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National Implementation Plan for the Stockholm Convention on Persistent Organic Pollutants for Sweden 2012

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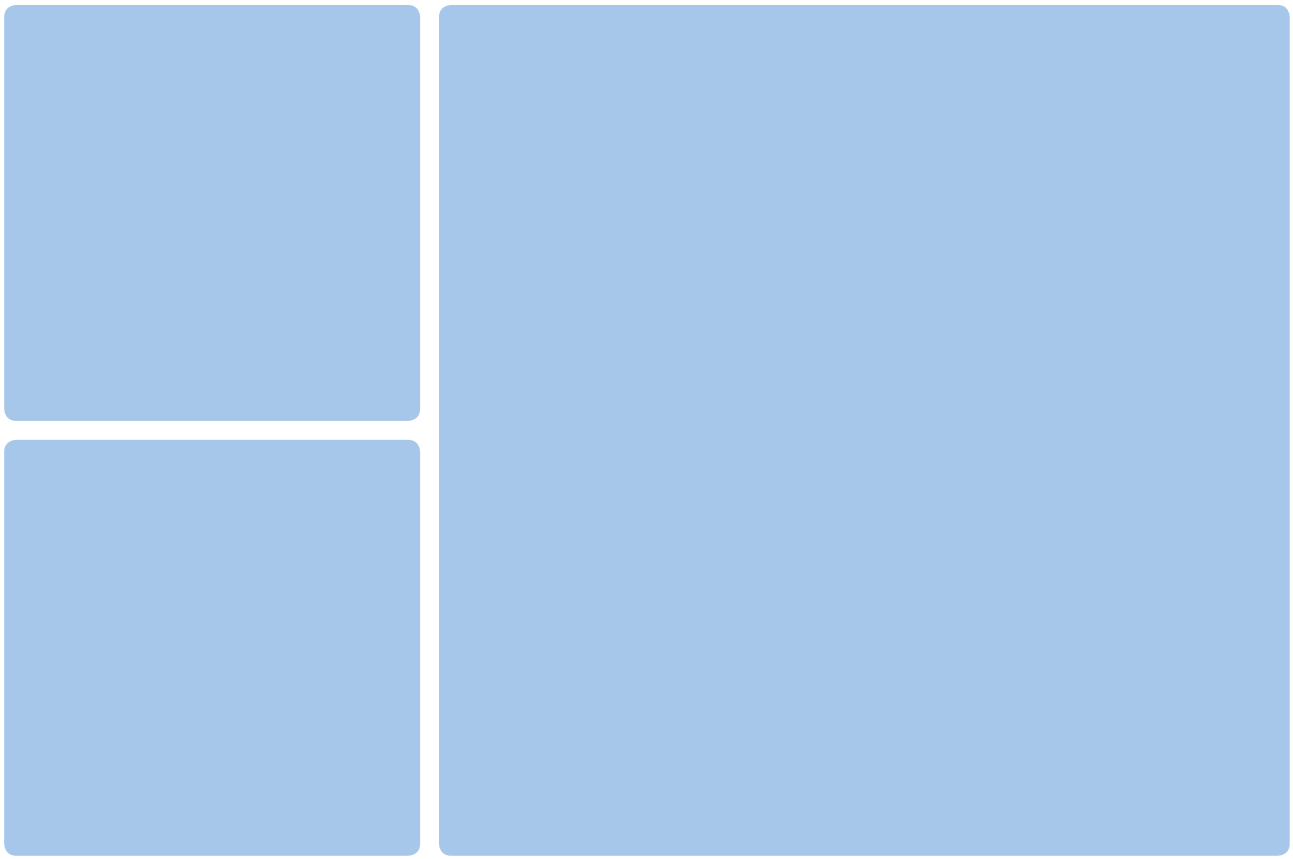

National Implementation Plan for the Stockholm Convention on Persistent Organic Pollutants for Sweden 2012

SWEDISH ENVIRONMENTAL
PROTECTION AGENCY

Order
Phone: + 46 (0)8-505 933 40
Fax: + 46 (0)8-505 933 99
E-mail: natur@cm.se
Address: CM gruppen AB, Box 110 93, SE-161 11 Bromma, Sweden
Internet: www.naturvardsverket.se/publikationer

The Swedish Environmental Protection Agency
Phone: + 46 (0)10-698 10 00, Fax: + 46 (0)10-698 10 99
E-mail: registrator@naturvardsverket.se
Address: Naturvårdsverket, SE-106 48 Stockholm, Sweden
Internet: www.naturvardsverket.se

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Preface

The objective of the Stockholm Convention on Persistent Organic Pollutants is to protect human health and the environment from the substances listed in the Convention. Under the Convention, each Party is to develop and endeavour to implement a plan for the fulfilment of its Convention obligations.

The first National Implementation Plan (NIP) for Sweden was prepared in 2006.

In early 2011, the Government commissioned the Swedish Environmental Protection Agency to review and update the National Implementation Plan. Under this remit, the update was done in cooperation with the Swedish Chemicals Agency and the Swedish Agency for Marine and Water Management.

The Swedish Chemicals Agency has prepared the sections relating to deliberately produced POPs in all the chapters. The Swedish Agency for Marine and Water Management has been involved in discussions and provided comments on the text. The Swedish Environmental Protection Agency has prepared the other texts and has coordinated and managed the process.

In preparing this report, the three agencies have consulted a broad range of stakeholders from other agencies, industry organisations, academia, civil society and environmental non-governmental organisations in Swedish society.

In accordance with the Guidelines, the report describes Swedish legislation, on chemicals in general and POPs in particular, as well as measures that Sweden has taken to protect the Swedish population and the Swedish environment from POPs, so as to comply with the Convention obligations. The newly listed substances have been included and references to legislation and work in the EU have been made. This NIP also includes an executive summary in order to enhance reading of the document.

A decision on this report was taken by the Director General Maria Ågren, on 16 May 2012 in collaboration with the Swedish Chemicals Agency and the Swedish Agency for Marine and Water Management.

Swedish Environmental Protection Agency, May 2012.

Maria Ågren

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Executive Summary

Purpose

The overall purpose of this updated[1] National Implementation Plan (NIP) on Persistent Organic Pollutants (POPs) is to fulfil legal obligations, increase awareness of POPs and their control measures, and also to take stock of action taken and lay down a strategy and action plan for further measures related to POPs. The updated NIP is to be submitted to the Secretariat of the Stockholm Convention on Persistent Organic Pollutants (Stockholm Convention), to which Sweden has been a party since 2002.

The objective of the Stockholm Convention is to protect human health and the environment from POPs. The pursuit of this goal is similar to that of Sweden's environmental quality objective "A Non-Toxic Environment". This include enhancing knowledge and information about chemical substances, phasing out substances of particular concern such as POPs, and reducing the risks posed by the use of other chemicals. Sweden acknowledges the Stockholm Convention, with a current total of 176 Parties, as an important tool in this process.

Exposure to POPs continues to be a health problem in Sweden. The two major problems related to POPs that need to be addressed are the atmospheric deposition of unintentionally formed POPs and the diffuse sources of POPs from mainly imported products. It is therefore of the utmost importance to work globally to eliminate their presence in products and to minimise unintentional formation in thermal processes.

Background

Persistent organic pollutants (POPs) are chemical substances that persist in the environment, bio-accumulate, and pose a risk of causing adverse effects to human health and/or the environment. These pollutants are transported across international boundaries far away from their sources, even to regions where they have never been used or produced. The Baltic regions are examples of EU sinks of POPs.

Given their long-range transport through air, water and products, no one government acting alone can protect its citizens or its environment from POPs. International action is necessary to reduce and eliminate production, use and release of these substances. The Stockholm Convention on POPs was therefore formally adopted in May 2001 in Stockholm, Sweden, upon completion of negotiations conducted in the framework of the United Nations Environment Programme (UNEP). The international regime promotes global action on an initial cluster of twelve POP substances with the overall objective of protecting

[1] The first National Implementation Plan, KemI Report 4/06 can be found on the website of the Convention, or at the websites of the Swedish Chemicals Agency www.kemi.se and the Swedish Environmental Protection Agency www.naturvardsverket.se .

human health and the environment from POPs. Specific reference is made in the Convention to the precautionary approach and, this principle is made operational in the article which lays down the rules for including additional chemicals in the Convention. Toxicological interactions are also to be considered.

The generic exemptions allowed in the convention are laboratory-scale research, use as a reference standard and unintentional trace contaminants in products and articles.

Import and export of the intentionally produced POPs listed in Annex A or B is severely restricted by the Stockholm Convention. After all substance specific exemptions have ceased, import and export is allowed only for the purpose of environmentally sound disposal under restricted conditions. Special provisions are included in the Stockholm Convention for those Parties with regulatory assessment schemes. They have to review existing chemicals for POPs characteristics and take regulatory measures with the aim of preventing the development, production and marketing of new substances with POP characteristics.

Releases of unintentionally formed by-products listed in Annex C are subject to continuous minimisation with the objective of ultimate elimination where feasible. The main tool for Parties to apply in order to do this is the NIP, which should cover the source inventories and release estimates as well as plans for release reductions. The most stringent control provision with regard to by-products is that Parties are to promote and, in accordance with their action plans, require the use of best available techniques for new sources within their major source categories identified in Part II of Annex C of the Stockholm Convention.

The Stockholm Convention also foresees identification and safe management of stockpiles containing or consisting of POPs. Articles in use containing POPs are subject to an exemption provided that Parties submit information on the uses and the national plan for waste management for such articles to the Secretariat of the Stockholm Convention.

Waste containing, consisting of or contaminated with POPs should be disposed of in such a way that the POP content is destroyed or irreversibly transformed so that it no longer has POP characteristics. In cases where destruction or tranformation does not represent the environmentally preferable option or where the POP content is low, waste has to be disposed of in an environmentally sound manner. Disposal operations that may lead to recovery or re-use of POPs are forbidden under Article 6 of the Convention. However, when the listing of brominated flame retardants and PFOS that were considered common in the waste stream for recycling of materials was adpoted, a time-limited exemption from this article was adopted. At COP5 a voluntary work programme with recommendations on how to ensure the elimination of these substances from the waste stream was agreed, and the Parties are due to report on their experiences in implementing the work programme. With regard to shipment of wastes, relevant international rules, standards

and guidelines, such as the 1989 Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, are to be taken into account.

In addition to control measures, the Stockholm Convention includes several general obligations. Each Party is obliged to develop and strive to implement a National Implementation Plan (NIP), facilitate or undertake the exchange of information and promote and facilitate awareness and public access to information on POPs. The Parties also have to encourage or undertake appropriate research, development, monitoring and co-operation pertaining to POPs and, where relevant, to their alternatives and to candidate POPs. They are also to regularly report to the Conference of the Parties on the measures taken to implement the provisions of the Stockholm Convention. The effectiveness of the Convention is based on monitoring and reporting data.

The Stockholm Convention recognises the particular needs of developing countries and countries with economies in transition, and specific provisions on technical assistance and on financial resources and mechanisms are therefore included in the general obligations.

Nine additional substances

At present, 22 substances or groups of substances are covered by the Stockholm Convention. At the Fourth Conference of Parties, COP4 in May 2009, it was agreed for the first time that nine substances would be added (see Table 1) to the twelve previously listed in the Convention. Two of these POPs are pesticides (chlordecone and lindane) three occur in pesticides (alpha- and beta-hexachlorocyclohexane, α,β-HCH and pentachlorobenzene, PeCB) and four are industrial chemicals (hexabromobiphenyl, HBB, perfluorooctane sulfonic acid/sulfonyl fluoride PFOS/PFOSF, and commercial penta- and octa-bromodiphenyl ether, BDEs). Pentachloro-benzene may also be formed unintentionally in thermal processes.

Part 1 – Country Baseline

Assessment of the POPs issue in Sweden

The most acute problem related to “old” POPs in Sweden today is that levels of dioxins and dioxin-like PCBs in fatty fish from the Baltic Sea are unacceptably high and constitute a risk to human health. In the EU, a tolerable weekly dioxin intake (TWI) of 14 picograms (pg) WHO-TEQ/kg bodyweight has been set by specialists from the Scientific Committee on Food. The TWI corresponds to a tolerable daily intake (TDI) of 2 pg WHO-TEQ/kg body weight. The tolerable intake represents the level considered safe over a lifetime of consumption and is calculated with the use of safety margins. The average exposure to dioxin and dioxin-like PCBs from food among children and adults in Sweden is below the TDI. The levels of dioxins and dioxin-like PCBs in fatty fish from the Baltic Sea and some of the Swedish fresh-water lakes are high. Individuals

who regularly consume these types of fish are at increased risk of exceeding the TDI. As early as the beginning of the 1980s, dietary recommendations were introduced concerning fish with elevated levels of organochlorine environmental toxins. Commercial- and recreational fishermen and their families have been identified as possible risk groups with high consumption of dioxin-contaminated fish. Among these, all children and women in their childbearing years in particular should limit their consumption. Based on the strict dietary recommendations Sweden has had an exemption from the EU maximum levels of dioxins and PCBs for certain fish species from the Baltic Sea area since 2012. Fish that exceed the maximum levels can not be exported to other EU-countries.

Moreover, the presence of the compounds in human breast milk is not acceptable, and levels should therefore be reduced. Breast-feeding is beneficial for infant health but the exposure of breast-fed babies to dioxins and dioxin-like PCBs clearly exceeds the TDI.

The decline in dioxin in the environment has become less and less pronounced in many areas in recent years. In some parts of the environment the decrease has probably levelled off. Available data are very limited, however, and generalisations can easily give rise to misleading results.

Monitoring shows that the levels of the newly listed POPs (PFOS, penta-BDE and octa-BDE) have displayed a trend towards increasing concentrations since 1968 in some environmental matrices. In human milk and blood serum the levels of PFOS and penta-BDE have decreased since the end of the 1990s.

As releases of unintentionally formed POPs from Swedish primary sources have abated, secondary and diffuse sources have become more important in relative terms. Not enough is known about the quantity, release, dispersal and cycling of dioxins, PCBs and HCB from secondary and diffuse sources.

The main issue to be considered with the “new” POPs is that POPs such as flame retardants and PFOS can still be found in products currently in use in Sweden. The identification, sorting, safe handling and treatment of waste potentially containing these substances is a challenge for the waste management and recycling industry as well as for the enforcement authorities. Some waste management activities for example shredding of plastic materials could potentially be a source of occupational exposure to POP flame retardants.

Legislation and regulations

The legislation and regulations addressing POPs are adopted at EU level and are common to all EU member states. Since August 2010 all the provisions have been contained in the POP Regulation (EC) No 850/2004 of the European Parliament and of the Council of 29 April 2004 on persistent organic pollutants, as revised and established by Regulation (EU) No 756/2010 and (EU) No 757/2010 of 24 August 2010.

The Environmental Code, SFS 1998:808, provides for the enforcement of the POP Regulation in Sweden. More detailed provisions have been laid down in government ordinances.

Part 2 – Implementation plan

Policy statement

The objective of the Stockholm Convention is to protect human health and the environment from POPs. The pursuit of this goal is similar to that of Sweden's environmental quality objective "A Non-Toxic Environment" including enhancing knowledge and information about chemical substances, phasing out those of particular concern such as POPs, and reducing the risks posed by the use of other chemicals.

Sweden acknowledges the Stockholm Convention as a central tool in this process and is fully committed to the effective implementation and further development of this international legally binding instrument. This includes the necessary financial commitments by Sweden to assist the developing countries and countries with economies in transition, as required by the Stockholm Convention.

Sweden considers there to be more substances than the present 22 listed POPs which fulfil the criteria of the Convention and warrant global action. Sweden will continue to actively participate in and support the POP Review Committee in its work on nominated substances. Moreover, Sweden will continue to work with the European Commission to nominate further candidates for the Convention.

Implementation of the basic obligations

INTENTIONALLY PRODUCED

Sweden considers that it has fulfilled its obligations under the Convention with regard to the production, placing on the market, use, import and export of all the substances in Annexes A and B. The legal measures taken through Regulation (EC) No 850/2004 are considered comprehensive so that there is no need for further legislative measures. The measures on production and use took effect on 26 August 2010.

Concerning the additional POP pesticides listed under the Convention, these were all banned in Sweden as long ago as the 1970s and 1980s.

PCBs in sealants and flooring

The 2007 Ordinance on PCBs etc. requires compulsory inventories of PCB sealants and flooring materials and remediation/decontamination of sealants and flooring containing more than 500 ppm (mg/kg) PCB by 30 June 2016.

Results indicate that the Swedish inventory and cleanup of PCBs in buildings has generally worked well. However, owners of buildings as well as enforcement authorities have an important task in making sure that the remediation of the remaining PCBs in sealants and flooring materials is completed in time.

PCBs in electrical and electronic equipment

All equipment (above 5 dm3) with PCB levels higher than 500 ppm has been decontaminated. Most equipment with levels of 50–500 ppm has been decontaminated. Most equipment within the range of 2–50 ppm has been decontaminated due to stricter regulation in Sweden.

The Swedish EPA will inform companies that own equipment containing PCBs about their responsibilities to decontaminate equipment according to the PCB Ordinance.

Other products still in use which may contain PCBs are small capacitors used in lamp fittings, small single-phase motors in dishwashers etc. All electronic waste in Sweden is considered to be hazardous waste and is collected for pre-treatment where components containing PCBs are removed. All types of waste containing PCBs are subject to high-temperature incineration.

PFOS

Sweden had imports of PFOS for use in the metal industry totalling about 200 kilograms in 2010. No use in this sector is allowed after 26 August 2015. The industrial use of PFOS as mist suppressants for non-decorative hard chromium (VI) plating in Sweden is not what can be described as closed-loop.

According to the Convention and the EU Regulation, alternatives are to be phased in as soon as possible. During the development of this NIP, information was provided on the availability on the market of efficient alternatives to this remaining use of PFOS. These alternatives should be fully considered by the metal industry and the relevant authorities.

Imports of PFOS contained in articles were allowed to remain. Market surveillance in relevant sectors such as carpets, textiles and outdoor equipment will therefore be necessary.

In order to – as required – assess and report progress made to eliminate the use and emissions of PFOS from ongoing use and also from the waste streams, there is a need to improve the compilation of data regarding the amount of PFOS imported for example in hydraulic fluids for aviation.

The remaining use of PFOS is to be reported both to the Secretariat of the Convention and to the European Commission.

HCB

During market surveillance activities in 2010 and 2011 HCB was found in fireworks available on the Swedish market. Border and market surveillance therefore remains necessary. Cases of noncompliance will be reported to the European Commission.

UNINTENTIONAL FORMATION

Although action has been taken to reduce releases from all known primary sources, the environmental load of unintentionally formed POPs is still too high.

Identified needs for further action to reduce releases are:

Improved self-monitoring
Operators need to show more clearly their emissions and the loads they give rise to. Data that reflect entire process cycles, including disruptions, and provide information about this variation need to be collected. In this respect, operator self-monitoring needs to be improved. It is currently under investigation whether ash samples from different industrial processes should be included in the national environmental monitoring programme.

Reduced costs of analyses and sampling with higher representativeness
To increase representativeness, continuous sampling methods should be further improved and applied, as such sampling makes it possible to monitor how and to what extent process variations affect the formation of POPs.

A goal has been set in the Swedish national waste plan that waste incineration plants should have continuous sampling of emissions of dioxins and furans. The relevant stakeholders should work to improve measurements from Swedish waste incineration plants and authorities should provide guidance and awareness-raising and follow-up of this goal. Continuous sampling could also be set as a condition in permits issued for waste incineration plants.

Study of Swedish destruction capacity for POPs waste
Swedish capacity for destruction of hazardous waste through incineration is generally very good.

To ensure that POPs waste is treated in accordance with Article 6.1d of the Stockholm Convention, Sweden will initiate a study focusing on emissions to air and the POP content of ashes and slags. The study will cover the following activities:

- Study of waste flows – where is POP waste incinerated? There are approximately 70 plants incinerating waste in Sweden. The incineration of well-known types of hazardous waste, e.g. waste containing PCBs, is handled by only one plant. A study should be performed to monitor which of the other plants receive waste containing new POPs.
- Conditions needed to adequately destroy the POP content of waste should be identified.
- Further measurements should be performed and methods for detection of POPs should be developed.
- The studies should focus on emissions to air and the POP content of ashes and slags.

The aim of the study is to acknowledge the results in the current Swedish practice for incineration of waste. The results could also potentially lead to amendments to the legislation.

STOCKPILES, WASTES AND ARTICLES IN USE

There are no known stockpiles of POP wastes in Sweden. Nor does Sweden have any storage of POP wastes, apart from temporary storage before disposal.

The installed amounts in Sweden of PFOS in PFOS-treated leather furniture and carpets made of synthetic fibres are not known. Before further action is taken to reduce releases of PFOS in waste management, more knowledge on installed amounts is needed. The Swedish Chemicals Agency will have market surveillance activity directed towards producers and importers of flooring materials in 2012, which is likely to provide some information.

POPs flame retardants still occur for example in vehicles and electric and electronic equipment in use in Sweden. Waste containing POP flame retardants will therefore be generated for many years to come, although levels will gradually decline. Sweden will perform the following actions to control the safe management and destruction of waste containing POP flame retardants and PFOS:

- The Swedish EPA will provide guidance and awareness raising on the waste requirements of the Stockholm Convention and the EU-POP Regulation. The Agency will also step up efforts to inform supervisory authorities and companies about the requirements that arise from the addition of the nine new POPs to the Convention. Information will be directed towards local and regional authorities, waste holders, waste management facilities and other relevant companies. The focus will be on information about POP-flame retardants and PFOS.
- The Swedish EPA will participate in the work of the EU-TAC committee on setting limit values for the new POP in waste (annex IV of the EU POPs-Regulation).
- The Agency will continue to work to improve the sorting and handling of waste containing POPs flame retardants. This will include further investigations on the current situation in Sweden and will require contacts with and input from companies handling e.g. waste from vehicles and electric and electronic equipment (please also note 3.3.4).

Sweden will take measures to ensure that landfilling of residues containing POP flame retardants (shredder light fraction) will stop. Sweden has had a national ban on landfilling of organic waste for more than seven years (Ordinance on the Landfilling of Waste (2001:512)). Most organic waste is consequently incinerated, and only a very small residue is still landfilled. Some of these residual amounts may still contain POP flame retardants. However, completely halting the landfilling of residues is not a simple task and may still take some time to fulfil.

Wastes coming from chromium sludges with PFOS are sent to landfills for hazardous waste with leakage control. No remaining stocks of PFOS containing fire-fighting foam are currently identified. If identified, such stocks will be directed to hazardous waste incineration.

CONTAMINATED SITES AND REMEDIATION MEASURES

A method has been developed for assessing risks on a uniform basis and with a reasonable degree of reliability. The results provide a basis for the setting of priorities and for decisions concerning additional investigations, remediation, designation of hazardous sites and other measures.

The first phase in the risk assessment is a preliminary inventory beginning with the identification of relevant sites and industries for assessment. The identification of contaminated sites is now almost complete. The second phase consists of a preliminary site investigation that begins with an on-site inspection. Samples are then taken at strategically selected locations and analysed to quantify pollutants and releases. After the survey, a more thorough examination is carried out in order to facilitate remediation.

Several methods are now in use for the remediation of soil, sediments and groundwater. Remediation aims to remove, reduce, destroy or immobilise the pollutant(s).

IMPLEMENTATION OF THE OBLIGATIONS ON SUPPORTING ACTIVITIES

Information exchange and stakeholder involvement

The Swedish Chemicals Agency and the Swedish Environmental Protection Agency maintain a dialogue with relevant stakeholders concerning chemicals management, including management of POPs. Information is regularly posted on the Agencies' websites. A stakeholder group, consisting of representatives from industry, government agencies and local authorities, universities and NGOs, see Annex V, was involved in the development of this NIP. The stakeholder group will also be involved in future work.

A project on global collaboration with stakeholders in providing information on the chemical composition of products through each step of its lifecycle is actively supported by Sweden under SAICM. Such an information exchange would, for example, enable improved prevention of the entry of substances that exhibit characteristics of persistent organic pollutants into the recycling stream. More information can be found at www.chem.unep.ch/unepsaicm/cip/

Public information, awareness and education

In general, considerable emphasis is put on dissemination of information to the general public, industry and other interested parties on Sweden's environment policy and activities. POP management is an integral part of chemicals management in Sweden. Information on important activities in the area of chemicals management and significant data on chemicals can be found on the websites of the Swedish Chemicals Agency and the Swedish EPA.

Research and development

Research on POPs is currently being undertaken in a number of areas, such as reproductive effects, levels and trends in biota, including human tissue, and the contributions of current and historical sources to current levels of dioxins in Baltic fish.

The overall objective of the recently finalised project COntrol of Hazardous substances In the BAltic Sea region (COHIBA) is to support the implementation of the Baltic Sea Action Plan (BSAP), with regard to hazardous substances by developing joint actions to attain the goal. The COHIBA project is one of the flagship projects of the EU strategy for the Baltic Sea Region.

Areas of interest for future research and development

Reducing the costs of analyses and improving sampling methods for on-line measurements are key concerns for increasing knowledge about unintentionally formed POPs.

Other areas of interest are research on the formation of unintentionally formed POPs in all thermal processes, including small-scale incineration; development of tools for predictions of environmental hazards and development of analysis methods for new and existing POPs.

Coordination of research, at both national and international levels, would be beneficial in order to minimise duplication of effort. A long-term perspective in planning and funding is necessary to maintain the quality of Swedish research.

Monitoring

The relevant substances for Sweden are included in monitoring programmes for levels in air and deposition and in human matrices. An expanded programme of environmental monitoring would provide an even better basis for evaluation of the effectiveness of measures to achieve the objective of the Stockholm Convention. However, the need for more extensive environmental monitoring has to be weighed against other, as yet unmet, monitoring needs in other quarters, such as the EU's framework directives on air, water and habitats.

IMPLEMENTATION OF THE OTHER COMMITMENTS

Technical and financial assistance

Sweden will continue to assist developing countries and countries with economies in transition, as required by the Stockholm Convention. Sweden prefers support for coherent implementation of activities with the overall objective of developing national structures for chemicals management. Implementation of POP-related activities being done in isolation from other related issues should be avoided.

Reporting

Sweden will continue to report both to the Convention and as required under Article 12 of the POP Regulation. The progress made in eliminating the use of PFOS in exempted areas has to be reported every four years, starting in 2014.

Addition of future chemicals to the Stockholm Convention

Hexabromocyclododecane (HBCDD), nominated by Norway, has been considered by the review committee under the Convention and is to be considered for listing at the next Conference of the Parties in 2013. Four more substances have been nominated by the European Commission for inclusion in the Convention, namely polychlorinated naphthalenes (PCN), short-chained chloroparaffins (SCCP), penta-chlorobenzene (PeCB) and hexachlorobutadiene (HCBD). These substances are currently under review by the POPs Review Committee.

The Stockholm Convention does not lay down any particular obligation concerning addition of chemicals to it but allows any Party to propose amendment of the Stockholm Convention by nominating further substances for listing.

Sweden is of the view that the presently listed substances in the Convention are not the only ones that fulfil the criteria in Annex D. There are other substances and groups of substances that are very persistent, bio-accumulate, are transported over long distances and have adverse effects on organisms, including humans. Swedish authorities will continue to monitor the environment and evaluate chemicals for emerging POP candidates, prepare technical reports and, where appropriate, notify the government about substances that warrant further attention.

Table 1. Overview of the nine additional POPs. Further information is available at www.pops.int

Name	Production	Import (or placing on the market)	Use (or incorporating or mixing the chemical into products)
Lindane (Gamma-hexachlorocyclohexane, HCH) CAS NO. 58-89-9	None	Prohibited	Pesticide Prohibited in Sweden 1989
Alpha hexachlorocyclohexane (Alpha HCH) CAS No. 319-84-6	None	Prohibited	Pesticide constituent in production of Lindane. None
Beta hexachlorocyclohexane (Beta HCH) CAS No. 319-85-7	None	Prohibited	Pesticide constituent in production of Lindane. None
Tetrabromodiphenyl ether and penta-bromodiphenyl ether, (BDE) (CAS No: 40088-47-9, CAS No 32534-81-9) and other tetra- and penta –BDEs present in **commercial pentabromodiphenyl ether,** penta-BDE	None (prohibited)	Prohibited Perhaps still imported in articles. Content in electronic equip. regulated	Flame retardant None, prohibited. Needs to be considered during recycling processes
Hexabromodiphenyl ether and hepta-bromodiphenyl ether,(CAS No: 68631-49-2, CAS No: 207122-15-4, CAS No: 446255-22-7, CAS No: 207122-16-5) and other hexa- and hepta- BDEs present in **commercial octabromodiphenyl ether,** octa-BDE	None (prohibited)	Prohibited. Maybe still imported in articles. Content in electronic eqip. Regulated	Flame retardant None, prohibited Needs to be considered during recycling processes
Chlordecone CAS No. 143-50-0	None	Prohibited	Pesticide Prohibited in Sweden 1978
Hexabromobiphenyl, HBB CAS No.36355-01-8	No	Prohibited Perhaps still imported in some articles. Content in electronic equip. Regulated	Flame retardant None, prohibited Needs to be considered during recycling processes
Pentachlorobenzene, PeCB CAS No. 608-93-5	No (prohibited since 1980s) Unintentional production during incineration	Prohibited	Flame retardant, pesticide None, prohibited
Perfluorooctane sulfonic acid, **PFOS** CAS No. 1763-23-1, its salts :CAS No. 29457-72-5 (lithium salt), 4021-47-0 (sodium salt), 2795-39-3 (potassium salt) , 29081-56-9 (ammonium salts),70225-14-8 (diethanolammonium salts)etc.	None	Exemptions for use Probably still also imported in articles (textile carpets, outdoor garments)	Regulated with exemptions Continued use in the metal industry. This use is allowed in the EU regulation until 26 August 2015 Aviation hydraulic fluids are still used with no set time limit.
Perfluorooctane sulfonyl fluoride [CAS No. 307-35-7]	None A starting materal/inter-mediate for production of PFOS	None	None

Sammanfattning

Syfte

Det övergripande syftet med denna uppdaterade[2] nationella genomförandeplan (NIP) om långlivade organiska föroreningar (POPs) är att uppfylla åtagandena att öka medvetenheten om POPs, att utvärderar de åtgärder som vidtagits och att skapa en strategi och en åtgärdsplan för ytterligare åtgärder rörande POPs. Den uppdaterade nationella genomförandeplanen skall lämnas in till sekretariatet för Stockholmskonventionen om långlivade organiska föroreningar. Konventionen ratificerades av Sverige 2002.

Målet med Stockholmskonventionen är att skydda människors hälsa och miljön mot POPs. Åtgärderna för att uppnå detta mål liknar de som används för Sveriges miljökvalitetsmål om en ”Giftfri miljö”. Detta inkluderar att öka kunskapen och informationen om kemiska ämnen, att fasa ut sådana ämnen som är särskilt problematiska, såsom POPs, samt att minska de risker som användning av andra kemikalier medför. Sverige ser Stockholmskonventionen, med för närvarande 176 parter, som en viktig del i detta arbete.

Exponeringen för POPs fortsätter att vara ett hälsoproblem i Sverige. De två största problemen som gäller POPs och som måste åtgärdas, är atmosfärisk deposition av oavsiktligt bildade POPs samt de diffusa källorna till spridning av POPs huvudsakligen via importerade produkter. Det är därför av yttersta vikt att arbeta globalt för en utfasning av förekomst av POPs i produkter samt att minimera oavsiktligt bildande av POPs i termiska processer.

Bakgrund

Långlivade organiska föroreningar (POPs) är kemiska ämnen som är långlivade i miljön, som bio-ackumuleras och som utgör en risk för negativa effekter på människors hälsa och/eller miljön. Dessa föroreningar transporteras över internationella gränser, långt från sina källor, även till regioner där de aldrig har använts eller tillverkats. Östersjöregionen är ett exempel på område inom EU där POPs-ämnen hamnar.

Med hänsyn till den långa transporträckvidden via luft, vatten och produkter kan inget land ensamt agera för att skydda sina medborgare och miljön från POPs. Internationella åtgärder krävs för att reducera och eliminera produktion, användning och utsläpp av dessa ämnen. Stockholmskonventionen om POPs antogs därför formellt i maj 2001 i Stockholm, inom ramen för FN:s miljöprogram (UNEP). Konventionen främjade då globala åtgärder beträffande en första grupp av tolv POPs-ämnen med det allmänna syftet att skydda människors hälsa och miljön. Specifik referens görs i konventionen till före-

[2] Den första nationella genomförandeplanen, KemI Report 4/06, finns på konventionens hemsida och på Kemikalieinspektionens www.kemi.se respektive Naturvårdsverkets www.naturvardsverket.se hemsidor.

byggande åtgärder och regler för att inkludera ytterligare kemikalier finns i konventionen. Toxikologiska samverkanseffekter ska också beaktas.

De allmänna undantag som tillåts i konventionen är forskning på laboratorienivå, användning som referensstandard och oavsiktliga spår av föroreningar i produkter och artiklar.

Import och export av de avsiktligt producerade POPs som anges i bilagorna A och B begränsas kraftigt. När alla ämnesspecifika undantag har upphört är import och export endast tillåtet för miljömässigt säker avfallshantering under kontrollerade förhållanden. Parter som tillämpar regelverk för kontroll och bedömning av kemikalier skall undersöka om existerande kemikalier har POP-egenskaper och vidta lagstiftande åtgärder i syfte att förebygga utveckling, produktion och marknadsföring av nya ämnen med POP-egenskaper.

Utsläpp av oavsiktligt bildade ämnen som anges i Bilaga C ska kontinuerligt minskas och målsättningen är att utsläppen slutligen ska elimineras där så är möjligt. Den nationella genomförandeplanen för detta bör omfatta inventering av källor samt beräknade utsläpp och planer för utsläppsminskning. Den striktaste kontrollåtgärden beträffande oavsiktligt bildade ämnen är att parterna skall främja och, i enlighet med sina åtgärdsplaner, kräva användning av bästa möjliga teknik för nya källor inom de viktigaste källkategorierna som identifieras i del II i bilaga C till Stockholmskonventionen.

Stockholmskonventionen omfattar även identifiering och säker hantering av lager innehållande eller bestående av POPs. Varor som är i bruk som innehåller POPs undantas under förutsättning att parterna lämnar information om hur de används och en nationell plan för avfallshantering av sådana artiklar till Stockholmskonventionens sekretariat.

Avfall som innehåller, består av eller har förorenats med POPs ska hanteras på sådant sätt att POPs-innehållet förstörs eller omvandlas irreversibelt så att det inte längre har några POPs-egenskaper. I fall där destruktion eller omvandling inte utgör det alternativ som är att föredra ur miljöhänsyn eller då POPs-innehållet är lågt skall avfallet hanteras på ett ur miljöhänsyn säkert sätt. Avfallshantering som kan leda till återvinning eller återanvändning av POPs är förbjuden i konventionens artikel 6. Dock infördes ett tidsbegränsat undantag då bromerade flamskyddsmedel och PFOS antogs på listan eftersom dessa ämnen ansågs vanliga i avfallsströmmen för återvinning av material. Vid femte partsmötet gjordes en överenskommelse om att införa ett frivilligt arbetsprogram med rekommendationer om hur eliminering av dessa ämnen från avfallsströmmen skulle ske och parterna skall avge rapport om sina erfarenheter vid genomförande av detta program. När det gäller transport av avfall skall relevanta internationella regler, standarder och riktlinjer, såsom 1989 års Baselkonvention om kontroll av gränsöverskridande transporter och slutligt omhändertagande av farligt avfall, beaktas.

Förutom kontrollåtgärder innehåller Stockholmskonventionen flera allmänna skyldigheter. Varje part måste utveckla och sträva efter att implementera en nationell genomförandeplan (NIP), möjliggöra eller genomföra utbyte

av information samt främja och underlätta medvetenhet om och allmänhetens tillgång till information om POPs. Parterna skall vidare främja lämplig forskning, utveckling, kontroll och samarbete beträffande POPs och i förekommande fall, om deras alternativ. De skall även regelbundet rapportera till Partskonferensen vilka åtgärder som vidtagits för att genomföra Stockholmskonventionen. Effektiviteten hos konventionen följs upp genom miljöövervakning och rapportering av data.

Stockholmskonventionen tar hänsyn till de särskilda behov som finns i utvecklingsländer och länder med ekonomier som befinner sig i ett övergångsskede och därför finns allmänna villkor om teknisk hjälp och ekonomiska resurser.

Nio nya ämnen

För närvarande omfattas 22 ämnen eller grupper av ämnen av Stockholmskonventionen. Vid den fjärde partskonferensen, COP4, i maj 2009, beslutades för första gången att nio ämnen (se tabell 1) skulle läggas till de tidigare 12 ämnena i konventionen. Två av dessa POPs är pesticider (klordekon och lindan), tre förekommer i pesticider (alfa- och betahexaklorcyklohexan, α, β-HCH samt pentaklorbensen, PeCB) och fyra är industrikemikalier (hexabrombifenyl, HBB, perfluoroktansulfonat/sulfonylfluorid PFOS/PFOSF och kommersiell penta- och oktabromodifenyleter, BDE. Pentaklorbensen kan bildas oavsiktligt i termiska processer.

Del 1 – Situationen i Sverige

Bedömning av POPs-problemet i Sverige

Det mest akuta problemet när det gäller de ”gamla” POPs i Sverige i dag är att nivåerna av dioxiner och dioxinliknande PCB i fet fisk från Östersjön är oacceptabelt höga och utgör en risk för människors hälsa. Inom EU har det tolerabla intaget per vecka av dioxiner (TWI) om 14 pikogram (pg) fastställts av specialister från Scientific Committee on Food. Detta TWI motsvarar ett tolerabelt dagligt intag (TDI) om 2 pg WHO-TEQ/kg kroppsvikt. TDI representerar en nivå som anses säker över en livstidskonsumtion och beräknas med användning av säkerhetsmarginaler. Genomsnittlig exponering för dioxin och dioxinliknande PCB från föda bland barn och vuxna i Sverige är under TDI. Nivåerna av dioxiner och dioxinliknande PCB i fet fisk från Östersjön och vissa av Sveriges sjöar är höga. Personer som regelbundet konsumerar dessa typer av fisk löper en högre risk att överskrida detta gränsvärde. Så tidigt som i början av 1980 infördes kostrekommendationer beträffande fisk med förhöjda nivåer av miljögifter i form av organokloriner. Kommersiella fiskare och fritidsfiskare samt deras familjer har identifierats som möjliga riskgrupper med en hög konsumtion av dioxinförorenad fisk. Bland dessa bör framför allt barn och fertila kvinnor begränsa sin konsumtion. Baserat på

de strikta kostråden i Sverige omfattas Sverige av ett sedan 2012 permanent undantag inom EU från de maximala nivåerna av dioxiner och PCB för vissa arter av fisk från Östersjön. Fisk som överskrider maxnivåerna får inte exporteras till andra EU-länder.

Vidare är förekomsten av dessa föreningar i bröstmjölk inte acceptabel och nivåerna bör sänkas. Amning är bra för spädbarns hälsa men ammande spädbarns exponering för dioxiner och dioxinliknande PCB överskrider tydligt TDI.

Minskningen av dioxiner i miljön har blivit allt mindre märkbar under senare år. I vissa delar av miljön har minskningen sannolikt planat av. Tillgängliga data är emellertid mycket begränsade och generaliseringar kan lätt leda till missvisande resultat.

Kontroller visar att nivåerna av vissa nyligen tillagda POPs (PFOS, penta-BDE samt okta-BDE) visar en trend av ökande koncentrationer sedan 1968 i vissa miljömatriser. I människomjölk och blodserum minskar nivåerna av PFOS och penta-BDE sedan slutet av 1990-talet.

I samma takt som utsläppen från oavsiktligt bildade POPs från svenska primära källor har avtagit, har sekundära och diffusa källor blivit viktigare, relativt sett. Det saknas tillräcklig kunskap om kvantitet, utsläpp och spridning av dioxiner, PCB, PeCB?? och HCB från sekundära och diffusa källor.

Huvudproblematiken med de ”nya” POPs är att flamskyddsmedlen penta-BDE och okta-BDE samt PFOS återfinns i produkter som fortsatt används i Sverige. Identifiering, sortering, säker hantering och behandling av avfall som potentiellt kan innehålla dessa ämnen är en utmaning för avfallshanterings- och återvinningsbranscherna samt för tillsynsmyndigheterna. Vissa avfallshanteringsaktiviteter, såsom fragmentering av plastmaterial som innehåller flamskyddsmedel kan eventuellt utgöra en källa för exponering av POPs i arbetsmiljön.

Lagstiftning och föreskrifter

Lagar och föreskrifter om POPs regleras på EU-nivå och är desamma för alla EU:s medlemsstater. Sedan augusti 2010 återfinns alla bestämmelser i POPs-förordningen (Europaparlamentets och rådets förordning (EG) nr. 850/2004 av den 29 april 2004 om långlivade organiska föroreningar), med ändringar och fastställelser i förordningarna (EU) 756/2010 samt (EU) 757/2010 av den 24 augusti 2010.

Miljöbalken, SFS 1998:808, innehåller bestämmelser om verkställande av POPs-bestämmelserna i Sverige. Mer detaljerade bestämmelser har fastställts i regeringens förordningar.

Del 2 – Genomförandeplan

Målet med Stockholmskonventionen är att skydda människors hälsa och miljön mot POPs. Åtgärderna för att uppnå detta mål liknar de som används för Sveriges miljökvalitetsmål om en ”Giftfri miljö”. Detta inkluderar att öka kunskapen och informationen om kemiska ämnen, att fasa ut sådana ämnen som är särskilt problematiska, såsom POPs, samt att minska de risker som användning av andra kemikalier medför.

Sverige ser Stockholmskonventionen som ett centralt verktyg i detta arbete och är engagerat i effektivt genomförande och ytterligare utveckling av detta internationella juridiskt bindande instrument. Detta inkluderar nödvändiga ekonomiska åtaganden från Sverige för att hjälpa utvecklingsländer och länder med ekonomier i omvandling, i enlighet med kraven i konventionen.

Sverige anser att det finns fler ämnen än de 22 som för närvarande anges som POPs som uppfyller kriterierna för konventionen och som motiverar globala åtgärder. Sverige kommer att fortsätta att aktivt delta i och stödja granskningskommittén för långlivade organiska föroreningar i dess arbete med nominerade ämnen. Vidare kommer Sverige att fortsätta att arbeta med EU-kommissionen för att nominera ytterligare ämnen för listning i konventionen.

Genomförande av grundläggande skyldigheter

AVSIKTLIGT PRODUCERADE

Sverige anser att skyldigheterna enligt konventionen beträffande produktion, placering på marknaden, användning, import och export av alla ämnen i bilagorna A och B är uppfyllda. De juridiska åtgärderna genom förordning (EG) nr. 850/2004 anses omfattande och därför finns inget behov av ytterligare lagstiftningsåtgärder. Åtgärderna trädde i kraft den 26 augusti 2010.

När det gäller de POPs-pesticider som finns med i konventionen har dessa förbjudits i Sverige redan under 1970- och 1980-talen.

PCB i fog- och golvmassor

Den svenska förordningen från 2007 om PCB m.m. ställer krav på inventering av PCB i fogmassor och golvmaterial samt sanering av fog- och golvmassor som innehåller mer än 500 ppm (mg/kg) PCB före den 30 juni 2016.

Uppföljning visar att den svenska inventeringen och saneringen av PCB i byggnader i allmänhet har fungerat väl. Ägare av byggnader samt tillsynsmyndigheter har emellertid en viktig uppgift i att se till att de återstående mängderna PCB i fog- och golvmassor åtgärdas inom tidsramarna i förordningen.

PCB i elektrisk och elektronisk utrustning

All utrustning (som innehåller över 5 dm^3 isolervätska) med PCB-halter över 500 ppm har dekontaminerats. Nästan all utrustning med nivåer på 50–500 ppm har dekontaminerats. Även större delen av den utrustning som innehåller isolervätska med halter i området 2–50 ppm PCB har dekontaminerats enligt bestämmelserna i den svenska förordningen.

Naturvårdsverket kommer att informera företag som äger utrustning med PCB om deras skyldighet att dekontaminera utrustningen enligt PCB-förordningen.

Övriga produkter som fortfarande är i bruk och som kan innehålla PCB är små kondensatorer som återfinns i lampor, små enfasiga motorer i diskmaskiner m.m. Allt elavfall i Sverige samlas in för förbehandling där komponenter innehållande PCB avlägsnas. Alla typer av avfall som innehåller PCB skickas till förbränning vid hög temperatur.

PFOS

Sverige hade under 2010 en import av PFOS om cirka 200 kilo för användning inom metallindustrin. All användning inom denna sektor förbjuds efter den 26 augusti 2015. Industriell användning av PFOS som vätmedel vid icke-dekorativ hård förkromning (VI) är inte vad som skulle kunna beskrivas som en sluten process.

Enligt konventionen och EU-förordningen skall alternativa metoder fasas in så snart som möjligt. Då denna genomförandeplan togs fram framkom information om att det finns effektiva alternativ på marknaden till denna återstående användning av PFOS. Dessa alternativ bör beaktas av metallindustrin och av berörda myndigheter.

Import av PFOS via varor kan fortsatt förekomma. Marknadskontroll i relevanta sektorer såsom mattor, textilier och utomhusutrustning kan därför komma att krävas.

För att, i enlighet med kraven, bedöma och rapportera framsteg för att eliminera användning och utsläpp av PFOS, även från avfallsströmmar, finns det ett behov av att sammanställa data om mängden PFOS som importeras i exempelvis hydralolja för flyg.

Återstående användning av PFOS skall rapporteras såväl till konventionens sekretariat som till EU-kommissionen.

HCB

Vid marknadskontroller under 2010 och 2011 återfanns HCB i fyrverkeripjäser på den svenska marknaden. Gräns- och marknadsövervakning är därför fortfarande nödvändigt. Bristande efterlevnad kommer att rapporteras till EU-kommissionen.

OAVSIKTLIGT BILDADE

Åtgärder har visserligen vidtagits för att minska utsläppen av oavsiktligt bildade POPs från alla kända primära källor, men miljöbelastningen är fortfarande alltför hög.

Identifierade behov av ytterligare åtgärder för att minska utsläppen är:

Förbättrad egenkontroll
Verksamhetsutövare måste tydligt visa de utsläpp och den belastning de ger upphov till. Data som speglar hela processcykler, inklusive avbrott, samt information om denna variation måste samlas in. Egenkontrollen på detta område måste förbättras. Utredning pågår huruvida askprover från olika industriella processer bör ingå i det nationella miljöövervakningsprogrammet.

Minskade kostnader för analyser och provtagning med förbättrad representativitet
För att öka representativiteten bör kontinuerliga provtagningsmetoder utvecklas och användas. Sådan provtagning möjliggör övervakning av hur och i vilken utsträckning processvariationer påverkar bildning av POPs.

En målsättning i den svenska avfallsplanen är att avfallsförbränningsanläggningar skall ha kontinuerlig provtagning av utsläpp av dioxiner och furaner. Berörda aktörer bör arbeta för att förbättra provtagningen från svenska avfallsförbränningssanläggningar och myndigheterna bör vägleda och informera om kontinuerlig provtagning samt följa upp denna målsättning. Prövningsmyndigheterna kan även driva villkor om kontinuerlig provtagning av dioxiner och furaner i mål och ärenden som gäller prövning av anläggningar som förbränner avfallsklassat bränsle.

Studie av svensk destruktionskapacitet för POPs-avfall
Den svenska kapaciteten för destruktion av farligt avfall genom förbränning är i allmänhet mycket god.

För att säkerställa att POPs-avfall behandlas i enlighet med artikel 6.1d i Stockholmskonventionen kommer Sverige att initiera en studie med fokus på luftutsläpp och POPs-innehåll i aska och slagg. Studien kommer att omfatta följande aktiviteter:

- Studie av avfallsflöden – var sker förbränning av POPs-avfall? Det finns ca. 70 anläggningar för avfallsförbränning i Sverige. Förbränning av väl kända typer av farligt avfall, t.ex. avfall som innehåller PCB, hanteras endast av en anläggning. En studie bör genomföras för att undersöka vilka av de övriga anläggningarna som tar emot avfall som innehåller nya POPs.
- De förhållanden som krävs för att i tillräcklig omfattning destruera POPs innehållet i avfall bör identifieras.
- Ytterligare mätningar bör göras och metoder för detektion av POPs bör utvecklas.
- Undersökningarna bör fokusera på utsläpp till luft och POPs-innehåll i aska och slagg.

Syftet med studien är att resultaten ska kunna användas som underlag till svensk praxis för avfallsförbränningsanläggningar. Resultaten skulle även potentiellt kunna leda till regeländringar.

LAGER, AVFALL OCH VAROR I BRUK

Det finns inga kända lager av POPs i Sverige. Sverige har inte heller några lager av POPs-avfall, förutom tillfälliga lager före destruktion.

Den installerade mängden av PFOS i behandlade lädermöbler och mattor som tillverkats av syntetiska fibrer är okänd. Innan åtgärder vidtas för att minska utsläppen av PFOS vid hantering av dessa varor när de blir avfall behövs mer kunskap om den installerade mängden. Kemikalieinspektionen kommer under 2012 att göra en marknadskontroll som riktas mot tillverkare och importörer av golvmaterial som kan ge viss information.

POPs-flamskyddsmedel finns fortfarande kvar i exempelvis fordon och elektrisk och elektronisk utrustning i Sverige. Därför kommer avfall innehållande POPs-flamskyddsmedel att genereras under många år framöver även om koncentrationerna gradvis kommer att minska. Sverige kommer att genomföra följande åtgärder för att kontrollera säker hantering och destruktion av avfall som innehåller POPs-flamskyddsmedel och PFOS:

- Naturvårdsverket kommer att vägleda och informera om avfallskraven i Stockholmskonventionen och POPs-förordningen. Myndigheten kommer även att informera tillsynsmyndigheter och företag om de krav som nu gäller efter det att de nio nya POPs lagts till i konventionen. Informationen kommer att riktas till lokala och regionala myndigheter, avfallsinnehavare, avfallsanläggningar och andra relevanta aktörer. Informationen kommer att inriktas på POPs-flamskyddsmedel och PFOS.
- Naturvårdsverket kommer att delta i arbetet med att sätta gränsvärden for de nya POP-ämnena i avfall (bilaga IV i POP-förordningen) som utförs genom EUs-TAC-kommitté till förordningen.
- Naturvårdsverket kommer att arbeta för att förbättra sortering och hantering av avfall som innehåller POPs-flamskyddsmedel. Detta kommer att inkludera ytterligare undersökningar om situationen i Sverige och kommer att kräva kontakter med, och information från, företag som hanterar exempelvis avfall från fordon och elektrisk och elektronisk utrustning (se även avsnitt 3.3.4).

Sverige kommer att vidta åtgärder för att se till att deponering av fragmenteringsrester som innehåller POPs-flamskyddsmedel (fluff) upphör. Sverige har haft ett nationellt förbud mot deponering av organiskt avfall i över sju år (förordning om deponering av avfall (SFS 2001:512)). Huvuddelen av det organiska avfallet förbränns idag och endast en mycket liten rest deponeras fortfarande. En del av dessa rester kan fortfarande innehålla POPs-flamskyddsmedel. Att helt stoppa deponering av rester kan dock komma att ta lång tid att genomföra.

Avfall i form av kromslam som innehåller PFOS skickas till deponi för farligt avfall med lakvattenkontroll. Inga återstående lager av brandsläckningsskum som innehåller PFOS har identifierats. Om sådana lager påträffas kommer de att skickas till förbränning som farligt avfall.

FÖRORENADE OMRÅDEN OCH SANERINGSMETODER

En metod har utvecklats för att bedöma risker på enhetlig grund och med en rimlig grad av tillförlitlighet. Resultaten ger en grund för att skapa prioriteringar och för beslut rörande ytterligare undersökningar, sanering, utformning av riskplatser och andra åtgärder.

Den första fasen i riskbedömningen är en preliminär inventering som börjar med identifiering av platser och industrier som är relevanta för bedömning. Identifieringen av förorenade områden är nu nästan klar. Den andra fasen består av en preliminär platsgranskning som börjar med en inspektion på plats. Prov tas därefter från strategiska platser och analyseras för att kvantifiera föroreningar och utsläpp. Efter granskningen görs en grundligare undersökning för att identifiera saneringsåtgärder.

Flera metoder används för närvarande för sanering av jord, sediment och grundvatten. Saneringen syftar till att avlägsna, minska, förstöra eller immobilisera förorening(ar).

GENOMFÖRANDE AV SKYLDIGHETEN TILL STÖDJANDE AKTIVITETER

Informationsutbyte och engagemang från intressenter

Kemikalieinspektionen och Naturvårdsverket har en dialog med intressenter beträffande kemikaliehantering, inklusive hantering av POPs. Informationen läggs kontinuerligt ut på myndigheternas hemsidor. Vid beredningen av denna genomförandeplan var en grupp av intressenter, bestående av företrädare för industrin, nationella och lokala myndigheter, universitet och NGO:er (se bilaga V) involverade. Gruppen med intressenter kommer även att vara involverad i framtida arbete.

Ett projekt om globalt samarbete med intressenter för att tillhandahålla information om den kemiska sammansättningen i produkter genom varje steg av deras livscykel stöds aktivt av Sverige inom SAICM. Sådant informationsutbyte kan exempelvis möjliggöra bättre kontroll av att ämnen som uppvisar POPs-egenskaper inte hamnar i avfall som går till återvinning. Ytterligare information finns på www.chem.unep.ch/unepsaicm/cip/

Offentlig information, medvetenhet och utbildning

I allmänhet läggs stor vikt vid informationsspridning till medborgare, till industrin och till andra som har intresse av Sveriges miljöpolitik och -aktiviteter. POPs-hantering är en integrerad del av kemikaliehantering i Sverige. Information om viktiga aktiviteter inom kemikaliehantering och viktig information om kemikalier återfinns på Kemikalieinspektionens och Naturvårdsverkets hemsidor.

Forskning och utveckling

Forskning om POPs sker för närvarande inom ett antal områden, såsom reproduktionseffekter, halter och trender i biota, inklusive humanvävnad, samt bidrag från nutida och historiska källor beträffande aktuella nivåer av dioxiner i fisk från Östersjön.

Den allmänna målsättningen för det nyligen avslutade projektet COHIBA (COntrol of Hazardous substances In the BAltic Sea region) är att stödja implementeringen av aktionsplanen för Östersjön, BSAP (Baltic Sea Action Plan) beträffande farliga ämnen genom att utveckla gemensamma åtgärder för att uppnå målet. COHIBA-projektet är ett av flaggskeppsprojekten för EU:s Östersjöstrategi.

Områden av intresse för framtida forskning och utveckling

Att minska kostnaderna för analyser och att förbättra provtagningsmetoderna för online-mätning är viktiga frågor för ökad kunskap om oavsiktligt producerade POPs.

Andra intresseområden är forskning om uppkomst av oavsiktligt bildade POPs i alla termiska processer, inklusive småskalig förbränning; utveckling av verktyg för prognoser av miljörisker och utveckling av analysmetoder för nya och existerande POPs.

Samordning av forskning, såväl på nationell som på internationell nivå, skulle vara gynnsamt för att minimera dubbelarbete. För att bibehålla den svenska forskningskvaliteten krävs ett långsiktigt perspektiv när det gäller planering och finansiering.

Kontroll

De ämnen som är relevanta för Sverige inkluderas i kontrollprogrammen för halter i luft och sediment och i mänskliga matriser. Ett utökat program för miljöövervakning skulle ge en ännu bättre grund för effektivitetsutvärdering av åtgärder för att uppnå målsättningen med Stockholmskonventionen. Behovet av mer omfattande miljöövervakning måste dock vägas mot andra, hittills ej uppfyllda, kontrollbehov inom andra områden, såsom EU:s ramdirektiv om luft, vatten och habitat.

GENOMFÖRANDE AV ÖVRIGA ÅTAGANDEN

Tekniskt och ekonomiskt bistånd

Sverige kommer att fortsätta bistå utvecklingsländer och länder med ekonomier i omvandling . Sverige föredrar att stödja genomförande av aktiviteter med det allmänna syftet att utveckla nationella strukturer för kemikaliehantering. Man bör undvika att låta implementering av POPs-relaterade aktiviteter ske isolerat från andra relaterade frågor.

Rapportering

Sverige kommer att fortsätta att rapportera såväl till konventionen som i enlighet med artikel 12 i POPs-förordningen. De framsteg som gjorts för att eliminera användning av PFOS i undantagna användningsområden måste rapporteras vart fjärde år, med början år 2014.

Tillägg av framtida kemikalier i Stockholmskonventionen

Hexabromcyklododekan(HBCDD) som nominerats av Norge har beaktats av granskningskommittén under konventionen och kommer att övervägas för listning i konventionen vid nästa partskonferens 2013. Fyra ytterligare ämnen har nominerats av EG för inkludering i konventionen, närmare bestämt: polyklorinerade naftalener (PCN), kortkedjiga klorparaffiner (SCCP), pentaklorbensen (PeCB) samt hexaklorbutadien (HCBD). Konventionens expertkommitté granskar för närvarande dessa ämnen.

Stockholmskonventionen innehåller inte någon specifik skyldighet beträffande tillägg av kemikalier men den tillåter att en part föreslår tillägg genom att nominera ytterligare ämnen för listning.

Sverige anser att de ämnen som för närvarande finns med i konventionen inte är de enda som uppfyller kriterierna i bilaga D. Det finns andra ämnen och grupper av ämnen som är mycket långlivade, som bioackumuleras, som transporteras långa sträckor och som har skadlig inverkan på organismer, inklusive människor. Svenska myndigheter kommer att fortsätta att övervaka miljön och utvärdera kemikalier som möjliga POPs-ämnen, förbereda tekniska rapporter och, om det är lämpligt, meddela regeringen om ämnen som bör undersökas närmare.

Tabell 1. Översikt av de nio ytterligare POPs. Ytterligare information finns på www.pops.int

Namn	Produktion	Import (eller placeras på marknaden)	Användning (eller för införlivning eller blandning av kemikalien i produkter)
Lindane (Gamma-hexachlorocyclohexane, HCH) CAS NO. 58-89-9	Ingen	Förbjudet	Pesticid Förbjöds i Sverige 1989
Alpha hexachlorocyclohexane (Alpha HCH) CAS No. 319-84-6	Ingen	Förbjudet	Pesticidbeståndsdel vid produktion av Lindan Ingen
Beta hexachlorocyclohexane (Beta HCH) CAS No. 319-85-7	Ingen	Förbjudet	Pesticidbeståndsdel vid produktion av Lindan Ingen
Tetrabromodiphenyl ether and pentabromodiphenyl ether, (BDE) (CAS No: 40088-47-9, CAS No 32534-81-9) and other tetra- and penta –BDEs present in **commercial pentabromodiphenyl ether,** penta-BDE	Ingen (förbjudet)	Förbjudet Kanske fortfarande importeras i varor. Innehåll i elektronisk utrustning regleras	Flamskyddsmedel Ingen, förbjuden. Måste beaktas under återvinningsprocesser
Hexabromodiphenyl ether and hepta-bromodiphenyl ether, (CAS No: 68631-49-2, CAS No: 207122-15-4, CAS No: 446255-22-7, CAS No: 207122-16-5) and other hexa- and hepta- BDEs present in **commercial octabromodiphenyl ether,** octa-BDE	Ingen (förbjudet)	Förbjudet Kanske fortfarande importeras i varor. Innehåll i elektronisk utrustning regleras	Flamskyddsmedel Ingen, förbjuden. Måste beaktas under återvinningsprocesser
Chlordecone CAS No. 143-50-0	Ingen	Förbjudet	Pesticid Förbjudet i Sverige sedan 1978
Hexabromobiphenyl, HBB CAS No.36355-01-8	Nej	Förbjudet Kanske fortfarande importeras i vissa varor. Innehåll i elektronisk utrustning regleras	Flamskyddsmedel Ingen, förbjudet. Måste beaktas under återvinningsprocesser
Pentachlorobenzene, PeCB CAS No. 608-93-5	Nej (förbjudet sedan 1980-talet) Oavsiktlig produktion vid förbränning	Förbjudet	Flamskyddsmedel, pesticid Ingen, förbjudet
Perfluorooctane sulfonic acid, **PFOS** CAS NO. 1763-23-1, its salts :CAS NO. 29457-72-5 (lithium salt), 4021-47-0 (sodium salt), 2795-39-3 (potassium salt), 29081-56-9 (ammonium salts),70225-14-8 (diethano-lammonium salts)etc.	Ingen	För angivna undantag Importeras sannolikt fortfarande i varor (textilier, mattor, ytterkläder)	Reglerat med undantag Fortsatt användning inom metallindustrin. Denna användning är tillåten enligt EU-förordningen fram till och med den 26 augusti 2015. Hydraulvätskor för flygindustrin används fortfarande utan tidsgräns.
Perfluorooctane sulfonyl fluoride [CAS No. 307-35-7]	Ingen Är ett startmaterial/ intermediär för produktion av PFOS	Ingen	Ingen

1 Introduction

According to the Stockholm Convention on Persistent Organic Pollutants, each Party to the Convention is to develop and endeavour to implement a plan for the implementation of its obligations under the Convention. The Swedish Government in June 2005 commissioned the Swedish Chemicals Agency and the Swedish Environmental Protection Agency to prepare a national implementation plan for Sweden and to report back to the Government at the latest by 1 April 2006. In May 2009 it was decided by the Parties to add nine substances to the Convention. In the beginning of 2011, the Government commissioned the Swedish Environmental Protection Agency to review and update the national implementation plan and report back by 30 April 2012. In accordance with the commission the update was done in cooperation with the Swedish Chemicals Agency and Swedish Agency for Marine and Water management.

The Swedish Chemicals Agency has prepared the sections related to intentionally produced POPs in all chapters. The Swedish agency for Marine and Water management has been involved in discussions and provided comments on the text. The ministry of environment has commented on an advanced draft.The Swedish Environmental Protection Agency has prepared the other texts and has coordinated and managed the process.

In preparing this report the three agencies have consulted with a broad range of stakeholders from other agencies, industry organisations, academia, civil society and environmental non-governmental organisations within Swedish society.

In accordance with the Guidelines, the report describes Swedish legislation, on chemicals in general and POPs in particular as well as measures that Sweden has taken to protect the Swedish population and the Swedish environment from POPs, so as to comply with the obligations of the Convention.

2 Country baseline

2.1 Country profile

2.1.1 Geography and population

Sweden has an area of 450,000 km² (174,000 sq. mi.), which makes it the third largest country in Western Europe. Of the total area forests cover 53%, mountains 11%, cultivated land 8% and lakes and rivers 9%. The longest north-south distance is 1,574 km (978 mi.) and the longest east-west distance is 499 km (310 mi.). The capital of Sweden is Stockholm with a population of about 1 million. Sweden has 9.4 million inhabitants. In 2011, the average life expectancy in Sweden was 81.07 years.

In addition to Swedish the following recognised minority languages are spoken: Sami (Lapp), Finnish, Meänkieli (Tornedalen Finnish), Yiddish, Romani Chib (a Gypsy language).

Sweden is a constitutional monarchy and a parliamentary democracy. The Parliament, the Riksdag, has 349 members in one chamber.

Of the total population 70% belong to the Evangelical Lutheran Church of Sweden. Sweden also has large minorities of Catholic, Greek and Russian Orthodox, and Islamic believers.

2.1.2 Political and economic profile

Sweden is an open market economy with extensive trade, mainly with the EU and the US. The most important export goods are electrical and telecom equipment, machinery, passenger cars, paper, pharmaceuticals, iron and steel. The most important imported goods are electrical and telecom equipment, machinery, foodstuffs, crude oil, textile products, footwear, passenger cars.

2.1.3 Profiles of economic sectors

Chemical industry

The chemical industry grew to an important element of the Swedish economy during World War II. For the past fifty years it has outstripped most other major domestic industries in its rate of growth. During the past twenty years pharmaceuticals represent the most successful section of the chemical industry, with an exception for recent years when the pharmaceuticals industry has shown a clear decline. Including the petroleum refineries, and the rubber and plastic industries a total of 61,947 persons were employed in the chemical industry, with a sales value of approximately MSEK 166,000 in 2008. The total industrial production in Sweden reached the sales value of MSEK 156,900 and the chemical industry stands for 10.6%. The total number of employees in Swedish industry is about 695,850, which makes the chemical industry amount to 8.9% of the work force. Swedish exports of chemicals in 2008 amounted to approximately MSEK 130,620, i.e. 10.9% of Sweden's total exports or equivalent to more than 80% of the value of the entire chemical production in Sweden. Imports of chemicals reached MSEK 122,030

in 2008. In 2008 61% of the Swedish chemicals in value were exported to EU countries and 79.4% of the imports originated from EU countries.

Chemical production is concentrated in about 50 plants belonging to some 20 companies. As a consequence of the rapid globalisation of the chemical industry in the 1990s all major companies are foreign owned today.

The Chemical industry in Sweden has a long tradition of working with continuous improvements of its environmental performance e.g. Responsible Care, the chemical industry's commitment to continual improvement in all aspects of health, safety and environment performance and to openly communicate its activities, achievements, plans and targets, was introduced in Sweden. As of today 81 companies are participating in the Responsible Care program. Almost all Swedish chemical industries have adopted environmental management systems according to ISO 14001 and/or EMAS.

Iron and steel

Sweden has a very long tradition of mining but nowadays steel accounts for about 4% of the total value added in Swedish industry. Around 20.000 people, or roughly 4 % of the total industrial labour force, are currently employed in the Swedish steel industry. Large investments have been made in research and development, as well as in restructuring and modernising production facilities.

Steel is one of Sweden's most important export products. In 2010, 3.7 million tonnes of steel were exported, valued at approx. SEK 50 billion.

Forest industries

The forest industry – pulp, paper, sawmill and other wood products – represents a large share of the Swedish economy, accounting for some 12 per cent of industrial turnover, value-added, employment and total exports. Direct employment in the industry totals almost 75,000, and this figure is tripled when indirect employment in sectors supplying goods and services to the industry is added. The forest industry is vital to many rural areas in Sweden, where it can be the dominant employer, creating a base for private and public production of goods and services. In nine of Sweden's counties (län), the forest industry provides one fifth or more of industrial employment.

Sweden's forest industry creates a high degree of self-sufficiency in forest products for the Swedish economy. In addition, imports of raw and input materials for industry are low, which makes a major contribution to the Swedish trade balance.

Environmental efforts in the forest industry now cover the complete range of activities from forestry to production, and from use to recycling of products. The Swedish Forestry Act attaches equal importance to environmental and production goals. Today, some 60% of productive forest land is certified according to the PEFC and/or FSC systems.

Surface Treatment Industry

In Sweden there are approximately 500 metal surface treatment installations of which 350 performs chemical pretreatment before painting (i.e. phosphating and chromating). Most of these are engineering industries painting their own products.

About 170 companies perform metal coating where the most common methods are electrolytic (zinc, chrome, nickel, copper), chemical (nickel, copper) or thermic (hot dip galvanizing). This is mostly done on lego basis, very few engineering industries operate this type processes.

The surface treatment industry employs about 1,500 people. The turnover is difficult to calculate because the surface finishing is only a small part of the value of a product, but could be estimated to SEK 1–1.5 billion.

Recycling Industry

The Swedish Recycling Industries' Association, SRI, is an organization that represents Swedish companies working within the recycling field. The member companies represent the main part of the recycling market in Sweden. The organization is a member of the Confederation of Swedish Enterprise.

SRI represent the private recycling industry with a turnover of more than 18 billion SEK and nearly 6,000 employees. The member recycling companies handle more than 10 million tons of material per year, most of which are raw materials for industry, but also waste fuels. The member companies work with everything from collection to recycling of all types of waste and materials. Clients include municipalities, producer companies and all kind of other companies. The business idea is to gather all Swedish recycling companies of good repute and with high environmental profile in one organization.

The overall objectives as described by SRI are:

- The members are well-informed about current issues in the political decision-process on environmental and recycling matters in Sweden and in the European Union.
- Politicians, decision makers and industrial companies have high confidence in SRI.
- Through SRI the member companies have an influence on political decisions.
- To be a member of SRI is a guarantee for high environmental knowledge, good ethics and high credibility.

The members have implemented a Code of conduct and also made a voluntary commitment not to use cash in the purchase of metal-scrap to avoid rogue sellers.

Waste Management

Avfall Sverige – Swedish Waste Management – is a Swedish interest organization within the waste management and recycling sector. The members are municipalities and private companies. The primary task is to represent and develop members in waste management by creating networks, providing information and influencing decision-makers. The task encompasses separation, collection, recycling, waste disposal as well as issues regarding administration, economy, information, planning, training and development. We are 16,000 people working with Swedish households and companies.

Recycling and destruction of waste streams of particular interest for new POPs

Since the introduction of certain brominated flame retardants and PFOS as new POPs, some recycling industries and waste destruction facilities of particular interest are briefly presented.

End of life vehicles, waste cars, are being dismantled in a total of 300 car dismantling facilities and thereafter shredded in 7 shredding facilities.

Waste from electrical and electronic equipment is being dismantled in approximately 50 dismantling facilities and shredded in a few shredding or granulating facilities.

Waste with organic content is being incinerated with energy recovery in 70 facilities. There is one special facility for high temperature destruction of well known types of hazardous waste containing PCB etc.

2.1.4 Environmental overview

During the first half of the 20th century, environment work in Sweden involved little more than nature conservancy and certain measures for the protection of public health. It was not until after World War II that Sweden began to look more closely at the effects of industrial emissions, which were initially viewed as a local problem only. In the 1960s and 1970s, when thousands of lakes and wide stretches of forest had already been damaged, the Swedes became aware of the fact that pollutants do not respect national boundaries. Measures to curb emissions from industries and incineration plants in Sweden were largely successful. Today, foreign emission sources account for a larger share of the most serious airborne pollutants than indigenous sources.

Environmental improvement has focused mainly on production processes. Far too often, environmental impacts have merely moved from production to the use, consumption and disposal stages. Today, lifestyles involving greater comfort and a constant growth in consumption are causing a steady increase in chemicals, heavy metals and other harmful substances in our products. As a result, focus has shifted from end of pipe solutions to more preventive policies, including stricter chemicals control. An increasing flow of automotive traffic and larger cars are devouring some of the gains from better exhaust emission control, cleaner fuels and noise reduction. The same applies to growing dependence on energy as a result of greater automation, both at work and in households.

International work

In the POPs related area Sweden is Party to the Basel, Rotterdam, Stockholm and Vienna Conventions including the Montreal Protocol and the UNECE LRTAP POPs Protocol, as well as the Helsinki Commission and the Oslo and Paris Conventions. Sweden has also actively promoted the development of the Strategic Approach to International Chemicals Management (SAICM) and the adoption of the Dubai Declaration.

The Stockholm Convention, which aims at banning the production and use of some of the most hazardous chemicals, was strongly supported by Sweden, which also hosted the diplomatic conference that adopted the Convention.

Sweden's EU membership since 1995 has led to major changes in its environmental policy. In some cases, Sweden has been forced to give up its stricter standards. On the other hand, membership has made it more possible to influence countries whose emissions may rain down on Sweden. Sweden has also been able to strongly influence the EU in the chemicals field as one of the main idea providers for the REACH legislation. In addition, the Swedish derogations to the accession treaty in 1995 have almost without exception become present union policy and legislation.

2.2 Institutional, policy and regulatory framework

2.2.1 Environmental policy, sustainable development policy and general legislative framework

In April 1999 the Swedish Parliament adopted national environmental quality objectives, describing what quality and state of the environment and the natural and cultural resources of Sweden are environmentally sustainable in the long term. In a series of decisions, Parliament subsequently has adopted interim targets, indicating the direction and timescale of the action to be taken to move towards these objectives. Ultimately, our efforts to attain the environmental quality objectives are concerned with ensuring that the next generation – our children and grandchildren – and generations to come are able to live their lives in a rich and healthy environment.

As we work towards the goal of sustainable development, Sweden's environmental quality objectives, of which there are now sixteen, are being used to lend visibility to the ecological dimension of the process.

One of the sixteen objectives adopted by the Swedish Parliament is 'A Non-Toxic Environment'. The Stockholm Convention's aim of protecting human health and the environment from persistent organic pollutants is a component part of the endeavour to achieve this objective .

A Non-Toxic Environment

The occurrence of man-made or extracted substances in the environment must not represent a threat to human health or biological diversity. Concentrations of non-naturally occurring substances will be close to zero and their impacts

on human health and on ecosystems will be negligible. Concentrations of naturally occurring substances will be close to background levels.

The outcome within a generation for this environmental quality objective should include the following:

- Overall exposure in the working environment, the natural environment and the indoor environment to particularly dangerous substances is close to zero and, as regards other chemical substances, to levels that are not harmful to human health.
- Polluted areas have been investigated and cleaned up where necessary.
- All fish in the seas, lakes and watercourses in Sweden are fit for human consumption with regard to the contents of foreign substances.

Further information including interim targets that currently are being revised, can be found at http://www.naturvardsverket.se/en/In-English/Start/Environmental-objectives/

2.2.2 Roles and responsibilities of ministries, agencies and other governmental institutions involved in POPs life cycles (from source to disposal, environmental fate and health monitoring)

Responsibilities of ministries and central government agencies

Ministries in Sweden generally have relatively small staffs and their work is largely devoted to policy-making. The responsibilities for supervision are given to a number of semiautonomous government agencies under but outside the ministries. The responsibilities of central, regional and local authorities with regard to supervision (inspections, etc.) under the Environmental Code are listed in Annex I.The central agencies for enforcement of the Environmental Code are also listed in Annex I. For information purposes, authorities responsible for other legislation of relevance in connection with POPs have been included in the tables.

Swedish agencies are heavily engaged in the preparation of positions in EU negotiations and in the implementation of Community legislation. This requires smooth co-operation and effective exchange of information with the Government, which is the body that makes decisions on the national positions when new EU law is developed.

Public administration in Sweden is both self-governing and subordinated to political decision-makers. There has traditionally been a sharp division between politics and administration. The split between Government and Agencies is a manifestation of this. The Government or the Riksdag (Swedish Parliament) may not dictate how an Agency shall decide on an individual issue relating to the application of national law. The Government has, through the authority vested in an Agency or through established practice, given the administrative agency the right to act on its own on the basis of more or less precise instructions from the Government.

In the case of implementing Community legislation, the Agencies can often decide within their existing mandates what Swedish legislation is required for

the implementation of Community law. Agencies may issue regulations, while ordinances are issued by the Government and laws by the Riksdag. The distribution of power between the Government and the Agencies in the issuing of regulations makes great demands on co-ordination. The Agencies have to inform the Government how Community legislation has been implemented by them in Swedish regulations.

The Swedish Environmental Protection Agency is the central administrative authority with responsibility, alongside regional and local authorities, for protection of the natural environment under the provisions of the Environmental Code. This responsibility encompasses environmental protection in a wide sense, including the use of land, chemicals and waste and the conservation of biological diversity. The Agency issues a range of regulations designed to safeguard the environment, including regulations on pesticide use in agriculture.

The *Swedish Chemicals Agency* (KemI) is the main responsible agency for supervising chemicals that are placed on the market. It is a driving force in efforts to achieving the environmental quality objective of 'A non-toxic environment'. The Agency is a supervisory authority under the Ministry of Environment and works at the national, EU and global levels to limit the health and environmental risks associated with chemicals. KemI keeps a product register and maintains a number of databases to support its work and that of other agencies. Pesticides must be approved before they may be placed on the market. KemI controls that health and environmental requirements are met. In the Pesticides Register it is possible to search on approved pesticides, companies and exemptions, on the website: http://apps.kemi.se/bkmregoff. It checks companies' compliance with applicable regulations, provides support to local authorities, provides support to other countries and issues reports and publications. KemI makes its expert knowledge available through several duty officers and its website www.kemi.se, with a large number of databases and up-to-date information on chemicals, plant protection products and biocides.

The *Work Environment Authority* is responsible for monitoring chemical risks in the workplace and ensuring that employers comply with the requirements of the Work Environment Act. Through inspections and by other means, the authority checks that limit values are not exceeded.

The *National Food Agency* is the central administrative authority for matters relating to food, with the role of actively promoting safe foods of high quality. It is responsible for the food control including pesticide, veterinary drug and contamination control. Foods are also monitored for contaminants for which maximum limits are lackning in the food legislation.

The *Swedish Board of Agriculture* is the Government's expert authority in the field of agricultural and food policy, and the agency responsible for the agriculture, horticulture and reindeer husbandry sectors. It also has a responsibility for feedstuffs.

The *Swedish Forest Agency* is the Government's expert authority on forests and forest policy. It has a responsibility for the protection of woodland natural habitats.

The *Medical Products Agency* is responsible for chemicals in pharmaceuticals and cosmetics.

The *Swedish Agency for Marine and Water Management* (SwAM) was started in July 2011 and has the responsibility to manage the use and prevent overuse of Sweden's sea and freshwater environments. SwAM has the overarching responsibility for the enforcement of national and international legislation pertaining to waters. The work is largely steered by european legislation such as the water framework directive and the marine strategy framework directives, regional conventions such as OSPAR and HELCOM as well as Swedish law and relevant national Environmental Quality Objectives. The authority is responsible for the monitoring of the aquatic environment, although this responsibility is shared with the Environmental Protection Agency when it comes to hazardous substances. An important tool is marine spatial planning to solve issues that arise from conflicting interests between protection and usage. The authority also has a special responsibility to regulate commercial fishing in Swedish waters.

The *Swedish international development cooperation Agency (Sida)* is a government organization under the Swedish Foreign Ministry that administer approximately half of Sweden's budget for development cooperation. The overall target of Sweden's development assistance is to ensure that those in poverty have the ability to improve their living conditions. To carry out this assignment effectively and strategically, Sida has divided its work into five areas, where *Sustainable development* is one area that includes the sound management of chemicals.

Regional (State) and local (municipal) supervision

The *County Administrative Board* exercises supervision within the county. Municipal authorities engaged in work within the environmental or health protection area exercise supervision within each municipality. These authorities are often referred to as Environmental Boards. Regional and local supervision of the occupational environment is exercised by the Labour Inspectorate. (The National Board of Occupational Safety and Health and the Labour Inspectorate together constitute the Swedish Occupational Safety and Health Administration.)

Chemical emergency information centres for accident prevention and response

There are two chemical emergency information centres in Sweden; the *Swedish Poisons Information Centre* and the Swedish Civil Contingencies Agency (MSB). The Swedish Poisons Information Centre monitors and gives information on acute poisonings and accidents related to human exposure to chemicals in all situations i.e. on an individual basis and in mass exposure

situations. The Centre also acts as the Chemical Emergency Response Centre for the Swedish Chemical Industry. This means that the Centre gives information on environmental aspects of chemical release, provided that the chemical industry has supplied this information to the Centre. This activity is run in close collaboration with the Swedish Civil Contingencies Agency (MSB)

The Swedish Civil Contingencies Agency (MSB) is responsible for chemical emergency information dealing with activities related to rescue actions and environmental aspects. When an accident happens where chemicals are involved e.g. when transporting dangerous goods, the rescue leader seeks relevant information on how to deal with the chemical(s) first of all in his own files. Pertinent information can also be found in the transport documents. Information is also available from the Rescue Services Information Bank at the Swedish Civil Contingencies Agency (MSB) This Agency has a stand-by person ready (within half an hour) to assist municipal rescue services in all types of accidents.

Co-ordinating mechanisms

The co-ordinating mechanisms at the ministerial level, at agency level as well as between the levels are well established and work effectively. The necessary co-ordination is assured by e.g. regulations in Government Ordinances or in other government decisions. The roles of existing government agencies are as a rule well defined through relevant legal acts. Chapter 26 of the Environmental Code states that, when warranted, the supervisory agencies shall co-operate in the work of supervision.

The Swedish Chemicals Agency, the Swedish Environment Protection Agency and the National Board of Occupational Safety and Health have agreed on common strategies for chemicals control nationally and internationally. The ministries as well as the agencies, when preparing legislation and other decisions concerning chemicals, as a rule invite other ministries and agencies involved to take part or come up with comments. All interested stakeholders, e.g. industry, trade unions and public interest groups are frequently brought into the process .

2.2.3 Relevant international commitments and obligations

With regard to the sound management of chemicals including POPs Sweden is Party to a number of international agreements, conventions and networks as listed in Annex II together with the national contact point.

Sweden's policy for global development from 2008 (Govt. Comm. 2007/08:89U) addresses the question of how Sweden can effectively contribute to sustainable global development. Chemicals management is there identified as one of the focus areas.

2.2.4 Description of existing legislation and regulations addressing POPs (manufactured chemicals and unintentionally formed POPs)

The legislation and regulations addressing POPs are regulated on EU level and is common with all EU member states. Regulation (EC) No 850/2004 of the European Parliament and of the Council of 29 April 2004 on persistent organic pollutants (the POPs-regulation) includes all the provision of the Stockholm Convention. Of the nine chemicals included in the Convention as decided by the parties in May 2009, restrictions were previously listed in Annex XVII in Regulation (EC) No 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), for three of these chemicals: Pentabromodiphenyl ether Octabromodiphenyl ether and Perfluorooctane sulfonates with a description of the restriction conditions imposed for each substance. However since August 2010 all provisions are found in the POPs-regulation, as revised and established by regulations (EU) 756/2010 and (EU) 757/2010 of 24 August 2010.

The Environmental code

(SFS 1998:808) provides for the implementation and enforcement of the Regulation (EC) No 850/2004 in Sweden. The Code entered into force on 1 January 1999. . Despite the fact that the Environmental Code contains 33 chapters comprising almost 500 sections, only the fundamental environmental rules are included in the Code itself. More detailed provisions have been lain down in government ordinances. The (EC) No 850/2004 and other relevant EU legislation have been incorporated into the Code and its ordinances. Chapter 14 of the Code and the adjacent legislation have changed considerably during the past five years due to the adoption of the REACH), the Regulation (EU) no 1107/2009 concerning the placing of plant protection products on the market and the Regulation (EU) no 1272/2008 on the classification, labelling and packaging of chemicals (the CLP-regulation). As all EU-regulations, they are directly applicable in the Sweden.

The objectives and scope of the Environmental Code

The Environmental Code is to be applied so that the health of humans and the environment is protected against damage and nuisance, irrespective of whether these are caused by pollution or other influences, valuable natural and cultural environments are protected and conserved, biological diversity is preserved, land, water and the physical environment generally are used so that, from an ecological, social, cultural and socio-economic viewpoint, the long-term good management of resources is assured, and reuse and recycling together with other management of material, raw materials and energy are promoted so that an ecological cycle (‘eco-cycle’) is attained.

The fundamental rules of the Environmental Code apply, in principle, to all human activity that may harm the environment. The general rules of consideration are the most central provisions. These indicate that operations must be conducted and measures taken so that harm to the health of humans and

the environment is averted. Simultaneously, the efficient management of land, water and other resources is promoted. Unless otherwise provided, the rules of the Environmental Code apply to all operations and measures that affect the environment. It is immaterial whether the operation or measure takes place as part of a commercial operation or if it is conducted by a private individual. Thus, the Environmental Code applies to everything from major projects, such as building and operating hydroelectricity plants or motorways, to small individual measures, such as washing a car with detergents or composting household waste.

Precautionary measures

The fundamental rule for consideration in the Environmental Code means that everybody who is to take a measure must perform those protective measures, observe the limitations and take the precautionary measures that are required in order that the measure will not harm health or the environment. The rule is a natural consequence of the Polluter Pays Principle prepared by the OECD in the early 1970s. The obligation to take precautionary measures is also closely linked to internationally recognised principles e.g. Principle 15 of the Rio Declaration and subsequent developments in the Cartagena Protocol, the Stockholm Convention and other international instruments. According to the precautionary principle, precautionary measures must be taken as soon as there is reason to assume that a measure may injure human health or the environment. The person conducting the operation cannot excuse himself by the absence of complete scientific evidence that harm arise.

Examples of appropriate precautionary measures include: the minimisation of emissions by the use of a particular filter or careful purification of waste water; that garden waste is not burned during unfavourable wind conditions; the erection of noise barriers; that chemicals are dealt with on a hard surface so that spills do not penetrate the ground; that dams are built in accordance with safety requirements and without constituting migration obstacles to fish; that the number of animals in agriculture is limited; or that a person arranging outdoor recreation for others informs the participants about the meaning of the right of common access (Right of Public Access).

Best available technology

Commercial operations must apply the best possible technology to avoid damage. The technology must, from the technical and financial viewpoint, be industrially feasible to apply within the trade in question. This means that it must be available and not only exist at an experimental stage. However, the technology does not have to be located within Sweden. In the case of existing activities, a certain transitional period is sometimes required for the introduction of equipment corresponding to what is considered to represent the best possible technology.

Knowledge

It is reasonable that a party intending to commence an operation first acquires the knowledge required to determine the environmental effects that may arise. There is a special rule concerning this. There is, of course, a difference in the requirements that may be imposed concerning a private individual's knowledge of the effect of various everyday measures on the environment and the requirements that may be imposed on someone responsible for operating industrial activities when choosing, for example, various chemical products required for the activity. However, it is always the possible effect of a measure, which determines the required knowledge and not the person taking the measure.

The Product Choice (Substitution) Principle

Everybody who is to take a measure must avoid using or selling chemical products or bio-technical organisms that can harm human health or the environment, if these may be replaced with such products or organisms that may be assumed to be less hazardous. Corresponding requirements apply as regards goods containing or which have been dealt with a chemical product or bio-technical organism. The provisions express the product choice principle, or the substitution principle.

An assessment must be made in every individual case. Prohibition of the use or sales can never be imposed generally for a product, organism or goods. Instead, general prohibitions of chemical products that are so hazardous that they cannot be permitted under any circumstances, and also prohibitions of such products where equally effective substitutes involve a manifest advantage from the environmental viewpoint, may be imposed under the provisions of the chapter of the Environmental Code dealing with chemical products.

It should be observed that the product choice principle does not only apply to commercial sale or use. The rule also applies to a private individual who takes a measure. When a car owner washes his/her car and is to purchase detergents for this at a garage, he/she must choose the substance that is the least hazardous to the environment as possible yet nevertheless cleans the car. A correct choice presupposes that the goods are labelled in such a manner that the consumer obtains correct information about the properties of the product.

In the POPs area, the Swedish Chemicals Agency promoted the idea of substitution by preparing and publishing a report entitled Alternatives to Persistent Organic Pollutants (KemI Report 4/96). This report, which was submitted to the IFCS/UNEP ad hoc Working Group on Persistent Organic Pollutants at its final meeting in Manila, Philippines, in June, 1996 was instrumental in creating the consensus that global action against POPs was warranted.

PRIO is a web-based tool (in Swedish and English, www.kemi.se) developed and maintained by the Swedish Chemicals Agency, intended to be used to preventively reduce risks to human health and the environment from chemicals. The aim of PRIO is to facilitate in the risk assessment so that people who work as environmental managers, purchasers and product developers can identify the need for risk reduction. To achieve this PRIO provides a guide

for decision-making that can be used in setting risk reduction priorities. The target groups for PRIO are primarily Swedish actors but also include chemical suppliers to Sweden in other countries. PRIO also provides a source of knowledge for environmental and health inspectors, environmental auditors, risk analysts and those who in some other way can influence the use and handling of chemicals. Linked to PRIO are a number of environmental and health criteria, including PBT for the substances to be prioritised The recommendations on which chemicals are prioritised for risk reduction measures are based on the environmental quality objective "A non-toxic environment" adopted by the Swedish parliament, work towards sustainable development and are in line with the objectives in the EU chemicals legislation, REACH. Throughout PRIO reference is made to Swedish legislation and other Swedish considerations.

In 2010 a statistical database "The Commodity Guide" giving examples on what materials approx 1,000 groups of products can be made of and what chemicals can be part of these materials has been developed by the Swedish Chemicals Agency. The Commodity Guide is an attempt at placing commodities in a system, providing an overview of commodities and material used in Sweden. The aim of The Commodity Guide is to provide a guide to product developers and purchasers in decision-making and find alternatives.The idea is that those who possess knowledge about individual groups of commodities or materials should be able to contribute with data to develop the Commodity Guide.

Producer responsibility

Regulations about producer responsibility may be issued under the Environmental Code. Producer responsibility means that the producer must ensure that the waste is collected, transported away, recycled, reused or disposed of in such a manner as may be necessary from the viewpoint of health and environmentally acceptable waste handling. Such regulations may be issued as regards waste from the goods and packages that producers manufacture, import or sell and the waste from the operations they conduct. The expression 'producer', in this connection, also comprises a party who imports or sells goods or packages.

To date, the Government has made rules on extended producer responsibility in many areas, e.g. recycled paper, tyres, packages, automobiles and electric and electronic products.

Environmental quality standards

An important provision in the Environmental Code permits the introduction of environmental quality standards. Under this provision, the Government may issue regulations, for certain geographical areas or the whole of Sweden, concerning the quality of land, water, air or the environment generally, if this is necessary to ensure long-term protection of or remedy adverse effects on human health or the environment. Such regulations are referred to as environmental quality standards. Standards which Sweden is required to introduce under EC rules may also be issued by authorities other than the Government.

Under the definition used in Sweden, environmental quality standards are legally binding limits, regarding some aspect of environmental status, which may not be exceeded, or are to be attained where possible, after a specified date. Such standards specify the levels of pollution or disturbance which humans, the environment or natural ecosystems may be exposed to without risk of significant detriment. They state, for example, maximum or minimum amounts of chemicals in land, water or air, or maximum levels of noise. Environmental quality standards may also specify the highest or lowest water levels or flows in a watercourse, or the maximum or minimum occurrence in a water body of organisms that can serve as indicators of the state of the environment.

To date, several ordinances setting out environmental quality standards have been adopted under the provisions of chapter 5 of the Environmental Code. The great majority of the environmental quality standards are based on EC directives.

The Ordinance (2010:477) on environmental quality standards for ambient air contains standards relating to nitrogen dioxide, oxides of nitrogen, sulphur dioxide, carbon monoxide, lead, benzene, particulate matter PM10 and PM 2,5, ozone benzo(a)pyrene, arsenic, cadmium, mercury and nickel in ambient air.

The Ordinance (2001:554) on environmental quality standards for fish and bivalve waters contains standards and guide levels for parameters such as zinc, dissolved copper, temperature, dissolved oxygen, pH, phenol compounds, ammonia, ammonium, nitrites and salinity.

The Ordinance (2004:675) on environmental quality standards for noise requires strategic noise mapping and the establishment of action programmes to limit, for example, road traffic, aircraft and railway noise.

There is also an Ordinance on Water Quality Management (SFS 2004:660) that sets environmental quality standards for bodies of surface water and which implements the EC Water Framework Directive (Directive 2000/60/EC) and its daughter directive, Directive 2008/105/EC. According to this ordinance, environmental quality standards for surface and ground water bodies shall be set by the relevant authorities and the standards generally need to be fulfilled no later than 22 December 2015. Priority substances and their EU wide Environmental Quality Standards for surface waters are specified in 2008/105/EC.

Public agencies and local authorities are required to ensure that environmental quality standards are met when reaching decisions on permits and similar approvals. This applies to determinations under both the Environmental Code and other legislation, for example the Planning and Building Act, the Roads Act and the Nuclear Technology Act. Permits may not be issued for operations that entail an infringement of an environmental quality standard. Furthermore, an existing permit may be reconsidered if the operation in question contributes significantly to an environmental quality standard being breached.

When public agencies and local authorities exercise supervision or issue regulations, too, environmental quality standards have to be met. They must also be observed in conjunction with planning. Municipal plans under the Planning and Building Act may not be adopted in contravention of the standards. An action programme is required to be prepared if this is necessary to comply with an environmental quality standard or if such a programme is called for under EC law. The programme will be prepared by the Government or by a government agency or local authority.

The action programme must state what measures are to be taken to ensure compliance with the relevant environmental quality standard, which authorities and municipalities are to ensure that these measures are taken, and when they are to be implemented.

The principle of appropriate siting

The choice of site for an operation has a major impact on what environmental disturbances arise. In the case of operations and measures that involve the use of areas of land or water, other than on a purely temporary basis, sites must be chosen that are appropriate with regard to the objectives and resource management provisions of the Environmental Code.

Sometimes, several locations may be suitable for an activity. When choosing between them, it is necessary to select a site which enables the purpose to be attained with the least possible damage or detriment to human health and the environment. In other words, the most appropriate site must be chosen.

Factors that may be relevant to a siting decision include sensitivity to discharges to water bodies, nature conservation at the location where the operation is to be conducted, and distance from housing areas.

The provision on appropriate siting is of most significance when a location is to be chosen for an operation that has not yet commenced. However, it also applies to extensions to existing installations. In addition, it is to be taken into account when permits are reconsidered: in such a situation, relocation may be required. However, such a requirement must not be unreasonable.

The resource management and eco-cycle principles

Everyone undertaking an operation or measure is required to conserve raw materials and energy and to reuse and recycle them wherever possible. In the first instance, renewable sources of energy are to be used. This provision of the Environmental Code represents the resource management and ‘eco-cycle’ (or ‘closed loop’) principles.

As regards both these principles, the best effects can be achieved at the design and manufacturing stages. The principles are to be applied, inter alia, in the consideration of permit applications for environmentally hazardous activities. This extends the scope of permit decisions compared with earlier legislation.

Environmentally hazardous activities and health protection

The general provisions of the Environmental Code, for example the general rules of consideration, naturally apply to environmental hazardous activities and to other measures that may affect human health. In addition, chapter 9 of the Code contains special provisions on environmentally hazardous activities and health protection.

The concept of 'environmentally hazardous activity'

An environmentally hazardous activity is defined as any use of land, buildings or structures that involves an emission to land, air or water. The same applies to uses that entail other forms of detriment to human health or the environment, for example caused by noise, vibration or radiation. In contrast to earlier rules, ionising radiation, for example gamma, X-ray and particle radiation, is also included.

To be regarded as environmentally hazardous, an activity does not need to be hazardous to the environment in the individual case. Nor need too much be read into the word 'activity'. The concept 'use' is to be viewed in a long-term perspective, which means, for example, that a landfill site where waste is no longer deposited will be covered as long as there is a possibility of it resulting in pollution. The decisive factor is the effect of the activity, and not the actual running of the operation.

General rules on environmentally hazardous activities

The power to issue general regulations concerning environmentally hazardous activities was significantly extended with the introduction of the Environmental Code. The Government may issue regulations, applicable to particular parts of Sweden, prohibiting the emission of wastewater, solid matter or gas or the disposal of solid matter. This applies if the activity in question may result in surface water, land or groundwater being polluted or affected in some other way. The power may be used, for example, to prohibit emissions to a lake that is an important source of drinking water, or which supports rare or particularly valuable species of fauna and flora.

In other cases, too, the Government may issue rules laying down prohibitions, protective measures, restrictions and other precautions. The intention is that the powers granted will in part be used to transpose EC legislation into Swedish law and to comply with other international obligations, and also to introduce regulations of a general nature for a particular sector. Such regulations may be used instead of individual permit decisions.

Permit and notification requirements for environmentally hazardous activities. Under the Environmental Code, the Government may require that permits be obtained for or notification given of an environmentally hazardous activity. Such activities may be assigned to one of three lists, A, B or C.

Environmentally hazardous activities included on the A list require a permit from an environmental court. The B list comprises activities for which permit applications are instead considered by county administrative boards or munic-

ipal committees. Finally, the C list includes environmentally hazardous activities that are subject to a requirement to notify the county administrative board or the local authority.

Even if an activity is not subject to a permit requirement, the supervisory authority may in a particular case require an operator to apply for a permit if there is a risk of significant pollution or other substantial detriment.

Where changes are made to existing activities, too, it may be necessary to apply for a permit. In such cases the law now requires an overall assessment to be made of the entire operation. This will avoid several permit decisions being in force for a single operation; otherwise each individual permit would apply only to the part that has been altered. However, an overall assessment is not required in the case of minor alterations. Existing activities which have not actually been altered, but which were started before the permit requirement was introduced, are also subject to this requirement. It also applies to activities which under the earlier rules obtained an exemption from the requirement to hold a permit.

Under earlier legislation, the permit system in principle only applied to emissions from environmentally hazardous activities. The Environmental Code requires a broader assessment, also taking into account questions concerning the management of natural resources and use of chemicals. Furthermore, it is now possible to make a combined assessment of permit applications for both an environmentally hazardous activity and a water operation, if they are submitted by the same applicant and relate to the same activity or to activities that are connected with each other.

Health protection

The Environmental Code contains special provisions designed to prevent any detriment to human health, i.e. any disturbance which, from a medical or public health point of view, may have adverse effects on health. Disturbances that are trivial or purely temporary are not covered. The definition is somewhat wider than the expression ‘sanitary nuisance’ used in earlier legislation.

Under the Code, housing and public premises are required to be used in such a way as to prevent detriment to health. They must be kept free of vermin and other pests. Installations for the supply of groundwater must likewise be established and used in such a manner that no detriment to human health arises. Municipalities may introduce a permit or notification requirement for new groundwater supplies in areas subject to water shortages. A permit may also be required for the keeping of animals in an area subject to a detailed development plan or area regulations, provided such a requirement is necessary to prevent detriment to human health.

Contaminated sites

Remediation of contaminated sites is also governed by the Environmental Code, which clarifies the question of responsibility for the remediation of contaminated areas of land and water. The rules are based on the Polluter Pays Principle (PPP).

The Code states, for example, that persons who pursue or have pursued an activity or taken a measure that causes damage or detriment to the environment are responsible, until such time as the damage or detriment ceases, for remedying it to the extent deemed reasonable. Where the Code so provides, the person may instead be liable to pay compensation for the damage or detriment.

Liability for remediation rests primarily on the present or previous operator. In the second instance it is the landowner that is responsible. For a site that is owned for private housing, it is a precondition for liability that the purchaser knew about the pollution. If several operators or landowners are responsible, they will normally be jointly and severally liable. Remediation liability means that the party responsible must, to the extent that is reasonable, perform or pay for remediation. Under the transitional provisions of the Environmental Code, this liability applies to activities undertaken after 30 June 1969.

An owner or user of a property must immediately notify the supervisory authority if contamination is discovered. This requirement applies even if the site was previously considered to be contaminated. If a land or water area is severely contaminated and it is necessary to restrict the use of the land, then the county administrative board must declare it an environmental hazard zone.

Chemical products and biotechnical organisms

The general rules of consideration in chapter 2 of the Environmental Code also apply with regard to chemical products and biotechnical organisms. The knowledge requirement and the product choice principle are of particular importance. In addition, chapter 14 contains special provisions concerning chemical products and biotechnical organisms. There is also a special Ordinance on chemical products and biotechnical organisms (1998:941), an Ordinance on plant protection (which supplements the Regulation (EU) no 1107/2009) and an ordinance on biocide products.

In the Code Chemical product is defined as a chemical substance or preparation of chemical substances. Bio-technical organism is defined as a product that has been specially produced to function as a pesticide or for some other technological purpose or which completely or partially consists of or contains living micro-organisms, nematodes, insects or spiders. In this connection, micro-organisms also include viruses.

Chemical products that are commercially manufactured in Sweden or imported to Sweden must be registered in a products register. A corresponding register may be prepared for bio-technical organisms.

The provisions on chemical products also apply to articles which contain or are treated with chemicals. The definition of article is the same as in the Reach regulation (Regulation (EU) no 1907/2006) and the CLP regulation (Regulation (EU) no 1272/2008).

Chemical Products Register

Chemical products that are commercially manufactured in Sweden or imported to Sweden must be registered in a products register. A corresponding register may be prepared for bio-technical organisms.

Permit and approval

A permit is required for the commercial transfer and handling by non-professionals of particularly dangerous products and organisms.

Special requirements apply to chemical or biological pesticides (see below).

Prohibition

If it is of particular importance from the health or environmental viewpoint, a chemical product or bio-technical organism may be generally prohibited, provided that such prohibitions are consistent with applicable EU-law. Such prohibitions are set out in the Ordinance on prohibition on the handling, import and export of chemical products (1998:944). This may be appropriate in the case of, for example, carcinogenic products. It may also be relevant in the case of products whose feared injurious effects in the individual case, though not of a serious kind, can through widespread use result in injurious effects, such as for example cosmetics, hygienic products and pesticides.

Environmental penalty charges and sanctions

The Environmental Code contains rules on enforcement, criminal sanctions and environmental penalty fees. The rules of enforcement through administrative measures are generally applicable to all legislations which fall under the environmental code. The enforcement authorities can use issue injunctions and bans with or without a fine in order to force a person or a company to comply with the legislation. Core provisions in the Environmental Code and the legislation which fall under the Code (including EU-regulations) are specifically criminalised in the Code. Breaches of the EU regulation 850/2004 prohibiting production and use of the regulated POPs and violations of the waste management rules has been criminalised in May 2012.

The applicable sanctions for private individuals include fines (set on the basis of the personal income) or imprisonment up to six years. Companies can be required to pay a company charge of EUR 500 up to EUR 1,000,000. An environmental penalty charge must be paid by business operators who in the conduct of commercial operations neglect specific requirements that follows from regulations issued under the Environmental Code and which are specified in the Ordinance on Environmental Penalty Charge (1998:950). The charge is founded on strict liability. The charge varies from SEK 1,000 to SEK 50,000. The supervisory authority decides on the environmental penalty charge. The decision may be appealed against to the environmental court.

Pesticide Regulations

The legal basis for Swedish pesticide control is to be found in four categories of documents:

- the European Community legislation
- the Environmental Code and other acts promulgated by the Swedish Parliament
- ordinances promulgated by the Swedish Government
- regulations issued by competent Swedish authorities

The Environmental Code is a framework statute covering inter alia the control of pesticides. It contains several basic provisions governing the manufacture, import, export, sale and other handling of chemical products. The Code is accompanied by an Ordinance on pesticides, an Ordinance on Biocidal Products and an Ordinance on Chemical Products and Biotechnical Organisms. The purpose of the legislation is to prevent injury to human health and the environment being caused by the inherent properties of pesticides. The framework structure of the Code means that the Government or a designated government agency (such as the Swedish Chemicals Agency) can promulgate ordinances and regulations, respectively, in order to implement the provisions of the Code (and Ordinance). After the entry into force of the Regulation (EU) no 1107/2009 concerning the placing of plant protection products on the market, the requirements in the Environmental Code and regulations under it apply mainly to biocidal products and the use of nematodes, insects or spiders for pesticide purposes. Since the authorisation procedure for plant protection products is governed by the EU regulation 1107/2009 and not by the Environmental Code it will not be described in the account below.

Biocidal products are used for different purposes to counteract harmful organisms. In accordance with the Biocidal Products Directive 98/8/EC , biocidal products are divided into 23 product types.

The Biocidal Products Directive 98/8/EC is implemented in Swedish law in:

- Chapter 14 of the Swedish Environmental Code (SFS 1998:808);
- The Chemical Products and Biotechnical organisms Ordinance (2008:245);
- The Biocidal Products Ordinance (2000:338) and
- The Swedish Chemicals Agency's Chemical Products and Biotechnical Organisms Regulations (KIFS 2008:3).

The main rule in Sweden is that all biocidal products must be authorised to be placed and used on the Swedish market. However, today some products are currently exempted from the requirement for authorisation, this is the case for, inter alia, disinfectants. These exemptions will cease to apply once Sweden has transposed the Biocidal Products Directive into Swedish law. The Biocidal Products Directive stipulates that all biocidal products placed on the market in the EU must be authorised by 14 May 2014.

One condition for authorisation of a biocidal product, or for using the exemption from the requirement for authorisation, is that the active substances in the biocidal product are among the substances included in the EU work programme for existing substances. The active substance must be included in Annex II to Commission Regulation (EC) no 1451/2007 on the second phase of the 10-year work programme referred to in Article 16(2) of Directive 98/8/EC of the European Parliament and of the Council concerning the placing of biocidal products on the market. If the active substance in the product is included in Annex II there might be Commission decision to allow or not allow the substance for use in biocidal products.

If a product contains an active substance that is not included in Annex II, or if there is a decision that the substance is not allowed to be used in biocidal products, the biocidal product is not allowed to be placed on the Swedish market. This also applies to products which at the present situation are exempted from the requirement for authorisation.

Training requirements

Pesticides assigned to Class 1 and those pesticides in Class 2 used mainly in agriculture, forestry, horticulture or as wood preservatives may be used only by persons meeting certain competence requirements, and, who in some cases, have attained a certain age.

Spreading pesticides

Chemical or biological pesticides must be spread in such a manner that human health is not harmed or humans caused other nuisance and so that the environmental impact is as little as possible. Pesticides may not be spread from aircraft. Nor may pesticides be spread over forestland to combat brushwood.

Banned or severely restricted pesticides

The European Union has issued a list of substances which may be included as active substances in approved plant protection products in the European Union (Commission Implementing Regulation (EU) no 540/2011 implementing Regulation (EC) no 1107/2010 of the European parliament and the Council as regards the list of approved active substances) There is also a number of substances included in the international Prior Informed Consent Procedure (Regulation 304/2003), which are either banned or severely restricted within the European Union. If a biocidal product contains an active substance that is not included in Annex II of Regulation 1451/2007, or if there is a decision that the substance is not allowed to be used in biocidal products, the biocidal product is not allowed to be placed on the Swedish market.

To avoid stockpiling and other waste management problems of a pesticide following a decision to discontinue the approval, the retailer is usually allowed to keep on marketing the product for a year. After that period, the pesticide may be used yet another year.

Pesticide fees

The Swedish Chemical Agency's pesticide related activities are funded by fees paid by the pesticide industry. The fee for an application for approval varies from approximately EUR 1,250 to EUR 13,000 depending on if it is an application for a mutual recognition of a pesticide approved in another member state or if it is a new application. The prolongation fee (every five years) is USD 700 (SEK 6,000). The annual fee is 2.6 % of the product's sales value the previous year with a minimum fee of USD 235 (SEK 2,000) and a maximum fee of USD 23,500 (SEK 200,000). The application fee for an EU-new active substance (for inclusion on Appendix 1 of Directive 91/414/EEC) is EUR 450,000. For biocides the fee is EUR 380,000

Sales statistics and feedback

The Agency keeps a restricted database (Pesticides Register) covering all approved pesticide products, their composition, and quantities sold the previous year. A list of approved pesticide products as well as annual sales statistics is available on the website www.kemi.se. Swedish manufacturers and agents to foreign manufacturers who have had a pesticide product filed in the Pesticides Registry on some occasion during a calendar year must provide information to the Swedish Chemicals Agency concerning the quantity of the product transferred, and estimated distribution of the quantity between agriculture, forestry, commercial fruit growing and gardening, industry, and household consumption.

In 2010 a total of 8,615 metric tonnes of pesticides (active substances) was sold in Sweden. The main part (76%) was sold to industry, mainly for wood treatment using pressure and vacuum technology. The annual amount of sold quantities is strongly affected by the demand for creosote impregnated wood, particularly for export purposes. A total of 1,565 tonnes was sold to agriculture, accounting for 18% of the total sold quantities. Compared with the average during 1981–1985 (the base years for the national risk reduction programme), a reduction of 65 % has been achieved. A total of 410 tonnes of pesticides were sold as consumer products. These always belong to the lowest hazard class.

The Swedish Poisons Centre collects and publishes statistics on incidents and accidents concerning pesticides (and other chemicals).

Enforcement

A number of government agencies make sure that the manufacturers and importers of pesticides take their responsibility under the pesticides control legislation. The Swedish Chemicals Agency (an agency under the Ministry of Environment) is responsible for the entire approval procedure covering both health and environmental aspects and agricultural and non-agricultural pesticides (plant protection products and biocides). The Agency has a right to issue regulations and restrict or prohibit the use of a pesticide.

Other government agencies supervise occupational use and environmental effects of pesticides, respectively. The National Food Agency (a general-directorate under Ministry of Agriculture) establishes maximum pesticide residue limits and monitors imported and domestically produced foods, and drinking water. Results are published the year after the monitoring took place. The Swedish Environmental Protection is the competent authority for hazardous waste management. The Swedish Board of Agriculture (in co-operation with the County Administrations) evaluates efficacy and phytotoxicity and is also responsible for the training of spray operators.

Residue monitoring

Pesticide residues in fresh and preserved fruits and vegetables (imported as well as domestic), and occasionally drinking water are monitored by the National Food Agency. Results are published annually. Residues in water have been monitored by the National Food Administration and others.

Other Legislation related to chemicals management

In addition to the Environmental Code, there are several product-related or activity-related national acts and ordinances. The chemicals control legislation of the European Community has been implemented into the national chemicals control system with only a few and basically temporary exceptions.

The use of chemicals is also regulated by the Work Environment Act, administered by the National Board of Occupational Safety and Health. Government agencies such as this one have the power to establish binding regulations under the law.

Several agencies use standard setting procedures, for example the Food Administration, the National Board of Occupational Safety and Health and others. A report (in Swedish) has recently been issued by the Swedish Toxicological Council on how and why standards are set.

The Work Environment Act (1977:1160) and the Work Environment Ordinance (1977:1166) lay down provisions to ensure a working environment which will not expose employees to ill health or accidents and which is satisfactory having regard to the nature of work and social and technical developments in the community. They also promote partnership between employers and employees in pursuit of a good working environment.

Several areas where problems related to chemicals may occur are regulated separately, e.g.:

- The Food Act (1971:511) and the Food Ordinance (1971:807) which apply to the offering for sale, selling and serving or other delivery of food for consumption.
- The Act (1985:295) on Feeding-stuffs.
- Regulations are also issued governing the import of foodstuffs, permitted food additives, residues of xenobiotics and on drinking water.

- The Medicinal Products Act (1992:859) and Medicinal Products Ordinance (1992:1752) apply to pharmaceuticals. The Environmental Code, however, is applicable to chemical products that are marketed as hygienic or cosmetic products.
- The Act (1988:868) on Flammable and Explosive Products.
- Ordinance (1988:1145) on Flammable and Explosive Products.
- The Act (1982:821) on Transportation of Dangerous Goods.
- The Ordinance (1982:923) on Transportation of Dangerous Goods.

The Secrecy Act (1980:100) contains provisions on secrecy applicable to inter alia supervisory agencies under the Ordinance on Chemical Products and Biotechnical Organisms. Secrecy shall apply to information about the business or management conditions, inventions or research results of a private person, if it can be assumed that the person concerned should suffer economically if the information was to be disclosed.

Regulations on PCBs

The Swedish ordinance (Order 2007:19 on PCB:s etc.) replaces and extends the two previous Swedish ordinances regulating PCBs: the Ordinance on PCBs and the Ordinance on the Disposal of PCBs. The regulation is partly harmonised within the European Union through the POPs Regulation, and Sweden has also implemented the Directive (96/59/EC) on the disposal of PCB/PCT. The 2007 ordinance forms the major part of Sweden's implementation of the Directive. Some of the most important sections of the ordinance are summarised below:

The Ordinance contains definitions of a PCB and a PCT preparation and a PCB and a PCT product. The limit values are 50 ppm (mg/kg) for e.g. sealants and flooring material and 2 ppm (mg/kg) for insulation liquids. It also includes a ban on the manufacture, processing, marketing and transfer of such preparations and products, for use or reuse.

A transformer or the type of capacitor with a power higher than two kilovolt-amperes (reactive) must not be used if it contains a PCB product.

Anyone who holds equipment which contains or which can be assumed to contain more than five cubic decimetres of a PCB product shall notify the Swedish Environmental Protection Agency of this fact immediately. The holder of such equipment shall also ensure that the equipment is decontaminated immediately.

The 2007 ordinance also requires compulsory inventories of PCB sealants and flooring materials and remediation/decontamination of sealants and floorings containing more than 500 ppm (mg/kg) PCB before 30 June 2016.

Anyone who owns a building or other installation in which joint-sealing compounds or anti-skid flooring compounds may have been used during erection or renovation in the period from 1956 to 1973 shall investigate whether the joint-sealing compound or flooring compound is a PCB product. The

owner shall ensure that sealants and flooring containing more than 500 ppm (500 mg/kg) PCB product is removed according to the timelines given in the ordinance i.e. 2016 at the latest.

Anyone who holds a PCB product or equipment that contains or may be assumed to contain a PCB product shall ensure that the product or equipment is clearly marked with the information that it contains a PCB product.

The management of PCB in waste from electrical and electronic products is regulated by the Swedish Environmental Protection Agency's Regulations on Professional Pre-treatment of Waste Electrical and Electronic Products (NFS 2005:10). The management of PCB capacitors is also mentioned in Directive 2000/53/EC on end-of -life vehicles and in the Ordinance (2007:186) on vehicle disposal.

Regulations on stockpiles and wastes

The new Swedish Waste Ordinance (2011:927), which entered into force on 9 August 2011 forms part of Sweden's implementation of the waste framework direcitve of the European Union. The Waste Ordinance includes among other things rules on the procedures to be followed in the handling, transport, recovery and disposal of wastes.

Due to the early phase-out of most POPs in Sweden, there are no known stockpiles of POPs substances. Some of the POPs substances, typically those which have been used in products with a long life-span, may still however remain in products and articles in use in Sweden. These are for example PBDEs in electrical and electronic equipment or vehicles and PCBs in sealants and flooring material.

The waste ordinance along with chapter 15 of the Swedish environmental code and the EU POPs regulation regulate the safe handling and disposal of waste containing POPs. Sweden has a good capacity for incineration of waste, for example waste containing PCBs is subject to high temperature incineration at the SAKAB facility.

The classification of waste as hazardous follows the European List of Waste which is currently under revision to be adapted to the EU CLP classification system. This revision along with the setting of limit values for the new POPs under the EU POP regulation are expected to further clarify the requirements for classifying waste containing POPs as hazardous waste and the subsequent treatment and destruction.

Under the Ordinance on Environmentally Hazardous Activities and Health Protection (1998:899), professional storage and treatment of hazardous waste may only be undertaken with a permit from the competent authority (an environmental court or county administrative board).

Regulations on releases of unintentionally formed POPs

National regulation on chlorinated dioxins and furans exist in relation to the incineration of waste, under the Waste Incineration Directive (WID) (EC/2000/76). In Sweden this directive is implemented as general binding rules setting minimum standards for the whole waste incineration (and co-incineration) sector. Since the regulation not only includes emission limit values but also construction and management obligations, it is also expected to promote the reduction of other POPs than dioxins and furans.

As regards other POPs, and other sectors, conditions regarding emissions of POPs are set individually, e.g. for industrial installations.

Regulations on waste

Unintentionally formed POPs in wastes, such as fly ash from waste incinerators, are regarded as hazardous wastes if they meet the criteria for classification as such wastes. The provisions on hazardous waste mentioned above also apply to wastes containing unintentionally formed POPs, if those wastes are classified as hazardous wastes. Even if concentrations of POPs are below the level to be classed as hazardous waste, fly ash may not be allowed to be landfilled. The reason for this is that the ash will normally not meet the criteria for the acceptance of waste at landfills (Council Decision 2003/33/EC).

Regulations on food and feed

Commission Regulation (EC) No. 466/2001 of 8 March 2001 sets maximum levels for certain contaminants in foodstuffs. There is also a Commission Recommendation of 6 February 2006 (2006/88/EC) on the reduction of the presence of dioxins, furans and PCBs in feeding stuffs and foodstuffs.

The EU has established maximum limits for dioxins and dioxin-like PCBs in food and feed, at strict but feasible levels. It is intended that these levels should gradually be lowered, in order to eliminate products with unacceptably high levels of contamination. In the event of an abnormal increase in levels of these compounds, it is important to identify sources and/or pathways of contamination. In order to determine what are to be considered abnormally increased levels, action levels are set. Action levels are designed to trigger a proactive approach on the part of competent authorities and operators, with a view to identifying sources and pathways.

Target levels are the levels to be achieved in food and feed whereby it can be reasonably assumed that the dietary exposure of a large majority of the European population will be within the tolerable weekly intake for dioxins and dioxin-like PCBs. (se also.2.3.6)

2.2.5 Key approaches and procedures for POPs chemical and pesticide management including enforcement and monitoring requirements

See 2.2.1 and 2.3.6.

2.3 Assessment of the pops issue in the country

2.3.1 Assessment with respect to Annex A

2.3.1.1 PESTICIDES AND HCB

Historical, current and projected future production

None of the listed POPs pesticides have been produced in Sweden.

Use, import and export

With regard to the "old" POPs pesticides listed in2001, *Endrin* was banned in 1966, followed by *Aldrin* and *Dieldrin* in 1970 and *Chlordane* in 1971. The use of *DDT* in Sweden was banned in 1975. , and *hexachlorobenzene* (HCB) that once also was used as a pesticide was banned in 1980. *Heptachlor* and *Toxaphene* had never been used as pesticides in Sweden but were banned as active ingredients in pesticides through an administrative decision with effect from year 2000. *Mirex* has never been used in Sweden and was banned in 2004 through the EC Regulation on POPs (850/2004).

Hexachlorobenzene (HCB) is also an industrial chemical. All use or import of HCB in articles is prohibited by the POPs-regulation (EC) No 850/2004. The substance has however been found in fireworks sold on the Swedish market. Hexachlorobenzene HCB can enhance the color of fireworks but should have been substituted. In the autumn of 2011 twelve fireworks were analysed by the Swedish Chemicals Agency. Three of them contained high levels of the banned substance hexachlorobenzene (HCB). A previous analysis of fireworks made in the autumn and winter of 2010–2011 showed that six out of eight fireworks contained HCB. The companies that imported the fireworks in question have been contacted and informed about the analytical results. The Swedish Chemicals Agency has requested particulars on how large quantities of the fireworks the companies have imported and sold, and when the last import was made. Companies have also had the opportunity to comment on the circumstances surrounding the high levels of HCB found.

With regard to the "new" POPs pesticides listed in 2009, *Chlordecone*, CAS no. 143-50-0, was banned in 1978 and *Gamma hexachlorocyclohexane (HCH) or Lindane,* CAS no. 58-89-9, was banned in 1989. Lindane was previously used as an insecticide in pharmaceutical products against lice and scabies.

Pentachlorobenzene, PeCB, CAS no. 608-93-5, was originally used in the production of pesticides, one of them being quintozene, in which it occurs as an impurity. The use of Quintozene is prohibited in Sweden since 1985 and within EU since 2000.

Existing policy and regulatory framework

Production, placing on the market and use of aldrin,, dieldrin, chlordane, endrin, heptachlor, mirex, toxaphene, hexachlorobenzene, DDT and HCB as such, in preparations or in articles is prohibited by Regulation (EC) No 850/2004 since 2004. No country specific exemptions are allowed.

Production, placing on the market and use of all the HCH isomers (including Alpha-, Beta- and Gamma-hexachlorocyclohexane), chlordecone and pentachlorobenzene, whether on their own, in preparations or as constituents of articles are prohibited by the POPs-regulation (EC) No 850/2004 since August 2010.

Summary of available monitoring data (environment, food, humans) and health impacts

Most of the pesticide POPs have been included in Swedish monitoring programmes in biota and in food (see 2.3.6).

2.3.1.2 PCB

Historical, current and projected future production

PCBs have never been synthesised on a commercial scale in Sweden. However, they have been produced for reference substance purposes. Technical PCBs and products containing PCBs have been imported for various uses. The main suppliers were Monsanto (USA and UK), Bayer (Germany) and Prodélec (France). Swedish manufacturers of PCB capacitors were ASEA (now ABB), in the case of power capacitors, and Rifa (before 1971), for small capacitors.

Use, import and export

An important use of PCBs has been in the manufacture and use of electrical capacitors. As mentioned above, both power capacitors and small capacitors containing PCBs were previously manufactured in Sweden, and an important share of the total production, especially of power capacitors, was exported. Only a limited number of PCB transformers, around 200, have been used in Sweden. Another important use is as a plasticiser in sealants used for joints in buildings: between prefabricated concrete cladding panels, in dilatation joints for large brick façades, around retail store fronts and around windows. Insulating glazing has been sealed with a sealant plasticised with PCBs. These sealants were mainly manufactured under licence in Sweden. The use of PCBs as hydraulic and heat transfer fluids was discontinued in the early 1970s, following the denial of permits. PCBs have also been used in paints for ships and corrosive environments. An application in the food industry was as a plasticiser in an acrylic, non-skid flooring material. In addition, PCBs were used as a solvent in carbon-free copying paper.

New use of PCBs is not allowed in Sweden. The use of transformers and power capacitors containing PCBs has not been permitted since 31 December 1994. The phase-out decision was a consequence of a steel mill fire and several incidents involving PCB power capacitors. Remaining ongoing uses are

in buildings, in the four applications mentioned: sealants, window insulation, non-skid flooring and small capacitors (fluorescent lamp ballasts and start capacitors for small, one-phase electric motors). The former use of PCBs in carbonless copying paper has resulted in emissions from paper mills using recycled paper and has required remediation measures. Some of this paper remains in archives and landfills. PCBs in electrical equipment also contribute to the PCB content of (old) landfills.

Few data are available on the quantities involved. Two surveys of PCB use were carried out when these chemicals had been detected in biological samples in 1966 and when regulation of PCBs was introduced a few years later. An estimate has also been made of imports of technical PCBs, but not of exports of products containing PCBs.

Table 2.3.1.2-I: Use of PCBs in Sweden in 1969.

Use of PCBs in Sweden in 1969	
Capacitors and transformers	450–500 tonnes
PVC and other paints (1,000 tonnes of paint)	55 tonnes
Ship paints (400 tonnes of paint)	15 tonnes
Sealants (160 tonnes of sealant)	35 tonnes

In 1983, the total estimated amounts in power capacitors were 1,500 tonnes (100,000 units) and in transformers 500 tonnes (200 units).

Table 2.3.1.2-II: Use of PCBs in Sweden in 1971.

Use of PCBs in Sweden in 1971	
Capacitors	about 375 tonnes/year, of which some 250 tonnes/year was exported in manufactured products
Transformers	in all, some 175 units, containing 500 to 2,000 kg per unit
Paints	about 35 tonnes/year
Sealants	40–45 tonnes/year
Hydraulic fluids	8–10 tonnes/year
Heat transfer fluids	8–10 tonnes in all in equipment

The estimated import of PCBs over the years 1957–1980 totalled 8,000–10,000 tonnes, of which probably more than 50% was exported in products.

Existing policy and regulatory framework

The section Regulation on PCBs above describes the current Swedish PCB legislation in more detail.

PCBs were first identified in biological samples in Sweden in 1966. The first regulation of their use came into force in 1971. The rules did not ban the use of PCBs outright, but did strongly restrict their use by introducing a permit requirement. The use of PCBs in power capacitors for phase compensation of long power transmission lines from northern Sweden was permitted,

since it was deemed essential to the power supply system and no substitutes were available. Only a limited number of operators were involved, most of them publicly owned, which meant that a high level of control could be maintained. The result of the regulation was that all new use of PCBs except in power capacitors ceased in 1973, and that no permits for power capacitors were granted after 1978.

A Swedish ordinance (March 2007) requires compulsory inventories of PCB sealants and flooring materials and remediation /decontamination before 30 June 2016. The inventory and remediation of PCBs in building i.e. sealants and floorings requires trained personal with technical expertise as well as appropriate measures to prevent spreading of PCB. The remediation should preferably be supervised by local authorities.

For PCB in sealed insulating window panes, no covering inventory is made. There is no indication saying that there are any releases of PCBs to the environment while they are in use as windows. The management in the waste handling system makes use of high temperature incineration.

An ongoing use of PCBs in buildings is known for four purposes: as plasticizer in sealants; sealed insulating windows; acrylic flooring; and for impregnating small capacitors used in fluorescent lamp fittings, small one-phase motors in dishwashers etc. The use was banned in 1973. There is no ban on the continued use of these small capacitors, but they must not be reused.

Apart from the PCBs occurring in the products mentioned above, PCBs are still found in low concentrations (typically below 50 ppm) as contaminants in insulations liquids in transformers and some types of cables.

Summary of available monitoring data (environment, food, humans) and health impacts can be found in section 2.3.6.

2.3.1.3 POPS FLAME RETARDANTS

Historical, current and projected future production

None of the listed flame retardants have been produced in Sweden.

Commercial pentabromodiphenyl ether (c-pentaBDE) and *Commercial octabromodiphenyl ether (c-octaBDE)* are both mixtures of various bromodiphenyl ethers.

Commercial pentaBDE is included in the Stockholm Convention as *tetrabromodiphenyl ether and pentabromodiphenyl ether*. The description in the Convention is: BDE-47 with CAS no. 40088-47-9, BDE-99 with CAS no. 32534-81-9) and other tetrabromodiphenyl and pentabromodiphenyl ethers present in c-pentaBDE.

Commercial octaBDE is included in the Stockholm Convention as *hexabromodiphenyl ether and heptabromodiphenyl ether*, which refer to BDE-153 with CAS no 68631-49-2, BDE-154 with CAS no.207122-15-4), BDE-175 with CAS no 446255-22-7), BDE-183 with CAS no. 207122-16-5 and other hexabromodiphenyl and heptabromodiphenyl ethers present in c-octaBDE.

Hexabromobiphenyl (HBB) is included in the Stockholm Convention with CAS no.36355-01-8, which stands for the most commonly occurring isomers of HBB.

The use of *Pentachlorobenzene, PeCB* as a flame retardant and as an agent for reducing the viscosity of materials containing PCB that were used as heat conductor is prohibited in Sweden since 1980s.

Use, import and export

Brominated flame retardants (BFR) are generally entering Sweden incorporated in products and not as raw material. i.e. materials flame-retarded with BFRs are only to a minor extent manufactured in Sweden.

It is for new electrical and electronic equipment prohibited that they contain polybrominated biphenyls (PBB, including HBB) or polybrominated diphenyl ethers (PBDE, including pentaBDE and octaBDE).

Flame retardants containing bromine (which are more inclusive than pentaBDE, octaBDE and HBB) are mainly used in the polymer, plastics and textile industries, where they are added to or mixed into plastics to make them non-flammable. These materials are also used in the casings of electronic and electric equipment, such as printed circuit boards and plastic casings. According to the BiPRO Report 2010 the predominant source of pentaBDE is from polyurethane foam in automotive applications and in upholstery (furniture) and the predominant source of octaBDE is from ABS plastic in electric and electronic equipment.

The volumes of the regulated BFRs or other BFRs that are entering Sweden incorporated in products such as construction material or automotive parts each year are not estimated. Examples of imported products that could continue to include regulated BFRs are; circuit boards, light switches, cables, electrical outlets, surveillance equipment, and elevators, electrical installations cables, plastic details, light switches, surfaces carpets (textiles and polyolefin), panels, HVAC materials ventilation material of plastic, plastic containing products like fans, pipe, insulation of rubber or plastic, refrigerating machines, heating pumps, roof/ceiling glass incrusting, ceiling lining fabric (Jonsson and Felix, 2010).

Penta- and octaBDE are still present in e.g. electrical and electronic equipment and vehicles in use in Sweden. The safe handling and disposal of waste containing penta- and octaBDE will be an important task for Swedish waste management and recycling industry for some years to come.

Existing policy and regulatory framework

Production, import and use of POPs flame retardants, whether on their own, in preparations or as constituents of articles are prohibited by the POPs-regulation (EC) No 850/2004.

Production, placing on the market and use of pentabromodiphenylether and octabromodiphenylether are restricted by the POPs-regulation with following limits;

1. Shall not be placed on the market or used as a substance or as a constituent of preparations in concentrations higher than 0.1% by mass.
2. Articles may not be placed on the market if they, or flame-retarded parts thereof, contain this substance in concentrations higher than 0.1% by mass.

According to Directive 2002/95/EC (RoHS Directive), which aims is to restrict hazardous substances in electrical and electronic equipment, from 1 July 2006, new electrical and electronic equipment put on the market shall not contain polybrominated biphenyls (PBB, including HBB) or polybrominated diphenyl ethers (PBDE, including pentaBDE and octaBDE).

According to the Swedish Construction Federation (Sveriges Byggindustrier) the construction industry is trying to eliminate the use of hazardous substances in construction materials (Jonsson and Felix, 2010). A system called BASTA has been initiated with the purpose to accelerate the elimination of hazardous materials. The system, which includes a database, is used by the suppliers to determine if their products fulfill a certain standard to pass the criteria of BASTA. According to the Swedish Construction Federation, there are no systematic investigations to control the amount of BFR in waste from the construction industry.

To have a better control of the content of the components that the car companies use, International Dismantling Information System (IDIS) is used by the automotive industry for monitoring components and the substances used in them. However IDIS does not provide specific information about BFRs (Jonsson, and Felix, 2010)

Summary of available monitoring data (environment, food, humans) and health impacts PentaBDE, octaBDE, PeCB and Hexabrombifenyl have been included in Swedish monitoring programmes in biota and in food (see 2.3.6).

2.3.2 Assessment with respect to Annex B chemicals

2.3.2.1 DDT

Consumption peaked in the 1960s, when just less than 100 tonnes was applied yearly, above all to arable land. In 1970, the use of DDT in agriculture was banned. A special exception allowed forest owners to use this substance until 1975, when it was completely banned.

Summary of available monitoring data (environment, food, humans) and health impacts can be found in section 2.3.6

2.3.2.2 PFOS

Historical, currrent and projected future production

PFOS or PFOSF has never been produced in Sweden. The Stockholm Convention refers to PFOS as perfluorooctane sulfonic acid (CAS number 1763-23-1), its salts and perfluorooctane sulfonyl fluoride (CAS number 307-35-7). The CAS numbers in the Convention are those of the PFOS salts that are commercially important: 2795-39-3, 29457-72-5, 29081-56-9, 70225-14-8, 56773-42-3 and 251099-16-8). PFOSF is used as the starting compound/intermediate to produce all PFOS compounds. (UNEP Risk profile 2006). The production and use of PFOS is restricted to specific exemptions and acceptable purposes as described in Annex B of the Convention.

PFOS-related substances are extremely persistent fluorinated compounds, that does not hydrolyse, photolyse or biodegrade in any environmental condition tested (OECD, 2002). The only known condition whereby PFOS is degraded is through high temperature incineration under correct operating conditions (3M, 2003). Potential degradation at low temperature incineration is unknown.

Use, import and export

PFOS has been imported to Sweden over a long period for a variety of industrial applications. In the past, PFOS had many uses in articles such as textiles, leather, carpets, paint, paper, cardboard and fire-fighting foam. PFOS also has a number of ongoing industrial uses globally in a wide variety of products and processes, among them being microchips, chrome plating, and as a component of hydraulic fluids for aircraft (UNEP-risk profile, 2006).

While most uses of PFOS have been phased out, Sweden has an ongoing use of PFOS in hard metal plating. The uses falls under the exemptions a) and d) listed below. According to the POPs-regulation, the use in not closed loop systems has to be phased out by 26 August 2015. According to the Swedish Products register (KemI 2011) approx. 190 kilos of PFOS was imported in 2010. PFOS continues to be imported for industrial applications in the metal-working industry as wetting agents for use in controlled electroplating systems. PFOS is useful as a surfactant, wetting agent and mist suppressing agent for chrome plating to decrease aerosol emission and improve the work environment.

In an inventory made in 2011 the emissions to waste water was estimated to be 1.9 kg/year in Sweden and that the rest mainly treated as hazardous waste (Cohiba 2012). According to the BiPRO Report 2010 the main emissions of PFOS from the metal plating industry are found in the waste water whereas the amounts to air are considered very low. Activated carbon can be used to capture PFOS in the waste water. Sewage sludge is another relevant path for PFOS by which it leaves the facility as waste. A rough estimate indicates a content in sludge in the vicinity of 4 kg PFOS to be continue to be released each year in Sweden during the continued import and use of PFOS as a demister and humidifier for non-decorative chrome-plating purposes even though alternatives exist.

Imported articles can be assumed to still constitute the largest proportion of imported PFOS to Sweden.

An unknown amount of PFOS continues to be imported in electronic equipment and hydraulic aviation oils, as there currently are no or few alternatives and there are continued global uses of PFOS in the production. PFOS is likely also still imported in articles such as carpets, outdoor garments, packages etc. even though alternatives exist as there are continued global use of PFOS in the production of such articles.

Substantial amounts of PFOS and PFOS-related substances are released into the environment during the ongoing use of materials or products containing PFOS in industrial and consumer applications and during the waste stage after their use. The amounts installed or present in the waste streams in Sweden are not estimated. According to the BiPRO Report 2010 the sources of PFOS are dominated by wastes resulting from the use in carpets (94%) followed by the use of fire fighting foams approx. 5 %) and the leather industry (approx. 1%) The emissions from the other sectors like hydraulic fluid, photo industry, metal plating etc are of minor importance. To repel water, oil and dirt (stains) from carpets as much as 15% of the fibre weight is PFOS. Previous reports assessing the use of PFOS in Sweden has not indicated any large amount of PFOS emissions coming from the use in carpets. In most domestic houses stain repellant carpets are not common. However, in hotels or public buildings the use of such carpets could be substantial also in Sweden.

Import of PFOS-containing fire-fighting foam ended in 2003. An estimation from 2004 (KemI report 3/04) indicated that the maximum amount of PFOS in installed fire-fighting foam then was 1,500 kilos. The use of installed PFOS-containing fire-fighting foam is not allowed since July 2011. The amount of fire-fighting foam containing PFOS still present throughout Sweden is estimated to be low.

Fire training areas have been revealed to previously constitute a source of PFOS emissions due to the presence of PFOS in fire-fighting used for exercises or training. All such use ended before 2006 (Kemi report 7/06) High levels of PFOS have been detected in neighbouring wetlands of such an area in Sweden (Swedish EPA, 2004).

Existing policy and regulatory framework

The use of PFOS has within EU been restricted for many applications since December 2006. Since August 2010 production, import and use of PFOS and PFOSF are restricted by the POPs regulation (EC) No 850/2004 with derogations.

As soon as new information on details of uses and safer alternative substances or technologies becomes available, the derogations will be reviewed so that the uses of PFOS will be phased out as soon as the use of safer alternatives is technically and economically feasible. A derogation can only be continued for essential uses for which safer alternatives do not exist and where

the efforts undertaken to find safer alternatives have been reported on and releases of PFOS into the environment have been minimised by applying best available techniques.

If the quantity released into the environment is minimised, production and placing on the market is allowed for the following specific uses provided that Sweden report to the Commission every four years on progress made to eliminate PFOS:

a) until 26 August 2015, wetting agents for use in controlled electroplating systems;
b) photoresists or anti reflective coatings for photolithography processes;
c) photographic coatings applied to films, papers, or printing plates;
d) mist suppressants for non-decorative hard chromium (VI) plating in closed loop systems;
e) hydraulic fluids for aviation.

By way of derogation fire-fighting foams that have been placed on the market before 27 December 2006 could be used until 27 June 2011.

Summary of available monitoring data (environment, food, humans) and health impacts

PFOS have since 2002 been included in Swedish monitoring programmes in biota and in food (see 2.3.X). The results display a trend of increasing concentrations since 1968 (17 – 623 ng/g) in some environmental matrixes. In human blood serum the levels are decreasing since the end of the 1990s.

The criterion for the total ingestion of PFOS via food each day is the tolerable daily intake (TDI) of 150 ng/kg body weight (EFSA, 2008). Concentrations in fish liver caught in background areas in Sweden have been reported ranging from 1 to 18 ng/g wet weight. The concentration in fish muscle is generally lower than in the liver but it cannot be ruled out that the TDI can be exceeded by people who eat large amounts of fish, especially from exposed areas. In humans levels of PFOS of 5 ng/g ww have been observed and perch muscle from locally exposed areas have shown to reach 200–800 ng/g.

2.3.3 Assessment of releases from unintentional formation of Annex C chemicals

In 2005 the Swedish Environmental Protection Agency presented a study of existing national knowledge concerning sources of unintentionally formed substances such as dioxins (PCDD/F), polychlorinated biphenyls (PCBs) and hexachlorobenzene (HCB) (Survey of unintentionally formed substances, Swedish EPA Report 5503). That study also covered the management of waste containing these substances and the occurrence of contaminated sites. It was the first study in Sweden involving the systematic collection of data on unintentional formation of PCBs and HCB. In the case of dioxins, an extensive survey had been carried out between 1988 and 1992 (de Wit & Strandell, 2000). The contents of this section are taken from the Swedish EPA survey mentioned above.

Since the 1970s, levels of dioxins, PCBs and HCB in the Swedish environment have fallen. Although action has been taken to reduce all known primary sources, the decrease has been less pronounced in recent years. Levels of these compounds in human breast milk and in fish from the Baltic Sea could still be unacceptably high, and constitute a risk to human health. In order to take further effective measures for protection of human health and the environment, there is a need for better data and knowledge concerning the formation, release, dispersion and cycling of these compounds.

Today, emissions of unintentionally formed POPs often occur at levels that are considerably lower compared to a few decades ago. The amounts of POPs released are however still significant, owing to the large volumes of i.a. flue gases and wastes as ashes.

Currently little is known in Sweden on the amounts of unintentional formation of PeCB. This is due to the fact that it has not been asked for earlier.

Primary sources

Since 1992, some studies and analyses with the aim of identifying new and quantifying known sources of unintentionally formed substances have been carried out in Sweden. An overall picture is however still missing. More recent analyses are completely lacking from several industrial sectors, while only a few have been performed in others. It is uncertain how representative these analyses are for the current conditions as they generally include a limited number of samples usually without replicates. This lack of samples results not only in uncertainty on the quantities but also on the variation occurring. Therefore, there is a lack of knowledge on the variations of formation and release of the substances concerned during different phases of industrial processes. The formation and emission of dioxins and other POPs formed unintentionally may be several times higher during the start-up phase or during disruptions to operations. More samples are needed to represent the full cycle of the processes concerned, including temporary disruptions.

Since the 1980s, a number of actions have been taken to reduce formation and emission of dioxins from a number of industry categories. It is likely that these actions also have resulted in reductions of formation and emission of PCBs and HCB.

Tables 2.3.3-I and 2.3.3-II show the magnitudes of a number of primary sources of dioxins and unintentionally formed PCBs and HCB. The tables give an idea of the relative order of magnitude of the different sources, rather than exact values. Several of the figures in the tables involve a wide range of uncertainty, as different measurements and other attempts at accurate quantification have yielded widely diverging results. This underscores the need to produce more reliable data that will enable the real situation to be assessed. Quantities of dioxins have been estimated using different systems, and are shown in grams TEQ (toxic equivalents). The systems used are Eadon, I-TEQ, N-TEQ and WHO-TEQ. The values are therefore not fully comparable

Table 2.3.3-I: Magnitudes of a number of primary dioxin sources today. Quantities of dioxins have been estimated using different systems, and are shown in grams TEQ (toxic equivalents). The systems used are Eadon, I-TEQ, N-TEQ and WHO-TEQ. The purpose of the table is to give an idea of the relative order of magnitude of the different types of sources. A dash means that no reliable data are available. The figures are based on emission factors and/or measurements.

Dioxins			
	Releases to air (g TEQ/yr)	**Releases to water (g TEQ/yr)**	**Products and wastes (g TEQ/yr)**
Iron and steel works and pellet plants	5.9–8.6	–	–
Non-ferrous metal works and foundries	5.6–10.3	–	<2
Cement industry	Cement industry	–	–
Pulp and paper industry	‹‹1.2	<0.1	<5
Chlor-alkali industry	–	0.001–0.02	0.008–0.26
Fossil fuel-fired boilers	<4	–	–
Small-scale wood burning and large-scale burning of biomass fuels	<14	–	<11
Waste incineration	1.1	–	~ 160
Landfill fires	0.4–65		
Road transport	0.6		
Shipping to and from Swedish ports	0.2–0.5		

Table 2.3.3-II: Magnitudes of a number of primary sources of unintentionally formed PCBs and HCB today. Quantities of PCBs have been estimated using different systems: each number is labelled and explained in the footnotes below the table. The purpose of the table is to give an idea of the relative order of magnitude of the different types of sources. A dash means that no reliable data are available. The figures are based on emission factors and/or measurements.

PCBs and HCB						
	Releases to air		**Releases to water**		**Products and wastes**	
	PCBs (g/yr)	**HCB (g/yr)**	**PCBs (g/yr)**	**HCB (g/yr)**	**PCBs (g/yr)**	**HCB (g/yr)**
Iron and steel works and pellet plants		33,000				
Non-ferrous metal works and foundries		370–1,500			0.1[1]	
Cement industry	0.4[1]	<3.9				
Pulp and paper industry						
Chlor-alkali industry			0.1– .65[1]	1.5–15.5	0.4–1.2[1]	7–29
Fossil fuel-fired boilers						
Small-scale wood burning and large-scale burning of biomass fuels	< 0.4[1]	<800			1,000–7,000[2]	50–330
Waste incineration	< 120[2]				3,000–4,000[2]	600–6,000
Landfill fires	300–4,000[3]	100–2,500				
Road transport						
Shipping to and from Swedish ports	280–660[2]	70–160				

[1] TEQ
[2] PCB_{tot}
[3] PCB_7

Incineration still seems to be an important source of emissions of dioxins to air (table 2.3.3-I. Biomass burning (including small-scale wood incineration and large-scale burning of biomass fuels), backyard burning, accidental landfill fires and the use of fossil fuels are example of sources.

There are large variations in releases of dioxins, PCBs and HCB from different kinds of small-scale incineration (tables 2.3.3-I and II). These variations are due to differences in the quality and age of the boilers used, the composition of the fuel, the burning procedure etc. Old boilers are often particularly problematic in the start-up phase, with poor incineration conditions. Adding plastics dramatically increases emissions. Other tests have shown that burning wood treated with chlorophenols also results in higher releases. Recent incineration studies simulating back yard burning in metal drums have produced similar results.

The formation and release of these compounds in accidental landfill fires are extremely difficult to estimate. There are major uncertainties regarding the scale, composition and frequency of such fires. The method used to put out the fire can also affect the formation and emission of the compounds of concern.

Emissions of dioxins, PCBs and HCB to water come primarily from the pulp and paper industry and the chlor-alkali industry (tables 2.3.3-I and II). The values in the tables, are however, based on a very limited set of data and thus very uncertain.

Municipal waste incineration is still an important source of dioxins (table 2.3.3-I). Today, very small amounts are released to air, owing to the widespread introduction of flue-gas cleaning. Instead the dioxins are caught in the fly ash and end up in landfills. Similarly, the primary and secondary steel industry has introduced flue-gas cleaning systems which collect dust in fabric filters, venturi scrubbers or electrostatic precipitators. An estimate of the dioxin content of the dust thus collected in the steel industry is in the range of 0.8–140 g per year. However, a major part of the dust removed is reprocessed within the industry and only a small portion of it goes to landfill.

Secondary sources

As releases from primary sources have abated, secondary sources have become more important in relative terms. Very little is known about the quantities, releases, dispersion and cycling of dioxins, PCBs and HCB from secondary sources.

The total quantities of dioxins, PCBs and HCB currently to be found in and around different contaminated sites may be substantial. Some of these sites could therefore be of appreciable significance for the current and future exposure of humans and the environment to these substances. Our knowledge of the real quantities of dioxins, PCBs and HCB in contaminated sites, however, is very limited. Often only a few samples are analysed from a limited number of sites and, given the heterogeneous character of the contamination, quantification of the substances is difficult to perform. The magnitude of releases to water and air is also hard to quantify, as it may vary between sites.

Atmospheric transport and deposition contribute to the total loading of dioxins to the environment. The significance of long-range transport for the environmental load is poorly understood.

Timber treated with pentachlorophenol (PCP), and with similar, previously dioxin-contaminated compounds, constitutes another potentially important secondary source. This method of treatment was outlawed in Sweden in 1976. Of the estimated total of 200 kg of dioxins (as TEQ) once incorporated in timber, up to 30 kg could still be present in treated wood in Swedish society. The extent of this problem, the potential for leaching and possible remedial action need to be studied more closely.

Results of previous measures

Levels of PCBs and HCB in the environment have decreased since the 1970s. This can be attributed partly to the bans that have been introduced, and partly to the measures taken to reduce the formation and release of dioxins. The decreases may also be a result of other measures introduced with the aim of curbing emissions and discharges more generally, e.g. improved particulate control.

Regarding PCBs, unintentional formation can make only a limited contribution to the overall quantities occurring in the environment. The main bulk of the total is likely to originate from the former use of these compounds in condensers, transformers, plastics, building materials etc. Compared to the situation for PCBs, a larger proportion of HCB probably originates from unintentional production.

Most of the dioxin sources identified in the 1980s have been reduced, resulting in appreciably lower emissions. Since the beginning of the 1990s, however, the reductions have been less clear-cut. In some parts of the environment the decrease has probably levelled off. Available data are very limited, however, and generalisations can easily give rise to misleading results.

In an on-going research program, BalticPOPs (www.balticpops.se), the reasons for the high and stable levels of dibenzo-p-dioxins and dibenzofurans (PCDD/Fs or “dioxins”) in Baltic biota are being investigated through new field measurements as well as through experimental and modelling studies. Atmospheric modelling studies indicate that emissions of dioxins to air, as reported by the EMEP countries to UNECE, are significantly underestimated and need to be revised. It is further shown that the dioxins levels in the Baltic Sea sediments are declining both in coastal and in off-shore areas probably as a result of actions taken to reduce emissions. The final report of the research program will be presented in the fall 2012.

Although action has been taken to reduce all identified primary sources, dioxins and related compounds still constitute a risk to human health and the environment. Further efforts to reduce the formation and release of these compounds are therefore called for.

2.3.4 Information on the state of knowledge on stockpiles, wastes and contaminated sites and remediation measures.

2.3.4.1 PESTICIDES

Contaminated sites

Work relating to contaminated sites is governed by Sweden's environmental quality objectives. Measures will be implemented at a sufficiently large portion of the prioritised contaminated sites to ensure that the environmental problem as a whole can be solved by 2050 at the latest.

The Environmental Protection Agency has requested the country's county administrative boards to submit a regional programme each year for the remediation of contaminated land. These programmes include lists of the 30 most prioritised sites in each county. Future efforts to achieve the environmental targets will focus on contaminated sites in the highest risk class. As part of a risk assessment process, contaminated sites are assigned to one of four risk classes.

At some installations, such as chlor-alkali plants and sawmills, past production methods resulted in the formation of dioxins and their release into the soil and the wider environment. In the case of chlor-alkali plants, soils and sediments are often contaminated with both dioxins and mercury. Treatment of wood with pentachlorophenol (PCP) or similar chemicals has previously occurred at around 1,122 sites but, so far, only 134 of them are among the prioritised sites. So far about 150 of 1,122 sites are undergoing investigation, one fifth in order to facilitate remidiation and 31 have already been remediated. High levels of dioxins are not uncommon at these sites, and there is a risk of leaching into groundwater. There are at this point about 22 sites where PCB is a mayor concern. About 30% of prioritised sites are contaminated by dioxins, PCBs or similar compounds. This figure will probably change as inventories and quantification of pollutants continue. Data on releases from sites are scarce and it is therefore difficult to give an accurate picture of the present state of affairs.

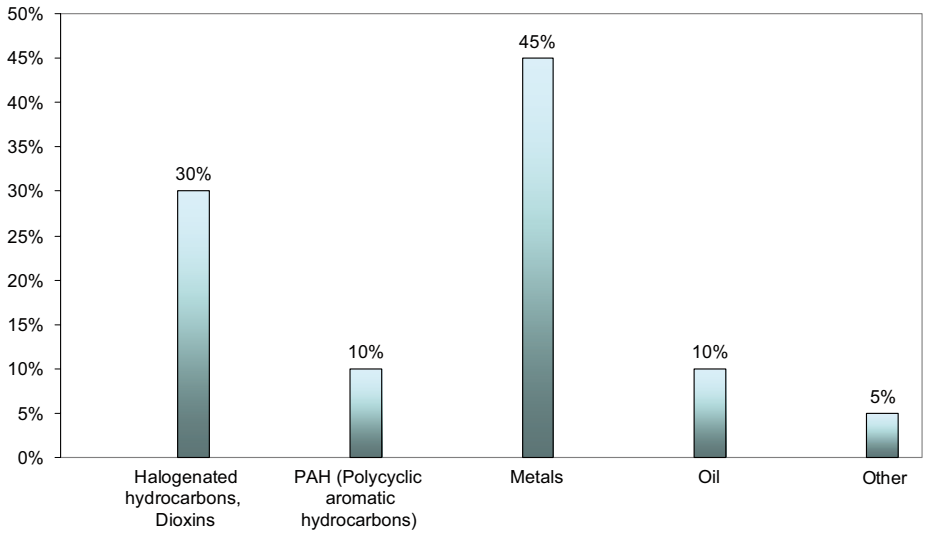

Figure 2.3.4.1-I: Common pollutants at prioritized contaminated sites.

By the end of 2011, it is estimated that the total number of contaminated sites have been identified (around 80,000 sites). Sites are assigned to one of four risk classes using a risk classification method known as MIFO (in Swedish, short for Method for Inventories of Contaminated Sites). Some 1,400 sites are in the highest risk class and have thus been given the highest priority. Where responsible operators or landowners can be identified, the supervisory authorities are seeking to enforce the necessary action, since grants are not available in such cases. Inventory work and quantification of pollutants are in progress at about 94% of the sites in the highest risk class. So far, around 200 of the sites in the highest risk class have been remediated and detailed investigations in order to facilitate remediation are in progress at another 200.

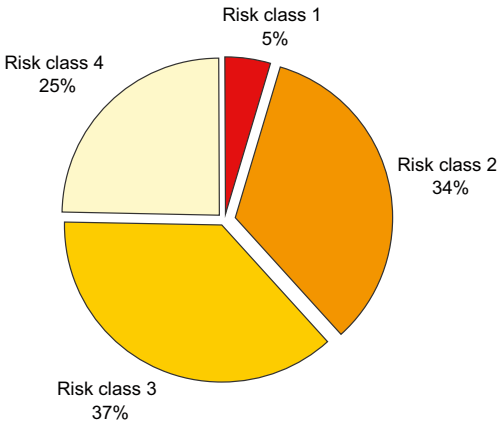

Figure 2.3.4.1-II: Breakdown by risk class of all reported sites in the MIFO database.

It is not unusual for pollutants to be unevenly distributed at a contaminated site. Furthermore, there is a risk of their being released when soils or sediments are disturbed. As the dispersion of pollutants is difficult to determine, it is almost impossible to determine the effects on the environment. Evaluation and development of sampling techniques and remediation methods are necessary to minimise future errors.

In addition, existing knowledge is insufficient to determine the significance which contaminated land and sediments may have, now and in the future, for the large-scale dispersion of pollutants such as dioxins.

As part of a programme known as 'Sustainable remediation', the Environmental Protection Agency is funding research projects, technology evaluation and development, and other projects designed to increase knowledge in this area.

Stockpiles and wastes

Due to the early phase-out of both the previous and the newly listed POPs pesticide substances and the capacity for incineration of hazardous waste in Sweden it is expected that no stockpiles or wastes of these substances remain.

2.3.4.2 PCB

Contaminated sites

There are about 22 sites where PCB presumably is a major concern. Four of them have to this date been remediated and another four are undergoing detailed investigation in order to facilitate remediation. Often the PCB contamination originates from oils used as insulations or contaminated building materials. PCB contamination is a result of leakage from transformation stations and high voltage cables and from sealants in building into the soil and groundwater. Further transportation occur through run off to surface water. Deposits where PCB contaminated construction materials previously have been tipped uncontrolled are presumed to be another major source.

In Sweden the Umeå river is a well known site where soil and river sediments are contaminated by PCB. The main source of this contamination is a scrap yard near by the river handling wasted transformers. The amount of PCB in the river sediment are estimated to 300 kilos. Detailed investigations are in progress to decide which remediation technique to use.

Stockpiles and wastes

Current inventory and cleanup of PCBs in buildings in Sweden

In Sweden during 1956–1972 some 260 tonnes of PCBs were estimated to be used in sealants and 20–30 tonnes of PCBs in flooring materials. In the late 1990s there were reports on PCBs leaking from these sealants. This marked the beginning of an extensive work in order to remove the sealants and flooring materials in buildings that act as open source distribution of PCBs. Work has been undertaken, in close cooperation between the authorities and the construction and real estate sector, and has led to comprehensive information and education activities.

Since 2007 it is regulated that buildings and structures erected between 1956 and 1973 should be investigated and remediated for PCBs in the sealants and flooring materials. Inventory should be completed in 2008. Remediation of PCBs in an environmentally sound manner should be completed by June 30, 2014 or June 30, 2016 depending on the type of building.

As part of a survey commissioned by the Swedish EPA in 2010 a questionnaire was sent to 100 municipalities, representing about 70 % of the country's building stock. The results (65 municipalities responded) indicate that local authorities have worked actively with the implementation of the ordinance.

- More than 80 % of responding municipalities have identified the properties concerned and sent written information about the regulation to the property owners.
- About 50 % of the responding municipalities have issued injunctions for inventory (affecting about 15 % of the number of properties).
- Approximately 70 % of the properties have been inventoried.
- Approximately 25 % of the inventoried properties are containing PCBs and at least 30 % of these have been cleaned up.

The total amount of PCBs detected by the inventory is very difficult to assess but a rough calculation indicates that the initial amount of PCBs was around 260 tonnes of which about 100 tonnes remains to be removed. SAKAB, who has the only facility for the destruction of PCBs in Sweden, is during 1998–2009 estimated to have destroyed around 40 tonnes of pure PCBs in sealants.

Apart from the PCB still in use in sealants and flooring materials PCBs are still found in low concentrations (typically below 50 ppm) in insulations liquids in transformers and some types of cables. As mentioned above other products still in use which may contain PCBs are sealed insulating windows and small capacitors used in lamp fittings, small one-phase motors in dish-washers etc. All types of waste containing PCB is subject to high temperature incineration.

2.3.4.3 POPS FLAME RETARDANTS

Contaminated sites

There have not been any production of the listed brominated flame retardants of other polybrominated diphenylethers (PBDE) in Sweden and no individual contaminated site where brominated flame retardants are the greatest concern are known so far.

The greatest source of brominated flame retardants are believed to be landfills although contamination also may be expected in connection to textile- and plastic industries and to manufacture sites for electronic equipments. The manufacturing sites where brominated flame retardants may have been a component in production are to a large extent identified in the regular inventory of contaminated sites performed in Sweden. Municipal sludge also have a large content of polybrominated diphenylethers .

Stockpiles and wastes

Most of the information about penta- and octaBDE in articles and waste concerns all brominated flame retardants or all PBDEs as a group. This is due to the difficulty in collecting information on specific flame retardants.

POPs flame retardants present in waste from electrical and electronic equipment (WEEE)

In Sweden, collected WEEE is sorted at pre-treatment plants run by recycling companies. As the methods applied for sorting the WEEE plastics can only distinguish between plastics containing BFR and BFR-free plastics, PBDE-containing plastics waste is handled the same way as plastics waste containing other BFRs. The major statistics related to WEEE in Sweden are presented in the table below. In the estimation of annual amount collected and treated WEEE plastics in Sweden, TVsets and computer monitors are assumed to be the major sources of WEEE plastics. Printed circuit boards are not taken into account in the terms “Fraction of plastics in collected TV sets and computer monitors” and “Fraction of plastics containing BFR” (Retegan and Felix, 2010).

Table 2.3.4.3: Waste from electrical and electronic equipment

WEEE data Sweden	Approximate annual amount (tonnes)
Collected WEEE	168,000
Fraction collected TV sets and computer monitors	40,000
Fraction of plastics in collected TV-sets and computer monitors	6,000
Fraction of plastics containing BFR	2,000

Recycling of WEEE plastics in the form of re-processing into raw material (materials recycling) is currently not carried out in Sweden. The Swedish recycling industry is for various reasons, such as environmental concerns and policies, or lack of economic incentives not prioritising the materials recycling of BFR-containing WEEE plastics. The current general handling of WEEE plastics in Sweden is to export the BFR-free plastics (4,000 tonnes per year) to Asia for materials recycling and to incinerate the remainder containing BFR (2,000 tonnes) at authorised plants in Sweden.

The Swedish market is largely requesting BFR-free products and consequently the presence of BFR is expected to decrease continuously in WEEE in Sweden (except for in printed circuit boards). The latter factors would imply a smaller national market for recycled BFR-containing plastics, lower availability of recycled BFR-containing plastics and a more costly recycling process. The Swedish recycling industry is not, therefore, presently interested in materials recycling of BFRcontaining plastics. The Swedish Recycling Industries' Association has made a statement that BFR-containing plastics must be phased out and not recycled.

Recycling of WEEE plastics containing BFRs may, in addition, lead to increased emissions of hazardous BFRs and by-products. Several investigations point at increased levels: notably polybrominated dioxins and furans in the recycling process environment, in recycled materials and particularly when PBDEs are present as flame retardants (Retegan and Felix, 2010).

PBDEs and other BFRs in end of life vehicles

The handling of ELV cars involves a first step when the cars are emptied of liquids and windshields, tyres, and some other parts are dismantled. The stripped cars are then compacted and transported to shredding. During the shredding process, a fraction called Shredder Light Fraction (SLF), also called Automotive Shredder Residue (ASR), is obtained. The SLF (including fines), which usually comprises about 20% of the ELV waste, consists of plastic, rubber and tissue (70%), metals (20%), and glass and other rubbles (10%). Besides SLF, there is a fraction called Fines, which consists of smaller pieces of the shredded material. This fraction has more or less the same composition as SLF (Jonsson and Felix, 2010).

In Sweden 133,512 end of life vehicles were reported in 2008, which will give rise to about 32,000 tonnes of SLF. According to interviews with Christer Forsgren, Technical & Environmental Director at Stena Metall AB, they have

measured the total amount of bromine in all the fractions that are produced when a car is shredded. This is done regularly by extracting samples from the shredding line and letting an independent laboratory measure bromine content using Ion Chromatography or an ion-selective electrode. The type and content of specific BFRs are not detected. The amount of bromine in the SLF was measured to be between 0.01 to 0.03%. The amount of bromine in the fraction called Fines was approximately 0.01%. Assuming a bromine content of 0.03 %, the total amount of BFRs in SLF generated in Sweden annually would be 0.0003 x 32,000 x1.62 = 16 tonnes. According to Stena, about 60% of the BFRs in the SLF, corresponding to 10 tonnes, are included in a fraction subjected to incineration with energy recovery and 40%, corresponding to 6 tonnes in a fraction that is land-filled (Jonsson and Felix, 2010).

Stena Metall AB, which is the largest metal recycling company and the major company handling ELV waste in Sweden, produces from their European operations totally about 150,000 tonnes of SLF and Fines annually. About 75,000 tonnes containing 0.01% of bromine are put on a landfill and 75,000 tonnes containing 0.01–0.03 % of bromine are incinerated with energy recovery. Incineration is carried out in an authorised waste incineration plant and the SLF is mixed with other fuels to a level of maximum 10 weight percent. It is important to keep a low SLF content in the fuel since SLF has a high heat value and moreover causes an increased ash production as well as the formation of corrosive alkali chlorides.

The reported recycling level is 91% for ELV (2008) and is achieved mainly by materials recycling of metals and to some extent by incineration with energy recovery of about half of the shredder light fraction (corresponding to about 10 weight percent of the total ELV waste). Since plastics from ELV generally end up in the SLF, they are thus not subjected to materials recycling (Jonsson and Felix, 2010).

PBDEs and other BFRs in construction and demolition waste

Waste from the construction industry and building sites is generally transported to a waste management facility operated by a recycling company, where the waste is separated into different fractions depending on material type, quality and line of use. Some of the fractions, mainly metals, are subjected to materials recycling, other fractions are subjected to incineration with energy recovery, and some fractions are land-filled. Plastics waste is normally not subjected to materials recycling, but is instead incinerated with energy recovery at authorised plants. Consequently, sorting out BFR-containing plastics from other plastics is not carried out.

During 2006, construction activities in Sweden generated close to 9 million tonnes of waste, according to a report from the Swedish EPA. Approximately 6.5 million tonnes of these are soil and minerals removed from construction sites. The remaining 2.5 million tonnes of waste constitute a mixture of many different materials used at a construction site. In 2002, the building and construction sector in Sweden generated 23,000 tonnes of plastic waste. However,

volumes of BFR-containing materials are not known. Analyses for detecting types and content of BFRs in construction and demolition waste are normally not carried out (Jonsson and Felix, 2010).

It is assumed that the major BFRs appearing in the waste stream from construction and demolition are PBDE (including deca-BDE), TBBPA and HBCDD.

In the last few years, stricter regulations related to land-filling, have led to increased volumes of construction and demolition waste subjected to incineration/energy recovery and materials recycling instead of land-filling. About 75% of the waste from the construction industry was put on a landfill in 1998, compared to only 30% in the year 2006 (Jonsson and Felix, 2010).

Waste from the construction industry usually contains a large number of different materials, e.g. plastics, concrete, soil, paper and wood. The recycling companies, engaged by the construction industry to handle waste construction materials, sort the materials into different fractions. Collection of waste from the construction industry is carried out by a large number of companies, such as Sysav, Ragn-Sells and SITA.

PentaBDE and OctaBDE appearing in the waste stream

The use of PentaBDE and OctaBDE in new products has been banned within EU since mid 2004. The total import to Sweden in 1999 of octa-, penta- and deca- BDE (PBDE) was about 20 tonnes and in 2009 only minor amounts of deca-BDE remained, according the Swedish products register. The use of PentaBDE and OctaBDE within the Swedish textile industry ended during the 1990s. The import of brominated flame retardants into Sweden is dominated by the import in finished goods (KemI 4/03). An estimation made in 1997 (KemI 6/97) is that at least 2000 tonnes per year of brominated flame retardants was imported in articles. This estimation was based on the assumption that Sweden consumes 1% of the total world production.

The lifespan of products containing BFRs varies considerably. Electric and Electronic Equipment, such as TVs and computers, which traditionally have been a major area of application for BFRs, usually have a lifetime of 5–10 years. Cars have an average lifetime of 14 years whereas buildings have a much longer lifetime (Jonsson and Felix, 2010). Consequently, current BFR-containing waste from construction and demolition has a high probability of containing BFRs banned for use in new products (e.g. PentaBDE). Many cars containing banned BFRs should have been scrapped by 2010. However, Swedish cars have a relatively long life-span and thus it can not yet be excluded that banned BFRs still appear in current ELVs in Sweden.

Both PentaBDE and OctaBDE are assumed to appear in the waste stream for at least 10–15 more years, since some of the products containing these BFRs have a relatively long lifespan. In a report from 2005, an estimation of the volumes of PentaBDE and OctaBDE appearing in the future waste stream in Sweden was made [Thuresson 2005], see table 2.3.4.4. The estimation was based on the volume of products that have entered Sweden and the amount

of PentaBDE or OctaBDE that these products were expected to contain. The report predicts significant volumes of PentaBDE and OctaBDE to enter the waste stream in Sweden in the next 5–15 years. Recalculating the data with 2010 as a starting point, yields an average total annual volume of 50–80 tonnes of PentaBDE and OctaBDE in the waste stream over the next 5–15 years (Jonsson and Felix, 2010).

Table 2.3.4.4: Estimated volumes of PentaBDE and OctaBDE entering the waste stream in Sweden with the year 2005 as a starting-point.

Lifetime of product	PentaBDE (tonnes)	OctaBDE (tonnes)
5 years	–	212
10 years	283–306	507–577
20 years	471–589	–

2.3.4.4 PFOS

Contaminated sites

At fire drilling sites used by the fire brigades PFOS are to be expected. These compounds originate from foam consisting of PFOS in fire extinguishers. Sites known to be contaminated with PFOS are a former school of civil defence in Rosersberg, airports such as Arlanda and Landvetter where there have been several fire drilling sites. High levels of PFOS have also been found in snow from airports suggesting that PFOS in the oils used in aircrafts reaches the vicinity. In 2009 a five year research project about PFOS in connection to the large Swedish airports began. The project named RE-PATH is carried through by IVL the Swedish Environmental Research Institute and is financed through the foundation of IVL, by The Swedish Environmental Protection Agency and state-owned Swedavia AB who owns and operates most of the Swedish airports. The research aims to clarify the human and environmental risks with PFOS and what measurements that are possible at these sites. Besides the soils the surface water areas in connection to the airports are affected by PFOS. In lake Halmsjön at Arlanda airport, very high concentrations of PFOS (86 ng/l in water and 61 ug/kg TS in sediment) have been found in both sediments and fish (perch). Another source of PFOS are sewage treatment plants and the diffuse discharge from households and industries.

Stockpiles and wastes

The volumes of stockpiles of fire fight foam containing PFOS remaining in Sweden are estimated to be insignificant.

The sludge from the metal industry where the PFOS used could end up, is put on landfills for hazardous waste. The sludge, approximately 5,000–6,000 tons annually, consists mainly of metal hydroxides. The leachate is collected and treated.

The use of stain repellant carpets that could contain PFOS is uncommon in domestic houses in Sweden. However, in hotels or public buildings the use of such carpets could be substantial. There is currently no recycling of carpets or textiles in Sweden. When becoming waste the carpets are handled as municipal waste and are generally combusted.

2.3.4.5 SUSBSTANCES RELEASED FROM UNINTENTIONAL FORMATION

Stockpiles and wastes

Dioxin contaminated wastes are generated by different activities in the society and consist mainly of solid matrices. Examples of different waste categories that may contain dioxins are:

i) residues from thermal processes,
ii) impregnated wood and waste wood litter,
iii) chemical waste, and
iv) residues from e-waste recycling.

Dioxins are not intentionally produced but formed unintentionally in various industrial high-temperature processes as incineration of waste and for generation of heat and energy, in chemical and metal industry to mention a few. The incineration processes give rise to large amounts of ashes, usually separated into fly ash and bottom ash. Generally, the bottom ash will contain lower amounts of dioxins compared to the fly ash. In order not to let the fly ash contaminate the environment it is trapped an collected in different kinds of filters. The amount of dioxins the trapped fly ash is depending on the fuel, incineration process, cooling and the efficiency of the filters.

For the classification and managing of waste products in an environmentally sound manner, a suggested maximum level of 15 µg TEQ kg-1 for PCDD/F in waste was first proposed by the Basel convention and was later adopted by EU (BIPRO, 2005). The corresponding level for total PCBs is 50 mg kg-1 (50 ppm). These levels are commonly referred to as Low POP Content Limits (LPCL). There are techniques to treat these waste products in order to reduce the content of dioxins.

The level 15 µg TEQ kg-1 could be compared to the often used Tolerable Daily Intake of dioxins at 2 pg TEQ/kg bw. Considering a bodyweight at 70 kg the TDI would be 140 pg TEQ, In ash containing 15 µg TEQ kg-1, 140 pg will be found in some 10 mg of this ash. So human intake (direct or indirect) of this small quantity of ash would be enough to reach the TDI. We should however note that the current human exposure (in Europe) to dioxins via food is close to the TDI and the TDI is estimated to be exceeded by some 10% of the population.

Considering these facts, it is doubtful if it is part of a sustainable development to continue to produce and store substantial amounts of ash and other waste products containing relatively high concentrations of dioxins.

2.3.5 Summary of future production, use and releases of POPs – requirements for exemptions

Sweden does not require any exemptions for the listed Annex A substances. No production or use is now occurring. Current releases are either from old sources, e.g. mobilisation from soils or sediments, or from long-range sources.

For Annex B substances the EU has registered both for specific exemptions and for acceptable purposes see 3.3.3. The only ongoing permitted use of PFOS in Sweden is related to the use in the chromium VI electroplating process. This is listed as a specific exemption and the use is to be phased-out at the latest by 26 August 2015.

2.3.6 Existing programmes for monitoring releases and environmental and human health impacts, including findings

Environmental monitoring has been conducted in Sweden for a quarter of a century. The predecessor of the current national environmental monitoring programme was the Programme for Monitoring of Environmental Quality (PMK), begun by the Swedish EPA in 1978.

Many of the individual data series included in the programme dated back even further than the inception of the programme. By the early 1990s, PMK's annual budget had risen to SEK 32 million, not taking inflation into account. The programme had by then been evaluated on several occasions. As a result, the Swedish Parliament decided in its 1990/91 session to introduce a coordinated environmental monitoring programme. The national programme was to be expanded, and each county would also establish a regional programme.

A revised environmental monitoring programme was thus adopted in 1999 by the Environmental Monitoring Council. The needs given priority under the new national programme were primarily monitoring of progress towards the national environmental quality objectives and reporting of environmental data to the EU and international bodies. The same year, the budget for national monitoring was increased by SEK 18 million, which made it possible to continue operations then in progress and to improve monitoring of biodiversity and agriculture.

Following a further increase in funding, it has also been possible to extend health-related monitoring and monitoring of toxic substances. In 2010 the budget for the whole national monitoring programme was approximately SEK 158 million.

Coordinating environmental monitoring is one of the key functions of the Environmental Objectives Council. Its coordinating responsibility covers not only the national and regional sub-programmes paid for via the Council itself, but also some surveys conducted by sectoral authorities. Alongside these activities, county administrative boards, municipalities and NGOs also gather large quantities of environmental monitoring data (at a cost totalling approximately twice the Environmental Objectives Council's funding for environmental monitoring). In other words, environmental data are produced by a large number of bodies and organisations, which requires documentation and consensus if integrated evaluations are to be possible.

Environmental monitoring focuses on the state of the environment in 'reference areas', that is, areas that are not appreciably affected by local disturbance. An accurate picture of Sweden as a whole therefore requires the addition of data from more significantly affected areas, obtained for example by monitoring of receiving bodies of air and water, monitoring of the effects of lake liming, and monitoring programmes for agriculture and forestry. Considerable gains could be achieved if use of the findings from these various activities could be better coordinated. However, data on persistent organic pollutants is less frequently generated within the regional programs.

Table 2.3.6-I: Summary of relevant matrices included in the existing environmental monitoring programme.

Measurement/matrix	Frequency	Remarks
Concentrations in sludge and effluentwater	Annually at 7 sewage plants	Data available from 2004 on
Concentrations in fish in the marine and aquatic environment	Annually at 12 sites	Data available from about 1990 on
Concentrations in top predators (guillemot eggs)	Annually at 1 site	Data available from about 1970 on
Sediment survey	Every 5–10 years (frequency not determined): PCBs, HCB, dioxins	First undertaken in 2004
Long-range transport	Annually at 3 sites	Data available from about 1995 on
Concentrations in human breast milk and serum	Every 2 years at 1 location	Data available from 1996 on. Dioxin measurements included in programme from 2004 on

Monitoring of POPs

The monitoring programmes that exist do not deal with all the substances covered by the Convention. The substances excluded have been banned for a number of years and some of them are known to be not be found in Sweden. E.g. Screening for mirex, for example, was carried out in 2004, but no detectable levels could be observed in the Swedish environment.

The substances covered by the regular monitoring activities described above are PCBs, DDT, PCDD/PCDF and HCB. For information about monitoring of the newly added POPs see "POPs in food", "POPs flame retardants" and "PFOS" below.

Aldrin and dieldrin are covered by the pesticide monitoring programme. Aldrin has been detected in 3 samples out of 1,830, with a maximum concentration of 1.2 µg/l; dieldrin in 2 samples out of 1,832, with a maximum concentration of 1.6 µg/l

Freshwater fish are not analysed for POPs on an annual basis at present, but only at less frequent intervals. However, biological material is collected every year from 18 lakes and placed in a specimen bank. This material can if necessary be used to measure and perform retrospective analyses.

In addition to the National Environmental Monitoring Programme, various regional programmes are being undertaken, on varying scales. Extensive monitoring is for example being conducted in Lakes Vättern, Vänern and Mälaren.

Results from the monitoring programme

Levels of PCBs and HCB in the environment have fallen since the 1970s. This can be attributed partly to the bans that have been introduced, and partly to a decrease in the unintentional formation and release of these substances, resulting from measures taken to reduce the formation and release of dioxins.

The decline in dioxin levels in the environment has become less and less pronounced in many areas in recent years. In some parts of the environment the decrease has probably levelled off. However, available data are very limited and generalisations can easily give rise to misleading results.

Table 2.3.6-II: Measured levels of certain POPs in some of the matrices used in the national monitoring programme (2010). Karlsö (Metaller och organiska miljögifter i marin biota, trend- och områdesövervakning. Sakrapport till nationella miljöövervakningen. Överenskommelse 2121011, dnr 235-3366-10Mm).

	DDT	PCB	PCDD/ PCDF	HCB
Herring muscle	<0.4 µg/g lw	<0.2 µg/g lw	<50 pg/g lw	<0.05 µg/g lw
Cod liver	<0.2 µg/g lw	<1 µg/g lw	–	<0.02 µg/g lw
Common mussel	<0.15 µg/g lw	<0.1 µg/g lw	–	<0.005 µg/g lw
Guillemot eggs	<50 µg/g lw	<50 µg/g lw	<1 ng/g lw	<1.5 µg/g lw
Human breast milk	<100 ng/g lw (DDE)	<40 ng/g lw (CB153)	~200 pg/g lw	<30 ng/g lw

LW=lipid weight n=20–40 for human milk
n=approx 40/year for other POPs

Within the Swedish Environmental Protection Agency (EPA), the Environmental Assessment Department is involved in a number of projects aimed at collecting data on POP levels in matrices of relevance to human health. Among these projects are studies of POPs in food, intake estimates, and surveys of POP levels in human breast milk, activities that are being conducted by the National Food Agency (NFA) with financial support from the Swedish EPA.

POPs in food

The presence of POPs in food is regulated by means of maximum levels (MLs) and (national) dietary recommendations. MLs are becoming increasingly harmonised within the EU, one example being the MLs for dioxins that were included in EU legislation in 2002. Sweden has long had national MLs for PCBs in food, and the EU has now introduced common MLs for PCBs. The EU already has MLs for a number of persistent pesticide residues, including DDT, in food products.

The Swedish National Food Agency (NFA) reports annually to the EU on levels of dioxins, PCBs and several other POPs in specific food products, as part of its responsibility for the national control programme. In addition, the NFA has recently performed an extensive survey of fatty fish from the Baltic region as a basis for the introduction of common MLs for dioxins in food (see NFA web site: www.livsmedelsverket.se ; search for 'dioxin', five interim reports available). Several national authorities perform measurements of POPs on human samples. The NFA has measured levels of dioxins, PCBs, brominated flame retardants (PBDEs, HBCD), and several persistent chloropesticides in breast milk from primiparous mothers in the county of Uppsala since 1996, and since 2006 samples have been collected every year. Regional comparisons of POP levels in breast milk have also been performed. Health effects attributable to high POP levels cannot be excluded. Consumers of large quantities of fatty Baltic fish could reach dioxin intakes that are above tolerable limits, and other animal food products could also contribute to a high intake. In Sweden, the NFA has issued national dietary advice on fatty fish from the Baltic region (see 2.3.8).

Different groups in the population show different levels of exposure. The average Swede's exposure to dioxins and dioxin like PCBs is according to current knowledge considered below the tolerable daily intake (TDI) set by the EU. However for 4–8% of the children and for 1–2% of women in fertile age the TDI is according to current knowledge exceeded.

POPs in human breast milk

In order to estimate the body burdens of POPs among pregnant and breast-feeding women, and the exposure of foetuses and breast-feeding infants to these compounds, the Swedish National Food Agency (NFA) has made recurrent measurements of POPs in human breast milk from the Uppsala region since 1996. Another aim of this project is to establish whether there are any temporal trends in POP levels in breast milk. At present, milk is sampled annually and is analysed every other year. In order to investigate possible regional differences in POP levels in breast milk, samples have also been collected in Göteborg (on the west coast of Sweden), Lund (southern Sweden) and Lycksele (northern Sweden).

In most studies, the POPs analysed are PCBs, brominated flame retardants (PBDEs, HBCD), dioxins (PCDD/F) and several chloropesticides (incl. DDT and its metabolites). In special studies, phenolic compounds (e.g. PCP; in blood) and musk compounds have also been analysed. These investigations are partly financed by the Swedish Environmental Protection Agency, and reports can be found at www.naturvardsverket.se (see Annex VII).

Residue monitoring

Pesticide residues in fresh and preserved fruits and vegetables (imported as well as domestically grown), and occasionally in drinking water, are monitored by the National Food Agency. Results are published annually. Residues in water have been monitored by the National Food Agency and others.

2.3.6.1 PESTICIDES

Aldrin and dieldrin are covered by the pesticide monitoring programme. Aldrin has been detected in 3 samples out of 1,830, with a maximum concentration of 1.2 µg/l; dieldrin in 2 samples out of 1,832, with a maximum concentration of 1.6 µg/l. Mirex hade been looked for but never detected.

None of the newly added pesticides are used today in Sweden. This is one reason why there is not much data available concerning them. Alfa-, beta-, gamma- HCH are included in marine monitoring programmes, and gamma HCH in human monitoring programmes but apart from that, data is scarce.

2.3.6.2 PCB

Concentrations of PCBs have decreased at a rate of approximately 4–10% per year in herring and cod from both the Baltic and the Kattegat and in guillemot eggs and perch from the Baltic since the end of the 1970s.

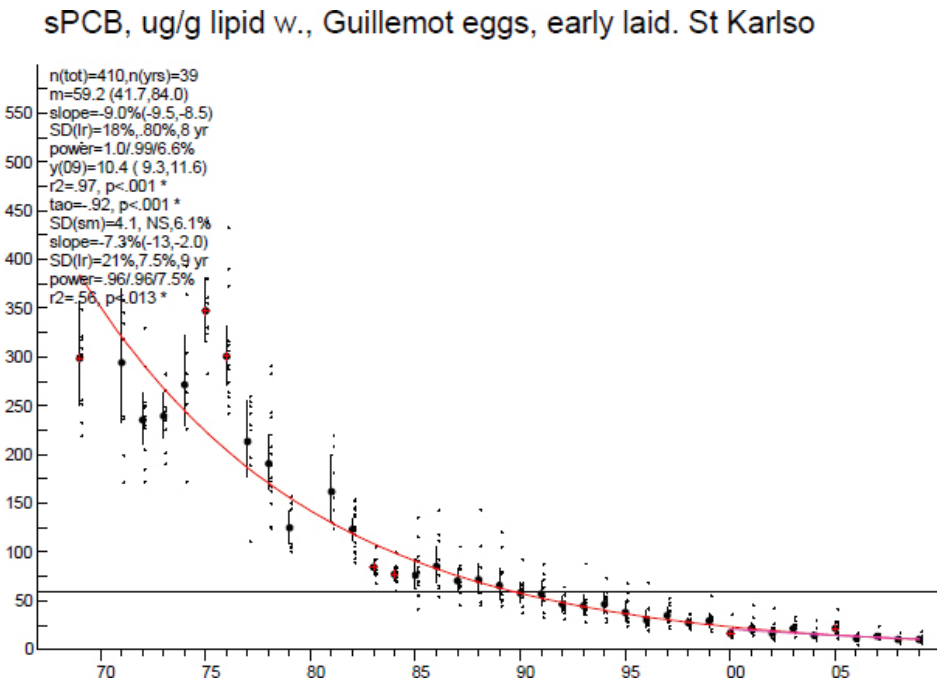

Figure 2.3.6.2-I: Example of time series of PCB concentrations in guillemot eggs from Stora Karlsö (Metaller och organiska miljögifter i marin biota, trend- och områdesövervakning. Sakrapport till nationella miljöövervakningen. Överenskommelse 2121011, dnr 235-3366-10Mm).

Monitoring of PCBs

Regular measurements of PCBs are carried out by the Swedish EPA in fish, guillemot eggs, human breast milk, human blood, sewage sludge, air and deposition.

Table 2.3.6.2-I: Monitoring of PCBs.

PCBs		
Matrix	**Location**	**Frequency**
Fish	marine environment around Sweden	yearly
Guillemot eggs	Stora Karlsö, Gotland	yearly
Air and deposition	2 locations	yearly
Human breast milk	Uppsala region	every two years
Human blood (major fish consumers and subgroups of the general population)	various	every three-five years
Sewage sludge	7 different plants	yearly

Table 2.3.6.2-II: Estimated levels of PCB in certain matrices (µg/g lipid) (Metaller och organiska miljögifter i marin biota, trend- och områdesövervakning. Sakrapport till nationella miljöövervakningen. Överenskommelse 2121011, dnr 235-3366-10Mm) and Glynn et.al. (2010).

Estimated levels of PCB in certain matrices	
Herring muscle	<0.2 µg/g lipid
Perch muscle	<0.05 µg/g lipid
Common mussel	<0.05 µg/g lipid
Cod liver	<0.4 µg/g lipid
Mother's milk	<100 ng/g lipid

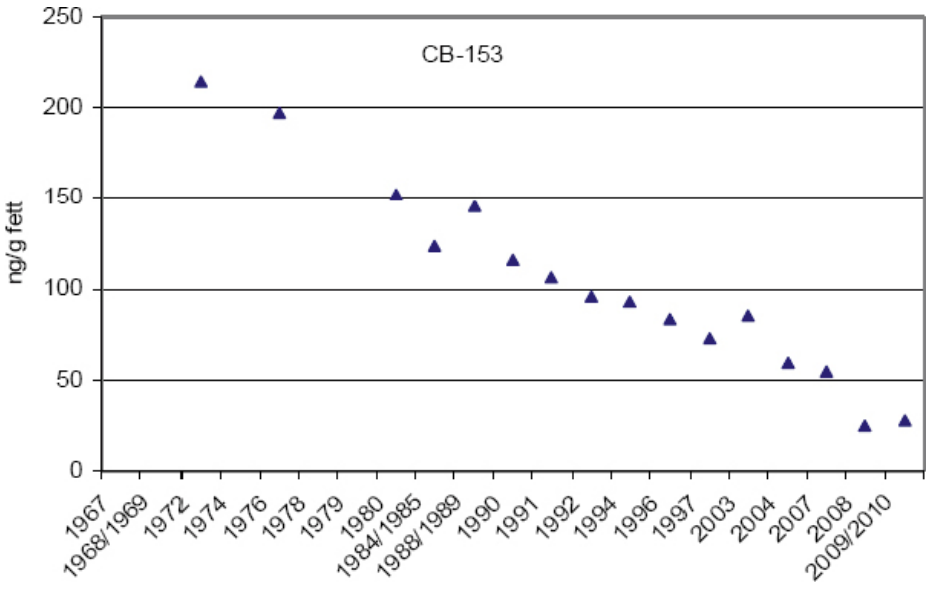

Figure 2.3.6.2-II: Levels of CB-153 in mother's milk in samples collected in Stockholm (Bergman et.al., 2010)

2.3.6.3 POPS FLAME RETARDANTS

Polybrominated diphenylethers, PBDEs are produced as three different technical products; penta-, octa and deca BDE. Each of these products include a few major congeners. For pentaBDE these are BDE-47, -99, and -100. OcatBDE contains mainly BDE-183, while decaBDE includes almost exclusively BDE-209 (LaGuardia et al. 2006). HBCDD is produced as a mixture of three stereo-isomers α-, β- and γ-HBCDD (Covaci et al. 2006). Both PBDEs and HBCDD have been or are used as additive flame retardants incorporated into materials such as plastics and textiles in products that need to be prevented from catching fire.

Leakage of these substances to the environment occurs from production and use of products, and long-range transport via air borne particles. The PBDE congeners that are most commonly found in fish are BDE-47, -99 and -100, while PBDE congeners with a higher degree of bromination are more common in the terrestrial environment.

Hexabromobiphenyl and Pentachlorobenzene were earlier used as a flame retardants.

None of the newly added POPs flame retardants are however used today in Sweden. This is one reason that there is not much data available concerning them, see table 2.3.6.3-I and table 2.3.6.6-I.

Within the EU, the penta- and octaBDE products were banned for use in 2004. A Swedish ban of decaBDE was established in 2007, but this ban was withdrawn when decaBDE was included in the RoHS directive in 2008. PBDEs are also on the list of prioritized substances within the Water Framework Directive.

Table 2.3.6.3-I: Estimated levels of BFR in certain matrices (µg/g lipid) (Metaller och organiska miljögifter i marin biota, trend- och områdesövervakning. Sakrapport till nationella miljöövervakningen. Överenskommelse 2121011, dnr 235-3366-10Mm) and Glynn et.al. (2010).

Estimated levels of BFR in certain matrices	
Herring muscle	<14 ng/g lipid
Blue mussel	<2 ng/g lipid
Cod liver	<1 ng/g lipid
Mother's milk	<3 ng/g lipid

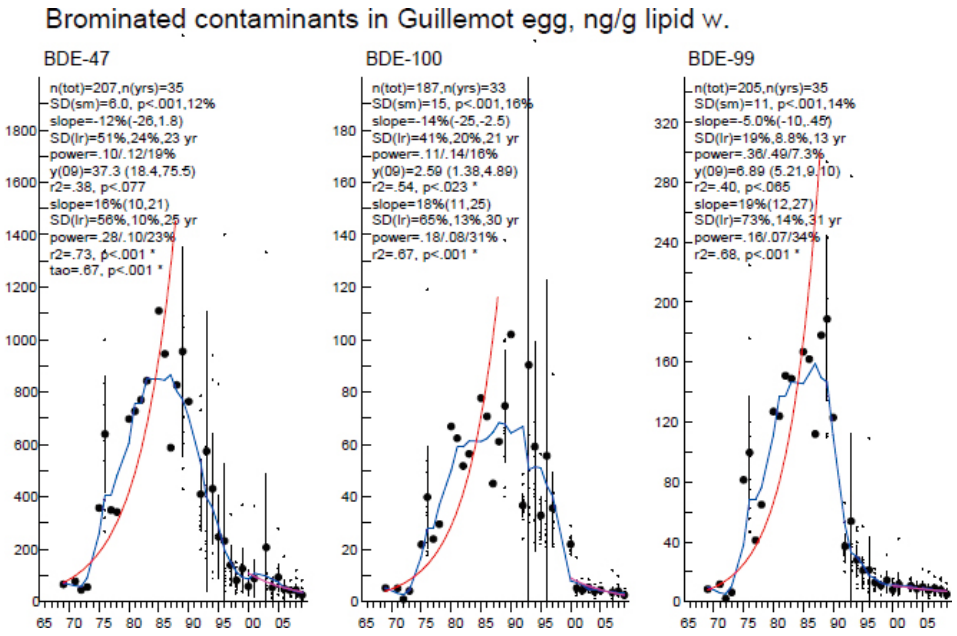

Figure 2.3.6.3-II: Example of a time series for BFRs at Stora Karlsö. (Metaller och organiska miljögifter i marin biota, trend- och områdesövervakning. Sakrapport till nationella miljöövervakningen. Överenskommelse 2121011, dnr 235-3366-04Mm).

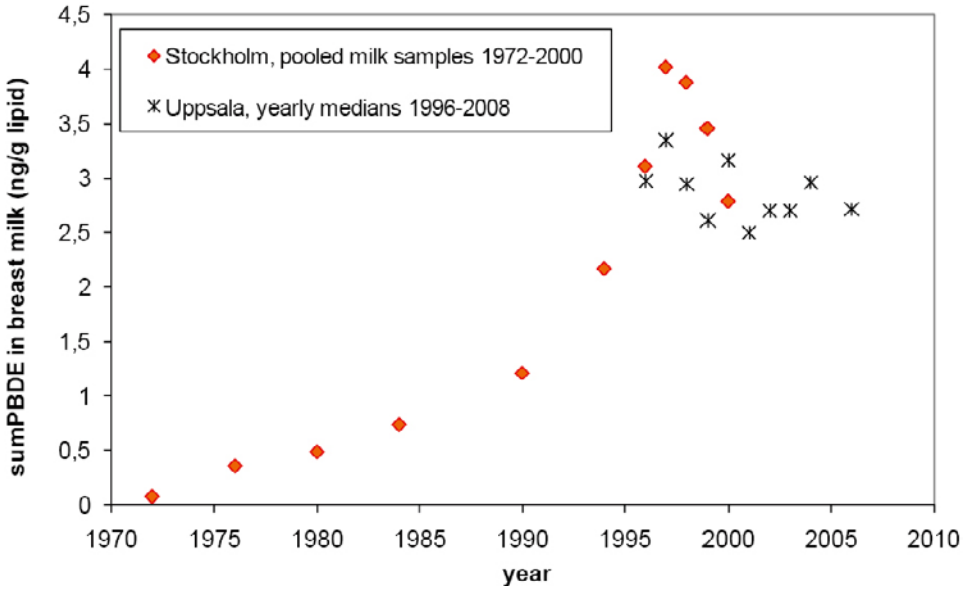

Figure 2.3.6.3-III: Levels of brominated flame retardants in breast milk samples (Livsmedelsverket 2011).

2.3.6.4 DDT

Summary of available monitoring data

DDT and its metabolites are measured yearly, or every other year, in fish from the marine environment around Sweden (40 samples), in guillemot eggs (10 samples), and in human breast milk from the Uppsala region (30 samples, every 4 years). They are also measured in deposition at Råö outside Göteborg and in Pallas in northern Finland (10 samples).

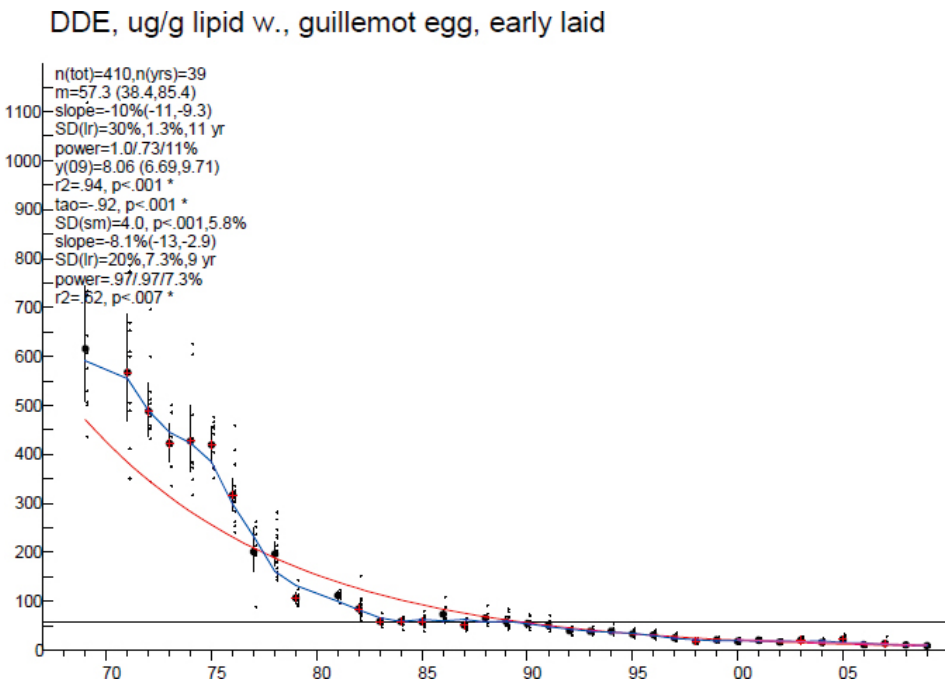

Figure 2.3.6.4-I: Example of a time series for sDDT at Stora Karlsö (sDDT = total DDT, the sum of the concentrations of DDT and its metabolites DDE and DDD). (Metaller och organiska miljögifter i marin biota, trend- och områdesövervakning. Sakrapport till nationella miljöövervakningen. Överenskommelse 2121011, dnr 235-3366-10Mm).

Concentrations of total DDT (sDDT, i.e. DDT and its metabolites DDE and DDD) in herring muscle from all investigated herring sites (except for Väderöarna, where the time series is still short), and also in cod and perch and in common mussels from the Kattegat and Skagerrak, show significant decreasing trends over the period 1980–2002. The rate varies between 6% and 12% a year. The time series for guillemot eggs (1969–2001) show a significant decreasing trend of about 10% a year. DDT concentrations in herring muscle and cod liver from all sites show significant downward trends (11–17%) over the period 1978(80)–2001. The release of fresh DDT in eastern Germany (the former GDR) in 1983–84 (Bignert et al., 1990) is clearly noticeable in the time series from Landsort and Utlängan in the Baltic proper and from Fladen on the west coast of Sweden. The number of years required to detect an annual change of 5% for DDE in herring varied between 16 and 21 years

for the herring time series. The ratio of DDT/sDDT is decreasing significantly at all herring sites except for Väderöarna, where there are not enough data points to detect a possible change.

Conclusion

DDT concentrations have decreased at a rate of approximately 2–13% per year in both the Baltic and the Kattegat since the end of the 1970s. DDT is in general decreasing faster than total DDT (sDDT).

Spatial variation

Herring muscle from Landsort and Utlängan in the Baltic proper shows the highest total concentrations of the herring samples, significantly higher than in those from Harufjärden in the Bothnian Bay and Fladen on the Swedish west coast. There are no significant differences in concentrations between the different locations.

Table 2.3.6.4-I: Estimated levels of DDT in certain matrices (µg/g lipid) (Metaller och organiska miljögifter i marin biota, trend- och områdesövervakning. Sakrapport till nationella miljöövervakningen. Överenskommelse 2121011, dnr 235-3366-10Mm) and Glynn et.al. (2010).

Estimated levels of DDT in certain matrices	
Herring muscle	<0.4 µg/g lipid
Cod liver	<0.2 µg/g lipid
Common mussel	<0.15 µg/g lipid
Guillemot eggs	<50 µg/g lipid
Mother's milk	<50 ng/g lipid

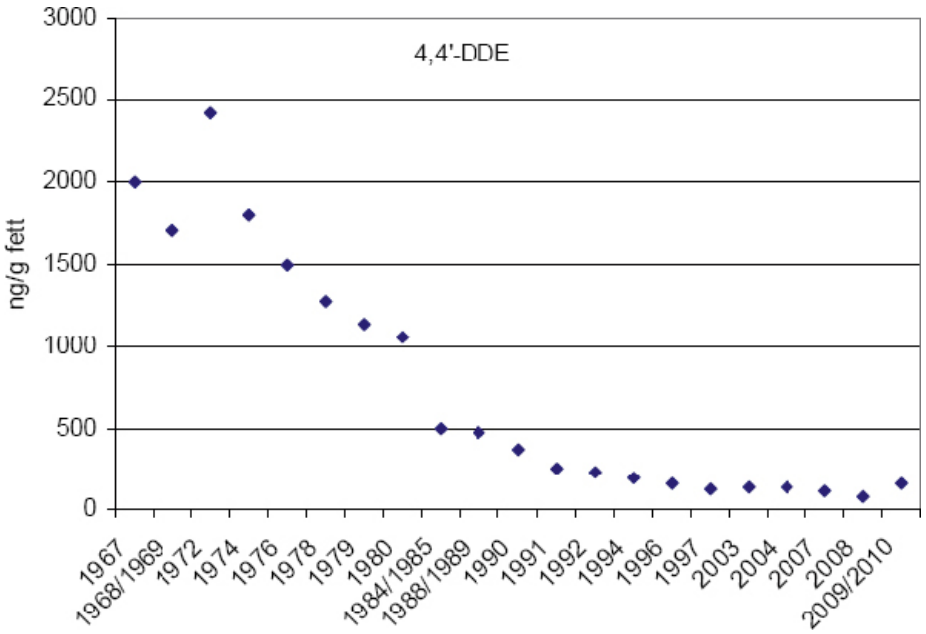

Figure 2.3.6.4-II: Levels of DDE in mother's milk in samples collected in Stockholm (Bergman et.al. 2010).

2.3.6.5 PFOS

Perfluorinated substances (PFAS) have been used industrially and commercially since the beginning of the1950s. However it was not until 2000 that the main producer, 3M, started to phase out their production of the main compound of concern, perfluorooctane sulfonate (PFOS) and PFOS-related chemicals (Key et al. 1997; Holmström et al. 2005).

PFCAs (perfluorinated carboxylates) in the environment can have two sources – direct sources from manufacturing and use of PFCAs, and indirect sources from degradation of volatile precursor compounds (Prevedouros et al. 2006). PFNA (perfluorononanoate) is intentionally produced and therefore probably originates mainly from direct sources (production and use of consumer products containing PFNA, such as PTFE products), and waterborne transport to remote locations. Therefore, sewage treatment plant effluent from industry or larger cities could represent hot-spots. In contrast, PFUnA (perfluoroundecanoate) and PFTriA (perfluorotridecanoate) are unintentionally formed substances, and their presence in the environment is probably due to both direct sources (impurities in PFOA (perfluorooctanoate) and PFNA productions) and indirect sources (atmospheric transport and degradation of precursors).

PFOS, its salts, and perfluorooctane sulfonyl fluoride are among the nine new Persistent Organic Pollutants (POPs) included in The Stockholm Convention on POPs.

Table 2.3.6.5-I: Estimated levels of PFAS in certain matrices (µg/g lipid) (Metaller och organiska miljögifter i marin biota, trend- och områdesövervakning. Sakrapport till nationella miljöövervakningen. Överenskommelse 2121011, dnr 235-3366-10Mm).

Estimated levels of PFAS in certain matrices	
PFOS Herring liver	<15 ng/g wet weight
PFOA Herring liver	<2 ng/g wet weight
PFOSA Herring liver	<1 ng/g wet weight

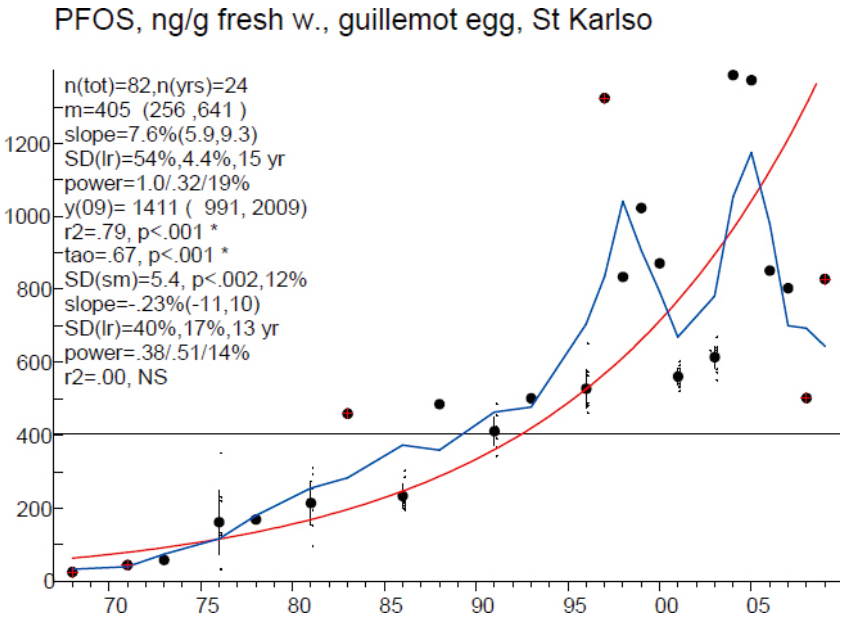

Figure 2.3.6.5-I: Example of a time series for PFOS at Stora Karlsö (Metaller och organiska miljögifter i marin biota, trend- och områdesövervakning. Sakrapport till nationella miljö-övervakningen. Överenskommelse 2121011, dnr 235-3366-10Mm).

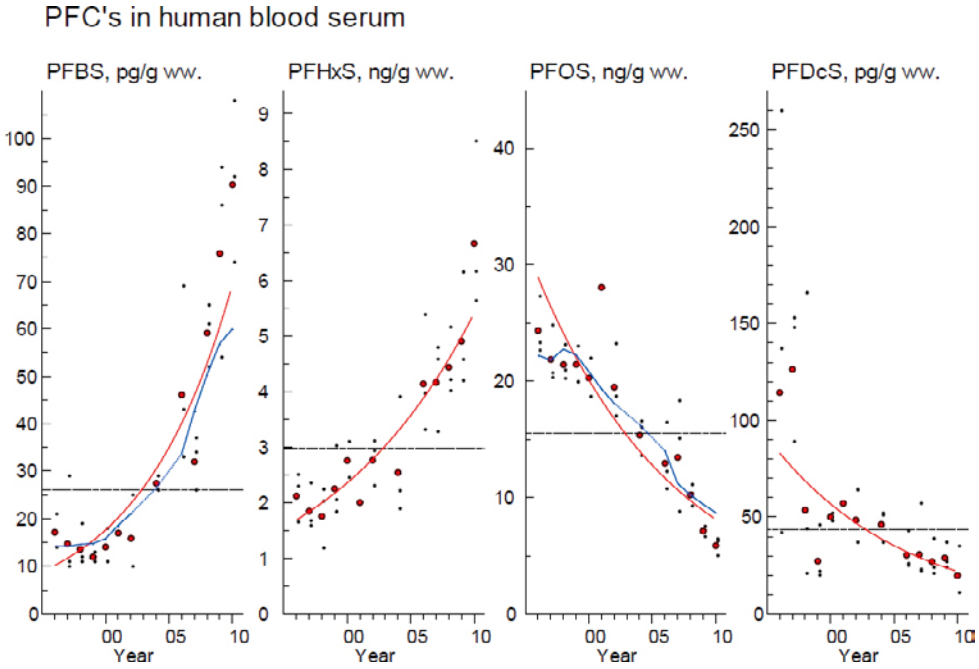

Figure 2.3.6.5-II: Concentrations of perfluorinated alkyl sulfonates in pooled samples (N=36) of blood serum from first-time mothers in Uppsala sampled between 1996 and 2010. The bigger red dots represents the geometric means for the pooled samples for each year. The red regression lines show significant linear trends for log-normal PFAS data. A running mean smoother (blue line) shows significant non-linear trend components. PFC's=perfluoroalkyl compounds, PFDcS=PFDS. (Glynn et.al. (2011).

2.3.6.6 OTHER PERSISTENT SUBSTANCES

Attempts are also made to discover other persistant, bioaccumulating and toxic substances to be able to gain awareness of other chemical pollutants of importance. Many of these measurements are carried out in biota. Finding a substace in biota samples is a clear indication of its bioaccumulating potency.

One way of searching for other substances is via screening. The screening programme is a key part of the Swedish environmental monitoring programme for toxic pollutants that are not monitored on a regular basis. The purpose of the screening is to gain an understanding of the substances found the environment, their respective concentrations, and the extent of human exposure to these substances. A typical screening study aims at answering one or several of the following questions:

- Is the substance subject to large-scale transport?
- Do diffuse emissions occur?
- Is the substance released from certain point sources?
- Does the substance bioaccumulate in the environment?
- Are human exposed?

Table 2.3.6.6-I Monitoring of POPs pesticides and POPs flame retardants

Substance	Matrix	Observed level
Chlordecone		No recent data found
α- Hexachlorcyclohexane (HCH)	Herring muscle	<30 ng/g lipid (Bignert et al 2011)
β –Hexachlorcyclohexane (HCH)	Mother's milk	4.5 +– 2.1 ng/g lipid (Glynn et.al. 2010)
Lindane	Herring muscle	<50 ng/g lipid (Bignert et al 2011)
Pentachlorobenzene	Moose & rhein-deer muscle	Detected but to low levels to quantify (Danielsson et.al. 2008)
Hexabromodiphenylether/ Heptabromdiphenylether		No recent data found
Hexabromobiphenyl (HBB)	Eggs, sea eagle	53–429 ng/g lipid (Helander 2008)

2.3.6.7 SUBSTANCES RELEASED FROM UNINTENTIONAL FORMATION

Dioxins

Apart from the measurements in human milk currently being carried out in the framework of the Environmental Monitoring Programme, there are earlier time series of such data from breast milk banks, begun in 1972 (dioxins) and 1967 (PCBs). These data indicate that the levels in human milk are steadily decreasing.

Table 2.3.6.6.-II Summary of dioxin measurements included in the existing environmental monitoring programme

Measurement/matrix	Frequency	Remarks
Concentrations in sludge	Annually at 7 sewage plants	Data available from 2004 on
Concentrations in fish	Annually at 4 sites	Data available from about 1990 on
Concentrations in top predators (guillemot eggs)	Annually at 1 site	Data available from about 1970 on
Concentrations in human breast milk	Every 2 years at 1 location	Data available from 1996 on.

Table 2.3.6.6.-III. Percent change in concentrations of POPs per year in mother's milk from primiparae women living in Uppsala County 1996–2006. Adjusted for age, pre-pregnancy BMI, weight gain during pregnancy and weight loss after delivery (Glynn et. Al. 2007)

	Change/ year (%)		"Half-time"	
Compound	**Mean**	**SE**	**Years**	**P**
PCDD TEQ 1998[h]	–6.9	0.5	10	<0.001
PCDD TEQ 2005[i]	–6.9	0.5	10	<0.001
PCDF TEQ 1998[j]	–5.7	0.6	12	<0.001
PCDF TEQ 2005[k]	–5.7	0.6	12	<0.001
PCDD/DF TEQ 1998	–5.4	0.4	12	<0.001
PCDD/DF TEQ 2005	–6.4	0.5	10	<0.001
Total TEQ 1998	–6.7	0.5	10	<0.001
Total TEQ 2005	–7.0	0.5	10	<0.001

Table 2.3.6.6.-IV. Concentrations of PCDD/F in mother's milk 1996–2006 (Glynn et al. 2007)

Compound	**N**	**Mean**	**Median**	**Min**[a]	**Max**
PCDD/F (pg/g lipid)					
TCDD	184	0.94	0.86	0.05	2.8
1,2,3,7,8-PeCDD	184	2.5	2.3	0.66	6.5
1,2,3,6,7,8-HxCDD	184	8.2	7.4	1.9	21
2,3,4,7,8-PeCDD	184	6.1	5.5	1.9	21
PCDD TEQ 1998[f]	184	4.7	4.3	1.3	12
PCDD TEQ 2005[g]	184	4.7	4.3	1.3	12
PCDF TEQ 1998[h]	184	3.5	3.1	1.1	12
PCDF TEQ 2005[i]	184	2.2	2.0	0.70	7.0
PCDD/F TEQ 1998	184	8.1	7.4	2.6	23
PCDD/F TEQ 2005	184	6.9	6.4	2.2	19
Total TEQ 1998	183	16	15	5.2	39
Total TEQ 2006	183	13	12	3.9	31

Freshwater fish are not analysed for organic pollutants on an annual basis at present, but only at less frequent intervals. However, biological material is collected every year from 18 lakes and placed in a specimen bank. This material can if necessary be used to measure and perform retrospective analyses.

Dioxins in guillemot eggs from St. Karlsö have been retrospectively analysed in a time series dating back to 1968. Herring muscle tissue has been analysed since 1989. In guillemot eggs, significant decreasing trends were observed for TCDD (2,3,7,8-tetrachlorodibenzo-p-dioxin),TCDF (2,3,7,8-tetrachlorodibenzofuran) and total PCDD/Fs (TCDD-equivalents) during the period 1970–2009. However, contrary to the TCDDs, the TCDFs show no decreasing trend since 1990, which may explain the levelling off of the trend for total PCDD/Fs during the last 20 years.

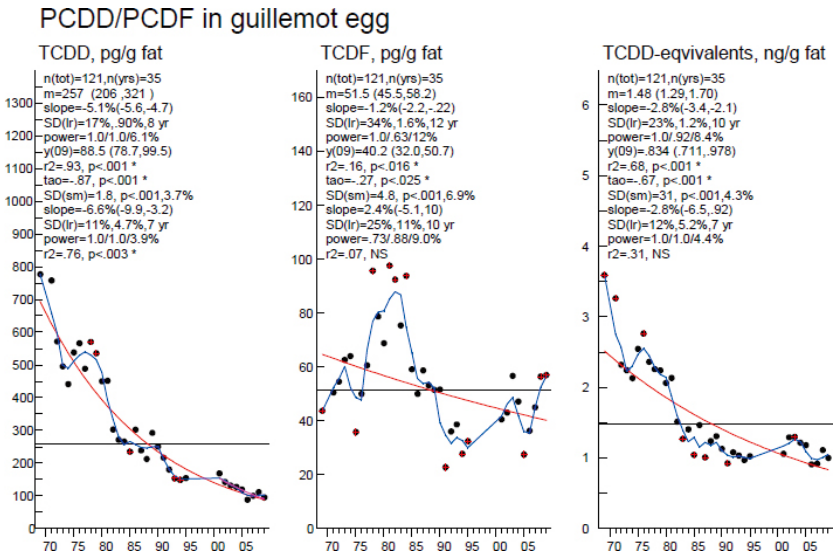

Figure 2.3.6.6-I: PCDD, PCDF (pg TCDD-eqv/g fat) and PCDD/F (ng TCDD-eqv/g fat) concentrations in guillemot eggs from Stora Karlsö (time series starting in 1970).

There were no significant changes in the PCDD/F concentrations over time in herring muscle at Harufjärden, Utlängan and Fladen, either on a wet weight or a lipid weight basis. At Ängskärsklubb, however, which had very high levels at the start of the sampling period, a significant decreasing trend is seen (Fig. 26.3 and 26.4). All time series are above the suggested target value fish (protection of predators against secondary poisoning). Between 2000–2007, an increasing trend was observed at Harufjärden but the very low level of TCDD-equivalents in herring from 2008/2009 eliminated that trend. The low levels of TCDD-eqivalents at can not be explained by fat content, weight or length (these parameters were normal) so further investigations are needed.

2.3.7 Information, awareness and education among target groups

Dioxins in Swedish food

The National Food Agency has long been aware of the problem of dioxins in foodstuffs. As early as the beginning of the 1980s, dietary recommendations were issued concerning fish with elevated levels of toxic organochlorine pollutants.

Commercial and recreational fishermen and their families have been identified as possible risk groups, with a high consumption of dioxin-contaminated fish. Within these groups, girls and women in their childbearing years in particular should limit their consumption.

Dietary recommendations for groups at risk

Maximum levels for dioxins in food are one tool to prevent the sale of foodstuffs contaminated with high levels of dioxins. However, such limits do not prevent the group most at risk (children and women in the families of commercial and recreational fishermen) from eating fish caught by members of

their own families. Following the dietary recommendations concerning contaminated fish will give these risk groups adequate protection from a high dioxin intake, while enabling them to retain the nutritional advantages of having fish in their diet. From a public health standpoint, the consumption of fish is generally beneficial.

Advice on certain foods

The NFA has for a long time given dietary advice on food items that could contain elevated levels of environmental pollutants and therefore should be avoided or eaten less often. Well-known examples are the recommended restrictions on the consumption of certain fishes, prompted by high levels of POPs or organic mercury. More specifically, such recommendations are aimed at certain vulnerable groups, who are given more restrictive advice than other consumers. In the case of POPs and methyl mercury, these groups are children and women of child-bearing age, and pregnant and nursing women, respectively. The advice on POP-contaminated fatty fish was last revised 2007.

The dietary advice on fatty fish from the Baltic region is as follows:
Do not eat more than one than one portion per week of herring, salmon and brown trout from the Baltic Sea and Gulf of Bothnia, salmon and brown trout from Lakes Vänern and Vättern, and arctic char from Lake Vättern. Children and women of child-bearing age should not eat more than one portion 2–3 times per year of the mentioned fishes. This advice does not apply to farmed fish.

These dietary recommendations are given on the NFA's web site and are communicated to Swedish newspapers, broadcasters and other media that could disseminate the information to Swedish consumers. As regards the above advice on fish in particular, it is conveyed to expectant mothers when they attend antenatal clinics. Information on the subject is also given in Swedish schools.

On a daily basis, many consumers contact the NFA by telephone, e-mail or post, and their questions are answered by a specially created information centre. In addition, local and regional authorities often have the necessary expertise to communicate with consumers on questions of food safety, and in such cases the NFA can provide back-up information and knowledge.

Exchange of information between food authorities in the different European countries often takes place through EU or EFSA (European Food Safety Authority) channels. Where rapid information is needed, the RASFF system is used.

2.3.8 Mechanisms for exchange with other Parties

Sweden participates actively in the work of the Persistent Organic Pollutants Review Committee (POPRC) under the Convention. Sweden was member 2005–2010 and thereafter participates as observer at the meetings and in the intersessional work. The Swedish Chemicals Agency and the Swedish Environ-

ment Protection Agency are designated as competent authorities under the EU Regulation 850/2004 and participate in the meetings under the Regulation and the information exchange mechanisms linked to it. The Swedish Chemicals Agency also participates in meetings under the EU Council of Ministers in preparation for Conferences of the Parties and other meetings. The websites of the Swedish Chemicals Agency and the Swedish Environment Protection Agency contain information on international activities and the Stockholm Convention.

2.3.9 Relevant activities of non-governmental stakeholders

Awareness and understanding of workers and the public

Sweden has the requirements for provision of information to the workers. The system includes regulations for classification, labelling and Material Data Sheets (MSDs) when marketing chemicals. The employers have the obligation to label chemicals used in the working places, to assure that MSDs are available as well as appropriate safety instructions (oral and written), for the kind of work carried out. They also have to inform the workers about the overall safety procedures in the enterprise.

Government agencies and other institutions in the field of occupational safety and health offer education to various specialists (physicians, nurses, safety controllers) working with occupational safety and health. They also produce and distribute written information on important issues.

The Swedish Employers' Confederation (Sw. Arbetsgivareföreningen) and the trade unions have established a joint institution (Sw. Arbetarskyddsnämnden) with the task to produce educational material and information on safety and health at work. The production is comprehensive and includes books, booklets and brochures. Their information (also available on electronic media) is widely used in the enterprises by both employers and unions. The educational material is often specially adjusted for use in study circles. A number of private organisations and consultants offer seminars and courses on chemicals assessment and management.

The consumers get information on specific chemicals via labelling and if necessary supplementing information which the producers and importers have to present when marketing chemicals. The educational system provides basic information on chemicals at all levels.

Also government agencies and the municipalities produce and distribute information to the public inter alia in the form of newsletters, periodicals, booklets and brochures. At the public libraries in each municipality more comprehensive information is available to everyone. The libraries of agencies and other public institutions are open to the public as well.

The non-governmental environmental organisations have several types of activities directed towards the public. For their members they produce periodicals and other types of information. They also arrange local study circles on different topics which are open to everyone. Their booklets and brochures are sometimes distributed to all households.

Activities of industry, public interest groups and the research sector

The Government as well as the government agencies act openly with respect to non-governmental organisations, other interested parties and the general public. Working groups and reference groups, hearings and other types of consultations are frequently used in both the legislative work and other types of decision making in order to let interested parties get information as well as to contribute with viewpoints and comments. NGOs as a whole have good opportunities to share their views on risks as well and on the need for risk reduction measurements.

The industrial branches are as a whole very active with respect to information and education to their member enterprises. Several branches have developed consultant services towards the companies thereby contributing expertise which especially small or medium sized enterprises otherwise could not afford. Many branches have taken joint steps in order to find solutions to problems within the branch. Lately the whole dealers and retailers' organisations have been very active in promoting development and marketing of environmentally friendly chemicals and other types of products to private consumers.

The environmental organisations are very active in raising the public awareness as are the labour unions with respect to their members. They both inform of government activities and criticise the same when not being considered adequate, but rather insufficient or even non-existing.

Industry, the labour unions and the environmental organisations frequently present data from research they support or from research made outside the country in order to influence the government and the agencies. These data are assessed and used if found to be relevant for actions.

The Green Flame™ is a voluntary system for simultaneously assessing products, in relation to environment and health quality, when involved in fires. It is open for all kinds of different products and will create incentives for manufacturers who design products that perform better than the standards applicable to them. The intention is that the Green Flame™ system will provide competitive advantages to the companies that possess the competence and determination to develop consumer products that represent a major improvement in fire safety and environmental quality. (www.sp.se/en/index/services/greenflame)

2.3.10 Overview of technical infrastructure for POPs assessment, measurement, analysis, alternatives and prevention measures, management, research and development – linkage to international programmes and projects

The Swedish Board for Accreditation and Conformity Assessment has accredited more than 20 laboratories for POPs analysis (for further information see www.swedac.se/en)

2.3.11 Identification of impacted populations or environments, estimated scale and magnitude of threats to public health and environmental quality and social implications for workers and local communities

There is evidence of slightly retarded physical or mental development in children exposed to organic pollutants. The effects are most marked among victims of pollution disasters in Japan and Taiwan, for example, although it is possible that they also occur at a more subtle level among populations with background exposures. For example, the average birth weight of children of Swedish east coast fishermen (who ingest a considerable amount of persistent organic pollutants by eating large quantities of Baltic fish) is somewhat lower than that of children of fishermen on the west coast. It has not been proved that organic pollutants are responsible for this difference, however.

As far as can be judged, dioxin-like PCB variants are found in such high concentrations in food that their toxic effects are comparable with those of dioxins themselves.

The dietary recommendation on fish are given because high levels of POPs and Me-Hg in certain fish species could potentially endanger the foetus and neonate via pre-natal and/or breast milk exposure. The total dose of dioxins and dioxin-like compounds ingested by the average Swede is currently 2–4 time lower than the TDI generally applied within the EU of 2 pg WHO-TEQ/kg body weight. According to NFA's intake calculations based on the Swedish consumption survey Riksmaten 1997–98 and 2010, 1–2% of women 17–40 yr (i.e. women in child-bearing ages) had an intake above the recommended TDI. Interestingly, a majority of the women (17–40 yr) that exceeded the TDI also consumed more fatty fish than recommended in the dietary advice. For women over 40 and all men 1–2% exceeded the TDI.

According to current knowledge, as many as 4–8% of the children in Sweden exceed the recommended TDI.

Breast-fed infants, generally exceed this TDI set for life-long exposure. However, infants exposed to such elevated doses receive these during a limited period, and the positive effects of breast feeding are considered to far outweigh the risks posed by organic pollutants.

2.3.12 Details of any relevant system for the assessment and listing of new chemicals

Article 3(3) of the POPs-regulation repeats the provision of the Convention on the need for measures to prevent the production, placing on the market and use of new chemicals and pesticides, which exhibit characteristics of persistent organic pollutants. The practical implementation is left to be done in the framework of the existing Community regulatory and assessment schemes for industrial chemicals, plant protection products and biocides. Provisions to prevent the production, placing on the market and use of new substances exhibiting POP characteristics were incorporated into the new regulatory framework for chemicals, plant protection products and biocides.

Pursuant to REACH, substances which are persistent, bioaccumulative and toxic (PBTs) or very persistent and very bioaccumulative (vPvBs) can be subject to authorisation. The strict rules within REACH for authorisation for substances having PBT/vPvB properties should prevent industry to develop new substances having such properties.

Pursuant to Regulation (EC) No 1107/2009 concerning the placing of plant protection products on the market, an active substance, safer or synergist can only be approved if it is not a listed POP, PBT or vPvB substance. A substance must be seen as a candidate for substitution if it meets two of the PBT criteria. Specific criteria on persistency, bioaccumulation and toxicity are laid down when a substance shall not be considered as of low risk.

The (EC) No 1451/2007 on biocidal products lists PBTs among substances that should be substituted and not be allowed for use in low-risk products.

2.3.13 Details of any relevant system for the assessment and regulation of chemicals already in the market

Article 3(3) of the POPs-regulation repeats the provision of the Convention on the need for measures to control existing chemicals and pesticides which exhibit characteristics of persistent organic pollutants. The implementation system for regulating chemicals already in the market is within the Reach regulation. The properties of PBT substances are defined by criteria laid down in Annex XIII of the Regulation. For substances manufactured or imported in quantities of 10 tonnes or more, a chemical safety assessment must be performed which includes assessment of PBT and vPvB properties. In quantities higher than 100 tonnes, the registration requires specific tests for PBT/vPvB assessment.

Guidance on information requirements and chemical safety assessment, including PBT assessment is adopted since May 2008 (Chapter R.11). It is concluded in the Guidance that for PBT and vPvB substances a "safe" concentration in the environment cannot be established using the methods currently available with sufficient reliability for an acceptable risk to be determined in a quantitative way. Therefore Registrants are required to perform a specific PBT/vPvB assessment in the context of their chemical safety report. In practise the PBT/vPvB assessment comprises of three steps; comparison with the risk criteria, emission characterisation and risk characterisation which are outlined in detail in the Guidance.

3 Strategy and action plan elements of the National Implementation Plan

3.1 Policy statement

The objective of Swedish activities relating to Persistent Organic Pollutants (POPs) is to protect human health and the environment. The Stockholm Convention requires Parties to take measures to eliminate or reduce the release of listed POPs into the environment. Sweden acknowledges the Stockholm Convention as an important tool in this process and is fully committed to the effective implementation and further development of this international legally binding instrument. This includes the necessary financial commitments by Sweden to assist developing countries and countries in transition, as required by the Stockholm Convention.

One of the national environmental quality objectives adopted by the Swedish Parliament in 1999 is "A Non-Toxic Environment" and the Stockholm Convention's aim is part of the endeavour to achieve this objective, as it also is for other national environmental quality objectives.

3.2 Problems to be further addressed

The most acute problem relating to "old" POPs in Sweden today is that levels of dioxins and dioxin-like PCBs in human breast milk and in fatty fish from the Baltic Sea are unacceptably high and constitute a risk to human health. Fatty fish from the Baltic Sea contain levels of dioxin and dioxin-like PCBs organic pollutants that exceed EU limit values for consumption.. Moreover, the presence of the compounds in human breast milk is not acceptable, and the levels should therefore be reduced. Breast-feeding is beneficial for infant health, but, the exposure of breast-fed babies to dioxins and dioxin-like PCBs clearly exceeds the tolerable daily intake.

- Individuals with a high consumption of fatty Baltic Sea fish have an increased risk of exceeding the TDI for dioxins and dioxin-like PCBs.
- The time- limited exposure of breast-fed babies to dioxins and dioxin-like PCBs clearly exceeds the long-term tolerable daily intake.
- Not enough is known about sources, releases and flows of, and exposure to, both unintentionally produced and newly listed POPs is very limited.
- Safe handling and treatment of waste from articles still in use containing POPs flame retardants and PFOS needs to be further developed.

In the EU, a tolerable weekly dioxin intake (TWI) of 14 picograms (pg) WHO-TEQ/kg bodyweight has been set by specialists from the Scientific Committee on Food. The TWI corresponds to a tolerable daily intake (TDI) of 2 pg WHO-TEQ/kg body weight. The tolerable intake represents the level considered safe over a lifetime of consumption and is calculated with the use of safety margins. The average exposure to dioxin and dioxin-like PCBs from food among children and adults in Sweden is below the TDI. Levels of dioxins and dioxin-like PCBs in fatty fish from the Baltic Sea and some of the Swedish fresh water lakes are high. Individuals who regularly consume these types of fish have an increased risk of exceeding the TDI. As long ago as the early 1980s, dietary recommendations were introduced concerning fish with elevated levels of organochlorine environmental toxins. Commercial- and recreational fishermen and their families have been identified as possible risk groups with high consumption of dioxin-contaminated fish. Among these, children and women in their childbearing years in particularshould limit their consumption. Based on the strict dietary recommendations, Sweden has had an exemption from the EU maximum levels of dioxins and PCBs for certain fish species from the Baltic Sea area since 2012. Fish that exceed the maximum levels can not be exported to other EU-countries.

The main issue to be considered with the "new" POP is that POPs flame retardants and PFOS can still be found in articles currently in use in Sweden. The identification, sorting, safe handling and treatment of waste potentially containing these substances is a challenge for the waste management and recycling industry as well as for the enforcement authorities. Some waste management activities e.g. shredding of plastic materials could potentially be a source of occupational exposure to POP flame retardants.

Monitoring shows that levels of the newly listed POPs (PFOS, penta-BDE and octa-BDE) and other substances with similar characteristics are high or increasing in some environmental biota. In humans levels of penta-BDEs and PFOS have been decreasing since the end of the 1990s.

The decline in dioxin levels in the environment has become less and less pronounced in many areas in recent years. In some parts of the environment the decrease has probably levelled off. Available data are very limited, however, and generalisations can easily give rise to misleading results.

As releases of unintentionally formed POPs from Swedish primary sources have abated, secondary and diffuse sources have become more important in relative terms. Not enough is known about the quantity, release, dispersal and cycling of dioxins, PCBs and HCB from secondary and diffuse sources.

Substances nominated for listing in the Stockholm Convention and the LRTAP Protocol such as HBCDD are showing high or increasing levels in the Swedish environment.

3.3 Activities, strategies and action plans

The activities directly linked to this National Implementation Plan including, review, reporting, evaluation and further development of the Stockholm Convention are handled jointly by the Swedish Chemicals Agency and the Swedish Environmental Protection Agency.

The objective of the Convention, and the need to get away from the use of POPs, is an integral part of the Swedish environmental quality objective 'A Non-Toxic Environment', adopted by the Swedish Parliament.

'A Non-Toxic Environment' – The environment must be free from man-made or extracted compounds and metals that represent a threat to human health or biological diversity. Illustration: Tobias Flygar

Everyone concerned needs to take their share of the responsibility if A Non-Toxic Environment is to be achieved. Enterprises, operators, authorities and consumers can make important contributions along with municipalities, county administrative boards and responsible central agencies. As the agency with overall responsibility for the environmental quality objective, the Swedish Chemicals Agency co-ordinates work on the environmental objective. An in-depth evaluation of the environmental goals is performed regularly. The aim of the in-depth evaluation is to establish whether the policy instruments used or the objectives themselves need to be revised. The evaluation report describes the progress made towards the objectives and includes proposals on such matters as appropriate measures, instruments, resources, organisational arrangements and, where relevant, changes to interim targets or monitoring systems (www.miljomal.nu).

In December 2010 the Swedish Government instructed the Swedish Chemicals Agency to produce a national action plan for a toxine-free everyday environment. This plan includes the measures needed in the period 2011–2014 to reduce the risk faced by people of being exposed to hazardous chemicals in their everyday lives. Chemical hazards in the working environment are not part of this assignment. Implementation of the plan will involve collaboration with other government agencies, industry, the scientific community, environmental groups and consumer organisations. See further information at http://www.kemi.se/en/Start/Action-plan-for-a-toxin-free-everyday-environment/

With HELCOM's Baltic Sea Action Plan (BSAP) the Baltic Sea countries have committed themselves to achieving a "Baltic Sea with life undisturbed by hazardous substances".

Better data and knowledge

To enable effective actions to be taken to protect human health and the environment from persistent organic pollutants, the relevant sources and exposure pathways must be identified. However, to attain the objectives within a reasonable time-frame, it may be necessary to implement measures on the basis of limited data, in line with the precautionary principle. It is therefore important to work in parallel with both knowledge improvement efforts and tangible measures to reduce formation, releases and exposure to persistent organic pollutants. Before taking measures, priorities need to be set and cost-benefit analyses performed.

Better data and knowledge on the formation, release, dispersal, cycling and exposure pathways of these substances are necessary as a basis for preventive measures and to deal with pollutants already present in the environment and in products in use or in the waste stream. Better data will also help to set clear priorities among measures.

Providing information on chemicals in articles through each step of its lifecycle would enable improved prevention of the entry of substances that exhibit characteristics of persistent organic pollutants into the recycling stream. Sweden therefore actively supports the development of a global framework or programme for information systems on chemicals in products in SAICM. A project on global collaboration in this area is being led by UNEP. More information can be found at www.chem.unep.ch/unepsaicm/cip/

Regarding the identification and quantification of releases, and diffuse and secondary sources are still incomplete. For primary sources, it is necessary to collect further measurement-based data which reliably show how large emissions of unintentionally formed substances are under varying conditions. In this respect, operator self-monitoring needs to be improved.

As knowledge is increased by means of assessments, research etc., measures such as guidance and information, licensing and supervision, and regulations and other policy instruments can be implemented.

Additions of further chemicals to the Stockholm Convention

The Stockholm Convention does not lay down any particular obligation concerning addition of chemicals to it but allows any Party to propose amendment of the Stockholm Convention by nominating further substances for listing.

In NIP Report 4/2006 a number substances were put forward as likely POP candidates for listing in the Stockholm Convention after a screening process. Of these substances, a number have now been listed in the Convention[3],

[3] Pentabromodiphenylether (pentaBDE), Lindane (including alpha, beta, gamma-HCH), PFOS, pentachlorobenzene (PeCB), Chlordecone, and Hexabromobiphenyl (HBB) and endosulfan. Additionally, octabromodiphenylether(octaBDE) has been listed since 2009.

and four substances have currently been nominated for listing in Annex A by the EU, namely short-chained chloroparaffins (SCCP) in 2006, and polychlorinated naphthalenes (PCN), hexachlorobutadiene (HCBD) and pentachlorophenol (PCP) in 2011. These substances are currently under review. The proper functioning of the POPs Review Committee is of crucial importance in this regard. Sweden will continue to actively participate in and support the POPs Review Committee in its work, in order to ensure that the submitted proposals are evaluated.

In 2008, hexabromocyclododecane (HBCDD) was nominated by Norway for listing in Annex A. HBCDD has been considered by the POPRC and is to be considered for listing at the next Conference of the Parties in 2013. As the drafter for the risk profile during a period within the POPRC, the Swedish Chemicals Agency has been playing an active part in the process. In October 2008, the Member States Committee of the European Chemicals Agency (ECHA) agreed to include HBCDD in the candidate list for authorisation under the European chemicals legislation (REACH). The decision was based on the European risk assessment dossier (European Commission, 2008) prepared by Sweden, which was also a basis for the nomination of HBCDD to the Stockholm Convention. In 2011 HBCDD was included in the ECHA list of substances to be subject to authorisation. The Swedish Chemicals Agency in 2006 made a technical assessment of HBCDD and possible commercially available alternatives, from a quality and a fire-protection perspective, which provided input to the risk profile.

In 2005 Sweden submitted the nomination of PFOS for listing, and as drafter in the POPRC was extensively involved in the process that in 2009 led to PFOS becoming the first perfluorinated substance included in the Stockholm Convention. It is currently noted that other fluorinated substances or groups of substances are being found in increasing concentrations in the environment. The group of perfluoroalkylated substances contains other potential PBT or even POP candidates, and our strategy is to participate in the evaluation of the PBT properties of these substances, which eventually might also lead to POP nominations. The bioaccumulation of perfluorooctanoic acid (PFOA) is being currently discussed among some EU Member States in relation to its meeting this criterion (the P and T criteria are already fulfilled). Sweden is currently investigating the options for classifying other perfluoroalkylated substances for reproductive toxicity as a way of supporting the toxicity criteria for them.

Nordic collaborative efforts will continue to be important. When the negotiations on the Stockholm Convention were concluded in 2000, the Nordic countries identified pentaBDE as a priority new POP candidate. Compilation of a nomination dossier was therefore initiated in order to support nomination of pentaBDE, but also in order to contribute some ideas on the scientific requirements of such a dossier as a basis for inclusion in the convention. The Swedish Chemicals Agency acted as project leader for this work, and the report (Pentabromodiphenyl ether as a global POP; TemaNord 2001:579) was later a basis for the Norwegian nomination of pentaBDE.

The Swedish Chemicals Agency participates in the advisory PBT group that the ECHA established in 2012. The mandate of this PBT group is to provide advice to the ECHA, Member States and registrants on questions relating to identification of PBT/vPvB substances under REACH.

The PBT/vPvB criteria of the REACH regulation are displayed in Annex XIII of the Regulation. They are similar but not identical to the criteria of the Stockholm Convention. The Swedish Chemicals Agency (KemI) in 2010 participated in a cooperation between EU Member States in compiling a list of suspected PBT/vPvB substances based on national prioritisation projects supplemented by information from the Danish QSAR database (quantitative structure activity relationships).

In Sweden's judgment the ongoing work on persistent, bioaccumulative and toxic substances (PBT) and on very persistent and very bioaccumulative substances (vPvB) under REACH is likely to be the major source for identifying new POP candidates. The current mechanism under REACH for identifying PBT/vPvB substances starts with a proposal from either a Member State or the Commission (via ECHA). If the substance is judged to fulfil the PBT/vPvB criteria of Annex XIII of REACH, the substance is listed in what is known as the Candidate List. This process relies on existing data and there are no legal means for requesting new studies from the registrants (producers/importers). However, suspected PBT/vPvB substances can be evaluated by the Member States in a substance evaluation under which new studies can be requested from the registrants in order to clarify for example the PBT/vPvB properties of a substance. In its work on prioritisation for the different REACH processes, Sweden is currently looking for suitable substances to propose for the candidate list and for substance evaluation, aiming at clarifying the PBT/vPvB properties of industrial substances.

Concerning active substances in plant protection products, Regulation (EC) No 1107/2009 or Regulation (EC) No 1451/2007 on biocidal products, a mechanism related to the POPs criteria is likely to be of less importance.

In many cases, the data provided under the regulatory schemes are not sufficient to assess whether international action is warranted, but additional information, especially from monitoring programmes, is needed. It could be considered that the coverage of current monitoring programmes should be exchange systems between other Parties and should thus be strengthened in this regard.

Sweden considers there to be more substances than the present 22 POPs which fulfil the criteria of the Convention and warrant global action. Sweden will continue to actively participate in and support the POPs Review Committee in its work on nominating substances. Moreover, Sweden will continue to work with the European Commission to nominate further candidates for the Convention.

Since several POP candidates tend to be in active use in articles that end up as waste many years later, it is important to acknowledge the time-lag for substances from decision until disappearance from stockpiles and wastes.

Achieving destruction capacity for POP waste sufficient for all countries is an aspect of POP regulation that merits further consideration.

3.3.1 Institutional and regulatory strengthening measures

No further institutional or regulatory measures are needed for the POPs currently covered by the Convention. As described earlier in 2.2.2 these measures are already in place.

3.3.2 Measures to reduce or eliminate releases from intentional production, import/export and use

See details below.

3.3.2.1 PESTICIDES AND HCB (ANNEX A):

All Annex A pesticides and HCB have long been banned in Sweden, and no further legal measures are needed with regard to the production, import and export or use of these substances.

During market surveillance activities in 2010 and 2011, HCB was found in fireworks available on the Swedish market. Border and market surveillance therefore remains necessary. Cases of noncompliance will be reported to the European Commission.

3.3.2.2 PCB AND EQUIPMENT CONTAINING PCB (ANNEX A):

PCBs in sealants and flooring

In this report we consider sealants and flooring containing PCBs to be in use and not (yet) waste. The 2007 Ordinance on PCBs etc. requires compulsory inventories of PCB sealants and flooring materials and remediation/decontamination of sealants and flooring containing more than 500 ppm (mg/kg) PCB by 30 June 2016. The main reason for performing these far-reaching actions was initially to prevent PCBs in these applications escaping into the environment and possibly undergoing biomagnification in food webs. Today we are also aware that PCBs in buildings could migrate into indoor air and thus substantially contribute to the total human exposure.

As part of a survey commissioned by the Swedish EPA, a questionnaire was sent to 100 municipalities, representing around 70 % of the country's building stock. The results (65 municipalities responded) indicate that local authorities have worked actively on implementation of the Ordinance.

- More than 80% of responding municipalities have identified the properties concerned and sent written information about the regulatory instrument to the property owners.
- About 50% of the responding municipalities have issued orders for inventories (relating to around 15% of the number of properties).
- Approximately 70% of the properties have been inventoried.
- Approximately 25% of the inventoried properties contain PCBs and at least 30% of these have been cleaned up.

The total volume of PCBs detected by the inventory is very difficult to assess, but a rough calculation indicates that the initial volume of PCBs was around 260 tonnes, of which around 100 tonnes remain to be removed. The remedia-

tion of buildings and structures in order to remove PCBs is a time-consuming process that entails meticulous manual work. Recommendations on the use of protective equipment have therefore been issued in order to keep direct human exposure as low as possible for both workers and residents.

The results indicate that the Swedish inventory and cleanup of PCBs in building has generally worked well. However, owners of buildings as well as supervisory authorities have an important task to make sure that the remediation of the remaining PCBs in sealants and flooring materials is completed in time.

PCBs in electrical and electronic equipment

Apart from the PCBs still in use in sealants and flooring materials, PCBs are still found in low concentrations (typically below 50 ppm) in insulation liquids in transformers and occasionally also in cables. Anyone who holds equipment which contains or which can be assumed to contain more than five cubic decimetres of a PCB product has to notify the Swedish Environmental Protection Agency of this fact immediately. The holder of such equipment has to ensure that the equipment is decontaminated immediately.

The remaining part (all below 500 ppm) has not been decontaminated due to high costs combined with long life of the equipment. This equipment requires an exemption for use for a few more years. The Swedish EPA can grant exemptions as long as they do not contravene Council Directive 96/59/EC of 16 September 1996.

All equipment (above 5 dm3) with PCB levels higher than 500 ppm was decontaminated before the end of 2010. Most equipment with levels of 50–500 ppm has been decontaminated. Most equipment in the range of 2–50 ppm has been decontaminated due to more strict regulation in Sweden.

The Swedish EPA will inform companies that own equipment with PCB about their responsibilities under the PCBs Ordinance.

Other products still in use which may contain PCBs are sealed insulating windows and small capacitors used in lamp fittings, small single-phase motors in dishwashers etc. All electronic waste in Sweden is considered to be hazardous waste and is collected for pre-treatment where components containing PCBs are removed. All types of waste containing PCBs are subject to high-temperature incineration.

Hazardous waste treatment in Sweden has sufficiently high capacity to handle incoming PCB waste within a reasonable time. There are therefore no stocks of used or waste PCB to be considered.

3.3.2.3 POP FLAME RETARDANTS (ANNEX A) :

All Annex A POPs flame retardants have been banned in Sweden, and no further measures are needed with regard to the production, import and export or use of these substances.

3.3.2.4 PFOS (ANNEX B)

No further regulatory measures need to be taken with regard to restricting the production, import and export or use of perfluorooctane sulfonate (PFOS).

It should be noted that PFOS is strictly regulated in the EU Regulation with a few exemptions as stated below:

"If the quantity released into the environment is minimised, production and placing on the market is allowed for the following specific uses provided that Member States report to the Commission every four years on progress made to eliminate PFOS:

(a) until 26 August 2015, wetting agents for use in controlled electroplating systems
(b) photoresists or anti reflective coatings for photolithography processes
(c) photographic coatings applied to films, papers, or printing plates
(d) mist suppressants for non-decorative hard chromium (VI) plating in closed loop systems
(e) hydraulic fluids for aviation"

Sweden had ongoing importing of PFOS for use in the metal industry that totalled about 200 kilograms in 2010. No use in this sector is allowed after 26 August 2015. The industrial use of PFOS falls under exemptions a) and d) above. According to the Convention and EU Regulation alternatives are to be phased in as soon as possible. During the development of this NIP, information was given on the availability on the market of effective alternatives to this remaining use of PFOS. These alternatives will be fully considered by the metal industry and the relevant authorities.

Importing of PFOS contained in articles could remain. Market surveillance in relevant sectors such as carpets, textiles and outdoor equipment will therefore be necessary.

In order to assess and report progress made to eliminate the use and emissions of PFOS from ongoing use and also from the waste streams as required, there is a need to improve compilation of data regarding the amount of PFOS imported for example in hydraulic fluids for aviation.

3.3.3 Register of exemptions and the continuing need for exemptions

Regulation (EC) No 850/2004 does not allow any country-specific exemptions for the listed POP substances. The European Commission has registered specific exemptions at the Secretariat of the SC regarding the production and use of PFOS, its salts and PFOS-F and all PFOS derivatives defined as C8F17SO2X in metal plating (hard metal plating and decorative plating, X=OH, metal salt (O–M+), halide, amide, and other derivatives including polymers. This exemption will expire in August 2015 if an extension is not proposed and approved by the Conference of the Parties.

Sweden has ongoing use of PFOS in hard metal plating, and around 200 kilograms are imported annually for this purpose. According to information given during the preparation of this NIP, alternatives are available on the market for all uses.

Pursuant to Paragraph 1 of Part III of Annex B of the Convention, the European Commission has registered acceptable purposes for the production and use of PFOS, its salts and PFOSF in photo-imaging, photo-resist and anti-reflective coatings for semi-conductors, etching agent for compound semi-conductors and ceramic filters, aviation hydraulic fluids and hard metal plating in closed-loop systems.

The annual volume of PFOS needed in Sweden for use in these exempted areas is currently not known. There are no closed-loop systems in the Swedish hard metal plating industry.

Sweden, as a contribution to a reduced need for exemptions internationally, has financially supported the development of global guidance on alternatives to PFOS applications that is available on the website of the Convention.

3.3.4 Action plan: measures to reduce releases from unintentional formation

Although action has been taken to reduce releases from all known primary sources, the environmental load of unintentionally formed POPs is still too high in Sweden.

According to BiPro 2010, PeCB has historically been used in small quantities in PCB containing liquids. Due to the low concentration and the achieved phase-out of PCB, this historic use is of no relevance. The most relevant current sources of PeCB are unintentional formation in thermal processes similar to those generating PCDD/PCDF, PCB, HCB, namely metallurgical industry, power production, thermal waste treatment and domestic incineration. PeCB has been found in Swedish environmental samples as air, water, sediment sewage sludge and biota although a majority of the results were below the level of detection.

It is likely that PeCB emissions from many primary sources have also been reduced in recent decades, but there are profound uncertainties concerning the total quantities released.

In line with the precautionary principle, measures may need to be introduced on the basis of limited data. More data are needed, however, to set clear priorities. Sweden is steadily working to close existing gaps in knowledge, so as to be better equipped to formulate an adequate reduction/elimination strategy.

Identified needs for further action to reduce releases from unintentional formation are:

1. Improved self-monitoring

Operators need to more clearly show their emissions and the loadings they give rise to. Data that reflect entire process cycles, including disruptions, and provide information about this variation need to be collected. In this respect, operator self-monitoring needs to be improved. It is currently under investigation whether ash samples from different industrial processes should be included in the national environmental monitoring programme.

2. Reduced costs of analyses and sampling with higher representativeness
To increase the representativeness, continuous sampling methods should be further improved and applied as such sampling makes it is possible to monitor how and to what extent process variations affect the formation of POPs.

A goal has been set in the Swedish national waste plan that waste incineration plants are to have continuous sampling of emissions of dioxins and furans. The relevant stakeholders should work to improve measurements from Swedish waste incineration plants and authorities should provide guidance and awareness-raising and follow-up of this goal. Continuous sampling could also be set as a condition in permits issued for waste incineration plants.

Further reductions in certain sectors
There are some sectors where further measures to reduce releases may be necessary. One example is the metallurgical sector, where there is still reasonable scope to reduce releases to air, in particular regarding dioxins.

Another area in which further measures may be necessary is the burning of biofuels and other alternative fuels. This is a growing sector which gives rise to large volumes of flue gases. This means that total emissions may rise to relatively large quantities, even if the concentration of unintentionally formed POPs in the gases is low. It is not likely that large scale burning of biofuels is among the the major sources of POPs to the air. Current data are however scarce and do not allow a reliable estimation of the importance of this sector.

Reduced formation
Emissions to air from primary sources have been substantially reduced by flue-gas treatment. This does not represent a final solution to the problem, however, since the pollutants end up instead in the residues from the treatment processes. Although the concentrations of POPs may be low, the total amounts are significant owing to the large quantities of residues arising. There is thus good reason to study how the formation of unintentionally formed POPs can be reduced.

Diffuse sources
The impact of small-scale burning of wood is dependent on the quality and age of the boiler or stove, and the composition of the fuel, incineration procedures and cooling of gases significantly affect the formation of unintentionally formed POPs. Adding plastics dramatically increases POP emissions. Tests have shown that burning wood treated with chlorophenols also results in higher releases, and incineration studies simulating backyard burning in metal drums verify these results.

Information and guidance are key instruments, alongside general regulations and their enforcement. Above all, it is necessary to create an awareness of the fact that what people burn, and how they go about it, makes a major difference to emissions.

Landfill fires

Landfill fires can be significant sources of unintentionally formed substances. It is not possible to assess the total loading for which they might be responsible. Steps are being taken to reduce the risk of such fires, by reducing the amounts of organic waste being landfilled and through guidance on how to prevent and fight fires.

Study of Swedish destruction capacity for POPs waste

Swedish capacity for destruction of hazardous waste through incineration is generally very good.

To ensure that POPs waste is treated in accordance with Article 6.1d) of the Stockholm Convention, Sweden will initiate a study covering the following activities:

- Study of waste flows – where is POPs waste combusted? There are approximately 70 plants combusting waste in Sweden. The incineration of well-known types of hazardous waste, for example waste containing PCBs is handled only by one plant. A study should be performed to monitor which of the other plants receive waste containing new POPs.
- Conditions needed to sufficiently destroy the POPs content of waste, should be identified
- Further measurements should be performed and methods for detection of POPs should be developed
- The studies should focus on emissions to air and POPs content in ashes and slags.

The aim of the study is to acknowledge the results in current Swedish practice for incineration of waste. The results could also potentially lead to adjustments of the legislation.

3.3.5 Measures to reduce releases from stockpiles and wastes

There are no known stockpiles of POP wastes, but exceptional cases will arise and they will be handled according to the legislation and the waste will be managed as POP waste and hazardous waste. Nor do we have any storage of POP waste, apart from temporary storage in the course of waste management at the locations where the waste is generated and disposed of.

The listed brominated flame retardants have been widely used in Sweden, both in production and in imported products. The most common use (approx. 95%) of pentaBDE was in flexible polyurethane (PUR) foams which in turn was mainly used for the production of automotive and upholstery applications. Of the number of other applications and finished articles containing penta –BDE the imports of penta-BDE in epoxy resin in imported printed circuit boards might be of importance according to BiPRO (2010), but no data are available to estimate this volume in the waste stream. The main (approx. 70%)

historical use of octa-BDE was in acrylonitrilebutadiene-styrene (ABS) polymers for housings/casings of electrical and electronic equipment. Octa-BDE was typically added at concentrations of 10–18% by weight.

PFOS and PFOS-related substances can be released into the environment during the production of materials or products containing PFOS, during their use in industrial and consumer applications, and during the waste stage after their use.

Due to their surface-active properties PFOS has been widely used both in industrial processes and in consumer articles. Although strictly regulated, emissions of PFOS still occur, according to data from COHIBA 2012. With the European ban on the use of PFOS-containing firefighting foams that came into force in 2011, emissions of PFOS are likely to decrease substantially. It is not known how much foam containing PFOS is still with end-users. In KemI Report 7/06 it is reported that relatively small amounts of foam are destroyed. Emissions from the use phase of PFOS-containing articles can also be expected to decrease as the stock accumulated in society decreases.

The voluntary work programme with recommendations from the POPRC (POPRC6-2) on how to ensure the elimination of regulated flame retardants (penta-, and octa- BDE) and PFOS from the waste stream has been considered when developing this updated NIP. An overview of the situation in Sweden in the different recommendations can be found in Annex III.

According to BiPRO,2010, sewage sludge constitutes an important secondary sources of PFOS. However measurements in Sweden indicate low volumes in the sludge.

3.3.5.1 STRATEGY: IDENTIFICATION OF STOCKPILES, ARTICLES IN USE AND WASTES

Since all the regulated pesticides included have been banned for a long time , no major remaining stockpiles are expected.

POPs flame retardants are still present in some types of articles in use. See section 3.3.5.2. for actions to manage waste from articles containing POPs flame retardants.

According to the Cohiba study in 2012, the main sources of PFOS in Sweden were the use of PFOS-containing firefighting foam and municipal wastewater treatment plants, with approximately 70% and 30% of the total amounts to water. Important sources upstream of the plants were the metal plating industry and service life emissions from products and materials for PFOS as well as landfill leachate for PFOA.

The installed volumes in Sweden of PFOS in PFOS-treated leather furniture and carpets made of synthetic fibres are not known. The products have a long life and are often held in temporary storage before becoming part of general domestic waste. In the Swedish Chemicals Agency's reports 3/04 and 7/04 this use of PFOS has not been considered to be major in Sweden. However, in the BiPro 2010 report, the majority of PFOS is currently installed in carpets (86%) and the discharge of PFOS to waste from carpets is estimated at over

94% of the total. An inventory of the installed amounts in Sweden would therefore be needed as a first measure in order to reduce releases through improved waste management. The Swedish Chemicals Agency will have a market surveillance activity directed towards importers of flooring materials in 2012 that is likely to provide some information.

Old landfills may contain POPs wastes, both obsolete pesticides and PCBs and unintentionally formed dioxins. The new landfill regulations will result in the closure and capping of most of these sites.

3.3.5.2 MANAGE STOCKPILES AND APPROPRIATE MEASURES FOR HANDLING AND DISPOSAL OF WASTES.

No major stockpiles of PCB are expected to emerge in Sweden. The required inventory of buildings will be performed and identified properties with PCB sealants and PCB flooring materials will be remediated according to a defined time schedule. The remaining sealed insulating glazing units and small capacitors will be managed on an ongoing basis in accordance with the legislation in place.

POP flame retardants still occur for example in vehicles and electric and electronic equipment in use in Sweden. Waste containing POPs flame retardants will therefore be generated for many years to come, although the concentrations will gradually decline. Sweden will perform the following actions to control the safe handling and destruction of waste containing POP flame retardants:

- The Swedish EPA will provide guidance and awareness raising on the waste requirements of the Stockholm Convention and the EU-POPs Regulation. The Agency will also step up efforts to inform supervisory authorities and companies about the requirements that arise from the addition of the nine new POPs to the convention. Information will be directed towards local and regional authorities, waste holders, waste management facilities and other relevant businesses. The focus will be on information about POP-flame retardants and PFOS.
- The Swedish EPA will participate in the work of the EU-TAC committee to set limit values for the new POPs in waste (Annex IV of the EU POPs-Regulation).
- The Agency will continue to improve the sorting and handling of waste containing POPs flame retardants. This will include further investigations on the current situation in Sweden and will require contacts with and input from companies handling for example waste from vehicles and electric and electronic equipment (please see also note 3.3.4).

Sweden will take measures to ensure that landfilling of residues containing POPs flame retardants (shredder light fraction) will stop. Sweden has had a national ban on landfilling of organic waste for more than seven years (Ordinance on the Landfilling of Waste (2001:512)). Most organic waste has

consequently been incinerated for many years and only a very small residue still remains that is landfilled. Part of this residue may still contain POP flame retardants. However completely halting the landfilling of residues is not a simple task and may still take some time to fulfil.

Wastes coming from chromium sludges using PFOS are sent to landfills for hazardous waste with leakage control etc. No remaining stocks of PFOS containing fire fighting foam are currently identified. If identified such stocks are directed to hazardous waste incineration.

3.3.5.3 STRATEGY: IDENTIFICATION OF CONTAMINATED SITES AND REMEDIATION IN AN ENVIRONMENTALLY SOUND MANNER

A method has been developed for assessing risks on a uniform basis and with a reasonable degree of reliability. Risk assessment is based on environmental quality criteria for contaminated sites, including a method for risk classification. The method is known as MIFO (short for Method for Inventories of Contaminated Sites in Swedish). The results provide a basis for the setting of priorities and for decisions concerning additional investigations, remediation, designation of hazardous sites and other measures. Each site is assigned to one of four risk classes on the basis of the assessment, where class 1 represents a very high risk and class 4 a low risk.

The first phase in the risk assessment is a preliminary inventory beginning with the identification of relevant sites and industries for assessment. This is followed by data collection from maps and archives, together with on-site inspections and interviews. The identification of contaminated sites is now almost complete. The second phase consists of a preliminary site investigation that begins with an on-site inspection. Samples are then taken at strategically selected locations and analysed to quantify pollutants and releases. After the survey, a more thorough examination is carried out in order to facilitate remediation.

Several methods are now in use for the remediation of soil, sediments and groundwater. Remediation aims to remove, reduce, destroy or immobilise the pollutant(s). Site-specific conditions determine the choice of method, and often several methods need to be used. Examples of site-specific conditions are the type and amount of the pollutant, the time that has elapsed since the polluting activity ceased, geological, biological and weather conditions, (marine) currents, and sedimentation processes. Before remediation takes place, specific goals are set. These differ depending on future plans for the site. A site that is to be part of a housing project has to meet more stringent criteria than one intended for use as a car park.

Remediation methods can be divided into in situ methods and removal with treatment elsewhere. Examples of in situ methods are air sparging, chemical and biological reduction or destruction, chemical or thermal stabilisation and permanent cover. If the polluted soil or sediment is removed, several methods of treatment are available. For example, the pollutant can be destroyed by burning, separated by thermal treatment, immobilised, extracted from the

soil, or treated by chemical and biological methods. Within each method, several techniques exist. It is not uncommon for a remediation project to require the development of new techniques. The treated soil or sediment can either be landfilled or returned to the site.

Sites known to be contaminated with PFOS are fire-drill sites, especially those located at the Swedish airports and their surrounding water areas. Such places are subjected to the inventory work going on in Sweden and are systematically undergoing investigation to be remediated. In Sweden there is an ongoing project called RE-PATH carried out by IVL, the Swedish Environmental Research Institute, in order to calculate the risks to human health and the environment and what measures that should be taken at the airports and water areas.

3.3.6 Facilitating or undertaking information exchange and stakeholder involvement

The Swedish Chemicals Agency and the Swedish Environmental Protection Agency maintain a continuous dialogue with relevant stakeholders concerning chemicals management, including management of POPs. The agencies' websites and information magazines regularly address chemicals management issues.

In the development of the Swedish implementation plan, a stakeholder group, consisting of representatives from industry, governmental and local authorities, universities and NGOs, see Annex VI, was involved.

3.3.7 Public awareness, information and education

The websites of the Swedish Chemicals Agency and the Swedish EPA provide information in both Swedish and English. Information on important activities in the area of chemicals management and significant data on chemicals can be found there. The Agency regularly produces information, both on its website and in leaflet form, about the roles and responsibilities of different stakeholders, e.g. manufacturers and importers, downstream users and regional and local supervisory authorities, with regard to sound management of chemicals. In Sweden, POPs management is an integral part of chemicals management. Concerning information about POPs in food, see section 2.3.6.

A project on global collaboration with stakeholders in providing information on the chemical composition of products through each step of its lifecycle is actively supported by Sweden in SAICM. Such information exchange would for example enable improved prevention of the entry of substances that exhibit characteristics of persistent organic pollutants into the recycling stream. More information can be found at www.chem.unep.ch/unepsaicm/cip/.

3.3.8 Effectiveness evaluation

As part of the effectiveness evaluation, Sweden will continue to support the international work regarding the monitoring of POPs.

3.3.9 Reporting

Sweden has reported twice to the Convention on NIP implementation in accordance with Article 15 and the established reporting format.

Sweden reports annually to the Commission with more extensive reporting every third year, in accordance with the requirements of Regulation 2004/850. Every four years Sweden has to report on progress made to eliminate PFOS in exempted uses.

At the fifth Conference of the Parties a voluntary work programme containing recommendations on how to ensure the elimination of brominated flame retardants and PFOS from the waste stream was agreed, and the Parties are due to report on their experiences in implementing the work programme in 2012.

3.3.10 Research, development and monitoring

Research

Analyses of POPs in the environment and toxicological investigations of their biological effects have been performed in Sweden since the mid-1960s. Research on POPs is currently being undertaken in a number of areas, such as reproductive effects, levels and trends in biota, including human tissue, and the contributions of current and historical sources to current levels of dioxins in Baltic fish.

Under the HELCOM Baltic Sea Action Plan (BSAP) the Baltic Sea countries have committed themselves to achieving a "Baltic Sea with life undisturbed by hazardous substances". Loads and impacts of some hazardous substances have been reduced considerably in the past 20–30 years, but concentrations of some other substances have increased in the marine environment. The overall objective of the project COntrol of Hazardous substances In the BAltic Sea region (COHIBA) is to support the implementation of the BSAP with regard to hazardous substances by developing joint actions to reach the goal. The COHIBA project is one of the flagship projects of the EU strategy for the Baltic Sea Region.

The COHIBA has identified the sources and inputs of 11 hazardous substances including PFOS and has developed measures to reduce these substances.

Monitoring

An identified need for improved monitoring is extended coordination of regional and local monitoring. Development of uniform methods, guidance for monitoring and the creation of databases are examples of how this could be attained.

The relevant substances for Sweden are included in monitoring programmes for levels in air and deposition and in human matrices. An expanded programme of environmental monitoring would provide an even better basis for effectiveness evaluation of measures to achieve the objective of the Stockholm Convention. However, the need for more extensive environmental

monitoring has to be weighed against other, as yet unmet, monitoring needs in other quarters, such as the EU's framework directives on air, water and habitats.

3.3.11 Technical and financial assistance

Sweden prefers support to coherent implementation of activities with the overall objective of developing national structures for chemicals management. Implementation of POP-related activities being done in isolation from other related issues should be avoided. Developing country participation in Stockholm Convention meetings including the POPs Review Committee is important, and Sweden has annually supported such participation.

Sweden`s total funding of the Global Environment Facility (GEF) as the financial mechanism of the Stockholm Convention for the period 2011–2015 was SEK 1,105 million, and 10 % of GEF funds as allocated for Persistent Organic Pollutants (POPs) projects.

The Strategic Approach to International Chemicals Managements (SAICM) was approved in February 2006 and Sweden's contribution to the SAICM Quick Start Programme to support capacity building and implementation activities including POPs-related activities totals SEK 70 million.

Moreover, the Swedish International Development Cooperation Agency (Sida) has an agreement with UNEP for the period 2010–2013 with the purpose of supporting UNEP's work with its Medium Term Strategy (MTS) 2010–13. The Swedish contribution totalling SEK 95 million has to support the implementation of four cross-cutting thematic areas, including harmful substances and hazardous waste, such as the POPs under the Stockholm Convention.

In 2005, KemI and the Swedish EPA signed agreements with Sida for increased co-operation in the field of development co-operation. Several co-operative development programmes have started based on those agreements, and have been reported to the Secretariat of the Convention.

KemI supports the development of national structures for chemicals management, with a focus on chemicals placed on the market. This is done at the national, regional and global levels in developing countries and in countries with economies in transition. Examples of areas covered are development of legislation, institutional capacity building, and specific areas such as risk assessment, risk management, systems for distribution of risk information (classification and labeling, safety data sheets) and enforcement. KemI also supports awareness raising and capacity building in civil society, through co-operation with NGOs. In its global work on chemicals management, KemI focuses on the implementation of the chemical conventions and SAICM.

Swedish EPA's core areas of expertise in development co-operation involve chemicals as waste and as pollution in different medias after being used in society.

The Conference of the Parties' decisions on technical assistance state the priorities for technical assistance. Sweden's development cooperation has specifically contributed in the following areas: improved global monitoring of POPs, support to the establishment of poison centres, development of legislation and management of chemicals, and the identification and disposal of POP wastes. Sweden has financially supported the development of a global guidance on alternatives to PFOS applications that is available at the website of the POPs Review Committee under the Convention, as a contribution to a reduced need for PFOS exemptions internationally. Since effective control of insect-borne diseases such as malaria, which is transmitted by mosquito vectors, in some developing countries still entails the use of DDT, which is not only environmentally noxious, but also increasingly ineffective due to resistance, Sweden has supported the DDT Global Alliance and the introduction of Integrated Vector Management for efficient malaria control without the use of DDT.

Sweden supports the key role of Stockholm Convention regional and subregional centres in promoting the implementation of the Convention, in particular with regard to capacity building and technology transfer. KemI has initiated collaboration with a Regional Centre in Africa, the African Institute.

3.4 Timetable for plan implementation and measures of success

In Sweden, PCBs and all the pesticides covered by the Stockholm Convention have been banned for many years.

The main implementation activities for Sweden relate to releases of unintentionally formed POPs (Annex C substances) and handling of articles in use and wastes. Implementation of the identified activities follows the time table for the national environmental objectives and will be an integral part of that work.

3.5 Resource requirements

Resource requirements for implementation of the national plan for POPs will be handled within the traditional system for the allocation of central government resources in Sweden.

Annex I

Table 1:Municipal (local) and state (central and regional) authorities for supervision under the Environmental Code or other legislation of relevance for POPs substances

Authority	Responsibility
Environmental Protection and Public Health Committees (local/municipal)	Chemicals control, waste control and supervision of activities hazardous to the environment and human health as defined by the Environmental Code
County administrative boards (regional/state)	Protection of the natural environment and human health in connection with activities hazardous to the environment and human health and the use of chemical products and bio-technical organisms
	Supervision of shipments of waste within , into and out of the European Union in accordance with Council Regulation (EEC) No. 259/93
Labour Inspectorate (regional)	Supervision in connection with permits given under the Ordinance on Pesticides by the National Board of Occupational Safety and Health
Medical Products Agency	Manufacturers and other primary suppliers of cosmetics and hygiene products.
National Board of Health and Welfare	Certain decisions concerning pesticides
Swedish Chemicals Agency	Manufacturers and other primary suppliers of chemical products and bio-technical organisms available.
National Food Agency	Food and material and products intended for contact with food.
Swedish Civil Contingencies Agency	Transport of waste
Surgeon General	Issues concerning health and environmental protection within the Swedish Armed Forces
Swedish Agency for Marine and Water Management (SwAM)	Responsible for managing the use and preventing the overuse of Sweden's sea and freshwater environments, including fishery
Swedish Board of Agriculture	Feedstuff
Swedish Customs Board	Supervision of shipments of waste within , into and out of the European Union in accordance with Council Regulation (EEC) No. 259/93
Swedish Environmental Protection Agency	Has an overview of conditions in the environment and progress in environmental policy. Coordinate, monitor and evaluate efforts, involving many agencies, to meet Sweden's environmental objectives.
Swedish Forest Agency	Forestry
	Protection of natural habitats
Swedish Maritime Administration	Use at sea of substances

Table 2:Authorities responsible for central guidance on implementation and enforcement

Authority	Guidance for supervision and enforcement of legislation on
County administrative boards	– activities hazardous to the environment and human health
	– polluted sites
Swedish Chemicals Agency	– chemical and bio-technical products, pesticides, biocides
Swedish Environmental Protection Agency	– activities hazardous to the environment and human health
	– polluted sites
	– waste
Work Environment Authority	– Certain issues concerning pesticides and biocides
Swedish Civil Contingencies Agency	– large accidents

ANNEX II

INTERNATIONAL LINKAGES

International Agreements, Conventions, Networks, etc.	National Contact Point
Stockholm Convention on Persistent Organic Pollutants; www.pops.int	Swedish Chemicals Agency Swedish Environmental Protection Agency
Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (UNEP); www.pic.int	Swedish Chemicals Agency
Basel Convention on the Control of transboundary Movements of Hazardous Wastes and Their Disposal; www.basel.int	Swedish Environmental Protection Agency
Globally Harmonised System for Classification and Labelling of Chemicals; http://www.unece.org/trans/danger/publi/ghs/ghs_welcome_e.html	Swedish Chemicals Agency
Chemical Weapons Convention; www.opcw.org	National Inspectorate of Strategic Products
Convention for the Prevention of Marine Pollution from Land-Based Sources / The MARPOL convention; http://www.imo.org/home.asp	National Maritime Administration
Codex Alimentarius (FAO/WHO); http://www.codexalimentarius.net/web/index_en.jsp	National Food Agency
Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter / London Dumping Convention; http://www.londonconvention.org/	Swedish Environmental Protection Agency
Intergovernmental Forum on Chemical Safety (IFCS); www.who.int/ifcs/	Swedish Chemicals Agency
Montreal Protocol on Substances that Deplete the Ozone Layer; http://hq.unep.org/ozone/	Swedish Environmental Protection Agency
Convention on Long-Range Transboundary Air Pollution (CLRTAP); http://www.unece.org/env/lrtap/	Swedish Environmental Protection Agency
Baltic Marine Environment Protection Commission/ Helsinki Commission (HELCOM); www.helcom.fi	Swedish Agency for Marine and Water Management
OSPAR – Commission for the Protection of the Marine Environment of the North-East Atlantic / Oslo-Paris Convention; http://www.ospar.org	Swedish Agency for Marine and Water Management
Global Environmental Information Exchange Network / International Environ-mental Information System (UNEP-INFOTERRA); http://www.unep.org/infoterra/welcome.htm	Swedish Environmental Protection Agency
International Occupational Safety and Health Information Service (ILO-CIS);http:// www.ilo.org	CIS Service, National Institute for Working Life
OECD Environmental Health and Safety Programme; http://www.oecd.org/	Swedish Chemicals Agency
Strategic **A**pproach to **I**nternational **C**hemicals **M**anagement, SAICM www.saicm.org	Ministry for the Environment
UNITAR Informal Capacity Building Network; http://www.unitar.org/	Swedish Chemicals Agency

International Agreements, Conventions, Networks, etc.	National Contact Point
United Nations Recommendations on the Transport of Dangerous Goods; http://www.unece.org/trans/main/dgdb/dgcomm/ac10age.html	Swedish Civil Contingencies Agency (land transport) Swedish Maritime Administration (sea transport); Civil Aviation Administration (air transport)
CEFIC – European Chemical Industry Council; www.cefic.org	Association of Swedish Chemical Industries
European Crop Protection Association (ECPA); www.gcpf.org	IVT – Association of Swedish Plant and Wood Protection Industries

ANNEX III

Comments and Swedish situation regarding the Work programmes on new persistent organic pollutants (recommendations in the annex to decision POPRC-6/2 of the POPs Review committee).

The Conference of the Parties (decision SC-5/5: Work programme on brominated diphenyl ethers and perfluorooctane sulfonic acid, its salts and perfluorooctane sulfonyl fluoride) Encourages parties and other relevant stakeholders to implement where appropriate, taking into account national circumstances, the recommendations set out in the annex to decision POPRC-6/2 on the elimination from the waste stream of brominated diphenyl ethers that are listed in Annex A to the Convention and on risk reduction for perfluorooctane sulfonic acid, its salts and perfluorooctane sulfonyl fluoride.

The Conference of the Parties also invites parties to submit information on their experiences in implementing the recommendations.

This annex presents Swedish comments and experiences in implementing some of the recommendations.

I. Recommendation on the elimination of brominated diphenyl ethers from the waste stream

A. OVERALL RECOMMENDATION

1. The objective is to eliminate brominated diphenyl ethers from the recycling streams as swiftly as possible. To meet this objective, the principal recommendation is to separate articles containing brominated diphenyl ethers as soon as possible before recycling. Failure to do so will inevitably result in wider human and environmental contamination and the dispersal of brominated diphenyl ethers into matrices from which recovery is not technically or economically feasible and in the loss of the long term credibility of recycling. Initially, the main focus should be on developed countries handling primary flame-retarded articles containing higher concentrations of brominated diphenyl ethers and attention should be paid to identification and treatment of brominated diphenyl ethers in articles for both domestic use and for export.

2. Time is short because articles containing brominated diphenyl ethers are already present in many existing waste streams as a result of the time frame of former production of these articles. Brominated diphenyl ethers should not be diluted since this would not reduce the overall quantity in the environment. In some cases, it is likely that the quantities in waste have reduced significantly from their peak concentration levels.

3. To prevent similar difficulties with other substances, parties should step up efforts to regulate chemicals with the aim of preventing the production and use of chemicals that exhibit the characteristics of persistent organic pollutants in compliance with paragraphs 3 and 4 of Article 3 of the Stockholm Convention.

Swedish situation

The Swedish legislation for pre-treatment of e-waste requires separation of plastics containing brominated flame-retardants. Methods currently used in Swedish recycling industry for discerning and separating BFRcontaining plastics from other plastics are:

- written instructions/guidelines for the operators at the pre-treatment plant,
- work experience; a person with a formal training and experience of manually sorting WEEE plastics/parts containing BFR, will carry out the sorting process and remove plastic parts that according to his experience contain BFRs.
- density separation; Different thermoplastics (containing BFR for example) can be separated by using water with different salinity (density).
- furthermore, some of the recycling companies claim to have regular checking of the accuracy of their methods by X-ray fluorescence (XRF, handheld tool).

The methods above do not distinguish between plastics containing PBDEs from plastics containing other BFRs.

E-waste plastics containing brominated flame retardants are most commonly incinerated in Sweden for example by SAKAB (major Swedish plant authorised for incineration of hazardous waste). Some quantities may be exported, this will be investigated further. Recycling of plastics containing brominated flame retardants is not performed in Sweden and there is currently no demand for this kind of plastics by Swedish industry. The Swedish Recycling Industries' Association has made a statement that BFR-containing plastics must be phased out and not recycled.

Residues from the fragmenting of end of life vehicles and e-waste could contain POPs flame retardants. The extent to which POPs flame retardants (c octa-BDE) are still present in end of life vehicles in Sweden will be further investigated. Sweden has had a ban on landfilling of organic waste for several years, however exemptions are given in some cases for shredder residues due to technical difficulties during incineration of this material. The landfilling of shredder residues should stop and the possibilities to improve incineration will be further investigated.

Sweden participates in the EU TAC-committee for the POPs-regulation and welcomes the ongoing process for the setting of limit values for the new POPs. The limit values will further clarify the requirements for handling of POPs-waste. Sweden also actively participates in the EU-process of nominating candidate POPs to the Stockholm convention.

B. RECOMMENDATIONS FOR SHORT-TERM ACTIVITIES

4. The key recommendation for the short-term in countries in a position to do so, especially developed countries, is to establish and apply screening techniques and to separate materials containing brominated diphenyl ethers in order to stop these materials from being recycled.

Swedish situation:

Some screening and separation techniques are currently in use in Sweden e.g. manual sorting, screening for bromine using XRF-instrument and density separation of shredded plastics containing bromine.

There is no recycling of material containing POPs flamed retardants in Sweden. Sweden has enough capacity to handle waste containing POPs and consequently the storage of such materials and articles will be very limited.

There is a ban on export to non-OECD countries through The Regulation on the Shipment of Waste (1013/2006/EC). This Regulation translates the provisions of the Basel Convention into European legislation. Exports to third countries of waste intended for disposal are prohibited, except to EFTA (European Free Trade Association) countries. Exports of hazardous waste intended for recovery are prohibited, except those directed to OECD countries and to third countries which are party to the Basel Convention.

Chapter 3 of the Swedish National Implementation Plan describes some further activities e.g. study of Swedish incineration capacity and providing guidance on the EU POPs regulation.

C. RECOMMENDATIONS FOR MEDIUM-TERM ACTIVITIES

Swedish situation:

Several of the medium-term recommendations are not applicable to Sweden as a party to the convention.

There is a ban on the landfilling of organic waste in Sweden and therefore landfilling of material containing POPs is uncommon. The most common treatment for POPs containing waste is incineration. There is no known recycling of waste containing POPs in Sweden. Sweden has ongoing screening studies of the leachate from landfills. As part of further activities described in chapter 3 a study of Swedish incineration capacity will be performed.

D. RECOMMENDATIONS FOR LONG-TERM ACTIVITIES

- To prioritize for remediation activities landfills, sediments and production, manufacturing and treatment sites that present significant risks to human health and/or the environment.
- To evaluate surveys conducted in developing countries and countries with economies in transition and apply their conclusions, where appropriate, to other countries with similar waste streams. If the survey indicates a significant presence of materials containing brominated diphenyl ethers, provisions for technology transfer should be implemented.

Swedish situation:

The manufacturing sites where PBDE may have been a component in production are to a large extent identified in the regular inventory of contaminated sites performed in Sweden. There are also a couple of research or screening projects on-going in the country in order to quantify and manage the problems with leakage of POP:s from contaminated sites and landfills to the environment.

For detailed work related to surveys in developing countries a decision by the Parties is necessary. It is without a decision not possible to have mandatory provisions for technology transfer. It is a very broad area to handle waste streams.

II. Recommendations on risk reduction for PFOS, its salts and PFOSF

A. RECOMMENDATIONS WITH REGARD TO PFOS PRODUCTION AND INDUSTRIAL USE

Short term

- To use best available technique and best environmental practice destruction technologies for wastes containing PFOS in current production and industrial uses of PFOS. No landfilling of these wastes should be permitted, unless leachate containing PFOS is properly treated.
- To ensure safe storage when destruction technologies are not readily available.
- To launch urgent investigations into landfills where waste from PFOS producers or from PFOS industrial users (paper, carpet, textile, chromium plating and other industries having used PFOS) are deposited. Drinking water from reservoirs and wells in the vicinity of these landfills and also around the PFOS production and user areas should be analysed.
- To assess industries' current and historical practices in managing sludge. If contaminated sludge has been applied as a biosolid to agricultural areas or other soils, such practices should be stopped.
- To monitor rivers and lakes and, in particular, the fish in the lakes and rivers close to landfills and production and industrial use areas. Depending on the PFOS levels in fish, an advisory board for fish consumption should be established.

- To monitor occupational exposure at production and industrial use facilities and to implement appropriate occupational health and safety measures.

Medium term

- If contamination has occurred, to carry out remediation activities in accordance with the polluter-pays principle to reduce risk.
- For recording remediation technologies, strategies and associated damages, to document the cost of management and remediation, including the related cost of not using drinking water wells and of restricting fishing. Such information should be included, as appropriate, in the national implementation plan and/or reports submitted under Article 15 of the Stockholm Convention.

Swedish situation:

Capacity to handle and incinerate waste containing PFOS is available in Sweden as described above for PBDE. There is also a ban on landfilling of organic waste. As described in chapter 3 a study of Swedish incineration capacity will be performed to further improve the handling of waste containing PFOS.

Sludge resulting from metal plating industry is deposited in landfills for hazardous waste.

Sites where manufacturing and use of POPs e.g. the sites where fire extinguishers have been used causing contamination of PFOS are to a large extent identified in the regular inventory of contaminated sites performed in Sweden. There are also a couple of research or screening projects going on in the country in order to quantify and manage the problems with leakage of POP:s from contaminated sites and landfills to the environment.

B. RECOMMENDATION ON RISK REDUCTION FROM PFOS USE

5. Taking into account the information contained in the guidance document on alternatives to PFOS and its derivatives and additional information provided thereafter:

Short term

- To withdraw or cease open applications (e.g., in impregnated/surface modified paper, insecticides, chemically driven oil production, carpet, textile, leather, furniture, detergents).
- To identify and implement alternatives in open applications under acceptable purposes (fire-fighting foam and ant baits). For a range of other acceptable-purpose applications, alternatives are used in developed countries and appear available in practice.
- If using PFOS in industrial applications, to do so in closed-loop systems. Releases of PFOS from industrial processes should be retained by best available technique and best environmental practice treatment technologies. Resulting sludge, adsorbents and wastes containing PFOS should be destroyed and not deposited.

- To continue to gather information on experiences of using PFOS alternatives in the areas of acceptable purposes and specific exemptions. This information should be compiled to support the work of the Conference of the Parties in evaluating the continued need for these chemicals.
- To assess the toxicity and ecotoxicity of alternatives to PFOS.

Swedish situation:
There are no remaining uses of PFOS in open applications. The remaining use in hard metal plating industries is in accordance with BAT/BEP. The use is not in closed loop systems. This remaining use will be phased out at the latest in 2015 according adopted EU-legislation. Resulting sludge is deposited in landfills specialized for hazardous waste.

To support the use of alternatives to PFOS, Sweden has supported the development of a guidance set out in document UNEP/POPS/POPRC.6/13/Add.3/Rev.1.

Before alternative substances are marketed their toxicity and ecotoxicity has to be assessed by the industry that wants to put it on the market.

C. RECOMMENDATION ON RISK REDUCTION FOR PFOS IN EXISTING STOCKS

Swedish situation:
There are no known stocks of PFOS in Sweden.

D. RECOMMENDATION ON RISK REDUCTION FOR RECYCLING OF ARTICLES CONTAINING PFOS

Swedish situation:
There is no known recycling of carpets or other textiles containing PFOS in Sweden.

E. RECOMMENDATION ON RISK REDUCTION FROM PFOS IN CONSUMER PRODUCTS DEPOSITED IN MUNICIPAL LANDFILLS

Short term
- To cease deposition of materials identified as containing PFOS (in particular carpets, furniture and textiles) in landfills and to store them to await proper destruction.

Medium term and long term
- To assess the extent to which PFOS releases occur in the recycling of paper, textiles and impregnated furniture.
- To assess whether other material recycling streams are affected by materials containing PFOS.

- To monitor releases of PFOS, among other contaminants, from municipal landfills. Monitoring should also be undertaken of the groundwater, surface water and biota that could be affected by releases from landfills.
- When releases are discovered, to apply appropriate measures, including leachate control.

Swedish situation:
There is a ban on landfilling of organic waste in Sweden. Waste carpets, furniture and textiles are most commonly incinerated in municipal waste incineration plants. The amounts of PFOS in the Swedish waste stream should be further investigated along with the study of Swedish incineration capacity as described in chapter 3. There is a need to further improve the handling of waste containing PFOS.

There is no known recycling of articles containing PFOS. On-going recycling of paper or packaging material is according to the industry not affected by materials containing PFOS.

There are a couple of research or screening projects going on in the country in order to quantify and manage the problems with leakage of POP:s from contaminated sites and landfills to the environment.

F. RECOMMENDATIONS ON RISK REDUCTION FROM RELEASES FROM CONTAMINATED SITES

Short term

- To establish and implement a strategy for identifying and monitoring sites contaminated with PFOS in accordance with Article 6 of the Convention.

Medium and long term

- To gather information on remediation technologies for sites contaminated with PFOS.
- To encourage the exchange of information and country experiences on sound management and remediation of contaminated sites.
- To take action to remediate sites contaminated with PFOS.

Swedish situation:
Sites where manufacturing and use of POPs e.g. the sites where fire extinguishers have been used causing contamination of PFOS are to a large extent identified in the regular inventory of contaminated sites performed in Sweden. These sites are thereby also covered by the Swedish programme for the remediation of contaminated sites.

There are also a couple of research or screening projects going on in the country in order to quantify and manage the problems with leakage of POP:s from contaminated sites and landfills to the environment.

Annex IV POPs

Annex A – Elimination	Annex B – Restriction	Annex C – Unintentional production
1. Aldrin	10. DDT	11. Polychlorinated dibenzo-p-dioxins (PCDD)
2. Chlordane		
3. Dieldrin	21. Perfluorooctane sulfonic acid (PFOS)	12. Polychlorinated dibenzofurans (PCDF)
4. Endrin		
5. Heptachlor		
6. Hexachlorobenzene (HCB)		HCB
7. Mirex		PCB
8. Toxaphene		PeCB
9. Polychlorinated Biphenyls (PCB)		
		Also stockpiles and wastes
13. Chlordecone		
14. Hexabromobiphenyl		
15. Pentabromodiphenyl ether		
16. Lindane		
17. Alpha-hexachlorocyklohexane		
18. Beta-hexachlorcyclohexane		
19. Octabromodiphenyl ether		
20. Pentachlorobenzene (PeCB)		
22. Endosulfan		

Substances currently under review by the POPRC

Step 1. Screening criteria, Annex D	Step 2. Develop a risk profile Annex E	Step 3. Develop a risk management evaluation, Annex F	To be considered at COP6 in 2013 Including proposal for listing
Pentachlorophenol (PCP)	Hexachlorobutadiene (HCBD) Polychlorinated naphtalenes (PCNs) Shortchained chlorinated paraffins (SCCP)	–	Hexabromocyclo dodekan, HBCD

Abbreviations and explanations

Aldrin	Pesticide listed in 2001
Alfa-HCH	Alpha hexachlorocyclohexane, Pesticide constituent when producing Lindane
Beta HCH	Beta hexachlorocyclohexane, Pesticide constituent when producing Lindane
Chlordecone	Pesticide listed in 2009
Chlordane	Pesticide listed in 2001
DDT	Pesticide listed in 2001
Endrin	Pesticide listed in 2001
Dioxins	Polychlorinated dibenzo-p-dioxins and dibenzofurans, listed in 2001 PCDD/F
EFSA	European Food Safety Authority of the European Union
EMAS	Eco-Management and Audit Scheme, the EU voluntary instrument which acknowledges organisations that improve their environmental performance on a continuous basis.
Endosulfan	Pesticide listed in 2011
Endrin	Pesticide listed in 2001
FSC	The Forest Stewardship Council, an international network to promote responsible management of the world's forests
HBB	Hexabromobiphenyl, flame retardant listed in 2001
HCB	Hexachlorobenzene, listed in 2001
HELCOM	Baltic Marine Environment Protection Commission/ Helsinki Commission
octa-BDE	commercial octabromodiphenyl ether where Hexabromodiphenyl ether and hepta-bromodiphenyl ethers are listed as POPs-substances
HBB	Hexabromo biphenyl, listed in 2009
HBCDD	Hexabromocyclododekan, flame retardant to be considered for listing by the Parties in 2013
HCBD	Hexachlorbutadiene. Curently under review. Are covered by the Protocol on Persistent Organic Pollutants of the LRTAP Convention
IFCS/UNEP	Intergovernmental Forum on Chemical Safety under United Nations Environment Programme
ISO	International Organisation for Standardisation
KemI	Swedish Chemicals Agency
Lindane	gamma-hexaclorocyclohexane, pesticide listed in 2009
(C)LRTAP	Convention on Long-Range Transboundary Air Pollution
Mirex	Pesticide listed in 2001
NFA	National Food Agency

OSPAR	Commission for the Protection of the Marine Environment of the North-East Atlantic / Oslo-Paris Convention
PAH	Polyaromatic Hydrocarbons, are covered by the Protocol on Persistent Organic Pollutants of the LRTAP Convention
PBDE	Polybrominated diphenyl ethers
PBT	Persistent, Bio-accumulating and Toxic substances
PCB	Polychlorinated Biphenyls, listed in 2001
PCN	Polychlorinated naphtalenes, currently under review. Are covered by the Protocol on Persistent Organic Pollutants of the LRTAP Convention
PCP	Pentachlorophenol, nominated for listing
PeCB	Pentachlorobenzene, listed in 2001
penta-BDE	Commercial pentabromodiphenyl ether where Tetrabromo-diphenyl ether and pentabromodiphenyl ether are listed as POPs,
PFOS	Perfluorooctane sulfonate or Perfluorooctane sulfonic acid and its salts, listed in 2009
PFOSF	Perfluorooctane sulfonyl fluoride, listed in 2009. Is a starting material/intermediate to produce PFOS
PMK	Programme for Monitoring of Environmental Quality
POPRC	Persistent Organic Pollutants Review Committee under the Stockholm Convention
POPs	Persistent Organic Pollutants
RASFF	Rapid Alert System for Food and Feed in the European Union
SCCP	Shortchained chlorinated paraffins. Are covered by the Protocol on Persistent Organic Pollutants of the LRTAP Convention
Swedish EPA	Swedish Environment Protection Agency
TCDD	2,3,7,8-tetrachlorodibenzo-p-dioxin
TCDF	2,3,7,8-tetrachlorodibenzofuran
Toxaphene	Chlorinated camphene, pesticide listed in 2001

ANNEX V

POPs network and project stakeholder group

Akademin för naturvetenskap och teknik
Bil Sweden
CIT Recycling Development AB
Confederation of Swedish Enterprise
County Administrative Board of Västra Götaland
El-kretsen
Geological Survey of Sweden
Kemisk-Tekniska Leverantörsförbundet (KTF)
Medical Products Agency
Miljökonsultgruppen i Stockholm HB
National Food Agency
SAKAB
Sims Recycling Solutions AB
Statistics Sweden
Stena Metall Group
Stena Technoworld AB
Swedenergy
Swedish Association for Nature Conservation
Swedish Board of Agriculture
Swedish Civil Contingencies Agency
Swedish Consumer Agency
Swedish Customs
Swedish Energy Agency
Swedish Environmental Research Institute Ltd
Swedish Forest Industries Federation
Swedish Foundry Association
Swedish Geotechnical Institute
Swedish National Testing and Research Institute
Swedish University of Agricultural Sciences (SLU), Department of Aquatic Sciences and Assessment
Work Environment Authority
Svensk Ytbehandlings Förening AB
Svenska Fogbranschens Riksförbund
Teknikföretagen
Textile Importers' Association in Sweden
The International Chemical Secretariat
The National Board of Housing, Building and Planning
The Swedish Association of Local Authorities and Regions (SALAR)
The Swedish Waste Management (Avfall Sverige)
The Swedish Construction Federation

The Swedish Electronics Trade Association
The Swedish Fire Protection Association (SFPA)
The Swedish Paint and Printing Ink Makers Association
The Swedish Plastics and Chemicals Federation
The Swedish Recycling Industries' Association
The Swedish Steel Producers' Association
Umeå university, Department of Chemistry
University of Stockholm, Department of Applied Environmental Science
University of Stockholm, Department of Environmental Chemistry
Örebro University

ANNEX VI

Contact addresses:

Swedish Chemicals Agency
P.O. Box 2
SE-172 13 Sundbyberg, Sweden
Phone: +46 8 519 411 00
Fax: +46 8 735 76 98
E-mail: kemi@kemi.se
Website: www.kemi.se

Swedish Environmental
Protection Agency
(Naturvårdsverket)
SE-106 48 Stockholm, Sweden
Valhallavägen 195
Phone +46 10 698 10 00
Fax +46 10 698 10 99
E-mail natur@naturvardsverket.se
Website: www.naturvardsverket.se

ANNEX VII

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National Implementation Plan for the Stockholm Convention on Persistent Organic Pollutants for Sweden 2012

REPORT 6498

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The objective of the Stockholm Convention on Persistent Organic Pollutants (POPs) is to protect human health and the environment from the substances listed in the Convention. The most acute problem related to POPs in Sweden today is that levels of dioxins and dioxin-like PCBs in fatty fish from the Baltic Sea are unacceptably high and constitute a risk to human health.

The first National Implementation Plan (NIP) for Sweden was prepared in 2006.

With this report the National Implementation Plan has been reviewed and updated. The report describes Swedish legislation, on chemicals in general and POPs in particular, as well as measures that Sweden has taken to protect the Swedish population and the Swedish environment from POPs, so as to comply with the Convention obligations. The newly listed substances have been included and references to legislation and work in the EU have been made.

Swedish EPA SE-106 48 Stockholm. Visiting address: Stockholm – Valhallavägen 195, Östersund – Forskarens väg 5 hus Ub, Kiruna – Kaserngatan 14. Tel: +46 10-698 10 00, fax: +46 10-698 10 99, e-mail: registrator@naturvardsverket.se Internet: www.naturvardsverket.se **Orders** Ordertel: +46 8-505 933 40, orderfax: +46 8-505 933 99, e-post: natur@cm.se Adress: CM Gruppen AB, Box 110 93, SE-161 11 Bromma. Internet: www.naturvardsverket.se/publikationer