KEMI
Report
Nr 4/06
A Report from the Swedish Chemicals Inspectorate
www.kemi.se

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

SWEDISH CHEMICALS INSPECTORATE

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

ISSN: 0284-1185
Order No. 360 827
Stockholm, May 2006
Publisher: Swedish Chemicals Inspectorate©
Order address: Telefax +46 8 50 59 33 99, e-mail: kemi@cm.se

Foreword

The Swedish Government commissioned the Swedish Chemicals Inspectorate jointly with the Swedish Environment Protection Agency to prepare a national implementation plan for the Stockholm Convention on Persistent Organic Pollutants.

The project to develop the report was done in full cooperation with the Swedish EPA. The EPA has prepared the sections on unintentionally produced POPs and on PCB in Chapter 2, and the sections within their area of responsibility in Chapter 3. A joint Steering Committee between the agencies was set up for the project. The following staff participated in the project from the Inspectorate: Bo Wahlström (project leader), Bert-Ove Lund, Lars Andersson and Stefan Gabring. From the EPA the following staff participated: Maria Nyholm (project leader), Maria Wallin (assistant project leader), Lars Asplund, Erik Nyström, Bo Carlerup, Margareta Appelberg, Mikaela Gönczi, Britta Hedlund, Niklas Johansson and Malin Gunnarsson.

The project was executed in dialogue with a reference group representing the authorities and organizations concerned, including NGOs. Comments on individual sections in the text have also been sought from authorities and organizations.

Sundbyberg 12 April 2006

Förord

Denna rapport är en redovisning av ett uppdrag från regeringen att i samverkan med Naturvårdsverket ta fram en nationell genomförandeplan för Stockholmskonventionen om långlivade organiska föroreningar.

Uppdraget har utarbetats i löpande samverkan med Naturvårdsverket. Naturvårdsverket har bl.a. bidragit till delarna om oavsiktligt bildade ämnen och PCB i kapitel 2 samt alla de delar av kapitel 3 som ligger inom Naturvårdsverkets ansvarsområde. Myndigheterna har haft en gemensam styrgrupp för arbetet. Från KemI har följande personer deltagit; Bo Wahlström (projektledare) samt Bert-Ove Lund, Lars Andersson och Stefan Gabring (nya ämnen). Från Naturvårdsverket har följande personer deltagit; Maria Nyholm (projektledare), Maria Wallin (bitr. projektledare), Lars Asplund, Erik Nyström, Bo Carlerup, Margareta Appelberg, Mikaela Gönczi, Britta Hedlund, Niklas Johansson och Malin Gunnarsson.

Uppdraget har bedrivits i en dialog med en referensgrupp bestående av berörda myndigheter och branschorganisationer. Synpunkter på enskilda avsnitt har också inhämtats under hand från myndigheter och organisationer.

Sundbyberg den 12 april 2006

CONTENTS

Summary

The objective of the Stockholm Convention is to protect human health and the environment from persistent organic pollutants (POPs). This is to be achieved by prohibiting or restricting the production, use, import and export of such substances and by minimising or if possible eliminating releases of unintentionally produced POPs. The goal of the Convention coincides with the Swedish environmental objective 'A Non-Toxic Environment' and therefore has a natural part to play in the context of attaining that objective. At present, the Convention covers twelve chemical compounds or groups of compounds. Eight of these are pesticides (aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, mirex and toxaphene); two are industrial chemicals (PCBs and hexachlorobenzene, HCB; both were also once used as pesticides and may be formed unintentionally); and two are groups of substances formed unintentionally in combustion and other high-temperature processes (polychlorinated dioxins, PCDD, and furans, PCDF).

One problem which Sweden currently faces is the long-range atmospheric transport of unintentionally produced POPs from other countries. To reduce this pollutant loading, Sweden must continue to contribute to international efforts in this area. Sweden regards the Stockholm Convention and the LRTAP Protocol on long-range atmospheric transport as important tools in this process.

Concerning the pesticides addressed under the Convention, Sweden was one of the first countries to take action. Only six of these substances were ever approved for use in Sweden, and the substances in question were banned in the 1960s and 1970s. The production, use, export and import of all the pesticides are prohibited under the EU POPs Regulation (Regulation (EC) No 850/2004 of the European Parliament and of the Council of 29 April 2004 on Persistent Organic Pollutants and amending Directive 79/117/EEC).

A ban has long been in place in Sweden on the manufacture and use of PCBs and on their presence in equipment. In 1966 Stockholm University was the first to identify PCBs in a biological sample. This prompted the Swedish Government to take action to prevent the use of these chemicals as early as 1969. Sweden's regulation of PCBs is far ahead of the requirements of the Convention, which calls for a phase-out by 2025 and final disposal by 2028. Sweden has also done more than is required under the EU POPs Regulation (Regulation (EC) No 850/2004). Identification and disposal of the remaining known PCBs in sealants in buildings from the 1960s and early 1970s are under way and regulatory proposals have been put forward.

Since the 1970s, concentrations of dioxins, HCB, PCBs and DDT in the environment have fallen. However, the decline has become less pronounced in recent years, and levels of dioxins and dioxin-like PCBs in fish from the Baltic Sea still give cause for concern. The average exposure of Swedish consumers to dioxins and dioxin-like PCBs is now only marginally below the highest tolerable daily intake (TDI) set by the EU. This means that, for over 10% of Sweden's population, the TDI for dioxins is exceeded. Breast-fed babies have a particularly high exposure, clearly in excess of the TDI. In a large proportion of fatty fish from the Baltic, levels of persistent organic pollutants are still above EU limit values for consumption. This has resulted in export restrictions.

With regard to domestic consumption of such fish, Sweden and Finland have been granted exemptions from the EU rules, since the two countries are considered to have issued sufficiently stringent dietary recommendations.

It is unclear which sources are responsible for current levels in the environment. The fall in concentrations of unintentionally produced POPs is due largely to an appreciable decrease in emissions from industry since the 1980s. Over the last fifteen years, however, few studies and analyses of releases from primary/industrial sources have been carried out. It therefore cannot be entirely ruled out that such sources may be contributing to the environmental load, even if their emissions are now assumed to be small. Another problem is the large fluxes of flue gases and wastes, for example, from certain sectors. Although concentrations of unintentionally formed POPs in emissions and wastes are low, the combined quantities involved may nevertheless be of significance for the levels we are seeing in the environment today.

The operators concerned need to establish more clearly what releases their operations give rise to. Data showing how emissions vary over the different phases of entire processes, and in conjunction with disruptions, would provide a better basis for a more reliable determination of total emissions. Such data would also promote a greater understanding of how the formation of dioxins, in particular, can be reduced. In addition, sampling should be carried out in such a way as to reflect variations in pollutant levels, for example within a waste. Operator self-monitoring needs to be improved in these respects.

As releases from industry have abated, secondary sources, such as contaminated sites and sediments, and diffuse sources, such as small-scale combustion, backyard burning and deposition arising from emissions in other countries, have increased in importance. At the present time, such sources are probably of most significance. Further studies need to be made of the contributions of secondary and diffuse sources to overall environmental loadings of POPs.

Better data and knowledge concerning formation, release, dispersion, cycling, exposure pathways and hazardousness are necessary as a basis for preventive measures and to deal with pollutants already present in the environment. Such data would also help to set clear priorities among different measures. To enable effective action to be taken, the relevant sources and exposure pathways of POPs need to be identified. In line with the precautionary principle, however, it may be necessary to implement measures on the basis of incomplete data. It is therefore important to work in parallel both to improve knowledge in this area and to introduce tangible measures.

Sweden is of the opinion that further substances, in addition to the present twelve, should be covered by the Convention, and has nominated perfluorooctane sulphonate (PFOS). Sweden also supports the other proposals for new substances that have been put forward: lindane, pentabromodiphenyl ether, hexabromobiphenyl and chlordecone. Sweden will continue to work with other EU member states to identify additional candidates for listing under the Convention. The Swedish Chemicals Inspectorate will in addition continue to monitor the area for emerging POPs candidates and, as appropriate, notify the government about substances that may warrant further attention or action.

To sum up, Sweden considers that it has fulfilled its obligations under the Convention with regard to the POPs listed in Annexes A and B. Regarding the unintentionally produced substances listed in Annex C; Sweden has introduced a range of measures to reduce their formation and release. Sweden intends to continue its efforts to achieve further reductions in environmental loads of these substances.

Svensk sammanfattning

Målet med Stockholmskonventionen är att skydda människors hälsa och miljön mot långlivade organiska föroreningar (POPs). Detta ska göras genom att förbjuda eller begränsa produktion, användning, import och export samt att minimera eller om möjligt eliminera utsläpp av oavsiktligt bildade POPs. Målet med konventionen sammanfaller med det svenska miljömålet ”Giftfri Miljö” och utgör därför en naturlig del av detta arbete. Konventionen omfattar i dagsläget tolv kemiska föreningar eller grupper. Av dessa är åtta bekämpningsmedel (aldrin, klordan, DDT, dieldrin, endrin, heptaklor, mirex och toxafen), två industrikemikalier (PCB och hexaklorbensen, HCB; båda har även använts som bekämpningsmedel och kan bildas oavsiktligt) samt två oavsiktligt bildade ämnesgrupper som bildas vid förbränning och i andra högtemperaturprocesser (polyklorerade dioxiner, PCDD, och furaner, PCDF).

Ett problem Sverige står inför idag är långväga lufttransport av oavsiktligt bildade POPs från andra länder. För att minska denna belastning är det viktigt att Sverige fortsätter att bidra till det internationella engagemanget. Sverige ser Stockholmskonventionen och LRTAP-protokollet om långväga lufttransport som viktiga verktyg i detta arbete.
För pesticiderna i konventionen var Sverige ett av de första länderna att agera. Endast sex av substanserna var någonsin godkända för användning och dessa förbjöds på 1960- och 1970-talet. Samtliga pesticider är förbjudna att tillverkas, användas, exporteras eller importeras enligt EU-förordningen om POPs (Regulation (EC) No 850/2004 of the European Parliament and of the Council of 29 April 2004 on Persistent Organic Pollutants and amending Directive 79/117/EEC).

Sverige har sedan länge förbud mot tillverkning och användning av PCB, liksom mot förekomst i utrustning. Stockholms Universitet var 1966 de första att identifiera PCB i ett biologiskt prov. Detta föranledde den svenska regeringen att vidta åtgärder för att förhindra användning av PCB så tidigt som 1969. Den svenska PCB-regleringen ligger långt före de krav som ställs i konventionen på en utfasning till år 2025 och ett slutligt omhändertagande till år 2028. Sverige ligger också före de krav som ställs i EU-förordningen om POPs (Regulation (EC) No 850/2004). Identifiering och omhändertagande av den resterande kända förekomsten av PCB i fogmassor i byggnader från 1960- och tidigt 1970-tal pågår och förslag till reglering finns.

Sedan 1970-talet har halterna av dioxin, HCB, PCB och DDT minskat i miljön. Minskningen har dock blivit mindre uttalad på senare år och nivåerna av dioxiner och dioxinliknande PCBer i fisk från Östersjön ger fortfarande anledning till oro. Svenska konsumenters medelintag av dioxin och dioxinlika PCBer ligger idag endast marginellt under EU: s värde för högsta tolerabla dagliga intag (TDI). Detta innebär att drygt 10 % av den svenska befolkningen överskrider TDI för dioxiner. En särskilt utsatt grupp är ammade spädbarn som klart överskrider värdet för TDI. Stora delar av den feta fisken i Östersjön innehåller fortfarande halter av organiska miljögifter som överskrider EU: s gränsvärden för konsumtion. Detta har lett till exportrestriktioner. För konsumtion av fisken inom landet har Sverige och Finland fått undantag från EU: s regler eftersom vi anses ha tillräckliga kostrekommendationer.

Det är oklart vilka källor som orsakar dagens nivåer i miljön. Att halterna av oavsiktligt bildade POPs har minskat beror till stor del på att utsläppen från industrin har minskat

avsevärt sedan 1980-talet. Under de senaste femton åren har dock få studier och analyser av utsläpp från primära/industriella källor gjorts. De primära källornas bidrag till miljöns belastning kan därför inte helt uteslutas, även om de idag antas vara små. En annan problematik är de stora flödena av t.ex. rökgaser och avfall från vissa sektorer. Trots att koncentrationerna av oavsiktligt bildade POPs i utsläpp och avfall är låga kan mängderna sammantaget vara av betydelse för de halter vi ser i miljön idag.

Det finns ett behov av att berörda verksamhetsutövare ytterligare klargör hur stora utsläpp deras verksamheter ger upphov till. Data som visar hur utsläppen varierar under hela processens olika faser och vid driftsstörningar skulle ge ett bättre underlag för att säkrare fastställa de totala utsläppen. Sådana data bidrar även till kunskap om hur bildningen av framförallt dioxiner kan minskas. Det finns dessutom behov av att utföra provtagningen på ett sådant sätt att den speglar hur föroreningshalten varierar inom t.ex. ett avfall. Egenkontrollen behöver stärkas i dessa avseenden.

I takt med att utsläppen från industrin har minskat har sekundära källor såsom förorenade områden och sediment samt diffusa källor som småskalig eldning, olaglig eldning och nedfall från utsläpp i andra länder ökat i betydelse. Det är sannolikt att dessa källor är de mest betydande i dagsläget. Det finns ett behov av att ytterligare utreda sekundära och diffusa källors bidrag till den totala belastningen av POPs i miljön.

Bättre data och kunskap om bildning, utsläpp, spridning, omsättning, exponering och farlighet behövs som underlag för att vidta förebyggande åtgärder och för att kunna vidta åtgärder mot föroreningar som redan finns i miljön. Sådant underlag skulle även vara till stöd för att göra tydliga prioriteringar i arbetet. För att kunna vidta effektiva åtgärder behöver de relevanta källorna och exponeringsvägarna för POPs identifieras. Det kan dock vara nödvändigt, med försiktighetsprincipen som grund, att vidta åtgärder baserat på ett ofullständigt dataunderlag. Vi behöver därför jobba parallellt med kunskapsuppbyggande och konkreta åtgärder.

Sverige anser att fler ämnen än de nuvarande tolv bör omfattas av konventionen och har nominerat perfluoroktansulfonat (PFOS). Sverige stöder också de övriga förslagen till nya ämnen: lindan, pentabromdifenyleter, hexabrombifenyl och klordekon. Tillsammans med andra länder inom EU kommer Sverige att arbeta för att identifiera ytterligare kandidatämnen för nominering till konventionen. Kemikalieinspektionen kommer dessutom själv att följa utvecklingen på området för att vid behov uppmärksamma regeringen på ämnen som kan behöva granskas närmare och eventuellt åtgärdas.

Sammanfattningsvis anser sig Sverige ha uppfyllt sina åtaganden under konventionen för de POPs angivna i bilaga A och B. För de oavsiktligt bildade ämnena i bilaga C har Sverige vidtagit flera åtgärder för att begränsa bildning och spridning. Sverige avser fortsätta med sina ansträngningar för att ytterligare minska belastningen av dessa ämnen på miljön.

1 Introduction

According to Article 7, paragraph 1 (a) and (b) of 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 and to transmit its implementation plan to the Conference of the Parties within two years of the date on which the Convention enters into force for it. The Swedish Government in June 2005 commissioned the Swedish Chemicals Inspectorate 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 preparing this report the two 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. The report will, as appropriate, be reviewed and updated on a periodic basis and in a manner to be specified by a decision of the Conference of the Parties, and will in the meantime serve as guidance for all involved in the implementation of the Convention.

The first part of the report describes Swedish legislation on chemicals in general and POPs in particular and the 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. These measures were generally taken long before the negotiations for the Convention were even started. The report shows that Sweden has fulfilled the obligations of the Convention with regard to the substances in Annexes A and B.

The second part presents what Sweden intends to do in the future to fulfil its obligations under the Convention in relation to unintentionally released POPs. In addition, it outlines Swedish views on the addition of new substances to the Convention to make it a living, dynamic instrument for a healthier future.

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 million inhabitants.

In addition to Swedish the following recognised minority languages are spoken: Sámi (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 80% belong to the Evangelical Lutheran Church of Sweden. Sweden also has large minorities of Catholic, Greek and Russian Orthodox, and Islamic believers.

In 2004, the average life expectancy in Sweden was 78.4 years for men and 82.7 years for women.

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 ten years pharmaceuticals represent the most successful section of the chemical industry. Including the petroleum refineries, and the rubber and plastic industries a total of 63 025 persons were employed in the chemical industry, with a sales value of approximately MSEK 155 000 in 2001. The total industrial production in Sweden reached the sales value of MSEK 1 470 500 and the chemical industry stands for 10.5%. The total number of employees in Swedish industry is about 729 700, which makes the chemical industry amount to 8.6% of the work force. Swedish exports of chemicals in 2002 amounted to approximately MSEK

85 330, i.e. 11% of Sweden's total exports or equivalent to more than 70% of the value of the entire chemical production in Sweden. Imports of chemicals reached MSEK 63 300 (- 4.1%) in 2002. In 2002 53% of the Swedish chemicals in value were exported to EU countries and 73% 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 now the most chemical industries are foreign owned.

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. As of today 124 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

Strong global demand for steel in recent years has led to rapid production growth. Over the past ten years, production has increased on average by 3.8 per cent per year. In 2004, world production of crude steel reached and passed the magic boundary of 1 billion tonnes. The increased demand is mainly explained by China's rapid economic growth. Demand has risen substantially in other parts of Asia as well.

If international demand for steel has increased, this applies even more to highly processed and advanced steel products. Since in all essential respects the Swedish iron and steel industry operates in a global market in the face of tough international competition, both products and market organisation have to meet demanding requirements. Swedish companies have branches all over the world and work in close contact with their customer, which has a very significant impact on product development and research. Sweden is unique in the world in having alloy steel make up so high a proportion of its total output, 53%, compared with 15% in the rest of the EU 15 and 10% in Japan and the United States.

Sweden has a very long tradition of mining. In many cases, high-grade Swedish ores have made it possible to develop high-quality products and this potential is being carried forward by the present development of niche products meeting high standards. The producers of iron and steel, copper and other metals have undergone many consolidations and changes of ownership. Today they focus on making high-value specialty steels – including stainless, bearing, tool and high-speed steel – but also high-strength carbon steels from Swedish iron ores and scrap. Swedish steel makers have been among the leaders in developing and improving such methods as the ladle furnace technique, thin slab casting, powder metallurgy and computer-controlled processes that save energy and reduce emissions.

As a result of a pronounced focus on niche products, the Swedish iron and steel industry is the world leader in carefully selected product segments, where it has won very large shares of the world market. The Swedish industry would have been unable to implement

its niche strategy without extensive commitments to research on the part of the companies, implemented both directly and indirectly through the steel research institutes. The Swedish iron and steel industry invests no less than 2% of its turnover in R&D. For comparison, the equivalent figure for the EU 15 is 1%, for the United States 0.5% and for Japan 1.8%.

Of approximately 600 blast furnaces and hammer forges existing in the 19th century, only 11 steelmaking plants remain. In addition, hot-rolling of steel is undertaken at 13 places. The location of the country's steelworks is largely a heritage from the past. Most are still to be found in central Sweden.

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 2004, 4.7 million tonnes of steel were exported, valued at SEK 47.5 billion. This corresponds to approximately 90 per cent of the total value of the country's steel production.

Forest industries

With a good supply of high-quality wood raw materials and energy, as well as a skilled labour force, Sweden's forest industry has developed into one of the major forest products exporters in the world. With less than one per cent of world forests, it is the world's third largest exporter of paper and sawn timber and the fourth largest exporter of pulp. Major investments in production facilities have ensured high technical standards, and products and production processes have been developed in close cooperation with suppliers of chemicals, machinery and other equipment.

The industry faces increased competition from low-cost producing countries in Asia and Latin America, as well as from Russia and new EU member states in eastern and central Europe. Fast-growing forest plantations and low production costs, combined with the most recent technology, put pressure on the Swedish industry to increase its efficiency and to develop products and processes that meet customer requirements with high value-added. Electronic media and other packaging materials than paper or wood are other challenges to the industry.

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.

Environmental improvement work in mills has been characterised by a strategy of 'clean at source', in other words, trying to minimise the formation of pollutants by improving processes. Important changes include the introduction of modified cooking and bleaching processes in the production of chemical pulp. As a result of methods such as these, the use of elemental chlorine at Swedish mills ceased in 1993. External treatment of effluents has also been introduced. Discharges of chlorinated organic matter, expressed as AOX, have been reduced by about 97% since the mid-1980s and now amount to about 0.1 kg per tonne of pulp. Emissions to air have also shown a sharp decrease.

Efforts to safeguard the environment are today characterised by a holistic view, and use of chemicals, transportation and waste minimisation are examples of areas that have received greater attention. Environmental management systems are now an important tool in environmental protection, and certified systems have been introduced at virtually all of Sweden's pulp and paper mills and at about half of the country's sawmills.

2.1.4 Environmental overview

During the first half of the 20th century, environmental 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

The country is still working to promote environmental progress in the global arena. This includes supporting all multilateral treaties to protect the global environment. Sweden is also working in such bodies as the UN Commission on Sustainable Development, which oversees the implementation of Agenda 21 environmental action plans worldwide.

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 played a major part in the development of the Strategic Approach to International Chemicals Management 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 easier 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

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'

A non-toxic environment is one of 16 environmental quality objectives adopted by the Swedish Parliament. The Swedish Chemicals Inspectorate is the responsible agency for this objective. Environmental quality objectives define the aim of the environmental work, while interim targets indicate scope and time perspectives for concrete environmental measures. A progress report is submitted to the Parliament every year.

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

- The concentrations of substances that naturally occur in the environment are close to the background concentrations.
- The levels of foreign substances in the environment are close to zero and their impact on the ecosystems is negligible.

- All fish in the seas, lakes and watercourses in Sweden are fit for human consumption with regard to the contents of foreign substances.

- 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.

Interim targets for A Non-Toxic Environment

Knowledge and information

- By 2010 data will be available on the properties of all deliberately manufactured or extracted chemical substances handled on the market.

  For substances handled in larger volumes and for other substances which, for example after initial general tests, are assessed as being particularly dangerous, information on their properties will be available earlier than 2010. The same information requirements will apply to both new and existing substances.

  In addition, by 2020 data will as far as possible be available on the properties of all unintentionally produced and extracted chemical substances.

- By 2010 finished products will carry health and environmental information on any dangerous substances they contain.

Phase-out of particularly hazardous substances

- Newly manufactured finished products will as far as possible be free from:

  - New organic substances that are persistent and bioaccumulating, new substances that are carcinogenic, mutagenic and reprotoxic, and mercury, as soon as possible, but no later than 2007;

  - other carcinogenic, mutagenic and reprotoxic substances, and endocrine disrupting substances or highly allergenic substances, by 2010, if the products that contain them are intended to be used in such a way that they will enter natural cycles;

  - Other organic substances that are persistent and bioaccumulating, and cadmium and lead, by 2010.

Nor will these substances be used in production processes unless the company can prove that human health and the environment will not be harmed.

Already available finished products containing substances with the properties listed above, or mercury, cadmium or lead, will be handled in such a way that the substances in question are not released to the environment. This applies to substances that are man-

made or extracted from the natural environment. It also applies to substances giving rise to substances with the above properties, including those formed unintentionally.

Risk reduction

- Health and environmental risks associated with the manufacture and use of chemical substances will be reduced continuously up to 2010, as measured by indicators and ratios to be established by the competent authorities.

  Over the same period, the occurrence and use of chemical substances which impede recycling of materials will decrease.

Environmental quality indicators

- By 2010 guideline values will be established by the competent authorities for at least 100 selected chemical substances not covered by interim target 3.

Polluted areas

- By 2010 all contaminated sites indicating acute risks at direct exposure, and polluted areas which today or in a near future, constitute a threat to water supplies or valuable nature areas will have been investigated and, if needed, remediated.
- During 2005 to 2010, remediation of the sites given highest priority has been taken to such an extent that the environmental problem could fully be solved by 2050 at the latest.

Dioxins in food

- By 2010 measures will be established involving continuous reduction of harmful concentrations of dioxins in food.

Cadmium

- By 2015 exposure of cadmium to the general population through food and work will be at a level that is safe from a long-term human health perspective.

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, Table1.The central agencies for enforcement of the Environmental Code are listed in Annex I,

Table 2. 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 Chemicals Inspectorate (KemI) is the main responsible agency for supervising chemicals that are placed on the market. It is also a driving force in efforts to attain a non-toxic environment. The Inspectorate is a supervisory authority under the Ministry of Sustainable Development and works in Sweden and in the EU to promote legislation and rules that contribute to achieving the environmental quality objective of ´A non-toxic environment´. KemI keeps a product register and maintains a number of databases to support its work and that of other agencies. KemI approves pesticides and assesses the risk of chemicals. It checks companies' compliance with applicable regulations, provides support to local authorities, provides support to other countries and issues reports and publications.

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, water, 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 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 Administration 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 ensuring that food and drinking water do not contain concentrations of pesticide residues that exceed permitted levels. Foods are also monitored for other hazardous substances, such as other POPs.

The Swedish Board of Fisheries is responsible for fisheries and for ecologically sustainable development in this sector, with a special focus on the environmental quality objectives Flourishing Lakes and Streams and A Balanced Marine Environment, Flourishing Coastal Areas and Archipelagos.

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 Rescue Services Agency is responsible for rules about transport of hazardous substances, such as chemicals transported to and from plants and hazardous wastes and also for EU Directive 96/82/EC (Seveso II Directive). The agency is also a leading governmental agency for fire prevention that includes all kind of industries and storage of chemicals or plants where dangerous substances can be formed in fires or other accidents.

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 district offices of the Swedish Work Environment Authority.

Chemical emergency information centres for accident prevention and response

There are two chemical emergency information centres in Sweden; the Swedish Poisons Information Centre in Stockholm and the Swedish Rescue Services Agency in Karlstad. 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 Rescue Services Agency.

The Swedish rescue Services Agency 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. Advice is also given at chemical fires or when dioxins or other POPs substances may be developed at fires. Pertinent information can also be found in the transport documents. Information is also available from the Rescue Services Information Bank at the Swedish Rescue Services Agency. 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. provisions 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 National Chemicals Inspectorate, the Swedish Environment Protection Agency and the Swedish Work Environment Authority 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 (see below).

2.2.3 Relevant international commitments and obligations

The distribution of development assistance reflects Sweden's prioritisation of such issues as water supply, eradication of poverty and combating global environmental threats. Also very important is the work of the specialised agencies. Agencies that are deemed efficient, and whose objectives are similar to those of Swedish development assistance, receive higher appropriations. Sweden prefers programs with focused, clearly delimited mandates.

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.

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

The Environmental Code

The Environmental Code (1998:808) entered into force on 1 January 1999. Earlier rules contained within 15 acts have now been amalgamated in the Environmental Code.

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 laid down in government ordinances. The relevant EU legislation has been incorporated into the Code and its ordinances.

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 of 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 applying to 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 treated with a chemical product or bio-technical organism. The provisions express the product choice principle, or the substitution principle as it was previously known.

Chemical product means a chemical substance or preparation of chemical substances. Bio-technical organism means 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.

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 piece of 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 an action. 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 Inspectorate 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. Requests for copies of this report are still coming to KemI.

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 applying 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 them.

To date, the Government has made rules on producer responsibility in five areas, namely 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, three ordinances setting out environmental quality standards have been adopted under the provisions of chapter 5 of the Environmental Code. Their contents are based on EC directives.

The Ordinance (2001:527) 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 ozone in ambient air. Standards are also to be issued within the next few years for particulate matter PM 2.5, 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 limit values 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.

Furthermore, in a few years' time implementation of the EC Water Framework Directive (Directive 2000/60/EC) will result in a number of standards based on the parameters in Annexes V and X. The Commission is to propose a daughter directive providing more detailed regulation of environmental quality standards and pollution control of hazardous substances.

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, environmental quality standards also 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 might 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 municipal 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 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 regulation, 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. In all material respects, the regulation of biotechnical organisms introduced in the Code was new. There is also a special Ordinance on chemical products and biotechnical organisms (1998:941).

A ‘chemical product’ is defined as a chemical substance or a preparation of chemical substances. The provisions on chemical products also apply to products containing or treated with chemicals. Examples of such products are treated timber and products containing asbestos or mercury.

A ‘biotechnical organism’ is defined as a product that has been specifically produced to act as a pesticide or for some other technical purpose, for example, as a detergent, and which, wholly or in part, consists of or contains living micro-organisms, nematodes (roundworms), insects or spiders. In this connection, micro-organisms also include viruses.

Environmental and health investigation

A party who manufactures or imports chemical products or bio-technical organisms shall ensure that there is a satisfactory environmental and health investigation. The obligation regarding investigation applies irrespective of whether there are any concrete fears. It applies continually and therefore does not end when a product or organism has been introduced onto the market.

Product information

Parties who commercially manufactures imports or transfers a chemical product or bio-technical organism must, by labelling, provide the information necessary to protect human health or the environment. Alternatively, the product information may be effected in another manner than by labelling, for example, by an information sheet enclosed with the chemical product or bio-technical organism.

A party who commercially handles imports or exports a chemical product or bio-technical organism shall also provide information about the product and organism to the Swedish Chemicals Inspectorate.

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.

Advance notification, permit and approval

The requirement of advance notification may be introduced for the manufacture and import of chemical products and bio-technical organisms that have not previously been used in Sweden. Furthermore, a permit may be required for the import of especially dangerous chemical products and bio-technical organisms from countries that are not members of the European Union and for the commercial transfer and other handling of particularly dangerous products and organisms.

Special requirements apply to chemical or biological pesticides. These may not be imported from countries outside the EU, released onto the market or be used without prior approval. Chemical or biological pesticides that have not been approved or which are not subject to an exemption from the requirement of approval may be used as pesticides only if it is obvious that their use does not involve a risk to human health or the environment.

Prohibition

If it is of particular importance from the health or environmental viewpoint, a chemical product or bio-technical organism may be generally prohibited (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, through widespread use can result in injurious effects, such as for example cosmetics, hygienic products and pesticides.

Environmental penalty charges

An environmental penalty charge must be paid by a business operator who in the conduct of commercial operations neglects regulations issued under the Environmental Code, violates a permit or condition or commences an activity that requires a permit or is subject to a duty to give notice without such permit or notice. The charge shall be imposed even if the violation has not occurred intentionally or by carelessness. Thus it is founded on strict liability. Furthermore, it is of no relevance whether the business operator had any economic gain from the violation or if the violation involved any nuisance in the particular case.

The environmental penalty charges will be imposed for various kinds of violations in respect of which the Government, by regulations, has determined fees. Thus, the Government will by an ordinance compile a list of various violations with information on the charge for the respective violation. The charge may be at a minimum SEK 1 000 and at a maximum SEK 1 000 000. If rectification is not effected, the supervisory authority may make a new decision for an environmental sanction charge for a subsequent period. However, the charge does not prevent the imposition of a penalty for the criminal activity.

The supervisory authority decides on the environmental penalty charge. The decision may be appealed against to the environmental court. Even if the decision is appealed against it may be enforced.

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 Inspectorate) can promulgate ordinances and regulations, respectively, in order to implement the provisions of the Code (and Ordinance).

Supplier's responsibilities

Anyone handling or importing a pesticide (or other chemical product) must take such steps and observe such precautions as are necessary to prevent or minimise harm to human beings or the environment. This includes avoiding a product for which a less hazardous substitute is available. The Environmental Code and accompanying legislation lay the main responsibilities on the manufacturer or importer to fulfil the objectives with regard to safe and environmentally sound use. This task is achieved in Sweden through measures such as the following:

- Mandatory investigations by the manufacturer of all pesticide products with respect to their health and environmental effects,
- Mandatory provision by the manufacturer of sufficient product information (labels, safety data sheets) to the end user, and
- Mandatory substitution of hazardous products with less hazardous products.

Registration procedure

Pesticides may not be placed on the market or used without being authorised by the Swedish Chemicals Inspectorate. A pesticide may be authorised only if it is acceptable from the standpoints of human health and environmental protection. An authorisation is accompanied by specific conditions concerning the area of use and may include restrictions. Requirements on packaging, labelling and other product information

important for the protection of human health and the environment are specified in the legal documents (both in the ordinances and the regulations).

Sales and use permits

During the approval procedure, potential environmental and health effects of the pesticide are assessed in consideration of its intended use. Based on such an evaluation, the pesticide is assigned to one of the following classes:

Class 1: Pesticides that may only be used professionally by someone holding a special permit;

Class 2: Pesticides that may only be used professionally;

Class 3: Pesticides that may be used by anyone.

In addition, a permit is required for professional transfer and other than professional handling of products classified as extremely dangerous or very dangerous.

Labelling requirements

It is the obligation of the Swedish manufacturer, the importer or other supplier of a pesticide to ensure that the product is labelled in Swedish and in accordance with the regulations. The label must include the area of approved application; the phrase ‘All other use is prohibited; the word 'Pesticide'; contents specification; instructions for use needed for the protection of health and the environment; name of the pesticide(active ingredient/ingredients); risk information including danger symbol/symbols; safety precautionary measures; safety advice; instructions for final disposal of the product and the package in a safe manner; the name and concentration of the active ingredient(s); name and address of the permit-holder; competence (restriction) class; for pesticide products in Class 1 the text ‘ Only for professional use with special permit’; for pesticide products in Class 2 the text: Only for professional use’; shelf life if less than two years; registration number; batch number; and net weight or net volume.

Safety Data Sheets

Manufacturers, importers and other suppliers who place a pesticide on the market for professional use (restriction classes 1 and 2), shall provide information on the properties of the product from the viewpoints of risk and safety. The information shall be provided free of charge to the professional user in the form of a safety data sheet. The safety data sheet must contain the following information: identification of the product and of the company; composition, information on ingredients, classification; hazard identification; first-aid measures; fire-fighting measures; accidental release measures; handling and storage; exposure control and personal protection; physical and chemical properties; stability and reactivity; toxicological information; ecological information; disposal considerations; transport information; and regulatory information.

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 Swedish Chemicals Inspectorate has issued a list of pesticides (active substances) which have been banned or severely restricted for health or environmental reasons or for which the manufacturer has voluntarily withdrawn a product from the Swedish market (KIFS 1998:8, Appendix 5, 6 and 7). All pesticide POPs, with the exception of mirex were included in this list. Mirex was banned through EU Regulation 850/2004.

The European Union has issued a list of substances which may not be included as active substances in approved plant protection products in the European Union (Directive 79/117/EEC, Chapter 5, 2) and a list of substances that have been withdrawn from the market in the European Union (Directive 91/414/EEC). There are 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 (see also http://www.kemi.se/templates/Page____3755.aspx)).

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 Inspectorate's pesticide related activities are funded by fees paid by the pesticide industry. The registration fee is US$ 1 170 (SEK 10 000) per product plus US$ 3 530 (SEK 30 000) for each new active substance. The prolongation fee (every five years) is US$ 700 (SEK 6 000). The annual fee is 2.6 % of the product's sales value the previous year with a minimum fee of US$ 235 (SEK 2 000) and a maximum fee of US$ 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 SEK 4 125 000 (more than US$ 500 000). For biocides the fee is 3 300 000 SEK.

Sales statistics and feedback

The Inspectorate 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 Inspectorate 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 2004 a total of 9337 metric tonnes of pesticides (active substances) was sold in Sweden. The main part (84%) 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 1075 tonnes was sold to agriculture, accounting for 12% of the total sold quantities. Compared with the average during 1981-1985 (the base years for the national risk reduction programme), a reduction of 76% has been achieved. A total of 382 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 Inspectorate 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 Inspectorate 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 Administration (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 Agency 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 Administration. Results are published annually. Residues in water have been monitored by the National Food Administration and others.

Regulations on biocides

Biocidal products are used for different purposes to counteract harmful organisms. In accordance with the Biocidal Products Directive 98/8/EC[1], biocidal products are divided into 23 product types.

A biocidal product has to be approved by the Swedish Chemicals Inspectorate before it can be placed on the Swedish market. Some biocidal products, for example chemical products intended for use as disinfectants against micro-organisms, may under a transition period be imported and handled without authorisation from the Swedish Chemicals Inspectorate. The transition period ends 13 May 2010, at the latest.

The Biocidal Products Directive states that member states shall prescribe that a biocidal product shall not be placed on the market and used in their territory unless it has been authorised in accordance with the Directive. One scope of the Directive is to establish, at Community level, a positive list of active substances which may be used in biocidal products. So far, no active substance is listed on this positive list.

Some active substances that were identified as active substances in biocidal products on the European market must not be placed on the market from September 2006. These substances are above all listed in Annex 3 and 7 of Regulation (EC) No 2032/2003[2]. The Swedish Chemicals Inspectorate will soon cancel authorisations for such authorised biocidal products that contain active substances that are listed in these Annexes.

So far, four EU Regulations describe the 10-year work program under the Directive:

- Commission Regulation (EC) No 1896/2000 on the first phase of the programme referred to in Article 16(2) of Directive 98/8/EC of the European Parliament and of the Council on biocidal products;

- Commission Regulation (EC) No 1687/2002 on an additional period for notification of certain active substances already on the market for biocidal use as established in Article 4(1) of Commission Regulation (EC) No 1896/2000;

- Regulation (EC) No 2032/2003 on the second phase of the 10-year 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, and amending regulation (EC) No 1896/2000;

- Regulation (EC) No 1048/2005 amending regulation (EC) No 2032/2003 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.

[1] Directive 98/8/EC of the European Parliament and of the Council of 16 February 1998 concerning the placing of biocidal products on the market.
[2] Last amended by Regulation (EC) No 1048/2005

The Biocidal Products Directive is implemented in Swedish law for example in:

- Chapter 14 of the Swedish Environmental Code (1998:808);
- The Chemical Products and Biotechnical organisms Ordinance (1998:941);
- The Biocidal Products Ordinance (2000:338) and
- The Swedish Chemicals Inspectorate's Chemical Products and Biotechnical Organisms Regulations (KIFS 1998:8, last amended by KIFS2006:1).

Regulations on PCBs

The Waste Ordinance (2001:1063), which entered into force on 1 January 2001, combines provisions from the former ordinances on hazardous waste and public cleansing. This Ordinance forms part of Sweden's implementation of the waste directives of the European Union. It is a framework ordinance, which means that if provisions on waste exist in other statutes those provisions take precedence over the rules of the Waste Ordinance. In addition, the Waste Ordinance includes five annexes, one of which embodies the European Commission's decision on a list of wastes.

The substances covered by the POPs Regulation become hazardous waste when they are discarded, and are then governed by the provisions of the Waste Ordinance and of any applicable special statute. The Waste Ordinance includes among other things rules on the procedures to be followed in the handling, transport, recovery and disposal of wastes. Discarded POPs substances can be classified according to the different waste categories set out in Annex 1 of the Waste Ordinance, the 'Q list'. They can, for example, be placed in the categories Q7, Q8, Q12, Q13 and Q16.

In addition to the POPs Regulation and chapters 2 and 14 of the Environmental Code, there are currently two ordinances regulating PCBs: the Ordinance on PCBs and the Ordinance on the Disposal of PCBs. These two ordinances form part of Sweden's implementation of the European Council Directive on the disposal of PCB/PCT.

The Ordinance on PCBs contains definitions of a PCB and a PCT preparation and a PCB and a PCT product. Furthermore, it includes a ban on the manufacture, processing, marketing and transfer of such preparations and products, for use or reuse. The Ordinance also bans the import and export of preparations and products into and out of the European Union. In addition, it includes a ban covering transformers and power capacitors and a requirement to label packaging for preparations and products.

The Ordinance on the Disposal of PCBs contains definitions of a PCB preparation, a PCB product and decontamination. It also includes provisions prohibiting or regulating certain forms of handling of preparations, together with requirements concerning examination, disposal and decontamination. Certain equipment must be labelled, a national list must be kept of equipment that is required to be made an inventory of, and an action plan must be drawn up for the decontamination or disposal of such equipment.

The provisions of the two PCB ordinances will probably have to be amended in 2006 as a consequence of the POPs Regulation and REACH.

Regulations on stockpiles and wastes

Wastes containing certain concentrations of POPs are regarded as hazardous waste. The basis for the classification of wastes is the same as for the classification of chemical products (Council Directive 67/548 on the approximation of laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances, and Commission Directive 88/379 on the approximation of the laws, regulations and administrative provisions of the Member States relating to the classification, packaging and labelling of dangerous preparations, and its subsequent amendments).

Wastes containing unintentionally produced POPs, 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 produced POPs, if those wastes are classified as hazardous wastes. Even if concentrations of POPs are low enough for the waste to be classed as non-hazardous, fly ash may not be allowed to be landfilled. The reason for this is that the ash will not normally meet the criteria for the acceptance of waste at landfills (Council Decision 2003/33/EC).

The general provisions of the Waste Ordinance mentioned under Regulations on PCBs relate to hazardous wastes in general, including those containing POPs.

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). Storage of hazardous wastes in households does not require a permit. There may be a large number of small stockpiles of outdated pesticides that are covered by the POPs rules.

Regulations on releases of unintentionally produced POPs

National guidelines on dioxins and furans exist in relation to the incineration of waste, under the Waste Incineration Directive (WID) (EC/2000/76). In Sweden, conditions regarding emissions are set individually, e.g. for industrial installations, waste incinerators and combustion plants. So far, no such conditions have been set with respect to dioxins. In addition to individually set conditions, there may be general binding rules setting minimum standards for a sector. These standards may be based on EC directives. One example is the standards set on the basis of WID.

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.

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.

Sweden participates as a member of the European Union in the common notification system of the Union under the Directive 67/548/EEC (latest amendment 92/32/EEC) and Sweden participates in the Existing Substances Programme according to EU Regulation 793/93 of the European Union.

The use of chemicals is also regulated by the Work Environment Act, administered by the Work Environment Authority. 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 Work Environment Authority 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 Bio-technical 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.

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

See 2.2.1 and 2.3.7.

2.3 Assessment of the POPs issue in the country

2.3.1 Assessment with respect to Annex A, part I chemicals (POPs pesticides)

Pesticide registration started in Sweden in 1953 through the promulgation of the Plant Protection Ordinance (1953:589) and the Plant Protection Institute. In 1962 the Poison Board took over the responsibilities of the Plant Protection Institute with a new Ordinance on Pesticides (1962:702). In 1973 the Act on Products Hazardous to Health and the Environment (1973:329) replaced the earlier legislation together with an Ordinance on Products Hazardous to Health and the Environment (1973:334) in which provisions on pesticides was a sub-section. The Products Control Board took over from the Poison Board. In 1985 the Act on Chemical Products replaced the earlier legislation and the Swedish Chemicals Inspectorate was established. The chemicals legislation was incorporated into the Environmental Code in 1998.

With regard to the POPs pesticides, endrin was banned in 1966, followed by aldrin and dieldrin in 1970 and chlordane in 1971. DDT was banned in 1975 and hexachlorobenzene (HCB) 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 the year 2000. Finally mirex has never been used in Sweden and was banned in 2004 through the EC Regulation on POPs (850/2004). In addition, all formulations containing pentachlorophenol and other

polychlorinated phenols were banned in 1980, due to their contamination with polychlorinated dioxins and furans.

Measures to prohibit the import and export of the POPs pesticides were taken successively from 1993 to 2003 in accordance with EC Regulation No 304/2003 and Council Regulation No 2455/92.

None of the POPs pesticides has ever been produced in Sweden.
Several pesticide POPs have been included in Swedish monitoring programmes in biota and in food (see 2.3.3 and 2.3.7).

2.3.2 Assessment with respect to Annex A, part II chemicals (PCBs)

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 plasticizer 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 plasticized 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 plasticizer 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 2.3.2-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 (1000 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 1500 tonnes (100 000 units) and in transformers 500 tonnes (200 units).

Table 2.3.2-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 2000 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 8000–10 000 tonnes, of which probably more than 50% was exported in products.

Table 2.3.2-III: Imported quantities of PCBs, tonnes, Swedish Customs data.

Imported quantities of PCBs, tonnes, Swedish Customs data	
1973	316
1974	390
1975	447
1976	235

Existing policy and regulatory framework

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.

Policy in this area is 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. Two ordinances on PCBs are in force: the Ordinance on PCBs etc. (1985:837) and the Ordinance on the Disposal of PCBs etc. (1998:122). These two statutes are to be replaced by a single, revised ordinance, which will require an inventory and remediation of buildings containing PCB-based sealants. The use of PCBs in electrical and electronic products is regulated in the Ordinance (2005:209) on Producer Responsibility for Electrical and Electronic Equipment and the Ordinance (2000:208) on Producer Responsibility for Filament Bulbs and Certain Luminaries for Fluorescent Lamps, which implement the WEEE (2002/96/EC) and RoHS (2002/95/EC) Directives. The management of waste from electrical and electronic products is also 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 the Ordinance on Producer Responsibility for Cars (1997:789).

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

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.

PCBs have been shown to cause a variety of adverse health effects in animals, e.g. cancer and a number of serious non-cancer effects, including effects on the immune system, reproductive system, nervous system, endocrine system etc. Studies in humans provide evidence of potential carcinogenic and non-carcinogenic effects of PCBs.

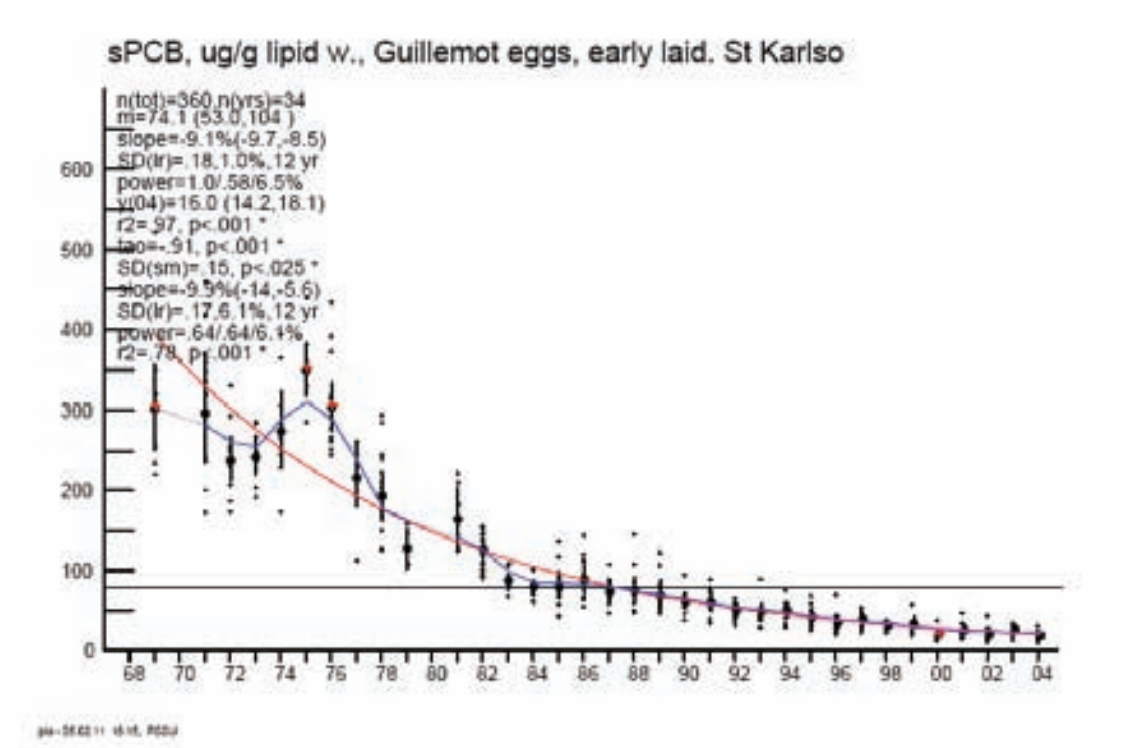

Figure 2.3.2-I: Example of time series of PCB concentrations in guillemot eggs from Stora Karlsö (Metaller och organiska miljögifter i marin biota, trend- och områdesövervakning. Sakrapport till nationella miljöövervakningen. Överenskommelse 2120414, dnr 721-2621-04Mm).

Low birth weights and learning problems are also among the health risks. The different health effects of PCBs may be interrelated. Alterations in one system may have significant implications for the other systems of the body.

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 2.3.2-IV: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 years
Sewage sludge	7 different plants	yearly

Assessment with respect to Annex B chemicals (DDT)

DDT was never used on a large scale in Sweden. Consumption peaked in the 1960s, when just under 100 tonnes was applied every year, 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

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 2 years). They are also measured in deposition at Råö outside Göteborg and in Pallas in northern Finland (10 samples).

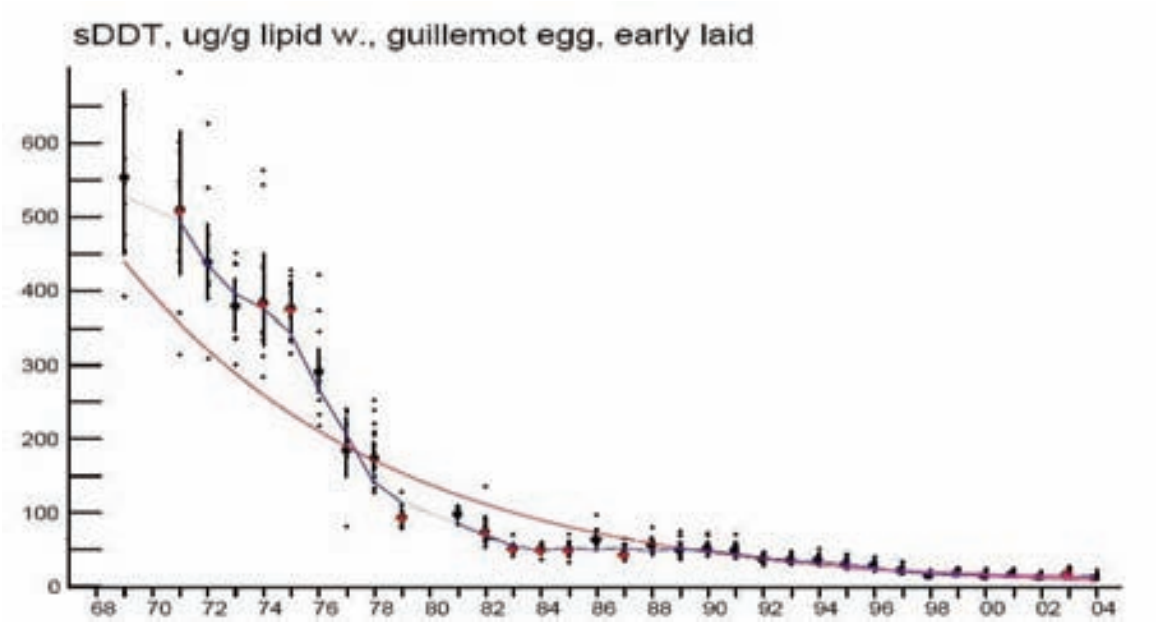

Figure 2.3.3-II: Example of a time series for sDDT at Stora Karlsö (sDDT = total DDT, the sum of the concentrations of DDT and its metabolites DDE and DDD). (Metaller och organiska miljögifter i marin biota, trend- och områdesövervakning. Sakrapport till nationella miljöövervakningen. Överenskommelse 2120414, dnr 721-2621-04Mm).

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 2.3.3-I: Estimated levels of DDT in certain matrices (μg/g lipid) (*Metaller och organiska miljögifter i marin biota, trend- och områdes-övervakning. Sakrapport till nationella miljöövervakningen. Överenskommelse 2120414, dnr 721-2621-04Mm*).

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

2.3.3 Assessment of releases from unintentional production of Annex C chemicals (PCDD/PCDF, HCB and PCBs)

In Sweden, an unsatisfactorily small number of studies with the aim of identifying new and quantifying known sources of unintentionally produced POPs have been carried out. On the basis of available data, it is not possible to tell which sources are the main contributors to the current environmental load.

In 2005 the Swedish Environmental Protection Agency presented a study of existing national knowledge concerning sources of unintentionally produced substances such as dioxins (PCDD/F), polychlorinated biphenyls (PCBs) and hexachlorobenzene (HCB) (Survey of unintentionally produced 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 production 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 are still unacceptably high, and constitute a risk to human health. In order to take 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 produced compounds often occur at very low concentrations. Despite this, the amounts of POPs released are significant, owing to the large volumes of flue gases, wastes and leachates.

Primary sources

Since 1992, unexpectedly few studies and analyses with the aim of identifying new and quantifying known sources of unintentionally produced substances have been carried out in Sweden. In several industrial sectors, more recent analyses are completely lacking, while in others only a few have been performed. It is uncertain how representative of current conditions these analyses are. Generally, few samples and no replicates are taken, which makes the results uncertain and provides poor information about the quantity of contaminants and the variation occurring. Little is known about variations in the formation and release of the substances concerned during different phases of industrial processes. The formation and emission of dioxins may be several times higher in 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.

Tables 2.3.4-I and 2.3.4-II show the magnitudes of a number of primary sources of dioxins and unintentionally produced 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.

Table 2.3.4-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	*0.2–0.3*	–	–
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 2.3.4-II: Magnitudes of a number of primary sources of unintentionally produced 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	–	*33000*	–	–	–	–
Non-ferrous metal works and foundries	–	*370-1500*	–	–	*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*	–	–	*1000-7000*[2]	*50-330*
Waste incineration	*< 120*[2]	–	–	–	*3000-4000*[2]	*600-6000*
Landfill fires	*300-4000*[3]	*100-2500*	–	–	–	–
Road transport	–	–	–	–	–	–
Shipping to and from Swedish ports	*280-660*[2]	*70-160*	–	–	–	–

1. TEQ

2. PCB_{tot}

3. PCB_7

Figures 2.3.4-1, 2 and 3 illustrate the values in table 2.3.4-I. The lower value in a range in the table is shown in the figures as an estimated minimum value and the higher number as an estimated maximum.

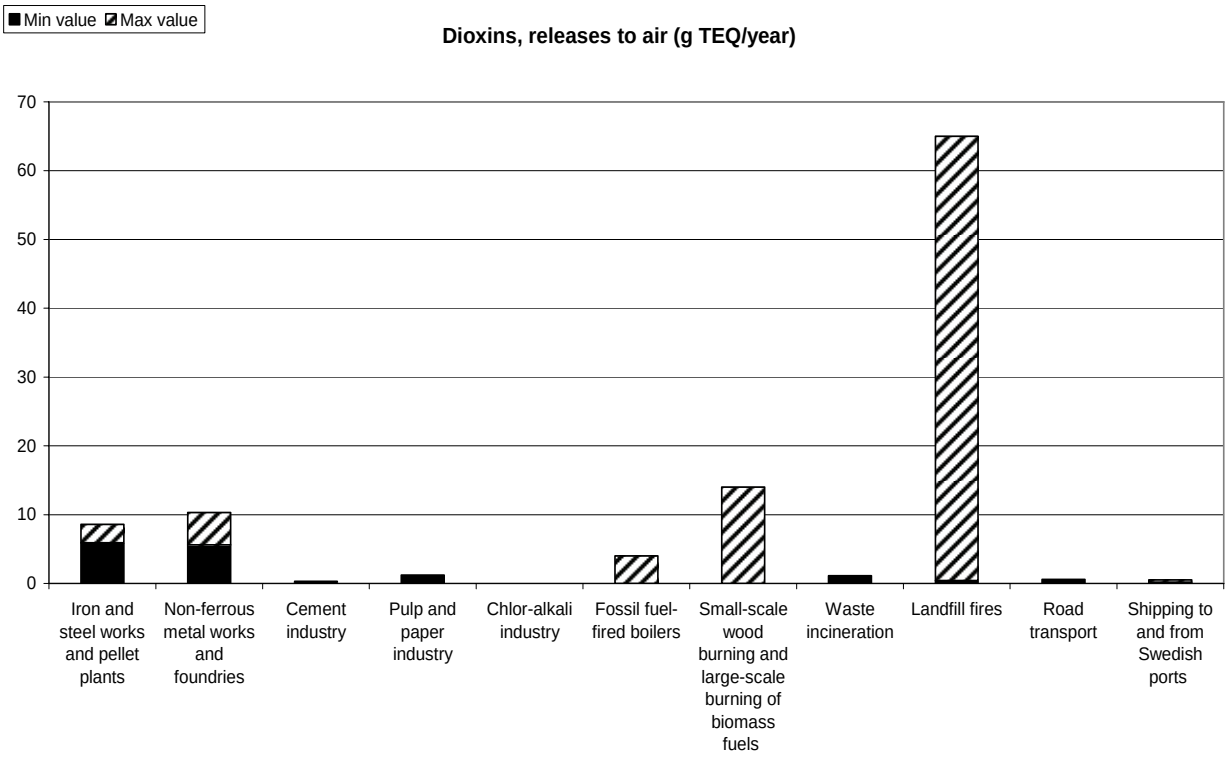

Figure 2.3.4-1: *Magnitudes of a number of primary sources of dioxin releases to air. Quantities of dioxins have been estimated using different systems, and are shown in grams TEQ (toxic equivalents). The systems used are Eadon, I-TEQ, N-TEQ and WHO-TEQ. The diagram is based on table 2.3.4-I and gives an idea of the relative order of magnitude of the different types of sources. The figures are based on emission factors and/or measurements. The lower number in a range in the table is shown in the diagram as an estimated minimum value and the higher number as an estimated maximum.*

Combustion still seems to be an important source of emissions of dioxins to air (table 2.3.4-I, figure 2.3.4-1). Biomass burning (including small-scale wood combustion and large-scale burning of biomass fuels), backyard burning, accidental landfill fires and the use of fossil fuels could be the most important sources.

There are large variations in releases of dioxins, PCBs and HCB from different kinds of small-scale combustion (tables 2.3.4-I and II; figure 2.3.4-1). 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 combustion conditions. Adding plastics dramatically increases emissions. Other tests have shown that burning wood treated with chlorophenols also results in higher releases. Recent combustion 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.

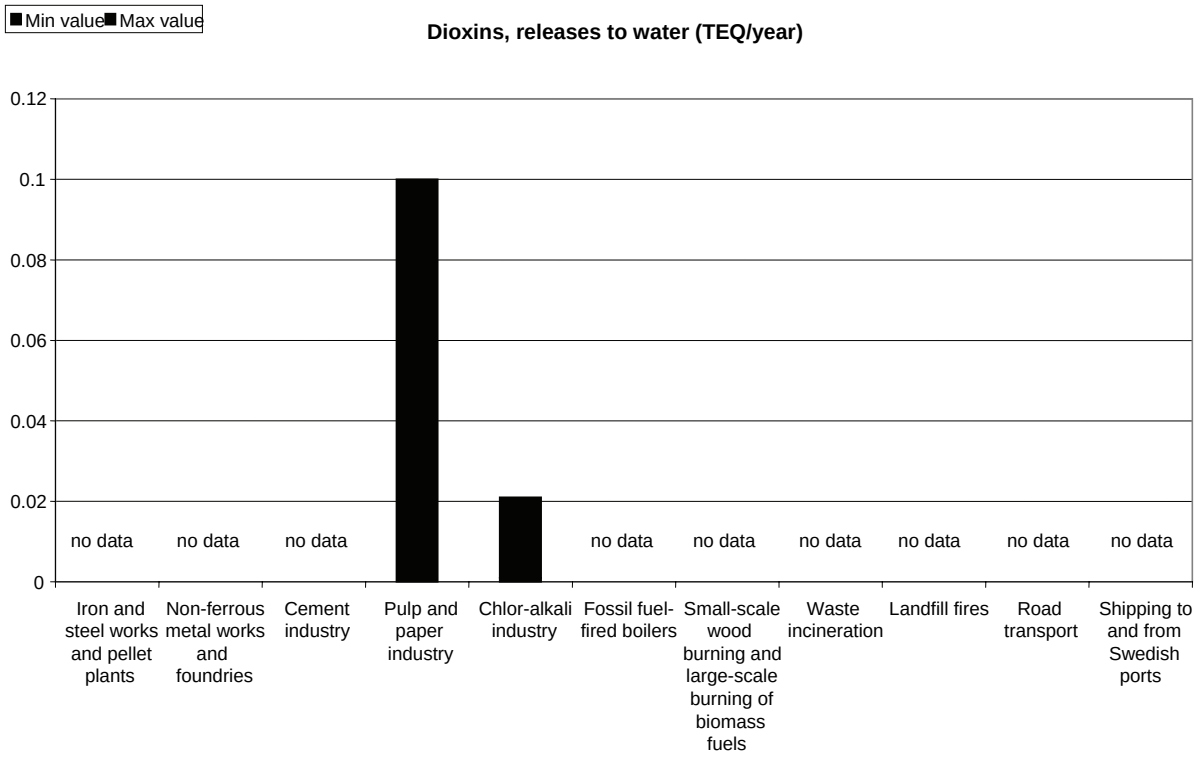

Figure 2.3.4-II: *Magnitudes of a number of primary sources of dioxin releases to water. Quantities of dioxins have been estimated using different systems, and are shown in grams TEQ (toxic equivalents). The systems used are Eadon, I-TEQ, N-TEQ and WHO-TEQ. The diagram is based on table 2.3.4-I and gives an idea of the relative order of magnitude of the different types of sources. The figures are based on emission factors and/or measurements. The lower number in a range in the table is shown in the diagram as an estimated minimum value and the higher number as an estimated maximum.*

Emissions of dioxins, PCBs and HCB to water come primarily from the pulp and paper industry and the chlor-alkali industry (tables 2.3.4-I and II; figure 2.3.4-2). The values in the tables, however, are very uncertain.

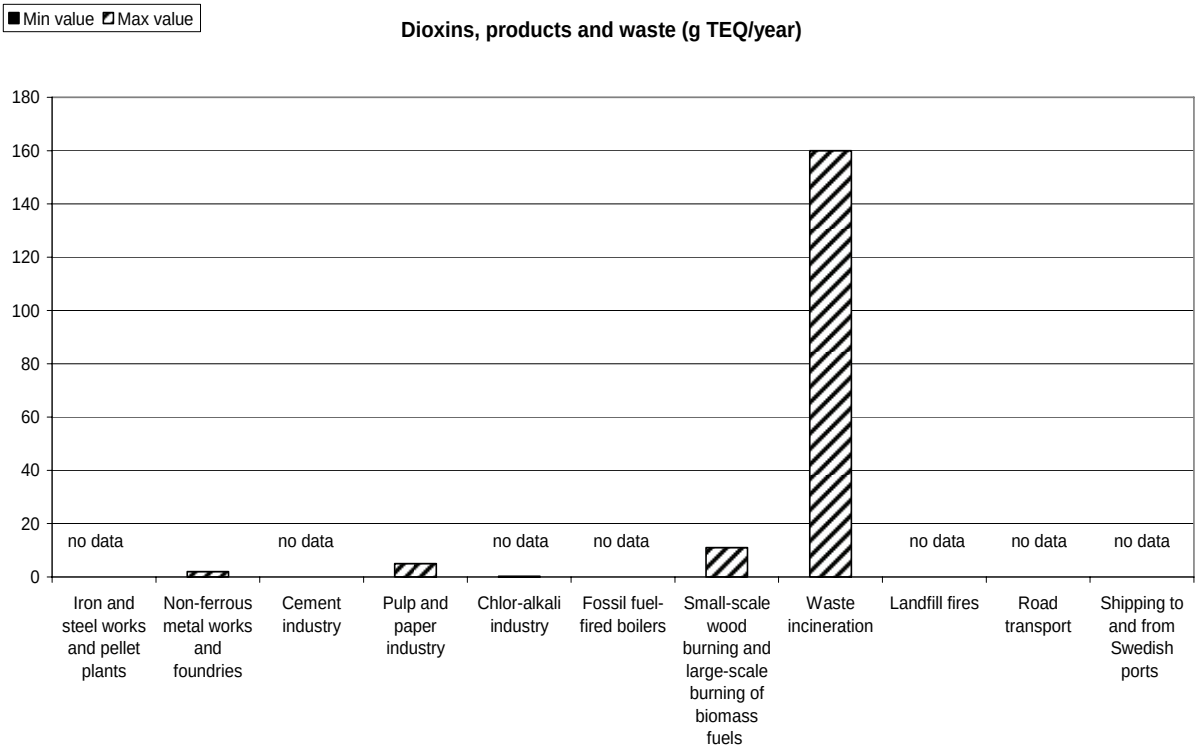

Figure 2.3.4-III: *Magnitudes of a number of primary sources of dioxins in products and wastes. Quantities of dioxins have been estimated using different systems, and are shown in grams TEQ (toxic equivalents). The systems used are Eadon, I-TEQ, N-TEQ and WHO-TEQ. The diagram is based on table 2.3.4-I and gives an idea of the relative order of magnitude of the different types of sources. The figures are based on emission factors and/or measurements. The lower number in a range in the table is shown in the diagram as an estimated minimum value and the higher number as an estimated maximum.*

Municipal waste incineration is still an important source of dioxins (table 2.3.4-I; figures 2.3.4-1 and 3). 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 fallen 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 production 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.

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, contaminated sites and wastes, identification, likely numbers, relevant regulations, guidance, remediation measures and data on releases from sites

Contaminated sites

Work relating to contaminated sites is governed by two interim targets adopted under Sweden's environmental quality objectives. First, by the end of 2010, studies will have been carried out and, where necessary, appropriate action will have been taken at all contaminated sites that pose an acute risk on direct exposure, and at contaminated sites that threaten important water sources or valuable natural environments, today or in the near future. Secondly, between 2005 and 2010, 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 500 sites but, so far, only 96 of them are among the prioritised sites. High levels of dioxins are not uncommon at these sites, and there is a risk of leaching into groundwater. The question of how to deal with dioxin-contaminated sites is under discussion. About 30% of prioritised sites are contaminated by dioxins, PCBs or similar compounds. This figure will probably change as inventories and quantification of pollutants continues. Data on releases from sites are scarce and it is therefore difficult to give an accurate picture of the present state of affairs.

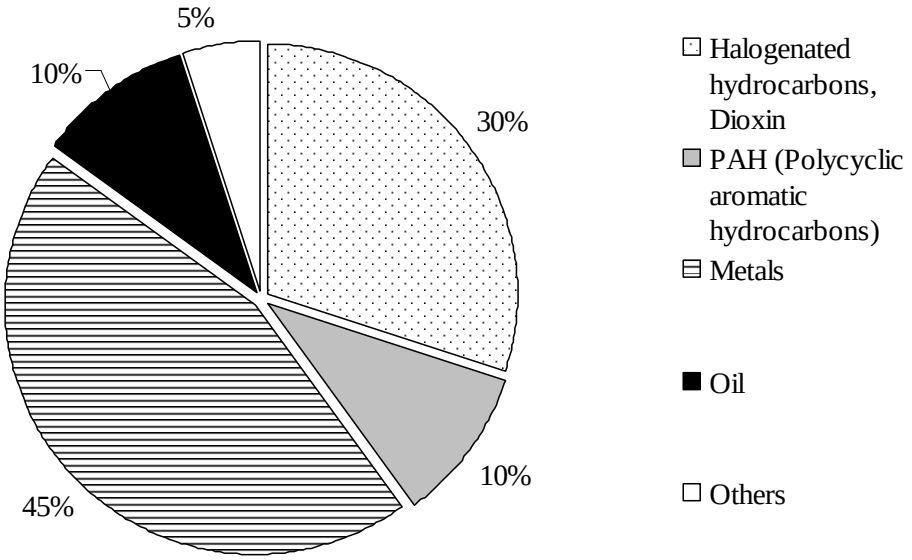

Figure 2.3.5-I: Common pollutants at prioritized contaminated sites.

By the end of 2005, 96% (around 78 000) of the estimated total number of contaminated sites had been identified. 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). About 1 500 sites are estimated to be in the highest risk class and 94% of these are identified 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. Roughly half of the prioritised sites have been risk classified in accordance with the MIFO method. So far, 31 sites have been remediated and remediation is in progress at another 28. A number of sites are expected to begin the remediation process during 2006.

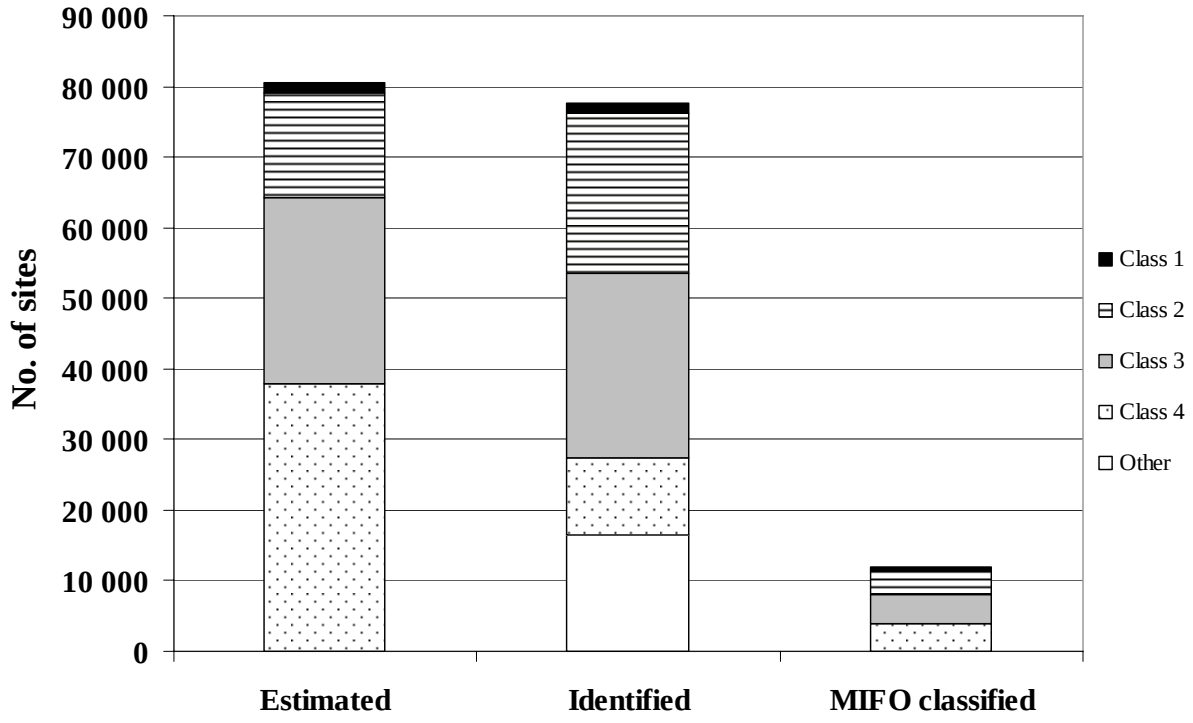

Figure 2.3.5-II: Key data on identification and classification

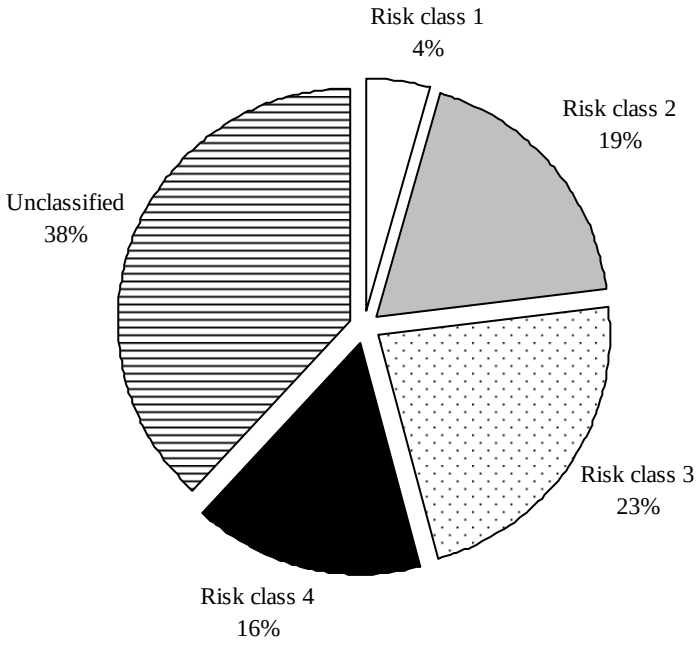

Figure 2.3.5-III: Breakdown by risk class of all reported sites in the MIFO database.

It is not unusual for pollutants to be unevenly distributed at a contaminated site. Furthermore, there is a risk of them 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

According to the report Management of PCB in Buildings (June 2002, file No 643-2492-02), 100–500 tonnes of PCBs have been used in sealants in buildings. The quantity still in buildings may be in the lower part of this range. Sealed insulating glazing contains around 35 tonnes and acrylic floor coverings 20–30 tonnes. The amounts in small capacitors for fluorescent tubes add up to 20 tonnes.

There is limited information available on the production of POPs waste.

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

Sweden does not require any exemptions for 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.

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.

Figure 2.3.3-I: Map showing sampling stations in the national monitoring programme relevant in the present context. Circles = stations in the marine environment, triangles = air monitoring stations, square = breast milk monitoring.

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 of SEK 25 million from 2001, it has also been possible to extend health-related monitoring and monitoring of toxic substances. SEK 26 million of the total funding for national environmental monitoring in 2001 (SEK 89.1 million) was allocated to monitoring of chemicals and SEK 21 million to biodiversity. Today the budget for the whole monitoring programme is approximately SEK 132 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 than it is at present.

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 many of them cannot be found in Sweden. 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 regular monitoring activities are PCBs, DDT, PCDD/PCDF and HCB.

Aldrin and dieldrin are covered by the pesticide monitoring programme. Aldrin has been detected in 3 samples out of 1830, with a maximum concentration of 1.2 μg/l; dieldrin in 2 samples out of 1832, with a maximum concentration of 1.6 μg/l

Table 2.3.7-I: Summary of dioxin measurements included in the existing environmental monitoring programme.

DIOXINS		
Measurement/matrix	**Frequency**	**Remarks**
Concentrations in sludge	Annually at 7 sewage plants	Data available from 2004 on
Concentrations in fish	Annually at 3 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. Dioxin measurements included in programme from 2004 on

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).

Freshwater fish are not analysed for PCBs and HCB 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 of dioxin levels, and to continue the annual measurements of PCBs and HCB in fish previously performed at certain sites.

Table 2.3.7-II: Summary of measurements of PCBs and HCB included in the existing environmental monitoring programme.

PCBs and HCB		
Measurement/matrix	**Frequency**	**Remarks**
Long-range transport	PCBs measured annually at 3 sites	Data available from about 1995 on
Concentrations in sludge	PCBs and HCB measured annually at 7 sewage plants	Data available from 2004 on
Concentrations in fish	PCBs and HCB measured annually at 9 sites	Data available from about 1990 on
Concentrations in common mussels	PCBs and HCB measured annually at 2 sites	Data available from about 1980 on

Concentrations in top predators (guillemot eggs)	PCBs and HCB measured 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
Concentrations in human breast milk	PCBs and HCB measured every 2 years at 1 location	Data available from 1996 on

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 and PCB 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, or even given way to an increase. However, available data are very limited and generalisations can easily give rise to misleading results.

Table 2.3.7-III: Measured levels of certain POPs in some of the matrices used in the national monitoring programme (2004). Karlsö (Metaller och organiska miljögifter i marin biota, trend- och områdesövervakning. Sakrapport till nationella miljöövervakningen. Överenskommelse 2120414, dnr 721-2621-04Mm).

	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 Administration (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 is currently seeking to introduce 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 Administration (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 2000 samples have been collected every two years. 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).

Despite the measures introduced, the average Swede's exposure to dioxins and dioxin-like PCBs is currently only marginally below the highest tolerable daily intake (TDI) set by the EU. This also means that, for some 10% of Sweden's population, the TDI is 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 Administration (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 and analysed every other year, and sampling is being conducted in 2006. 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 Administration. Results are published annually. Residues in water have been monitored by the National Food Administration and others.

2.3.7 Current level of information, awareness and education among target groups

Awareness of POPs in Sweden has a long history. Rachel Carson's book Silent Spring (1962) was rapidly translated into Swedish and was read by a wide audience of scientists, policy makers and concerned citizens. The environmental movement grew rapidly in the 1960s and 70s. The traditional Swedish right of public access to the countryside played an important role in issues such as aerial spraying of pesticides and herbicides. The discovery in 1966 of PCBs in the tissues of a white-tailed eagle from the Baltic by the Danish-born scientist Sören Jensen, active at the Wallenberg Laboratory in Stockholm, led to the insight that our environment was slowly being poisoned by invisible threats in the shape of persistent organic substances that were never intended to reach the environment.

The accident at the Hoffmann-la Roche subsidiary ICMESA in Seveso in the summer of 1976, in which significant amounts of polychlorinated dioxins and furans were released on unsuspecting villagers, further increased awareness among Swedish decision makers, NGOs and the public of the threats of POPs to human health and the environment.

Dioxins in Swedish food

The National Food Administration 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

Threshold values 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 (girls 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 girls and women of child-bearing age, and pregnant and nursing women, respectively. The advice on POP-contaminated fatty fish was last revised 1995, and is currently once again under revision.

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. Girls and women of child-bearing age should not eat more than one portion per month 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 meetings and activities under the Convention. The Swedish Chemicals Inspectorate and the Swedish Environment 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 Inspectorate 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 Inspectorate 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 (MDSs) when marketing chemicals. The employers have the obligation to label chemicals used in the working places, to assure that MDSs 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 (Sv. Arbetsgivareföreningen) and the trade unions have established a joint institution (Sv. 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. The Swedish government has established a National Agenda 21 Committee to initiate, co-ordinate and support local work with Agenda 21 issues. All municipalities actively take part in activities initiated by the national and local committees. A new policy to reduce unemployment is to engage unemployed persons as environment information

officers with the task to study local environmental problems and to disseminate information to companies and the general public.

National information exchange systems

The Institute for Environmental Medicine at the Karolinska Institute has established a Forum for Organic Environmental Toxins (http://www.imm.ki.se/divisions/FOM/Eng/index.htm) together with The Swedish Chemicals Inspectorate, The Swedish Environmental Protection Agency and The National Food Administration. The Forum functions as an active network in which issues and information that concern the occurrence and the health risks of persistent organic substances that bioaccumulate can be discussed from the point of view of both researchers and authorities.

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 stakeholder 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. In general, the degree of co-operation between non-governmental sectors and the government and the agencies is comprehensive, open and constructive.

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.

Examples of activities are listed in Annex III.

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 Accreditation Agency has accredited a total of 24 laboratories for POPs analysis (for further information see http://www.swedac.se/sdd/System.nsf/(GUIview)/index.html).

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 among much broader categories. 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, PCBs continue to account for a substantial proportion of the total toxic effect of food. For instance, dioxin-like PCB variants are found in such high concentrations in food that their toxic effects are comparable with those of dioxins themselves. The total dose of dioxins and dioxin-like compounds ingested by the average Swede is not far from that regarded as the maximum tolerable intake. Certain categories of people, such as breast-fed babies, may be receiving in excess of this limit. However, infants only receive this dose for a limited period, and the positive effects of breast feeding are considered to far outweigh the risks posed by organic pollutants.

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 maternal or breast milk exposure. As a base for the advice on POPs, the levels in fish, the intake and possible human health effects are taken into consideration. One important group of POPs are the dioxins, and EU-SCF has recently determined a tolerable daily intake (TDI) of dioxins (PCDD/DF + DL-PCBs) of 2 pg WHO-TEQ/kg body wt. According to NFA's own intake calculations based on the Swedish consumption survey Riksmaten 1997-98, 5% 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 all consumers, the percentage of consumers exceeding the TDI was higher (ca. 15%).

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

Sweden is part of the common notification system of the European Union under the Directive 67/548/EEC (as amended 92/32/EEC).

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

Sweden takes part in the Existing Substances Programme according to EC Regulation No 793/93. Sweden participates in the Technical Working Group on persistent, bio-accumulating and toxic substances under the European Commission. This group has the task to identify PBT-substances among the New and Existing EU chemicals. The procedure involves screening for potential PBT-substances based on available data, and, if necessary, request appropriate data from industry on the PBT-candidates to be able to finally conclude on the PBT-status of the substances. Recently, this group has been tasked to screen also pesticide active ingredients using the same criteria.

3 Strategy and action plan elements of the national implementation plan

3.1 Policy statement

In April 1999 the Swedish Parliament adopted fifteen national environmental quality objectives. The objectives describe what quality and state of the environment, and the natural and cultural resources, of Sweden that are environmentally sustainable in the long term. In a series of decisions from 2001 to 2003, Parliament subsequently adopted a total of seventy-one interim targets, indicating the direction and timescale of the actions to be taken to move towards these fifteen 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.

Under the overall goal of 'A Non-Toxic Environment', nine interim targets have been adopted, indicating the scope and timescales of concrete environmental measures (see chapter 2.2.1).

The objective 'A Non-Toxic Environment' reads as follows:

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.'

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

- The concentrations of substances that occur naturally in the environment are close to background concentrations.
- The levels of foreign substances in the environment are close to zero and their impact on the ecosystems is negligible.
- All fish in the seas, lakes and watercourses in Sweden are fit for human consumption with regard to the contents of foreign substances
- 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.

For further information on Sweden's environmental goals, indicators tracking progress at the national and regional levels, and interesting links to other government agencies and organisations, readers are referred to the Environmental Objectives Portal, www.miljomal.nu.

3.2 Implementation strategy

The objective of the Stockholm Convention is a part of the Swedish environmental quality objective 'A Non-Toxic Environment', for which the Swedish Chemicals Inspectorate is the responsible agency. The discrete National Implementation Plan activities, including review, reporting, evaluation and updating of the National Implementation Plan, are handled by the Chemicals Inspectorate and the Environmental Protection Agency within the framework of the environmental objectives.

A progress report from the Environmental Objectives Council is submitted to the Swedish Parliament every year. That report provides background material, as do a number of other submissions to the Government in other contexts, chiefly proposals for new objectives and interim targets requested by the Government.

Under the terms of Government Bill 2000/01:130, 'The Swedish Environmental Objectives – Interim Targets and Action Strategies', a more in-depth evaluation of the environmental quality objectives is to be undertaken every four years. This evaluation is one of several documents that form a basis for the Swedish Government's forthcoming Environmental Objectives Bills.

Table 3.2.-I: Reviews and evaluations of efforts to achieve the environmental quality objectives.

Reviews and evaluations of the environmental quality objectives	**Frequency**	**Remarks**
Progress report	Annually	Provides background material, chiefly proposals for new objectives and interim targets requested by the Government.
In-depth evaluation	Every four years	Establishes whether the policy instruments used or the objectives need to be revised. Describes progress 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. Forms a basis for the Swedish Government's forthcoming Environmental Objectives Bills.

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.

The preparation of the in-depth review is coordinated by the Environmental Objectives Council through its Secretariat. The agencies and organisations represented in the Council draw up reports on the individual objectives. These documents are the responsibility of the bodies concerned and are submitted to the Government together with the in-depth review.

The reports on individual objectives, most of which include English summaries, and the annual progress reports, of which English versions are also available, can be found on the Environmental Objectives Portal, www.miljomal.nu.

3.3 Activities, strategies and action plans

Problems to be addressed

Although all the intentionally produced substances covered by the Convention have been banned for decades and measures have been taken to reduce or eliminate emissions of the unintentionally produced ones, their environmental effects linger on. In a study performed by WWF in 2005 (*Generations X*, http://detox.panda.org/, *WWF*, *2005*), it was found that children as young as twelve years old were contaminated with PCBs and a metabolite of DDT, even though these substances were banned years before the children were born. A variety of other man-made chemicals, e.g. perfluorinated compounds and brominated flame retardants, were also found in the blood of these children.

The most acute problem of which we are aware in Sweden today is that levels of dioxins and dioxin-like PCBs in human breast milk and in fish from the Baltic Sea are unacceptably high and constitute a risk to human health. The exposure of nursing babies to dioxins and dioxin-like PCBs clearly exceeds the tolerable daily intake (TDI) set by the EU. The average Swede's exposure to dioxin and dioxin-like PCBs is only marginally below the highest tolerable intake (TDI). Fatty fish from the Baltic Sea contain levels of organic pollutants that exceed EU limit values for consumption.

Problems to be addressed

- The average Swede's exposure to dioxins and dioxin-like PCBs is only marginally below the highest tolerable intake (TDI) set by the EU.
- Some 10% of the population exceed the TDI for dioxins and dioxin-like PCBs.
- The exposure of nursing babies to dioxins and dioxin-like PCBs clearly exceeds the tolerable daily intake.
- Knowledge about sources, releases and flows of, and exposure to, both unintentionally produced and emerging POPs is very limited.

The decline in dioxin and PCB 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, or even given way to an increase. Available data are very limited, however, and generalisations can easily give rise to misleading results.

The main contributors to the current environmental load are unknown. As releases of unintentionally produced POPs from Swedish primary sources have abated, secondary and diffuse sources have become more important in relative terms. Very little is known about the quantity, release, dispersion and cycling of dioxins, PCBs and HCB from secondary and diffuse sources.

Candidate substances proposed for the Stockholm Convention and the LRTAP Protocol show increasing levels in the environment. We have limited knowledge of the effects these levels may result in.

Objective

The objective of Swedish activities relating to persistent organic pollutants is to protect human health and the environment.

To protect human health, it is important to decrease exposure via food and products. In order to ensure that exposure via foodstuffs is acceptable, levels of persistent organic pollutants in the environment need to be kept down.

Persistent organic pollutants have adverse effects on the well-being of plants and animals, and may harm ecological values. To protect the environment, releases from primary, diffuse and secondary sources must be reduced. Examples of secondary and diffuse sources are products, fires, small-scale combustion, backyard burning, long-range transboundary air pollution, and contaminated soils and sediments.

Objective

Protect human health and the environment from persistent organic pollutants.

- Decrease human exposure via food intake
- Decrease human exposure from products
- Decrease releases to the environment from diffuse, secondary and primary sources

Strategy

To achieve the objectives above, substances meeting the criteria of the Convention need to be identified in a systematic manner. Sweden will work in a precautionary manner with other parties to identify intentionally and unintentionally produced substances that exhibit POPs characteristics, with a view to including them in the Convention.

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, dispersion, 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. This will also help to set clear priorities among measures.

Regarding the identification and quantification of releases, diffuse and secondary sources are especially important as data on such sources are almost completely lacking. For primary sources, it is necessary to collect measurement-based data which reliably show how large emissions of unintentionally produced substances are under varying conditions. In this respect, operator self-monitoring needs to be improved.

Reduced costs for analysis and improved sampling methods for on-line measurement are key concerns when it comes to identifying sources and keeping track of emissions from primary, secondary and diffuse sources.

Strategy

Step 1

- Identify substances that fulfil the criteria of the Convention.
- Identify sources and exposure pathways for such substances.
- Obtain better data and knowledge on formation, release, dispersion, cycling and exposure pathways.

Step 2:

- Identify and evaluate effective measures to reduce use, formation, release and exposure.
- Set clear priories among measures.

Step 3:

- Implement measures such as guidance, information, licensing, supervision, regulations and other policy instruments.

Step 4:

- Evaluate and improve or take further measures if necessary.

Activities under each step have to be prioritised on the basis of both achievable results and time- and cost-effectiveness.

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 or improved.

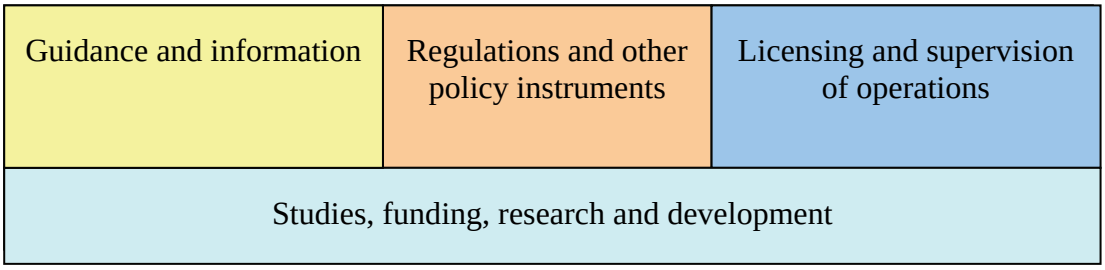

Figure 3.3-I: Examples of measures available to Sweden in its efforts to achieve a non-toxic environment.

More detailed activities are listed in Annex IV.

3.3.1 Activity: institutional and regulatory strengthening measures

No further institutional or regulatory measures are needed for the twelve POPs currently covered by the Convention.

3.3.2 Activity: measures to reduce or eliminate releases from intentional production and use

As stated below Sweden has already taken the steps needed under the Convention to prevent the production, import and export and use for the intentional POPs included in the Convention. However, Sweden is of the opinion that the present twelve substances or groups of 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 by air, water and biota, and have adverse effects on organisms, including man. The Swedish Government commissioned the Swedish Chemicals Inspectorate in 2000 to identify possible POPs candidates, using the criteria in Annex D,. The Inspectorate reported back in December 2001, with an update in mid-2002 on a number of substances that could possibly become candidates for entering into the Convention.

The selection of substances was based on work performed in other fora e.g. the LRTAP convention, OSPAR, the EU programme for new substances, the EU existing chemicals programme, the EU programme for classification and labelling of substances and the EU programme for re-registration of plant protection products. In addition the substance lists of HELCOM, the EU water directive, the EU endocrine disrupting substances, the risk reduction list and the Swedish EPA regulation 1995:7 were used.

The focus was on the Annex D screening criteria for persistence, bioaccumulation, toxicity and potential for long-range transport.

Substances that did not fulfil all criteria were removed from the list. For the remaining substances there was a varying degree of evidence for fulfilment of the criteria, mainly with regard to persistence. The substances were grouped according to how well they were considered to fulfil the criteria. Factors that were taken into account include:

- If there are risks to health and the environment today that may be reduced by regulation
- The suitability of the conventions to regulating these substances
- The availability of alternative substances and/or processes
- The difficulty in reaching agreement on inclusion of a candidate
- Knowledge about ongoing production and/or use
- If, for substances no longer being produced, it may still be important to prevent production from being restarted.

After screening several hundred substances the Swedish Chemicals Inspectorate identified 14 substances not yet under the Stockholm Convention for which there is

relatively substantial and reliable information that shows them to be POPs candidates. They were subdivided in five priority groups according to information about:

- Persistence, bioaccumulation, toxicity and long-range transport (i.e. the PBT+L criteria)
- Production and use
- Feasibility for being regulated through the Stockholm convention

The five groups and the substances in them are as follows:

1. Substances that by a wide margin fulfil the PBT and L criteria and where there is information available on production, use and occurrence in the environment;

- *Pentabromodiphenylether (PBDE)*
- *Polychlorinated naphthalenes (PCN)*

2. Substances which probably fulfil the PBT and L criteria and where there is information available on production, use and occurrence in the environment;

- *Lindane (HCH, including gamma-HCH)*(already in the LRTAP POPs protocol)
- *Perfluorooctanosulfonic acid and its salts (PFOS)*
- *Short chained chloroparaffins (SCCP)*

3. Substances that fulfil the PBT and L criteria but where it is uncertain whether they are produced any longer (i.e. no known production in the OECD countries but production may be ongoing in developing countries);

- *Chlordecone/kepone* (already in the LRTAP POPs protocol)
- *Pentachlorobenzene*
- *Polybrominated biphenyls* (hexabromobiphenyl already in the LRTAP POPs protocol)

4. Substances that are produced and/or used but where the PBT and L properties are not fully elucidated (For these substances it is predominantly uncertain whether the persistence criterion is fulfilled);

- *Dicofol*
- *Endosulfan*
- *Methoxychlor*
- *Hexabromocyclododecane (HBCDD)*
- *Hexachlorobutadiene (HCBD)*

5. Substances for which the Stockholm convention is not judged to be the right forum;

- *Polyaromatic hydrocarbons (PAH)* (already in the LRTAP POPs protocol)

Of these 14 substances five have already been proposed for the Stockholm Convention: pentabromodiphenylether (PBDE) by Norway; lindane by Mexico,

perfluorooctanosulfonic acid and its salts (PFOS) by Sweden and chlordecone/kepone, and hexabromobiphenyl (HBB) by the EC.

Five more have been proposed by the EC to be included in the LRTAP POPs Protocol, namely: polychlorinated naphthalenes (PCN), short-chained chloroparaffins (SCCP), pentachlorobenzene (PeCB), hexachlorobutadiene (HCBD) and octabromodiphenylether (OBDE).

The remaining four intentionally produced POPs candidates; dicofol, endosulfan, hexabromocyclododecane and methoxychlor, are being evaluated for their PBT properties within the European Union. The Netherlands is rapporteur for dicofol, Germany for endosulfan and Sweden for hexabromocyclododecane (HBCDD). The outcome of that evaluation will decide whether they should be put forward as new POPs candidates.

In addition to the above substances the pesticide trifluralin has been identified as a possible POPs candidate. Concern has also been raised about other fluorinated substances or groups of substances e.g. perfluorinated octanoyl acids, fluorinated telomers etc.

In the judgment of the Swedish Chemicals Inspectorate, the ongoing work on persistent, bioaccumulating and toxic substances (PBT) and on very persistent and very bioaccumulating substances (vPvB) under the European Commission Technical Committee on New and Existing Substances in the future will likely be the major source for identifying new POPs candidates. The Swedish Chemicals Inspectorate will in addition continue to monitor the area for emerging POPs candidates and, as appropriate, notify the government about substances that warrant further attention.

3.3.3 Activity: production, import and export, use, stockpiles and wastes of Annex A POPs pesticides (Annex A, part 1 chemicals)

All Annex A pesticides have for a long time been banned in Sweden, and no further measures are needed with regard to the production, import and export or use of these substances. There are no known large stockpiles or wastes containing Annex A POPs pesticides. Remaining stockpiles are to be found in private households and small enterprises such as farms. Campaigns mounted by farmers' organisations and local authorities result in the discovery of a few cases.

3.3.4 Activity: production, import and export, use, identification, labelling, removal, storage and disposal of PCBs and equipment containing PCBs (Annex A, part II chemicals)

The necessary regulatory measures have been introduced with regard to the production, import and export, use, identification, labelling, removal, storage and disposal of PCBs and equipment containing PCBs. A new ordinance currently in preparation deals with the ongoing use of these chemicals in sealants and flooring materials in buildings. Time limits will be set for an inventory and subsequent removal of such materials in existing buildings. The existing use of PCBs in small capacitors and sealed glazing units is not

prohibited, but the management of waste originating from such use is regulated. The Waste Ordinance requires waste from electrical and electronic products to be pre-treated by a certified company in such a way that hazardous components are removed. The same ordinance requires waste from building and demolition activities to be separated and components containing hazardous substances such as PCBs to be handled separately as hazardous waste.

3.3.5 Activity: production, import and export, use, stockpiles and wastes of DDT (Annex B chemicals) if used in the country

DDT has long been banned in Sweden, and no further measures need to be taken with regard to the production, import and export or use of the substance.

Remaining stockpiles may be found in private households and small enterprises such as farms. Campaigns mounted by farmers' organisations and local authorities result in the discovery of a few cases.

3.3.6 Activity: register of specific exemptions and the continuing need for exemptions (article 4)

Sweden has not applied for any specific exemptions and sees no need to do so for any of the intentionally produced POPs currently covered by the Convention.

3.3.7 Action plan: measures to reduce releases from unintentional production (article 5)

Although actions have been taken to reduce releases from all known primary sources, the environmental load of unintentionally produced POPs is still too high. It is not known which sources contribute significantly to the present environmental load.

Emissions from primary sources are currently estimated to be low, but there are uncertainties concerning the quantities released. The lack of reliable data on emissions from certain primary sources makes it difficult to exclude them from the overall picture. Another problem concerning primary sources is that even if concentrations of POPs in flue gases, wastes etc. are low, the total quantities may be significant owing to the large fluxes involved.

As releases from primary sources have abated, diffuse sources have become more important in relative terms. Small-scale burning of wood, backyard burning, natural and accidental fires etc. may, when all small sources of these kinds are added together, constitute a significant source.

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 working to close existing gaps in knowledge, so as to be better equipped to formulate an adequate reduction/elimination strategy over the next few years.

More detailed examples of measures in progress and identified needs can be found in Annex III.

Identified needs for further action to reduce releases from unintentional production

The needs identified in this section will be assessed and further developed in the in-depth evaluation of the environmental objective 'A Non-Toxic Environment'.

Establish emissions from different sources

1. Improved self-monitoring

Operators need to establish more clearly what emissions they give rise to. In this respect, operator self-monitoring needs to be improved. Measurement-based data which reliably show how large emissions are from primary sources under varying conditions are scarce. Furthermore, when wastes are sampled, often only a few samples are taken with no replicates. This makes the results uncertain and means that we have poor information about the quantity of contaminants and the variation occurring. Data that reflect entire process cycles, including disruptions, and provide information about variation need to be collected.

The importance of self-monitoring should be emphasised by the competent authorities in connection with supervision and licensing of operations. Guidance to operators on how to improve self monitoring may be provided by trade associations.

2. Reduced costs for analyses and on-line sampling

In order to be able to assess emissions from primary sources, more use needs to be made of continuous sampling methods. This kind of sampling also needs to be further developed. With continuous sampling it is possible, in addition, to monitor how and to what extent process variations affect the formation of POPs. Reducing the costs of analyses is another key issue when it comes to identifying sources and keeping track of emissions from unintentional production.

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 of dioxins. For newly established operations, or where major changes are made to existing ones, this should be a mandatory requirement.

Another area in which further measures may be necessary is the burning of bio-fuels 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 high levels, even if the concentration of unintentionally produced POPs in the gases is low.

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. Even though the concentrations of POPs may be low, the total amounts are significant owing to the large quantities of residues arising. There is thus every reason to study how the formation of unintentionally produced POPs can be reduced. The goal should be to develop processes and technologies that will avoid unintentionally produced substances being formed or transferred to waste streams. Such technologies should be introduced, especially at new plants or in connection with major changes to existing ones. Development and improvement of technologies may appropriately be undertaken within the different industrial sectors concerned.

Diffuse sources

Mention should also be made in this context of small-scale burning of wood. This may be of significance when all the small individual sources involved are added together. The quality and age of the boiler or stove, composition of the fuel, combustion procedures and cooling of gases significantly affect the formation of unintentionally produced POPs. Adding plastics also dramatically increases emissions. Tests have shown that burning wood treated with chlorophenols also results in higher releases. Recent combustion studies simulating backyard burning in metal drums have produced similar 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 difficult to assess the total loading for which they are 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. Fires in stored wastes are also covered by this guidance, which has been prepared by the Swedish Association of Waste Management.

3.3.8 Activity: measures to reduce releases from stockpiles and wastes (article 6)

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

Transitional rules are in force for landfills until the end of 2008. As far as we are currently aware, the most significant type of waste containing PCDD/F in Sweden, in terms of the quantity arising, is fly ash from waste incineration. Depending on the outcome of the work on limit values for Annex IV of the POPs Regulation (Regulation (EC) No 850/2004), this waste may have to be treated or managed according to part 2 of

Annex V if permits can be issued. If the lower POP content limit is set at 15 µg I-TEQ/kg, incinerator fly ashes will most probably fall below the limit value, that is, they will not be a POP waste requiring destruction under the Stockholm Convention. No matter what the outcome is, measures to restrict recovery of waste containing more than , say, 1 µg/kg of dioxins should be considered and as well as measures to reduce emissions of dust from landfilling of such waste.

3.3.9 Strategy: identification of stockpiles, articles in use and wastes

Since the pesticides included were banned as early as the 1970s, remaining stockpiles are to be found in private households and small enterprises such as farms. Campaigns mounted by farmers' organisations and local authorities result in the discovery of a few cases. Waste of this type may come to light when the estate of a deceased person is distributed or a farm is discontinued.

Ongoing use of PCBs in buildings will be identified as a result of a new ordinance requiring an inventory of PCB sealants and flooring materials containing PCBs. As new use of PCB products was terminated in 1973, most products containing PCBs have reached the end of their life cycle and become waste. There is a remainder in fluorescent lamp ballast capacitors and sealed insulating glazing, which have not been shown to leak PCBs into the environment.

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.

Assessments suggest that up to 30 kg of dioxins could still be present in wood treated with pentachlorophenol (PCP) and similar dioxin-contaminated compounds. The Swedish EPA aims to assess the feasibility of identifying, collecting and disposing of this timber in the in-depth evaluation of the environmental objective 'A Non-Toxic Environment'.

3.3.10 Activity: manage stockpiles and appropriate measures for handling and disposal of articles in use.

No major stockpiles are expected to emerge. 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.

3.3.11 Strategy: identification of contaminated sites (Annex A, B and C Chemicals) 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 (in Swedish, short for Method for Inventories of Contaminated Sites).

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 identification of contaminated sites is now almost complete. 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 first phase is estimated to be completed in 2010. 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 *ex situ* methods involving removal and treatment elsewhere. Examples of *in situ* methods are permanent cover, chemical and biological reduction or destruction, and chemical or thermal stabilisation. 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.

3.3.12 Activity: facilitating or undertaking information exchange and stakeholder involvement

The Swedish Chemicals Inspectorate and the Swedish Environmental Protection Agency maintain a continuous dialogue with relevant stakeholders concerning chemicals management, including management of POPs. The Swedish Plastics and Chemicals Federation and environmental, academic and trade union NGOs are represented on the Boards of the Chemicals Inspectorate and the Swedish EPA. The agencies' websites and information magazines continuously address chemicals management issues.

A Swedish POPs network, coordinated by the Swedish EPA and the Chemicals Inspectorate, has been formed to discuss current issues. A stakeholder group, consisting of representatives of industry, central government and local authorities, universities and NGOs (see Annex VI), was involved in the development of the Swedish implementation

plan. The participants in this group are the first members of the POPs network, and anyone wanting to join can do so by contacting either of the responsible authorities (Annex VIII).

3.3.13 Activity: public awareness, information and education (article 10)

The websites of the Swedish Chemicals Inspectorate 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 Inspectorate 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.

The Swedish Consumer Agency is working with the issue of the use of firewood for domestic heating. The Agency has information on its website regarding the environment-friendly use of wood fuels:
http://www.konsumentverket.se/mallar/sv/lista_artiklar.asp?lngCategoryId=1196

The Swedish Consumer Agency's magazine *Råd & Rön* (Advice & Results) has published tests of wood-fired boilers, and environmental data have been highlighted in the test results. When the opportunity arises, for example when consulted on related issues, the Agency stresses the importance of measures that make it as advantageous as possible for households using wood-fired boilers to install accumulators, change to more modern boilers and so on.

A joint information campaign by the Swedish EPA and the Swedish Consumer Agency is one possible way of creating wider awareness of the fact that what people burn, and how they go about it, may make a major difference to emissions.

Concerning POPs in food, cf. section 2.3.8.

3.3.14 Activity: effectiveness evaluation (article 16)

See sections 2.3.7. and 3.3.16.

3.3.15 Activity: reporting

Sweden will report regularly to the Convention on updates of the national implementation plan and on other ongoing activities, e.g. POPs monitoring and identification of possible candidate POPs.

3.3.16 Activity: research, development and monitoring (article 11)

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.

The two marine research programmes Marine Biodiversity, patterns and processes (www.marbipp.tmbl.gu.se) and Aquatic alien species – where and why will they pose a threat to the ecosystem functions and economy? (www.aqualiens.tmbl.gu.se), currently financed by the Swedish EPA, will be completed during 2006 and 2007, respectively. Planning for a new marine research programme will begin with a study identifying different needs regarding management of the marine environment, in relation to available research results and ongoing international and national research. This study will be completed early in 2007 and the conclusions will be used to prioritise areas for the new research programme, either as a national programme or as part of the BONUS-169 programme (see below).

Furthermore, the programme 'BONUS for the Baltic Sea Science' will extend its collaboration by applying for an Article 169 programme. BONUS is a network and partnership of key agencies funding research in the Baltic Sea region; for more information, readers are referred to www.bonusportal.org. In addition to funds from each member state, support for the programme will be provided by the European Commission. Several of the proposed sub-programmes have a link with research on POPs. BONUS/169 will involve all the countries around the Baltic Sea. The areas of research envisaged are truly multidisciplinary, and the links and implications for policy makers are strong.

In 2006, the Swedish EPA is planning to launch a research programme aimed at monitoring flows of POPs in society, including emissions of POPs from articles, in order to gain a better understanding of human exposure and the fate of different organic substances.

Areas of interest for future research and development

Reducing the costs of analyses and improving sampling methods for on-line measurements are key concerns when it comes to increasing knowledge about unintentionally formed POPs. One way to reduce the costs of on-line measurements could be to develop the use of indicator substances. The development of cheaper analyses with a view to attaining more and better measurement data is crucial as a basis for identifying sources and keeping track of releases from primary, secondary and diffuse sources.

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

It is important to develop a better understanding of mechanisms for bioaccumulation for non-lipophilic substances, e.g. perfluorinated substances and of the effects of potential POPs candidates with insufficient data. Research on fate in the environment and mechanisms for long-range transport for substances such as PFOS, PFOA and

perfluorinated substances with chain length greater than eight is important to better understand how they reach distant targets e.g. the Arctic and its inhabitants.

Coordination of research, on both a national and an international level, would be beneficial in minimising duplication of effort. To maintain the quality of Swedish research, a long-term approach to planning and funding is essential.

Monitoring

An identified need with regard to improved monitoring is greater coordination of regional and local monitoring. Development of uniform methods, guidance on monitoring and the creation of databases are examples of how this could attained.

Table 3.3.16-I: Proposed additions to the environmental monitoring programme

Proposed measurement/matrix	Frequency	Remarks
Long-range transport (deposition)	Annually at 3 sites	Programme is suggested to be extended to include HCB and dioxins
Concentrations in marine sediments	Every 5–10 years	Programme is suggested to be undertaken regularly
Concentrations in human blood	Every 3 years	Programme is suggested to be extended to include dioxins

An expanded programme of environmental monitoring would provide a better basis for effectiveness evaluation of measures to achieve the objective of the Stockholm Convention. The most important additions are listed in table 3.3.16-I.

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 framework directives on air, water and habitats.

Costs

Measurements of dioxins, PCBs and hexachlorobenzene are often undertaken as part of larger studies. It is therefore difficult to isolate this particular component and state the cost of a corresponding programme for dioxins alone.

To implement the proposed additions in full, the existing environmental monitoring programme must first of all be able to continue on its present scale, with funding that is adjusted in line with future increases in costs. The costs of the various additions are listed in table 3.3.16-II.

Table 3.3.16-II: Costs of proposed additions within the national environmental monitoring programme

Proposed additions	**Costs (SEK)**
Long-range transport (deposition)	100 000
Concentrations in marine sediments	40 000
Concentrations in human blood	200 000
Extension of current monitoring programme	100 000 – 200 000
Total	**440 000 – 540 000**

3.3.17 Activity: Technical and financial assistance (articles 12 and 13)

In June 2005 the Swedish Chemicals Inspectorate signed an agreement with the Swedish International Development Agency (Sida) to provide support to Sida in development cooperation in the chemicals area. The agreement covers the period June 2005 to December 2006 and is intended to be replaced during spring 2006 by a long-term agreement covering 2006–2009. Under the agreement, KemI would develop and participate in global, regional and, as appropriate, bilateral activities aimed at facilitating the implementation of the Stockholm Convention, the Rotterdam and Basel Conventions and the Strategic Approach to International Chemicals Management (SAICM). The present regional focus is on South-East Asia, Southern Africa and the Balkans. The Swedish Chemicals Inspectorate will also support Sida in developing international training programmes in chemicals management and in developing its research programme (SAREC) in the chemicals area.

The Swedish Environmental Protection Agency participates in environmental projects within the framework of Swedish development support to other countries. EPA projects form part of Sweden's international development cooperation, which is in turn part of overall Swedish policy to promote equitable and sustainable global development.

All Swedish Environmental Protection Agency cooperation projects are based on the wishes of the countries involved. The work undertaken has a particular focus on supporting countries in their efforts to develop national environmental legislation, organise their environmental activities in efficient government agencies, and comply with and implement international environmental agreements. The Swedish EPA has long experience in these fields, from its cooperation with countries in eastern and central Europe. Cooperation on the protection and use of water resources in transboundary lakes and watercourses is a key issue. Other key issues for the Swedish EPA are nature conservation, chemicals, and the setting and implementation of environmental standards for heavy industry.

Russia, Belarus, Vietnam, China and Ukraine are the main partner countries. Contacts are also being developed with countries in the western Balkans. Cooperation projects on transboundary waters in the eastern parts of the Baltic Sea region will continue.

However, direct development cooperation with the new EU member states Estonia, Latvia, Lithuania and Poland is being phased out and will be replaced by cooperation between EU members.

Sweden is a lead country in a multilateral cooperative project, 'Reduction/Elimination of Emissions of Dioxins and Furans in the Russian Federation with focus on the Arctic and northern regions impacting the Arctic', aimed at realising a programme to identify and quantify emissions of dioxins and furans, for the purpose of reducing the development and environmental emission of these pollutants.

The project was initiated in the framework of the Arctic Council Action Plan (ACAP) per Centre for International Projects of the Russian Federation at the turn of the 2003 and in 2004. The project's steering group consists of Sweden (lead country), Norway, Russia, the USA and AMAP. The project consists of three phases, the first of which was completed in August 2005. The second phase is now in progress. The third is planned to start late 2006/early 2007.

Different categories of sources have been assessed in the following three regions: Murmansk oblast, Arkhangelsk oblast and the Republic of Komi. In total emissions of dioxins for the three regions, the incineration of municipal solid waste occupies the first place in importance (24.8%), combustion in industry second place (20.4%).

For further information, a report on phase I is available: 'Assessment of some major sources of dioxins/furans in Arkhangelsk and Murmansk regions and the Republic of Komi'.

3.4 Development and capacity- building proposals and priorities

No specific capacity-building proposals are foreseen.

3.5 Timetable for plan implementation and measures of success

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

The main implementation activities for Sweden relate to releases of unintentionally produced POPs (Annex C substances). The related activities and timetable are shown in Annex IV.

3.6 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) (Ministry of Industry)	Supervision in connection with permits given under the Ordinance on Pesticides by the National Board of Occupational Safety and Health
Medical Products Agency (Ministry of Health and Social welfare)	Manufacturers and other primary suppliers of cosmetics and hygiene products.
National Board of Health and Welfare (Ministry of Health and Social Affairs)	Certain decisions concerning pesticides
National Chemicals Inspectorate (Ministry of Environment)	Manufacturers and other primary suppliers of chemical products and bio-technical organisms available. (Exceptions: cosmetics and hygiene products, materials and products intended to come in contact with foods, nipples, motor fuels, substances affecting the ozone layer, and batteries)
National Food Administration (Ministry of Agriculture)	Material and products intended for contact with food, and nipples
National Police Board	Transport of waste

Surgeon General	Issues concerning health and environmental protection within the Swedish Armed Forces
Swedish Board of Agriculture (Ministry of Agriculture, Food and Consumer Affairs)	Feedstuff
Swedish Board of Fisheries (Ministry of Agriculture, Food and Consumer Affairs)	Fishery
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	Supervision of shipments of waste within , into and out of the European Union in accordance with Council Regulation (EEC) No. 259/93
Swedish Forest Agency (Ministry of Industry, Employment and Communications)	Forestry Protection of natural habitats
Swedish Maritime Administration (Ministry of Industry)	Use at sea of substances which affect the ozone layer

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 – chemical and bio-technical product
National Chemicals Inspectorate	– chemical and bio-technical products, pesticides, biocides
Swedish Environmental Protection Agency	– activities hazardous to the environment and human health – polluted sites – waste
Swedish Work Environment Authority	-Certain issues concerning pesticides and biocides
Swedish Rescue Services 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 Inspectorate 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 Inspectorate
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 Inspectorate
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 Administration
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/	National Chemicals Inspectorate
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 Swedish Chemicals Inspectorate

Baltic Marine Environment Protection Commission/ Helsinki Commission (HELCOM); www.helcom.fi	Swedish Environmental Protection Agency
OSPAR - Commission for the Protection of the Marine Environment of the North-East Atlantic / Oslo-Paris Convention; http://www.ospar.org	Swedish Environmental Protection Agency
Global Environmental Information Exchange Network / International Environmental 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 Inspectorate
OECD/UNEP Chemical Accident Prevention, Preparedness and Emergency Response; http://www.oecd.org/	Swedish Rescue Services Agency; Swedish Poisons Information Centre
UNITAR Informal Capacity Building Network; http://www.unitar.org/	The National Chemicals Inspectorate
United Nations Recommendations on the Transport of Dangerous Goods; http://www.unece.org/trans/main/dgdb/dgcomm/ac10age.html	Swedish Rescue Services 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

Examples of stakeholder activities

Swedish National Food Administration

Persistent organic pollutants (POPs) in breast milk from primiparous women in Uppsala, Sweden, 2004.
http://www.naturvardsverket.se/dokument/mo/modok/export/uppsala_brostmjolk.pdf

Regional differences in levels of persistent organic pollutants in breast milk from primiparous women in Uppsala, Göteborg, Lund and Lycksele (Sweden).
http://www.naturvardsverket.se/dokument/mo/modok/export/regional%20trend.pdf

Serum concentrations of pentachlorophenol (PCP), polychlorinated biphenyls (PCBs), and hydroxylated metabolites of PCB during pregnancy and lactation.
http://www.naturvardsverket.se/dokument/mo/modok/export/klorfenoler.pdf

Polychlorinated biphenyls and chlorinated pesticides/metabolites in breast milk from primiparous women in Uppsala County, Sweden – levels and trends 1996-2003.
http://www.naturvardsverket.se/dokument/mo/modok/export/brostmjolk_trend.pdf

Persistent organic pollutants in breast milk from primiparous women in Uppsala County, Sweden, 2002-2003.
http://www.naturvardsverket.se/dokument/mo/modok/export/brostmjolk_uppsala.pdf

Synthetic musk compounds in breast milk from primiparous women in Uppsala County, Sweden, 1996-2003.
http://www.naturvardsverket.se/dokument/mo/modok/export/mysk_brostmjolk.pdf

Contacts at the National Food Administration: Per Ola Darnerud and Sanna Lignell.

Swedish Association of Waste Management (RVF)

Projects in progress

Revision of RVF's criteria for the assessment of contaminated soils (RVF report 2002:09). This project is expected to be completed in October 2006.
Contact: Jessica Christiansen, RVF.

Planned projects

Update of RVF's study on the dioxin content of ash and slag from waste incineration (RVF report 2001:14).
Contact: Åsa Lindskog, RVF.

Fire in stored waste – fire prevention measures, fire fighting, limitation of effects on the environment.
Contact: Thomas Rihm, RVF.

Swedish National Testing and Research Institute (SP)

Characterisation of persistent organic pollutants formed during combustion processes – an approach to understanding, controlling and minimising toxic emissions

The quantities of persistent organic pollutants (POPs) and volatile organic compounds (VOCs) released into the atmosphere have been significantly reduced by the efficient air pollution control systems used during waste combustion, but virtually the same amounts are emitted to the environment adsorbed to ash and slag products. The aim of this research project is to understand the mechanisms by which POPs and VOCs form during combustion processes and thus to provide process optimisation strategies to reduce the total formation of POPs and VOCs. A unique, specially designed micro-scale reactor (MSR) fed with a split stream of flue gas generated from a 5 kW solid fuel fluidised bed reactor will be employed. The project will be divided into three phases: an analytical characterisation of POPs and VOCs formed; a characterisation of how different combustion parameters affect the mechanisms of POP and VOC formation; and a third phase that will focus on the mechanisms of POP and VOC formation from different fuels such as biomass and waste from various recycling fractions. This configuration offers a unique way of studying in depth the formation mechanisms of POPs and VOCs, all conducted in a typical combustion application environment. A research project of this kind has not previously been undertaken, owing to limitations in experimental and analytical set-ups. The goal is to provide society with important fundamental results that will facilitate clean energy production from MSW combustion.

Contacts: Per Liljelind 090-786 93 21 (per.liljelind@chem.umu.se), Jerker Fick 090-786 93 24 (jerker.fick@chem.umu.se)

The project is funded by the Swedish Research Council.

Swedish Steel Industry

In a project in the Swedish steel industry, levels of dioxins, PCBs and other substances in both flue gases and solid wastes were measured at all steelworks in the course of 2005. The results are to be collated and analysed during 2006.

ANNEX IV

Examples of activities in progress and identified as needed to reduce and eliminate formation and releases of unintentionally produced POPs in Sweden. Before taking further actions on activities identified as needed, clear priorities must be set and cost-benefit analyses performed.

Table 1: Examples of actions in progress and identified as needed to identify sources and determine the scale of releases of unintentionally produced POPs.

All sources **Objective: Sources of unintentionally produced POPs identified and scale of releases determined by 2010**			
Activities that will contribute to achieving the objective	**Responsible party**	**Time frame**	**Status**
Compile and assess available data to determine the scale of contributions from identified sources	Swedish EPA	2010; Continuous	
Reduce analysis and sampling costs, e.g. indicator substances, through research and methods development			Need identified
Develop cost-effective analysis methods for dioxins and dioxin-like PCBs through research and methods development	Umeå University		In progress

Table 2: Examples of actions in progress and identified as needed to identify sources and determine the scale of releases of unintentionally produced POPs from secondary and diffuse sources.

Secondary and diffuse sources

Objective: Sources of unintentionally produced POPs identified and scale of releases determined by 2010

Activities that will contribute to achieving the objective		**Responsible party**	**Time frame**	**Status**
a) Contaminated sites and sediments				
1. Identification	• Identification of sites where risk activities has been or are undertaken	Swedish EPA and operator	2005	Completed
	• Phase 1: Preliminary inventory according to MIFO - identification of relevant sites for assessment - data collection from maps and archives - on-site inspections and interviews	(Majority of government-funded work is carried out by county administrative boards)	2010	In progress
	• Phase 2: Preliminary site investigation according to MIFO - on-site inspection - sampling and quantification of pollutants			In progress
2. Determine the scale of releases	Under development. See also 'Improve knowledge on POPs in the Baltic Sea'			Need identified
b) Landfills	Investigate risks of leaching, quantities released and possible exposure pathways			Need identified
c) Atmospheric deposition	Research and assessment to determine load			Need identified
	Partly covered in 'POPs in the Baltic Sea', see table 4			In progress

d)	Sewage sludge	Self-monitoring to determine quantities and possible releases	Operator		
e)	Small-scale household combustion	Determine releases through research and assessment of available data			Need identified
f)	Backyard burning	Research to quantify emissions of unintentionally produced POPs			Need identified
g)	Natural and accidental fires	Research, compilation and assessment of available data			Need identified
h)	Products	Asses possibility to identify pentachlorophenol-treated timber in society	Swedish EPA	2006	Need identified

Table 3: Examples of actions in progress and identified as needed to quantify releases of unintentionally produced POPs from primary sources in Sweden.

Primary sources **Objective: Releases of unintentionally produced POPs to air, water, waste and products quantified by 2010**			
Activities that will contribute to achieving the objective	**Responsible party**	**Time frame**	**Status**
Improve sampling and analysis methods for on-line measurements through research and development			Need identified
Emphasise the need for measurement data in conjunction with operational changes and licensing	Supervisory authority	Continuous	Need identified
Improve operator self-monitoring by: • providing guidance documents	Operator and relevant trade association	Continuous	Need identified
• increased supervision and improved guidance for supervisors	Local authority		Need identified
a) Pulp and paper industry Self-monitoring	Operator		Continuous
Project: Measurements of dioxins in incoming water and releases to air, water, waste. Results will probably be available during 2006	Swedish Forest Industries Federation and SSVL	2006	In progress

b)	Steel industry	Self-monitoring	Operator	Continuous	In progress
		Project: Measurements of dioxins, PCBs etc. at all Swedish steelworks	The Swedish Steel Producers Association and operators	2006	In progress
		Project: At the Rönnskär smelter plant dioxin measurements will be carried out on waste containing less than 0.1% mercury	Operator	2006	In progress
c)	Chemical industry	Self-monitoring	Operator	Continuous	In progress
d)	Waste incineration	Self-monitoring	Operator	Continuous	In progress
		Project: Revision of study of dioxin content of fly and bottom ashes from waste incineration (RVF report 2001:14)	Swedish Association of Waste Management (RVF)		Planned
e)	Large-scale combustion of biofuels	Self-monitoring	Operator	Continuous	In progress

Table 4: Examples of actions in progress and identified as needed to improve knowledge on the formation, release, dispersion, cycling and exposure pathways of unintentionally produced POPs in Sweden.

Objective: Improve knowledge on formation, release, dispersion, cycling and exposure pathways of unintentionally produced POPs by 2010			
Activities that will contribute to achieving the objective	**Responsible party**	**Time frame**	**Status**
Research on formation of unintentionally produced POPs in all thermal processes, including small-scale combustion			Need identified
Project: Characterisation of persistent organic pollutants formed during combustion processes – an approach to understanding, controlling and minimising toxic emissions	Umeå University, Swedish National Testing and Research Institute (SP) and Swedish Energy Agency		In progress
Pulp and paper industry Project: Study of unintentional formation of dioxins in the production of chlorine dioxide for bleaching of pulp. Results probably available during 2006.	EKA Chemicals	2006	In progress
POPs in the Baltic Sea			In progress
1. Identify the origin of POPs present in the Baltic through a programme for environmental monitoring of POPs in the Baltic environment	Swedish EPA	End of 2007	
2. Investigate the quantities of POPs in major compartments, in part based on the improved programme for environmental monitoring of POPs	Swedish EPA	End of 2007	
3. Improve knowledge on current loads, cycles and sinks of POPs in the Baltic, including its coastal areas, through investigation of the absolute or relative importance of different sources (primary and secondary) and transfer routes, such as the role of atmospheric deposition	Swedish EPA	End of 2007	

Table 5: Examples of actions in progress and identified as needed to reduce releases of unintentionally produced POPs in Sweden.

Objective: Implement measures to reduce releases of unintentionally produced POPs			
Activities that will contribute to achieving the objective	**Responsible party**	**Time frame**	**Status**
Identify relevant measures through evaluation and assessment in dialogue with concerned parties	Swedish EPA, other authorities and operators	2008	In progress
Remediate contaminated sites	Swedish EPA or operator	2050	In progress
Revise criteria for assessment of contaminated soils (RVF report 2002:09)	Swedish Association of Waste Management (RVF)	2006	In progress
Inform households, via Swedish Consumer Agency's website, about environment-friendly use of wood fuel	Swedish Consumer Agency		In progress
Inform the public about what should and should not be burnt in small wood-fired boilers and in open fires in gardens	Swedish EPA, Swedish Consumer Agency, local authorities		Need identified
Reduce emissions from fires in stored waste Project: Fire in stored waste – fire prevention measures, fire fighting, limitation of effects on the environment	Swedish Association of Waste Management (RVF)		Planned
Reduce releases from primary and secondary sources (including atmospheric deposition) globally by pursuing issues in the EU, under international conventions and in other international contexts	All stakeholders	Continuous	In progress
Reduce emissions from recycled waste by regulating the use of waste for construction purposes	Swedish EPA	2007	In progress
Reduce emissions from recycled waste by establishing limit values for EU	European Commission		In progress

Develop technical solutions to avoid formation of POPs	Operator	Continuous	In progress
Encourage replacement of small outdated wood-fired boilers with environmentally improved ones	Swedish EPA		Proposed

Table 6: Examples of actions in progress and identified as needed to evaluate the effectiveness of measures to reduce and eliminate releases of unintentionally produced POPs in Sweden.

Objective: Effectiveness evaluation of measures to reduce formation and release of unintentionally produced POPs			
Activities that will contribute to achieving the objective	**Responsible party**	**Time frame**	**Status**
Monitor levels in the environment through regular measurements in sediments, fish, mussels, guillemot eggs, human breast milk, human blood, sewage sludge, air and deposition	Swedish EPA	Continuous	In progress
Strengthen environmental monitoring, see section 3.3.16	Swedish EPA		Need identified
Extend coordination of regional and local monitoring; develop uniform methods and guidance for monitoring, create databases	Swedish EPA and local authorities		Need identified

ANNEX V

Abbreviations and explanations

Aldrin*	1,4:5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro-, (1.alpha.,4.alpha.,4a.beta.,5.alpha.,8.alpha.,8a.beta.)-
AOX	adsorbable organic halogens
Chlordecone	1,1a,3,3a,4,5,5,5a,5b,6-decachloro-octahydro-1,3,4-metheno-2H-cyclobuta[cd]pentalen-2-one
Chlordane*	4,7-Methano-1H-indene, 1,2,4,5,6,7,8,8-octachloro-2,3,3a,4,7,7a-hexahydro-
DDD	1,1-dichloro-2,2-bis(*p*-chlorophenyl)ethane, metabolite of DDT
DDE	1,1-dichloro-2,2-bis(*p*-chlorophenyl)ethylene, metabolite of DDT
DDT*	(1,1,1-trichloro-2,2-bis(4-chlorophenyl) ethane
Dieldrin*	2,7:3,6-Dimethanonaphth[2,3-b]oxirene, 3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-, (1a.alpha.,2.beta.,2a.alpha.,3.beta.,6.beta.,6a.alpha.,7.beta.,7a.alpha.)-
Endrin*	2,7:3,6-Dimethanonaphth[2,3-b]oxirene, 3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-, (1a.alpha.,2.beta.,2a.beta.,3.alpha.,6.alpha.,6a.beta.,7.beta.,7a.alpha.)-
Dioxins* PCDD/F	Polychlorinated dibenzo-p-dioxins and dibenzofurans
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.
Endrin*	2,7:3,6-Dimethanonaphth[2,3-b]oxirene, 3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-, (1a.alpha.,2.beta.,2a.beta.,3.alpha.,6.alpha.,6a.beta.,7.beta.,7a.alpha.)-
FSC	The Forest Stewardship Council, an international network to promote responsible management of the world's forests
HBB	Hexabromobiphenyl
HCB*	Hexachlorobenzene
HCH	Hexachlorocyclohexane
HELCOM	Baltic Marine Environment Protection Commission/ Helsinki Commission
IFCS/UNEP	Intergovernmental Forum on Chemical Safety under United Nations Environment Programme

ISO	International Organisation for Standardisation
KemI	Swedish Chemicals Inspectorate
Lindane	γ-1,2,3,4,5,6- hexaclorocyclohexane
(C)LRTAP	Convention on Long-Range Transboundary Air Pollution
Mirex*	1,3,4-Metheno-1H-cyclobuta[cd]pentalene, 1,1a,2,2,3,3a,4,5,5,5a,5b,6-dodecachlorooctahydro-
ML	Maximum level for a pollutant in food
NFA	National Food Administration
OSPAR	Commission for the Protection of the Marine Environment of the North-East Atlantic / Oslo-Paris Convention
PAH**	Polyaromatic Hydrocarbons
PBDE	Polybrominated diphenyl ethers
PBT	Persistent, Bio-accumulating and Toxic substances
PCB	Polychlorinated Biphenyls
PCP	Pentachlorophenol
PCT	Polychlorinated Terphenyls
PEFC	Programme for the Endorsement of Forest Certification schemes, an independent, non-profit, non-governmental organisation which promotes sustainably managed forests through independent third party certification
PFOS	Perfluorooctane sulfonate
PM10/PM2.5	Particulate Matter 10 and 2.5 microns or less respectively in diameter
PMK	Programme for Monitoring of Environmental Quality
POPs	Persistent Organic Pollutants
RASFF	Rapid Alert System for Food and Feed in the European Union
EU-SCF	The Scientific Committee on Food of the European Union
Swedish EPA	Swedish Environment Protection Agency
Toxaphene*	Chlorinated camphene, a manufactured insecticide containing over 670 chemical compounds

*Substance covered by the Stockholm Convention
** Substance covered by the Protocol on Persistent Organic Pollutants to the LRTAP Convention

ANNEX VI

Project Stakeholder Group and Swedish POPs network

Contact points for the Swedish POPs network:

Maria Nyholm
Swedish Environmental Protection Agency
Implementation and Enforcement Department
Office: Blekholmsterassen 36
Postal address: 106 48 Stockholm, Sweden
Phone: +46 8 698 16 95
Fax: +46 8 698 13 45
E-mail: maria.nyholm@naturvardsverket.se
Home page: www.naturvardsverket.se

Bo Wahlström
Swedish Chemicals Inspectorate
Office: Esplanaden 3A
Postal Address: P.O Box 2
SE-172 13 Sundbyberg, Sweden
Phone: +46 8 5194 1260
Fax: +46 8 735 7698
E-mail: bo.wahlstrom@kemi.se
Home page: www.kemi.se

Participants in the project stakeholder group and POPs network:

Björn Albinsson, Swedish Rescue Services Agency

Eva Brorström Lundén, IVL- Swedish Environmental Research Institute Ltd

Stellan Marklund, Umeå University, Department of Environmental Chemistry

Per Ola Darnerud, National Food Administration

Birgitta Lindblad, Jernkontoret- The Swedish Steel Producers Association

Åke Bergman, Stockholm University, Department of Environmental Chemistry

Dag Broman, Stockholm University, Department of Applied Environmental Sciences

Anders Norrman, The Plastics and Chemicals Federation

Jessic Christiansen, RVF-The Swedish Association of Waste Management

Christina Molde Wiklund, Swedish Forest Industries Federation

Eva Lena Wikström, SP- Swedish National Testing and Research Institute

Mariannne Walding, Swedish Work Environment Authority

Jolanta Green, Länsstyrelsen i Skåne län

Gudrun Bremle, Länsstyrelsen i Jönköpings län

Lena Åkerblom, Länsstyrelsen i Värmlands län

Ingemar Cato, Geological Survey of Sweden

Johan Jareman, Swedish Consumer Agency

Kerstin Blom Bokliden, The Swedish Association of Local Authorities and Regions (SALAR)

Karl Krook, Friends of the Earth, Sweden

Rodolfa Magne, Swedish Association for Nature Conservation

Lars Reuthergård, Swedish Association for Nature Conservation

Mia Jameson, The Swedish Recycling Industries' Association

Kristina Einarsson, The National Board of Housing, Building and Planning

Maja-Lena Brännvall, Länsstyrelsen I Gävleborgs län

Per Rosander, The International Chemical Secretariat

Katarina Jacobson, Swedish Energy Agency

Peter Nayström, Swedish Foundry Association

Cynthia de Wit, Stockholm University, Department of Applied Environmental Sciences

Thomas Levander, Swedish Energy Agency

ANNEX VII

References

Legislation:

The references refer to the original statute the amendments should be observed. When translations of Swedish statutes are referred to they are not officially valid only the Swedish text is binding. References to EC directives implies that the directive is mentioned in the text. The notation (1998:808) refers to the Swedish Code of Statutes. KIFS refers to the Swedish Chemicals Inspectorate statute-book and SNF to the Swedish EPA statute-book.

Swedish legislation

Environmental Code (1998:808) http://www.sweden.gov.se/sb/d/574/a/20549

Plant Protection Ordinance (1953:589)

Ordinance on Pesticides (1962:702)

Food Act (1971:511)

Food Ordinance (1971:807)

Act on Products Hazardous to Health and the Environment (1973:329)

Ordinance on Products Hazardous to Health and the Environment (1973:334)

Work Environment Act (1977:1160)

Work Environment Ordinance (1977:1166)

Secrecy Act (1980:100)

Act on Transportation of Dangerous Goods (1982:821).

Ordinance on Transportation of Dangerous Goods (1982:923)

Ordinance on PCBs (1985:837)

Act on Feeding-stuffs (1985:295)

Act on Flammable and Explosive Products (1988:868)

Ordinance on Flammable and Explosive Products (1988:1145)

Act on Medicinal Products (1992:859)

Ordinance on Medicinal Products (1992:1752)

Ordinance on Waste oil (1993:1268)

Ordinance on Producer Responsibility for Cars (1997:789)

Ordinance on Chemical Products and Biotechnical Organisms (1998:941)

Ordinance on the Disposal of PCBs (1998:122)

Ordinance on Environmentally Hazardous Activities and Health Protection (1998:899)

Ordinance on Biocidal Products (2000:338)

Ordinance on Producer Responsibility for Filament Bulbs and Certain Luminaries for Fluorescent Lamps (2000:208)

Ordinance on Environmental Quality Standards for Ambient Air (2001:527)

Ordinance on Environmental Quality Standards for Fish and Bivalve Waters (2001:554)
Ordinance on Waste (2001:1063)

Ordinance on Waste Incineration (2002:1060)

Act on Civil protection (2003:778). Ordinance of Civil protection (2003:789)

Ordinance on Environmental Quality Standards for Noise (2004:675)

Ordinance on Public Administration of the Aquatic Environment (2004:660)

Ordinance on Producer Responsibility for Electrical and Electronic Equipment (2005:209)

Swedish regulations

The Swedish Chemicals Inspectorate Regulations on Chemical Products and Biotechnical Organisms (KIFS 1998:8, last amended by KIFS 2006:1)

The Swedish EPA Regulation on Waste Incineration (NFS 2002:28)

Act on Civil protection (2003:778)
Ordinance of Civil protection (2003:789)

The Swedish EPA Regulation on Land Filling, Criteria and Procedures for the Reception of Waste at Landfill Facilities (NFS 2004:10)

The Swedish Environmental Protection Agency's Regulations on Professional Pre-treatment of Waste Electrical and Electronic Products (NFS 2005:10)

EU legislation

Council Directive 67/548 on the approximation of laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances

The common notification system of the Union under the Directive 67/548/EEC (latest amendment 92/32/EEC) and Existing Substances Programme according to EU Regulation 793/93 of the European Union.

The Waste Incineration Directive (WID) (EC/2000/76)

Directive 96/82/EC (Seveso II Directive) to reduce the effects on man and environment from large scale chemical accidents

Commission Directive 88/379 on the approximation of the laws, regulations and administrative provisions of the Member States relating to the classification, packaging and labelling of dangerous preparations, and its subsequent amendments

Council Directive 91/414/EEC of 15 July 1991 concerning the placing of plant protection products on the market

Directive 98/8/EC of the European Parliament and of the Council of 16 February 1998 concerning the placing of biocidal products on the market

Directive 2000/53/EC of the European Parliament and of the Council of 18 September 2000 on end-of life

Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy, the Water Framework Directive

Commission Regulation (EC) No. 466/2001 of 8 March 2001 sets maximum levels for certain contaminants in foodstuffs

Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)

Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003 on waste electrical and electronic equipment (WEEE)

The criteria for the acceptance of waste at landfills (Council Decision 2003/33/EC)

EC Regulation No 304/2003 concerning the export and import of dangerous chemicals

Regulation (EC) No 850/2004 of the European Parliament and of the Council of 29 April 2004 on Persistent Organic Pollutants and amending Directive 79/117/EEC.

Regulation (EC) No 396/2005 of the European Parliament and of the Council of 23 February 2005 on Maximum Residue Levels Of Pesticides In Or On Food And Feed Of Plant And Animal Origin and amending Council Directive 91/414/EEC

Reports

Bignert, A., Odsjö, T. och Olsson, M., 1990. *Monitoring of organic pollutants in biota.* Report to the National Monitoring Programme 1989. Report 3805, Swedish Environmental Protection Agency.

Inventory of unintentionally produced substances: PCDD/F, PCB and HCB. 2005. Report to the Swedish EPA, Contract 505 0302. Dnr 235-6086-03Me.

Survey of sources of unintentionally produced substances, 2000. Report 5503, Swedish Environmental Protection Agency.

de Wit, C., & Strandell, M., 2000. *Levels, Sources and Trends of Dioxins and Dioxin-like Substances in the Swedish Environment – The Swedish Dioxin Survey*, Vol 1, Report 5047, Swedish Environmental Protection Agency.

WWF, 2005. *Generations X*, http://detox.panda.org/

ANNEX VIII

Contact addresses:

Swedish Chemicals Inspectorate (KemI)
P.O. Box 2
SE-172 13 Sundbyberg, Sweden
Phone: +46 8 519 411 00
Fax: +46 8 735 7698
E-mail: kemi@kemi.se
Website: www.kemi.se

Swedish Environmental
Protection Agency
(Naturvårdsverket)
SE-106 48 Stockholm, Sweden
Blekholmsterrassen 36
Phone +46 8 698 10 00
Fax +46 8 20 29 25
E-mail natur@naturvardsverket.se
Website: www.naturvardsverket.se

KEMI
KEMIKALIEINSPEKTIONEN

SWEDISH CHEMICALS INSPECTORATE • P.O. Box 2 • 172 13 SUNDBYBERG
PHONE +46 8 519 41 100 • FAX +46 8 735 76 98 • www.kemi.se • e-mail kemi@kemi.se