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ENABLING ACTIVITIES TO FACILITATE EARLY ACTION ON THE IMPLEMENTATION OF THE STOCKHOLM CONVENTION ON PERSISTENT ORGANIC POLLUTANTS (POPs)

POLAND

NATIONAL IMPLEMENTATION PLAN FOR THE STOCKHOLM CONVENTION

Warsaw 2004

The Minister of the Environment endorsed the National Implementation Plan for the Stockholm Convention, which was prepared under the UNIDO Contract within the framework of the Project entitled "*Enabling activities to facilitate early action on the implementation of the Stockholm Convention on Persistent Organic Pollutants (POPs)*", funded by the Global Environment Facility (GEF).

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EXECUTIVE SUMMARY

The National Implementation Plan for the Stockholm Convention (NIP) has been prepared under Project No. GF/POL/01/004 entitled: "*Enabling activities to facilitate early action on the implementation of the Stockholm Convention on Persistent Organic Pollutants (POPs*)", hereinafter referred to as 'the GEF Project' or 'the Project', and executed under Contract No. 2001/369 concluded between the United Nations Industrial Development Organization (UNIDO) and the Institute of Environmental Protection (IOŚ). The Global Environment Facility (GEF), acting as the Stockholm Convention financial mechanism, funded the whole Project.

The provisions of the Convention cover the following substances classified as particularly persistent organic compounds: aldrin, chlordane, dieldrin, endrin, heptachlor, hexachlorobenzene, mirex, toxaphene, PCBs, DDT, PCDDs and PCDFs. Persistent organic pollutants (POPs) are very toxic, highly soluble in fats and they undergo bioconcentration and biomagnification. POPs may have an adverse impact on human health even in very small concentrations by disrupting biological functions, hormone activity and other information transmitters. Consequently, this may lead to: undesirable reproductive effects, malfunction of different body organs (e.g. thyroid), development of tumours and inborn defects, immunity decrease of living organisms and developmental disorders in children. Therefore, POPs pose a major threat to the future generations. For this reason it is very important and worthy to undertake steps to preserve the prohibition for their use and placing on the market, to provide safe treatment of their stockpiles and wastes, to reduce their emissions/releases from unintentional production and ensure environmental monitoring and control.

The NIP includes a list of activities presenting the means by which POPs problems can be solved in Poland in an integrated manner, as well as an estimation of costs for the necessary action to be taken. This will provide decision makers with further information required to start the ratification process for the Stockholm Convention, which entered into force on 17 May 2004, and to implement its provisions. The main task of the NIP is to define activities drawn from the goals of the "National Strategy for Environmental Protection against Persistent Organic Pollutants", which focuses on two issues:

- Reduction of quantities of POPs present in the environment, followed by their elimination, and
- Minimisation of impacts of those substances on human health through reduction of their presence in food.

The NIP, which has been elaborated in line with the *"Interim Guidance for Developing a National Implementation Plan for the Stockholm Convention"* prepared and revised in December 2003 by UNEP and the World Bank, consists of two parts: an assessment of the current situation regarding POPs in Poland and action plans to fulfil the obligations of the Convention. The Plan has been prepared as of 31 December 2003. Only Chapter 2 with Poland's baseline and the Polish profile, providing background information relevant to POPs, has been generally based on data of the year 2000. It has been assumed that the year 2000 will be considered as reference year to demonstrate progress in the implementation of the provisions of the Stockholm Convention in Poland.

Country baseline

This part of the NIP presents general information on Poland with particular emphasis on environmental aspects, especially POPs-related issues including, *inter alia*, an inventory of hazards caused by the use (at present and in the past) of hazardous substances, subject to the Stockholm Convention, and assessment of the national infrastructure and its capability for implementing the provisions of the Convention.

Analyses of the gathered information indicate that among the substances covered by the Stockholm Convention, only DDT, dieldrin, hexachlorobenzene and toxaphene were used for production of pesticide preparations in Poland. Whereas, in agriculture, apart from the above mentioned substances, also aldrin, endrin and heptachlor preparations were used. Among all these preparations, DDT and toxaphene were produced in Poland while the others were imported. Preparations containing substances listed in Annexes A and B of the Stockholm Convention are currently neither manufactured or used in our country nor imported or exported. For the last over 25 years only substances and preparations that do not contain POPs have been used for the production of pesticides.

Despite the fact that chloroorganic pesticides have not been used in Poland, generally since the mid 70s of the XXth century, they are still, with the exception of mirex, detected in river waters, bottom sediments and in living organisms. Their concentrations in water are lower compared to concentrations in the dry matter of bottom sediments, and in the latter – lower than in the fish fat tissue. This clearly indicates that the process of accumulation of these substances primarily takes place in aquatic organisms and successively in bottom sediments. Studies on POPs concentrations were carried out at the delta parts of the major Polish rivers and the Włocławski Reservoir.

Obsolete plant protection products deposited in pesticide landfills scattered all over the country constitute the most serious environmental hazard caused by persistent organic pollutants in Poland. According to estimates the entire quantity of POPs wastes deposited in pesticide landfills is contaminated to such a level that they must be treated as hazardous waste containing chlorinated organic substances. Therefore, all these pesticide landfills need to be eliminated. In the vicinity of some obsolete pesticide landfills contamination of the environment caused by releases of hazardous substances, including POPs was observed. Elimination of obsolete pesticide landfills in Poland is carried out gradually. The likely number of obsolete pesticide landfills awaiting elimination in Poland is 166, and the estimated quantities of waste deposited there are approximately 5000 Mg (with possible underestimation by app. 50%).

Identification and quantitative assessment of POPs deposits on landfills owned by chemical plants is not possible due to lack of reliable information on the levels of substances controlled by the Stockholm Convention (because of unselective waste depositing in the past, lack of waste documentation and differentiated remediation of landfill sites).

Polychlorinated biphenyls (PCBs) have been produced in Poland only in small quantities. There was, however, considerable import of PCB-containing electrical equipment and oil used in this equipment. The first PCBs inventory was carried out in 2002 identifying the actual stocks of equipment and oils containing this group of substances. According to it 3000 Mg of oil is contaminated with PCBs and the total quantity of equipment contaminated with PCBs amounts to around 1400 Mg of capacitors and over 5600 Mg of transformers. At the same time the capabilities for PCB treatment and PCB-containing equipment decontamination are being developed in Poland. However, their utilization requires

mechanisms (e.g. assistance funds) stimulating enterprises to speed up the treatment process of PCBs and PCB-contaminated equipment. Analysis results proved that the decontamination costs in Poland are lower than abroad and that the existing domestic capacities would enable successful completion of the decontamination process, in line with the obligations of the Act – Environmental Protection Law, by 2010. Therefore, export of PCB-contaminated equipment for its decontamination will consequently be gradually reduced.

The Polish industry, including the chemical and metallurgy sector, is undergoing restructuring of production, which has a parallel impact on the reduction of unintentional releases of PCDDs/PCDFs, PCBs and HCB.

On the basis of emission and release estimations, carried out under the GEF Project, for PCBs, PCDDs/PCDFs and HCB the following levels have been obtained for the year 2000:

- For emissions into the air: PCBs – 2320.36 kg, HCB – 8.57 kg, PCDDs/PCDFs – 505.28 g TEQ,
- For dioxin and furan releases into the soil – 4.96 g TEQ, into water bodies – 1.22 g TEQ, into wastes/residues – 341.3 TEQ g, and into products – 10.78 g TEQ.

Some PCB congeners are not detectable in water, but they appear in bottom sediments and in fish tissue. In the bottom sediments of the Włocławski Reservoir the majority of PCB congeners, dioxins and furans, regarded by WHO as the most toxic, including 2,3,7,8-TCDD, were detected. The toxicity level of the analysed sediments was higher than that at the estuary areas of the Oder and the Vistula Rivers.

The review of the available data with regard to PCDD/PCDF, PCB, HCB risk assessment, including health risk, indicates that exposure data is insufficient, limiting the opportunity of performing a complete health risk assessment. Scarce data on dioxin and PCB concentrations in human breast milk demonstrate a high level of exposure of breast-fed babies to these chemical compounds. These data may also indicate that human exposure can be the reason for justified concern about the potential health hazards.

A review of the Polish legislation concerning environmental protection, chemical substances and wastes revealed that the legal system is generally compliant with the Stockholm Convention and requires only a few regulations. Full assessment of the efficiency of law regulating POPs-related issues is currently not possible because the majority of relevant legal acts have not been in force long enough. This is particularly valid for the system of integrated environmental permits and for the law concerning chemical substances and preparations. Legislation already in force (e.g. concerning dioxin determination in exhaust gases from incineration and co-incineration of waste) requires enforcing solutions for its compliance.

Furthermore, the capacity of Polish companies dealing with the elimination of obsolete pesticide landfills, and treatment of pesticide waste by incineration has been evaluated. Preliminary review indicates that technical capacities for POPs treatment using conventional methods are sufficient in Poland but there are no companies present on the Polish market that would have at their disposal POPs treatment technologies alternative to combustion methods.

Also, the roles and responsibilities of central and voivodeship state administration and self-government bodies involved in the implementation of the provisions of the Stockholm Convention were discussed. The existing authorities and institutions have sufficient competences to fulfil the obligations, although in some cases an expansion of the present scope of tasks and responsibilities will be required.

Among the institutional factors, which may slow down the implementation of the Convention, is the shortage of human resources and insufficient qualifications of personnel. The latter refers to the public administration staff and the dramatically growing scope of responsibilities of environmental authorities at all managerial levels. On the other hand, among the factors speeding up the implementation of the Convention are the privatisation processes of the industry facilitating the transfer of best available techniques (BAT) from mother factories in highly industrialized countries to Poland, and the market factors, which through competition on the European market stimulate modernisation processes in Polish enterprises.

The NIP stresses the need for broadening and strengthening of the existing State Environmental Monitoring system by widening measurements, studies and evaluation of all POPs subject to the Stockholm Convention with regard to emissions to air, water and soil. It is also necessary to set the missing standards for permissible contents of dioxins, furans, PCBs and HCB in certain food products and for the emissions from major industrial sources.

It is also necessary to establish a system for monitoring hazards posed by dioxins, furans, PCBs and HCB to human health with regard to risk assessment of such threats and trends of their changes in time and space. The existing capacity of laboratories is sufficient to conduct measurements and analyses regarding POPs. Poland has an appropriate research potential for carrying out studies in line with the provisions of the Convention. Although, lack of appropriate financial support is regarded as the basic problem.

Because of relatively low awareness of the Polish society concerning harmful effects of dioxins/furans and PCBs and about the related problem of uncontrolled burning of waste at households, extensive awareness raising measures for different social groups should be strengthened by, *inter alia*, increasing the role of NGOs in this process. It is also essential to incorporate POPs-related issues into educational programmes and to provide countrywide access to information on persistent organic pollutants.

Strategy and action plan elements of the National Implementation Plan

In principle, the fulfilment of obligations imposed by the Stockholm Convention, does not require any specific actions to be undertaken by Poland other than the ones resulting from the Polish law or the European Union legislation. However, the NIP covers overall activities essential for solving the POPs problem in Poland. Apart from measures directly resulting from the provisions of the Convention the NIP also includes activities that are partly enforced by the “National Environmental Policy” as well as governmental documents, such as: the “National Strategy for Environmental Protection against Persistent Organic Pollutants”, the “National Waste Management Plan” or the “National Strategy for Environmental Education”.

In Poland the Minister of the Environment is responsible for overall issues related to the implementation of the provisions of the Stockholm Convention, including the implementation of the NIP. Thus, he/she will coordinate, at an intergovernmental level, the implementation of the activities set out in the NIP, which are assigned to other ministers and administrative bodies within their competences. To fulfil this task he/she will have at his/her disposal an organizational system consisting of an executive team composed of representatives of the different departments of the Ministry of the Environment and the national secretariat for the Convention (this role has been assigned to the Institute of Environmental Protection).

For practical reasons the NIP covers the period until 2010, which is also determined by, *inter alia*, the obligations regarding POPs resulting from the Polish accession to the European Union. It is assumed that the Plan will be periodically updated, also beyond this time limit.

The implementation strategy of the NIP is directed at:

- Improvement in providing complete and reliable information for decision-makers and the public,
- Providing financial resources for the elimination of the existing obsolete pesticide landfills and decontamination of POPs-containing equipment in use,
- Reduction of unintentional PCDD/PCDF, PCB and HCB releases,
- Effective and integrated monitoring of substances subject to the Convention,
- Up-to-date evaluation of environmental and health effects.

On the basis of prior determined criteria and carried out analyses a list of 10 priorities has been drawn up, which are regarded as most important with a view to the Polish situation with POPs.

The ***long-terms goals*** to be achieved by **2015,** providing full implementation of the Stockholm Convention in Poland include:

- Reduction of PCDD/PCDF, PCB and HCB emissions generated unintentionally in processes of fuel and waste combustion by means of applying best available techniques (BAT), in accordance with the IPPC Directive and other technical solutions adequate for that purpose;
- Identification of contaminated sites and their remediation in an environmentally sound manner and further elimination of obsolete pesticide landfills and stockpiles, which had not been identified earlier, and other wastes and materials with low concentrations of PCBs, as well as decontamination of the remaining PCB-containing equipment;
- Establishment and maintenance of permanent organisational, scientific, technical and legal conditions required to ensure the highest possible level of implementation of the provisions of the Stockholm Convention and effective control of POPs releases into the environment in Poland.

The following ***short-term goals*** to be achieved by **2010**, are among the most important ones:

- Elimination of wastes and stocks of POPs, collected and stored over the years as a result of intentional production, import and use, as well as decontamination of equipment containing PCBs;
- Establishment of an inventory system on POPs emission sources, in accordance with the provisions of the UN ECE Protocol on Pollutant Release and Transfer Registers (PRTRs);
- Development and extension of the monitoring system on POPs circulation in the natural environment and on their impact on food products and human health;
- Performing the necessary scope of feasibility studies required to assess properly the environmental effects of the proposed capital investment projects, including cost/benefit analysis of the:
    - Construction of a decontamination facility for PCB-contaminated equipment,
    - Extension of the incineration capacities for liquid and solid substances containing POPs,
    - Application of alternative technologies for the elimination of POPs in Poland.
- Strengthening educational programmes and public awareness raising regarding POPs-related issues.

The NIP includes 65 actions grouped into 11 activities, strategies and action plans. The ones that are not specific for Poland (e.g. releases from intentional production of POPs) or the ones covered by other groups of activities have been omitted. In these cases information on where to find relevant data has been provided.

Actions listed in the NIP designed to meet the obligations of the Convention cover the legal, institutional and organizational issues connected with the elimination of obsolete pesticide landfills, the identification and control of industrial waste landfills containing POPs, the identification of equipment and installations containing POPs intended for decontamination, the reduction of POPs releases from fuel and waste combustion and from industrial processes, and the strategies for information exchange, education, scientific research and monitoring.

Additionally, the NIP also includes proposals of funding applications to be submitted to GEF for 3 capital investment projects and 1 educational project enabling and facilitating early action on the implementation of the provisions of the Stockholm Convention in Poland.

The total costs for solving the POPs problem in Poland in 2004–2010 amount to 219 mln PLN[*], of which over 44 mln PLN result directly from the requirements of the Stockholm Convention. The remaining costs are related to the implementation of other legal documents, such as: the Act – Environmental Protection Law, the National Waste Management Plan and the European Community directives. The POPs monitoring costs have a significant share in the NIP budget (over 66 mln PLN). A considerable share in the total costs has also the elimination of obsolete pesticide landfills and PCBs.

A significant part of expenditures (over 55%) resulting directly from the ratification of the Convention could be covered using the foreign assistance funds, whereas the private sector share has been estimated at app. 18% and app. 14% of the state budget. The remaining costs will be covered from other sources (e.g. environmental funds, self-government budgets).

The NIP is available on an Internet website: http://ks.ios.edu.pl/gef/events_proj.php.

Full implementation of the NIP is determined by the ratification of the Stockholm Convention. The political will for its ratification has been expressed by signing it by Poland on 23 May 2001. Polish accession to the European Union imposes compliance with the European Community legislation on POPs in view of the "*Community Strategy for Dioxins, Furans and Polychlorinated Biphenyls*", which is more stringent than the provisions of the Stockholm Convention.

[*] Average exchange rate of the National Bank of Poland BP as of 31 December 2003 used for calculations in the NIP: 1 USD = 3.7405 PLN.

CHAPTER 1. INTRODUCTION

The basic goal of the NIP is to achieve full implementation of the provisions of the Stockholm Convention by:

- Identifying key issues with regard to specific country's background,
- Proposing optimal actions to solve the problems caused by POPs covered by the provisions of the Convention,
- Designing measures essential for harmonized execution of tasks included in the NIP.

The major objective of the Convention [68], which entered into force on 17 May 2004, is to protect human health and the environment from persistent organic pollutants by coordinating worldwide actions to finally eliminate the residues left over after the period of common use of these substances in the economy.

The initial list of pollutants subject to the Convention consists of 12 substances, which can be divided into 3 groups:

- Substances, which should be **eliminated from intentional production and use**: aldrin, chlordane, dieldrin, endrin, heptachlor, hexachlorobenzene, mirex, toxaphene, polychlorinated biphenyls (PCBs) ;
- Substances with **restricted** use only to specific purposes: DDT;
- Substances, which are unintentionally produced, and thus appear as **waste by-product** in production processes and when using other substances: hexachlorobenzene (HCB), polychlorinated biphenyls (PCBs), dioxins and furans (PCDDs/PCDFs).

Following the provisions of the Convention the above initial list of POPs is expected to be successively amended by adding new substances to the Annexes of the Convention, for which appropriate procedures and screening criteria have been provided.

The Convention provides general guidance on prevention and release reduction measures, and guidelines on best available techniques (BAT) and best environmental practices (BEP). Special attention has been given to public access to information on risks related to the use of these substances, promoting education and training on POPs and raising public awareness of hazards caused by these substances, also for the future generations.

Effective elimination of persistent organic pollutants from the environment is carried out in several phases, of which two are the most important. The first one is preparing of a diagnosis on the basis of collected information on existing places of production, use and storage of these substances, on their import and export, and on contaminated sites. The second one covers the designing of all necessary actions, economically and socially feasible in order to eliminate POPs from the environment.

Therefore, the structure of the NIP consists of two substantial chapters:

- Chapter 2 presents Poland's baseline, with basic background information, affecting proper implementation of the provisions of the Convention, i.e.:
    - Political, economic and social profile, along with the present environmental overview,

- Existing institutional, policy and regulatory framework in Poland,
- Country's profile with regard to persistent organic pollutants providing an overall view of the current situation with POPs in Poland – addressing all the areas subject to the Stockholm Convention, including inventory of POPs production, use, export and import, and releases into the environment, ending with an assessment of Polish capability to meet the requirements of the Convention, and thus an assessment of existing organisational structures, regulatory measures, administrative procedures, monitoring, ongoing research, as well as health and social implications;

- Chapter 3 presents the strategy and action plan elements of the NIP; activities to reduce hazards caused by POPs:

- Implementation strategy for the NIP,
- 65 actions grouped into 11 country-specific activities designed to meet the obligations of the Convention, out of the 17 groups of activities, strategies and action plans foreseen in the Guidance [88],
- Priority areas where current capacity and capability need to be strengthened to achieve the objectives of the NIP,
- Timetable for the implementation of the Plan with designed measures for its successful enforcement,
- Identified baseline and incremental costs for measures included in the NIP, along with potential sources of funding.

Annexes, which are complementary to the main part of the Plan, provide detailed background data and supporting information. Abbreviations used in this NIP are explained in Annex 12.

The NIP has been elaborated in accordance with the draft *"Guidance for Developing a National Implementation Plan for the Stockholm Convention*" [88], prepared under the auspices of UNEP and the World Bank in December 2003. The Plan reflects, with slight changes, the structure proposed in these guidelines.

A special financial mechanism for the purposes of the Stockholm Convention was used in the preparation of the National Implementation Plan. This mechanism provides support to developing countries and countries with economies in transition offered by industrialized countries. For the transitional period, i.e. until at least the first meeting of the Conference of the Parties, the Global Environment Facility (GEF) has been entrusted with the operations of the financial mechanism for the Stockholm Convention, which is administered by the World Bank. Its first initiative was to provide financial resources to several countries, including Poland, to execute pilot projects aimed at the acceleration of activities for effective implementation of the provisions of the Convention.

Already in 2001 GEF has made a decision to provide Poland financial support for the execution of Project No. GF/POL/01/004, entitled *"Enabling activities to facilitate early action on the implementation of the Stockholm Convention on Persistent Organic Pollutants (POPs)"*. This project (hereinafter referred to as 'the GEF Project' or 'the Project') was executed under Contract No. 2001/369 concluded between the United Nations Industrial Development Organization (UNIDO), acting as an international coordinator of the GEF projects under the Convention, and the Institute of Environmental Protection (IOŚ). To ensure coordination and substantial supervision of the Project, the Minister of the Environment has established the national Steering Committee, consisting of representatives of relevant

ministries (Environment, Health, Labour, Economy, Agriculture, Finance, Foreign Affairs and National Defence), R&D institutions, the industry and NGOs.

The major goal of the 5-phase GEF Project was to carry out an inventory on hazards from the use (current and historical) of hazardous substances controlled by the Stockholm Convention and to develop a national action plan. The objective of the NIP is to indicate the means by which POPs-related problems can be solved and to estimate the costs for the necessary action to be taken. This should provide decision makers with further information required to start the ratification process for the Convention.

The first phase of the project was completed at the beginning of 2003 and covered an assessment of persistent organic pollutants related issues in Poland in the context of the provisions of the Stockholm Convention. The results obtained from the analysis served as a basis for formulating the "National Implementation Plan for the Stockholm Convention", hereinafter referred to as 'the Plan' or 'the NIP'. The results of the analysis were published in a special report [47], which is complementary to the GEF Project. The report is, generally, based on data as of the end of 2000 and serves as a background for the evaluation of ongoing changes resulting from meeting the provisions of the Convention and obligations of Polish and EU legislation.

An interdisciplinary team of authors faced a particularly difficult problem since it appeared that knowledge on the actual level of emissions and releases, and the amounts of wastes containing substances covered by the Convention was far too incomplete. This NIP is a unique undertaking, considering that other countries have not developed such plans yet. Furthermore, it has been proved by the results of the third phase of the GEF Project, covering criteria and priority setting, that our elaborations serve as model documentation for others. A list of intermediate reports prepared under the GEF Project is presented in the references.

The results obtained during all phases of preparation of the GEF Project were disseminated through the Internet[1] and consulted at 5 workshops organised with the participation of all the stakeholders: representatives of governmental and self-governmental institutions, representatives of research and industry sectors, consultancy and waste treatment companies, and non-governmental organizations (Annexes 6 and 11).

Poland is already, to a great extent, fulfilling the basic obligations of the Convention, such as discontinuation of POPs production, elimination of waste and reduction of undesirable emissions. However, a number of problems, like completion of the elimination of obsolete pesticide landfills, inventories and decontamination of PCB-containing equipment and reduction of the uncertainty margin in the evaluation of environmental pollution by POPs, are still to be solved.

Activities proposed for implementation in this NIP result partly from the officially approved documents: the "National Environmental Policy" and the "National Waste Management Plan" (NWMP), the "National Strategy for Environmental Protection against Persistent Organic Pollutants" and the "National Strategy for Environmental Education". Additionally, activities that have not been foreseen by any of the existing governmental programmes, but result directly from the provisions of the Stockholm Convention, have been included in the NIP.

[1] Internet website: http://ks.ios.edu.pl has been developed on the server funded under the GEF Project. It is maintained by the national secretariat for the Stockholm Convention (the portal has been described in Chapter 2.3.8).

The main task of the NIP is to define activities drawn from the goals of the "National Strategy for Environmental Protection against Persistent Organic Pollutants", which can be brought down to two elements:

- Reduction of quantities of POPs present in the environment, followed by their ultimate elimination, and
- Minimisation of impacts of those substances on human health through reduction of their concentrations in food.

Tasks arising from the Stockholm Convention are of a long-term character. With such perspective in mind it would be unjustified to develop a detailed plan, due to substantial changes in economic and social conditions and scientific progress, making the relevance of the NIP questionable. It was therefore decided to limit the scheduled implementation period until the end of the first decade of the current century, assuming that the Plan will be of a step-by-step nature and will be updated every several years. Following this decision the NIP goals have been divided into short-term (until 2010) and long-term (until 2015) goals.

Among all substances covered by the Stockholm Convention only DDT and toxaphene were produced in Poland, in 1949–1977 and 1961–1962, respectively. Aldrin, chlordane, endrin, heptachlor and mirex have not been used by the chemical industry for the production of pesticide preparations. Dieldrin, hexachlorobenzene, heptachlor, endrin and aldrin were imported. Over the years a significant progress has been observed in the restructuring of the chemical industry and in the reduction or elimination of the organic chlorine compounds. None of the substances subject to the Convention are currently produced in Poland. At present only products that are more sophisticated and safe for the environment are used. Also substances listed in Annexes A and B of the Convention are not imported or exported (apart from POPs-containing wastes exported for treatment).

It is important to undertake measures to reduce releases of dioxins, furans, PCBs and HCB formed as by-products during combustion and certain technological processes in the industry and human activity.

Available monitoring data and research results confirm the presence of POPs in the environment and their tendency to bioaccumulate in the tissues of living organisms. However, insufficient dioxin, PCB and HCB exposure data in Poland makes it impossible to carry out health risk assessments. Scarce data on dioxin and PCB concentrations in human milk demonstrate a high level of exposure of breast-fed babies to these chemical compounds. These data may also indicate that human exposure can be the reason for justified concern about potential health hazards.

Due to relatively low awareness of the Polish people concerning harmful effects caused by persistent organic pollutants there is a need for awareness raising for different social groups, *inter alia*, by providing access to complete and reliable information, by incorporating POPs-related issues into educational programmes, and by increasing the role of NGOs in this process.

The institutional and legislative system for various POPs-related issues is sufficiently constructed in Poland. However, it needs better coordination and strengthening of its role in the implementation of the provisions of the Stockholm Convention.

The existing research capacity in Poland is sufficient to conduct studies in the field of monitoring, control and treatment of POPs, and to carry out POPs risk assessment with regard

to human health and agricultural production. However, the major problem is lack of appropriate financial support for research and costly monitoring.

While developing the NIP the authors faced special difficulty in estimating the costs of its implementation. In many cases they had to draw from international experience or approximate the costs. This does not mean that such estimates are of low significance. Their verification, together with the review of the whole Plan, will be performed on a regular basis, giving the opportunity to make the estimates more precise. In general, the Plan has been prepared in line with the status as of 31 December 2003 (only Chapter 3 has been amended with legislative data according to the legal status as of 31 July 2004). Costs connected with the implementation of the provisions of the Stockholm Convention have been divided into two categories:

- Baseline costs - covering the costs of activities leading to the implementation of these provisions and the fulfilment of the obligations of other Polish and European Community legally binding documents,
- Incremental costs – costs resulting directly from the implementation of the provisions of the Convention and from this alone.

The NIP that has been prepared includes many activities required to be undertaken in Poland in order to fulfil the obligations of the Convention. This would require:

- Enlargement of the scope and improvement in providing complete and reliable information for policy and decision-makers,
- Financial resources for the elimination of the existing waste landfills containing POPs,
- Reduction of unintentional releases from industrial activity,
- Effective monitoring of substances, subject to the Convention, from historical production and use,
- Up-to-date evaluation of environmental and human health effects.

The need to enforce activities foreseen in the NIP results from the fact that pollutants subject to the provisions of the Convention are very resistant to degradation in the environment through physical, chemical and biological processes. Despite their relatively low volatility they are transported through the air over long distances. They are poorly soluble in water but highly soluble in fats. They accumulate in the environment (e.g. sediments, water), as well as undergo bioconcentration (biomagnification) in fat tissues, and thus in the trophic nutritional chain their concentration levels may rise many times. After reaching the nutritional chain they may pose a threat to the safety of food and human health.

CHAPTER 2. COUNTRY BASELINE

2.1. Country profile

2.1.1. Geography and population

Geography. Poland is situated in Central Europe, south from the Baltic Sea. The country's area, including maritime internal waters is 312 685 km^2. The surface of Poland is, in terms of latitude, formed from coastal lowlands in the north, through hills of the lake districts, vast central lowlands and mountains located in the south from which the two largest rivers: Vistula (1047 km) and Oder (854 km) originate. 54% of the territory lies below 150 m above sea level, close to 37% at the level of 150–300 m above sea level. Highlands and mountains (over 300 m above sea level) cover almost 8% of the country's territory, out of which the mountains represent only 0.1% of the Polish territory.

Climate. Poland has a moderate type of climate of a transitional character between maritime and continental. This is caused by the exchange of humid air masses from the Atlantic with dry continental air from Europe and Asia. This is demonstrated by considerable variety of climate conditions from year to year and the weather changes from day to day. The average annual air temperature in Poland has a growing tendency (from 7.4°C in 1951–1980 to 8.0°C in 1991–1999). The effect of the shape of the Polish terrain is most visible in the distribution of precipitation totals. The average precipitation total is 600 mm, with the lowest rainfall in Central Poland (approx. 500 mm) and the highest in the mountains (about 1500 mm), higher in summer than in winter. Variation in the intensity and spatial distribution of annual precipitation is high.

Water resources. In terms of water supply Poland belongs to the poorest countries in Europe, having 1800 m^3 annual water run-off per inhabitant, i.e. three times lower value than the European average and four times lower than the global average. Additionally, large seasonal and territorial differentiation of water resources causes seasonal water shortage or excess of water in many country regions. The capacity of retention reservoirs in Poland is rather small. Being able to retain just 6% of the total annual water run-off, they do not ensure protection against drought or flood.

In recent years the water abstraction for household and industrial purposes has declined significantly. The average intake in 1995–1999 was by as much as 21% lower than in 1988, resulting mainly from reduced water consumption by the industry (responsible for 70% of the total water consumption), but also from water saving by households and agriculture. Over 83% of the water used originates from surface water resources, 15% from underground water and 2% from mining activities.

Land use. Farming and forestry are the dominating forms of land use in Poland, covering almost 89% of the country's territory. Most of the farmland area is arable land, which covers close to 48% of the Polish territory. The area of farmland is systematically declining, primarily to the advantage of forestry, residential areas, idle land and communication lines.

Population. Since mid eighties the population growth rate in Poland has been decreasing. In 1999 for the first time a negative population growth was recorded. This tendency is still observed - the birth rate attained 0.0‰. In the following years the population number was decreasing reaching at the end of 2000 a total of 38644 thousand.

Also the population age structure is changing unfavourably. Declining number of births causes a reduction in the share of population of pre-working age in the total population (from 29.8% in 1989 to 24.1% in 2000), with parallel growth of the production and post-production age population shares (from 57.6% in 1989 to 61.2 in 2000, and from 12.6 in 1989 to 14.7 in 2000, respectively).

The share of urban population stabilized during the nineties at 61.8%. In 2000 there were 880 towns and cities in Poland, out of which 19 with more than 200 thousand inhabitants each. The population of Warsaw, the capital and the largest Polish city, amounts to 1.6 million inhabitants.

The average population density amounts to 124 persons per 1 km^2, though in the most densely populated Silesian Voivodeship it reaches 396 persons per 1 km^2. The north-eastern regions – Podlaskie and Warmińsko-Mazurskie Voivodeships - with 61 persons per km^2, are the least populated in Poland.

2.1.2. Political and economic profile

Political profile. The Republic of Poland is a constitutional republic of a mixed, presidential and parliamentary model of authority. The Parliament, consisting of two Chambers: the *Sejm* (lower Chamber) and the *Senate* (higher Chamber), represents the legislative authority. Joint debate of the *Sejm* and the *Senate* form the National Assembly. The President and the Council of Ministers hold the highest executive power. The Government – the Council of Ministers, headed by the Prime Minister – is responsible for the domestic and foreign state policy. At the regional level the government administration is represented by voivodes (governors of voivodeships). From 1 January 1999 there is a triple level system of territorial division composed of: communities or communes (2489 *gminas*), districts (373 *poviats*) and regions or provinces (16 voivodeships). Polish is the official language.

The process of thorough social and economic transformations that has been initiated in 1989 caused in-depth ownership changes, activated antimonopoly policies, enabled liberation of prices and adjusted them to the world market system and opened the economy to foreign investments. The strategic aim of the Polish economy for the nearest future is to maintain economic growth (under balanced macroeconomic conditions).

Poland is a member of, *inter alia,* the following organizations[2]:

- United Nations Organization - since 1945,
- World Health Organization (WHO) - since 1948,
- World Meteorological Organization (WMO) - since 1950,
- World Bank - since 1986 (once again),
- World Trade Organization (WTO) - since 1995,
- Council of The Baltic Sea States (CBSS) - since 1992,
- Organization for Economic Co-operation and Development (OECD) - since 1996,
- North Atlantic Treaty Organisation (NATO) - since 1999.

[2] European Union – since 1 May 2004.

Furthermore, since 1972 Poland has been actively participating in the work of the United Nations Environment Programme (UNEP).

Economic profile. Since 1994 the growth rate of the gross national product (GNP) remained high reaching its highest level of 7% in 1995. The next two years were also favourable with a 6% and 6.8% increase in 1996 and 1997, respectively, mainly as a result of an increase in both, domestic consumption and investment market demands. Changes in the generation structure of GNP in 1995–2000 are presented in Table 2.1.2.1.

Table 2.1.2.1. Sectors contributing to the generation of GNP in 1995–2000

Specification	GNP structure [%] in current prices				
	1995	1997	1998	1999	2000
GNP total, incl.:	100	100	100	100	100
Gross added value, covering:	87.1	87.4	87.6	87.2	87.8
1) Agriculture, hunting and forestry	6.0	4.8	4.1	3.4	3.3
2) Industry total, incl.:	27.6	25.7	24.2	23.6	23.4
• Underground and placer mining	3.6	3.1	2.5	2.3	2.4
• Manufacturing	20.6	19.6	18.9	18.3	18.1
• Energy, gas and water supply	3.4	3.0	2.8	3.0	2.9
3) Construction sector	6.3	6.9	7.6	7.6	7.3
4) Services, incl.:	47.2	50.0	51.7	52.6	53.8
• Trade and repair	17.4	18.4	18.1	18.2	18.3

Source: GUS.

Economic development was stimulated, additionally, during that period by an increase of the employment rate, linked to improved labour efficiency, significant slow down of the inflation growth and revival of international trade under progressing turnover liberation conditions. After 1997 the annual GNP growth gradually declined from 4.8% in 1998 to 4.1% in 2000, as a result of reduced demand on the domestic and global markets.

Unemployment. Significant changes on the employment market took place during the transformation of the Polish economy (1990–2000). Three specific periods of these changes can be distinguished:

- 1990–1993: an economic transition period marked by significant decrease in demand for labour by as much as 2628 thousand people, and an increase in the number of unemployed;
- 1994–1997: a period of rapid economic development with 6.8% annual growth of GNP; the situation on the labour market was gradually improving as a result of good economic opportunities, slow down in restructuring of economy and decrease of illegal employment; the unemployment rate decreased to 10.3%;
- From 1998 onwards: a period with growing unemployment rate up to 18% in 2002, mainly as a result of a slow down in economic growth and acceleration of reconstruction

processes of some industrial sectors, as well as a significant reduction of production, trade and service activities, caused by unfavourable situation on the world markets.

2.1.3. Profiles of economic sectors

Agriculture. The majority of Polish farming has retained its traditional patterns, characterised by diversified and extensive production. Over 40% of individual farms maintain mixed production without any specific specialization. Crop production prevails in 33% of farms, while animal production and breeding is the main branch in 20% of farms. The share of agriculture, hunting and forestry in the GNP generation in 2000 was 3.3%.

The structure of agricultural commodity production in 2000 by specific products (data from GUS – Central Statistical Office) is as follows:

1) total crop production 39%, including:

- cereals 11.7 %,
- cash crops 7.4 %,
- potatoes 3.0 %,
- vegetables 7.7 %,
- fruit 7.8 %;

2) total animal production 61%, including:

- beef cattle 5.1 %,
- porker pigs 23.5 %,
- milk 17.8 %,
- eggs 4.4 %.

The majority of Polish farms are small in size. The average acreage of agricultural land in individual farms in 2000 was 7.2 ha, and the majority of farms belonged to the 1–5 ha category. There was only 0.7% of large farms with over 50 ha each. During the last decade a significant change in the ownership structure of arable land has been observed in favour of the already dominating small individual farms, which in 2000 covered 83.9% of the total farmland area.

Individual farms manufacture 86% of the total commodity production – mainly pig, cattle and poultry. The basic crops are cereals, potatoes and cash crops, are the basic agricultural plants cultivated in farms. In 2000 these crops covered an area of 86.6% of the total sowing area in Poland.

The use of mineral fertilisers has been significantly reduced. In 2000 the level of fertilisation was almost two times lower than in 1988.

This was also the case as far as application of plant protection products (pesticides) is concerned. It was associated mainly with the elimination of large-sized state-owned farms, which used the highest amounts of herbicides and pesticides. Their countrywide use has been stabilised by the end of the nineties at a level of slightly below 9000 Mg of active substances per year, and about 60 kg of active substances per 100 ha of arable land (Table 2.1.3.1).

Table. 2.1.3.1. The use of active pesticide chemicals in agriculture in 1990–2000

Active pesticide substances	Years						
	1990	1995	1996	1997	1998	1999	2000
Total [Mg]	7548	6962	9420	9501	8699	8469	8848
Per 100 ha of arable land [kg]	51.5	47.8	66.3	66.3	60.5	58.8	61.7

Source: GUS.

Herbicides constitute the majority among all plant protection products that are used. Pesticides, fungicides and seed treatment preparations represent almost 50% of all the herbicides used. Pesticides containing active substances subject to the provisions of the Stockholm Convention are not used in Poland.

Industry. Industry is still the main source of economic growth, despite the reduction of its share in the GNP generation to 23.4%. After a considerable fall in 1990 the industrial sold production was growing, attaining the highest level in 1994 exceeding by 12.2% the level of the previous year. In 1995–1999 the average annual growth of industrial sold production was 7.6%. The total value of the sold production in 2000 reached 503 billion PLN in current prices. The following sectors contributed to this sum: the underground and placer mining (27 billion PLN), the processing industry (427 billion PLN), and the production and supply of electric energy, gas and water (49 billion PLN).

Transition towards market economy forced transformations and changes in the Polish industry. The share of underground and placer mining declined to the benefit of the processing industry. In a number of industrial sectors an in-depth restructuring took place resulting in a shut down of a number of facilities and elimination of certain types of production. This affected specifically: the ferrous metallurgy, coke making, coal mining and the chemical industry.

The number of private industrial enterprises, particularly small and medium sized, has grown very fast (Table 2.1.3.2). The private sector, generating 70% of the total production sold, begins to play an important role, while in 1995 its share was just about 47%. In accordance with the adopted strategy, the privatisation process of the basic sectors of the economy, i.e. energy and gas supply, and the mining industry, will continue.

Table 2.1.3.2. Structure of industrial enterprises depending on the number of employees (as of 31.12.1999)

Specification	Enterprises			
	Micro	Small	Medium	Large
Number of enterprises	198 629	36 650	6276	1791
Number of employees	1–9	10–49	50–249	≥ 250

Source: GUS.

Table 2.1.3.3. Employment and production level in major industry sectors (covering enterprises with over 50 employees)

Type of production	Number of enterprises	Average number of employees [in thousands]	Production value [billion PLN]
Food products	1748	320.2	66.8
Textile industry	368	79.1	6.7
Timber and timber products	422	73.9	10.1
Paper pulp and paper	165	29.0	8.5
Chemical products	297	100.1	25.6

Type of production	Number of enterprises	Average number of employees [in thousands]	Production value [billion PLN]
Rubber and plastic products	506	72.0	12.5
Products of non-metallic raw materials	516	111.4	16.3
Metals	181	93.4	22.4
Metallic products	738	114.3	13.9
Machines and installations	846	180.8	17.2
Motor vehicles	242	87.2	29.9
Underground and placer mining	165	234.6	26.2
Production and supply of energy, gas, steam and hot water	576	222.9	43.5
Total	**9430**	**2 271.9**	**395.9**

Source: GUS statistical Yearbook. Industry 2001.

The highest concentration of industry is found in the Mazowieckie, Śląskie, Wielkopolskie, Dolnośląskie, Małopolskie and Łódzkie Voivodeships.

In terms of production and employment levels the dominating production sectors in industrial enterprises are the following: food industry, machines and installations, metal products, products of non-metallic raw materials, chemical products (including the rubber and plastics industry and power generation and supply) (Table 2.1.3.3).

2.1.4. Environmental overview

Environmental protection is one of the constitutional tasks of the state as well as the right and responsibility of the citizens. According to the fundamental law - the Constitution[3]: *"The Republic of Poland (...) shall ensure the protection of the natural environment pursuant to the principles of sustainable development" and "Public authorities shall pursue policies ensuring the ecological security of current and future generations".*

The Minister of the Environment is chief state administration authority supervising and co-ordinating environmental protection activities. He/she fulfils his/her functions with the executing body – the Ministry of the Environment. The basic tasks and competences of the Minister of the Environment include the drafting of national environmental policies (strategies), and applying with legislative initiatives, and the implementation of the adopted policies and enacted laws.

The basis for the implementation of the Polish policy on environmental protection is the National Environmental Policy, which was adopted by the Parliament in 1991 [52] with its updates. It defines, in particular, the major objectives of environmental protection, its priorities, time schedules for the implementation of activities planned and measures necessary to achieve the goals that are set (Chapter 2.2.1).

[3] Constitution of the Republic of Poland of 2 April 1997 (DzU of 1997 No. 78, item 483).

Environmental management is based on an extensive and systematically updated system of laws and regulations (Chapter 2.2.4). The following acts are the most important: the Act – Environmental Protection Law[4], the Act on Spatial Planning and Management, the Act on Environmental Protection Inspection, the Act on Forestry, the Act on Nature Protection, the Act on the Protection of Agricultural and Forest Land, the Act on Maintaining Order and Cleanliness in Gminas, the Act on Fertilisers and Fertilisation, the Act on Geological and Mining Law, the Act – Water Law[9], the Act on Waste[5], the Act on Packaging and Packaging Waste, the Act on Obligations of Enterprises Concerning the Management of Certain Wastes, and on Product Charges and Deposit Fees, the Act on Chemical Substances and Preparations[6] and the Act on Plant Protection[7].

The existing legal regulations in force include penal responsibility for violation of laws and infringement against the environment. One of the significant sanctions for striking abuse of environmental protection principles is the possibility of shutting down production activities of an economic entity, which is violating these principles.

Financial resources such as monetary charges and fines for the use of the environment and its pollution are collected through environmental funds at different levels: *gmina, poviat,* voivodeship and the countrywide - National Fund for Environmental Protection and Water Management. These resources are among the major means for financing national or regional environmental projects of highest priority.

Ministers responsible for specific areas are also responsible for providing conditions necessary to implement environmental protection regulations (Chapter 2.2.2).

At all levels of the state administrative division (Chapter 2.1.2) there are general responsibilities for environmental protection as well as a certain level of budgetary independence (supported additionally at each level by the resources of environmental protection and water management funds).

Voivodes represent the regional governmental administration authorities responsible for environmental protection. They execute their duties through their voivodeship offices for environmental protection. The voivodeship environmental protection offices are responsible for:

- Issuing administrative decisions permitting the use of environmental resources and determining terms of such use with regard to activities, which potentially may pose significant environmental threats;
- Laying down additional requirements on specific areas;
- Maintaining registers on the types, quantities and locations of substances posing particular environmental threat (based on the information obtained from entities, governors of *gminas,* mayors and city presidents);
- Performing control activities;
- Preventing environmental threats in extraordinary situation.

Voivodes are in charge of the comprehensive governmental administration bodies, particularly the Police and Fire Service, as well as the environmental protection inspection, and others.

Also non-comprehensive governmental administration bodies, such as the customs services, statistical offices, the state forest administration, maritime offices, water management

authorities operate at the territorial level (voivodeship, *poviat*) or within other organisational and spatial systems.

The Polish self-government authorities are as follows:

- *Gmina* (commune) councils, *poviat* (district) councils and voivodeship assemblies (*sejmik)* – acting as local legislative authorities,
- Chiefs of *gminas* (*wójt*), mayors (*burmistrz*) or presidents of towns – at the *gmina* level; district heads (*starosta)* – at the *poviat* level; and voivodeship marshals (*marszałek województwa*) – at the voivodeship level – all acting as local executive authorities.

In line with the provisions of the Act – Environmental Protection Law[4] voivodeship marshals, *starostas* and chiefs of *gminas (wójt)*, city mayors or presidents are, within their competences, responsible for compliance and enforcement of environmental regulations.

The **voivodeship self-government authorities** determine the strategies for the development of their voivodeships, approve voivodeship environmental protection programmes and voivodeship implementation plans targeted at regional and countrywide public goals, as well as governmental tasks included in voivodeship registers.

At the *poviat* level a *starosta* is an environmental protection authority responsible, among others, for:

- Issuing decisions granting, *inter alia*, integrated permits, permits to release pollutants into the environment and to produce solid waste;
- Issuing decisions concerning certain obligations: to prepare environmental impact assessment reports and environmental reviews/audits to reduce adverse environmental effects, to restore the proper state of the environment, to monitor the concentrations of certain substances in soil, to monitor emissions, if the control that has been carried out proved non-compliance with the existing emission standards, as well as decisions on the requirements of contaminated site remediation;
- Maintaining a register containing information: on areas where the soil quality standards have been exceeded, specifying areas for which *starosta* is responsible for clean-up activities; and on the waste produced and methods of their treatment;
- Implementation of the *poviat* environmental protection programme, including site remediation in the order pursuant to the programme.

The basic competences of *gminas* are primarily connected with issuing permits for capital development projects, for nature conservation and for solid waste management projects. *Gminas* have considerable freedom/independence in creating their own environmental development through adequate entries in the local plans of spatial management. This freedom is limited only by: (1) the necessity of securing financial resources and (2) the need to ensure, that the local plans are in conformity with the government action plans negotiated with voivodes, and with the action plans of the voivodeship self-government authorities negotiated with voivodeship marshals, to provide support to achieve regional level public goals.

The major responsibility and decisions concerning specific activities aimed at environmental protection are assigned to the economic entities and local self-governments, which have the last word in these matters and dispose of financial resources both from their own sources and obtained from environmental funds.

2.2. Institutional, policy and regulatory framework

2.2.1. Environmental policy, sustainable development policy and general legislative framework

Environmental policy. The basis for environmental protection in Poland was created by the "National Environmental Policy" [52], which was adopted by the Parliament in 1991. It includes goals and priority actions until 2025. Environmental safety of the existing and future generations with the provision of sustainable development has been considered as the major objective. Among environmental priorities that have been laid down are the following:

- Up-dating and amending environmental legislation,
- Establishing new systems/structures responsible for environmental monitoring and effective control of the enforcement of environmental law,
- Introducing new and improving the existing environmental instruments (charges and fines, tax and customs preferences, donations and preferential loans),
- Establishing and putting into effect institutions financing environmental activities, including environmental capital investments.

The "National Environmental Policy" has been amended in 2000 [60]. Furthermore, in 2002 the Council of Ministers adopted a short-term "National Environmental Policy for 2003–2006 with due Account of the Perspectives for 2007–2010" [69].

Succeeding Polish Governments implemented the principle of sustainable development. The execution of the most urgent tasks specified in the action plan to the environmental policy [70] improved the state of the environment in Poland. Recently the following priority areas of a strategic, tactical and sectoral nature have been identified:

- Improvement of all environmental components,
- Adjusting sectoral policies to sustainable management of natural resources, and reduction of environmental strain,
- Strengthening environmental management bodies at all levels of the government and self-government administration,
- Promoting environmental consumption patterns and a dematerialised life style,
- Providing access to information, public participation in decision-making and access to justice in environmental matters,
- Effective protection against threats posed by hazardous chemicals (including pesticides), genetically modified organisms, etc.

One of the main goals of the Polish environmental policy is the development of action plans, followed by:

- Elimination and treatment of hazardous waste containing, *inter alia*, persistent organic pollutants,
- Initiating activities aimed at the elimination of old waste sites, primarily obsolete pesticide landfills,
- Inventorying PCB-contaminated equipment and undertaking decontamination of this equipment, and treatment of all PCB-containing materials, mainly oils,

- Conducting constant monitoring and implementing of an effective control system.

In the field of improving air quality the environmental policy envisages reduction of emissions of substances directly affecting human health, including dioxins and furans, as well as pesticides. In the field of chemical safety the policy targets prohibition of production and use of certain substances and preparations hazardous to human health and the environment.

Detailed objectives and tasks concerning POPs have been formulated in the "National Waste Management Plan" (KPGO) [67] and in the "National Strategy for Environmental Protection against Persistent Organic Pollutants" [71]. One of the goals of the Strategy is to implement the provisions of the Stockholm Convention in Poland.

Sustainable development policy. Poland has actively participated in the development of sustainable development principles adopted by the World Summit Declaration and by the AGENDA 21 (Rio de Janeiro, 1992). The concept of development adopted in Rio de Janeiro has gained approval in Poland, both among political and social groups, as well as the authorities at all managerial levels, including the local self-government. A significant role in public awareness raising and in the implementation of the Rio outputs was played by non-governmental environmental organizations. The speed and the scale of implementation of the sustainable development principles in Poland is mainly determined by:

- Economic capability for development and restructuring,
- People's welfare and public awareness,
- Social and demographic situation.

The idea of sustainable development has gained appropriate prestige in the development of the country through the adoption, by the Government, of the "POLAND 2025 – Long-term Strategy for Sustainable Development" [61]. Its strategic goal is to provide better welfare for the Polish families, strengthen their economic independence and their sense of safety, including environmental safety. Action in this field includes protection of health and life, economic backup, improvement of housing conditions, providing public order and external safety. An advantage of this strategy is underlining the significance of environmental aspects and rational management of resources by incorporating the strategy into the future social and economic development in Poland. The strategy objectives are consistent with the "National Environmental Policy". Almost all governmental programme documents, prepared after 2000 make reference to these principles, e.g. the "National Strategy for Environmental Education – 'Sustainable Development through Education'" of 2001 [64], which created the basis for education and information exchange.

The local initiatives for the implementation of the provisions of AGENDA 21 should also be noted, e.g. activity of associations, whose aim is to:

- Promote, develop and support public initiatives contributing to the improvement of the quality of life in the region, in line with the principles of sustainable development;
- Initiate and support public dialogue and active and efficient cooperation of the inhabitants of the region with the self-government authorities in the implementation of recommendations included in the AGENDA 21 and in other documents on sustainable development.

An analysis of achievements in environmental protection in the transitional period proves that Poland, like other countries, is a source of environmental threats. However it is not among the countries with high environmental pressure and can be classified as a country, which by

following sustainable development principles at a global level has developed the necessary legal, institutional and technical basis for that purpose.

General legislative framework. The provisions of the Act – Environmental Protection Law[4] form a specific environmental code, which lays down the general rules for almost all environmental issues and for the sound management of its resources in the spirit of sustainable development principles. Furthermore, the Act introduces interesting tools and instruments, which should facilitate their gradual implementation. Its general provisions in detailed matters, including persistent organic pollutants are regulated by: the Act on Waste[5], the Act on Chemical Substances and Preparations[6], the Act on Plant Protection[7], the Act on Biocidal Products[8] and the Act – Water Law[9] (Chapter 2.2.4).

2.2.2. Roles and responsibilities of ministries, agencies and other governmental institutions involved in POPs life cycles

As shown by the review of the legal system presented in Chapter 2.2.4, the responsibility for the implementation of specific legal requirements is imposed by the Council of Ministers on several ministries and governmental agencies. The general system of supervision and control of persistent organic pollutants in Poland is shown in Figure 2.2.2.1. Information presented under this chapter reflects the legal status as of 1 July 2003.

The major burden related to the execution of environmentally targeted tasks and their coordination lies within the competences of the **Minister of the Environment**, who is responsible for overall supervision on the preparation process for the implementation of the provisions of the Stockholm Convention in Poland, covering, inter alia:

- Coordination of policies and strategies regarding POPs,
- Developing principles for waste management,
- Providing pollution reduction of different environmental components,
- Establishing environmental quality standards,
- Coordination of activities promoting the use of best available techniques (BAT) and best environmental practices (BEP),

[4] Act of 27 April 2001 – Environmental Protection Law (DzU of 2001 No. 62, item 627, No. 115, item 1229; of 2002 No. 74, item 676, No. 113, item 984, No. 153, item 1271, No. 233, item 1957; of 2003 No. 46, item 392, No. 80, item 717 and 721).

[5] Act of 27 April 2001 on Waste (DzU of 2001 No. 62, item 628; of 2002 No. 41, item 365, No. 113, item 984, No. 199, item 1671, of 2003 No. 7, item 78).

[6] Act of 11 January 2001 on Chemical Substances and Preparations (DzU of 2001 No. 11, item 84, No. 100, item 1085, No. 123, item 1350, No. 125, item 1367; of 2002 No. 135 item 1145, No. 142, item 1187; of 2003 No. 189, item 1852).

[7] Act of 18 December 2003 on Plant Protection (DzU of 2004 No. 11, item 94).

[8] Act of 13 September 2002 on Biocidal Products (DzU of 2002 No. 175, item 1433; of 2003 No. 189, item 1852).

[9] Act of 18 July 2001 – Water Law (DzU of 2001 No. 115, item 1229, No. 154, item 1803; of 2002 No. 113, item 984, No. 130, item 1112, No. 238, item 2022; of 2003 No. 80, item 717, No. 165, item 1592, No. 190, item 1865, No. 228, item 2259).

- Supervision of the execution of capital investment projects and projects funded by foreign resources,
- Determining provisions for environmental monitoring and rules in case of non-compliance with environmental regulations,
- Representing Poland at the international forum within his/her competences.

The **Minister of the Environment** (in cooperation with other ministers) initiates and conducts legislative activities and supervises the implementation of environmental law. Control and monitoring activities are assigned to the **Environmental Protection Inspection – the Chief Inspectorate for Environmental Protection and voivodeship inspectorates for environmental protection,** which are subordinated to the voivodes within the framework of the territorial governmental administration. The Inspection is responsible for controlling compliance with the legal regulations and administrative decisions concerning environmental issues (including inspections of industrial plants), as well as for monitoring and assessment of the state of the environment (within the State Environmental Monitoring System) and upgrading procedures and methods in this field, also with regard to POPs. The **National Fund for Environmental Protection and Water Management** and the **voivodeship, *poviat* and *gmina* environmental funds** provide financial support for environmental activities. They also finance research and development projects, expertise and capital investment undertakings targeted at the reduction of POPs releases into the environment and environmentally sound treatment of POPs. The **State Environmental Protection Council** serves as an advisory and consultancy body, while various **research institutes** provide scientific background for the Minister of the Environment. Institutions subordinated to or supervised by the Minister of the Environment have also been involved in activities connected with the implementation of the Stockholm Convention. The **Institute of Environmental Protection** plays the leading role, in this respect, with its National Focal Point for the Stockholm Convention and the **National Emission Centre**, also operating within the Institute. The latter is responsible, *inter alia*, for collecting data on the 12 substances subject to the Convention. The Institute is also involved in preparing official reports about environmental impacts of plant protection products. The **State Geological Institute** in Warsaw is conducting work on POPs inventories in soil and underground waters and is carrying out activities on obsolete pesticide inventory and elimination of pesticide landfills throughout the country. The **Institute for Ecology of Industrialized Areas** in Katowice is conducting research on POPs releases into the environment, and the **Maritime Branch of the Institute for Meteorology and Water Management** is involved in measurements of POPs concentrations in river waters, bottom sediments and aquatic organisms.

The **Minister of Economy, Labour and Social Policy**[10] is responsible for creating favourable conditions, including proper legal basis, for economic development, covering the operation of enterprises and improvement of working conditions. The latter is linked to the elimination of adverse effects of hazardous substances, including POPs, from the working environment. The Minister is also responsible for actions related to the registration and labelling of PCB-containing equipment, development of decontamination plans, collection and registration of PCB-contaminated equipment. Furthermore, the Minister conducts feasibility studies to develop appropriate national technical capacity to decontaminate the equipment and provide sound treatment of PCBs. To carry out the above tasks, the Minister

[10] Currently – the Minister of Economy and Labour.

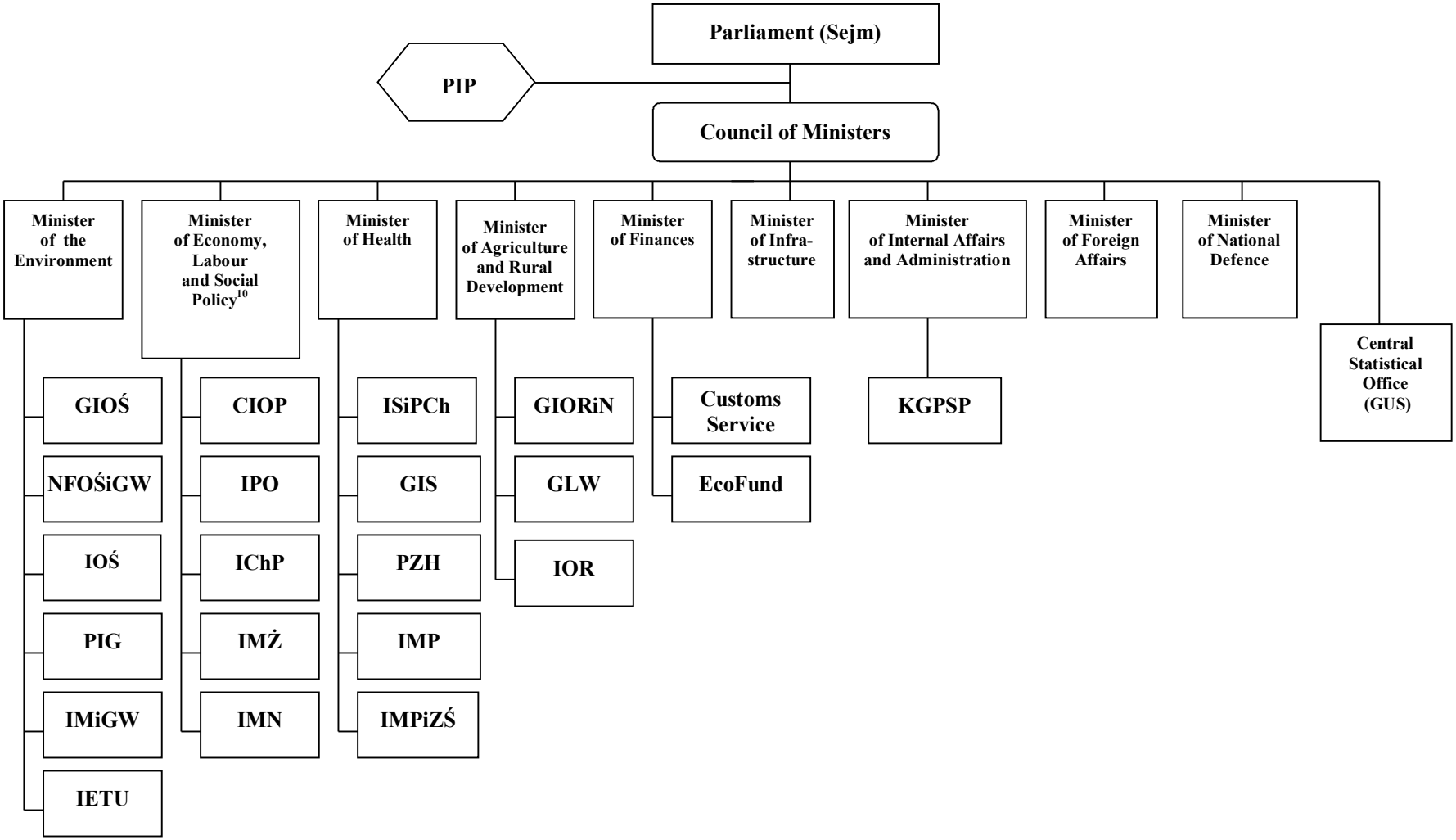

Figure 2.2.2.1. An institutional scheme for supervision and control of POPs in Poland (description of abbreviations in Annex 12)

cooperates with the National Emission Centre participating in the evaluation of POPs emissions from the industry. The **Central Institute for Labour Protection** conducts research on the impacts of harmful factors, including POPs-related effects on people at their workplace. The **Industrial Chemistry Research Institute** conducts research and development studies on process safety in the chemical industry, on POPs emissions, and POPs content in products. The **Institute of Industrial Organic Chemistry** is involved in research and development activities on pesticide synthesis, chemical safety, transportation of hazardous materials and chemical plant protection preparations. The **Institute of Ferrous Metallurgy** deals with methods of investigation and treatment technologies for waste from the metallurgical industry, as well as research on emissions of hazardous substances from smelting and combustion processes in the ferrous metallurgy. The **Institute of Non-Ferrous Metals** performs research activities concerning emissions of hazardous substances, including POPs, from the metallurgy and processing of non-ferrous metals.

The **Minister of Health** co-ordinates issues aimed at human health protection, including POPs effects on human health. The following agencies, subordinated to the Minister, are involved in the execution of these tasks:

- **Chief Sanitary Inspector**, whose task is to exercise the overall supervision of the country's sanitary state (covering POPs in foodstuffs, cleaning agents and other products used by people);
- **Inspector for Chemical Substances and Preparations** who maintains a register of chemical substances and preparations (except for pesticides and medicines) placed on the market (produced or imported);
- A number of research and development institutes, e.g. the **National Institute of Hygiene** in Warsaw, conduct research work on human exposure to different POPs levels in the environment and on relevant risk assessment. The Institute also plays an important advisory role to the health sector on POPs effects on humans. Two other centres – the **Institute of Occupational Medicine** and the **Institute of Occupational Medicine and Environmental Health** – are conducting research work concerning hazards to humans posed by environmental pollutions, particularly in the industrialized areas.

The **Minister of Agriculture and Rural Development** is responsible for the implementation of the governmental policy concerning agriculture (including plant protection products). The **Chief Veterinary Surgeon** determines major activity areas for the **Veterinary Inspection** and evaluates the safety of use of animal-originating products and their production requirements. He/she develops programmes and plans on, *inter alia*, monitoring of substances, which are not permitted for use, monitoring of chemical and biological residues in animal products, in waters and feedstuffs. The **Chief Inspector for Plant Protection and Seed Service** is in charge of supervision and control for, *inter alia*, pesticide marketing and use. The duty of registration of plant protection products placed on the market (produced and imported) has been entrusted to the **Bureau for Registration of Plant Protection Products** located at the **Institute of Plant Protection** in Poznań. The latter is the leading research and development centre for activities connected with the use of pesticides. Its Branch Office in Sośnicowice conducts research on the elimination of pesticide residues (including obsolete pesticide landfills).

The **Minister of Foreign Affairs** is coordinating international cooperation, including negotiations of multilateral agreements, and is responsible for their ratification procedures. He is also acting as a political coordinator of the GEF activities in Poland.

The **Polish Steering Committee for the Global Environment Facility** was established by the Ministry of Foreign Affairs in order to initiate strategic and programme consultations to determine priority areas of cooperation with GEF and to evaluate proposals of large projects submitted to the Global Environment Facility.

The Minister of Finances is responsible for the state budget and supervises public finances and financial institutions.

The **Ecofund Foundation** provides support for activities targeted at the improvement of the state of the environment in Poland. Additionally, it acts as an organisational focal point for the GEF, and supports operational activities of GEF related to medium and large projects.

The Customs Service, apart from tax duties, is mainly, responsible for customs control of the turnover of goods with foreign countries, for combating smuggling and for preventing customs fraud. It also controls compliance with national and international regulations related to restrictions and prohibitions in the transboundary goods turnover, and with the national customs policy instruments regulating the areas and levels of goods turnover with foreign countries (e.g. monitoring the execution of customs quota).

The **Minister of Internal Affairs and Administration** coordinates activities aimed at the improvement of security. The **National Headquarters of the State Fire Service** is responsible for actions of the fire brigades within the National Fire and Rescue System. These actions include carrying out controls, investigations and rescue services (in cases of fire, accidents and damage with the presence of hazardous substances or waste).

The **Minister of Infrastructure** is in charge, of urban and transport development, with regard to the principles of the National Environmental Policy, and undertakes legislative initiatives aimed, among others, at safe transportation of hazardous materials.

The **Central Statistical Office** provides access to statistical data obtained through statistical surveys. These data are collected within the framework of the public statistics system at the country level (Central Statistical Office – countrywide data) and at the voivodeship level (voivodeship statistical offices - regional data). Environmental data has been presented since 1972 in the form of annual GUS publication series "Ochrona środowiska" (Environmental Protection). This data does not cover all POPs subject to the Stockholm Convention.

The **National Labour Inspection** has been established to supervise and control compliance with the occupational law, especially with regard to the regulations and principles of labour safety and hygiene. All enterprises, including facilities using hazardous substances, are subject to control. The National Labour Inspection is reporting directly to the Parliament.

A list of institutions and organizations involved in POPs-related issues in Poland, identified under the GEF Project, is presented in Annex 6.

2.2.3. Relevant international commitments and obligations

Poland has signed or ratified over 40 global and regional environmental agreements, which include targets and objectives partly consistent with the objectives set by the Stockholm

Convention. Our country is active on the international forum and participates in activities undertaken to fulfil the obligations, *inter alia*, of the following multilateral agreements:

- ***Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal*** (Basel Convention, 1989), which came into force for Poland on 18 June 1992. Poland has developed and implemented a system for preventing and combating illegal transboundary movement of wastes. Work on developing the basis for implementing obligations aimed at hazardous waste minimization, within the framework of the Convention, is under way;
- ***Convention on the Protection of the Marine Environment of the Baltic Sea Area*** (Helsinki Convention – HELCOM, 1992), which came into force on 17 January 2000. Its main goal is to protect the maritime environment of the Baltic Sea from all sources of pollution, and to restore and safeguard its ecological balance. Its aim is to protect the water-body, seabed and living resources from land-based sources, ships and the air. The Convention covers the whole catchment area of the Baltic Sea. The Baltic ports have been obliged to accept all waste from ships. The "polluter pays" principle is executed with regard to the polluters. Special attention has been given to gradual elimination of pollutants from land-based sources and solving the problem of the so-called "hot-spots". The tasks are undertaken through international cooperation between all Parties to the Convention (Denmark, Estonia, the European Community, Finland, Germany, Latvia, Lithuania, Poland, the Russian Federation and Sweden);
- ***Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade*** (Rotterdam Convention, 1998) The Prior Informed Consent (PIC) procedure builds on the existing voluntary PIC procedure, operated by UNEP and FAO since 1989. It requires from the exporters of certain hazardous substances to obtain approval of the importing country before future shipment. This procedure became effective by adopting the Rotterdam Convention, which entered into force on 24 February 2004. The Convention covers pesticides and industrial chemicals that have been banned or severely restricted for health or environmental reasons by Parties and which have been notified by Parties for inclusion in the PIC procedure. Poland is planning to ratify the Convention;
- ***Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters*** (Aarhus Convention, 1998), which became effective for Poland on 16 May 2002. It links environmental rights and human rights and acknowledges that we owe an obligation to future generations. The Convention grants the public rights and imposes on Parties and public authorities obligations regarding access to information and public participation and access to justice. Poland actively participates in the work of the Conference of the Parties to this Convention and implements its provisions under the Act – Environmental Protection Law;
- ***Protocol on Persistent Organic Pollutants*** (Aarhus Protocol, 1998) to the Convention on Long-range Transboundary Air Pollution (LRTAP Convention, 1979). Its main objective is to control, reduce or eliminate discharges, emissions and losses of 16 POPs. The Protocol bans the production and use of aldrin, chlordane, chlordecone, dieldrin, endrin, hexabromobiphenyl, mirex and toxaphene, whereas others are scheduled for elimination at a later stage (DDT, heptachlor, hexachlorobenzene, PCBs). The use of DDT, HCH (including lindane) and PCBs has been severely restricted. Furthermore, the Protocol includes provisions for dealing with wastes and products that are banned. It also obliges

Parties to reduce their emissions of dioxins, furans, PAHs and HCB below the level of the reference year between 1985 and 1995 (1988 for Poland). For the incineration of municipal, hazardous and medical waste, it lays down specific limit values and recommends best available techniques (BAT) to reduce POPs emissions from new and existing stationary emission sources. The major categories of stationary emission sources have been specified. The Protocol also provides recommendations on POPs emission reduction measures for mobile sources. The Protocol became effective on 23 October 2003;

- ***Protocol on Pollutant Release and Transfer Registers*** (Kiev Protocol, 2003) to the Aarhus Convention), which has not yet entered into force. Its major objective is to enhance public access to information through the establishment of coherent, nationwide pollutant release and transfer registers (PRTRs). These registers containing, *inter alia*, data on at least 86 pollutants specified in the Protocol, including 12 substances subject to the Stockholm Convention, should be publicly accessible and free of charge.

2.2.4. Description of existing legislation and regulations addressing POPs

The legal acts that are described below are of key importance to the implementation of the provisions of the Stockholm Convention in the Polish law. Annex 2 presents, in a tabular form, a comparison of the Polish legal provisions with the obligations of the Stockholm Convention.

The **Act – Environmental Protection Law**[4] imposes an obligation to update periodically the "National Environmental Policy", develop a system of permits for emissions of energy and substances to the environment determining specific conditions in this matter, including the use of environmental quality standards, best available techniques and environmental monitoring, as well as terms for collection, processing and dissemination of information concerning the use of the environment. The provisions addressing reduction and elimination of substances exhibiting POPs characteristics are laid down under chapter entitled "Pollution prevention". The Act prohibits marketing and re-use of substances posing particular environmental threat (Article 160, paragraph 1). It classifies PCBs to be considered as such substances (Article 160, paragraph 2) and authorizes the Minister of the Environment to list other substances as particularly hazardous to the environment. Out of all the POPs covered by the provisions of the Stockholm Convention such a status in 2003 has been additionally given to aldrin, dieldrin, endrin and DDT[11].

The provisions of the Act – Environment Protection Law (Articles 137–151, 180–181 and particularly Articles 144, 145 and 146) enable undertaking activities specified in Article 5 of the Stockholm Convention targeted at the reduction or elimination of unintentional releases of POPs. Pursuant to Article 146 paragraph 2 of the Act a regulation will be enacted on gradual updating of emission standards with a view of making them stricter (Article 145) with regard to installations specified in Annex C of the Convention, and particularly those, which, according to the existing regulations, are not required to obtain integrated permits. Articles

[11] Regulation of the Minister of the Environment of 9 December 2003 on substances posing particular environmental threat (DzU of 2003 No. 217, item 2141).

77–80 of the Act provide for public information and education, in line with Article 10 of the Stockholm Convention.

Similarly, articles 25–30 of the Act promote scientific research, development and monitoring activities regarding POPs (Articles 11 of the Convention). The national environmental policy (Articles 13–16 of the Act) and environmental protection action plans (Articles 17 and 18 of the Act) ensure initiation and implementation of plans aimed at identification, reduction of release levels and elimination of the sources of POPs emissions (Articles 5 and 6 of the Convention).

Following the pattern of the European Union legislation, Part II of the Act – Environmental Protection Law, entitled "Pollution combating" sets forth the rules, important in terms of the provisions of the Convention, concerning installations, equipment, substances and products. Referring to installations and equipment the Act requires that their use or operation should not exceed emission standards in force and that the impact of installations or equipment should not cause considerable worsening of the state of the environment or threatening human life or health. This is an outstanding interference into production processes and industrial production facilities. Poland was the first country to apply this idea in such a form.

The Act is expanding the list of permits used to-date for the operation of installations by introducing integrated permits, connected with the implementation of the EU IPPC Directive[12], and thus creates the legal basis for the use of best available techniques (BAT) in the industry. The importance of that regulation requires some explanation. For a number of years an annual inventory of unintentional emissions of PCDDs, PCDFs, PCBs and HCB has been carried out in Poland. This inventory takes into account specific production installations capable of performing waste incineration, their capacities and their technical state. The IPPC Directive, like the Act – Environmental Protection Law, covers all production facilities and waste incineration plants, which according to the current state of knowledge, release four substances listed in Annex C to the Stockholm Convention into air, and through generated wastewater, wastes and manufactured products. The same four substances are listed in the Annexes to the IPPC Directive, the emission of which should be reduced. Introduction of integrated permits and the BAT system is important for the implementation of the Stockholm Convention.

Moreover, the Act – Environmental Protection Law, under its Chapter IV, regulates the issues of preventing industrial accidents. It defines accurately the legal instruments concerning prevention of major industrial accidents, the duties of the managerial bodies of the facilities/plants likely to cause industrial accidents and the duties of the administrative bodies linked with such accidents. It should be emphasised that industrial accidents may, in some instances, unintentionally cause formation of the above-mentioned substances classified as POPs. These regulations are synonymous with the introduction to the Polish economic practice of the provisions of the so-called SEVESO II Directive[13].

Currently matters related to the use of plant protection products are regulated in detail by the **Act on Plant Protection**[7]. The Regulation of 5 March 2002 on detailed rules for granting

[12] Council Directive 96/61/EC of 24 September 1996 concerning integrated pollution prevention and control; O.J. L 257, 10/10/1996.

[13] Council Directive 96/82/EC of 9 December 1996 on the control of major hazards involving dangerous substances; the so-called SEVESO II Directive; O.J. L 10, 14/1/1997.

permits admitting plant protection products to marketing and use[14] specifies 63 biologically active substances contained in pesticides that are prohibited for use. All substances, subject to the Stockholm Convention, are also listed there. On this basis it may be concluded that the use of pesticides containing biologically active substances covered by the Convention is legally prohibited in Poland. And thus, no preparations containing these substances are produced, imported or exported from our country. The aforementioned legal acts reflect earlier amended relevant regulations, which have been enacted for the first time in 1961. Since then only substances not containing POPs are used in the production of plant protection preparations in Poland.

The **Act on Chemical Substances and Preparations**[6] lays down specific conditions and sets prohibitions or restrictions for production, marketing and use of chemical substances and preparations in order to prevent the negative effects of these substances and preparations on human health or the environment. It introduces a classification of substances based on human health and environmental threat criteria, and safety data sheets for substances as an indispensable condition for their marketing and use. Furthermore, the Act establishes a post of an Inspector for Chemical Substances and Preparations, reporting to the Minister of Health. This Act indicates administrative bodies competent for setting rules on human health and environmental risk assessments, introduces an obligation to notify the inspector about hazardous preparations to be placed on the market within the Polish territory and the testing obligations regarding chemical substances and preparations, and provisions for their labelling, packaging, marketing and use.
Pursuant to Article 31 of the above-mentioned Act the Minister of the Economy, on request of the Minister of Health or the Minister of the Environment, is authorised to enact a regulation on restrictions, prohibitions or conditions for:

- Production, marketing or use of specified substances or preparations,
- Specific applications of these substances or preparations,
- Specific uses of such substances or preparations in concentrations or proportions exceeding certain levels,

in cases, when production, marketing or use of these substances or preparations is proved to pose particular threat to human health or the environment, or when it is required by international agreements.

The Act states that in cases required by international agreements, the production, marketing or use of hazardous substances and preparations need permission of the Minister of the Economy.

In view of incorporating the provisions of the Stockholm Convention into the Polish law, Article 31 of this Act is considered to be particularly important. Implementation of its provisions will meet the obligations of Article 3 of the Convention.

The provisions of the Act on Chemical Substances and Preparations are regarded to be coherent with the requirements essential to fulfil the obligations laid down by the Convention,

[14] Regulation of the Minister of Agriculture and Rural Development of 5 March 2002 on detailed rules for issuing permits for the placing on the market and use of pesticides (DzU of 2002 No. 24, item 250; of 2003 No. 18, item 162 and of 2004 No. 16, item 162) – repealed by Community Regulation[68] since Poland has become a member of the EU (1 May 2004).

providing the Minister of Economy fulfils his/her authorization in line with Article 31 of the Act.

Act on Waste. According to the provisions of the Stockholm Convention any stockpiles of substances or preparations containing substances listed in its Annex A and Annex B are regarded as waste in countries becoming Parties to the Convention. Pursuant to the Act on Waste[5] all these substances have been classified as hazardous waste, providing that the concentrations of the controlled substances exceed certain threshold values. For PCBs the threshold concentration is 0005%, pursuant to Article 3, paragraph 17 of the Act – Environmental Protection Law, and for other substances the provisions of Annex 4 of the Act on Waste are in force (the so called risk phrases "R")[15].

Specific requirements in relation to POPs waste are defined in Article 6 of the Stockholm Convention. These provisions refer to the requirement of irreversible transformation of the substances in the process of waste destruction, and do not allow for recycling, recovery or direct reuse. The Act on Waste prohibits recovery of PCBs as set forth in its Article 38, paragraph 1, however, admission of the D9 process as a possible waste treatment method, pursuant to Article 38, paragraph 5 of this Act is somewhat problematic.

Legal provisions concerning releases of POPs into water and soil are also included in the **Act – Water Law**[9] and its executive acts – regulations. The Water Law lays down, *inter alia*, generals principles for water management, including, setting orders, prohibitions and restrictions aimed at maintaining good environmental quality of waters.

In terms of implementing the provisions of the Stockholm Convention, of particular importance is the obligation addressed by the Act to all water users, to comply with the requirements concerning the quality of wastewater discharged into water bodies or soil. These requirements cover also some of the substances subject to the Convention. Additional standards to be complied with by wastewater discharged into water bodies are laid down by executive regulations issued by the Minister of the Environment pursuant to Article 45, paragraphs 1–2 of the Act – Water Law. From the analysis of these regulatory acts it may be concluded that the concentrations of substances controlled in wastewater are regulated in four ways, by:

- Establishing unconditional prohibition to discharges of certain substances controlled by the Convention (DDT and PCBs) into water and soil – Article 41, paragraph 1b of the Water Law,
- Setting permitted amounts of substances, which may be released with treated industrial wastewaters, per unit of raw material or fuel used, or per final product; standards for aldrin, dieldrin, endrin and HCB in this respect are set by a special Regulation of the Minister of the Environment[16];
- Determining maximum permitted levels of aldrin, dieldrin, endrin and HCB concentrations in treated industrial wastewater; standards in this respect are set by a

[15] Since 1 May 2004, i.e. the day on which Poland became a member of the EU, relevant Community regulation has been in force[68].

[16] Regulation of the Minister of the Environment of 31 January 2003 on permitted amounts of substances, which may be discharged with industrial wastewater (DzU of 2003 No. 35, item 309).

Regulation of the Minister of the Environment[17] (the provisions of this Regulation entered into force on 1 January 2003);

- Determining maximum permitted pollution standards for industrial wastewater originating from stack gas cleaning processes and processes of thermal transformation of waste; these standards are set for dioxins and furans in the form of dioxin and furan totals (or sums) pursuant to the above-mentioned Regulation[17], but they will not become effective until 28 December 2005.

Review of the legal acts, presented in Annex 2, to which reference has been made above, proves that, in principle, the Polish legal system does not contain any provisions that could make the implementation of the Stockholm Convention impossible, on the contrary it is consistent with the spirit of the Convention. However, full implementation of the provisions of the Convention will be possible after a number of executive regulations to the above mentioned parliamentary acts are issued, while some Polish regulations, incoherent with the Convention, are eliminated (Chapter 3.3.1).

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

On the basis of the provisions of the environmental legislation[4,11] placing on the market or reuse of substances posing particular threat to the environment is prohibited in Poland. The following substances subject to the Stockholm Convention have been listed as belonging to that category:

- PCBs,
- DDT,
- Aldrin,
- Dieldrin,
- Endrin.

Substances posing particular environmental threat must be used, transported and eliminated under special safety conditions. Installations or equipment containing such substances should be decontaminated or disposed of in an environmentally sound manner. Substances still in use are subject to gradual elimination (PCBs by 2010).

The user of the above substances is obliged to maintain a record on the types, amounts and places as well as methods of elimination of these substances, and report this information to the voivode, on a regular basis. Such information is also submitted, in a simplified form, by private persons to the chiefs of *gminas (wójt), burmistrz* or the city president. Voivode maintains a register of these substances.

[17] Regulation of the Minister of the Environment of 29 November 2002 on conditions for discharging wastewater into water bodies or soil and on substances particularly harmful to the aquatic environment (DzU of 2002 No. 212, item 1799).

The ways of handling the eliminated substances, as well as installations and equipment containing these substances are laid down, in detail, in the Act on Waste[5]. Detailed requirements regarding PCBs are presented in Chapter 2.3.2.

The Act – Environmental Protection Law sets certain conditions for introducing the substances into the environment. Exploitation of an installation causing, *inter alia*:

- Releases of gases or dust into the air,
- Discharges of wastewaters into water bodies or soil,
- Generation of waste

is permitted in Poland after obtaining a permission.

Environmental authorities may grant the following types of permits:

- an integrated permit,
- a permit for gas or dust releases into the air,
- a water permit for discharging wastewater into water bodies or soil,
- a permit for generating waste.

An installation likely to cause adverse effects on the environment is subjected to notification to an environmental authority, even if its emission does not require obtaining a permit. Notification procedures with regard to waste generation are established pursuant to the Act on Waste.

Exploitation of an installation or equipment should not exceed emission standards and air quality standards. It should not cause worsening of the state of the environment and human life or health risks. The technology used in the newly operated or significantly modified installations and equipment should meet the requirements laid down, with due account of the product full life-cycle.

The operator of an installation and the user of equipment is obliged to carry out periodic or continuous measurements of emission levels, depending on the amount of substances or energy released. The Regulation of the Minister of the Environment[18] specifies substances (including dioxins and furans), for which measurements are mandatory, reference measurement methods (for dioxins and furans pursuant to the Polish Standard: PN–EN 1948–1,2,3) and procedures for keeping record of the measurements performed.

Legal regulations determine the levels of charges for making use of the environment and levels of fines for exceeding the environmental requirements laid down in relevant decisions. The levels of such charges and fines, which are mandatory in 2004, for persistent organic pollutants are presented in Chapter 3.3.1.

Releasing into the environment substances that are produced, used or transported is permitted only to the extent essential for carrying out the undertaken activity. Furthermore, placing substances on the market requires:

- Packing the substances in a way that prevent accidental leakage into the environment,

[18] Regulation of the Minister of the Environment of 13 June 2003 on requirements for emission measurements (DzU of 2003 No. 110, item 1057).

- Providing information to enable identification of risks deriving from releases of these substances into the environment and determining measures to minimise the damage.

In accordance with the environmental law products should bear information on their environmentally safe handling, use, dismantling, reuse or disposal. When placing on the market both the product and its packaging should be comply with environmental requirements.

Detailed rules concerning the placing on the market of substances, including plant protection preparations and biocidal products are presented in Chapters 2.3.12 and 2.3.13. It should only be emphasised here that:

- since 1961 a ban on the use of different substances covered by the Stockholm Convention has been gradually introduced in the field of plant protection,
- for the last over 25 years only substances and preparations not containing persistent organic pollutants have been used for the production of pesticides,
- it is mandatory to obtain a permission from the Minister of Agriculture and Rural Development for the use of each preparation; such permits are subject to periodic updating and publishing,
- execution of the law in force and compliance control by designated institutions are subject to relevant regulations.

Compliance control for the provisions of the Act on Chemical Substances and Preparations and the Act on Biocidal Products concerning the marketing and use of substances is executed by the Sanitary Inspection with:

- the Environmental Protection Inspection – with regard to environmental threats,
- the National Labour Inspection – with regard to supervision and control of the employers,
- the Trade Inspection – with regard to labelling of packaging in wholesale and retail trade,
- the State Fire Service – with regard to proper labelling of places where the substances and preparations are stored,
- the Border Guards and the Customs – with regard to the import of substances and preparations into the territory of Poland.

The Inspection for Plant Protection and Seed Service is, *inter alia*, responsible for the monitoring of compliance with the provisions of the Act on Plant Protection and for issuing decisions and executory acts.

Sanctions are imposed on those who, *inter alia*:

- Place on the market a preparation posing unacceptable risk to the human health and the environment, or who violates the conditions of its marketing specified in relevant decisions,
- Place on the market hazardous substances or preparations:
  - without labelling or labelled inadequately,
  - without the required safety data sheet,

- Fail to notify the Inspector for Chemical Substances and Preparations about new data on human health and environmental impacts of a new substance or about its new uses,
- Place on the market a new substance in its own form or as a constituent of a preparation, without notification required under the Act,
- Submit an incomplete or unreliable safety sheet,
- Promote a hazardous substance failing to indicate the class of danger connected with this substance,
- Place on the market a biocidal product failing to obtain a permit or to submit the product to the register, or does not fulfil the provisions laid down in the permit or in the register,
- Place on the market a biocidal product without the required packaging or labelling,
- Undertake activities connected with retail sales or marketing of pesticides failing to obtain the required valid special course certificate,
- Sell pesticides, classified as very toxic and toxic to humans, to persons, who are not in possession of a valid course certificate, which is required for the use of such substances,
- Fail to keep a record of the purchasers of pesticides classified as very toxic or toxic to humans, or fails to store the record for a period of two years,
- Sell pesticides in places where food and feed are also being sold,
- Sell pesticides in packaging not bearing a valid label – instruction of use,
- Use pesticides not permitted for marketing or violating the label-instruction of use,
- Apply forbidden pesticides to plants cultivated within water abstraction protection zones or in spa areas, and in national park and nature reserves surroundings,
- Fail to maintain a record of operations carried out with the use of pesticides or fails to store the record for a period of two years,
- Use pesticides or cultivates plants violating prohibitions, restrictions or conditions established by the voivode.

2.3. Assessment of the POPs issue in Poland

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

Two basic terms are used in this chapter in relation to pesticides depending on the forms of their appearance in production – the term “substance” and the term “preparation” (see Annex 12).

POPs found in different production processes and articles in Poland originated from the following four basic sources:

- Domestic production of chemical substances,
- Import of substances not produced within the country,
- Domestic production of preparations (final forms) of pesticides,

- Import of preparations (final forms) of plant protection products (pesticides).

Production

Toxaphene. Toxaphene is a mixture of compounds produced in the process of chlorination of terpenes or camphene. In both cases toxaphene represents a mixture of substances containing various concentrations of chlorine, and with reference to chlorination of terpenes, also a mixture of chlorine derivatives of different terpenes.

According to the Statistical Yearbooks of the Chemical Industry the chlorinated terpenes were produced in 1961 and 1962 under the name of *Terpentol*. This production can be regarded as experimental, since the output in 1961 was 25 Mg and only 15 Mg in 1962. The product of the terpene chlorination was subsequently processed into a preparation called *Terpentol plynny* (meaning "liquid Terpentol"). It contained 60% of chlorinated terpenes. Forty tonnes of chlorinated terpenes (toxaphene) was produced in total.

The Chemical Works ORGANIKA–AZOT in Jaworzno used to produce a preparation called *Kamfochlor* based on toxaphene, but representing the chlorinated camphene. The Statistical Yearbook of the Chemical Industry, however, does not mention the fact that chlorinated camphene was produced. This may suggest that it was produced with the use of imported toxaphene or that there was some kind of a mistake in the course of registration and it was *Terpentol* originating from the ROKITA chemical works that was processed into the ready-to-use form.

Other pesticides. The Polish chemical industry conducted some experimental studies aimed at possible industrial scale manufacturing of aldrin, dieldrin and hexachlorobenzene, but such a production of these substances has never been launched.

The production of pesticides covered by the Stockholm Convention has taken place in Poland from 1948 until 1978. A list of preparations produced is presented in Table 2.3.1.1. As it may be concluded from data presented in this table, from the substances subject to the Stockholm Convention, the following three were used as active substances by the Polish chemical industry for the production of pesticides:

- dieldrin,
- hexachlorobenzene (HCB),
- toxaphene.

Of all these substances dieldrin and hexachlorobenzene have never been produced by the Polish chemical works. Also other substances, covered by the Stockholm Convention, i.e. aldrin, chlordane, endrin, heptachlor and mirex have not been used in Poland for pesticide production.

Only three Polish chemical plants produced preparations containing POPs subject to the Stockholm Convention, i.e. the Chemical Works ORGANIKA–AZOT in Jaworzno, the Chemical Works GAMRAT in Jasło and the Organic Industries ROKITA in Brzeg Dolny.

Since the mid-seventies of the last century Poland has not been producing any of the substances listed in Part I of Annex A and such a production is not planned.

Hexachlorobenzene appeared in the chemical industry as an intermediate in the production of vinyl chloride and solvents in a closed system at a limited area and as such is not subject to

inventorying. HCB was also released unintentionally in the production of chlorobenzenes, pentachlorophenol, MCPA, 2,4-D, organochlorine solvents and in experimental production of 2,4,5-T and in copper production.

Table 2.3.1.1. A list of domestic pesticide preparations admitted for use and the declared shares of the active substances in the preparations

Name of preparation	Producer	Content of active substance [%]
DIELDRIN		
Dieldrin mix (*Mieszanka dieldrynowa)*	Ch. W. ORGANIKA–AZOT	2.7% of pure dieldrin
HCB		
Śnieciotoks 40	Ch.W. ORGANIKA–AZOT	40% of hexachlorobenzene
TOXAPHENE		
Kamfochlor	Ch.W. ORGANIKA–AZOT	10% of chlorinated camphene
Liquid Terpentol (*Terpentol płynny*)	ROKITA	60% of chlorinated terpenes

Use. The substances specified in Part I of Annex A of the Convention have been mainly used for plant protection. Polish pesticide consumption in the 70s and 80s amounted to 1 kg of an active substance/ha. Compared to other European countries this level was rather low.

Issues concerning the admission of pesticides for marketing and use in Poland were legally regulated by the Act on Plant Protection Against Diseases, Pests and Weeds[19], published for the first time in 1961. At that time, this Act was not prohibiting production and use of chloroorganic compounds, now-a-days classified as persistent organic pollutants. Since 1966 lists of plant protection products permitted for marketing have been published[20] by the Official Journal of the Ministry of Agriculture (*Dziennik Urzędowy Ministerstwa Rolnictwa*). Table 2.3.1.2 presents information, based on these lists, on the periods during which preparations containing POPs were used. These data facilitate the evaluation of the age of the unused preparations found in small quantities in warehouses, but mainly in waste landfills (Chapter 2.3.5).

Aldrin was permitted for use only in 1962 and in very small quantities. Preparations containing aldrin were not admitted for marketing in Poland after 1975. Preparations containing dieldrin were phased out from marketing also after 1975, whereas an endrin-containing preparation was phased out in 1972. A preparation produced on the basis of heptachlor was permitted for marketing only in 1966. Of all domestic preparations (Table 2.3.1.1.) the one containing HCB was used for the longest period of time. It has been for the last time permitted on the market in 1978. Imported preparations containing toxaphene

[19] DzU of 1961 No. 10, item 55.

[20] Until the beginning of the 90s, except for 1981-1983, information about the form, composition and the producer of a preparation was given.

(produced in East Germany) have been phased out from use in 1987. Other preparations were phased out much earlier, for the majority of them after 1971. Chlordane and mirex have never been permitted for marketing in Poland. Mirex has only been used in insignificant amounts for experimental studies on plant protection products.

In 1965 as much as 91 out of 190 preparations (about 50%) were chloroorganic compounds. During the subsequent years their share was declining reaching in 1994 only 20%. Unfortunately, this information does not reflect the situation with all POPs, as preparations containing e.g. MCPA and 2,4-D, which are also chloroorganic compounds, are still being used. Determination of their share in the group of chloroorganic compounds is practically impossible.

Table 2.3.1.2. Periods for which marketing of pesticides containing substances subject to the Stockholm Convention was permitted

Substance	Period of permitted marketing
Aldrin	Until1975
Chlordane	Not permitted for marketing in Poland
Dieldrin	Until 1975
Endrin	Until1972 in a mixture with aldrin (Arrex M)
Hexachlorobenzene	Until 1978 (note: “until exhaustion of stocks”); it is a decomposition product of Quintocene which was permitted for marketing until 1986
Heptachlor	Only until1966
Mirex	Not permitted for marketing in Poland
Toxaphene	Withdrawn starting from 1970 (since 1971 domestic production has stopped); imported preparations finally withdrawn in 1987

Import. Pesticide preparations were imported between 1961 and 1978 from the European countries, i.e. Austria, Denmark, the Netherlands, Yugoslavia, East Germany (GDR), West Germany (FRG), Switzerland and the United Kingdom. Detailed qualitative data concerning that import is presented in Table 2.3.1.3. No information is available on the imported quantities (apart from aldrin). The aforementioned table proves, there was no import of preparations containing chlordane, hexachlorobenzene or mirex, subject to the Stockholm Convention. Aldrin was imported only in 1962 (19.2 Mg). Dieldrin was presumably imported in the form of a 90% concentrate and processed into a commercial dieldrin mixture containing 2.7% of pure dieldrin.

Persistent organic substances listed in Part I, Annex A of the Stockholm Convention have never been subject to **export** in the past and are not exported from Poland at present.

Table 2.3.1.3. List of imported pesticide preparations allowed for use in Poland and the declared shares of active substances contained therein.

Name of preparation (original)	Producer	% of active substance
ALDRIN		
Aldrin 2.5	Schering (FRG) Nordisk Alkali (Denmark)	2.5% aldrin
Aldin 5	Schering (FRG) Chromophos (Yugoslavia)	5% aldrin
Arrex M	CELA (FRG)	8% aldrin; 25% endrin
Argonex TA	CELA (FRG)	22.3% aldrin; 49% tiuram
Liro Thiraldin	Ligtermoet Zoon	23% aldrin; 48% tiuram
DIELDRIN		
Alvit 55	Schering (FRG) Nordisk Alkali (Denmark)	90% Technological dieldrin
Dieldrex B	Shell (England)	75% dieldrin; 10% tiuram
Binasin	Merck (FRG)	dieldrin
Colotox	Sandoz (Switzerland)	1% dieldrin; 8% Cu compounds
ENDRIN		
Arrex M	CELA (FRG)	8% aldrin; 25% endrin
HEPTACHLOR		
Agronex hepta	CELA (FRG)	25% heptachlor
TOXAPHENE		
Liro Toxaphene 10	Ligtermoet Zoon (the Netherlands)	10% chlorinated camphene
Melipax Spritzmittel (liquid)	VEB Fahlberg list (GDR)	60% chlorinated terpenes
Melipax Staub (powder)	VEB Fahlberg list (GDR)	10% chlorinated terpenes
Melipax Aerospruhmittel (for fogging)	VEB Fahlberg list (GDR)	40% chlorinated terpenes
Toxaphene 50	Serum Zavod Kalinovia (Yugoslavia)	50% chlorinated camphene
Toxaphene 10	Merck, Schacht (FRG)	10% chlorinated camphene
Toxaphene 10	Luxan (the Netherlands)	10% chlorinated terpenes
Toxaphene 10	Ligtermoed Zoon-Luxan (the Netherlands)	10% chlorinated terpenes
Toxaphene 10	Linz (Austria)	10% chlorinated terpenes
Toxaphene 20	Merck, Schacht (FRG)	20% chlorinated camphene

Existing policy and regulatory framework. The Regulation of the Minister of Agriculture and Rural Development on detailed rules for granting permits admitting plant protection products for marketing and use[14] lays down the principles of marketing substances specified in Part I, Annex A of the Convention. Annex 9 of that Regulation entitled "Biologically active substances banned from use as constituents of plant protection products in Poland" includes all bioactive substances of plant protection products covered by the Stockholm Convention.

Permissible concentrations or content levels of these substances in different media are presented in Table 2.3.1.4 (with regard to aldrin, dieldrin, endrin, chlordane, heptachlor) and in Table 2.3.4.10 (with regard to HCB and PCBs).

Table 2.3.1.4. Permissible concentrations or contents of substances listed in Part I of Annex A of the Stockholm Convention regulated by the Polish law

Media or products	Permissible concentration or content
Drinking water[21]	0.03 µg/dm^3 (for aldrin, dieldrin) 0.10 µg/dm^3 (for other pesticides) 0.50 µg/dm^3 (for the sum of all parameter values of determined pesticides)
Soil or ground[22]	0.0025 mg aldrin/kg d.m., 0.001 mg endrin/kg d.m. and 0.0005 mg dieldrin/kg d.m for protected areas 0.025 mg aldrin/kg d.m., 0.01 mg endrin/kg d.m. and 0.005 mg dieldrin/kg d.m. for agricultural land 0.25 mg aldrin/kg d.m., 0.1 mg endrin/kg d.m. and 0.5 mg dieldrin/kg d.m. for industrial and traffic areas
Industrial waste waters[23] discharged into the sewage system	0.05 mg/l (aldrin, dieldrin, endrin);
Industrial waste waters[17] discharged into water bodies or to the ground	0.01 mg/l (aldrin, dieldrin, endrin)
All feedstuff[24]	0.01 mg /kg (aldrin, dieldrin, endrin) and 0.02 mg/kg (chlordane) in relation to feed containing 12% of water
- except fats	0.2 mg/kg (aldrin, dieldrin, heptachlor) and 0.05 mg/kg (chlordane and endrin) in relation to feed containing 12% of water

Summary of available monitoring data and health impacts. In the last decade POPs concentration levels in Polish rivers have been rarely examined (Table 2.3.1.5).

[21] Regulation of the Minister of Health of 4 September 2000 on requirements for drinking and bathing water and water intended for economic activity, and principles for water quality control by the Sanitary Inspection bodies. (DzU of 2000 No. 82, item 937).

[22] Regulation of the Minister of the Environment of 9 September 2002 on soil quality standards and land quality standards (DzU of 2002 No. 165, item 1359).

[23] Regulation of the Minister of Infrastructure of 20 July 2002 on detailed rules concerning the delivery of industrial waste waters and conditions for discharging waste waters into the sewage system (DzU of 2002 No. 129, item 1108).

[24] Regulation of the Minister of Agriculture and Rural Development of 22 October 2003 amending the regulation on permissible content of undesired substances in feedstuff (DzU of 2003 No. 192, item 1880).

Table 2.3.1.5. Concentrations of selected POPs in surface waters of Poland [ng/l]

Measurement location	Year	Endrin	Chlordane	Heptachlor	HCB
Vistula Mouth (Kiezmark)	1991–1992	–	0.004–0.019	0.0021– 0.020	0.0076–0.05
Mała Panew River	1999	69	–	–	–

– lack of data.

Since there is a lack of complete information on POPs concentrations in waters discharged from the Polish territory into the Baltic Sea, and particularly with regard to concentrations of all pesticides controlled by the Stockholm Convention, a pilot study was carried out on the respective concentrations in the Vistula and Oder Rivers' sections close to their mouths [3]. Samples were taken in July 2002, when the water flow in the Vistula River was near the multi annual average, and the flow in the Oder River about 20% higher than the mean value. Results of these measurements are presented in Table 2.3.1.6. This data proves that in spite of the fact that chloroorganic pesticides have not been used in Poland since many years, all of them are detected in river waters (5 compounds), in bottom sediments (7 compounds) and in living organisms (8 compounds).

Table 2.3.1.6. Maximum recorded concentrations of chloroorganic pesticides at the estuaries of the Vistula and Oder Rivers in 2002

Compounds	River water [ng/l]	Bottom sediment [ng/g d.m.]	Fish [ng/g fat]
HCB	4.3	3.3	23.2
Heptachlor	27.9	94.6	0.7
Cis Chlordane	not detected	3.6	52.4
Trans Chlordane	not detected	13.4	not detected
Aldrin	15.3	10.3	16.9
Dieldrin	2.5	7.4	81.3
Endrin	not detected	1.5	1.1
DDT	53.2	2.4	25.3
Toxaphene	not detected	not detected	8.9
Mirex	not detected	not detected	not detected
Sum of pesticides in the most polluted sample	53.2	102.8	181.0

The Włocławski Reservoir situated at the 675 km of the Vistula River is particularly interesting with regard to POPs concentrations in bottom sediments. It retains pollutants transported from Upper Silesia, Krakow and Warsaw urban agglomerations up to Płock in bottom sediments. The drainage basin area covers about 170 000 km^2, which makes 45% of the country's territory.

Detailed investigations of some chloroorganic substances in bottom sediments of the Włocławski Reservoir were carried out in 2000 [22]. The results of these measurements are summarised in Table 2.3.1.7.

A comparison of the average values for aldrin, dieldrin and endrin, included in Table 2.3.1.7 with the limit values in force[22] (Table 2.3.1.4) indicates that for agricultural and forest land as well as for residential and recreation areas (the latter dominate in the region concerned), the permissible levels in the bottom sediments of the Włocławski Reservoir have not been exceeded.

Table 2.3.1.7. The contents of substances subject to the Stockholm Convention in the bottom sediments of the Włocławski Reservoir, according to PIG

Substances	Average content [ng/g d.m.]
Aldrin	0.322
Dieldrin	0.042
Endrin	0.543
Heptachlor	2.795

Information on HCB concentrations in animal and plant products and on HCB health impacts is presented in Chapter 2.3.4.

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

Production. Polychlorinated biphenyls (PCBs) have never been produced in Poland in a technical scale. Only at the beginning of the 70s the Nitrogen Works in Tarnów attempted to launch PCB production at a semi-technical scale. They ended up with 679 Mg of a product called *Tarnol*, which due to low chlorination level, did not satisfy the requirements of isolation liquids used in electrical equipment. The properties of *Tarnol* were similar to the trade products of foreign manufacturers, such as: Aroclor 1248, Clophen A 40, Phenoclor DP-4, Fenchlor 42 and Kanechlor 400. It was mainly composed of trichlorobiphenyls, but this product also contained bi-, tetra-, and pentachlorobiphenyls. Presumably, the whole amount produced has been safely disposed of.

The ERG Works in Ząbkowice Będzińskie also produced PCBs under the commercial name of *Chlorofen*, which was mainly composed of the derivatives of biphenyl, containing from five to nine atoms of carbon per PCB molecule. *Chlorofen* was used in coal mining, presumably as a fireproof hydraulic fluid. However, no information is available about the volume of PCB production.

In total only small amounts of PCBs were produced in the past.

Capacitors containing PCBs were produced by 3 enterprises: EMIT Żychlin (1950–1980), ELTA Łódź (1956–1982) and FT&AT Manufacturing Capacitors MIKOŁÓW (production period impossible to determine). In 1968–1982 the ZWAR Works Warszawa produced capacitors with PCB saturants and oil switches, which are likely to contain PCBs or PCB-

contaminated oils. Furthermore, also WIEFAMEL may have produced resistance starters and BK Dymitrow/Warszawa – capacitors with PCBs.

At present, there is no PCB production in Poland, and PCBs are not used in new domestic or imported equipment.

However, there was considerable **import** of these substances in the past, as they were used as components of oils in electro-technical equipment and installations. Also, PCB-containing equipment was imported. There is no documentary on other possible uses of PCBs in Poland.

Export for the purpose of safe treatment is currently executed in relation to the eliminated equipment filled with PCB-contaminated mineral oils, or to PCBs themselves.

Inventory. Estimation of the amount of PCB-containing equipment found throughout the country was extremely difficult, because the former producers did not attach labels to their products with information on PCB content. Most of them were produced in the 60s and 70s, but some also earlier or later. A lot of equipment containing PCBs is still in use. Some of it as end-of-life equipment is found in storehouses, abandoned factories, in scrap yards, waste landfills, and in many places hard to define.

The first attempt made to investigate the problem of PCB amounts was an inventory of these substances found in electrical equipment used in the public power sector [8]. The survey has been carried out in 1994 by the Institute of Energy in the form of a questionnaire. It covered all the enterprises with large transformers and capacitors. Additionally, the Institute verified the content of PCBs in selected transformers. Finally, the review covered 33 energy enterprises, and 25 power and heating plants. Altogether, the inventory resulted in 44423 capacitors containing around 27 Mg of saturants with PCBs.

This partial inventory allows for the following conclusions:

- High-capacity transformers do not contain PCBs or PCB-contaminated oil,
- Distribution transformers, used in the public energy sector, in practice, also do not contain PCBs, however it is very likely that in the industrial energy sector, especially in the imported technology systems for the chemical, cable, metallurgical or mining industry, there may have been cases of using transformers filled with PCBs,
- Capacitors with PCB-containing saturants, both produced in Poland and imported, are still exploited in the public and industrial energy sectors.

The second inventory carried out in 1995–1997 in the south-western part of Poland covered 380 enterprises (facilities). Its results are presented in Table 2.3.2.1.

The results obtained on the basis of a review of PCB "resources" in Poland indicate the following:

- There are PCB stockpiles stored in liquid form with differing, but relatively high concentrations (1–100%), either not used in the past, or becoming waste of the phased out, discarded, dismantled equipment, mainly from the energy sector.
- There are multi-sized energy installations – high-weight transformers – functioning with the use of electroinsulating liquids either containing or not containing PCBs, but not decontaminated. They may still contain certain amounts of PCBs after being filled with new types of liquids.

- Capacitors contaminated with PCBs are the most important problem in Poland. Practically, all evaluated installations had capacitor batteries installed, at present or in the past. Although they represent a group of small-sized equipment with a 10–20% content of electro-insulating liquid in the total mass, but it is their quantity, spatial dispersion and waste handling, which are usually deposited in landfills, that make the major problem.
- No presence of PCBs has been observed in the hydraulic machines, such as compressors, vacuum pumps, nevertheless they may still be present in certain sectors, which have not been covered by the inventory – in the mining industry, aviation and military industry.
- It is very unlikely to find in Poland articles, for the production of which PCBs were used in the past, such as paints, impregnating preparations used in paper and leather industry, plastificators for plastics, softeners for rubber, heat carriers.
- Moreover, PCBs may be present in soil, ground waters and water reservoirs due to their historical use for over several decades and their uncontrolled release into the environment.

Table 2.3.2.1. Results of PCB source inventory in South-Western Poland

Equipment	Pieces of equipment	Oil quantity [Mg]
Transformers, including the ones with PCBs	24 674 69	25 720.9 85.1
Capacitors, including the ones containing PCBs: • in use • discarded	34 055 11 004 611	317.3 109.4 3.6
Other electric power installations	18 340	2749.9

Source: [53].

A subsequent analysis and an in-depth review of PCB stocks was carried out in 2001, with the aim of preparing an implementation plan for Directive 96/59/EC[25]. The results of this review, which are presented in Table 2.3.2.2, do not reflect the present status, but only provide some estimation on the expected amounts of waste after PCBs are finally withdrawn from use and their elimination is completed pursuant to Directive 96/59/EC. The information about the quantities of PCB-contaminated oils refers to the residues stockpiled by electrical power facilities after oil change, which were not classified as waste and remain in storehouses as materials withdrawn from commercial turnover. Similar estimates have been made in the National Waste Management Plan [67].

[25] Council Directive 96/59/EC of 16 September 1996 on the disposal of polychlorinated biphenyls and polychlorinated terphenyls (PCB/PCT); O. J. L 243, 24/09/1996

The aforementioned Acts[4,5] and their executive regulations published in 2002, specified below, created the legal basis for collecting official data on the amounts, types and places of PCBs.

The Regulation of the Minister of the Economy of 24 June 2002[26] imposed an obligation to carry out an inventory of PCB-containing equipment by the end of 2002 by its owners. The inventory was targeted at the equipment containing not less than 5 litres of PCB-liquids with a concentration of ≥ 0.005% by weight. A special list was prepared and enforced by the Regulation of the Minister of the Economy of 26 September 2002[27] specifying the types of equipment likely to be contaminated with PCBs, its date of production and producers.

Table 2.3.2.2. Estimated quantities of PCB waste and PCB-contaminated equipment, according to the implementation plan for Council Directive 96/59/EC

Specification	Mass [Mg]	Origin	Method of disposal
PCB-contaminated oil	3000	Oil drained from transformers – 1000 Mg. Oil drained from eliminated transformers and other equipment (switches, rectifiers, etc.) – 1000 Mg. Waste oils and fluids from decontamination processes – 1000 Mg	Incineration in an installation for destruction of liquid chloroorganic compounds
Capacitors and other equipment requiring neutralisation	7620	250 000 used and rejected capacitors, weighing in average 30 kg each – installed and discarded – 7500 Mg, non-metal materials from discarded capacitors (paper, wood etc.) – 120 Mg	Incineration in an installation for destruction of liquid chloroorganic substances
Transformers and other equipment requiring decontamination	3500	1000 transformers, drained of oil, non-metallic parts detached – 3000 Mg, metal parts of switches, rectifiers etc. – 500 Mg	Decontamination

The execution of the above mentioned regulations resulted in an evaluation of equipment still in use and stored, which was submitted to the voivodeship offices throughout the country. On this basis a compilation was made on PCB-containing equipment in different voivodeships under the GEF Project [23] in 2003 (Table 2.3.2.3).

More thorough estimation of PCBs amounts, taking account of the amounts owned by both the enterprises and private persons, will be possible at the end of 2004, after obtaining data for 2003.

[26] Regulation of the Minister of the Economy of 24 June 2002 on requirements concerning the use and transportation of substances posing particular environmental threat and on the use and decontamination of installations or equipment, in which these substances are or were used (DzU of 2002, No. 96, item 860).

[27] Regulation of the Minister of the Economy of 26 September 2002 on the specification of the equipment, which is likely to be contaminated with substances posing particular environmental threat (DzU of 2002 No. 173, item 1416).

By analysing the results of different inventory studies it seems obvious that capacitors pose a greater problem in both the quantitative and technical terms, as they appear in greater numbers and are significantly dispersed.

Existing policy and regulatory framework. The Act – Environmental Protection Law prohibits the placing on the market and reuse of PCBs since 2001 as they are regarded as substances posing particular environmental threat. Furthermore it imposes an obligation addressed to the owners of PCB equipment to submit annually to the specified authorities information on the quantity, types and locations of PCBs, and on their elimination methods on special forms.

Table 2.3.2.3. PCB-containing equipment still in use or stored as reserves in 2002 (without discarded equipment or waste)

Voivodeship	Type of installations and their weight [kg]			
	Transformers	Capacitors	Others	Unidentified
Dolnośląskie	346 102	39 077	709	–
Kujawsko-Pomorskie	42 057	29 471	279	–
Lubelskie	145 892	31 226	6 409	–
Lubuskie	14 820	4 433	0	–
Łódzkie	83 793	51 778	3 895	–
Małopolskie	1 343 449	258 298	8 119	944
Mazowieckie	114 150	37 159	4 306	–
Opolskie	600 933	46 721	3 624	–
Podkarpackie	628 366	174 416	189	–
Podlaskie	215 562	48 656	7 416	–
Pomorskie	635 981	62 180	2 100	–
Śląskie	651 744	333 616	42 913	–
Świętokrzyskie	239 031	122 250	18 377	–
Warmińsko-Mazurskie	225 591	9 779	4 752	–
Wielkopolskie	213 388	61 379	3 261	259 638
Zachodniopomorskie	36 165	67 046	36	–
Total	**5 537 024**	**1 377 485**	**106 385**	**260 582**

The executive regulations to this Act issued by the Minister of the Economy lay down the detailed requirements on the screening of PCBs and on the labelling of PCB-contaminated equipment. In line with these regulations the following articles have been labelled by 31 December 2002:

- equipment and installations containing over 5 litres of PCB-contaminated fluids,
- containers with eliminated fluids containing PCBs,
- elements of equipment and installations contaminated with PCBs,
- places of their storage.

The method of labelling must comply with the Polish Standards (items 1. and 2. of Table 2.3.2.4). Labelling also applies to transformers, which had their fluids containing askareles changed for fluids free of these compounds, if these transformers are to be further operated.

The standard PN–EN 12766–1:2002(U) will enable an in-depth survey and screening of equipment and installations and provide a more reliable assessment of PCBs amounts in Poland. The standards in force in Poland concerning PCBs are listed in Table 2.3.2.4.

In technical terms, there should be no difficulty in performing screening tests of the functioning and unused equipment containing PCBs or "suspected" to contain them. Polish laboratories of the research and development centres and some of the Voivodeship Inspectorate for Environmental Protection conduct PCBs analyses (Annex 5). A significant problem in this respect is the necessary financial input. Estimates show that preliminary investigations on PCB presence should cover about 400 thousand capacitors and other electro-technical equipment, operated and discarded, out of which some 10 thousand pieces will require detailed analyses of PCBs contained therein. Also, about 10 thousand capacitors will require to be tested for PCB content. The cost of that operation is estimated at about 40 million PLN.

In this situation, it seems worth considering, especially after a decontamination facility in Poland becomes available, to order the equipment to be sent for treatment on assumption, without testing it. Such procedure should refer particularly to capacitors, switches (small volumes) and small transformers.

Table 2.3.2.4. Polish Standards (PN) regarding PCBs

No.	Standard number : date of issue	Title of Standard
1.	PN–EN 50195:1998	Code of practice for the safe use of fully enclosed askarele-filled electrical equipment
2.	PN–EN 50225:1998	Code of practice for the safe use of fully enclosed oil-filled electrical equipment which may be contaminated with PCBs
3.	PN–C–04579–1:1999	Water and wastewater. Tests for polychlorinated bifenyls (PCB) content. Determination of PCB nr 28, 52, 101, 118, 138, 153, 180 in water by gas chromatography
4.	PN–EN 1528–1/2/3/4:2000	Fatty food. Determination of pesticides and polychlorinated biphenyls (PCBs). Part 1: General. Part 2: Extraction of fat, pesticides and PCBs, and determination of fat content. Part 3: Clean-up methods. Part 4: Determination, confirmatory tests, miscellaneous
5.	PN–EN ISO 15318:2002	Pulp, paper and board. Determination of 7 specified polychlorinated biphenyls (PCB)
6.	PN–EN 12766–1/2:2002(U)	Petroleum products and used oils. Determination of PCBs and related products. Part 1: Separation and determination of selected PCB congeners by gas chromatography (GC) using an electron capture detector (ECD). Part 2: Calculation of polychlorinated biphenyl (PCB) content

In line with the Polish law the use of PCBs in the existing equipment or installations is permitted not longer than until 30 June 2010. The deadline for their elimination and decontamination of equipment containing PCBs is 31 December 2010. Transportation of

PCBs in Poland must be carried out in compliance with the rules on transport of hazardous materials. The costs of treatment including transport are averaged at:

- 17 000 PLN per 1 Mg of PCB-containing oils;
- 20 000 PLN per 1 Mg of capacitors.

The National Waste Management Plan estimated the decontamination costs of PCB-containing equipment at a level of app. 6000 PLN/Mg.

Therefore, the issue of financing the activities connected with PCB waste treatment and decontamination of PCB-containing equipment becomes an important problem. The funding aspects may be considered as a factor limiting the interest of the owners of the waste and equipment containing PCBs in their urgent elimination. There is also a group of owners, which will not be able to cope with the financial requirements connected with the elimination of PCBs. This will, in the first place, apply to enterprises undergoing liquidation, and the ones unable to fulfil the basic financial obligations. Also, the state administration bodies and non-profit organizations and institutions, which are responsible for managing the assets taken over from the bankrupt enterprises together with the left over waste will not be able to cover the necessary costs. In this situation financial support from target environmental funds, including foreign assistance, becomes essential.

The provisions of the Act on Waste (Article 38, paragraph 7) impose an obligation for the owners of PCB waste, carrying out activities leading to its treatment, to include in the waste register chart information on PCB content in the waste. The Voivodeship Marshal has access to such information.

Table 2.3.4.10 presents permissible PCB concentration levels in different media and products. According to the legal regulations[28] the output originating from the deepening of maritime areas, which is connected with the maintenance of infrastructure providing access to ports, and from the deepening of water reservoirs, rivers, channels etc., is considered as polluted when the concentration of at least one substance (out of the metals and organic compounds listed in the regulation) reaches a certain level. In relation to the sum of 28, 52, 101, 118, 138, 153 and 180 PCB congeners[29] the concentration level is minimum 0.3 mg/kg d.m.

Treatment of PCB-containing waste. In Poland there are installations for PCB-containing waste treatment using thermal methods, i.e. hazardous waste incineration plants, which have been described in Chapter 2.3.5. It can be assumed, like in the case of pesticides, that the processing capacity of these installations is satisfactory and there is no need to build special incinerators for PCB-containing waste.

Decontamination covering PCB removal from the equipment previously containing PCBs requires appropriate facilities to be used. The capacity of the existing installation for the decontamination of transformers in the ANWIL Company in Włocławek[30] is 400 to 500 Mg/year[31]. Considering the mass of transformers to be decontaminated, as specified in

[28] Regulation of the Minister of the Environment of 16 April 2002 on the types and concentrations of substances responsible for causing the output to be regarded as polluted (DzU of 2002 No. 55, item 498).

[29] Determination of PCBs using the GC-ECD or GC-MSD methods in acetone extracts after the extraction of samples with a mixture of hexane/acetone.

[30] Organization of logistic action and analytical control of waste received is performed by the CHEMEKO Co. Ltd. in Włocławek providing specialized services.

[31] 50 transformers to be discarded and 200 transformers to be used further.

Table 2.3.2.3, an increase of that capacity to 800–1000 Mg/year, will be necessary. There is no facility available in Poland for the decontamination of small-sized electric equipment (mainly capacitors), drained of PCB-containing oils. It is necessary to put into operation such a facility in Poland or to ensure access to an adequate installation abroad.

Poland is also lacking both installations for thermal destruction of solid hazardous waste containing chloroorganic substances, and capabilities to treat such waste using other methods, for instance by disposing it of in rock salt excavations. It does not, however, seem appropriate to tackle the problem of PCBs in solid wastes, since the possibilities for their collection are very small.

The results of the preliminary review show that at present there are no other methods of POPs treatment available to companies operating on the Polish market than their thermal destruction.

Available monitoring and health impact data. Systematic investigations of river water pollution by PCBs are currently conducted in 20 river gauging sections (5 on the Vistula River, 5 on the Oder River and 10 on rivers of the coastal drainage belt area). The tests are performed within the State Environmental Monitoring system [4]. Summarised results are presented in Table 2.3.2.5. Table 2.3.2.6 contains the results of some additional examinations.

Table 2.3.2.5. Average annual concentrations of PCBs in 1992–2001 [μg/l]

Year	Vistula River			Oder River		
	Krakow	Warsaw	Kiezmark	Chałupki	Wroclaw	Krajnik Dolny
1992	0.027	0.008	0.008	0.002	0.001	<0.001*
1995	0.013	0.009	0.001	0.017	0.097	<0.001*
2000	0.017	0.014	<0.001*	0.001	0.016	<0.001*
2001	0.008	0.008	<0.001*	0.010	0.016	<0.001*
Average for 1992–2001	0.015	0.011	0.009	0.007	0.010	<0.001*

* Below the level of detection 0.001μ/l.

Table 2.3.2.6. Concentrations of the sum of PCBs in surface waters of Poland [ng/l]

Measurement location	Year	Σ PCBs
Vistula Mouth (Kiezmark)	1991–1992	0.120– 0.300
Oder River Basin	1998–2000	0.3–150

Since there is a lack of complete information on PCBs concentrations in waters discharged from the Polish territory into the Baltic Sea, a pilot study was carried out on the respective concentrations in the Vistula and Oder Rivers' gauging sections at their estuaries [3]. Samples were taken in July 2002, when the water flow in the Vistula River was near the multi-year mean, and the flow in the Oder River about 20% higher than the mean value. Results of these measurements are presented in Table 2.3.2.7.

Some of the PCB congeners are not detectable in water but appear in bottom sediments and in fish tissues. Additionally, their concentrations in water are lower in comparison with their

content in the dry matter of bottom sediments, and the latter is lower than in the fish fat tissue. This is an indication of a definite process of accumulation of these substances primarily in aquatic organisms and next in bottom sediments.

Single measurements, presented in the Table 2.3.2.7, do not provide for a credible determination of the PCB load discharged into the Baltic Sea. However, for the purpose of comparison, such calculations have been carried out. The results obtained are presented in Table 2.3.2.8.

Table 2.3.2.7. Highest recorded PCB concentrations in close to mouth sections of the Vistula and Oder Rivers in 2002

Compounds	River water [ng/l]	Bottom sediment [ng/g d.m.]	Fish [ng/g fat]
Polychlorinated biphenyls:			
• PCB 28	–	–	11.4
• PCB 52	1.5	2.0	20.3
• PCB 101	not detected	2.4	37.4
• PCB 118	not detected	0.9	68.1
• PCB 138	not detected	4.9	15.3
• PCB 153	4.9	6.9	81.7
• PCB 180	2.9	4.7	29.1
• PCB 189	not detected	not detected	–
Sum of PCBs in the most polluted sample	4.9	16.9	346.1
Coplanar polychlorinated biphenyls:	not detected	0.9	33.2
• PCB 77	not detected	0.1	22.7
• PCB 126	not detected	not detected	20.3
• PCB 169			
Sum of coplanar PCBs in the most polluted sample	not detected	1.0	69.9

Table 2.3.2.8. Loads of DDT and PCBs discharged into the Baltic Sea (momentary data of July 2002)

Sampling place	Concentration [ng/l]	Load [kg/year]
Vistula River mouth:		
• left river bank	0.64	–
• right riverbank	1.77	–
• average	1.20	22
Oder River mouth	1.31	24

- Not calculated due to lack of data on river flows.

Most systematic analyses of PCB content in costal seawaters are conducted at the Gdańsk Bay (4 measurement points). Concentrations of the sum of PCBs (7 congeners: 28, 52, 101, 118, 138, 153, 180) vary from 0.8 to 1.3 ng/l. In 1992–2000 concentrations of PCBs were quite stable with a very small falling trend. However, accumulation of these substances in the bottom sediments of the Gdańsk Abyss has been observed.

Studies on PCBs in bottom sediments of the Oder River and its tributaries were conducted in 1998–2000, within the framework of the "International Oder Project" [4]. Generalized results of these studies are presented in Table 2.3.2.9. The permissible content of the sum of 7 PCBs is 2000 ng/g d.m. for industrial and transport areas and 20 ng/g d.m. for the remaining areas. The average values for PCB content in the Oder River bottom sediments exceed the permissible values set for protected areas, agricultural land and forests as well as residential and recreation areas and wasteland in the Regulation of the Minister of the Environment[22] (Table 2.3.4.10).

Table 2.3.2.9. PCB content in bottom sediments of the Oder River and its tributaries in 1998–2000

PCB congener	Minimum–Maximum [ng/g d.m.]	Average value [ng/g d.m.]
52	1 – 23.3	2.2
101	1 – 9.1	2.3
118	1 – 30.5	4.0
153	1 – 19.3	3.8
138	1 – 23.1	4.6
180	1 – 46.9	6.4
189	1 – 1.0	0.4
Total of PCBs determined	**1.3 – 189**	**28.9**

Studies on PCB content in the bottom sediments were carried out in the Włocławski Reservoir by the State Geological Institute in 2000 and by the Institute of Meteorology and Water Management within the framework of the GEF Project in 2003 [22]. Most of PCB congeners were detected in the bottom sediments of the Włocławski Reservoir. Results are summarised in Table 2.3.2.10. A comparison of average values for PCBs, included in that table with the values presented by the Regulation of the Minister of the Environment[22] indicates that for agricultural and forest land as well as for residential and recreation areas (the latter dominate in that region), the permissible levels of these substances in the bottom sediments of the Włocławski Reservoir have not been exceeded.

Chapter 2.3.4 includes information on PCBs concentrations in food and in the biological human tissues. Furthermore, an assessment of human exposure to PCBs is also presented there.

Table 2.3.2.10. Content of PCBs in the bottom sediments of the Włocławski Reservoir

Substances (PCB congeners)	Content [ng/g d.m.]	Information source
PCBs (28,52,101,118,153,138,180)	1.258*	PIG data
PCBs (77,126,169)	0.164	GEF Project data

*Average value.

2.3.3. Assessment with respect to Annex B chemicals (DDT)

Historical production. DDT (1,1,1-trichloro-2,2-bis(4-chlorophenyl)ethane was the major active substance, classified as a pesticide, produced for many years in Poland under the name of *Azotoks.* Since 1972 the entry *Azotoks* in the Statistical Yearbook, has been presented as "DDT and analogues"[32].

Table 2.3.3.1. Production of DDT in Poland in 1949–1977

Year	Production [Mg]	Year	Production [Mg]
1949	35.0	1964	3845.0
1950	146.6	1965	4407.0
1951	221.0	1966	4378.0
1952	343.0	1967	4479.0
1953	803.0	1968	3729.0
1954	1118.0	1969	3487.0
1955	1493.0	1970	3805.0
1956	1648.0	1971	3485.0
1957	2108.7	1972*	(3377.0) 3977.0
1958	2470.7	1973*	(2318.0) 2918.0
1960	3142.0	1974*	(2855.0) 3455.0
1961	3754.7	1975*	(2755.0) 3355.0
1962	3686.0	1976*	(1678.0) 3278.0
1963	3322.0	1977*	(2270.0) 2870.0

* For the years 1972 –1977 the volume of DDT production (in brackets) was reduced by the volume of the *Metoksylochlor*[32] production.

[32] In this case DMDT (1,1,1-trichloro-2,2-bis(methoxyphenyl)ethane) was regarded as an analogue of DDT (1,1,1-trichloro-2,2-bis(4-chlorophenyl)ethane) marketed under the name of *Metoksychlor*. The definition of DMDT, as an analogue of DDT, apparently originated from the fact that production processes of both compounds are very similar. The difference is that one of the basic raw materials for DDT production was the monochlorobenzene, which in case of DMDT was replaced by the metoxybenzene (trade name *Anizol*). Attention should be given to the fact, that DMDT is not among the substances covered by the Stockholm Convention.

Table 2.3.3.1 illustrates the production level of the *Azotoks* concentrate, and the production of DDT and analogues (calculated as 100%) from 1972. Therefore, we may only be sure of the total volume of DDT concentrate production. It amounted to 75759.7 Mg of DDT concentrate calculated as pure substance for the whole period 1949–1977.

Preparations containing DDT were produced in Poland by the Chemical Works ORGANIKA–AZOT in Jaworzno and the Chemical Works GAMRAT in Jasło (small amounts of DDT-containing preparation). A list of commercial names of preparations produced on basis of DDT is presented in Table 2.3.3.2.

Table 2.3.3.2. List of domestic DDT preparations admitted for use and the content of declared share of active substances

Name of preparation (original)	Producer	% of active substance
Azotox liquid 25 *(Azotoks płynny 25)*	Ch.W. GAMRAT	25% DDT
Azotox powder 5 *(Azotoks pylisty 5)*	Ch.W. ORGANIKA–AZOT	5% DDT; 0.1% γ-HCH
Azotox liquid 10 *(Azotoks płynny 10*		10% DDT
Azotox liquid 30 *(Azotoks płynny 30)*		33% DDT
Azotox liquid 40 *(Azotoks płynny 40)*		40% DDT
Azotox 50 for suspensions *(Azotoks 50 do zawiesin)*		50% DDT
Azotox powder active *(Azotoks pylisty aktywny)*		5% DDT; γ-HCH; DMDT
Ditox *(Ditoks)*		5% DDT; 0.3% γ-HCH
Ditox L *(Ditoks L)*		4.7% DDT; 0.3% γ-HCH
Ditox 30 *(Ditoks 30)*		18% DDT; 2% γ-HCH
Fumatox DG *(Fumatoks DG)*		30% DDT; 3% γ-HCH
Kornikol		2% DDT; 7% HCH; 2% DNOC
Lasochron		10% DMDT; 7% DDT; 10% HCH
Mgławik 10		8% DDT; 5% γ-HCH
Mgławik 15		10% DDT; 2% γ-HCH
Tritox powder *(Tritoks pylisty)*		1.5% DDT; 0.5% HCH; 2% DMDT
Tritox liquid 30 *(Tritoks płynny 30)*		10% DDT; 5% γ-HCH; 14% DMDT
Tritox liquid for suspensions *(Tritoks płynny do zawiesin)*		45% DDT; 2% γ-HCH; 3% DMDT
Tritox powder *(Tritoks pylisty)*		1.5% DDT; 0.5% HCH; 2% DMDT
Tritox liquid 30 *(Tritoks płynny 30)*		10% DDT; 5% HCH; 14% DMDT
Tritox liquid for suspensions *(Tritoks płynny do zawiesin)*		45% DDT; 2% γ-HCH; 3% DMDT

The production structure of DDT-containing pesticide preparations was quite well developed in Poland. The Statistical Yearbooks published detailed data on it until 1970. Since 1971 the Statistical Bulletins of the Ministry of Chemical Industry has included data about the pesticides jointly, without indicating the purpose of their use. Table 2.3.3.3 illustrates, as an example, the structure of DDT-containing pesticides produced in 1965–1970.

Table 2.3.3.3. Production of preparations containing DDT in 1965–1970 [Mg]

Name of preparation (original)	Years					
	1965	1966	1967	1968	1969	1970
Azotox powder 5% *(Azotoks pylisty 5%)*	4061	2084	15 793	1163	715	578
Azotox liquid 25% *(Azotoks płynny 25%)*	150	317	826	1051	230	501
Azotox suspension 50% *(Azotoks zawiesinowy 50%)*	347	259	283	289	293	243
Ditox *(Ditoks)*	53 637	58 345	40 343	21 113	34 123	27 735
Tritox powder *(Tritoks pylisty)*	5721	3777	3953	3417	3493	6542
Tritox liquid 30% *(Tritoks płynny 30%)*	935	976	1240	1157	2287	2996
Tritox suspension *(Tritoks zawiesinowy)*	45	197	255	348	787	272
Mgławik	355	592	677	723	750	334

As it can be concluded from data presented in Tables 2.3.3.2 and 2.3.3.3 DDT was used as an active substance by the Polish chemical industry for the production of pesticides.

Use. DDT was used in Poland mainly for the protection against various species of pests causing damage to field crops, forests, fruit trees and gardens, as well as human and animal insects (within the framework of sanitary actions) and insects found in buildings. Introduction of the DMDT[32] production in Poland enabled the reduction of the content of DDT in plant protection preparations applied in agriculture, forestry and in households. For instance, the DDT consumption in 1961 and 1964 was 3.2 Gg and 1.1 Gg, respectively. Since 1972 DDT-containing preparations have been gradually withdrawn from use in line with the plant protection law in force. The process of phasing out has been finalized in 1975. *Lasochron* (a DDT preparation for forest protection) was used for the longest time. In general, DDT was used in Poland until it was proved that apart from its advantages in the protection against insects, it has disadvantages causing serious side effects. The studies carried out confirmed its negative impact on the death rate of birds of prey (e.g. white eagle), which assimilated the toxic substance through insects they ate. Since then only preparations and substances free of DDT are used for the production of pesticides in Poland.

Import. Pesticide preparations consisting of DDT were imported to Poland in the past from the European countries, i.e. Yugoslavia, East Germany (GDR) and West Germany (FRG). Detailed information concerning that import is presented in Table 2.3.3.4.

Table 2.3.3.4. A list of formerly imported DDT preparations permitted for use in Poland with their shares of active substances contained in them

Name of preparation (original)	Producer	% of active substance
Duolit powder 5	VEB Tettchem (GDR)	5% DDT
Duolit liquid 20	VEB Fettchem (GDR)	20% DDT
Pentacid Doliden Kerfec C	Kemikalia (Yugoslavia)	4.7% DDT 0.4–0.5 γ-HCH
Ring Deksol	VEB Bitterfeld (FRG)	6% DDT; 5% γ-HCH

Export. Statistical Yearbooks and Bulletins of the chemical industry do not provide data concerning the volume of the exported DDT concentrate and data on DDT-containing pesticide production. It is only known that the exported quantity was considerably high and intended for the Asian countries. The scale of the export may be quite accurately estimated for the years 1976 and 1977, because the permitted use of preparations containing DDT ceased in 1975. If so, then the entire amount of DDT would have been exported in the form of concentrated or ready-to-use pesticides. Hence, it would amount to 1678 Mg in 1976 and 2270 Mg in 1977 (calculated for the pure substance).

Another method of determining the volume of the DDT concentrate exported is to acknowledge the volume of export as the difference between the DDT production and its use for the production of pesticide preparations, assuming that only the concentrate was exported. This difference, taking into account only the years of maximum DDT production, varies from 1000 to 1500 Mg/year. However, these data may be charged by a considerable error, because the Statistical Yearbooks of the Chemical Industry and the Statistical Bulletins of the Ministry of Chemical Industry do not provide information on the methodology applied for the preparation and processing of statistical data concerning the production and use of pesticides.

Existing policy and regulatory framework. At present Poland does not produce DDT. Moreover it, also, does not plan to restart that production. Preparations containing DDT are not used, imported or exported. The use of DDT as a bioactive substance contained in plant protection preparations is currently forbidden pursuant to the Regulation of the Minister of Agriculture and Rural Development[14].

Permissible DDT concentrations or contents in different media and products are presented in Table 2.3.3.5.

Table 2.3.3.5. Permissible DDT concentrations or contents in different media and products

Media or products	Permissible DDT concentration or content
Drinking water[21]	0.10 μg/dm^3

Media or products	Permissible DDT concentration or content
Soil or ground[22]	0.00025 mg/kg d.m. (for protected areas) 0.025 mg/kg d.m. (for agricultural land) 0.25 mg/kg d.m. (for industrial or traffic areas)
All feedstuff[24]	0.05 mg/kg in relation to animal feed containing 12% of water
- except fats	0.5 mg/kg in relation to animal feed containing 12% of water

Available monitoring data. Studies on threats for surface water caused by chlorinated hydrocarbon insecticides were carried out in Poland for the first time in 1964 by the former Institute of Water Management in Warsaw (now the Institute of Meteorology and Water Management) at the Division of Coastal Water Protection in Gdańsk. Among pesticides used in 1961–1964 the following were found most dangerous for fish (listed from more to less hazardous): DDT > toxaphene > metoxychlor (DMDT)[32] > lindane[33] (γ-HCH). Such a hierarchy primarily resulted from higher level of use of DDT in relation to the remaining substances.

First tests on the presence of polychlorinated insecticides in surface waters were performed in the same research institute in 1968–1972 at the Vistula River mouth. In 1968–1969 DDT was sprayed from land-based facilities, whereas toxaphene from airplanes, and later on in 1970–1975 only from land-based appliances. The DDT concentration levels, immediately after spraying remained very high for a few hours in the drainage channels (125 mg/l). Within the next two months these concentrations usually decreased to below 20 mg/l, and after a longer period of time stabilized at a level of 3.0 mg/l.

In 1972–1975 studies were undertaken on DDT concentration levels in the Vistula River in the vicinity of Kraków, Warsaw and Gdańsk. The average concentrations of the sum of DDT in 1975 are presented in Table 2.3.3.6.

Table 2.3.3.6. Average concentrations of the sum of DDT at selected gauging-sections of the Vistula River in 1975 [μg/l]

Polluting substances	Upper Vistula River (Kraków)	Mid Vistula River (Warsaw)	Vistula River Mouth (Gdańsk)
Σ DDT	1.33	0.09	0.04

In 1980–1989 the concentrations of DDT and its metabolites in surface waters were further declining, although, they still remained at quite a high level in river basins under intensive farming and in waters heavily polluted by wastewaters (Table 2.3.3.7). The instantaneous concentrations (the highest measured) in surface waters polluted by wastewaters even reached a level as high as several mg/l: 7.9 mg/l for DDT, 1.3 mg/l for DDE and 1.8 mg/l for DDD.

[33] Not covered by the provisions of the Stockholm Convention.

Table 2.3.3.7. Average concentrations of DDT in surface waters in 1980–1989 [µg/l]

Polluting substance	Waters in basins with intensive farming	Waters heavily polluted by wastewaters	Surface waters (average)	Safe concentrations according to:		
				Polish Standards	EU Directives	US Standards
DDT	0.039	0.264	0.005	0.05		0.03
DDE (DDT metabolite)	0.016	0.064	–	0.05	<0.001	
DDD (DDT metabolite)	0.002	0.050	–	0.05		0.01

- data not available.

A general observation can be made that during the historical period (1961–1990) the concentrations of DDT in surface waters, not subjected to strong pressure of industrial wastewater discharge or intensive farming, did not exceed levels regarded as safe.

Regular examinations of river water pollution by DDT are presently conducted in 20 river cross sections (5 on the Vistula River, 5 on the Oder River and 10 on rivers of the coastal drainage belt area). These tests are performed within the State Environmental Monitoring system coordinated by the Chief Inspectorate for Environmental Protection. Summarized results are presented in Table 2.3.3.8.

Table 2.3.3.8. Average annual concentrations of the sum of DDT in 1992–2001 [µg/l]

Year	Vistula River			Oder River		
	Krakow	Warsaw	Kiezmark	Chałupki	Wrocław	Krajnik Dolny
1992	0.032	0.070	0.016	0.012	0.003	0.024
1995	0.047	0.027	<0.001*	0.012	0.018	0.012
2000	0.051	0.086	<0.001*	0.005	0.016	0.011
2001	0.022	0.044	<0.001*	0.003	0.004	0.008
Average for 1992–2001	0.063	0.048	0.020	0.013	0.028	0.014

* Below the limit of detection of 0.001µ/l.

In the last decade tests on DDT concentrations in Polish rivers were carried out on an irregular basis (Table 2.3.3.9).

Table 2.3.3.9. Concentrations of selected sums of DDT in surface waters of Poland [ng/l]

Measurement location	Year	Σ DDT
Vistula Mouth (Kiezmark)	1991– 1992	0.120–0.840
Mała Panew River	1999	186

Measurement location	Year	Σ DDT
Radunia River	1984–1988	n.d.–139
Oder River (Police)	1999	8
Oder River Basin	1998–2000	0.8–218

n. d. – not detected.

Extensive studies on DDT in bottom sediments of the Oder River and its tributaries were conducted in 1998–2000 under the "International Oder Project" executed after the tragic floods in Poland in1997. Summarised results of these studies are presented in Table 2.3.3.10.

The average value of the DDT sum exceeded the permissible concentration level for protected areas (2.5 ng/g dry matter) but was by half lower than the permitted level for farmland, forest, residential and recreation areas (25 ng/g dry matter) and 20 times lower than the permissible level for industrial and transport areas (250 ng/g dry matter). The maximum value did not exceed 250 ng/g dry matter. The above-mentioned permissible values have been drawn from a Regulation of the Minister of the Environment[22].

Table 2.3.3.10. Content of chloroorganic pesticides in the bottom sediments of the Oder River and its tributaries in 1998–2000

Pesticides	Minimum–Maximum content [ng /g dry matter]	Average value [ng/g dry matter]
DDE	1 – 27.8	5.2
DDD	1 – 27.6	4.2
DDT	1 – 31.2	3.2
Σ DDT	1 – 51.7	12.6

Detailed investigations of DDT in bottom sediments were carried out in 2000 in the Włocławski Reservoir by the State Geological Institute. The average DDT level in these sediments amounted to 1.692 ng/g d.m and did not exceed the permissible value.

As reported by GUS – the Central Statistical Office ("Environmental Protection 2000"), DDT pollution loads discharged from the Polish territory into the Baltic Sea declined progressively in 1990–1996 (Table 2.3.3.11). Since 1996 GUS has resigned from publishing such data.

Table 2.3.3.11. DDT loads discharged from the territory of Poland into the Baltic Sea in 1990–1996

Pollutant	Years						
	1990	1991	1992	1993	1994	1995	1996
	Amounts [Mg/year]						
DDT	0.40	0.48	0.31	0.24	0.15	0.15	0.16

Source: GUS.

Data presented in Table 2.3.3.11 originate from measurements carried out within the State Environmental Monitoring system, by the Voivodeship Inspectorates for Environmental Protection and by the Institute of Meteorology and Water Management (IMGW). These measurements were continued after 1996 and presented in annual reports prepared by IMGW for the Chief Inspectorate for Environmental Protection. The results obtained do not reflect a clear declining trend of DDT concentrations in river waters in 1997–2001. From data of these reports concerning DDT in river waters, no clear tendency of decline during 1997–2001 could be noted. Fluctuations in DDT loads discharged into the Baltic Sea to depend a great extent on hydro-meteorological conditions.

Estimations of DDT loads discharged into the Baltic Sea [3] have been made on the basis of single DDT concentration measurements carried out under the GEF Project in 2002. The results obtained are presented in Table 2.3.3.12.

Table 2.3.3.12.DDT load discharged into the Baltic Sea (momentary data of July 2002)

Sampling site	Concentration [ng/l]	Load [kg/year]
Vistula River mouth:		
- left river bank	19.05	–
- right river bank	13.77	–
- average	16.41	160
Oder River mouth	not detected	0.0

– not calculated due to lack of data on the river flow.

If these values were to be recognised as credible, they would confirm a slow down in the declining trend of the DDT load discharged into the Baltic Sea from the territory of Poland. This conclusion requires verification and possible modification in the nearest future by calculating loads on the basis of for all available data on DDD concentrations at the sites close to the Vistula and the Oder River mouths.

The most systematic tests of the DDT content in costal seawaters are conducted at the Gdańsk Bay (4 measurement sites). Concentrations of the DDT sum (DDT+DDE+DDD) vary from 0.1 to 0.2 ng/l. In 1992–2000 DDT concentration levels were quite stable with a slight declining trend. However, accumulation of these substances in the bottom sediments of the Gdańsk Abyss is observed.

The residues of DDT are sometimes found in cereal grains and in around 10% of samples of root vegetables in amounts not exceeding the maximum acceptable residue (MAR = 0.05 mg/kg). Whereas in rape and in vegetable oil the residues are present in all examined samples (Table 2.3.3.13). However, the MAR level is not exceeded. A significant decrease in DDT residue level has been observed in 1998–2001.

Table 2.3.3.13. Residues of DDT sum in plant products in 1998–2001

Year	Plant product	Number of examined samples	Number of samples with residues		Content range [mg/kg]*	Average content [mg/kg]
			n	%		
1997	Carrots	122	14	11.5	0.002 – 0.004	0.003
	Rye	113	2	1.8	0.040 – 0.085	0.063
	Rape	269	269	100		
1998	Carrots	123	24	19.5	0.001 – 0.035	0.016
	Rye	123	9	7.3	0.002 – 0.007	0.004
	Wheat	123	1	0.8	0.001	0.001
	Rape	146	146	100	0.025 – 0.476	0.150
1999	Carrots	99	12	12.1	0.005 – 0.095	0.024
	Rye	96	1	1	-	0.021
	Wheat	101	1	1	-	0.031
	Rape	314	314	100	0.022– 0.490	0.046
2000	Carrots	100	8	8	0.010 – 0.032	0.018
	Rye	96	1	1	-	0.019
	Wheat	104	0	0	-	-
	Rape	223	187	84	0 – 0.679	0.052
2001	Carrots	100	9	9	0.005 – 0.012	0.009
	Rye	96	1	1		0.006
	Wheat	104	3	3	0.006 – 0.014	0.007
	Rape	301	301	100	0.018 – 0.600	0.025

*Rape – mg/kg of fat.

Studies on residues of the DDT sum in the fat tissues of pigs, cattle, hunted animals, sea fish, in cow's milk and in muscle tissues of carps were carried out in animal food products (Figure 2.3.3.1). The results proved the presence of chloroorganic DDT compound residues in the majority of animal food product samples (over 95% in average), however the MAR levels were seldom exceeded. Interesting is the higher DDT contamination level of wild animals and the Baltic fish compared to household animals. The average content in the examination period remains at a similar level with a tendency to decline, especially with regard to the Baltic fish.

Health impacts. Residues of DDT, a common pesticide, which has been completely eliminated from use in Poland in the 70s, can still be found in humans, e.g. in women breast milk. According to the results of studies conducted since 1975 by the National Institute of Hygiene, the amount of DDT in humans and animals is being reduced in time. An average Pole in his organism had around 13.4 mg DDT per 1 kilogramme of weight. Sometimes the concentration even reached 35.4 mg/kg. Human milk contained around 0.28 mg/kg and reached 1.5 mg/kg at times. Nowadays the DDT content in cow's milk is 5 times lower than 25 years ago.

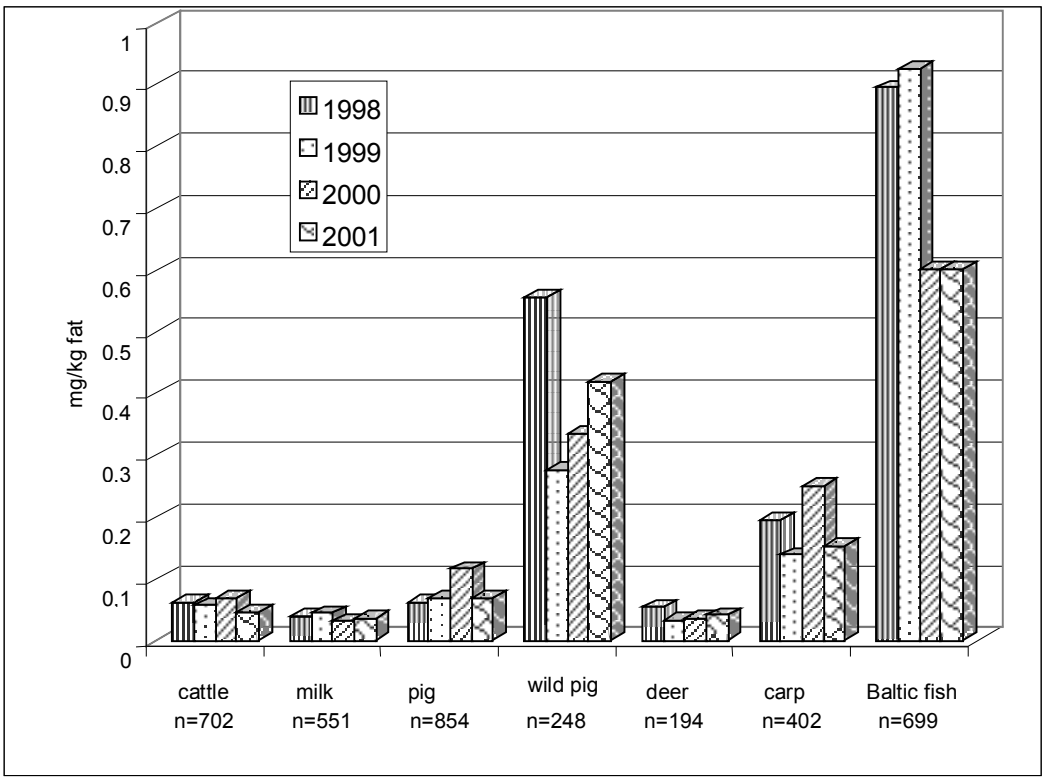

Figure 2.3.3.1. Average DDT sum content in animal products in 1998–2001

The DDT content reduction is, however, getting slower. It is assumed that at the beginning of the XXI century a balance has been achieved: the same amount of DDT metabolites is taken in as is released. Complete elimination from the environment is impossible. DDT circulates in the environment over years and it does not biodegrade. No polarity of DDT molecules causes poor water solubility, and high fat solubility, instead, which determines its accumulation and biomagnification in animal tissue while moving up the food chain. The effects of its activity are observed in future generations.

In 2001 many worldwide research institutions published data on the DDT presence in human organisms. This data confirms that DDT has a negative effect on e.g. the development of children. DDT metabolites also have effect on, *inter alia*, the hormone system and increase the risk of breast cancer.

2.3.4. Assessment of releases from unintentional production of Annex C chemicals (PCDDs/PCDFs, HCB and PCBs)

Unintentional PCDD/PCDF, HCB and PCB production. Unintentional production of these compounds is demonstrated by contamination of products, equipment and production installations. Processes of chlorination of organic compounds in Poland were performed in 8 chemical factories, out of which 7 used the rock salt electrolysis processes. Five of the latter

ones performed these processes applying the, so-called, mercury electrolysis using carbon electrodes.

Chlorination of the following chemical raw materials took place in these plants:

- Chlorination of methane for the production of methyl chloride, methylene chloride, chloroform and carbon tetrachloride; this process was carried out in one enterprise,
- Chlorination of aromatic hydrocarbons and their derivatives (benzene, nitrobenzene, biphenyl); these processes were executed in 6 enterprises,
- Chlorination of phenol and its derivatives (cresol); performed by 2 enterprises,
- Chlorination of acetylene for the production of trichloroethylene, perchloroethylene and vinyl chloride; conducted in 3 enterprises,
- Chlorination of olefins (ethylene and propylene) for the production of solvents (carbon tetrachloride, perchloroethylene), allyl chloride, dichloroethane and subsequently, vinyl chloride; carried out by 3 enterprises.

No comprehensive investigations aimed at the determination of the POPs content in products obtained in organic substance chlorination processes and in their waste by-products have been carried out in Poland so far.

A deep reconstruction of production processes is taking place in the Polish chloroorganic industry. Mercury electrolysis of rock salt has been eliminated in two enterprises. In the remaining plants carbon electrodes were replaced some 15 years ago by uniform titanic electrodes.

The process of methane chlorination has been eliminated from the production profile as well as a considerable part of acetylene chlorination processes and methane chlorination to perchloroethylene and carbon tetrachloride. Chlorination processes have been ultimately phased out in three chemical works.

PCBs have been entirely eliminated from production and the use of hexachlorobenzene in the complex of polyvinyl chloride and the solvents has been, practically completely reduced. The remaining chlorination processes have been thoroughly modernized in all chemical works. Safe waste treatment methods have been developed in enterprises using chlorination of organic compounds. This has substantially reduced the unintentional generation of pollutants such as PCDDs, PCDFs, PCBs and HCB.

Air emissions of PCDDs/PCDFs, PCBs and HCB

An assessment of the emissions of persistent organic pollutants (PCDDs/PCDFs, PCBs and HCB) into the air was performed in 2000 pursuant to the classification of emission sources of the Selected Nomenclature for Air Pollution (SNAP). The major 11 emission categories are subdivided into over 400 detailed sub-categories. The use of that classification ensures consideration of all significant emission sources, on which the reporting country has relevant information (emission factors and data on respective activities) and allows comparing and analysing emission data from different countries.

Emission inventories are performed in Poland on the basis of two data sets:

- The national statistical data published by the Central Statistical Office (GUS), concerning the use of fuels and raw materials, the annual output of industrial products or other parameters (the so-called activities), characterising a given sector,
- Data presenting emission factors, national or drawn from relevant literature, which reflect emission levels of different pollutants per production unit or unit of fuel used.

The emission level from a particular source is calculated as an activity value multiplied by the emission factor relevant to that activity. For instance, PCB emission from burning wood in residential plants (SNAP 0202) is calculated by multiplying the quantity of the wood burned [in Gg] by the factor of PCB emission per unit of timber mass ([g/Gg] in Table 2.3.4.1).

Statistical data on activities, taken from GUS, have been adapted to the required reporting system, which often needed expertise evaluation, concerning proper subdivision of emission sources within the specified SNAP categories. When data published by GUS were insufficient, other information, from credible and well-documented sources has been used.

Source of PCB emissions	**Emission factor adopted [mg/Mg]**	**Emission factor applied so far [mg/Mg]**
03. Combustion in manufacturing industry		
030301 Sinter and palletising plants	**0.065**	2.4
030311 Cement	**0.007**	not available
09. Waste treatment and disposal		
090202 Incineration of industrial waste (modern technology of combustion, good and v. good systems of stack gas cleaning)	**0.38**	not available
090207 Incineration of hospital waste (complying with EU Directive)	**0.39**	not available
Source of HCB emissions	**Emission factor adopted [mg/Mg]**	**Emission factor applied so far [mg/Mg]**
03. Combustion in manufacturing industry		
030301 Sinter and palletising plants	**0.140**	4.70
030311 Cement	**0.021**	0.17
09. Waste treatment and disposal		
090202 Incineration of industrial waste (modern technology of combustion, good and very good systems of stack gas cleaning)	**0.139**	not available
090207 Incineration of hospital waste (complying with EU Directive)	**0.295**	not available (the factor applied to all hospital waste was 29)
Source of dioxin and furan emissions	**Emission factor adopted [µg TEQ/Mg]**	**Emission factor applied so far [µg TEQ/Mg]**
03. Combustion in manufacturing industry		
030301 Sinter and palletising plants	**1.45**	5.00
030311 Cement	**0.07**	0.15

Apart from emission factors taken from literature, also the national factors for POPs emissions into the air were used for the purposes of the inventory (see table above). The latter ones are based on measurements performed by the Trace Analyses Team of the Institute of Chemistry and Inorganic Technology at University of Technology in Kraków. Measurements of PCDD/PCDF, PCB and HCB emissions were carried out – within the framework of the GEF Project – in two sinter plants (being the only two iron ore sinter plants in Poland), two cement factories and two hazardous waste incineration plants (including hospital waste) [1].

Emissions of polychlorinated biphenyls (PCBs)

According to data published by the European Commission the main sources of PCB emissions into the air are the leakages from capacitors (70–90% of total emission). The remaining sources, still regarded as significant, are as follows: steel production in arc furnaces (5–10%), cutting scrap into pieces (2–6%), coal burning (2–6%), burning heating oil (1–3%), leakages from transformers (1–3%), sewage sludge use in agriculture (1–3%), steel production in other furnaces (0.5–2%) and production of sinters (0.1–0.5%). The share of emissions from other sources does not exceed 0.5% of the total emission into the air.

According to the evaluation performed, the total PCB air emission in Poland in 2000 amounted to 2320 kg (Table 2.3.4.1) [2]. Figure 2.3.4.1 presents shares of different sectors in the national PCB emission. The major source of PCB emissions, responsible for 71% of the total PCB emission in Poland, is electrical equipment (SNAP 060507), and in particular capacitors filled with saturants containing PCBs. The other significant emission sources are non-industrial combustion (15% of countrywide emission) as well as the road transport and combustion processes in energy production and transformation (each of these sub-sectors is responsible for 5% of the total national PCB emission). Subject to SNAP 02 (non-industrial combustion plants), definitely the highest share in PCB air pollution has the burning of hard coal and wood under SNAP 0202 (residential plants).

Table 2.3.4.1. PCB emissions to the air in 2000

Sources of PCB emissions	Activity [Gg]	Emission factor [g/Gg]	Emission [kg]
01. Combustion processes in energy production and transformation			**120.79**
0101 Public power			
Hard coal	42 006.0	0.31	13.02
Brown coal	58 754.5	1.80	105.76
Fuel oil	175.2	0.60	0.11
0102 District heating plants			
Hard coal	871.0	0.31	0.27
Fuel oil	98.4	0.60	0.06
0103 Petroleum refining plants			
Hard coal	8.6	0.31	0.00
Fuel oil	696.8	0.60	0.42

Sources of PCB emissions	Activity [Gg]	Emission factor [g/Gg]	Emission [kg]
Wood	0.0	0.90	0.00
0104 Solid fuel transformation plants			
Hard coal	120.0	0.31	0.04
Fuel oil	1.6	0.60	0.00
Wood	0.0	0.9	0.00
0105 Coal mining, oil/gas extraction, pipeline compressors			
Hard coal	1490.2	0.31	0.46
Brown coal	354.1	1.80	0.64
Fuel oil	8.8	0.60	0.01
Wood	0.2	0.90	0.00
02. Non-industrial combustion plants			**356.10**
0201 Commercial and institutional plants			
Hard coal	5723.0	0.413	2.36
Brown coal	35.0	1.80	0.06
Fuel oil	30.6	0.60	0.02
Wood	8.1	0.90	0.01
Coke	61.4	3.60	0.22
0202 Residential plants			
Hard coal	8102.8	31.6	256.05
Brown coal	140.5	183.2	25.74
Fuel oil	710.3	3.6	2.56
Wood	6901.0	9.0	62.11
Coke	410.0	9.7	3.98
0203 Plants in agriculture, forestry and aquaculture			
Hard coal	1501.0	0.413	0.62
Brown coal	135.1	1.80	0.24
Fuel oil	1109.5	0.60	0.67
Wood	1140.1	0.90	1.03
Coke	120.0	3.60	0.43
03. Combustion in manufacturing industry			**19.02**
0301 Combustion in boilers, gas turbines and stationary engines			
Hard coal	3078.5	0.31	0.95
Brown coal	5.6	1.80	0.01
Fuel oil	283.1	0.60	0.17
Wood	7.4	0.90	0.01

Sources of PCB emissions	Activity [Gg]	Emission factor [g/Gg]	Emission [kg]
Coke	6.8	3.60	0.02
0302 Process furnaces without contact			
Hard coal	6484.5	0.31	2.01
Brown coal	41.7	1.80	0.08
Fuel oil	851.8	0.60	0.51
Wood	1739.5	0.90	1.57
Coke	193.7	3.60	0.70
0303 Processes with contact			
Hard coal	3229.9	0.31	1.00
Brown coal	7.4	1.80	0.01
Fuel oil	13.8	0.60	0.01
Wood	1.3	0.90	0.00
Coke	3071.3	3.60	11.06
030301 Sinter and palletising plants	8078.7	0.065	0.53
030309 Secondary copper production	68.0	2.60	0.18
030310 Secondary aluminium production	46.9	2.60	0.12
030311 Cement*	11 558.5	0.007	0.08
04. Production processes			**80.50**
040203 Pig iron tapping	6491.9	3.60	23.37
040205 Open hearth furnace steel plants	414.5	2.60	1.08
040206 Basic oxygen furnace steel plant	6793.8	2.60	17.66
040207 Electric furnace steel plants	3290.0	2.60	8.55
040208 Rolling mills	11 477.8	2.60	29.84
06. Solvent and other product use			**1 632.00**
060507 Electrical equipment	1.02	1 600 000	1 632.00
07. Road transport			**110.19**
Motor gasoline**	371.4	106.00	39.37
Unleaded motor gasoline	4559.0	0.02	0.09
Diesel oil (cars and light duty vehicles)***	16 589 000 000.0	0.00000005	0.83
Diesel oil (heavy duty vehicles)***	12 969 000 000.0	0.00000539	69.9
09. Waste treatment and disposal			**1.76**
090201 Incineration of domestic or municipal wastes	2.9	0.20	0.00
090202 Incineration of industrial wastes (no APCS)	15.2	30.40	0.46
090202 Incineration of industrial wastes (minimal APCS)	15.6	19.30	0.30

Sources of PCB emissions	Activity [Gg]	Emission factor [g/Gg]	Emission [kg]
090202 Incineration of industrial wastes (controlled combustion, good or sophisticated APCS)	192.7	0.38	0.07
090207 Incineration of hospital wastes (complying with EU directive)	4.2	0.39	0.00
090207 Incineration of hospital wastes (no or minimal APCS)	46.7	20.00	0.93
Total			**2320.36**

* The activity is a value of clinker production in Gg; emission factor unit is g/Gg of clinker.
** The calculation was based on literature emission factor 6.32 microgram/km, with mean fuel consumption of 8 litres/100km and motor gasoline density 0.74 kg/l.
*** The activity is mileage in km; the emission factor unit is g/km.

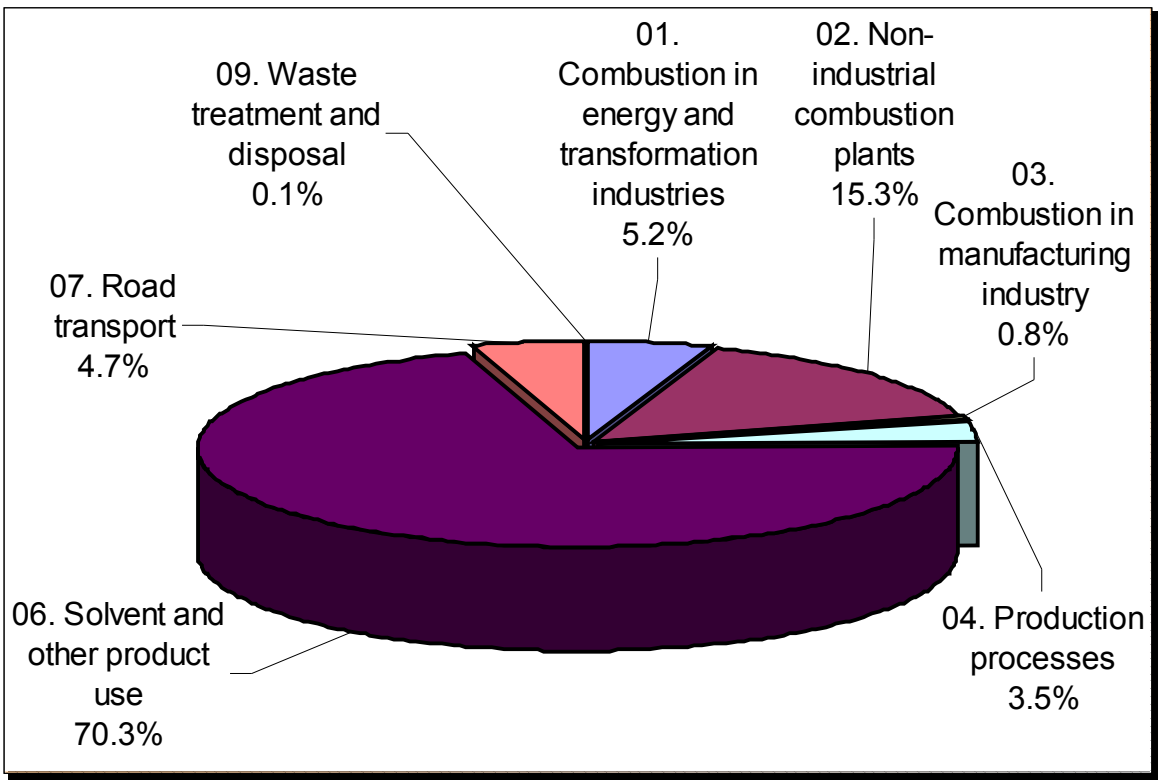

Figure 2.3.4.1. The share of different sectors in the total PCB air emission in 2000

Emission of hexachlorobenzene (HCB)

There are considerably less publications available on HCB emissions than on emissions of PCDDs/PCDFs or PCBs. According to the scientific literature, the main sources of HCB emissions are: the use of chlorinated pesticides (contaminated with HCB), production of chlorine and chloroorganic compounds (e.g. trichloroethylene, tetrachloroethylene, vinyl chloride and carbon tetrachloride), incineration of waste, burning of coal, and some metallurgical processes (e.g. certain technologies for production of aluminium or copper alloys, and ore sintering.

The total HCB emission to the air in Poland in 2000 has been estimated at 8.57 kg (Table 2.3.4.2) [2]. Figure 2.3.4.2 shows the shares of different groups of emission sources in the national emission. The highest 50% share provides "combustion in manufacturing industry" (SNAP 03). The highest emission values in this sector are attributed to the production of secondary copper (over 30% of total HCB emission) and to sintering plants (over 13% of total HCB emission).

Further sources, with a significant share in the total HCB emission, are: "waste treatment and disposal" (SNAP 09) – 23%, and "non-industrial combustion plants" (SNAP 02) – 18%. Among sources included in the latter two SNAP categories, the highest emission originates from incineration of hospital waste in facilities not furnished with air protection control systems (APCS) or having only the simplest systems reducing air pollution emission (almost 69% of emissions of the entire SNAP 09 category sources), and combustion processes in residential plants (about 90% of the whole SNAP 02 category sources).

Table 2.3.4.2. HCB emissions to the air in 2000

Sources of HCB emissions	Activity [Gg]	Emission factor [g/Gg]	Emission [kg]
01. Combustion in energy and transformation industries			**0.58**
0101 Public power			
Hard coal	42 006.0	0.013	0.55
0102 District heating plants			
Hard coal	871.0	0.013	0.01
0103 Petroleum refining plants			
Hard coal	8.6	0.013	0.00
0104 Solid fuel transformation plants			
Hard coal	120.0	0.013	0.00
0105 Coal mining, oil/gas extraction, pipeline compressors			
Hard coal	1490.2	0.013	0.02
Wood	0.2	0.060	0.00
02. Non-industrial combustion plants			**1.58**
0201 Commercial and institutional plants			
Hard coal	5723.0	0.013	0.07
Wood	8.1	0.060	0.00
0202 Residential plants			
Hard coal	8102.8	0.125	1.01
Wood	6901.0	0.060	0.41
0203 Plants in agriculture, forestry and aquaculture			
Hard coal	1501.0	0.013	0.02
Wood	1140.1	0.060	0.07

Sources of HCB emissions	Activity [Gg]	Emission factor [g/Gg]	Emission [kg]
03. Combustion in manufacturing industry			**4.28**
0301 Combustion in boilers, gas turbines and stationary engines			
Hard coal	3078.5	0.013	0.04
Wood	7.4	0.060	0.00
0302 Process furnaces without contact			
Hard coal	6484.5	0.013	0.08
Wood	1739.5	0.060	0.10
0303 Processes with contact			
Hard coal	3229.9	0.013	0.04
Wood	1.3	0.060	0.00
030301 Sinter and palletising plants	8078.7	0.140	1.13
030309 Secondary copper production	68.0	39.000	2.65
030311 Cement*	11 558.5	0.021	0.24
07. Road transport			**0.16**
Motor gasoline**	371.4	0.355	0.13
Unleaded motor gasoline**	4 559	0.000368	0.00
Diesel oil***	29 558 000 000	8.70E-10	0.03
09. Waste treatment and disposal			**1.97**
090201 Incineration of domestic or municipal wastes	2.9	0.150	0.00
090202 Incineration of industrial wastes (no or minimal APCS)	30.8	19.000	0.59
090202 Incineration of industrial wastes (good or sophisticated APCS)	192.7	0.139	0.03
090207 Incineration of hospital wastes (complying with EU directive)	4.2	0.295	0.00
090207 Incineration of hospital wastes (no or minimal APCS)	46.7	29.000	1.35
Total			**8.57**

* The activity is a value of clinker production in Gg; the emission factor unit is g/Gg of clinker.
** Calculation was based on literature emission factor 21 ng/km for motor gasoline and 0.024 ng/km for unleaded motor gasoline, with mean fuel consumption additionally of 8 and 8.8 litres per 100 km, and density 0.74 kg/l.
*** The activity is mileage in km; the emission factor unit is g/km.

For estimating HCB emission levels from sintering plants, cement factories, and industrial and hospital waste incineration plants equipped with highly efficient air protection control systems, emission factors based on measurements carried out in Poland were used. It was particularly important to determine the domestic emission factor from Polish sintering plants as in earlier inventories a literature-based factor was used with its value several times higher than the empirical level. This led to overestimation of the total country emission value, in

which HCB emission from sintering processes amounted to 82%. The remaining changes and amendments to emission factors (concerning emissions from transport and waste treatment) are based on published data.

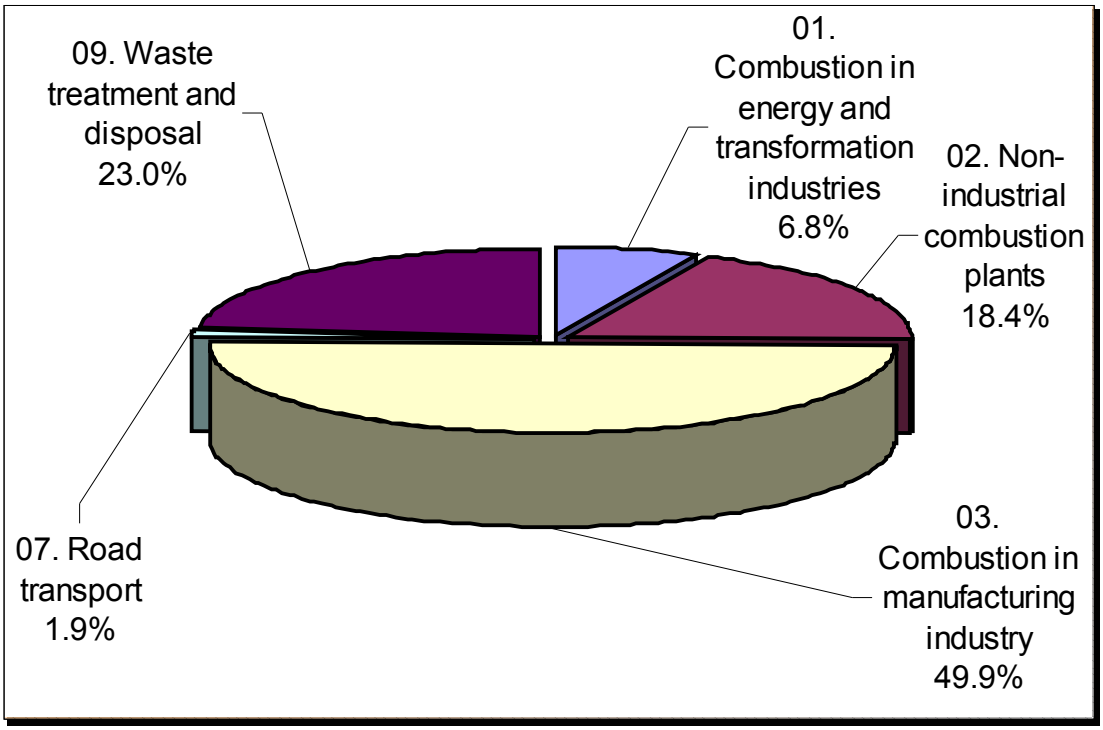

Figure 2.3.4.2. The share of different sectors in the total HCB emission to the air in 2000

Emission of dioxins and furans

According to the studies conducted in the European Union member countries, 62% of all releases of dioxins and furans are emitted into the air. The main sources of PCDD/PCDF emissions in the EU are as follows: controlled incineration of municipal waste – 25.5%, upgrading of metal ores by thermal methods – 17.6%, burning of wood – 16.4%, incineration of hospital waste – 14.2%, timber conservation – 6.6%, fires – 6.6%, illegal burning of household waste – 3%, processing of recycled raw material – 2%, road transport – 1.9%, steel metallurgy – 1.5%, copper smelting and processing – 1.3%, aluminium smelting and processing – 0.7%. Other emission sources are, *inter alia*: incineration of industrial waste, coal burning in household furnaces, industrial coal burning, cement production, smelting and processing of zinc, crematories, non-iron metallurgy and recovery of metals from cables.

Several series of dioxin emission measurements carried out in the past (1996–2001) allowed to establish the national emission factors for PCDD/PCDF emissions from the incineration of hospital waste in plants using differentiated technologies and various air protection control systems. Similar measurements enabled also to calculate PCDD/PCDF emission factors from coal combustion in public and industrial power generation plants, and in households, where co-incineration processes occur. In categories lacking domestic emission factors, factors selected through reviews of relevant publications, inventory reports and investigations made in other countries were used.

Emissions of dioxins and furans into the air have been estimated in Poland in 2000 at about 505 TEQ [2]. Detailed information on dioxin and furan emission levels from different sources is presented in Table 2.3.4.3 and in Figure 2.3.4.3. Non-industrial combustion processes from commercial and residential plants (SNAP 02) are responsible for about 37% of the total PCDD/PCDF emission and are recognised as the main sources of that emission. Within that SNAP category, emissions from residential plants (SNAP 0202) dominate, covering, *inter alia*, the burning processes in household stoves and furnaces (SNAP 020205), where often co-incineration takes place when household waste is being burned with the fuel. Emission from subcategory SNAP 0202 amounts to more than 98% of the emission level from non-industrial combustion sector, hence over 36% of the total PCDD/PCDF emission in Poland.

Table 2.3.4.3. Dioxin and furan emissions to the air in 2000

Sources of dioxin and furan emission	Activity [Gg]	Emission Factor [mg TEQ/Gg]	Emission [mg TEQ]
01. Combustion in energy and transformation industries			**7197.3**
0101 Public power			
Hard coal	42 006.0	0.06	2520.4
Brown coal	58 754.5	0.06	3525.3
Fuel oil	175.2	1.00	175.2
0102 District heating plants			
Hard coal	871.0	0.06	52.3
Brown coal	0.0	0.06	0.0
Fuel oil	98.4	1.00	98.4
0103 Petroleum refining plants			
Hard coal	8.6	0.06	0.5
Brown coal	0.0	0.06	0.0
Fuel oil	696.8	1.00	696.8
Wood	0.0	1.00	0.0
0104 Solid fuel transformation plants			
Hard coal	120.0	0.06	7.2
Brown coal	0.0	0.06	0.0
Fuel oil	1.6	1.00	1.6
Wood	0.0	1.00	0.0
0105 Coal mining, oil/gas extraction, pipeline compressors			
Hard coal	1490.2	0.06	89.4
Brown coal	354.1	0.06	21.2
Fuel oil	8.8	1.00	8.8
Wood	0.2	1.00	0.2
02. Non-industrial combustion plants			**185 202.7**

Sources of dioxin and furan emission	Activity [Gg]	Emission Factor [mg TEQ/Gg]	Emission [mg TEQ]
0201 Commercial and institutional plants			
Hard coal	5723.0	0.06	343.4
Brown coal	35.0	0.06	2.1
Fuel oil	30.6	1.00	30.6
Wood	8.1	1.00	8.1
0202 Residential plants			
Hard coal	8102.8	18.00	145 850.4
Brown coal	140.5	10.00	1405.0
Fuel oil	710.3	1.00	710.3
Wood	6901.0	5.00	34 505.0
0203 Plants in agriculture, forestry and aquaculture			
Hard coal	1501.0	0.06	90.1
Brown coal	135.1	0.06	8.1
Fuel oil	1109.5	1.00	1109.5
Wood	1140.1	1.00	1140.1
03. Combustion in manufacturing industry			**52 607.3**
0301 Combustion in boilers, gas turbines and stationary engines			
Hard coal	3078.5	0.060	184.7
Brown coal	5.6	0.060	0.3
Fuel oil	283.1	1.000	283.1
Wood	7.4	1.000	7.4
0302 Process furnaces without contact			
Hard coal	6484.5	0.060	389.1
Brown coal	41.7	0.060	2.5
Fuel oil	851.8	1.000	851.8
Wood	1739.5	1.000	1739.5
0303 Processes with contact			
Hard coal	3229.9	0.060	193.8
Brown coal	7.4	0.060	0.4
Fuel oil	13.8	1.000	13.8
Wood	1.3	1.000	1.3
030301 Sinter and palletising plants	8078.7	1.450	11 714.1
030307 Secondary lead production	36.8	8.000	294.4
030308 Secondary zinc production (minimal APCS)	15.2	100.000	1520.0
030308 Secondary zinc production (casting and remelting only)	9.6	0.300	2.9
030309 Secondary copper production	68.0	50.000	3400.0

Sources of dioxin and furan emission	Activity [Gg]	Emission Factor [mg TEQ/Gg]	Emission [mg TEQ]
030310 Secondary aluminium production (scrap processing)	123.2	150.000	18 480.0
030310 Secondary aluminium production (casting of alloys)	75.0	1.300	97.5
030311 Cement*	11 558.5	0.070	809.1
030312 Lime (no or minimal APCS)	1188.0	10.00	11 880.0
030312 Lime (good APCS)	1188.0	0.070	83.2
030313 Asphalt concrete plants (no APCS)	520.8	0.070	36.5
030313 Asphalt concrete plants (fabric filters)	520.8	0.007	3.6
030314-17 Glass (no or minimal APCS)	1549.6	0.200	309.9
030319 Bricks and tiles (no or minimal APCS)	1040.0	0.200	208.0
030319 Bricks and tiles (good APCS)	1460.0	0.020	29.2
030320 Fine ceramic materials (no or minimal APCS)	323.5	0.200	64.7
030320 Fine ceramic materials (good APCS)	323.5	0.020	6.5
04. Production processes			**38 444.5**
040201 Coke oven (dust removal/ afterburner)	9069.4	0.300	2720.8
040203 Pig iron tapping	6491.9	2.000	12 983.8
040205 Open heart furnace steel plants	414.5	2.000	829.0
040206 Basic oxygen furnace steel plants	6793.8	2.000	13 587.6
040207 Electric furnace steel plants	3290.0	2.000	6580.0
040301 Aluminium production	46.9	2.000	93.8
040617 Other (smoke houses - clean fuel, no afterburner)	229.1	6.000	1374.6
040617 Other (smoke houses - clean fuel, afterburner)	458.2	0.600	274.9
07. Road transport			**1452.3**
Motor gasoline	371.4	2.200	817.1
Unleaded motor gasoline	4559.5	0.104	474.2
Diesel oil	3745	0.043	161.0
08. Other mobile sources and machinery			**211.1**
Motor gasoline	68.10	2.200	149.8
Diesel oil	1426.00	0.043	61.3
09. Waste treatment and disposal			**152 476.3**
090201 Incineration of domestic or municipal wastes (sophisticated APCS)	2.90	0.50	1.5
090202 Incineration of industrial wastes (no APCS)	13.00	3500.00	45 500.0
090202 Incineration of industrial wastes (minimal APCS)	13.00	350.00	4550.0
090202 Incineration of industrial wastes (good APCS)	84.00	30.00	2520.0
090202 Incineration of industrial wastes (sophisticated APCS)	53.50	0.50	26.8

Sources of dioxin and furan emission	Activity [Gg]	Emission Factor [mg TEQ/Gg]	Emission [mg TEQ]
090202 Incineration of industrial wastes - dangerous wastes (no APCS)	2.16	35000.00	75 600
090202 Incineration of industrial wastes - dangerous wastes (minimal APCS)	2.64	350.00	924.0
090202 Incineration of industrial wastes - dangerous wastes (good APCS)	40.80	10.00	408.0
090202 Incineration of industrial wastes - dangerous wastes (sophisticated APCS)	14.40	0.75	10.8
090205 Incineration of sludge from waste water treatment (with APCS)	5.90	4.00	23.6
090207 Incineration of hospital wastes (complying with EU directive)	4.20	1.40	5.9
090207 Incineration of hospital wastes (minimal or good APCS)	22.90	68.00	1557.2
090207 Incineration of hospital wastes (no APCS)	23.80	453.30	10 788.5
0907 Open burning of agricultural wastes (except 1003)	350.00	30.00	10 500.0
090901 Cremations**	6000.00	0.01	60.0
10. Agriculture			**521.0**
1003 On-field burning of stubble, straw	16.8	5.00	84.0
1003 On-field burning of stubble, straw (unmanaged fields' fires)	87.4	5.00	437.0
11. Other sources and sinks			**67 168.6**
1103 Forest fires	260	5.00	1300.0
1125 Other (landfill fires)	49.3	1000.00	49 300.0
1125 Other (vehicle fires)	38.3	94.00	3600.2
1125 Other (houses and factories fires)	32.4	400.00	12 960.0
1125 Other (cigarette smoking)***	83.8 mld	1.00E-10	8.4
Total			**505 281.1**

* The activity is the amount of clinker production in Gg; the emission factor unit is mg TEQ/Gg of clinker.
** The activity is number of cremated bodies; the emission factor unit is mg TEQ/body.
*** The activity is number of cigarettes; the emission factor unit is mg TEQ/cigarette.

The second largest dioxin emission source is the treatment and disposal of waste – SNAP 09 (30% of the total PCDD emission). In this sector, incineration of industrial wastes (including hazardous waste) and hospital wastes in facilities without air protection control systems has the highest share in releases. Emission of PCDDs/PCDFs into the air from hazardous and industrial wastes incinerated without any air protection systems amounts to about 50% and 30%, respectively, of the entire SNAP 09 category. The share of such emission from hospital waste, which is treated under similar conditions amounts to 7%. Similarly, almost 7% of the emission under SNAP 09 category comes from open burning of agricultural (post harvest) waste. Emission estimates for SNAP 09 category, is not very accurate and presents a high level of uncertainty, as it is based on public statistics data covering only large waste

producers. Therefore, the emission levels obtained seem to be underestimated. In the national inventory of dioxins and furans carried out in accordance with the requirements of UNEP Chemicals [84] the actual level of PCDD/PCDF emission has been estimated for the year 2000 at 1–81 g TEQ for hazardous waste and 5.23–123 g TEQ for other industrial waste.

Subsequent significant sources of dioxin and furan emissions are fires of waste landfills, buildings (both residential and industrial) and motor vehicles. These sources, along with forest fires and cigarette smoking, have been classified as category SNAP 11: other sources of emission and absorption of pollutants (in some studies these sources are distinguished into a separate, twelfth category). In 2000 the emission from sources classified pursuant to SNAP 11 amounted to 13% of the total dioxin emission, of which over 73% (almost 10% of the total emission) originates from burning waste landfills. Estimates of emissions from landfill fires are very rough and present a high level of uncertainty because it is almost impossible to determine the accurate volume of waste burned during landfill fires, and the number of fires itself is also an approximation. The mass of plant residues from on-field burning has been calculated from the area of cultivated farmland (according to GUS in 2000 this area amounted to 14129.3 thousand hectares) and the EMEP/CORINAIR emission factor, determining the amount of biomass burned per one hectare of cultivated area (0.025 Mg/ha).

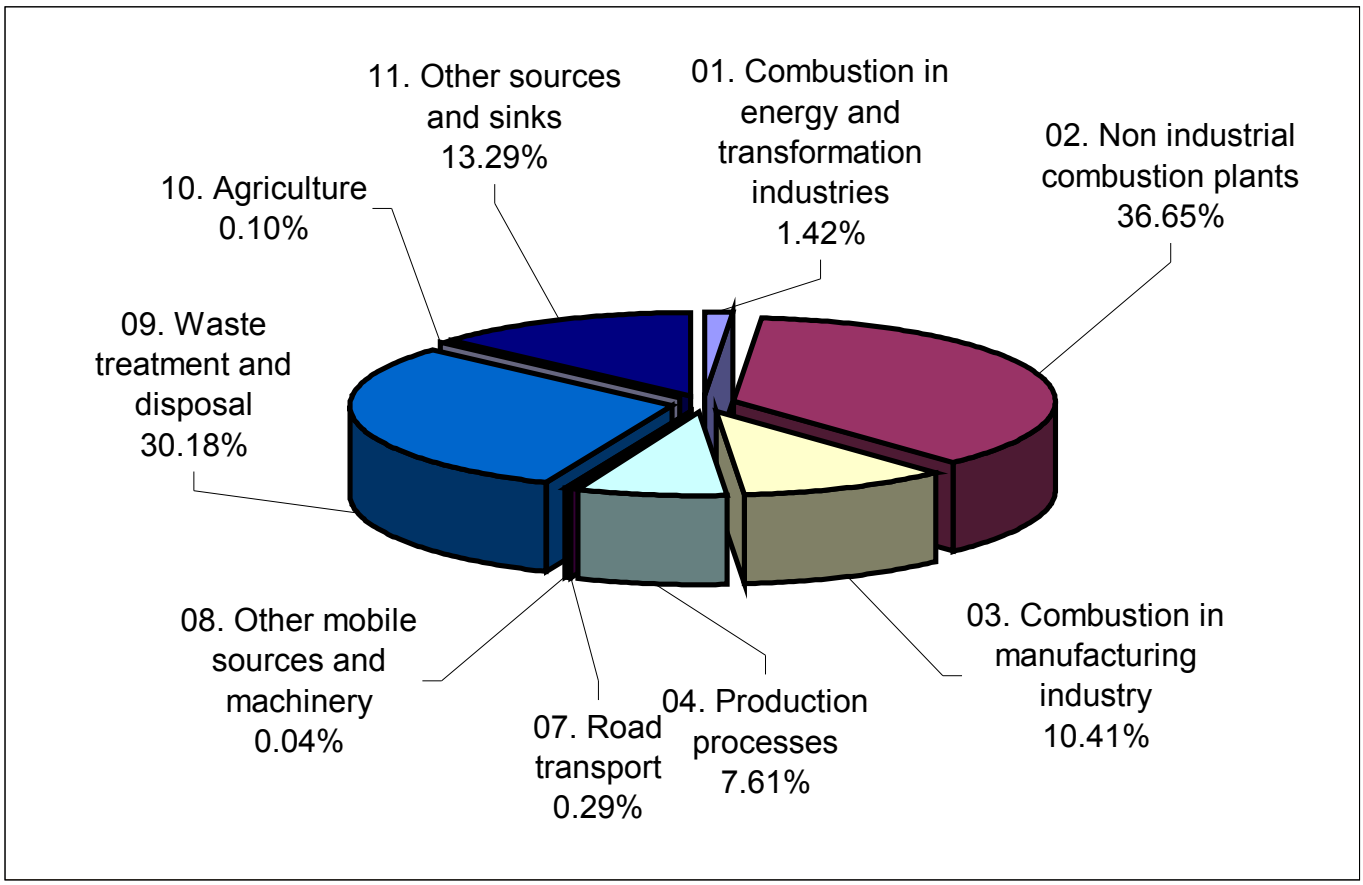

Figure 2.3.4.3. The share of different sectors in PCDD/PCDF air emission in 2000

The amount of wood burned in Poland is presented for statistical purposes in volume units and in energy units. This requires recalculation into mass units. According to information of the Central Statistical Office the average heat value of wood amounts to 9.5 GJ/m^3 and the weight to volume factor varies between 11.9 to 19 TJ/Gg. For the purpose of the inventory a mean value of 15 TJ/Gg was adopted.

PCB, HCB and PCDD/PCDF releases

An assessment of POPs releases into water, soil, waste/residues and products is more difficult and definitely less complex in comparison with the evaluation of emissions into the air, due to much more limited information on release factors into these media.

An estimation of PCDD/PCDF releases was made on the basis of factors published by UNEP Chemicals [84] and described below. It should be emphasised that the values of emission factors are unknown for many categories of emission sources, and despite the conviction that such emission takes place, it could not have been considered in the process of evaluation. Therefore, the emission values are presumably underestimated.

With reference to releases of HCB and PCBs into water, soil, waste/residues and products only the potential sources of these pollutants are indicated.

POPs releases with wastewaters. These releases, especially releases of PCDDs/PCDFs, HCB and PCBs, are the least recognised elements posing a threat to the environment. Lack of regulatory requirements to measure the level of POPs in wastewater in Poland, and to charge for POPs discharged is to be blamed for that situation.

In 1999–2002, in connection with the EU approximation process, an attempt was made to investigate by a method of inquiry, which production processes and which industries may discharge hazardous substances subject to Directive 76/464/EEC[34] and its daughter directives, including substances controlled by the Stockholm Convention, into water bodies and the sewage system. The questionnaire covered 250 small, medium and large enterprises. On the basis of these sample results a conclusion was drawn that in Poland there are at least 1000 enterprises, which can potentially discharge POPs with wastewaters, however their amounts have not been determined. Having this in mind, pilot tests of POPs concentrations in wastewater from about 1000 industrial enterprises were designed[35] in the Implementation Plan for Directive 76/464/EEC.

For the time being an assessment of POPs releases with wastewater is possible only by using literature-based release factors. Such factors have been specified in a technical report prepared under the GEF Project [2]. They include PCDD/PCDF release factors for discharges into the waters from 30 activity categories pursuant to SNAP. The results obtained are presented in Table 2.3.4.4.

[34] Council Directive 76/464/EEC of 4 May 1976 on pollution caused by certain dangerous substances discharged into the aquatic environment of the Community (the so-called "mother-directive"); O. J. L 129, 18/05/1976.

[35] In 2004 an inventory of discharges of hazardous substances into water bodies and the sewage system was completed for the Ministry of the Environment. The inventory covered 1200 enterprises throughout the country. No chlorinated insecticides or other pesticides, including aldrin, dieldrin, endrin and HCB, subject to the Stockholm Convention, were found in the examined samples. Small concentrations of DDT and its metabolites (1.6 mg/l) were only discovered in wastewaters of one chemical plant.

Table 2.3.4.4. Releases of PCDDs/PCDFs into waters in 2000

Sources of dioxin/furan releases	Activity [Gg]	Release factor [mg TEQ/Gg]	Releases [mg TEQ]
04. Production processes			**94.1**
040201 Coke production (after-burning, dust filters)	9069.4	0.006	54.4
040508 Polyvinyl chloride production (PVC)	273.9	0.030	8.2
0406 Processes in timber, paper and other industries (Kraft process, chlorine-less bleaching)	300.4	0.060	18.0
0406 Processes in timber, paper and other industries (unbleached paper pulp)	450.5	0.030	13.5
09. Waste management			**1122.9**
091002 Wastewater treatment in the municipal sector (without sludge disposal)*	250 578.0	0.0020	501.2
091002 Wastewater treatment in the municipal sector (with sludge disposal)*	792 947.0	0.0005	396.5
091002 Wastewater treatment in the municipal sector (treatment on bio-filter)*	450 475.0	0.0005	225.2
Total			**1217.0**

* Activity in Gg of wastewater, release factor in mg TEQ per Gg of wastewater.

Data included in Table 2.3.4.4. do not cover all categories of emission sources of dioxin and furan releases into water bodies. Therefore, the following conclusions can be drawn from them:

- the major sources of dioxin and furan releases into water are not industrial production processes but wastewater treatment (92% of the total);
- the dioxin and furan releases with wastewaters are many times lower than the emissions into the air (Table 2.3.4.3).

No sufficient data could be collected to assess the total release of PCBs and HCB into waters. An assumption could only be made that the releases from wastewater treatment processes could be estimated for over 50% and from industrial processes below 15% of all releases.

Releases into waste. No direct measurements of PCDD/PCDF, HCB and PCB content in wastes, disposed of in the environment are available (apart from PCBs in the used or discarded electrical equipment). Under these circumstances, mainly literature-based release factors can be used to evaluate the amount of POPs released with wastes, residues and industrial products. Such an evaluation was carried out in 2000 [2]. Forty categories of emission sources, according to the SNAP classification, were considered. Summary results have been put together in Table 2.4.4.5.

The level of dioxin and furan releases with waste into the environment (341.3g/year) is comparable with the emissions of these substances into the air (505.3 g/year). Sufficient data to evaluate PCB and HCB releases into the environment with wastes is not available. However, electric steelworks and secondary aluminium production may be regarded as their major sources of releases with wastes. The less significant sources would be: hard coal combustion, secondary copper processing, basic oxygen furnace steel plants, incineration of industrial waste and municipal wastewater treatment.

Table 2.4.4.5. Releases of PCDDs/PCDFs into waste/residues in 2000

Sources of dioxin and furan releases	Release [g TEQ]	% of total release
01 Combustion processes in energy production and transformation	13.3	4
02 Non-industrial combustion plants	31.1	9
03 Combustion processes in industrial sector	98.0	29
04 Production processes	59.7	18
05 Waste management (mainly wastewater treatment and incineration of sludge)	139.2	40
Total	**341.3**	**100**

Releases into the products. Persistent organic pollutants can be released into the environment through products generated by the industry and other economic activities. Such releases may take place either during the use of those products or after they become waste. Like in the case of wastewater and wastes, no sufficient and reliable data are available on the content of PCDDs/PCDFs in products and on the degree of their releases into the environment. Estimates of these releases, based on emission factors found in literature, indicate that this type of release is not significant (Tables 2.3.4.6. and 2.3.4.7). These releases mainly originate from paper and chemical industry products.

Table 2.3.4.6. PCDD/PCDF releases into products in 2000

Sources of dioxin and furan releases	Activity [Gg]	Emission factor [mg TEQ/Gg]	Emission [mg TEQ]
04. Production processes			10 684.2
040508 Polyvinyl chloride production (PVC)	273.9	0.1	27.4
040525 Production of pesticides (2.4-D; 2.4-bichlorophenoxyacetic acid)	4.0	700.0	2800.0
0406 Processes in timber. paper and other industries (biomass drying –pure timber)	1353.1	0.1	135.3
0406 Processes in timber. paper and other industries (Kraft process. chlorine-less bleaching)	1223.0	0.5	611.5
0406 Processes in timber. paper and other industries (recycled paper)	711.0	10.0	7110.0
06. Application of solvents and other products			63.8
060312 Fabrics finishing	63.8	1.0	63.8
09. Waste management			32.2
091005 Production of compost	322.0	0.1	32.2
Total			**10 780.2**

There are no sufficient data available to assess the quantitative releases of PCBs and HCB through products. It may be only estimated that more than 50% of releases of these substances originate from secondary paper production, more than 15% from pesticide production and less than 15% from other processes in the paper and timber industries, PVC production, pesticides, compost and fabric finishing.

Table 2.3.4.7. The share of different sectors in the release of PCDDs/PCDFs into the environment through manufactured products in 2000

Sources of dioxin and furan releases	Release [g TEQ]	% of total release
04. Production processes (production of PVC, pesticides, paper and timber articles)	10.70	99.0
06. Application of solvents (finishing fabrics)	0.06	0.6
09. Waste management (compost production)	0.03	0.4
Total	**10.80**	**100.0**

Releases directly into the soil

According to published data, based mainly on British inventories, the following are regarded as the major sources of PCB releases into the soil: cutting and fragmentation of scrap-iron (70–90%), leakages from capacitors (5–15%), land filling of municipal waste (1–5%), leakages from transformers (0.5–2%) and agricultural use of sewage sludge (1–3%). The share of other sources does not exceed 0.5% of the total release.

Dioxins and furans are released directly into the soil in result of on-field burning of agricultural waste (dry grass, stubble-fields and straw), directly on the top-soil, and in result of forest fires. A preliminary inventory of these releases indicates that it is not a significant source of dioxin and furan emissions to the environment (Table 2.3.4.8) in comparison with the emission into the air and with wastes.

Lack of credible data on factors regarding releases into the soil and on the number of electrical equipment (transformers, capacitors and electric cables) disposed of on scrap heaps, municipal waste landfills or stored in places of their elimination from use, did not allow for an estimation of direct releases of PCBs into the soil in 2000.

Even less evidence in this respect can be found in relation to HCB. Presumably some industrial waste landfills, pesticide landfills, deposits from air, and rainwater drained by leaking sewers may be the sources of HCB release.

Table 2.3.4.8. PCDD/PCDF releases directly into the soil in 2000

Sources of dioxin and furan releases	Activity [Gg]	Release factor [mg TEQ/Gg]	Releases [mg TEQ]
09. Waste management			3500.0
0907 Open burning of agricultural waste (without 1003)	350.0	10	3500.0
10. Agriculture			416.8
1003 Burning stubble-fields and straw	16.8	4	67.2
1003 Burning stubble-fields and straw (idle land fires)	87.4	4	349.6
11. Other sources of emission and absorption of pollutions			1040.0
1103 Forest fires	260.0	4	1040.0
Total			**4956.8**

Comparison of releases into different media. Assessment of dioxin and furan emissions into the air and releases into surface waters as well as with wastes, residues and products directly into the soil allows for estimating roughly the shares of releases into specific environmental media. Results of such an estimate indicate that around 58% of the total dioxin and furan emission reaches the air; almost 40% of the total release of dioxins and furans into the environment comes from wastes and the remaining share (2%) from water[36], products and directly into the soil (Table 2.3.4.9).

Table 2.3.4.9. PCDD/PCDF emission/release into specific environmental media in 2000

Specification	Air	Water	Wastes and residues	Products	Soil
Emission/release of dioxins and furans [g TEQ]	505.3	1.22	341.3	10.8	5.0
Share [%]	58.5	0.10	39.5	1.3	0.6

Due to insufficient data it was only possible to indicate the processes from which the penetration of PCBs and HCB into wastewater, wastes/residues, products and soil can be expected. PCBs and HCB are likely to be released into different environmental media from processes, which have also been identified as PCDD/PCDF emission sources.

Existing policy and regulatory framework. Table 2.3.4.10 presents permissible concentration levels of POPs (HCB, PCBs and PCDDs/PCDFs) commonly released into the environment with different media and products. The data has been compiled from Polish legal regulations and legally binding administrative decisions (e.g. Decision of the Chief Veterinary Surgeon [62]).

Table 2.3.4.10. Permissible concentration levels of HCB, PCBs and PCDDs/PCDFs in different media and products

Media or products	Permissible concentration		
	HCB	PCBs	PCDDs/PCDFs
AIR			
• workplace	0.5 mg/m^3	1 mg/m^3	–
WATER			
• drinking water	0.10 µg/l	0.5 µg/l	–
WASTEWATER			
• treated wastewater discharged into waters or into the ground	0.003–3.0* mg/l of wastewater	–	–
• industrial wastewater discharged into municipal sewerage systems	2 mg/l of wastewater	0.1 mg/l of wastewater	–

[36] The share of wastewater in the total emission of dioxins and furans into the environment is underestimated because of lack of reliable emission factors. The structure of PCDD/PCDF flows into specific environmental media may change after the emission with wastewater is verified.

Media or products	Permissible concentration		
	HCB	PCBs	PCDDs/PCDFs
SOIL, GROUND, SEDIMENTS			
• protected areas	–	20 ng/g d.m.	–
• farm land, forests, residential and recreation areas	–	20 ng/g d.m.	–
• industrial and transport areas	–	2000 ng/g d.m.	–
FOOD			
• cereal grains	0.01 mg/kg	–	–
• meat and meat products	0.2 (F) mg/kg	0.2 mg/kg	500 pg TEQ/kg
• milk and dairy products containing below 4% fat	0.01 mg/kg	0.1 mg/kg	–
• milk and dairy products containing more than 4% fat	0.25 (F) mg/kg	–	–
• eggs without egg shells	0.02 mg/kg	0.2 mg/kg	–
• tea leaves	0.01 mg/kg	–	–
• products for babies and small children up to 10% of fat	0.004 mg/kg		
• products for babies and small children containing more than 10% of fat	0.04 (F) mg/kg	–	–

– Lack of data.

(F) Calculated as per 1 kg of fat.

* The highest admitted daily mean value depending on the type of production.

Monitoring data. A single pilot study on dioxin and furan concentration levels at sites close to the mouths of the Vistula and Oder Rivers [3] was carried out within the framework of the GEF Project. The results of these measurements are presented in Table 2.3.4.11.

Furthermore, in 2003 additional measurements and tests have been carried out to determine the content of dioxins and furans in the bottom sediments of the Włocławski Reservoir situated in the middle course of the Vistula River. The reservoir retains pollutants originating from the Upper Silesia, Krakow and the Warsaw agglomeration and Płock, by capturing them inside its bottom sediments. The drainage area of the reservoir covers around 170 000 km^2, which stands for 45% of the country's territory. The results obtained are presented in Table 2.3.4.12.

Table 2.3.4.11. Highest recorded concentrations of dioxins and furans at the estuaries of the Vistula and Oder Rivers in 2002

Dioxin/furan compounds	River water [ng/l]	Bottom sediment [ng/g d.m.]	Fish [ng/g fat]
2,3,7,8-TCDF	not detected	0.0038	0.071
2,3,7,8-TCDD	not detected	0.00002	0.002
1,2,3,7,8-Pe CDF	not detected	0.0015	0.178
2,3,4,7,8-Pe CDF	not detected	0.0015	0.209

Dioxin/furan compounds	River water [ng/l]	Bottom sediment [ng/g d.m.]	Fish [ng/g fat]
1,2,3,7,8-Pe CDD	not detected	0.0037	0.143
1,2,3,4,7,8-Hx CDF	not detected	0.0037	0.169
1,2,3,6,7,8-Hx CDF	not detected	0.0002	0.247
2,3,4,6,7,8-Hx CDF	not detected	0.0005	0.047
1,2,3,7,8,9-Hx CDF	not detected	0.0002	0.045
1,2,3,4,7,8-Hx CDD	not detected	0.0001	0.005
1,2,3,6,7,8-Hx CDD	not detected	0.0009	0.056
1,2,3,7,8,9-Hx CDD	not detected	0.0067	0.016
1,2,3,4,6,7,8-Hp CDF	not detected	0.0003	0.018
1,2,3,4,7,8,9-Hp CDF	not detected	not detected	0.058
1,2,3,4,6,7,8-Hp CDD	not detected	0.0490	0.032
OCDD	not detected	0.7930	0.180
OCDF	not detected	0.2040	0.058
Sum of PCDDs/PCDFs in the most polluted sample	not detected	0.8360	0.645

Table 2.3.4.12. Dioxin and furan content in the bottom sediments of the Włocławski Reservoir in 2003

Substances	Contents [ng/g d.m.]
Dioxins	1.154
Furans	0.077

Health impact. In Poland there are two main sources of information about concentrations of POPs in food products and in human tissue: the results of studies conducted by scientific research institutes and the reports of the Soil, Plants, Farm Products and Food Quality Monitoring Council [56 and 63].

Exposure to HCB

Content of HCB in food products. HCB concentration values in food products obtained by different authors are presented in Table 2.3.4.13.

The data provided in Table 2.3.4.13. are in several cases higher than those obtained from monitoring measurements (Tables 2.3.4.14 and 2.3.4.15). These differences are caused by two factors: the differences in measurement methods and the lapse of time.

In 1995–1997 regular monitoring of the quality of plants, farm and food products was initiated covering, at the start, 100 sampling sites and 9 fisheries within the coastal zone of the Baltic Sea. (Chapter 2.3.7). The content of HCB was tested in carrots, potatoes and cereals. Among all the tested products the maximum accepted residue (MAR) level was established only for cereals – 0.01 mg/kg (Table 2.3.4.10). No increased content of HCB was noted in the tested material.

Tables 2.3.4.13–2.3.4.17 present summarized monitoring results of the HCB content in different products, mainly of animal origin.

Table 2.3.4.13. HCB content in food (in fat or products) in Poland

Material tested	Average content [mg/kg]	Number of samples	Year of the experiment
Cow milk	0.017	285	1994
Eggs	0.035	220	1994
Dairy products	0.025	75	1995–1997
Processed vegetables for children	0.004	63	1995–1997
Fish	0.004	42	1995
Fish products	0.034	45	1995
Pork fat	0.090	484	1991

Table 2.3.4.14. HCB content in the fat tissue of pork, cattle, game, cow milk and in the muscles of carp in Poland

Material tested	Range of concentration [mg/kg]	Average value [mg/kg]
Pork	0–0.005	<0.001
Cattle	0–0.013	0.005
Milk	0–0.004	<0.001
Game	0–0.028	0.006
Carp	0–0.014	0.004

Table 2.3.4.15. HCB content in food products and in rape seed in Poland in 2000

Products	Range of content [µg /kg fat]	Average value [µg /kg fat]	Number of samples tested
Pluck meat, cured meat	0–18.0	4.9	392
Oils	0–6.0	3.3	224
Margarines	0–3.4	3.0	244
Rape seed	0–43.0	3.0	223

Table 2.3.4.16. HCB content in kidney fat of slaughtered animals in Poland

Fat	Range of concentration [µg/kg fat]	Average value [µg/kg fat]	Number of samples tested
Goose	0–89.0	41.7	36
Turkey	0–3.3	3.0	53
Broilers	0–3.0	3.0	59
Lamb	0–4.0	5.0	12

Table 2.3.4.17. HCB content in raw fish and fish products in Poland

Material tested	Range of concentration [mg/kg fat]	Average value [mg/kg fat]	Number of samples tested
Raw fish	0.0011 – 0.0840	0.0170	190
Tinned fish	0.0015 – 0.0220	0.0091	51
Tinned cod liver	0.0163 – 0.0539	0.0360	16
Smoked fish	0.0014 – 0.0415	0.0068	152
Salted fish	0.0040 – 0.0194	0.0084	11
Pickles	0.0030 – 0.0146	0.0074	18

Although hexachlorobenzene has not been produced or used in Poland since a long time, it can still be found in the environment and in food products. On the basis of the monitoring results obtained a conclusion can be drawn that standards laid down by Polish regulations concerning permissible levels of HCB in food – the main source of human exposure – are complied with by food producers with a considerable safety margin. Monitoring the quality of plants, farm products and food provides up-to-date and reliable data, which may be used for the assessment of human exposure. Lack of monitoring data on HCB content in drinking water is less important for the evaluation of human exposure because of its poor solubility in water.

As far as HCB-related threats to the Polish population are concerned, monitoring of food contamination by this substance is far more important than the monitoring of other elements of the environment.

HCB content in human biological material. Research results on the content of HCB in humans are quite fragmentary and include tests on human milk and fat tissue. A summary of results obtained under several research projects, carried out mainly in 1990–2001, are presented in Table 2.3.4.18.

The analyses performed regarding the content of HCB in human biological material prove that we are exposed to that substance, but an in-depth interpretation of the level of HCB content in human milk and fat tissue is impossible because a permissible HCB content has not been set for biological material.

Assessment of human exposure to HCB. Assuming that food consumption is the main route of human exposure to HCB in Poland, in 2000 analyses of HCB contents in food were carried out within the system of monitoring soil, plant and food quality to assess the level of this exposure. Results obtained in 1991–1997 in several research centres were considered outdated and the testing methods used incompatible, and thus the results possibly not quite comparable.

Maximum acceptable residues (MAR) of HCB in foodstuffs, specified in a ministerial regulation[37], were used as a criterion for product quality assessment. Used as criteria for exposure assessment were the quantities of substances taken in compared with the tolerable daily intake (TDI).

[37] Regulation of the Minister of Health and Social Care of 15 April 1997 amending the Regulation on maximum acceptable residues in foodstuffs of chemicals applied in cultivation, protection, storage and transport of plants (DzU of 1997 No. 43, item 273).

Table 2.3.4.18. HCB content in human biological material in Poland

Place of sampling	Date	Tissue		Comments
		Milk	Fat	
Warsaw–lactarium	1993	0.0016 mg/l	–	average of 62 samples
Warsaw–hospital	1992	–	0.310 mg/l	average of 277 samples; age from 10 to 80
Kraków*	1992–1996	0.0014 mg/l	–	average value
Katowice*	1992–1996	0.0019 mg/l	–	average value
Gdańsk, Skierniewice, Warsaw, Lublin	1975–1990	–	0.260 mg/kg	average value
Brzeg Dolny**	2001	34 900 pg/g fat	–	average of 10 samples
Tarnów**	2001	31 500 pg/g fat	–	average of 10 samples
Włocławek**	2001	22 600 pg/g fat	–	average of 10 samples

* Studies were carried out in seven cities (here only examples from Kraków and Katowice are quoted). Average concentration of HCB in samples taken from all 7 cities was 0.002 mg/l, with the maximum of 0.005 mg/l (in Kielce).

** Samples were specially taken in locations, where manufacturers of chloroorganic substances and industrial waste incineration plants are situated.

– Not examined.

Table 2.3.4.19 presents data on HCB content in food products in 2000, expressed as a percentage of MAR. Concentrations presented above, except for the content found in goose meat, are low and do not exceed several percent of MAR. An assessment of exposure to HCB was made by taking into consideration the consumption scheme of selected food products and calculating the tolerable daily intake (TDI).

Table 2.3.4.19. Average HCB content in food products in 2000

Food product	Average content [mg/kg]	MAR [mg/kg]	% MAR
Pork	<0.001	0.2 (F)	0.5
Cattle	0.005	0.2 (F)	2.5
Milk*	<0.001	0.01	1.0
Game	0.006	0.2 (F)	3.0
Carp	0.004	0.2 (F)	2.0
Meat – pluck, cured	0.0049	0.2 (F)	2.5
Oils	0.003	0.2 (F)	1.5
Margarine	0.003	0.2 (F)	1.5
Rape seeds**	0.003	0.2 (F)	1.5
Goose	0.0417	0.2 (F)	20.8
Turkey	0.003	0.2 (F)	1.5
Broilers	0.003	0.2 (F)	1.5
Lamb	0.005	0.2 (F)	2.5

Food product	Average content [mg/kg]	MAR [mg/kg]	% MAR
Raw fish***	0.017	0.2 (F)	8.5
Tins – without tinned liver	0.009	0.2 (F)	4.5
Tinned cod liver	0.036	0.2 (F)	18.0
Smoked fish	0.007	0.2 (F)	3.5
Salted fish	0.008	0.2 (F)	4.0
Preserves	0.007	0.2 (F)	3.5
Pickles	0.007	0.2 (F)	3.5

* Includes milk and milk products up to 4% of fat.

** Oil seeds – the value as for fat was assumed.

*** No Polish standard for fish is available; permissible content as for fat has been taken

(F) – Calculated as per 1 kg of fat.

Table 2.3.4.20 includes the daily HCB intake per a statistical Polish citizen, calculated from the consumption structure of selected food products in 2000 and the average content of HCB in these products. The TDI value for HCB, determined by WHO, amounts to 0.17 µg per 1 kg of body weight. Concluding from data of Table 2.3.4.20, the daily HCB intake by a person with 70 kg of body weight amounts to 7.47 µg, which means that, as calculated per 1 kg of body weight, the intake is 0.107 µg/kg body weight per day, i.e. around 63% of the TDI.

Table 2.3.4.20. Daily HCB intake with food in 2000

Food product	Consumption [kg/day per person]	Content [mg/kg]	Intake [mg/day per person]
Milk	0.180	0.001	0.00018
Meat – pluck, cured	0.138	0.049	0.00676
Poultry	0.045	0.003	0.00014
Fat	0.018	0.003	0.00005
Margarine and other vegetable oils	0.034	0.003	0.00010
Fish	0.014	0.017	0.00024
Total			**0.00747**

According to WHO the total average daily HCB intake with food, air and drinking water in the general population of Europe and North America lies between 0.0004 and 0.0030 µg/kg body weight/day.

Results of HCB content tests in the fat tissue and human milk confirm historical exposure of the women and provide the basis for the assessment of babies' exposure to HCB through mothers' milk. Interpretation of the results, in the first instance, is incomplete since, to date, no methodical guidance for the assessment of human exposure, based on the content of chemical substances in the fat tissue, has been developed.

Exposure of babies fed by their mothers' milk can be assessed by applying two criteria: the permissible content in babies' and small children food products containing not more than 10% of fat – 0.004 mg/kg, and TDI – 0.17 µg/kg body weight.

The first criterion is fulfilled (Table 2.3.4.18). The HCB content in human milk (with less than 10% of fat) varies between 0.0008–0.0012 mg/kg, and thus is lower than the permissible level of 0.004 mg/kg.

The second criterion is also met because the calculated daily HCB intake based on results obtained in 2001 (Table 2.3.4.18) lies between 0.072 and 0.112 µg/kg body weight and is lower from the actual TDI (0.17 µg/kg body weight).

The possibility to predict health risks connected with exposure to HCB is limited to the comparison of the HCB intake with food with the tolerable daily intake – TDI. The daily intake of HCB with the food consumed is estimated at about 0.11 µg/kg body weight/day, i.e. about 63% of the TDI value recommended by WHO (0.17 µg/kg body weight/day). Also, the daily HCB intake by a baby with its mother's milk, as calculated from the data of the HCB content in human milk, amounting to 0.8–0.12 µg/kg body weight/day, is found within the limits of TDI.

The data presented may indicate that the exposure to HCB through consumption of products containing this substance does not pose a risk to human health in Poland, especially, since the other possible sources (air and drinking water) represent a negligible share in the total exposure.

Exposure to PCBs

PCB content in foodstuffs. The levels of PCBs in foodstuffs obtained by different authors[38] in 1994–1997 are shown in Table 2.3.4.21.

More extensive data, obtained by uniform methods, were gained in 1998–2000, within the monitoring system for plant, and agricultural and food products' quality, under which the content of the PCB sum was monitored (i.e. 7 indicative congeners marked as: 28, 52, 101, 118, 138, 153 and 180). These results are presented below in Tables 2.3.4.22–2.3.4.26.

Table 2.3.4.21. Content of PCBs in foodstuffs in Poland in1994–1997

Product	Average [mg/kg]	Number of samples	Date of measurement
Cow milk	0.0030	285	1994
	0.0001	52	1998
Eggs	<0.0010	220	1994
Fish	0.0034	42	1998
Citrus fruits	0.0002	64	1996/1997
Vegetables	0.0002	lack of data	1996

[38] Detailed literature data, referred to in this chapter, are specified in the technical report [14] prepared under the GEF Project.

Table 2.3.4.22. Content of PCBs' sum in the carcass fat tissue of pork, cattle, game, cow milk and muscles of carp in Poland in 1998–2000

Material examined	Range of results [mg/kg]	Average [mg/kg]
Pork	0–0.66	0.0012
Cattle	0–0.13	0.0036
Wild boar and roe	0–0.03	0.0059
Cow milk	0–0.08	0.0024
Carp	0–0.28	0.0278

Table 2.3.4.23. Content of PCBs' sum in different groups of food products and in rape seeds in Poland in 2000

Product	Range of results [µg/kg fat]	Average value [µg/kg fat]	Number of samples
Meat products	25.0–328.0	153.0	392
Oils	96.0–152.0	130.9	224
Margarine	29.0–437.0	135.1	244
Rape seeds	35.0–331.0	138.8	223

Table 2.3.4.24. Content of PCBs' sum in the fat tissue of poultry and lamb in Poland in 2000

Fat	Range of results [µg/kg]	Average value [µg/kg]
Goose	86.0–334.0	159.2
Turkey	38.0–335.0	177.9
Broilers	184.0–265.6	lack of data
Lamb	83.0–169.0	123.4

Table 2.3.4.25. Content of the PCBs' sum in food raw material and fish products in 2000

The tested material	Range of results [mg/kg fat]	Average [mg/kg fat]
Raw fish	0.040–3.645	0.460
Tinned fish	0.021–0.920	0.120
Tinned cod liver	0.300–1.600	0.660
Smoked fish	0.024–0.750	0.090
Salted fish	0.036–0.196	0.084
Pickles	0.031–0.200	0.069

Data of Table 2.3.4.24 indicate that in many samples of kidney fat, collected from poultry, the content of polychlorinated biphenyls' sum is higher than 250 µg/kg fat (i.e. MAR for the seven indicative PCB congeners), although the value of 100 µg/kg fat for the PCB 153 congener has not been exceeded in any of the samples.

Tests on the content of 7 PCB congeners were performed on 252 samples of food raw material and fish products (Table 2.3.4.25). In no tested sample the permissible level of 2 mg of the PCB sum per 1 kg fat, pursuant to the Dutch standards, was exceeded. When taking into account the results of earlier tests and the ones carried out in 2000 it can be concluded that the average content of the PCBs sum in fish products and raw fish has been constantly decreasing in the recent years. This indicates the improvement of the quality of the Baltic Sea water, on one hand, and the effect of the implementation of the Polish standard, limiting the processing of cod livers to the size of 350 g, on the other.

During four years the level of the PCBs sum (congeners no.: 28, 52, 101, 118, 138, 153 and 180) in the examined plant products has significantly decreased (Figure 2.3.4.4).

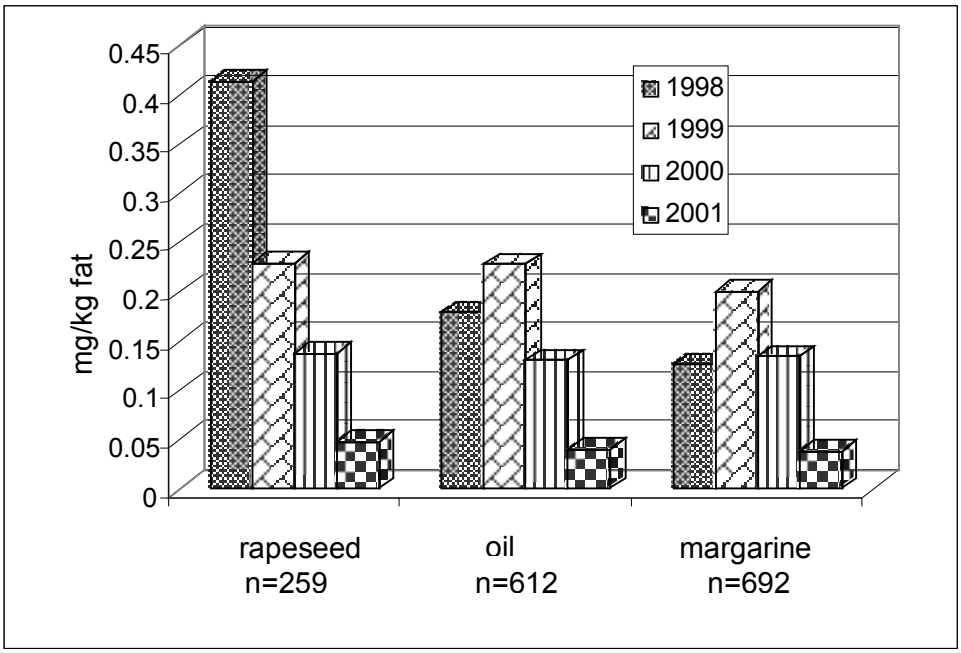

Figure 2.3.4.4. Average content of the PCBs' sum in rape seed and vegetable oil in 1998–2001

The presence of different PCB congeners is observed in all groups of examined foodstuffs of animal origin, in the fat tissue of pigs, cattle, game, cow's milk, sea fish, in carp muscles (Figure 2.3.4.5), and in the processed food products (Figure 2.3.4.6) [33]. The residues of the PCBs' sum are found in app. 20% of the pigs' fat tissue samples, app. 70% of milk samples and up to 100% of the fat tissue samples of the Baltic fish, but in amounts not exceeding the permissible levels in force in the EU member countries.

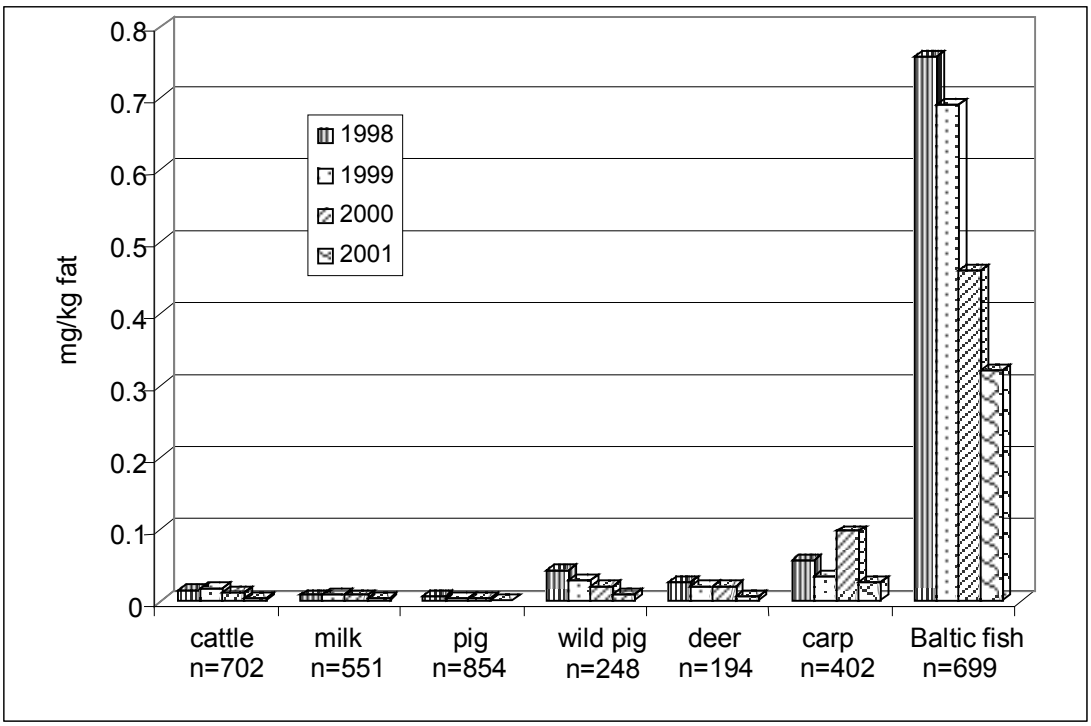

Figure 2.3.4.5. Average content of PCBs' sum in food raw products of animal origin in 1998–2001

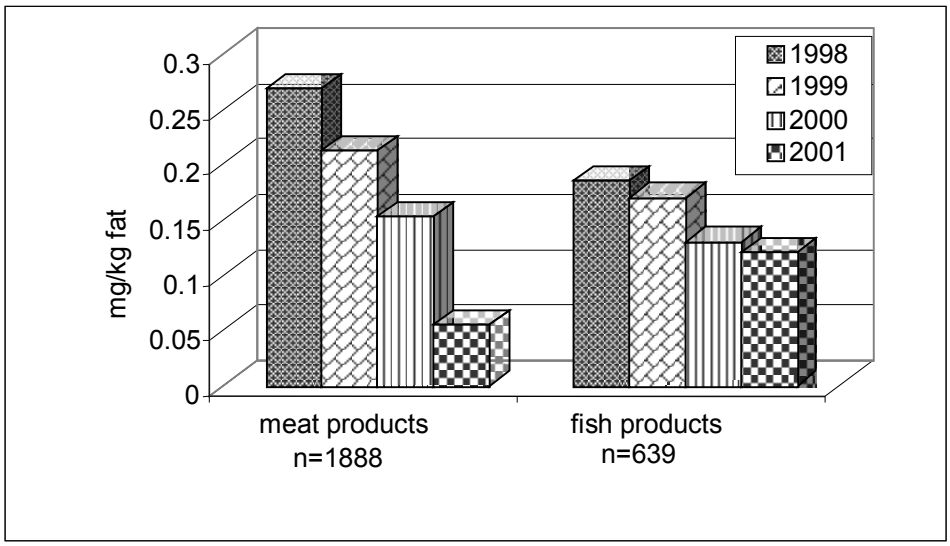

Figure 2.3.4.6. Average content of PCBs' sum in food products of animal origin in 1998–2001

PCB content in human tissues. Data published at the beginning of the 90s of the XX century present study results of the total PCB content in human milk with no information about the different PCB congeners. However, tests carried out at a later time do take into consideration the occurrence of coplanar congeners. This allows for the calculation of the tolerable daily intake (TDI) on the basis of the values of toxicity equivalents TEQ. During 1979–1992 the PCB level was measured in the fat tissue of men and women of different age. Table 2.3.4.26 presents the PCB content in human biological material in Poland.

Table 2.3.4.26. PCB content in human tissue in Poland

Site of sampling	Date	Tissue		Comments
		Milk	Fat	
Warsaw–lactarium	1993	723 pg/g fat	–	Average of 62 samples
Wielkopolska Region	2000–2001	77.6 ±55.1 ng/g fat	–	12 samples, average for 13 PCB congeners
Brzeg Dolny	2001	2.44 pg TEQ/g fat	–	In each city samples were taken from 10 women. Samples from one city were put together and 12 PCB congeners were tested.
Tarnów		2.12 pg TEQ/g fat	–	
Włocławek		2.05 pg TEQ/g fat	–	
Skierniewice	1979	–	966 pg/g (570–1600)	Average of 3 samples. Non-*orto* coplanar PCB
Gdańsk	1990	–	774 pg/g (150–1400)	Average of 9 samples Non-*orto* coplanar PCB
Warsaw – hospital	1992	–	856 pg/g fat	Average of 277 samples, population group: 10 to 80 years of age

– not examined

Assessment of human exposure to PCBs. The major PCB exposure route for the inhabitants of Poland is connected with the consumption of PCB-contaminated food. This is caused by the fact that PCBs are found throughout the country as a result of redistribution from one environmental element to another, e.g. from soil to water, from water to air, from air to water, from bottom sediments to water and from water to living organisms (e.g. fish).

Data in Table 2.3.4.27 indicates that the PCBs' sum content is low for many products, with the exception of tinned cod liver, and does not exceed the level of MAR (Table 2.3.4.10). Available data cannot be used for the calculation of the PCB intake dose since no quantities of different congeners are given. Only two out of seven indicative congeners specified in the guidelines of the Chief Veterinary Surgeon [62] – congeners Nos. 118 and 180 – belong to dioxin-like biphenyls and by taking advantage of their similarity to dioxins, their impact on humans may be assessed. For the other congeners, other than dioxin-like biphenyls, no concentration standards for food were established.

Tests of human milk in the Wielkopolska Region covered 13 PCB congeners, of which six of them (Nos. 105, 114, 118, 156, 170 and 180) are regarded as dioxin-like biphenyls (Table 2.3.4.26). By knowing the toxicity equivalents in relation to 2,3,7,8 TCDD it was possible to calculate the average daily intake (ADI) – 4.3 pg TEQ/kg body weight per day. The calculated value almost reaches the threshold value for the intake of infants.

The content of dioxin-like biphenyls in human milk sampled in Brzeg Dolny, Tarnów and Włocławek varied between 2.05 and 2.44 pg TEQ/g of fat, which means that the daily intake corresponds to 10.5 –12.5 pg TEQ/kg body weight. These values are greater than those mentioned above. The difference can be attributed to the number of congeners and their relevant coefficients considered in the calculations.

Table 2.3.4.27. Content of the PCBs' sum in food products

Products	Average content [mg/kg fat]	% of MAR
Milk and milk products (MAR – 0.100 mg/kg fat)		
Cow milk	0.0024	2.4
Meat and meat products (MAR – 0.200 mg/kg fat)		
Pork	0.0012	0.6
Beef	0.0036	1.8
Wild boar and roe	0.0059	2.9
Carp	0.0278	13.9
Processed meat	0.1530	76.5
Goose	0.1592	79.6
Turkey	0.1779	88.9
Lamb	0.1234	61.7
Smoked fish	0.0900	45.0
Salted fish	0.0840	42.0
Tinned cod liver	0.6600	330.0

Due to lack of health standards determining permissible levels of PCBs in human biological material (DSB) the data presented in Table 2.3.4.27 cannot be compared with the actual health risks as the table provides only information on historical exposure and it is difficult to analyse it with regard to human health impacts. Although testing of PCBs in foodstuffs indicates that the standards laid down by the guidelines of the Chief Veterinary Surgeon are met, but according to studies mentioned above the breast-fed babies are exposed to high PCB doses.

Information required for projections of health hazards caused by PCBs is limited to scares literature-bases data on the contents of these substances in foodstuffs and human milk and to the results of calculations on quantities of substances taken in with food.

According to data presented in Table 2.3.4.27 the intake of PCBs with food by an adult should not threaten its health. Such conclusion is based on the comparison of the total PCB contents in food products with the values in Table 2.3.4.10 given for these products. The estimated daily intake (EDI) lies at the level of 0.578 ng/kg body weight/day. Projection of

the expected health risk on the basis of the EDI value is in this case impossible, because the toxicological and epidemiological investigations carried out so far do not provide the basis for determining the tolerable daily intake (TDI) level for PCBs. Similarly as in the case of human exposure to dioxins, infants are threatened by relatively high exposure to PCBs. This is connected with the PCB content in human milk. The amount of PCB intake by infants during breast-feeding varies between 4.3 and 12.5 pg/kg body weight/day. These values exceed the threshold TDI value of 4.0 pg/kg body weight/day, recommended by WHO. Like in the case of exposure to dioxins, we should only bear in mind the short period of exposure and the small PCB dose taken with mother's milk in relation to the lifetime dose. Nevertheless, also in this case the relatively small safety margin should not be ignored. Therefore it is important to carry out further investigations on exposure to PCBs to obtain data representative for the whole country, to allow for reliable health risk assessment.

Exposure to PCDDs/PCDFs

In principle, tests for the presence of dioxins in foodstuffs and in the environment have not been carried out in Poland, except for the studies by A. Grochowalski and his collaborators (Table 2.3.4.28). However, the results obtained cannot serve as a sufficient basis for an assessment of human exposure to these substances in Poland.

Table 2.3.4.28. Content of dioxins in food products of domestic and foreign origin in 1999

Products	Range of content* [pg TEQ/g fat]	Reference data from other countries** [pg TEQ/g fat]
Sea fish (Baltic Sea fish)	7.0–40.0	2.40–214.3
Fish oil from Baltic Sea fish	11.2–40.0	–
Fish oil from Baltic Sea fish (import from Scandinavia)	–	–
Pork grilled on open fire (charcoal)	20.0–25.0	–
Poultry	0.6–12.8	0.70–2.200
Freshwater fish	1.2–9.40	2.400
Beef	2.4–8.50	0.10–16.70
Cheese	0.2–7.70	–
Eggs (yolk)	0.6–7.40	1.20–4.600
Butter	0.6–6.50	0.16–4.800
Milk powder	0.3–5.00	–
Milk	0.1–4.00	0.50–3.800
Beef tallow	3.8	–
Yoghurt with more than 2% fat	0.1–1.80	0.1800
Pork	0.05–1.30	0.3100

* Source: [59]

** Source: *Persistent organic pollutants in Poland* Waste Prevention Association *"3R"*, Kraków 2001.

– not investigated.

Lack of data on exposure to PCDDs and PCDFs in Poland makes it impossible to predict the health risk resulting from this exposure. Table 2.3.4.29 presents the intake of dioxins (in pg/TEQ/kg body weight/day) by babies with their mother's milk in five Polish cities. The estimated daily intake (EDI) for babies varies between 51 and 108 pg TEQ/kg of body weight. These results indicate that babies take very high doses of dioxins with the breast milk, but the small number of analyses makes it difficult to assess the sources of exposure.

The tolerable daily intake (TDI) value for dioxins, i.e. the quantity of substances, which an adult can take every day for lifetime without a predictable detriment to his health, has not been determined in Poland. The TDI established by WHO is 1–4 pg TEQ/kg body weight/day. No separate TDI was set for adults, babies and children. A comparison of the estimated daily dioxin intake with mother's milk (EDI) with the WHO recommended TDI value indicates, that the daily dioxin intake in breast-fed babies exceeds the TDI about one hundred times. This could suggest a considerable increase of the babies and children health risk. It should, however, be kept in mind that the TDI value refers to the daily dioxin intake for the whole lifetime. The WHO Working Group experts involved in the assessment of health risk caused by dioxins have acknowledged that the calculated life-time dioxins' dose (1800 ng TEQ) is more significant than the total amount of dioxins (about 80 ng TEQ) taken during the short period of baby's breast feeding time, amounting to around 4% of the life-time dose.

WHO experts draw attention to the fact that the increase of fat tissue in babies, during an average of a six month breast feeding period, causes an effect of "dilution", i.e. reduction in dioxin concentration in the fat tissue and as a consequence, it reduces considerably the differences in the dioxin content in the target organs between the baby and the adult.

Table 2.3.4.29. Intake of PCDDs/PCDFs by babies on the basis of human milk analysis in five cities of Poland

Place of sampling	Year	Intake [pg/TEQ/kg body weight/day]	Comments
Katowice	1992	108*/49**	TEQ was calculated basing on the Nordic Model* and US EPA Model**
Bytom	1989	51.10	Calculated on the basis of the Nordic Model
Brzeg Dolny	2001	90.48	Calculated basing on the Nordic Model assuming babies' body weight at 5 kg, 80% of fat absorption and consumption of 800 g of milk/day
Tarnów		86.74	
Włocławek		93.79	

Considering the data presented above, it can be recognized after WHO that the content of dioxins in human milk is not a contradiction to natural feeding. However, the fact that the daily dioxin intake by babies with their mothers' milk can be even one hundred times higher than the TDI value for an adult, is a good reason for concern, having particularly in mind, that the developing organism is most prone to toxic effects of chemical substances. Therefore, despite lack of confirmed evidence on infants' health risks caused by dioxin intake through human milk it is necessary to undertake appropriate measures to reduce dioxin releases into the environment and consequently minimise the level of exposure.

Limited data on the dioxin content in the Polish women milk are far from being representative and therefore should be treated highly cautiously. Countrywide in-depth studies on dioxin exposure are urgently needed.

2.3.5. Information on the state of knowledge on POPs stockpiles, contaminated sites and wastes, releases from sites and remediation measures

Residues and obsolete pesticide waste stockpiles. The most serious environmental threat caused by POPs in Poland originates from obsolete plant protection products, deposited in countrywide dispersed landfills in the form of underground silos made of concrete cases, of 1–2.5 m in diameter, treated with tar, around 3 metre deep with a concrete bottom. In Poland they are known as "pesticide tombs". These facilities, built and used in 1965–1985, turned out to be unsafe. Affected by corrosion, they became a source of contamination of ground water and the surrounding soil. Pesticide and herbicide waste is also stored directly (packaged) in ground ditches, military bunkers from World War II and concrete containers. Wastes from packing material of pesticides as well as other hazardous wastes were also deposited there.

Pesticide stocks were collected and stored mainly in the State Farms (PGR). After pesticide gradual withdrawal from use they were deposited in obsolete pesticide landfills mainly owned by PGR. Poviat Association of Commune Co-operatives (PZGS), as former distributors of plant protection products also contributed considerably to the construction of pesticide landfills. Elimination of PGR and PZGS made it difficult to carry out an inventory of pesticide landfills and site remediation. Due to lack of sufficient information on the contents of pesticide landfills the whole amount of POPs-contaminated waste deposited there is regarded as hazardous waste containing chloroorganic derivatives.

The phased out plant protection products, including those containing POPs, apart from landfills, are also found in storehouses of trade companies and with individual users of these substances. Considerable quantities are piled up in the stores of Regional Directorates of State Forests.

Depositing pesticide waste in landfills, as one of the methods of waste treatment is not prohibited in Poland.

A map (Figure 2.3.5.1) has been prepared under the GEF Project showing location of 303 obsolete pesticide landfills and other places where pesticides are stored (industrial waste landfills, earth pits, concrete containers, military facilities) [10]. There is no data on the amounts of waste deposited in 53 landfills [47].

According to the National Waste Management Plan (KPGO), adopted in 2002, there were 340 landfills in Poland where pesticides have been deposited since 1965. It has been estimated that pesticide landfills and stockpiles contain about 15 000 Mg of plant protection products. Completion of the inventory of places of pesticide storage and the development of a priority list with the most hazardous landfills to the environment has been considered essential.

Site contamination around obsolete pesticide landfills. Soil contamination caused by plant protection products has been observed at some of the landfills containing pesticides that have been withdrawn from use. Contamination is found mainly in the topsoil and sometimes in deeper layers due to POPs migration with penetrating water. Also, incidents of flooding

pesticide landfills could have taken place during the past floods, particularly in 1997, but reliable information in this respect was not available. It is also known, however, that pesticide landfills were not located in places threatened by flooding.

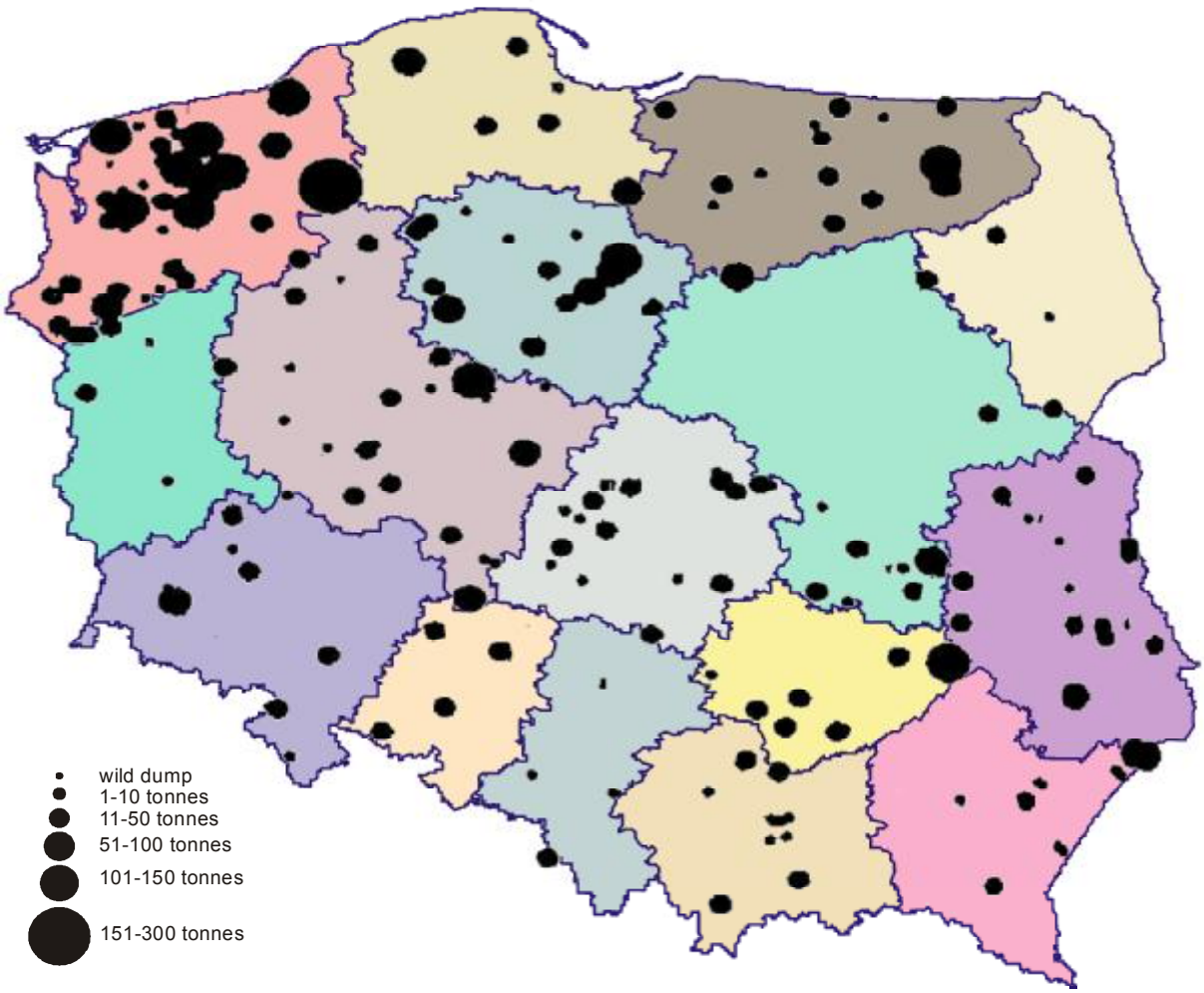

Figure 2.3.5.1. Distribution of obsolete pesticide landfills in Poland. (pursuant to the present administrative division into 16 voivodeships). Landfills have been classified according to the amount of waste stored.

Table 2.3.5.1 presents survey results of ground water contamination (including surrounding water abstraction sites) covering 43 pesticide landfills (14%), and results of soil contamination covering 32 pesticide landfills (10.6%). This limited scope of the study did not allow for evaluating the extent of soil contamination.

Table 2.3.5.1. Number of pesticide landfills and the state of research on ground water and soil pollution at their sites

Voivodeship	Number of pesticide landfills		Investigation of site contamination					
			Ground water			Soil		
			Total	Pollution		Total	Pollution	
	Total	Ground ditches		Yes	No		Yes	No
Dolnośląskie	11	1	0			1		1
Kujawsko-Pomorskie	23	3	5		5	8	5	3
Lubelskie	14	0	3	1	2	3	2	1
Lubuskie	7	0	0			0		
Łódzkie	30	9	4		4	1		1
Małopolskie	28	20	1		1	1		1
Mazowieckie	12	2	0			1		1
Opolskie	5	0	3		3	3		3
Podkarpackie	32	24	1		1	0		1
Podlaskie	10	0	0			0		
Pomorskie	7	0	3		3	2	1	1
Śląskie	12	0	3		3	1		1
Świętokrzyskie	30	20	10	1	9	6		6
Warmińsko-Mazurskie	16	1	1		1	2	1	1
Wielkopolskie	27	5	3		3	2		2
Zachodniopomorskie	39	0	9	1	8	0		

Source: [47].

Industrial waste landfills containing pesticides. The problem of POPs-containing waste from the production of active substances is in Poland limited only to one factory – the Chemical Works ORGANIKA–AZOT in Jaworzno. This enterprise has been the greatest producer of plant protection procucts in Poland since 1947.

According to data of the Inspectorate for Environmental Protection, wastes from the Chemical Works ORGANIKA–AZOT were and still are deposited mainly in the nearby Central Waste Landfill RUDNA GÓRA. It covers an area of around 11 hectares. It is 6 metres deep in the underground parts and 5 metres high in parts above the ground. The total amount of accumulated waste is estimated at about 250 Gg. Information about the starting date of operation of the landfill is not available, but its oldest part, the so-called “Field K” was closed for dumping waste in 1972, and some other parts were subsequently opened. Closed parts of the landfill were gradually cleaned up. In the past waste deposited in the landfill did not meet the present requirements for landfilling waste.

According to the information of the chemical works, the oldest parts of the landfill contained wastes from the production of DDT, presenting a mixture of isomers with about 75% of 4,4-dichloro-diphenyl-trichloroethane. Information about landfill disposal of HCB-containing waste is not available.

A similar situation is relevant for other chemical works, where wastes containing hexachlorobenzene could have been dumped in the past.

At present the ANWIL Company is using two landfill sections for depositing hazardous waste. The first one, about 4 hectare large and with about 70 000 m^3 volume was opened, after modernisation, in 1998. The second one with over 1.2 hectares and 42 000 m^3 of volume was opened in 1996. Both sections are already partly full. Previously, other sections, which are now closed and reclaimed, were exploited. Under these circumstances, it is difficult to determine where possible deposits of HCB could be found. It is worth mentioning that the control of the ANWIL landfill carried out in 1999 by the Voivodeship Inspectorate for Environmental Protection in Bydgoszcz did not reveal any abnormality in its management. This can also be true in relation to environmental impacts on the landfill surroundings [57].

The Chemical Works ORGANIKA in Nowa Sarzyna are currently using a landfill opened for exploitation in 1991, which is already almost 50% full. It covers an area of 0.23 hectares and has 9000 m^3 in volume. No information is available on previous waste dumping sites.

The Nitrogen Works in Tarnów–Mościce have two landfills at their disposal: NAD BIAŁĄ and CZAJKI with the total area of 6.85 hectares and 350 000 m^3 in volume. In addition, they also use 3 containers with app. 111 000 m^3 of total volume for toxic waste, which are partly filled. In 1999 almost 23% of the total amount of waste landfilled in the Małopolskie Voivodeship was deposited in the above-mentioned landfills [58].

In view of the presented information identification and quantitative assessment of all POPs deposits in landfills maintained by industrial enterprises is considered impossible, at present. Sites with possible historical POPs-containing waste deposits are either unknown, reclaimed or covered with other hazardous waste after production of the phased out POPs has been sustained.

The share of POPs in the total mass of waste deposited over the years is minimal. The assessment performed [9] shows that it is not possible to eliminate all POPs residues deposited in the chemical industry-owned landfills. In this case it is the environmental risk connected with the destruction of the landfill structure that should be decisive for taking measures aimed at the elimination of deposited POPs. Many of these landfills have already been remediated and do not affect the environment.

Site contamination around waste landfills No data on industrial site contamination by POPs are available. The only reliable information in this respect is regular monitoring data on water contamination at the ORGANIKA–AZOT Chemical Works in Jaworzno. DDT was found in landfill leachates, in ground waters of the surrounding area and in the Wąwolnica Stream water. Concentrations of that compound varied in time depending on the sites of measurement. The highest DDT concentration was found in waters of the landfill-draining ditch. In 2001 the DDT concentration in these waters oscillated between 15.8 and 43 µg/l. It may be interesting to mention for comparison purposes that the limit value for chloroorganic insecticides in wastewaters discharged into water bodies and into the ground should not

exceed 0.5 μg/l[17]. DDT was periodically present in ground water and in the Wąwolnica Stream.

The Chemical Works GAMRAT producing preparations from ready components using non-waste technology may have only collected and stored packages from active substances. They are likely to cause only minor hazards.

The Chemical Works ORGANIKA–AZOT in Jaworzno, the Organic Industries ROKITA in Brzeg Dolny and ANWIL Company in Włocławek have their own waste incineration plants used for treatment of useless by-products. The processing capacity of the incineration facility in Włocławek is higher than the needs of the chemical works, and therefore it can be used for incinerating other toxic substances.

Elimination of obsolete pesticide landfills and treatment of residues. Between 1999 and 2000 around 45 obsolete pesticide landfills have been completely eliminated and cleaned-up. About 4500 Mg of obsolete pesticides have been treated in the incineration plants in the Netherlands and Germany.

All pesticide landfills should be removed. Priority in the elimination should be given to the ones located in unfavourable geological conditions, thus strongly polluting the aquatic and ground environment. Despite significant progress in the elimination of pesticide landfills over the last few years, the situation differs from region to region. The authorities of some of the voivodeships either fail to acknowledge the problem or are unsuccessful in obtaining the necessary funds. Meanwhile, within the territories of voivodeships such as Warmińsko-Mazurskie, Łódzkie and Dolnośląskie numerous landfills require immediate elimination due to serious threats they pose to surface and ground waters (Annex 4).

In the process of elimination and reclamation of pesticide landfills, other hazardous wastes are generated at the sites (contaminated soil and concrete from demolition). The mass of these wastes is usually four times the quantity of removed obsolete pesticides, thus, about 60 000 Mg of these wastes will need to be deposited in hazardous waste landfills.

Elimination and reclamation activities are carried out in Poland by four enterprises, furnished with adequate permits, as required by the Act on Waste. Depending on the demand, Poland has the potential to increase the number and processing capacities of entities dealing with extraction, packing and transportation of pesticide wastes, POPs contaminated demolition waste and polluted soil. These enterprises originate from construction companies, which, after minor supplements of equipment and training of personnel, may be prepared to undertake this type of work.

There is an urgent need for developing framework guidelines for the elimination of pesticide landfills establishing classification criteria for contaminated demolition waste and ground, as well as basic principles of handling the extraction, packaging, storage and transportation of pesticide waste, debris waste and contaminated soil.

The number of cleaned-up pesticide landfills is only limited by the shortage of financial resources. Elimination of pesticides is ordered by voivodeship offices and *poviat* governors (*starostas*) and management boards of *gminas*. So far the majority of elimination programmes have been financed by the National Fund for Environmental Protection and Water Management and its Voivodeship Funds.

According to the guidelines of the 2nd National Environmental Policy [60], the deadline for ultimate elimination of the existing landfills and dumps containing obsolete pesticides, foreseen also by the National Waste Management Plan has been set for the year 2010.

During a six year period it has been estimated that 2 500 Mg of pesticides and 10 000 Mg of demolition waste with contaminated soil will be eliminated annually[39]. Therefore, the average capacities required to execute this task would be as follows:

- Extraction, storage and transportation of pesticide waste – 2500 Mg/year,
- Demolition work and extraction of contaminated soil – 10 000 Mg/year,
- Depositing demolition waste and soil in hazardous waste landfills – 10000 : 1.4 = 7000 m^3/year,
- Treatment (degradation, irreversible transformation) of obsolete pesticide – 2500 Mg/year,
- Site remediation – app. 8 ha/year.

The needs presented above are connected with the execution of the programme of elimination of obsolete pesticides and the clean-up capacities will become redundant after its completion. This fact makes the idea of encouraging the existing subsidiary construction enterprises to participate in the implementation of this programme justified. They could offer a relatively minor part of their capacity for the requirements of the programme and easily return to their normal activities after the task is completed.

So far, the elimination of pesticide landfills has been connected with thermal destruction of pesticides in the incineration plants abroad. Currently, hazardous waste incinerators exist and operate also in Poland. They are technologically prepared to handle POPs waste in an environmentally sound manner, e.g. the hazardous waste incineration plants in the ANWIL Company in Włocławek and in the ROKITA Chemical Works in Brzeg Dolny. An installation for pesticide waste incineration at the Sośnicowice Branch of the Institute of Plant Protection is waiting to be assembled and operated. According to the National Waste Management Plan the expected total processing capacity of hazardous waste incineration plants in Poland is as follows:

- 127 000 Mg in 2003;
- 139 000 Mg in 2006;
- 152 000 Mg in 2012.

The existing Polish hazardous waste incineration facilities, including the new planned incineration plant, will be able to accept for treatment all pesticide waste from eliminated pesticide landfills.

However, the issue of satisfying the needs for disposing of 10 000 Mg of contaminated demolition waste and soil looks rather different. At present, it is difficult to decide, without an adequate feasibility study, whether the concept of depositing all these waste in landfills would

[39] It has been assumed in the NWMP that for every 1 m^3 of pesticide waste, 4 m^3 of POPs-contaminated soil and demolition waste is generated during the clean-up operation. It seems that this value is overestimated as it results from the experience gained so far from pesticide landfill elimination activities. The sites cleaned up earlier, regarded as priority landfills, demonstrated heavy contamination.

be a good idea, considering that the main costs of such a solution would be connected with waste transport.

Doing away with the past legacy in pesticide management resulting in obsolete pesticide waste should be treated separately from the current needs in this respect. The market supply of pesticides in 2000 amounted to 22 164 Mg. Due to their high prices only very small amounts of pesticides become obsolete, however packaging wastes are generated. The estimated packaging weight per 1 kg of pesticides is 55.25 g, which gives a total of 1224.5 Mg of such wastes generated throughout the country. Most of them find their way to the municipal solid-waste disposal system. Pursuant to the Act on Packaging and Packaging Waste Law[40] producers and importers of goods are obliged to collect, at their own expense, returnable packaging and packaging waste. This should enable separation of this kind of waste from the stream of municipal waste. The packaging collecting system should be based on the goods' distribution network.

Since the waste stream connected with the current use of plant protection products and their packages, is relatively limited (in the coming years it is estimated at maximum 1200 Mg/year) there is no need for further capacity building for the elimination of these wastes. Plant protection chemicals produced nowadays and their packages can be destroyed in classical hazardous waste incineration facilities. For packages also other treatment methods than incineration should be taken into consideration.

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

The use of pesticides containing substances subject to the Stockholm Convention has been legally prohibited in Poland since the end of the 70s of the XXth century. Reactivating the production of substances listed in Annexes A and B of the Convention is not planned at present and in the future.

The present legal regulations prohibit the placing on the market and reuse of PCBs, DDT, aldrin, dieldrin and endrin, classified as substances causing particular environmental threat. Transposition of the Community legislation into the Polish law in 2001 enforced shorter periods than the ones laid down by the Stockholm Convention for the elimination of PCBs. Equipment containing PCBs may be used in Poland only until 30 June 2010. The final deadline for ultimate PCB elimination for the holders of such waste is 31 December 2010.

Poland has, also, ceased the use of HCB as an intermediate for the production of polyvinyl chloride and solvents.

Issues connected with proper management of waste, including hazardous waste containing POPs are sufficiently regulated. Activities aiming at reduction or elimination of POPs releases from stockpiles and stored wastes are undertaken (e.g. elimination of obsolete pesticide landfills).

[40] Act of 11 May 2001 on Packaging and Packaging Waste (DzU of 2001 No. 63, item 638; of 2003 No. 7, item 7; of 2004 No. 11, item 97 and No. 96, item 959).

The main goal of both the environmental policy and environmental law is improvement of the state of the environment through, *inter alia*, reduction of pollutant releases into the environment, including substances specified in Annex C of the Convention. Therefore, POPs releases into the air and to other environmental components are expected to decline gradually.

In view of the above information Poland does not have to apply for any exemptions foreseen in the provisions of the Stockholm Convention.

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

Environmental Monitoring System

Tasks. According to the Act on the Environmental Protection Inspection[41] the State Environmental Monitoring (PMŚ) network is a system of measurements, assessments, evaluations and projections of the state of the environment, which are carried out by the organisational units of the state administration and government bodies and organs of *gminas* as well as by academic schools and economic entities. PMŚ is performing its duties on the basis of long-term programmes endorsed by the Ministry of the Environment.

The objective of the PMŚ is to enhance the efficiency of environmental activities through collecting, analysing and providing access to data on the state of the environment and environmental changes taking place.

The basic task of the State Environmental Monitoring system is to provide information on:

- Current state and pollution level of different environmental elements;
- Pollutant loads released into the environment;
- Dynamics of anthropogenic changes in the environment;
- Predicted effects from the use of the environment.

The State Environmental Monitoring system (PMŚ) must ensure the execution of obligations resulting from international conventions signed by Poland and should take into account regulations and guidelines effective in this respect in the EU member countries. This is one of the factors allowing for the comparison of results obtained in various European countries. In this respect, the Monitoring Department of the Chief Inspectorate for Environmental Protection plays the role of the national focal point for the co-operation with the European Environment Agency (EEA) and co-ordinates operations of the European Information and Observation Network (EIONET) state unit established in Poland by EEA.

Organizational structure and scope of research. The State Environmental Monitoring system in Poland is based on the national, regional and local network of stations and measurement sites. The national network includes the following stations:

[41] Act of 20 June 2001 on the Environmental Protection Inspection (DzU consolidated text: of 2002 No. 112, item 982; No. 113, item 984, No. 153, item 1271; of 2003 No. 170, item 1652, No. 190, item 1865, No. 217, item 2124).

- Stations for early detection of radioactive contamination;
- Stations operating in compliance with international programmes, e.g. EMEP and HELCOM;
- Stations for monitoring environmental pollution along the state borders and border zones;
- Stations for monitoring environmental pollution with regard to efficacy and efficiency of the implementation of the National Environmental Policy;
- Stations for monitoring country-specific ecosystems.

The State Environmental Monitoring system (PMŚ) has been divided into three sub-systems:

1) A "Quality" sub-system covering, *inter alia*:

- Air quality monitoring and assessment (identification areas of non-compliance with the standards in force and trend analyses),
- The chemistry of precipitation and deposition of pollutants,
- Atmospheric background pollution pursuant to EMEP and GAW/WMO;

2) An "Emission" sub-system collecting emission data within the framework of the following three sections:

- "Air" for collecting measurement data on major air pollutants, which currently do not cover POPs subject to the Stockholm Convention;
- "Water" for gathering, *inter alia*, measurement results of the quality of seawater, surface and ground waters, data on fish contamination and on pollution level balances in datum point gauging section covering, *inter alia*, substances specified by the Convention – dieldrin, DDT sum, PCB sum and HCB;
- "Waste" for collecting information on the quantities of produced waste, keeping records on landfills and on hazardous waste management;

3) "Evaluations and projections" sub-system preparing integrated environmental quality assessments and projections on the basis of data provided by the first two sub-systems.

Laboratories of the Voivodeship Inspectorates for Environmental Protection carry out most of these measurements. In accordance with Article 25 paragraph 2 of the Act on Environmental Protection Inspection laboratories and other units involved in environmental measurements and operating within the PMŚ system should meet unified requirements laid down by the Minister of the Environment and obtain relevant authorization from the Inspectorate for Environmental Protection.

The results obtained are disseminated through the Internet and numerous publications.

The credibility of the PMŚ is guaranteed by improving a system of quality control for research and measurements, and particularly by certification of research laboratories, national and international inter-calibrations and developing and enforcing quality control systems in different monitoring sub-systems.

At present regular analyses of chloroorganic substances in river waters are carried out in 20 cross-sections (five in the Vistula River, five in the Oder River and ten in rivers at the coastline), but only with regard to two groups of substances controlled by the Stockholm Convention: DDT (with its metabolites: DDE and DDD) and PCBs. Summarised results of these tests are presented in Tables 2.3.2.5 and 2.3.3.8. Concentrations of other substances

subject to the Convention were investigated in the Polish rivers during the last decade sporadically (Tables 2.3.1.5, 2.3.2.5 and 2.3.3.9).

It is necessary to expand the monitoring system to enable measurements, research, control and assessment of releases of all POPs covered by the Stockholm Convention in order to meet the requirements of the Convention and the Community law. This would require:

- monitoring of POPs levels in industrial and municipal waste landfills,
- measurements of dioxin/furan, PCB and HCB emissions from certain categories of thermal emission sources and chlorine bleaching processes,
- monitoring of dioxin/furan levels in the air of large municipal and industrial agglomerations,
- monitoring of POPs levels in surface waters and in soil.

Monitoring of soil, plants, farm and food products

Since 1995 a countrywide system of "Monitoring of Soil, Plants, Farm and Food Products" has been operating in Poland. It has been organized by the Monitoring Council at the Ministry of Agriculture and Rural Development. Its main objective is to monitor the chemical contamination in representative samples of food products to evaluate food quality and assess the frequency of non-compliance of the food samples with the standards. In 1995–1997 regular monitoring was based on a network of 100 sampling sites around the country. In 1998–2000 the system of control points was extended to 300 sites. Samples were taken from 100 points from different country regions changed annually, and so during the three year period sampling covered the whole country. Sea fish originate from three Baltic zones. Study results are disseminated in published reports [56, 63].

The following substances are subject to monitoring of residues in Poland: pesticides, including POPs, polychlorinated biphenyls (PCBs), chloroorganic pesticides, polychlorinated aromatic hydrocarbons (PAHs), as well as heavy metals and mycotoxins in certain materials and products of plant and animal origin. Since many years, also 8 chlorinated pesticides from the list of 12 (DDT, aldrin, chlordane, dieldrin, endrin, heptachlor, mirex and toxaphene) have been examined within the residue monitoring, although their use in Poland is legally prohibited. The results obtained on POPs residues are presented in more detail in Chapters 2.3.3 and 2.3.4.

Therefore it is important to continue the monitoring activities as it has been done so far. The following institutions supervised by the Minister of Agriculture and Rural Development are involved in the monitoring: the Chemical and Agricultural Stations, the State Institute of Veterinary Science in Puławy, the Institute of Plant Protection in Poznań, the Institute of Biotechnology for Food Industry in Warsaw, the Institute for Meat and Fat Industry in Warsaw and the Marine Fisheries Institute in Gdynia.

Human health monitoring

Poland does not conduct monitoring of human health effects from persistent organic pollutants. However studies in this field are carried out at random. Detailed information in this matter is presented in Chapter 2.3.4. Available data analysis with regard to assessment of exposure to PCDDs/PCDFs, PCBs and HCB in Poland and the associated health risk shows

that there is a severe lack of exposure data, especially in the case of dioxins, which limits the possibility of performing health risk assessment.

Therefore, it is necessary to develop a system for monitoring effects of dioxin, PCB and HCB exposure on human health with a risk assessment and its trends of changes.

2.3.8. Current level of information, awareness and education among target groups; existing systems of communication and mechanism for information exchange with other Parties to the Convention

Access to information. Broad and continues public participation in activities aiming at human health and environmental protection against POPs is one of most significant elements affecting the effectiveness of these activities. Therefore, it is important to improve the knowledge and increase public involvement in combating hazards related to POPs, particularly through facilitating and broadening access to information, developing and executing educational and training programmes, as well as through direct participation of different social groups and their representatives in preparing specific solutions and undertaking certain tasks in this field.

In Poland access is provided to public information[42], including information regarding environmental protection, covering, *inter alia*:

- programmes with their implementation progress and effects,
- maintained registers and procedures on making them accessible,

In accordance with the provisions of the Act – Environmental Protection Law, administration authorities are obliged to make environmental information available to everybody. Access is provided in relation to, e.g.:

- Drafts and official documents such as: policies, strategies, plans, programmes;
- Registers on: hazardous substances and major industrial accidents, waste documentary; inventories: of emissions of air pollutants, of wastewater releases into water bodies or the soil, and of wastes and their production and disposal;
- Environmental impact assessment reports, environmental reviews;
- Results of research studies and surveys on environmental protection;
- Information on:
  - emissions and activities likely to cause adverse environmental effects,
  - environmental pollution effects on human health and conditions of life;
  - measures targeted at environmental protection.

The State Environmental Monitoring system is the major source of information on the environment, covering measurements, evaluations, assessments and projections of the state of

[42] Pursuant to the provisions of the Act of 6 September 2001 on Access to Public Information (DzU of 2001 No. 12, item 1198, of 2002 No. 153, item 1271).

the environment, and collection, processing and dissemination of environmental data (Chapter 2.3.7).

Monitoring activities are carried out by bodies, which are also obliged to provide access to environmental information on mutual basis. Entities making use of the environment are also involved in taking measurements on concentrations of substances in the environment and on their emission levels, for the purposes of the State Environmental Monitoring.

An Internet version of the Public Information Bulletin provides access to the following databases:

- on areas with restrictions deriving from risks connected with exceeding permissible or emergency levels of substances in the air (conducted by voivodes; executed by voivodeship inspectorates for environmental protection),
- on research results, and air and surface water (river and lake) quality assessments (maintained by WIOŚ),
- on soil quality study results and registers of places with exceeded levels of pollutants (maintained by *starostas*).

In 2001 an Environmental Information Centre has been established, which is "responsible for coordination of the implementation of international obligations of the state in the field of providing environmental information to all private persons, institutions and organizations on their request". One of the Centre's tasks is to maintain, on behalf of the Minister of the Environment, a publicly accessible list of documents containing information on the environment and its protection. In general, access to all above-mentioned information is free of charge.

The existing system of environmental information should to a greater extent cover POPs-related issues. There is relatively little data on POPs levels in the environment and in living organisms.

Educational system. The educational system in Poland is multigraded (primary schools, gymnasiums, secondary schools and academic schools). It comprises public, social and private schools. All of them are supervised by the Ministry of National Education and Sport. Only framework educational programmes are established for different subjects. The teachers, in general, execute their own complimentary educational programmes supported by their own choice of books and literature. Interactive methods of teaching supported by adequate schooling materials are commonly used. Apart from basic studies school children and students are also interested in environment-related subjects (environmental protection and management, biology, geography).

Depending on the type of faculty and specialization at the universities, different more advanced lecturers and exercises also cover POPs issues (studies on POPs properties and processes of their formation; determination of POPs in the environment, products and living organisms; their environmental fate; precautionary measures in relation to their use and presence in the environment and methods of handling; research on human exposure to POPs and health effects; providing help in case of poisoning, diagnostic and remedial measures). POPs-related issues are taken into consideration in, *inter alia*, medical, chemical, agricultural, technical and ecological faculties.

Dissemination of information on POPs. A system for disseminating information on POPs, including research results on threats they pose and recommended methods of handling them, to different target groups is not completely developed, yet. Information on POPs may be provided through:

- Different media:
  - the press (research papers, intervention reports, communications, etc.),
  - the television (environmental programmes, educational reports on scientific research, etc.),
- Internet websites of:
  - the Public Information Bulletin (BIP),
  - research institutions,
  - environmental organizations,
  - the GEF Project (http://ks.ios.edu.pl), which is composed of 3 sub-websites regularly updated. A sub-website entitled "Activities" includes general information on the Project and its progress, and a list of project-related documents (with access to text and graph files). A "Library" sub-website contains reference information on publications associated with the Stockholm Convention, with an installed search engine, which facilitates the use of its resources. A "News" sub-website presents the most important events. The Portal is intended for all interested persons in Poland (Polish version) and abroad (English and Russian versions). The Polish version is for obvious reasons broader. Foreign language versions are limited to information potentially interesting for foreign recipients,
- Scientific publications and reports,
- Statutory activities of governmental institutions and non-governmental organizations (Chapter 2.3.9),
- Promotion of environmentally sound activities, e.g.:
  - implementation of AGENDA 21,
  - selective collection of waste,
  - labelling of PCB-containing equipment,
  - cleaning-up within the World Earth Day,
- Training and courses, e.g. on the use of plant protection products (pesticides),
- Organizing seminars and conferences, for instance:
  - a series of conferences on dioxins in the industry and in the environment, organized by University of Technology in Kraków and EMIPRO Ltd. since 1999 (Chapter 2.3.10),
  - seminars on PCBs (Chapter 2.3.9).

The public awareness level regarding threats posed by persistent organic pollutants found in the environment and in food is rather low, but this situation is gradually improving pursuant to scientific progress (*inter alia*, in the field of ecology, ecotoxicology, toxicology, chemistry) and higher standard of living.

At the present stage[43] **a mechanism for information exchange among the Parties to the Convention** has not been established and implemented, as Poland has not yet ratified the Convention. In general, exchange of information with different countries is carried out under bilateral agreements on cooperation in the field of environmental protection and water management.

2.3.9. Relevant activities of non-governmental stakeholders

In Poland, like in other countries, non-governmental organizations (NGOs) play a significant role in encouraging public participation in the implementation of the provisions of the Stockholm Convention. This is particularly true with regard to environmental NGOs. The number of these organizations with different legal status (associations, foundations, movements, etc.) and with different activity reach (from local to countrywide) currently amounts to app. 700 – their precise number is difficult to determine due to divergence of data provided by various sources, and also because of relatively high dynamics of changes in this respect (some environmental NGOs cease their activities, change their profile or their name, and are replaced by new ones). For the majority of these organizations environmental problems are the basic subject of interest (e.g. the Nature Protection League, Federation of Green, whereas for some of them – it is among many other subjects, but considered one of the most important ones (e.g. the Polish Tourist and Sightseeing Association or the scouts' organizations).

Despite all the differences and changes in the Polish ecological movement it should be noticed that all the organizations operating within the movement undertake actions and carry out relevant tasks (i.e. education and training, dissemination and exchange of information and environmental lobbing). The methods of task execution differ from one another, they include: preparing and publishing relevant materials, maintaining Internet websites, organizing courses, seminars and conferences, organizing competitions and large-scale events, undertaking promotion campaigns and protests, cooperating with institutions and representatives of public life, and with the business sector, cooperating with international environmental organizations, initiating, supporting and also conducting research studies, surveys and expertise, etc. It should also be emphasised that since many years, despite different obstacles, the ecological movement in Poland keeps developing and strengthening – the number of environmental organizations is high. They aim at strengthening mutual cooperation and coordination of activities by signing relevant agreements and establishing coalitions and networks (e.g. the Greens' Federation). With the assistance of promoters the financial and technical back-up of these organizations is improving. Moreover, an increase of the scope, attractiveness, and availability of offers is also observed. Beside traditional book publications and brochures there are Internet websites and multimedia materials; beside courses and training – Internet guides and catalogues; beside protest actions – development of permanent cooperation terms with public institutions, such as the Ministry of the Environment or the National Fund for Environmental Protection and Water Management, as well as pressing on e.g. Parliamentary Members, councillors and business representatives.

[43] The Convention entered into force on 17 May 2004 and the first meeting of the Conference of the Parties to the Convention will be held on 2-6 May 2005 in Punta del Este in Urugway.

Involvement of the Polish NGOs in activities concerning, in particular, human health and environmental protection against POPs is increasing with the growing attention to the newest trends of environmental protection. This is particularly true, when the most contemporary and important environmental problems are identified, together with determination and promotion of solutions to such problems in accordance with the philosophy and principles of sustainable development, with priorities of environmental policy, specifically with its principles of cautiousness, prevention against pollution and hazards to human life and health. For this reason especially stimulated in tackling these issues are, on the one hand, organisations with the widest profile of activities including all aspects of environmental protection and sustainable development, and on the other hand, organisations focussing their attention on human health and environmental protection against the threats constituted by the intensive forms of activity within the contemporary technical civilisation (techniques, technologies and industrial products, chemical methods in agriculture, and their side effects in the form of pollution, burdens and waste). Relatively less interest in the POPs issues is demonstrated by organisations specifically involved, for instance, in nature and landscape conservation, conservation and enrichment of biological diversity, protection of cultural heritage, etc.

The following three NGOs are most active at the national level:

1) the **Polish Ecological Club** (*Polski Klub Ekologiczny*) – **Upper Silesian Branch in Katowice**, *inter alia*, dealing with analytical methods (HPLC, HRGC, LC, IR, UV) for the determination of organic compounds, especially POPs, transformation of organic substances, particularly carbonic derivatives in different industrial processes (focussing on thermal transformation processes) as well as possibilities of reducing POPs emissions and their negative impact on the environment and human health.

2) the **National Waste Prevention Association** *"3R"* in Kraków (*Ogólnopolskie Towarzystwo Zagospodarowania Odpadów "3R")* the main animator of a special campaign on the elimination of POPs. The main activities concerning POPs performed by that organisation include:

- Participation in the Steering Committee of the project financed by the Danish Government (funded by the Danish Environmental Protection Agency) executed by COWI and DANCEE; covering a review of treatment technologies for hazardous waste containing POPs, which could potentially be the subject of support from the Danish Government funds in Central and Eastern Europe, Asia and Africa;
- Participation in the GEF/WHO/UNIDO/HCWH Project – "*Demonstrating and promoting best practices in reducing medical waste to avoid environmental releases of dioxins and mercury from health care practice*", endorsed by GEF and the Polish Government (one of the first financed by GEF within the framework of the Stockholm Convention; its implementation shall start after completion of the ongoing preparatory activities, by the end of 2004);
- Conducting a series of training courses for the health service centres on the reduction of quantities and toxicity of hospital wastes and on the replacement of incinerators of such waste by non-emission treatment facilities, as well as developing waste management plans for hospitals;
- Maintaining a database on waste incineration plants, containing also emission data from all over the world, which is accessible for member organisations of the Global Alliance for Incinerator Alternatives (GAIA) network;

- Co-ordination of an information campaign concerning POPs in Poland and in some other Central and Eastern European countries, which is prepared by the International POPs Elimination Network Europe;
- Preparation and publishing a synthetic report concerning persistent organic pollutants in Poland, and a report summarising the results of research on the presence of POPs in human milk.

3) the **Lowersilesian Foundation of Sustainable Development** (*Dolnośląska Fundacja Ekorozwoju*) in Wrocław, which in 2001 was conducting an informative and educational programme under the name "PCB-Stop", with the intention of eliminating equipment and waste containing PCBs/PCTs. Experts from several research centres (universities, scientific and research institutes) and the ministries concerned participated in this programme. Materials concerning this programme are available on the websites under: **www.pcb.pl.** The scope of the programme focussed on the following issues:

- PCBs as hazardous waste in equipment and the environment,
- Methods of environmental protection against contamination,
- Legal aspects of protection and reduction of hazards,
- Impacts of PCBs on human health,
- Treatment technologies and safe elimination of PCBs.

2.3.10. Overview of technical infrastructure for POPs assessment, measurement, analysis, alternatives and prevention measures, management, research and development

POPs measurement capacities of analytical laboratories. In order to identify the monitoring capacities concerning persistent organic pollutants, 69 laboratories were assessed within the framework of the GEF Project – mainly belonging to the Voivodeship Sanitary and Epidemiological Stations (WSSE), Voivodeship Inspectorates for Environmental Protection (WIOŚ) and universities – for their abilities to test substances covered by the Stockholm Convention and for their preparedness to undergo inter-calibration tests of substances in selected environmental media (air, water, waste, food, living organisms, plants, food products and human body).

Table 2.3.10.1 presents the number of laboratories conducting POPs analyses in different media in Poland, and Annex 5 contains a compilation of more detailed information in this matter. Baseline information is available in reports, [5] and [47], prepared under the GEF Project. Below are the results obtained from a preliminary assessment of the potential for emission and concentration monitoring of POPs.

1) Five laboratories (WIOŚ Lublin, Kraków University of Technology, the Institute of Meteorology and Water Management – Gdańsk Branch, the Military Institute of Chemistry and Radiometry, the National Foundation of Environmental Protection in Warsaw) are performing the widest scope of measurements, covering all environmental media and three major groups of substances (PCBs, HCB, dioxins and furans) and are prepared to submit to

inter-calibration tests. They are the only laboratories that carry out dioxin and furan measurements;

2) Most of WIOŚ laboratories (12 out of 17) conduct the tests only for water and only within a limited scope – mainly PCBs and DDT. Within this group the widest range of measurements is offered by WIOŚ Olsztyn with its branch in Elbląg, WIOŚ Poznań and WIOŚ Szczecin;

3) Seven WSSE laboratories carry out analyses almost exclusively in water and food products, primarily for aldrin, HCB and DDT. The widest scope of measurements is available from WSSE Warsaw and WSSE Poznań;

4) Two laboratories (IMGW Wrocław and IMGW Warsaw) out of the three owned by the Institute of Meteorology and Water Management (IMGW), conduct only PCBs and DDT measurements. The third laboratory, IMGW Gdańsk, offers full range of tests and has been included under item 1);

5) The rest of the group consists of 11 laboratories from research institutes and universities not mentioned above. Three of them (the Institute of Chemical Carbon Processing, the Institute of Environmental Protection and the Marine Fisheries Institute in Gdynia) perform a very limited scope of measurements. The other research centres carry out tests in various media for the majority of the substances in question, usually depending on their specialization.

Table 2.3.10.1. Number of Polish laboratories conducting POPs analyses in different media

Persistent organic pollutants	Media								
	Air	Water		Solid waste, incl. sewage sludge and ashes	Bottom sediments	Living organisms	Plants	Food products	Human body (human milk, blood etc.)
		Drinking	Surface, ground, sea						
Aldrin	6	16	19	9	10	4	7	13	7
Chlordane	6	10	14	7	8	4	6	7	5
Dieldrin	6	16	19	10	11	4	8	14	7
Endrin	5	13	16	8	9	4	7	10	5
Heptachlor	6	16	18	9	10	5	8	15	7
HCB	7	18	20	12	12	6	9	17	9
Mirex	4	6	10	5	6	3	5	6	4
Toxaphene	5	7	10	5	6	2	4	5	4
PCBs	9	19	28	15	16	7	9	13	9
DDT	8	23	27	10	14	5	8	19	10
PCDDs/PCDFs	5	5	5	5	5	4	4	5	5

Inter-calibration laboratory tests. Eight laboratories have been selected for inter-calibration tests out of all that expressed their readiness for them. Inter-laboratory tests with regard to the determination of PCDDs, PCDFs, PCBs and HCB were carried out in November and December 2002. The participating laboratories had to determine the above compounds in a

sample of ashes taken from a hazardous waste incineration plant, which was prepared by the Team of Trace Analyses Laboratory at Kraków University of Technology in co-operation with the University of Umea in Sweden. The subject of determination included 17 congeners of PCDDs/PCDFs, 3 PCB congeners (PCB77, PCB126 and PCB169), and HCB in a 10g sample of ash.

Four laboratories of the following research centres submitted their test results: the Institute of Chemistry and Inorganic Technology, the Military Institute of Chemistry and Radiometry, the Institute of Pulp and Paper and the National Foundation of Environmental Protection.

The results of comparisons indicate that practically three laboratories determined correctly the content of PCDDs and PCDFs and two of PCBs and HCB. Inter-calibration tests on PCDDs/PCDFs, PCBs and HCB should be continued in the following years.

Research and development capacity. The research and development capacity with regard to persistent organic pollutants subject to the Stockholm Convention, is represented by a number of research centres specialised in POPs. In order to assess that capacity, the following were analysed:

- Scientific and research projects financed by the State Committee for Scientific Research
- Papers and articles published by Polish authors in Polish- and English-language scientific periodicals,
- Themes of the conferences held within a series: "Dioxins in the Industry and the Environment".

This review was carried out on the basis of the Internet databases relevant to the subject of assessment. The scope of research activities concerning POPs is very wide and includes various aspects of POPs presence in the environment. Many universities and research centres deal with these problems. Depending on the profile of specific institutions, activities are focused on the following issues:

- Development of measurement methods:
    - Laboratory tests of POPs content in samples of different origin,
    - Field measurements of POPs emissions into the air;
- Studies on chemical processes of POPs formation and treatment (methods, technologies);
- Analysis of POPs migration and accumulation processes in the environment;
- Research on POPs effects on living organisms (laboratory tests, experiments on animals).

Scientific and research activities financed by the State Committee for Scientific Research. The State Committee for Scientific Research financed a considerable number of projects related to POPs in 1996–2001. For instance: in 1996 one project financed by that Committee was completed, in the period between 1998 and 1999 – three projects each year, in 2000 six and in 2001 seven of these projects were finalized. Below is a list of institutions involved in the execution of scientific research projects dealing with dioxins and polychlorinated biphenyls (Table 2.3.10.2).

The database providing information about projects financed by the Committee using the key words "dioxins", "polychlorinated biphenyls" and "pesticides" in titles of research projects was reviewed.

Table 2.3.10.2. Institutions carrying out scientific and research projects concerning dioxins and polychlorinated biphenyls

Research institution
Medical University in Poznań: Faculty of Pharmacy, Chair and Section of Inorganic and Analytical Chemistry
Medical University in Lublin: Faculty of Medicine, Chair and Section of Pharmacology
Institute of Meteorology and Water Management, Gdynia Branch
Institute of Basics of Environmental Engineering, Polish Academy of Sciences, Zabrze
State Institute of Veterinary Science
Częstochowa University of Technology: Faculty of Construction and Environmental Engineering, and the Department of Engineering and Environmental Protection, Institute of Environmental Engineering
Gdańsk University of Technology: Faculty of Chemistry; Section of Analytical Chemistry and the Chair of Chemical Technology
Tadeusz Kościuszko Kraków University of Technology: Faculty of Chemical Engineering and Technology; Institute of Inorganic Chemistry and Technology
Łódź University of Technology: Faculty of Food Chemistry and Biotechnology
Wrocław University of Technology: Faculty of Chemistry; Institute of Petroleum and Coal Chemistry and Technology
Gdańsk University: Faculty of Chemistry
Adam Mickiewicz Poznań University: Faculty of Biology
Jagiellonian University in Kraków: Faculty of Biology and Earth Sciences; Institute of Zoology; Faculty of Chemistry

A list of projects completed under the above-mentioned categories is presented in Table 2.3.10.3. Under the category of "dioxins" most of the projects addressed issues connected with methods of POPs determination in various types of environmental samples (food products, soil and bottom sediments, samples of wastewater and municipal sewage sludge, surface and ground water and biological material) as well as measurement methods of dioxin and furan emissions into the air. Three projects were related to dioxin effects on biological processes.

Studies within the category of "polychlorinated biphenyls" covered, *inter alia*, the methods of PCB determination in samples of different origin, assessment of PCB pollution in ecosystems, extraction of PCBs from sewage sludge and the methods of PCB degradation in oil waste. In one of the projects an attempt was made to estimate the quantity of PCBs in Poland including an inventory of electrical equipment (capacitors and transformers).

Research activities concerning the "pesticide" category focussed on toxic effects, detoxication of chloroorganic and polychlorinated pesticides, and the assessment of the toxic composition of the river environment of the Oder River. The interest in hexachlorobenzene issues was minimal and no projects in this respect were carried out.

Table 2.3.10.3. List of research projects regarding POPs financed by the State Committee for Scientific Research in 1996–2001

Scientific and research projects	Period of performance	Project Manager	Executing agency
1	2	3	4
Studies on determination of polychlorinated dibenzodioxins, dibenzofurans and biphenyls.	02.1997 – 02.2001	Adam Grochowalski	Tadeusz Kościuszko Kraków University of Technology; Faculty of Chemical Engineering and Technology; Institute of Inorganic Chemistry and Technology
Studies on dioxins' formation processes in the gaseous phase and development of their determination methods in samples of materials with multiple matrix.	10.1996 – 06.2001	Izabela Wiater-Protas	Jagiellonian University in Kraków, Faculty of Chemistry
Dioxins – assessment of hazards for man in Poland – preliminary studies.	02.1998 – 12.1998	Stanisław Tarkowski	Nofer Institute of Occupational Medicine
Function of the Ah receptor in the action mechanism of dioxins and related compounds.	12.1998 – 04.1999	Jadwiga Piskorska--Pliszczyńska	State Institute of Veterinary Science
Development of polychlorinated-p-dibenzodioxins, dibenzofurans determination methods in materials of food-type products.	01.2000 – 12.2000	Ryszard Chrząszcz	Tadeusz Kościuszko Kraków University of Technology; Faculty of Chemical Engineering and Technology; Institute of Inorganic Chemistry and Technology
Studies on determination of dioxins in samples of wastewater and municipal sewage sludge.	09.2001 – 10.2001	Adam Grochowalski	Tadeusz Kościuszko Kraków University of Technology; Faculty of Chemical Engineering and Technology; Institute of Inorganic Chemistry and Technology
Influence of dioxins on steroid genesis of ovarian cells.	12.1998 – 06.2001	Renata Wołcz	Jagiellonian University in Kraków, Faculty of Biology and Earth Science
Measurements of dioxins and furans as well as other pollutants released into the air from the cement furnace of the Cement Factory Rudniki S.A.	04.2001 – 05.2001	Adam Grochowalski	Tadeusz Kościuszko Kraków University of Technology; Faculty of Chemical Engineering and Technology; Institute of Inorganic Chemistry and Technology

1	2	3	4
Analytical work in support of scientific and research activities with the use of equipment of the Institute of Inorganic Chemistry and Technology aimed at development of dioxin testing methods in the geological environment (soils, water sediments, surface and ground waters) and in biological material.	06.2000 – 06.2000	Adam Grochowalski	Tadeusz Kościuszko Kraków University of Technology; Faculty of Chemical Engineering and Technology; Institute of Inorganic Chemistry and Technology
Studies on polychlorinated biphenyls in samples of organic origin.	01.2001 – 12.2001	Ryszard Chrząszcz	Tadeusz Kościuszko Kraków University of Technology; Faculty of Chemical Engineering and Technology; Institute of Inorganic Chemistry and Technology
Extraction and dynamic of bleaching of polychlorinated biphenyls from sewage sludge.	01.1997 – 06.2000	Agata Rosińska	Częstochowa University of Technology, Faculty of Environmental Engineering and Protection, Institute of Environmental Engineering
Assessment of selected methods of polychlorinated biphenyls (PCBs) degradation in waste oil.	06.1998 – 09.2001	Elżbieta Sobiecka	Łódź University of Technology, Faculty of Food Chemistry and Biotechnology
Development of a determination method for coplanar chlorinated biphenyls in soil and sediment samples with use of mass spectrometry of the MS/MS type.	01.2000 – 12.2000	Adam Grochowalski	Tadeusz Kościuszko Kraków University of Technology; Faculty of Chemical Engineering and Technology; Institute of Inorganic Chemistry and Technology
Development of a system preventing the natural environment in Poland to be contaminated with PCB compounds.	05.1995–04.1997	Marian Rutkowski	Wrocław University of Technology; Institute of Petroleum and Coal Chemistry
Determination of coplanar chlorinated biphenyls in soil and sediment samples in the presence of chlorinated dibenzodioxins and dibenzofurans. Phase I.	01.1998 – 12.1998	Adam Grochowalski	Tadeusz Kościuszko Kraków University of Technology; Faculty of Chemical Engineering and Technology; Institute of Inorganic Chemistry and Technology
Polychlorinated biphenyls (PCB) in southern part of the Baltic Sea.	05.1997 – 12.2000	Adriana Dembowska	Gdańsk University; Faculty of Chemistry
Polychlorinated biphenyls in the environment.	03.1999 – 11.1999	Janina Lulek	Karol Marcinkowski Medical Academy in Poznań, Pharmaceutical Faculty

1	2	3	4
Degradation of chloroorganic pesticides in the structure UV/Ti O_2.	10.1995 – 07.2000	Adriana Zaleska	Gdańsk University of Technology, Faculty of Chemistry, Chair of Chemical Technology
Tremble causing and toxic effects of selected polychlorinated pesticides and synthetic pyretroids in mice. Influence of antagonists of stimulating amino acids.	10.1996 – 12.1997	Piotr Błaszczak	Medical University in Lublin, Faculty of Medicine, Chair and Section of Pharmacology
Photocatalytic detoxification of chloroorganic pesticides: comparison of efficiency in application of titanium dioxide in the form of suspension and the immobilised titanium dioxide at the surface of glass microspheres.	02.1998 – 01.1999	Adriana Zaleska	Gdańsk University of Technology, Faculty of Chemistry, Chair of Chemical Technology
Assessment of toxic composition of the Oder River environment.	01.2001 – 12.2001	Elżbieta Niemirycz	Institute for Meteorology and Water Management, Gdynia Branch in Gdynia
Polychlorinated biphenyls (PCBs) as a factor causing disorder in endocrine processes in pigs ovary.	01.2000 – 12.2002	Anna Wójtowicz	Jagiellonian University in Kraków, Faculty of Biology and Earth Science; Institute of Zoology
Determination of content and analysis of polychlorinated biphenyls in solid waste and sludge (thesis).	06.1996 – 12.1998	Wiesław Sułkowski	Częstochowa University of Technology, Faculty of Construction and Environmental Engineering
Hydrodesulphurisation of mineral oils contaminated with polychlorinated biphenyls (PCBs).	01.2000 – 12.2001	Marek Stolarski	Wrocław University of Technology; Faculty of Chemistry; Institute of Petroleum and Coal Chemistry
Assessment of the level of residues of selected polychlorinated biphenyls (PCBs) in the population of the Wielkopolska region.	03.1999 – 02.2002	Janina Lulek	Karol Marcinkowski Medical Academy in Poznań, Pharmaceutical Faculty Chair and Section of Inorganic and Analytical Chemistry
Dioxins in municipal sewage sludge as criteria of their non-industrial utilisation.	08.2001 – 07.2002	Sylwia Oleszek	Polish Academy of Sciences, Institute of Basics in Environmental Engineering, Zabrze
Studies on the effect of the matrix on surface water samples preparation for determination of the organic compounds' content (thesis)	01.2000 – 12.2000	Jacek Namieśnik	Gdańsk University of Technology, Faculty of Chemistry, Chair of Chemical Technology
Polychlorinated biphenyls in the southern part of the Baltic Sea (thesis).	07.1999 – 06.2000	Jerzy Falandysz	Gdańsk University, Faculty of Chemistry

Table 2.3.10.4. Papers of Polish authors in Polish periodicals

Author(s)	Paper title	Periodical
1	2	3
Sokołowski M.	Dioxins – assessment of the natural environmental hazards and methods of their detection.	EPI, *Biblioteka Monitoringu Środowiska*
Baranowska I., Pieszko C.	Analysis of pesticides by derivative spectrophotometry method	*Chemia Analityczna*, 2000, Vol. 45, No. 4, p. 583–593
Baranowska I., Pieszko C.	Derivative spectrophotometry in pesticide analysis.	*Zeszyty Naukowe. Chemia* / Politechnika Śląska, 1998, No. 137, p. 21–28
Biłyk A.	Occurrence of dioxins and furans in the environment	*Ochrona Środowiska*, 2000, Vol. 77, No. 2, p. 9–13
Dąbrowski Ł., Biziuk M., Gaca J.	Determination of selected environmental pollutions in samples of soil and bottom sediments with use of the GC-MS technique.	*Ekologia i Technika*, 1999, Vol. 7, No. 6, p. 185–191
Falandysz J.	Chloroorganic compounds in the environment. Health hazards.	*Roczniki PZH*, 1995, 47, p. 41–57
Falandysz J. et al.	Dioxins and furans in edible fish species of the Gdańsk Bay.	Roczniki PZH, 1996, 47, p. 197 – 204
Florek A.	Assessment of dioxin occurrence in the marine environment.	*Ekologia i Technika*, 2000, Vol. 8, No. 4, p. 100–108
Grabińska-Sota E., Kalka J., Wiśniowska E., Ścieranka B.	Effect of selected pesticides on the activity of activated sludge.	*Ochrona Środowiska*, 2000, Vol. 77, No. 2, p. 39–42
Grochowalski A.	Study on determination of polychlorinated dibenzodioxins, dibenzofurans and biphenyls.	*Zeszyty Naukowe* University of Technology in Kraków, 2000, No. 272, ISSN 0860-097X
Grochowalski A. et al.	Solid phase extraction and capillary C-ECD analysis of PCDDs in chlorinated phenols.	*Chemia Analityczna*, 1993, 33, p. 279–286
Grochowalski A., Wiater I.	Carbon column as a clean-up method for oily samples purification for the determination of polychlorinated dibenzodioxins and dibenzofurans.	*Chemia Analityczna* 1998, 43, p. 399–408

1	2	3
Kobierski M.	Technology of pesticide wastewater treatment on activated fly ash.	*Problemy Inżynierii Rolniczej*, 1998 (6), No. 1, p. 157–164
Makles Z.	Dioxins and incineration of solid waste.	*Biuletyn WIChiR,* 1997, 1(27), p. 29–46.
Nowakowski L., Budziarek M.	Dioxins – structure, physical and chemical properties and emission sources.	*Zeszyty Naukowe. Budownictwo* / Opole University of Technology, 1998, z. 1, p. 41–57
Pająk T.	Thermal processing of municipal waste as an element of contemporary comprehensive waste management.	*Przegląd Komunalny,* 1998 (78), p. 17–40
Pająk T.	Dioxins in the process of municipal waste incineration – hazards, standards, current situation, prevention.	*Roczniki PZH* 1996, 47, p. 105–119
Piecuch T.	Thermal waste processing and air protection against detrimental components of stack gases.	*Wydawnictwo Uczelniane Politechniki Koszalińskiej,* Koszalin 1998
Płaza G.	Dioxins – hazardous compounds.	*Ochrona Powietrza i Problemy Odpadów,* 1994, 28(2), p. 39–42
Skowron H.	Thermal processing of municipal waste – a necessity in the near future.	*Ekoproblemy,* 1998, 4, p. 14–18
Sokołowski M.	Dioxins – properties, sources and analytical problems	*Roczniki PZH* 1996, 47, p. 95–104
Ścigała R., Maślanka A	Fuel combustion as a potential source of dioxin and furan emissions.	*Chemik*, 2000, No. 4, p. 91–94
Wachowski L., Kirszensztejn P.	Dangerous dioxins and furans	*Ekoprofit,* 1999, 10(36), p. 44–48
Wandrasz J., Pikoń K.	Ability to absorb the imission of PCDD/PCDF compounds by man.	*Ekoproblemy,* 1996, 2, p. 10–11
Wandrasz J.W.	Management of hospital waste.	Polish Association of Sanitary Eng. and Technicians, *Oddział Wielkopolski,* Poznań 2000
Wiergowski M., Dąbrowski Ł., Galer K., Makuch B., Biziuk M.	Assessment of the Oder River basin water pollution by organic compounds after the flood in summer 1997. Part. I. Determination of pesticides and phenols in water and post flood sediments.	*Chemia Analityczna*, 2000, Vol. 45, No. 2, p. 181–190
Wiergowski M., Zaleska A., Biziuk M., Hupka J.	Comparison of three analytical procedures for determination of chloroorganic pesticides and their decomposition in water suspension during photo catalytic oxidation.	*Chemia Analityczna*, 2000, Vol. 45, No. 6, p. 901–910

Publications. The database on Polish scientific periodicals addressing issues related to dioxins contains information on publications mainly under the following titles: *Chemia Analityczna* (Analytic Chemistry), *Ochrona Środowiska* (Environmental Protection), *Ekologia i Technika* (Ecology and Technology), *Chemik* (Chemist). Reports on similar subjects are also published in other periodicals, such as: *Ekoproblemy* (Ecoproblems), *Ekoprofit* (Ecoprofit), *Ochrona Powietrza i Problemy Odpadów* (Air Protection and Waste Problems) as well as in the *Roczniki PZH* (PZH Annual Reports), *Biuletyn WIChiR* (Military Institute of Chemistry and Radiometry Bulletin) and *Zeszyty Naukowe* (Scientific Publications) of some universities. A significant number of scientific materials is published in the form of conference proceedings (domestic and international conferences and scientific symposia). Table 2.3.10.4 presents a list of these publications.

Review of Internet databases on foreign scientific periodicals, on the basis of "ScienceDirect" database, definitely does not allow for specifying all papers of the Polish authors concerning POPs. A list of publications identified accordingly is compiled in Table 2.3.10.5.

Table 2.3.10.5. Papers of Polish authors published in foreign periodicals and in Polish English-language journals

Author(s)	Title of paper	Periodical
Grochowalski A., Wybraniec S.	Levels of polychlorinated dibenzo-p-dioxins and dibenzofurans in flue gas and fly ash from coal combustion in a power plant	*Fuel and Energy Abstracts,* Volume: 37, Issue: 5, 1996: 385
Grochowalski A.	PCDDs and PCDFs concentration in combustion gases and bottom ash from incineration of hospital wastes in Poland	*Chemosphere,* Volume: 37, Issue: 9–12, 1998: 2279–2291
Grochowalski A., Chrząszcz R.	The result of the large scale determination of PCDDs, PCDFs and coplanar PCBs in Polish food product samples using GC-MS/MS technique.	*Organohalogen Compounds*, 47: 306–310, 2000
Grochowalski A., Chrząszcz R., Pieklo R., Gregoraszczuk E.L.	Estrogenic and antiestrogenic effect of in vitro treatment of follicular cells with 2,3,7,8-tetrachlorodibenzo-p-dioxin	*Chemosphere,* Volume: 43, Issue: 4–7, 2001: 823–827
Grochowalski A., Chrząszcz R., Pieklo R., Gregoraszczuk E.L.	Estrogenic and antiestrogenic effect of in vitro treatment of follicular cells with 2,3,7,8-tetrachlorodibenzo-p-dioxin	*Chemosphere,* Volume: 43, Issue: 4–7, 2001: 823–827
Lulek J.	Levels of polychlorinated biphenyls in some waste motor and transformer oils from Poland	*Chemosphere,* Volume: 37, Issue: 9–12, 1998: 2021–2030
Sułkowski W., Rosińska A.	Comparison of the efficiency of extraction methods for polychlorinated biphenyls from environmental wastes	*Journal of Chromatography A,* Volume: 845, Issue: 1–2, 1999: 349–355
Grochowalski A., Chrząszcz R., Wybraniec S.	Detemination of PCDFs/PCDDs in ambient air from Cracow , Poland	*Organohalogen Compounds,* 1995, 21: 321–326

Author(s)	Title of paper	Periodical
Grochowalski A. et al.	Determination of PCDDs in Polish wood conservants	*Journal of Chromatography,* 1990, 502(1): 160–166
Grochowalski A. et al.	PCDD/F mass concentration in residues from incineration of medical wastes in Poland	*Organohalogen Compounds,* 1996, 27: 42–46
Falandysz J., Szymczyk K.	Data on the manufacture, use, inventory and disposal of polychlorinated biphenyls (PCBs) in Poland	*Polish Journal of Environmental Studies,* Vol.10, No. 3 (2001): 189–193

Detailed information about persistent organic pollutants in the environment can be found in scientific literature. Environmental impacts of PCDDs/PCDFs, as well as related polychlorinated biphenyls; conditions, under which these compounds are formed; causes of their appearance in air, water, soil and food products; methods of their elimination and problems connected with biological activity of dioxins and furans are presented in a publication entitled "*Niebezpieczne dioksyny*" ("Dangerous dioxins") (*Arkady* Publishing Office, 2001). Another book entitled "*Pestycydy: występowanie, oznaczanie i unieszkodliwianie*" (Pesticides: occurrence, determination and treatment) (*Wydawnictwa Naukowo-Techniczne*, 2001) provides information on:

- Methods of pesticide determination in different elements of the environment,
- Pesticide wastes, their collection and treatment with particular attention to issues concerning elimination of obsolete pesticide landfills.

Conference series: "Dioxins in the Industry and in the Environment". Since 1999 the University of Technology in Kraków and EMPIRO Co. Ltd. have been the organisers of a series of conferences on "Dioxins in the Industry and in the Environment". The issues discussed at the conferences are very broad and cover the following research areas:

- Methods for determination of pollutants,
- Review of processes of POPs formation and sources of their releases,
- Monitoring and emission reduction methods,
- POPs impact on biological environment and health.

There are also a number of general reports on evaluation of environmental emissions of POPs and their accumulation in specific media, on exposure to PCBs in Poland and on the legal aspects. Information about the conferences is available on the following Internet website: **www.dioksyny.com.pl.**

Methods for determination of pollutants. Studies on POPs determination methods are, *inter alia,* connected with the use of various types of special equipment or with new analytical methods for extraction and measurement of the levels of different investigated groups of compounds in various types of samples.

Review of processes of POPs formation and sources of their releases. The issues referred to in scientific publications on POPs formation and their release sources include:

- Review of POPs generation in industrial and technological processes, and
- Review of POPs accumulation and migration in the environment.

Monitoring and emission reduction methods. Studies on measurements and emission reduction are mainly concerned with measuring methods, and manufacturing processes that can reduce POPs releases effectively.

POPs impact on biological environment and health. Investigations on POPs effects include:

- Studies of carcinogenic impact (nipple cancer) and disorder of endocrine functions (follicular functions, men infertility),
- Research on laboratory animals (influence of TCDD on the reproduction in rats, pleura inflammation in rats, enzymatic activity in the erythrocytes of mice),
- Studies on POPs accumulation in living organisms and in the food chain (Baltic fish, POPs in human milk).

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

The present-day procedure for the assessment of health hazards caused by chemical substances includes four basic elements:

- Identification of health hazards,
- Assessment of the relation: dose (concentration) – response (effect),
- Exposure evaluation,
- Risk assessment (quantitative and/or qualitative assessment of health effects of exposure).

This procedure has been adopted by the majority of countries in line with the recommendations and decisions issued, *inter alia*, by the US National Academy of Sciences, US EPA, the European Commission and WHO.

The primary requirement for risk assessment is to obtain reliable data related to all elements of risk assessment through compilation of data deriving from experimental or epidemiological studies. This condition is often not fully fulfilled. The reason for limited risk assessment opportunities is predominantly the lack of complete exposure data. Limitations are also connected with the difficulties in identifying the actual interactions between specific indices of health problems with the exposure to specific chemical substances. Under these circumstances, risk assessment is limited to qualitative characteristics, indicating the potential risk for health effects in people exposed to chemical substances exhibiting specific toxicological properties, and those for which the threshold doses, concentrations or values of unitary carcinogenic risk were established.

The development of a health risk prognosis resulting from exposure to dioxins and furans, polychlorinated biphenyls and hexachlorobenzene has been initiated in Poland on the basis of respective literature, toxicological characteristics of the examined chemicals and the review of data on sources and exposures to specific substances in Poland (Chapter 2.3.4).

Food is the basic source of human exposure to the POPs concerned. Air and water, jointly, represent less than 10% of the total intake of these substances. Due to lack of data concerning POPs concentrations in water and air, the risk assessment was based on considerations of POPs intake with food products, in accordance with the guidelines of Joint FAO/WHO Food Standards Programme Codex Alimentarius Commission.Wherever possible the Estimated Daily Intake (EDI) was taken into account by comparing it with the Acceptable Daily Intake (ADI) or the Tolerable Daily Intake (TDI).

When assessing POPs threat to human health, two types of evaluations should be distinguished: the toxicological assessment, covering permissible concentrations, exposure doses and routes on the one hand and the cancer risk, thus the probability of contracting cancer disease or its specific type, on the other. In these terms the International Agency for Research on Cancer (IARC) classified the 12 substances controlled by the Stockholm Convention as shown in Table 2.3.11.1. As demonstrated in that table, none of the 12 substances covered by the Stockholm Convention are classified as Group 1, "carcinogenic to humans". Two types of substances have been classified as "probably carcinogenic to humans" (Group 2A: PCDDs and PCBs). Most of the chloroorganic pesticides have been recognized as substances "possibly carcinogenic to humans" (Group 2B – 7 substances) and only 3 substances are "unclassifiable as to carcinogenicity in humans" (Group 3: PCDF, dieldrin and endrin). Since the substances specified in Table 2.3.11.1 under items 5–12 are not allowed to be placed on the market in Poland, thus they are neither produced nor used in the country. Their residues, however, are still found in surface waters, bottom sediments and living organisms (Chapters 2.3.1–2.3.3). Concentrations of their residues found in food are many times lower than those permitted pursuant to health criteria.

Table 2.3.11.1. IARC classification of POPs

No.	Persistent organic pollutants	IARC classification groups
1	Dioxins	2 A
2	Furans	3
3	Polychlorinated biphenyls	2 A
4	Hexachlorobenzene	2 B
5	Aldrin	2 B
6	Chlordane	2 B
7	Dieldrin	3
8	DDT	2 B
9	Endrin	3
10	Heptachlor	2 B
11	Mirex	2 B
12	Toxaphene	2 B

On the basis of data related to food products only 4 substances referred to below have been assessed in Chapter 2.3.4, in terms of their impact on human health. PCDDs, PCDFs, PCBs and HCB, which are commonly present in the Polish environment (although in small

quantities), as specified by the Stockholm Convention form a separate group of substances released into the environment as by-products of combustion and some production processes in the industry.

Data for calculating exposure and risk for the 12 substances under the Stockholm Convention are available in the US EPA database, as well as in other similar databases. However, application of these factors in the human risk assessment procedure faces serious obstacles in Poland, due to the lack of sufficient data on the exposure, standards of permissible levels of exposure and epidemiological studies evaluating health effects of exposure to POPs at a countrywide scale.

Social implications for the workers and local community have not been evaluated as Poland does not produce or use POPs covered by the provisions of the Stockholm Convention. Human health impacts caused by PCDDs/PCDFs, PCBs and HCB are described in Chapter 2.3.4.

2.3.12. System for the assessment and listing of new chemicals

The present system for evaluating and registering new chemical substances in Poland operates under the Act of 11 January 2001 on Chemical Substances and Preparations[6]. Producers and importers are obliged[44] to notify the Inspector for Chemical Substances and Preparations. New substances already placed on the market should be notified to the Inspector by 30 June 2003 at the latest. After this date notification must be made 60 or 30 days before placing on the market of a new substance depending on its planned annual turnover (at least 1 Mg or less than 1 Mg, respectively). When the notification is incompliant with the requirements or the data included is insufficient, then the Inspector through a decision imposes an obligation to amend the notification possibly with additional study results. On the contrary, the inspector issues a confirmation with a registry number of the application. A new substance may be placed on the market after 60 or 30 days, respectively from the date the application is accepted by the Inspector. The Minister of the Environment in a Statement of 28 March 2003 announced a list of new substances specified in the European List of Notified Chemical Substances (ELINCS) [45].

Documentary submitted to the Inspector for Chemical Substances and Preparations should include:

- Data essential to assess the risk posed by a new substance for human health and the environment, including information on the adverse effects caused under conditions of its expected use,
- Proposed classification, package labelling and safety data sheet in the case of new hazardous substances,

and additionally it can include the results of a preliminary risk assessment. The Inspector provides access to the data for medical and rescue services.

[44] Since 1 May 2004 new substances submitted in the EU Member States and in Island, Lichtenstein and Norway have been excluded from this obligation.

[45] Official Journal of the Ministry of Health of 2003 No. 3, item 34.

The scope of required data included in the documentation is determined by the expected turnover, pursuant to legal regulations[46] it consists of:

- Identity of the producer,
- Identity of the substance,
- Methods of detection and determination of the substance,
- Production, import/export data and uses of the substance,
- Recommended precautionary measures, safety measures in case of emergency or packaging damage, special rules on the provision of medical aid in order to reduce adverse effects,
- Results of physicochemical measurements,
- Toxicity results,
- Ecotoxicity results, including decomposition of the substance,
- Information on possible treatment of the substance.

Moreover, after placing a substance on the market, the notifier is obliged to provide to the Inspector any additional information concerning, *inter alia*, the changes in the quantities placed on the market and modifications in the chemical composition of the new substance, including its impurities as well as any new data on its new uses and on its impact on human health or the environment. If the notifier does not meet this obligation, the Inspector, through a decision, repeals the notification. It can be revalidated only when the required additional information is supplied.

The notifier indicates the data concerning commercial information and the production process, which are to be regarded as confidential. The Inspector has the right to treat them as confidential only for reasons connected with the protection of human health and the environment, including the protection of laboratory animals.

The following information is not regarded as confidential:

- the trade name of the new substance,
- identity of both the producer of the new substance and the notifier,
- physicochemical properties of the new substance,
- summarized toxicity and ecotoxicity results,
- the purity level of the new substance if it is relevant to its classification, and data on impurities or additives, if they are dangerous,
- data from the safety data sheet,
- treatment methods for a new substance classified as dangerous,
- provisions for the safe use of the new substance and guidelines regarding emergency measures in the case of human poisoning and uncontrolled release of the new substance into the environment,

[46] Regulation of the Minister of Health of 18 February 2003 on requirements concerning detailed data included in the documentation submitted by a notifier for a new substance, which are essential to provide a risk assessment with regard to human health and the environment (DzU of 2003 No. 50, item 437).

- methods for the determination of the new substance in the environment, including methods for human risk assessment, if the substance is listed as hazardous.

Notifications of new substances placed on the market for the purpose of carrying out research on production development, supplied in limited quantities are subject to exemption for a period of one year. However, the following new substances are not subject to notification:

- Polymers, except polymers containing at least 2% of the new substance in a combined form,
- When their annual quantities placed on the market do not exceed 10 kg,
- Placed on the market only for research purposes in R&D institutions or other laboratories, if their annual quantities do not exceed 100 kg and the producer or importer stores written information on their identity and data on their labelling and quantities placed on the market with a list of recipients,
- Used entirely as active substances within the meaning of the pharmaceutical law,
- Intended, entirely, for use as active substances in pesticides or biocidal products, for which procedures for the placing on the market with their assessment and record keeping are laid down in the Act on Plant Protection and the Act on Biocidal Products (Chapter 2.3.13).

Only institutions that meet the criteria for good laboratory practice (GLP) and are authorised by the Inspector are entitled to carry out tests on substances and preparations. So far the Inspector has provided one decision regarding physicochemical tests in line with the principles of GLP. The Institute of Industrial Organic Chemistry, Branch in Pszczyna, as the only one in Poland, so far, has a Statement of GLP Compliance obtained from the Slovak National Accreditation Service. It is entitled to carry out ecotoxicity and toxicity studies pursuant to OECD methods and in compliance with GLP. Furthermore, it is authorised[47] to carry out tests on chemical substances to determine their potential risk to human health.

Recommended methods for determining physicochemical properties, toxicity and ecotoxicity of substances and preparations are specified in an annex of the Regulation of the Minister of Health[48].

The need for carrying out additional tests, as well as their scope[49], depends on the levels of exceeded 3 threshold quantities set out for new substances placed on the market (10, 100 and 1000 Mg) and on the results of the risk assessment performed by the Inspector.

The risk assessment for human health and the environment posed by new chemical substances proceeds in the following sequence:

- identification of hazards;
- dose (concentration) – response (effect) assessment;

[47] Pursuant to Regulation of the Minister of Health and Social Care of 12 July 1996 on units authorized to carry out studies on materials and technology processes to determine the degree of hazard to human health and on the scope of these tests (DzU of 1996 No. 101, item 473).

[48] Regulation of the Minister of Health of 28 July 2003 on methods for determining physicochemical properties, toxicity and ecotoxicity of chemical substances and preparations (DzU of 2003 No. 232, item 2343).

[49] Regulation of the Minister of Health of 18 February 2003 on threshold quantities of new substances placed on the market, and on the scope and type of tests required when these thresholds are exceeded (DzU of 2003 No. 50, item 438).

- exposure evaluation;
- risk characterisation.

A joint risk assessment is carried out on the basis of both environmental and human health risk assessments with regard to toxicological and physicochemical properties of a new substance. Details concerning the procedure for performing such an assessment are regulated by relevant law[50].

The Inspector for Chemical Substances and Preparations is responsible for keeping record of new chemical substances. To date no new substances have been notified in Poland[51].

As regards "new" active substances and "new" biocidal products until the end of 2003 there have not been any notifications of substances/products with this status in Poland.

2.3.13. System for the assessment and regulation of chemicals already in the market

In Poland the principles of the risk assessment system for different substances are alike, irrespective of their intended uses, but the procedures applied vary depending on the law with which they have to comply. The assessment and procedure with respect to:

- chemical substances and preparations are regulated by the Act on Chemical Substances and Preparations[6],
- pesticides and their biologically active substances are determined by the Act on Plant Protection[7],
- biocidal products and their biologically active substances are regulated by the Act on Biocidal Products[8].

Since 2001 anyone placing on the market substances listed by the Minister of Health[52] has been exempted from the obligation[53] of notifying the Inspector of Chemical Substances and Preparations. The ministerial list includes the European Inventory of Existing Commercial Chemical Substances (EINECS), i.e. a list of substances placed on the market within the European Community before 18 September 1981.

The placing on the market of a dangerous preparation within the territory of Poland requires notification of the Inspector for Chemical Substances and Preparations. The information submitted at the latest on the day of its placing on the market includes: the identity of the

[50] Regulation of the Minister of Health of 18 February 2003 on the procedure for carrying out a risk assessment for human health and the environment posed by chemical substances (DzU of 2003 No. 52, item 467).

[51] Both the notification of a new substance and submission of additional study results to the inspector are charged on the day of notification or submission of the results.

[52] Statement of the Minister of Health of 13 January 2003 on a list of chemical substances, which are under production or placed on the market. (Official Journal of the Ministry of Health of 2003 No. 1, item. 1).

[53] An obligation to notify the Inspector about certain substances produced or placed on the market in the amounts of at least 10 tonnes in 2003 was imposed by the Regulation of the Minister of Health of 13 January 2004 on chemical substances produced or placed on the market, which are subject to notification (DzU of 2004 No. 12, item 111); none of the substances specified in the Annex to this Regulation are covered by the provisions of the Stockholm Convention.

person placing it on the market, the trade name of the dangerous preparation and its safety data sheet or other data, if the latter is not required. If data included in the sheet are insufficient the Inspector imposes an obligation to supplement it within a designated time limit. Furthermore, the Inspector may request to reveal the detailed chemical composition of the dangerous preparation. Such information is confidential and may be used solely for medical purposes. Each safety data sheet[54] receives a record number and is stored in the safety data sheet archive for dangerous preparations placed on the market of the Bureau for Chemical Substances and Preparations. The Inspector for Chemical Substances and Preparations, at the request of the Chief Sanitary Inspector or Chief Inspector for Environmental Protection or pursuant to his own decision, may prohibit the placing on the market or may specify conditions, which must be met by a preparation posing unacceptable threat to man and to the environment.

Producers, distributors and importers placing on the market the existing substances not included in the list of dangerous substances specified in the Regulation of the Minister of Health[55], are obliged:

- To gather reliable information on risks entailed by them to human health and the environment, deriving from their physicochemical and biological properties,
- To provide access to the aforementioned information for the recipients of these substances.

Persons placing on the market substances not specified in thatis list provide classification for these substances pursuant to criteria laid down by the Regulation of the Minister of Health[56]. Classification criteria, a choice of symbols and phrases indicating the type of threat, may be determined on the basis of physicochemical properties and toxicity, and analysis of the effects for human health and for the environment. Preparations are classified on the basis of the contents of hazardous constituents in the case of human health and environmental threats.

The labels of the packaging must be written in the Polish language version and contain appropriate safety and danger symbols and inscriptions enabling accurate identification of dangerous substances or preparations, and of persons responsible for placing them on the market. The labelling requirements are subject to the provisions of the Regulation of the Ministry of Health[57]. The use of an alternative designation for the purpose of confidentiality of the chemical identity of dangerous substances present in the preparation requires permission of the Inspector. Containers used both for the storage of dangerous substances and preparations and for their handling, pipelines containing them and places, in which significant quantities of dangerous substances and preparations are stored must be labelled in compliance with the legal rules in force[58].

[54] The database on dangerous preparations placed on the market within the territory of Poland, which is compiled on the basis of safety data sheets will be available through the Internet by the end of 2004.

[55] Regulation of the Minister of Health of 2 September 2003 on a list of dangerous substances with their classification and labelling (DzU of 2003 No. 199, item 1948).

[56] Regulation of the Minister of Health of 2 September 2003 on criteria and methods of classification of chemical substances and preparations (DzU of 2003 No. 171, item 1666).

[57] Regulation of the Minister of Health of 2 September 2003 on the labelling of packaging for dangerous substances and dangerous preparations. (DzU of 2003 No. 173, item 1679).

[58] Regulation of the Minister of Health of 14 March 2003 on provisions for labelling places, pipelines and containers for storing or containing dangerous substances or dangerous preparations (DzU of 2003 No. 61, item 552).

The packaging of dangerous substances and preparations placed on the market should satisfy the following requirements:

- its construction should not allow accidental releases of its contents; this requirement does not apply where special technical safety measures are required;
- the materials constituting the packaging must not be susceptible to adverse attack by the contents, or liable to form dangerous chemical compounds with the contents;
- must be tight throughout to ensure that it will not loosen and will safely meet the stresses and strains of normal handling;
- must ensure tightness during repeated refastening under normal handling conditions;
- must meet the provisions of regulations concerning the transport of hazardous materials.

Additionally, the law[59] specifies the types of dangerous substances and preparations for which packaging should be equipped with child-resistant fastenings and a tactile warning of danger.

A person responsible for the placing of a dangerous substance or preparation on the market is obliged to provide access to its safety data sheet free of charge, and to update its contents with a view to technical and scientific progress. Detailed requirements concerning the preparation and distribution of safety data sheets are laid down in the regulations of the Minister of Health[60,61]. The sheet is a compilation of data on dangerous properties of a substance or preparation and on the principles and recommendations for its safe use in order to protect human health and the environment Therefore dangerous substances and preparations may be used in economic activity only if they have safety data sheets. The user of a dangerous substance or preparation is obliged to acknowledge the sheet and undertake appropriate preventive action to protect human health and the environment.

Additionally, a person responsible for placing a dangerous preparation on the market, or under certain circumstances a preparation not classified as dangerous, is obliged to:

- store the data, which served as a basis for classification and labelling of the preparation, and for the elaboration of its safety data sheet, for 5 years after the withdrawal of the preparation from the market; this data is provided on request of the Sanitary Inspection and the Environmental Protection Inspection;
- establish, maintain and update regularly the record of dangerous substances and preparations owned.

Marketing of certain category dangerous substances and preparations requires special qualifications confirmed by the relevant sanitary inspector.

[59] Regulation of the Minister of Health of 30 April 2004 on dangerous substances and preparations, for which packaging must be equipped with child-resistant fastenings and a tactile warning of danger (DzU of 2003 No. 128, item 1348).

[60] Regulation of the Minister of Health of 3 July 2002 concerning the data safety sheet for dangerous substance or dangerous preparation (DzU of 2002 No. 140, item 1171).

[61] Regulation of the Minister of Health of 14 August 2002 on the obligation of providing safety data sheets for certain preparations not classified as dangerous (DzU of 2002 No. 142 item 1194).

The Regulation of the Minister of Economy, Labour and Social Policy[62] of 17 April 2003 specifies dangerous substances and preparations subject to relevant requirements concerning their marketing and use (prohibitions, restrictions and exemptions). The Regulation of the Minister of Health[63] of 15 October 2003 sets the terms for obtaining a permit for the export of certain chemical substances and preparations, including those covered by the Stockholm Convention, after fulfilling the provisions of the prior informed consent procedure with regard to the importing country.

The Inspector for Chemical Substances and Preparations is, *inter alia*, responsible for collecting data on dangerous substances and dangerous preparations, and for providing access to them for medical and rescue services.

The aforementioned principles of classification of substances, the requirements regarding safety data sheets as well as conducting studies on physicochemical properties, toxicity and ecotoxicity of substances, and their labelling and packaging, apply also to plant protection products and to the active substances contained in them as well as to biocidal products and their active substances.

Pesticides are chemical (or biological) substances with a specific biological effect. They are the active constituents of plant protection products, whereas a **plant protection product** itself is a preparation containing a pesticide (a biologically active substance), which is mainly used for agricultural purposes. In Poland since 1961 it has been required to obtain a permit from the Minister of Agriculture prior to introducing every new preparation to the market. These permits are updated and published periodically. The rules for granting permits for the placing of plant protection products on the market and their use are defined under the Regulation of the Minister of Agriculture and Rural Development[14]. The producer or importer has to enclose the necessary documentation on the product and submit it with an application for a permit. It is essential for evaluating its effectiveness and for providing an opinion concerning its human, animal and environmental hazards.

The documentation should include, *inter alia*:

- General information on the plant protection product,
- Study results and information on the physicochemical properties, including octanol/water partition coefficient,
- Information on the uses of the agent, including recommendations concerning its handling, storing, transport and fire, and on the disposal of the useless agent and its packaging,
- Analytical methods used for its examination,
- The toxicity results of the plant protection product and its biologically active substance with medical information on poisoning and on first aid and the medical treatment,
- The results of tests and information on the residues of the pesticide in products, food and feed, including the proposed maximum residue limit (MRL),

[62] Regulation of the Minister of Economy, Labour and Social Policy of 17 April 2003 on restrictions, prohibitions and conditions for the placing on the market or for the use of dangerous substances and preparations (DzU of 2003 No. 86, item 799).

[63] Regulation of the Minister of Health of 15 October 2003 on export limitations for certain substances and certain chemical preparations. (DzU of 2003 No. 187 item 1833); this Regulation has been in force until 1 May 2004.

- The results of tests and information regarding the behaviour and the degradation of the biologically active substance and the plant protection product in the environment, i.e. in soil, water and air,
- The results of ecotoxicological tests of the biologically active substance and the plant protection product, including their impact on birds, the aquatic organisms (fish, invertebrates, algae, organisms living in sediments and aquatic plants), terrestrial organisms (arthropods, earth worms, soil microorganisms and other non-target flora and fauna, as well as the ability of the pesticide to bioaccumulate,
- Additional information on:
    - the classification of the product with regard to its toxicity (very toxic, toxic, harmful and other),
    - danger symbols,
    - R-phrases (risk) and S-phrases (safety) determining the type of warning,
    - the wording of the label-instruction,
    - the packaging,
    - the properties of the product and requirements for its safe use presented in the form of a safety data sheet.

The following units are authorised to provide opinions on plant protection products:

- The National Institute of Hygiene, with regard to their effects on humans, animals and the environment, and concerning the quality of biologically active substances,
- The Institute of Environmental Protection, with regard to their effects on the environment,
- The Institute of Plant Protection, with regard to the quality of the biologically active substances.

All pesticides covered by the provisions of the Stockholm Convention are among the 63 biologically active substances of plant protection products, which are prohibited from use in Poland, i.e. aldrin, chlordane, DDT, dieldrin, endrin, hexachlorobenzene, heptachlor, mirex and toxaphene. The updated register of plant protection products admitted for marketing and use with the permission of the Minister of Agriculture and Rural Development, together with their labels-instructions is accessible through the Internet on the ministerial website[64]. Also, this website provides information on plant protection products that have been sold and stored in different years[65].

An active substance or a preparation containing at least one active substance, in the form supplied to the user, intended for destruction, repelling, treatment, preventing an activity or controlling harmful organisms through chemical or biological action is regarded as a **biocidal product**. In Poland the only biocidal products that are admitted for marketing within its territory are the ones for which the following documents must be obtained::

- permits for introducing them on the market,
- permits for placing them on the market temporarily,

[64] http://www.bip.minrol.gov.pl/DesktopDefault.aspx?TabOrgId=633.

[65] Data available since 2002.

as well as biocidal products listed in the register of biocidal products posing considerably little threat.

The person responsible for the placing of a product on the market submits the application form with the documentation and a sample of the product to the President of the Office for Registration of Medical Materials, Curative Products and Biocides. The President reviews the application supplied with its documentation with regard to its completeness and scientific value, and evaluates the biocidal product. While assessing the product it is important to pay attention to:

- Proper determination of the relation: dose(concentration)/response(effect) for humans and the environment,
- Whether the active substance or potentially dangerous substance (or its decomposition product) poses unacceptable risk for different environmental components (e.g. exceeds permissible concentrations for surface and groundwater) and for the animals,
- Precise calculations to determine the value of the relation PEC/PNEC as a decisive factor for further action; if PEC/PNEC value does nor exceed 1, then further information is nor required; if this value is higher than 1, then a decision has to be made regarding the need for further information and research results, whether to undertake measures to reduce the risk, or to refuse granting a permit - the decision depends also on bioaccumulation, persistence in the environment and the shape of the toxicity/time curve,
- Adverse effects,
- The effectiveness of the product.

It is assumed that a regulation containing a list of active substances permitted for use in biocidal products (divided into categories and groups) and a list of active substances permitted for use in low-risk biocidal products (with relevant requirements) will be enacted around 2010, upon completion of the European review of the existing active substances. Until that time they will remain undivided into low and high-risk substances and products. At present in the transitional period only a register of permits for the marketing of biocidal products is maintained.

The Ministry of Health issues an appropriate permission at the request of the President of the Registration Office, under the following conditions:

- The active substances are constituents of the biocidal product, which on 1 December 2002 was subject to marketing and indented for purposes other than scientific research and research for the development of production,
- The biocidal product is sufficiently effective in combating undesirable organisms,
- The biocidal product does not cause adverse effects on non-target organisms, and in particular does not contribute to the suffering of vertebrate animals,
- The biocidal product does not pose a direct or an indirect threat to human health, animals and the environment, and in particular to surface waters, groundwater and water intended for drinking, and to non-target organisms,
- It is possible to determine the type and quantity of the active substance and, if appropriate, of all pollutants and residues of toxicological and ecotoxicological relevance, which may be formed during the use of the product, according to the category registered.

- The physicochemical properties of the biocidal products are relevant for their proper use, storage and transport,
- Occupational safety rules have been developed for the use, storage and transport of biocidal products.

The list of biocidal products, updated on a day-to-day basis, which have been permitted for placing on the market in Poland is available in the Internet on the website of the Office for Registration of Medical Materials, Curative Products and Biocides [66].

[66] http://www.bip.urpl.gov.pl/page.aspx?id=160.

CHAPTER 3. STRATEGY AND ACTION PLAN ELEMENTS OF THE NATIONAL IMPLEMENTATION PLAN

3.1. Policy statement

The endorsement process of the National Implementation Plan for the Stockholm Convention consisted of three phases:

- Phase I – the endorsement by the intersectoral Steering Committee;
- Phase II – the discussion and approval by the Endorsement Workshop with the participation of the stakeholders;
- Phase III – the endorsement by the Minister of the Environment.

The NIP includes activities resulting not only from the provisions of the Stockholm Convention but also from the European Community legislation and the Polish law.

The international Steering Committee after reviewing the final version of the NIP on 8 October 2004 decided to endorse it taking into consideration the comments submitted by the Committee, and to apply to the Minister of the Environment for initiating the ratification process of the Stockholm Convention.

Around 90 persons interested in POPs issues participated in the Endorsement Workshop, which was held on 15 December 2004 in Warsaw. They represented 65 institutions and organizations, including the involved ministries, field administration, business and scientific research sector and non-governmental organizations. The Workshop participants received an invitation with the full text of the NIP, which enabled them to look in detail into the proposed activities. After discussion the NIP was considered to be prepared in a realistic and comprehensive manner and serves as a good basis for further work on the implementation of the provisions of the Stockholm Convention in Poland.

Therefore, the Minister of the Environment, keeping in mind that this NIP is a kind of follow-up to the "National Strategy for Environmental Protection against Persistent Organic Pollutants", which was approved on 22 December 2002 by the Council of Ministers, decided to endorse the National Implementation Plan for the Stockholm Convention, prepared under the GEF Project, and to use it as a basis for further work leading to the ratification of the Stockholm Convention and implementation of its provisions in Poland (Annex 1A).

The Minister's decision closes the consultation process and is regarded as a political declaration for undertaking action directed at reducing the impact of persistent organic pollutants on the environment and human health.

The aforementioned documents expressing approval for the National Implementation Plan are presented in Annex 1.

3.2. Implementation strategy

3.2.1. Introduction

Diagnosis. The diagnosis of the existing situation in Poland on the basis of the available data is an essential element for taking proper measures aiming at successful implementation of the

provisions of the Stockholm Convention. The review of the findings of the inventory reports and the evaluation of existing major gaps regarding available information and data essential for appropriate implementation of the provisions of the Convention, present a very broad miscellaneous material, which is rather difficult to be further analysed and used in its original form. Therefore a SWOT (*Strengths, Weaknesses, Opportunities, Threats*) analysis has been carried out, based on the results obtained to date. The analysis proved that Poland has good professional, institutional and scientific basis to fulfil the obligations of the Convention. The major obstacles ahead are:

- Insufficient information on the level of environmental and food contamination by compounds containing POPs,
- Low public awareness related to threats caused by POPs,
- Lack of sufficient financial resources to eliminate these substances from the environment.

Table 3.2.1 presents a brief abstract of this analysis.

Identification of information and data gaps. Below are the major gaps in information essential for proper implementation of the Convention, which will be eliminated while executing the NIP.

Lack of sufficient data on POPs releases to different environmental media. A very high level of differentiation in the completeness of obtained inventory data is observed in relation to emissions and releases to different environmental components. It would be necessary to develop a database on sources of unintentional POPs generation that cause contamination of wastewaters and surface waters, and to extend the scope of information on POPs releases from waste produced by the industry, including the energy sector.

Insufficient data on emission factors for environmental releases of POPs from their unintentional production. Emission factors used for inventories of dioxin and furan releases into the air are basically complete and regularly verified by measurements in high temperature processes. They only require slight supplementing, especially with regard to emissions from the biomass and coal combustion in small installations. However, significant supplementing is required for the database on emission factors for PCDD/PCDF unintentional releases into wastewaters. For HCB and PCBs the database on emission factors needs significant supplementing, requiring analytical research for individual processes, including releases into wastewaters, wastes and products. For this purpose, it will be essential to carry out measurements for calculating relevant release factors.

Incomplete information on the amounts of plant protection products containing substances, covered by the Convention, imported in the past. Although complete qualitative data on the composition of imported plant protection products containing these substances is available, there is still lack of data on the quantities of active substances imported this way.

Incomplete databases on PCB-contaminated equipment. Poland has carried out several inventories in selected voivodeships and industry sectors. The first countrywide inventory at a voivodeship level was carried out in 2003, which enabled assessment of the number of equipment requiring decontamination and of the quantities of PCBs and PCB-containing materials. This information will serve as a basis for developing a detailed action plan in this field and for establishing a central and voivodeship-level databases on such equipment and materials. The databases will require further development and regular updating.

Table 3.2.1. The SWOT analysis of possibilities to fulfil the provisions of the Stockholm Convention in Poland

Strengths	Weaknesses
▪ No POPs production and import ▪ Abandoned use of POPs pesticides ▪ Reliable and detailed data on POPs emissions into the air ▪ Emission levels below standards ▪ Satisfactory state of law ▪ Good laboratory back-up ▪ Competent research staff ▪ Sufficiently developed institutional system ▪ Privatisation process favourable for BAT implementation ▪ Significant influence of market instruments, like energy prices, on industrial modernisation ▪ Good technical capacity of companies involved in POPs management	▪ Incomplete data for the assessment of POPs releases into soil, wastewater, solid waste and products ▪ Incomplete data on soil pollution by POPs ▪ Incomplete data on food contamination by POPs ▪ Limited reliability of data on POPs levels in landfilled waste (hazardous, municipal and industrial) ▪ Insufficient data on the number and the state of pesticide landfills ▪ Incomplete data on the composition of obsolete pesticide landfills ▪ Lack of procedures for pesticide landfill elimination ▪ Limited data concerning health hazards caused by dioxins and PCBs ▪ Lack of information about the number and distribution of electrical equipment containing PCBs ▪ Lack of integrated monitoring on POPs levels in humans and the environment ▪ Lack of financial resources for research, monitoring and inventory ▪ Low awareness of the general public and decision makers about the hazards of POPs ▪ Uncontrolled burning of wastes in households ▪ Lack of alternative technologies for decontamination of equipment and treatment of substances and preparations containing POPs ▪ Insufficient human resources in public administration both in terms of numbers and technical skills ▪ Lack of some executive regulations ▪ Lack of certain standards for dioxins, furans, PCBs and HCB in food products and such emission standards for industrial sources
Opportunities	**Threats**
▪ Political will of the Government to solve the POPs problem in Poland, demonstrated, *inter alia*, by the: - National Environmental Policy - National Strategy for Environmental Protection against POPs - National Waste Management Plan ▪ Legislative framework, incl.: - Act – Environmental Protection Law - Act on Waste - Act on International Movement of Waste - Act on Chemical Substances and Preparations - Act on Plant Protection - Act – Water Law - Act on Biocidal Products ▪ Intellectual capacity ▪ Modern laboratories ▪ Active non-governmental organisations	▪ Difficult economic situation ▪ High unemployment rate ▪ Lack of necessary financial resources for inventory and elimination activities ▪ Difficult financial situation of large state-owned enterprises (smelters, mines) ▪ Limited financial and human resources of local self-governments

Insufficient information on waste landfills owned by industrial companies, which used to produce or still produce chloroorganic compounds. There is a complete list of producers of chloroorganic compounds managing their own industrial waste landfills. But, so far no sufficient data on the present state of such waste, and their treatment possibilities have been collected. There is lack of complex data regarding the presence of POPs waste in company-owned landfills and of data on POPs releases from these landfills. The problem is especially important in the case of the Chemical Plant in Jaworzno, where, apart from waste from DDT production, other substances covered by the Convention were also deposited, and where waste disposal has been carried out without any selection.

Scarce data on POPs levels in humans and animals. Measurements of POPs levels in living organisms that have been carried out so far provide too little information for reliable assessment of POPs exposure and related health hazards in Poland, in particular, with regard to exposure to dioxins and furans, and to a greater extent, PCBs. There is a lack of data confirmed by scientific research on on-going transformations in soils of the active substances of pesticides, as well as PCDD/PCDF and PCB levels. Without filling in this gap, an integrated assessment of the situation regarding POPs in Poland, in the context of the implementation of the provisions of the Stockholm Convention, will not be possible.

3.3.2. Policy framework for the NIP

Poland, like many other countries, has already undertaken appropriate steps leading to restrictions in the production and use of the majority of persistent organic pollutants. Detailed information on the matter is presented in Chapter 2 and in a publication prepared within the framework of the present Project entitled "Persistent Organic Pollutants. Vol. I. National Profile – Poland" [47]. Action taken in the 70s for eliminating the production and use of POPs covered by the Stockholm Convention reflects the Polish Government's will for improvement in this field.

The objective of the Convention is consistent with the objectives of the "POLAND 2025 – Long-term Strategy for Sustainable Development" [61]. The superior goal of the socio-economic policy is "*to ensure growth of well-being ... as well as a sense of security*", including also stimulation of development processes, which would least endanger the environment.

Poland's accession to the European Union is strengthening the political will for ratification of the Stockholm Convention by adopting the Accession Treaty, in which Poland as a Member State undertakes the obligation to ratify international agreements and conventions, which are ratified by the European Community. The Community is a Party to the Stockholm Convention since 16 November 2004. In addition to that Poland will be obliged[67] by the provisions of the "Community Strategy for Dioxins, Furans and Polychlorinated Biphenyls" [85] and the Regulation of the European Parliament and of the Council on persistent organic pollutants[68].

[67] Effective for Poland since it became a Member State of the European Union, i.e. since 1 May 2004.

[68] 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; O.J. L 229, 29/06/2004. Effective in Poland since 1 May 2004.

By signing the Stockholm Convention on 23 May 2001, Poland has expressed its political will for the ratification of this Convention.

3.2.3. Principles followed during the preparation of the NIP

The following principles have been followed while preparing the National Implementation Plan for the Stockholm Convention:

- Ensuring compliance with the "National Environmental Policy" and the "Long-term strategy for sustainable development",
- Providing economic efficiency of the proposed actions,
- Taking into consideration the actual economic situation of enterprises,
- Taking into account the participation of NGOs and other social groups,
- Compliance with the legislation of the European Community,
- Providing information to the public,
- Compliance with BEP/BAT.

3.2.4. Criteria and priorities

Criteria. To facilitate the selection of priorities for various actions connected with the implementation of the Stockholm Convention five criteria [24] described below were formulated and endorsed, with their scores, presented in Tables 3.2.4.1 and 3.2.4.2.

***Criterion K-1. Importance for the implementation of the main groups of activities identified by the inventory* process.** This criterion ensures selection of priority actions (mostly of an integrated nature), which will enable the final solution of problems from the point of view of the Stockholm Convention. It is most important for the ultimate elimination of POPs from production, use and for the final treatment of POPs-containing waste.

Criterion K-2. Importance for the implementation of the provisions of the Stockholm Convention. This criterion is used to select priorities from the point of view of their importance under Polish conditions. It is significant for adapting the requirements of the Convention to the Polish conditions with regard to the use of POPs and handling their residues.

Criterion K-3. Suitability for the evaluation of the Stockholm Convention implementation progress. This criterion allows selecting the priorities, which determine the rules for controlling and monitoring activities carried out under the NIP. It promotes activities aiming at creating information compilations for assessing the risks for human health and the environment.

Criterion K-4. Implementation progress to date. This criterion was adopted in order to give preference to undertakings, for which implementation is already considerably advanced, or to

activities executed and conducted systematically, as in the case of emission inventories and prohibitions for the production and use of POPs subject to the Stockholm Convention.

Table 3.2.4.1. Basic criteria with a range of scores assigned to them

Criteria	Symbol	Score
Importance for the implementation of the main groups of activities identified by the inventory process	K-1	60–100
Importance for the implementation of the provisions of the Stockholm Convention	K-2	40–80
Suitability for the evaluation of the Stockholm Convention implementation progress	K-3	30–60
Implementation progress to date	K-4	20–40

Criterion K-5. Additional set of criteria.

Under this set of criteria, deriving from the requirements of the GEF Project, the following issues are taken into consideration:

- the required implementation deadlines,
- the financial requirements,
- the state and requirements of the technical back-up,
- the state of human resources,
- impacts on human health.

Table 3.2.4.2. Scores for the additional set of criteria (K-5)

Deadlines	Financial requirements	Technical back-up facilities	Human resources	Health impacts
v. urgent - 20	high - 5	needed - 10	good - 10	high - 10
urgent - 15	moderate - 10	not needed - 5	sufficient - 5	moderate - 5
not urgent- 10	low - 15		low - 2	low - 2

The use of the above criteria enabled an in-depth analysis, taking into account all significant factors with regard to the provisions of the Convention, the situation in Poland as well as ongoing activities related to POPs subject to the Stockholm Convention. And above all, provided a ranking list of major priorities on the basis of the total scores obtained for analysed problems in a view of different criteria.

Priorities. On the basis of prior determined criteria and assigned ranking described above, and an analysis carried out on the importance of individual problems, a list of 10 priorities has been drawn up, which served as a basis for the planning of activities that are required to be

undertaken during the implementation of the provisions of the Stockholm Convention in Poland. They are as follows:

I. Maintenance of the existing system prohibiting the production, marketing and use of substances and preparations subject to the Stockholm Convention and further development of its control.

II. Elimination from the environment of PCBs contained in currently used and in discarded electrical equipment.

III. Elimination of obsolete pesticides from the environment (including pesticide landfills and stockpiles found in storehouses).

IV. Development of proposals for the improvement of the inventory system of PCDD/PCDF, HCB and PCB releases from industrial processes and from non-industrial sources, including the updating and verification of emission factors.

V. Record keeping on POPs emission sources and identifying waste landfills containing POPs.

VI. Prevention of unintentional emissions of PCDDs, PCDFs and PCBs primarily from most contributing sources.

VII. Taking activities targeted at information exchange, education, communication and public awareness raising with regard to the provisions of the Stockholm Convention.

VIII. Reduction of POPs releases from waste treatment processes.

IX. Sound management of waste from flue gas cleaning and wastewater treatment facilities as well as other POPs-containing waste.

X. Solving the problem of industrial waste landfills contaminated with POPs.

Each priority has a set of activities assigned to it to fulfil the obligations of the Stockholm Convention by achieving the short- and long-term goals that have been set.

3.2.5. Goals to be achieved from the implementation of the Plan

The basic ***long-terms goals* to be achieved by 2015**, providing full implementation of the Stockholm Convention in Poland include:

- Reduction of PCDD/PCDF, PCB and HCB emissions generated unintentionally in processes of fuel and waste combustion, and certain industrial processes by means of applying best available techniques (BAT), in accordance with the IPPC Directive and other technical solutions adequate for that purpose;
- Identification of contaminated sites and their remediation in an environmentally sound manner and further elimination of obsolete pesticide landfills and stockpiles containing POPs, which had not been identified earlier, and other wastes and materials with low concentrations of PCBs, as well as decontamination of the remaining PCB-containing equipment;
- Establishment and maintenance of permanent organisational, scientific, technical and legal conditions required to ensure the highest possible level of implementation of the

provisions of the Stockholm Convention and effective control of POPs releases into the environment in Poland.

***Short-term goals* to be achieved by 2010**, include complex activities enabling achievement of the three long-term goals mentioned above and provide proper assessment of progress in the execution of the NIP. These tasks are as follows:

- Elimination of wastes and stocks of persistent organic pollutants, collected and stored over the years as a result of intentional production, import and use, as well as decontamination of equipment containing PCBs;
- Continuation of the necessary inventorying of POPs, with particular attention to past stocks of pesticides, stocks of PCB-contaminated electrical equipment and oils and industrial landfills of POPs-contaminated waste;
- Attaining such a level of knowledge on releases of PCDDs/PCDFs, HCB and PCBs into waters, soil, waste and chemical products as has already been achieved in relation to atmospheric releases of those substances. This refers mainly to POPs emission and release sources and factors;
- Establishment of an inventory system on POPs emission sources in accordance with the standards of the Pollutant Release and Transfer Registers (PRTRs);
- Development and extension of the monitoring system on POPs circulation in the natural environment and their impact on food products and human health;
- Performing the necessary scope of feasibility studies required to assess properly the environmental effects of the proposed capital investment projects, including the cost/benefit analysis of the:
    - Construction of a decontamination facility for PCB-polluted equipment,
    - Extension of incineration capacities for liquid and solid substances contaminated with POPs,
    - Utilisation of alternative technologies for elimination of POPs in Poland.
- Strengthening educational programmes and public awareness regarding POPs-related issues.

The execution of the above activities and achievement of the goals is a great challenge. However, it is considered possible and socially and economically justifiable, despite certain limitations and significant burdens determined by the situation in Poland. Achievement of short-term goals will provide the basis for achieving long-term goals, which will lead to the protection of human health and the environment against persistent organic pollutants. And this goal is targeted by the Stockholm Convention.

3.2.6. Framework mechanism for NIP management

Management framework. In Poland the Minister of the Environment is responsible for the coordination of tasks resulting from international environmental agreements, including the Stockholm Convention. This duty is executed in cooperation with other ministries within their

competences regarding sectoral issues, and in particular with the Minister of the Economy (Chapter 3.3.1).

Periodical review and assessment of the NIP implementation progress will be carried out by the Minister of the Environment, and the relevant information will be submitted to the Council of Ministers, which is competent to make adequate decisions depending on the situation.

Establishment of a timetable and methods for monitoring the progress of the Convention's implementation and the preparation of relevant reports pursuant to future decisions of the Conference of the Parties to the Stockholm Convention and in compliance with the EC legislation also lies within the competences of the Minister of the Environment. The updating of the NIP, preceded by comprehensive progress evaluation, should take place not more often than every four years. It is assumed the national reports will be submitted to the Conference of the Parties also every four years[69].

Sources of funding. The problem of providing financial resources for the implementation of activities is the most difficult challenge with a view to the need to ensure proper management of the NIP. With regard to the specific nature of different activities the following 5 sources of financing have been distinguished: the state budget, the national environmental target funds (the national, voivodeship, *poviat*-level, *gmina*-level funds for environmental protection and water management, and the EcoFund Foundation[70]), the self-government resources, the private sector resources and foreign assistance funds, especially the EU Structural Funds and the EU Cohesion Fund, and the Global Environment Facility (GEF).

It is expected that the state budget will cover activities undertaken by the central administration; the target funds – activities carried out by the national secretariat for the Convention and expert groups as well as promotion and education, and activities supporting the self-governments in the treatment and elimination of obsolete pesticide wastes and stocks, and supporting local initiatives in the field of public awareness raising. Activities involving capital investments for activities such as the aforementioned elimination and treatment of hazardous waste contaminated with POPs covered by the Convention, will require greater engagement of the system of funds for environmental protection and water management. Also, sources from international assistance and the UE funds may be used for that purpose.

The sources from the private sector and from the Structural Funds and the Cohesion Fund should be used for funding activities targeted at the reduction of unintentional emission of the substances covered by the Convention, connected with POPs waste treatment and the elimination of obsolete pesticide landfills and decontamination of PCB-containing equipment.

The proposed shares of the different financial sources in the implementation of this NIP need approval by the Government. Financing would be subject to the procedures and rules effective for each of the sources specified in Table 3.6.2.

[69] UNEP/POPs/INC.7/19 Format and timing of Party reporting under Article 15.

[70] Pursuant to its mandate its activity ends in 2009.

3.3. Activities, strategies and action plans

3.3.1. Activity: institutional and regulatory strengthening measures

Objectives. The major goal is to approximate the Polish law to the requirements of the Stockholm Convention and to create institutional and organisational basis for fulfilling its provisions by Poland.

Background. Implementation of the NIP requires a management system to be established. Such a system should consist of legal, financial and organisational management subsystems with an institutional backup, functioning on the basis of the existing structures (Chapters 2.2.2, 2.2.4 and 2.1.4). This system should enable effective co-ordination and implementation of the obligations under the Stockholm Convention regarding, both, capital investment projects and activities of non-capital character.

Institutional background. The implementation of the provisions of the Convention does not require establishing any new institutions, but it will only necessitate assigning certain tasks to the existing ones. The existing bodies, institutions and companies are capable of performing all activities specified in this NIP (Annex 3), providing that their scope of duties is extended by POPs-related issues within their competences and regular activities. Below are the major stakeholders involved in the implementation of the Stockholm Convention in Poland.

The *Minister of the Environment* is, *inter alia*, responsible for developing environmental policy and the legal, financial and organisational basis for action in the area of environmental protection. Co-ordination of activities resulting from international environmental agreements, including the Stockholm Convention, also lies within the duties of the Minister, who, in particular, is also responsible for overall supervision of the implementation of this NIP at a national level. The Minister initiates, *inter alia*, activities connected with the development of mechanisms for accelerating the elimination of PCBs from electrical equipment and with the determination of the permissible level of environmental risk. Furthermore, the Minister's tasks include coordination of the implementation of best available techniques (BAT), and supervision of activities connected with the treatment of POPs wastes and stocks, and reduction of POPs emissions from low-output installations.

The *Minister of Economy and Labour* performs tasks connected with the supervision of compliance with the law in force prohibiting the production, marketing and use of substances and preparations covered by the Convention, and of the inventory of equipment containing PCBs. The Minister is also responsible for developing mechanisms stimulating the elimination of PCBs from electrical equipment.

The *Minister of Infrastructure* participates in the co-ordination of activities aimed at reduction of low-emission sources from individual furnaces, through their elimination or modernisation, and emission reduction from road traffic.

In line with the provisions of the relevant legal act[88] the *Minister of Health* is responsible for biological monitoring. The Minister of Health should ensure monitoring of levels of substances subject to the Stockholm Convention in human organisms, especially children and breast-feeding women, and in food products. He should promote studies on human health risk assessment and on safe threshold POPs concentrations.

The *Minister of Agriculture and Rural Development* coordinates activities to develop and issue concentration limits for substances covered by the Convention in soil and agricultural products, and supervises the monitoring of the quality of farmland and foodstuffs as well as maintains a pesticide register and issues permits for the use of pesticides and prohibits the use of dangerous substances in the process of manufacturing food products. Furthermore the Minister cooperates with the Minister of Health in reorganising the biological monitoring system.

The *Minister of Finance* should provide financial resources required for the implementation of the Convention by directing the necessary budgetary funds to the ministries mentioned above responsible for different tasks. The Minister is also responsible for creating mechanisms allowing local governments and economic entities to make use of other sources of funding activities aiming at the reduction of low-emission sources and elimination of unintentional emissions from certain industrial processes.

The *Chief Inspector for Environmental Protection (GIOŚ) together with regional/voivodeship authorities, regional governors (voivodes) and voivodeship inspectors for environmental protection (WIOŚ)*, each within his capacity, are responsible for monitoring concentrations of substances subject to the Stockholm Convention in the environment (air, soil, land, water and bottom sediments). The *Chief Sanitary Inspector* and the *Chief Veterinary Surgeon* should carry out activities connected with monitoring of bioconcentration of POPs in food and feed, as appropriate.

The *Customs Service* ensures compliance with the prohibition of import and export of POPs subject to the Convention.

The *governmental administration and self-governmental bodies* at the regional and local levels within their competences carry out activities targeted at the elimination of POPs from the environment. A special role is assigned to the self-governmental territorial bodies with regard to the promotion of cleaner fuels and BAT in the residential energy sector and with regard to the elimination of obsolete pesticide landfills.

Chemical, metallurgical and power generating *enterprises* as well as waste incineration plants are obliged to modernise their technologies (e.g. by introducing BAT/BEP), aiming, *inter alia*, at the reduction of unintentional generation of POPs. Companies dealing with industrial waste landfills with POPs-containing substances and preparations should prevent releases of these substances into ground water, soil and air.

Organizational background. The Minister of the Environment will have the following organizational system, supporting the implementation of the provisions of the Stockholm Convention, at his disposal:

- *Executive team.* To ensure effective co-ordination of the execution of activities within the scope of political, technical and legal assistance for the implementation of the Convention the Minister of the Environment will assign tasks to his different departments. The Department of International Co-operation will serve as the National Focal Point, expected to cooperate with the Secretariat for the Stockholm Convention and with other Parties to the Convention.
- The *national secretariat for the Convention*, under the supervision of the Department of Environmental Policy, will provide technical assistance for non-capital activities. The Ministry of the Environment has appointed the Institute of Environmental Protection (IOŚ) to play the role of the national secretariat for the Convention. The secretariat shall, *inter alia*, periodically update the strategy and implementation plan, and monitor

compliance with the schedule. Additionally, the secretariat will prepare proposals for necessary activities, which will be submitted to the Minister of the Environment.

Technical issues. Coordination of activities for the implementation of best available techniques (BAT) for POPs, and for the development of environmental techniques and technologies and alternative technologies for POPs is assigned to the Department of Instruments for Environmental Protection at the Ministry of the Environment.

The Chief Inspector for Environmental Protection will be responsible for the development of the State Environmental Monitoring system for the purposes of the Stockholm Convention.

Technical issues. All issues connected with inventories, as required by the Convention (development and verification of emission factors, estimation of emission and release levels) will be conducted by the National Emission Centre (KCIE) of the Institute of Environmental Protection in co-operation with the Chief Inspectorate for Environmental Protection and the Central Statistical Office (GUS).

Information, education and scientific research. Dissemination of information on POPs-related issues and on progress in the implementation of this NIP should be assigned to the Environmental Information Centre, supervised by the Minister of the Environment. However, it will be necessary to adjust its organizational structure to the aforementioned needs and to strengthen its capacities (personnel, facilities and financial resources). The Centre should provide access to data on POPs and circulate such information among decision-makers and the public. Its coordinating role in fulfilling these tasks should be considered as an optimal solution.

Education on POPs should be incorporated into the work programme of the Education and Public Communication Bureau within the Ministry of the Environment and the relevant departments of the Ministry of National Education and Sport (MENiS), whereas research activities shall be performed by institutes and research centres within the framework of the existing financing system for scientific research of the Ministry of Scientific Research and Information Technology (MNiI) and the European Union.

Legal background. The review of the law in force, which was carried out on 2003 (Chapter 2.2.4) allows to conclude, that in principle the Polish legal system does not include any provisions that could make implementation of the Stockholm Convention impossible. Polish environmental law is subject to permanent development, which is connected also with the transposition of the amended EU legislation into the Polish law. The Act[71] determining institutional and organisational framework for the execution of tasks deriving from international movement of waste pursuant to the Community regulations meeting the OECD requirements in this field, can serve as an example.

POPs covered by the provisions of the Stockholm Convention are subject to legal regulations[81] in Poland containing emission standards for the incineration and co-incineration of municipal and hazardous waste with regard to dioxins and furans (0.1 ng/m^3) with 11% of oxygen in flue gases. A special legal mechanism allows annual updating of the levels of charges for the use of the environment (emission/release charges) and fines for non-compliance. Below are the levels obligatory in 2004:

[71] Act of 30 June 2004 on International Movement of Waste (DzU of 2003 No. 191, item 1956).

- Charges for the use of the environment[72], i.e. releases:
  - into the air: for dioxins and furans – 286.39 PLN/kg and for PCBs – 143.19 PLN/kg,
  - into water and soil: for aldrin, dieldrin, endrin and HCB – 93.54 PLN/kg;
- Charges[73] for landfilling waste, soil, ground and oils containing PCBs: 124.33 PLN/Mg;
- Fines for violating conditions for discharging wastewaters to water bodies and to land and soil: 895.13 PLN for 1 kg of PCBs, HCB, DDT and insecticides belonging to the group of chlorinated hydrocarbons [73].

At the present stage, two amendments to the existing acts and 6 new executive regulations to the acts in force would be required to provide a legal basis for full implementation of the provisions of the Convention. The necessary regulatory changes in the Polish law should include:

- An amendment to the Act on Waste to introduce penal responsibility for violating the ban on recycling substances subject to the Stockholm Convention (at present only activities related to PCBs are regulated by the above Act);
- An amendment to the Act – Environmental Protection Law to ensure compatibility of the data collection system on emission sources and other POPs-related issues with the requirements of the EPER and PRTR systems and to establish databases on substances posing particular environmental threat;
- Issuing a regulation to the Act on Chemical Substances and Preparations prohibiting the production, marketing and use of substances listed in Annex A of the Convention;
- Issuing a regulation to the Act – Environmental Protection Law extending the list of substances posing particular environmental threat to include all substances listed in Annex A of the Convention;
- Issuing a regulation under the Act – Environmental Protection Law introducing emission standards for POPs, subject to Annex C of the Convention, from installations causing unintentional production of POPs;
- Issuing a regulation, under the Act – Environmental Protection Law, determining the minimum requirements in relation to POPs emissions, based on best available techniques and best environmental practice, which must be met by new installations referred to in Part II of Annex C of the Convention;
- Issuing a regulation, under the Act – Environmental Protection Law, setting emission standards for individual and municipal heat production facilities;
- Issuing locally effective orders by voivodes, legally binding at a local level, determining permissible types of fuels (gaseous, liquid, solid etc.) and/or types of boilers to be used for fuel combustion processes in energy production by individuals and legal entities operating within the territories of voivodeships concerned.

[72] Statement of the Minister of the Environment of 15 October 2003 on the levels of charges for the use of the environment for the year 2004 (MP of 2003 No. 50, item 782).

[73] Statement of the Minister of the Environment of 21 October 2003 on the levels of fines for non-compliance with the requirements on discharging wastewaters to water bodies or soil, and for exceeding permissible noise levels, for the year 2004 (MP of 2003 No. 50, item 783).

National reports on the implementation of the provisions of the Stockholm Convention will have to be most likely submitted every 4 years and therefore it would be necessary to make this a legal obligation in Poland. These reports should cover releases from all POPs emission sources listed in Annex C, including those, which according to the Polish law in force are not required to obtain integrated permits (as they have not been classified as sources likely to cause significant pollution of the environment as a whole or separately of its different components).

Below are the **14 actions** proposed under **Activity 3.3.1** on regulatory and institutional strengthening measures.

Action A1[74]**.** Enacting an amendment to the Act – Environmental Protection Law.

An amendment to the Act shall include:

a) requirements and procedures for collection of information concerning individual sources of POPs emissions and POPs-related activities.

Performing inventories of emission sources and POPs-related activities, according to the provisions of the Convention (Articles 3.1, 5a, 6.1, 10 and 15), requires a system for collection of information at the level of individual sources to be set up similar to the EPER or PRTR. This obligation should be fulfilled by amending the Act – Environmental Protection Law, which obligates entities making use of the environment to keep records of POPs releases and submit adequate information to the Voivodeship Marshal and to the Voivodeship Inspector for Environmental Protection to be incorporated into the voivodeship database.

This activity is also linked to the following legally binding documents and programmes: Decision of the European Commission 2000/479/EC[75], the EU programme concerning the implementation of the EPER, Kiev Protocol to the Aarhus Convention, the Implementation Programme for the National Component of the EPER, the Act on Access to Public Information, the National Environmental Policy, and the Programme of Public Statistics on POPs Inventories.

b) procedures for developing and maintaining electronic databases on substances posing particular environmental threat.

Preparation of summarized information at a national level regarding substances, which are or will be considered as causing particular environmental threat is essential to present it at an international level. It is particularly important in the context of the development of a report on PCBs for the Conference of the Parties to the Convention and the European Commission. Therefore, a programme on the collection, processing and transmission of data for different substances, including PCBs, from all voivodeships. The existing form of collecting data on PCBs does not allow for their effective and rapid use.

Supervising authority: Council of Ministers.

[74] This task is to be carried out entirely by the key ministry under its statutory activity; it cannot be entrusted to another entity.

75 Commission Decision 2000/479/EC of 17 July 2000 on the implementation of a European Pollutant Emission Register (EPER) according to Article 15 of Council Directive 96/61/EC concerning integrated pollution prevention and control; O.J. L 192, 28/7/2000.

Coordinator - responsible for the preparation of the draft and its consultation: Ministry of the Environment.

Costs[76] and their category: 0.12 mln PLN; baseline costs.

Source of funding: state budget.

Implementation deadline: 2005.

Action A2[74]. Enacting a regulation on the prohibition of production and marketing of substances listed in Annex A to the Stockholm Convention.

This regulation will ensure compliance with Article 3.1, and Annexes A and B of the Convention. Article 31.1 of the Act on Chemical Substances and Preparations authorises the minister responsible for the economy to enact such a regulation. The use and marketing of certain controlled substances are already subject to the provisions of the Act on Plant Protection[7] and the executive regulation[14] issued as required by that Act. According to these documents the use of substances listed in Annex A of the Convention as components of pesticide preparations is prohibited in Poland.

Coordinator – responsible for the action: Minister of Economy and Labour.

Costs and their category: 0.12 mln PLN; baseline costs.

Source of funding: state budget.

Implementation deadline: 2005.

Action A3[74]. Enacting a regulation aimed at adding the rest of the substances from Annex A of the Stockholm Convention to the Polish legally binding list of substances posing particular environmental threat.

Execution of this activity will fulfil the provisions of Article 3.1 of the Convention and the National Strategy for Environmental Protection against Persistent Organic Pollutants. Article 160.2 of the Act – Environmental Protection Law and the Regulation of the Minister of the Environment[11] incorporate into the list the following POPs: PCBs, aldrin, dieldrin, endrin and DDT. There is still a need for adding the rest of the controlled substances to the list of substances posing particular environmental threat by enacting a regulation on the basis of Article 163 of the above mentioned Act.

Coordinator – responsible for the action: Minister of the Environment.

Costs and their category: 0.12 mln PLN; baseline costs.

Source of funding: state budget.

Implementation deadline: 2005.

[76] Costs are divided into two categories: baseline costs - indirectly related to the Stockholm Convention resulting from other activities and regulations, and incremental costs - directly oriented on the fulfilment of the provisions of the Stockholm Convention in Poland (Chapter 3.6).

Action A4.[4] Enacting a regulation on POPs emission standards for certain types of installations.

Pursuant to Article 5c of the Convention, Parties should reduce their unintentional releases from the processes and source categories specified in Annex C. To follow this provision it is necessary to set appropriate emission standards for these sources. Article 145.1 of the Act – Environmental Protection Law authorises the minister responsible for the environment to issue a relevant regulation. These emission standards should be incorporated into the restructuring programmes of relevant industrial sectors.

Coordinator – responsible for the action: Minister of the Environment.

Costs and their category: 0.12 mln PLN; baseline costs.

Source of funding: state budget.

Implementation deadline: 2006.

Action A5[74]**.** Enacting a regulation determining minimum requirements as to emissions resulting from BAT, which should be met by new installations referred to in Annex C, Part II of the Stockholm Convention.

Article 206.2 of the Act – Environmental Protection Law authorises the minister responsible for the environment to determine, by regulation, minimum requirements resulting from BAT, if this is required to ensure a uniform approach to the procedure of granting integrated permits throughout the country. The obligation to apply BAT, as stipulated by Article 5 of the Convention to new emission sources, defined by Part II of Annex C to the Convention, should be fulfilled not later than 4 years after the Stockholm Convention becomes effective.

Coordinator – responsible for the action: Minister of the Environment.

Costs and their category: 0.12 mln PLN; baseline costs.

Source of funding: state budget.

Implementation deadline: 2006.

Action A6[74]**.** Enacting a regulation determining the requirements, which the heating equipment used in individual or municipal housing must comply with.

This regulation will allow fulfilling the provisions of Art 5c of the Convention concerning the reduction of PCDD/PCDF unintentional emissions from individual stoves and boilers. Criteria specified in Article 166 of the Act – Environmental Protection Law may be determined in more detail by a regulation on detailed requirements needed to comply with the provisions of the above article, *inter alia*, regarding emission standards for heating equipment. On this basis the Minister of Economy and Labour may, among others, set POPs emission parameters for the above heating installations. These standards will be incorporated into regional air protection programmes.

Coordinator – responsible for the action: Minister of Economy and Labour

Costs and their category: 0.12 mln PLN; baseline costs.

Source of funding: state budget.

Implementation deadline: 2007.

Action A7[74]**.** Enacting an amendment to the Act on Waste introducing penal responsibility for the violation of the prohibition on recycling of substances covered by the Stockholm Convention, other than PCBs.

The Stockholm Convention does not impose obligations in this respect. However, Article 72 of the Act on Waste[5] establishes penal responsibility and determines sanctions for the violation of the prohibition of PCB recycling and incineration, as well as the ban of mixing them with used oils during collection or storage. Preparing and enacting sanctions shall strengthen the legal effectiveness of that ban, and shall comply with the provisions of Article 13 of the Regulation of the European Parliament and the Council on POPs committing the Member States to enact sanctions for the violation of the provisions of that Regulation in their national legislation.

Supervising authority: Council of Ministers.

Coordinator – responsible for the preparation of the draft and its consultation: Ministry of the Environment.

Costs and their category: 0.06 mln PLN; baseline costs.

Source of funding: state budget.

Implementation deadline: 2005.

Action A8[74]**.** Issuing regulations at the voivode level determining the type or quality of fuels admitted for use within the given voivodeship or in parts of it.

The intention of such regulations is to create additional mechanisms to reduce unintentional emissions of PCDDs/PCDFs and PCBs, pursuant to Article 5c of the Convention, in regions that may be concerned. According to Article 96 of the Act – Environmental Protection Law voivodes are entitled to determine the type or quality of fuels admitted for use within the territory of their voivodeships or their parts, in order to prevent negative impacts on the environment or cultural heritage. Voivodes may set rules for enforcing this duty, by issuing appropriate regulations for those involved in activities connected with emissions of pollutants generated in fuel combustion processes used for energy production. The regulations will be implemented through regional air protection programmes.

Coordinator – responsible for the action: voivodes concerned.

Costs and their category: 0.12 mln PLN; baseline costs.

Source of funding: state budget.

Implementation deadline: 2006.

Action A9[74]**.** Ratification of the Stockholm Convention.

Poland signed the Convention[43] on 23 May 2001. In order to become a Party to this Convention procedures aiming at its ratification should be initiated. In accordance with Article 89 of the Constitution of the Republic of Poland ratification must be admitted by parliamentary act.

Supervising authority: Council of Ministers.

Responsible body for the preparation of the application for the ratification of the Convention along with its justification and for intergovernmental consultations: Minister of the Environment.

Responsible body for submitting the ratification instrument: Minister of Foreign Affairs.

Costs and their category: 0.06 mln PLN; incremental costs.

Source of funding: state budget.

Implementation deadline: 2005.

Action A10. Participation of representatives of Poland in the work of the subsidiary bodies of the Stockholm Convention.

Representatives of Poland shall take part in ordinary and extraordinary meetings of the Conference of the Parties to the Convention, and in any seminars, workshops and working group meetings that may be required for the achievement of the objectives of the Convention. In line with the provisions of the Convention (Article 19) the Conference of the Parties is to establish a subsidiary body – the Persistent Organic Pollutants Review Committee, consisting of government-designated experts. Participation of Polish delegates in the above bodies will also enable the implementation of relevant provisions of the Aarhus Protocol to the LRTAP Convention, and the Basel, Rotterdam and Helsinki Conventions.

Supervising authority: Minister of the Environment and Minister of Economy and Labour.

Implementation body: experts designated by the above ministers.

Costs and their category: 0.06 mln PLN annually (total: 0.36 mln PLN); incremental costs.

Source of funding: state budget.

Implementation period: 2005–2010.

Action A11. Operation of the national secretariat for the Stockholm Convention.

Formal appointment of the national secretariat for the Convention is required. So far the Institute of Environmental Protection has played its role. It is necessary to work out the scope of responsibilities and terms of references for the national secretariat, pursuant to Articles 9.3 and 9.4 of the Convention, and to provide resources for its ongoing operation.

Supervising authority: Minister of the Environment.

Implementation body: national secretariat for the Convention.

Costs and their category: 0.05 mln PLN annually (total: 0.35 mln PLN); incremental costs.

Source of funding: National Fund for Environmental Protection and Water Management.

Implementation period: 2004–2010.

Action A12. Coordination of cooperation between the Stockholm, Basel, Helsinki and Rotterdam Conventions at the national level.

Developing cooperation in the undertaking of activities in connection with the implementation of the provisions of the aforementioned conventions in Poland will contribute to the achievement of the targets set, enabling effective use of national capacities and avoiding duplication of work. The goal is to take advantage of the experiences and achievements of the individual conventions in the national activities undertaken to improve the state of the environment, e.g. for the establishment of necessary destruction and transformation levels for POPs waste, prevention of POPs generation, implementation of environmentally sound methods of treatment and elimination of POPs, in line with Article 6.2 of the Stockholm Convention.

Supervising authority: Minister of the Environment.

Implementation body: secretariats for the conventions.

Costs and their category: 0.02 mln PLN annually (total: 0.12 mln PLN); incremental costs.

Source of funding: National Fund for Environmental Protection and Water Management.

Implementation period: 2005–2010.

Action A13. Cooperation and coordination of activities concerning BAT.

According to Article 6 of the EU Regulation[68], Member States are obliged to use new or modernised equipment or installations, being a source of releases of substances specified in Annex III, taking into consideration the provisions of the IPPC Directive.

The aim of this action is to review and prepare guidelines, pursuant to Article 5d of the Convention, to assess existing technologies in the context of fulfilling BAT requirements regarding POPs. Activities concerning BAT promotion will also meet the provisions of the Aarhus Protocol.

Supervising authority: Minister of the Environment.

Implementation body: relevant departments of the Ministry of the Environment, national secretariat for the Convention.

Costs and their category: 0.12 mln PLN annually (total: 0.60 mln PLN); baseline costs.

Source of funding: state budget.

Implementation period: 2006–2010.

Action A14. Operation of an Information Centre on POPs within the Environmental Information Centre.

The existing Environmental Information Centre (CIOŚ), which is supervised by the Minister of the Environment, will additionally play the role of an Information Centre on Persistent Organic Pollutants in cooperation with the national secretariat for the Convention. The Centre's tasks will include:

- passive provision and active distribution of information on POPs, particularly on PCBs, HCB, dioxins and furans;

- supporting communication between the public and decision makers, government officials and international organisations

This will allow fulfilling the obligations of Articles 5a and 10.2 of the Convention and meet the requirements of the "National Strategy for Environmental Education", the "Second National Environmental Policy" (e.g. point 17), and the "Environmental Education Programme" of the National Fund for Environmental Protection and Water Management.

Activities of the Centre should take account of the legal requirements laid down not only by the Stockholm Convention, but also by: the Aarhus Convention with the Kiev Protocol, the Act – Environmental Protection Law, and the Act on the Protection of Confidential Information.

Supervising authority: Minister of the Environment.

Implementation body: Environmental Information Centre, national secretariat for the Stockholm Convention.

Costs and their category: 0.2 mln PLN annually (total: 1.0 mln PLN); baseline costs.

Source of funding: state budget 70%, NFOŚiGW 20%, foreign assistance 10%.

Implementation period: 2006–2010.

Work plan for different actions under Activity 3.3.1:

Type of action	Action implementation schedule						
	2004	2005	2006	2007	2008	2009	2010
Legislative		A1; A2; A3; A7; A9	A4; A5; A8	A6			
Institutional and other	A11	A10- A12	A10-A14	A10-A14	A10-A14	A10-A14	A10-A14

Coordinator of the entire activity: Minister of the Environment.

Total implementation costs of the activity (2004–2010): 3.39 mln PLN.

Baseline costs: 2.5 mln PLN.

Incremental costs: 0.89 mln PLN.

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

Generally, since the end of mid seventies of the 20th century no substances subject to Annex A of the Stockholm Convention, have been produced or used intentionally in Poland (Chapter 2.3.1). For this reason this Activity is not relevant for Poland.

The Minister of Agriculture and Rural Development pursuant to the provisions of the Act on Plant Protection[7] issues permits allowing the placing of pesticides on the market and maintains an accessible register of these products.

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

Objective. Elimination of obsolete pesticide stockpiles and POPs pesticide wastes containing DDT and substances listed in Annex A of the Convention.

Background. Due to the lack of sufficient and reliable information on the quantities of obsolete pesticides deposited in landfills and stockpiles in storehouses (see Chapter 2.3.5) the State Geological Institute (PIG) at the request of the Minister of the Environment carried out inventory work and research on the impact of landfills on the terrestrial and aquatic environment [72]. The inventory results obtained proved that in single cases migration of the groundwater into the landfills was possible, and this could be the case for small landfills, which are not properly managed and must be eliminated in the first place. Detailed information on the obsolete pesticide landfills (including their coordinates in the GIS network) can be found in the national database on pesticide landfills maintained by PIG.

The closing down of the State Farms (PGR) caused that most of the obsolete pesticide landfills lost their owners. Therefore, at present *poviat* governors *(starosta)* are responsible for their elimination. The removal of existing obsolete pesticide landfills in Poland is an ongoing activity. They are successively being eliminated in different voivodeships. Until mid 2004 110 landfills containing 8635 Mg of pesticide waste have been eliminated [45]. In certain voivodeships pesticide landfills have already been completely eliminated or are about to be fully disposed of (Podkarpackie, Lubuskie, Lubelskie, Świętokrzyskie). In several voivodeships however, a significant number of these landfills still exists (Warminsko-Mazurskie, Wielkopolskie, Mazowieckie) and tendering has already been undertaken for their elimination. Pesticide stockpiles from the storehouses of the Regional Directorates of State Forests have also been eliminated.

The likely total number of obsolete pesticide landfills still awaiting to be eliminated in Poland is estimated at 166, with approximately 5000 Mg of waste deposited there (Annex 4). The experience gained to date from the elimination of landfills so far indicates that the quantity of waste disposed of in landfills is likely to rise by 50%. This is connected with insufficient knowledge on the actual construction materials used for landfills and with the possibility of finding land pits, which have been filled with obsolete plant protection products. Furthermore, the estimates should take account of complete lack of data on 27 existing landfills and the possibility of identifying further landfills in the future. Therefore, it has been assumed in the NIP that the amount of app. 7500 Mg of obsolete plant protection products is likely to require elimination.

The NIP identifies a priority list of the obsolete pesticide landfills requiring urgent elimination. Priority was given to the most dangerous pesticide landfills, which should be eliminated due to geological and environmental reasons, and those within the voivodeships, which have not yet launched their elimination programmes or in which elimination was not sufficiently advanced (Table 3.3.3.1). The identified priority list will serve as a basis for financing these activities from national or foreign assistance funds. It should be considered in the local (*poviat*) environmental protection plans. It is also important for issues connected with the elimination of closed hazardous waste landfills and hazardous waste treatment to

remain in the priority list of the National Fund for Environmental Protection and Water Management.

Table 3.3.3.1. Priority list of obsolete pesticide landfills for elimination in different voivodeships on the background of the total number of these landfills requiring elimination

Voivodeship	Priority list for eliminating obsolete pesticide landfills	Number of pesticide landfills	Estimated total waste quantity [Mg]
Dolnośląskie	1. Lisowice, 2. Iwiny, 3. Składowice, 4. Kraśnik Górny.	9	110*
Kujawsko-Pomorskie	1. Lisie Kąty, 2. Piastowo, 3. Bożacin, 4. Grębocin, 5. Rogowo, 6. Mąkoszyn, 7. Małe Pułkowo, 8. Dąbrowa, 9. Sokołowo.	18	802*
Lubelskie	-	0	0
Lubuskie	-	0	0
Łódzkie	1. Strobów, 2. Sepno–Radonia, 3. Jadwinówka, 4. Pawłówek, 5. Wola Przerębska, 6. Wielgomłyny, 7. Dobków, 8. Bogumiłów.	31	245*
Małopolskie	1. Klonów I, 2. Klonów II, 3. Libiąż.	17	49*
Mazowieckie	1. Grójec, 2. Garlino–Krzywonoś, 3. Dobieszyn, 4. Kamion I, 5. Kamion II, 6. Zajezierze.	12	342
Opolskie	-	2	36
Podkarpackie	-	0	0
Podlaskie	-	7	80

Voivodeship	Priority list for eliminating obsolete pesticide landfills	Number of pesticide landfills	Estimated total waste quantity [Mg]
Pomorskie	-	4	180
Śląskie	1. Cieszyn-Gułdowy, 2. Zabrze-Grzybowice.	9	125*
Świętokrzyskie	-	0	0
Warmińsko-Mazurskie	1. Warlity Wielkie, 2. Kotkowo, 3. Nowe Guty, 4. Konopki Wielkie, 5. Cierzpięty, 6. Lipowa Góra 7. Rywociny	16	953
Wielkopolskie	-	13	777
Zachodniopomorskie	1. Osiek Drawski, 2. Osina, 3. Dalewo, 4. Dobra, 5. Kołomąć, 6. Gołańcz Pomorska, 7. Drzonowo, 8. Wiewiecko, 9. Modrzewo, 10. Więcław, 11. Kurzycko, 12. Smolnica.	28	1299*
Total	**51 priorities**	**166**	**4998 Mg***

* Amounts of pesticides deposited in places, about which no information is available, have not been included in the total estimate.

At present the elimination of obsolete pesticide landfills is carried out under the supervision of the State Geological Institute and the funding institutions, but the companies involved in this activity are not required to obtain permission or to provide evidence of their competences in the field of elimination and remediation procedures for contaminated sites after the removal of pesticide waste. Therefore, the next step will be to elaborate guidelines enlisting requirements concerning documenting the elimination of pesticide landfills, giving instructions on technical investigations to be performed before and after the elimination of landfills and on providing information to the public on the effects and costs of the operation. The guidelines should include requirements regarding preliminary and executive documentation for activities connected with the elimination of pesticide landfills and stocks, and other landfills.

Due to the improvement of the national capacity to eliminate pesticide landfills in 2003 enabling domestic treatment of all pesticide waste found in Poland, which is significantly less costly (Annex 10), export of such waste should be suspended.

The **2 actions** proposed within **Activity 3.3.3** are described below.

Action B1. Preparation of guidelines for the elimination of obsolete pesticide landfills, including its monitoring, and required documentation.

These guidelines shall determine the requirements and rules of implementation of tasks connected with the elimination of landfills and stockpiles of obsolete pesticides pursuant to the provisions of environmental protection and monitoring procedures to control the process. The guidelines will include requirements regarding preliminary and final documentation for the elimination of waste and remediation of sites as well as the technical outline of disposal, the scope of work and preliminary cost estimates and requirements connected with the use of best environmental practice (BEP) for the elimination of landfills. Introducing the guidelines will satisfy the provisions of Articles 5,7 and 11 of the Convention and of the National Waste Management Plan and regional[77] waste management plans.

Supervising body: Minister of the Environment.

Executing institution: appointed by the Minister of the Environment.

Costs and their category: 0.01 mln PLN; baseline costs.

Source of funding: foreign assistance.

Implementation deadline: 2004/2005.

Action B2. Elimination of landfills and stocks of obsolete pesticides.

This action satisfies the provisions of Article 6 d) of the Convention and of the "State Environmental Policy", the National Waste Management Plan and Directive 79/117/EEC[78]. The execution of this action will lead to the ultimate elimination of obsolete pesticide landfills with parallel treatment of POPs waste, decontamination of soil and improvement of the quality of ground waters and remediation of former storage sites. Details on the justification of estimated costs are presented in Annex 10.

Investor: voivodes, *starostas (poviat* governos*)*.

Executing institution: entities appointed by the investor.

Costs and their category: 59.25 mln PLN (8.46 mln PLN annually in 2004–2009 and 8.49 mln PLN in 2010); baseline costs.

Source of funding: national environmental funds (50%) and foreign assistance (50%).

Implementation period: 2004–2010.

[77] Regional waste management plans meaning plans for voivodeships, *poviats*, and communes (*gminas*).

[78] Council Directive 79/117/EEC of 21 December 1978 prohibiting the placing on the market and use of plant protection products containing certain active substances; O.J. L 33, 8/02/1979.

Work plan for different actions under Activity 3.3.3:

Type of action	Action implementation schedule						
	2004	2005	2006	2007	2008	2009	2010
Organisational	B1						
Services	B2	B2	B2	B2	B2	B2	B2

Coordinator of the entire activity: Minister of the Environment.

Total implementation costs of the activity (2004–2010): 59.26 mln PLN.

Baseline costs: 59.26 mln PLN.

Incremental costs: 0 mln PLN.

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)

Objective. Elimination from use of PCBs in electrical equipment and other articles, and decontamination of PCB-polluted equipment.

Background. In line with the provisions of the Stockholm Convention the final elimination of PCB-containing equipment from use should take place by 2025, whereas the Polish law as well as the EU legislation[25] (Chapter 2.3.2):

- Allow the use of PCBs in the operating equipment until 30 June 2010 with its gradual decontamination and elimination;
- Require decontamination of PCB-containing equipment in a manner safe for human health and the environment, and special labelling prior to its further use;
- Impose an obligation to eliminate and treat PCB waste by 2010 at the latest.

One of the goals of the present NIP is to urgently accomplish these tasks. According to the estimates carried out within the framework of the Project [23], it is necessary to eliminate PCB-contaminated equipment and waste, as presented in Table 3.3.4.1. However, it should be taken into consideration that the figures specified are only estimates. It was the first inventory carried out and many enterprises were not prepared well enough for it and provided overestimated values. Furthermore, the inventory did not cover individuals, who are obliged to submit such information only since 2004.

Table 3.3.4.1. Inventory of PCB-contaminated waste and equipment

Item no.	Specification	Mass [Mg]
1.	PCB-contaminated oil	3 000
2.	Capacitors and other equipment requiring elimination	1 380
3.	Transformers and other equipment requiring decontamination	5 652

In order to eliminate PCBs and decontaminate PCB-containing equipment it is necessary to:

- Carry out further inventories of PCBs and equipment containing at least 5 dm^3 of PCB-contaminated liquids with concentrations of at least 0.05%,
- Determine the requirements for the development and control of voivodeship databases on PCB equipment and stockpiles,
- Implement a Target Contracted Project, "National system for the collection and disposal of phased-out electric and electronic equipment"[79] with regard to technologies and dismantling techniques for the phased-out equipment, as well as waste treatment technologies,
- Prepare and disseminate guidelines on the replacement and decontamination of electrical equipment containing PCBs pursuant to the provisions of the EU Directive[80],
- Establish and organize a collection system for phased-out small electrical equipment from households intended for dismantling and decontamination (the required number and location of such collection stations will depend on the evaluation results on the number of equipment still in operation),
- Eliminate PCB-contaminated liquid waste (oils) in existing domestic hazardous waste incinerators,
- Decontaminate equipment after its PCBs content has been drained out. This will apply to:
    - transformers both withdrawn from use and still in use after the cooling oil has been replaced, by means of the existing installation of the ANWIL Company; the installation can be extended, as required,
    - capacitors containing over 5 litres of oil, constituting the outfit of capacitor stations at power distribution stations - either decontamination abroad or building a decontamination facility in Poland. The latter option requires economic analysis.

Taking into account the present poor involvement of enterprises in the elimination and decontamination of their equipment and oils containing PCBs financial mechanisms should be developed and put in place to encourage enterprises to undertake such activity. Financial support has proved to be an effective mechanism for enterprises, which decided on solving the problem earlier. It would enable gradual elimination of PCBs preventing the accumulation of tasks in the period closer to the deadline required by the Polish law, i.e. 2010.

Actions on awareness raising for enterprises to provide information on the possibilities for obtaining support from the European Union financial resources to earlier eliminate PCBs oils and decontaminate PCB-containing equipment, were taken.

It will be necessary to carry out a study on the possibilities of identification and phasing out of equipment containing over 0.05 dm^3 of PCB constituents at concentrations >0.005%, and to evaluate the level of PCB releases into the environment from such sources, and assess the risks. The results obtained will serve as a basis for a feasibility study covering activities leading to the elimination of equipment from use and special treatment of its waste.

[79] To be completed by 2004.

[80] Directive 2002/96/WE of the European Parliament and of the Council of 27 January 2003 on waste electrical and electronic equipment; O.J. L 37 13/2/2003.

Reports submitted to the Voivodeship Marshal concerning waste records contain information also on PCB waste. This information is made available for the purposes of waste management in *poviats* (districts) and *gminas* (communes). Annual voivodeship reports submitted to the Minister of the Environment to prepare national reports, pursuant to the requirements of the Community Regulation[68], will also be based on the data collected.

The **6 actions**, described below, have been proposed under **Activity 3.3.4.**

Action C1. Monitoring of data on PCB sources and quantities.

The aim of this action is to control and update information on PCB-containing equipment still in use. Enterprises and private persons are obliged to carry out annual inventories of PCBs, from 2002 and 2003, respectively. Voivodeship inspectorates for environmental protection will use the information on PCBs supplied to voivodes during their routine inspections in enterprises. The inspections/controls will aim at the monitoring of progress in eliminating PCBs in an environmentally sound manner and will review compliance with the regulations concerning PCBs in force (e.g. related to labelling). These activities satisfy the provisions of Article 6 of the Convention, the Regulation[26] on handling PCBs, Directive 96/59/EC[25] and the national and regional waste management plans.

Supervising body: Chief Inspector for Environmental Protection.

Control institution: Environmental Protection Inspection.

Costs and their category: 0.2 mln PLN/year (total of 1.4 mln PLN); baseline costs.

Source of funding: state budget.

Implementation period: 2004–2010.

Action C2. Development and management of voivodeship databases on PCBs.

To fulfil the provisions of the National Waste Management Plan and the Regulation[26] information received by the voivode on the quantities of PCBs, on PCB-containing equipment and on PCB treatment or elimination methods should be collected in electronic databases. The Minister of the Environment should lay down the conditions for maintaining such databases by voivodes (Action A1). A uniform structure of the database in all voivodeships will facilitate the use of data, which is currently available only at a voivodeship level, for PCB management and for preparing national reports.

Supervising body: Minister of the Environment.

Executing institution: voivodes.

Costs and their category: 2.0 mln PLN in 2005 +0.8/year (total: 6.0 mln PLN); baseline costs.

Source of funding: state budget.

Implementation period: 2005–2010.

Action C3. Review of the possibilities for the identification and inventory of other articles containing over 0.005% of PCBs

The aim of the review according to Annex A part II paragraph f of the Convention, is to investigate the possibilities of assessing hazards posed by other sources of PCB releases into

the environment and elaboration of guidance which allows to identify equipment and appliances containing PCBs and draw conclusions regarding their elimination

Supervising body: Minister of the Environment.

Executing institution: appointed by the Minister of the Environment.

Costs and their category: 0.12 mln PLN; incremental costs.

Source of funding: state budget.

Implementation deadline: 2007.

Action C4. Organization of collection stations for small appliances and PCB-containing waste (> 0.005%) that are in the possession of individuals.

Pursuant to the National Waste Management Plan each commune (*gmina*) should have collection points for hazardous waste. Selected collection points (one for each voivodeship) should serve as voivodeship collection stations to ensure safe and environmentally sound collection of waste and small appliances containing PCBs.

Supervising body: voivodes.

Executing institutions: appointed chiefs of *gminas (wójt)*, mayor or city presidents.

Costs and their category: 3.2 mln PLN; incremental costs.

Source of funding: self-governmental budget (30%), WFOŚiGW (70%).

Implementation deadline: 2007.

Action C5. Speeding-up of PCB-elimination and decontamination of PCB-containing equipment.

The obligation to eliminate PCBs from electrical equipment derives from Article 6 of the Convention and from the National Waste Management Plan as well as from the aforementioned Regulation[26], Directive 96/59/EC[25] and Directive 2002/96/EC[80]. The national law imposes an obligation on the holders of PCBs to eliminate PCB waste by 2010. The holders have to cover the elimination costs themselves. The execution of this obligation observed to date proves that PCB holders should take advantage of foreign assistance funds and environmental funds (see Action C6). Additional financial mechanism will speed up the decontamination process of PCB-containing equipment. Rational performance of this task requires the use of a financial mechanism encouraging enterprises to undertake such measures. Furthermore, depending on future needs, the possibility of setting up an additional installation for the decontamination of PCB small-sized equipment will be taken into consideration (see project description under 3.3.17.3).

Initiating body: Minister of the Environment.

A body responsible for managing assistance funds: NFOŚiGW.

Institutions interested in eliminating PCBs: voivodes, enterprises.

Costs and their category: 0.02 mln PLN; baseline costs.

Source of funding: state budget.

Implementation deadlines: 2004 and 2009.

Action C6. Decontamination of PCB-containing equipment and treatment of solid and liquid PCB-contaminated waste.

The national regulations impose an obligation to eliminate and treat PCB waste as well as to decontaminate PCB-polluted equipment by its holders by 2010. A financial mechanism referred to in Action C5 can be used for that purpose, which includes, *inter alia*, the possibilities for obtaining resources from the European Union Structural Funds for activities under Action 2.4 of the Sectoral Operational Programme on Strengthening Competitiveness of Enterprises (SPO-WKP), through NFOŚiGW, which serves as an Implementation Agency. Action C6 consists of three groups of tasks: the elimination of liquid waste containing PCBs, treatment of capacitors containing PCBs, and the decontamination of transformers containing PCBs in Poland using the national technological capacities (see Annex 6).

Responsible body: the holders of PCB-containing equipment.

Implementation body: appointed by the holder of equipment.

Costs and their category: 36.88 mln PLN (5.26 annually in 2004–2009 and 5.32 in 2010); baseline costs.

Source of funding: business sector (25%), EU assistance (75%).

Implementation period: 2004–2010.

Work plan for different actions under Activity 3.3.4:

Type of action	Action implementation schedule						
	2004	2005	2006	2007	2008	2009	2010
Organisational	C1; C5	C1;C2	C1;C2	C1;C2;C3;C4	C1;C2	C1;C2; C5	C1;C2
Services	C6	C6	C6	C6	C6	C6	C6

Coordinator of the entire activity: Minister of the Environment.

Total implementation costs of the activity (2004–2010): 47.62 mln PLN.

Baseline costs: 44.3 mln PLN.

Incremental costs: 3.32 mln PLN.

3.3.5. Activity: production, import and export, use, stockpiles and wastes of DDT (Annex B chemicals)

DDT is not produced or used in Poland (Chapter 2.3.3). Specific actions related to the elimination of existing landfills contaminated with DDT are described in Chapter 3.3.3.

3.3.6. Activity: register for specific exemptions and the continuing need for exemptions

In 2000 Poland requested for specific exemption, according to Article 4 of the Convention, for the use of PCBs in electrical equipment and HCB as a closed system site limited

intermediate. The relevant wording has been included in the list of requests from countries for specific exemptions (document UNEP/POPS/CONF/INF/Rev.2 of 22 May 2001).

The results of the recent survey carried out under the GEF Project (Chapter 2.3.7) proved that in a view of the actual situation requesting for specific exemptions is unjustifiable. Therefore, Poland is planning to withdraw its request.

3.3.7. Action plan: measures to reduce releases from unintentional production

Objective. The aim of this activity is to take action, pursuant to Article 5 of the Convention, to reduce unintentional releases of PCDDs/PCDFs, HCB and dioxin-like PCBs formed in certain industrial processes.

Background. Unintentional production of substances listed in Annex C to the Convention takes place during the processes of chlorinating hydrocarbons in the chemical industry, in metallurgical processes and in processes of fuel combustion in energy production as well as during thermal treatment (incineration) of waste and in secondary aluminium production. Other processes causing PCDD/PCDF emissions in Poland are of marginal importance.

The major source of dioxin emissions to the air from fuel combustion processes is the housing (residential) sector using individual heating boilers and stoves for cooking purposes, fired by solid fuels (coal and biomass). The problem of PCDD/PCDF emission from these sources is considered important, not only due to its significant share (over 36% of the whole emission level of dioxins and furans in Poland), but also due to the generally unsound conditions of incineration and co-incineration of household waste in furnaces and stoves.

Apart from the above emission sector other major polluters, as far as PCDD/PCDF releases into the air are concerned, are metallurgical processes, particularly iron ore sintering processes and steel oxidation converting as well as secondary aluminium production. In the latter case specific substances enhancing intensive PCDD/PCDF releases are used.

Emissions of PCDDs/PCDFs, HCB and PCBs are formed in the regeneration of catalysts used by the petroleum industry are negligible in the total Polish emission level.

The energy sector remains under special supervision through environmental regulation enforcing the use of protection measures (emission control), especially flue gas dust removal and desulphurisation processes, which prevent, to a great extent, PCB, HCB and PCDD/PCDF releases into the air. Concentration levels in residues (fly ash) have not been inventoried so far. However, in this case no protection facilities (APCS) can be used, nor releases reduced, as incineration processes are conducted under optimum conditions.

Reduction of unintentional emissions from industrial production. Due to unintentional emissions of PCDDs/PCDFs, HCB and PCBs into the air in metallurgical processes there is a need to improve technological processes, particularly processes of preparing iron ore sintering. Despite that PCDD/PCDF emissions from those processes are lower in Poland than in the Western European countries, efforts aimed at their further gradual reduction are required. The scope of these activities depends on the actual emission levels. Investigations carried out in Poland revealed considerably lower levels of such releases than might be expected by using the UNEP Toolkit [84].

Metallurgical processes that require additional analyses include processes conducted in oxygen converters, which have not been tested in detail in Poland so far. This issue should be taken into consideration in the government's restructuring plan for the metallurgy sector as a task for the future owners of enterprises from this sector.

Production of aluminium as another important source of POPs emissions. During the recovery of aluminium in the process of refining the aluminium scrap chlorine compounds are used. Theoretically, these processes should be accompanied by significant releases of PCDDs/PCDFs into the air. Also, production of secondary copper may generate dioxin emission. Therefore, it would require more thorough analysis of these processes to determine in detail the emission levels of these substances into the air and their releases with production wastes.

In the case of industrial processes in steel metallurgy and secondary aluminium and copper production action should be taken to:

- Determine through chemical analyses the actual emission levels of PCDDs/PCDFs, PCBs and HCB,
- Compare the results obtained through measurements with the emission factors, measurement data from other countries and BAT requirements with respect to the entire processes,
- Facilitate the decision-making process in industrial enterprises on the necessity to take action to reduce POPs releases into the environment,
- Develop and implement PCDD/PCDF, PCB and HCB emission reduction plans in individual enterprises.

Actions mentioned above will be possible to carry out when emission standards for these processes are introduced. If the standards are exceeded entities will be obliged to prepare and implement action plans to reduce emission levels to the standards in force.

Reduction of unintentional emissions from combustion processes in individual household furnaces. Individual and municipal heating systems in Poland are considerable emission sources of gaseous, particulate and aerosol pollutants containing substances of mutagenic, teratogenic and carcinogenic characteristics, including dioxins and furans adversely affecting the environment and human health - and "consuming" coal in technically unjustifiable quantities.

The reduction rate of PCDD/PCDF emissions from these sources is affected, *inter alia,* by: the composition of fuel used (through increasing the share of gaseous and liquid fuels), the development of central heating and hot water supply systems for the public, the modernization of individual heating systems, and the use of biomass.

Despite the fact that solid fuels represent the major source of primary energy in Poland, so far no regular studies on PCDD/PCDF emissions have been carried out for different types of technologies and techniques of energy production, which would enable detailed evaluation on the levels of amounts released.

To eliminate PCDD/PCDF emissions from individual households an update of the low emission sources' action plan is required, targeted at POPs emission reduction from fuel burning in the residential sector of individual households not covered by the central heating system. It should determine in detail proposals of activities aimed at the reduction of POPs releases into the air and into the residues from burning solid fuels.

Implementation of the above action plan should be addressed, most of all, to areas of high health risks caused by the presence of PCDDs/PCDFs adsorbed on the surface of particulate matter (*inter alia* in the area of Upper Silesia).

One of the fastest ways of introducing economically and environmentally feasible solutions for obtaining primary energy in individual and municipal heating systems is the introduction of "coal and biomass clean combustion technologies".

Introducing environmentally clean fuels, such as gas and electric power, would be the most effective solution. However, social, economic and technical reasons would not allow for replacing coal for clean sources of energy within a short period of time. Considering the present legislative, social and economic circumstances, the undertaking of initiatives concerning the elimination of emissions from residential areas from solid fuel combustion should in future take into account multi-targeted measures (i.e. investment, legislative, organisational and educational activities).

Undertakings requiring capital investment in Poland that affect reduction of furan and dioxin emissions, should be aimed at:

- Energy saving and reduction of emission by replacing old heating systems of low efficiency with new high energy efficiency installations with appropriate certificates of compliance with existing standards and cooperating with specially adjusted flue gas cleaning systems. By replacing "conventional" furnaces or boilers with retort boilers it is possible to achieve over 80% [73] reduction in PCDD/PCDF emissions, reducing other pollutants at the same time;
- Saving energy and fossil fuels by introducing "clean" biomass, which does not accumulate POPs, or other sources of renewable energy, as well as BAT/BEP in energy production;
- Energy saving by applying thermal modernisation of residential houses and automation of local heat distribution systems;
- Utilisation of local surpluses of heat energy by linking local systems with central heating networks;
- Placing on the market of adequately processed and standardized coal assortments, low-emission coal fuels and biomass through involvement of small and medium enterprises in their production.

Additionally, the possibility of promoting "cleaner" fuels, especially gas instead of coal, should be considered. This could be done by introducing financial programmes for individual heating systems.

The **11 actions** proposed within **Action plan 3.3.7** are described below.

Action D1. <u>Analysis of technologies used in economic activity with regard to their emission levels.</u>

The expected output would be a list of technologies applied in those types of economic activities that are responsible for the largest share in the national emission, and a review of emission levels for specific technologies and perspectives for emission reduction. The results obtained will be used in the public statistics programme and for emission inventories as well

as for reporting purposes as required by UN ECE/EMEP and the European Environment Agency (EEA).

Supervising body: Minister of the Environment.

Implementation body: appointed by the Minister of the Environment.

Costs and their category: 0.03 mln PLN every 3 years (total 0.06 mln PLN); baseline costs

Source of funding: NFOŚiGW.

Implementation deadline: 2006 and 2009.

Action D2. Evaluation of possibilities for applying alternative methods for PCDD/PCDF emission reduction.

This evaluation will be based on gathering a wide range of materials concerning alternative processes, including those used in individual household and municipal heating systems, and on an expert assessment of the possibilities for their use in Poland. This action will fulfil the provisions of the EC Strategy for Dioxins, Furans and PCBs and the provisions of Article 6 of the Convention.

Supervising body: Minister of the Environment.

Implementation body: appointed by the Minister of the Environment.

Costs and their category: 0.12 mln PLN; baseline costs.

Source of funding: foreign assistance.

Implementation deadline: 2004/2005.

Action D3. Verification of air emission factors for PCDDs/PCDFs.

This action covers verification of emission factors for PCDDs/PCDFs from secondary non-ferrous metal production, sintering processes in metallurgy and industrial and hazardous waste incineration. Changes of technologies, modernisation of facilities and plants has a considerable impact on emission factors. Therefore such factors should be subject to systematic verification. This is particularly valid for the major emission sources. Estimates of emission from some sources show a high level of uncertainty. During the last 2 years activities to improve data quality on PCDD/PCDF emissions were performed by supplementing or updating a number of air emission factors for PCDDs/PCDFs. It would be advisable to carry out measurements of dioxin emissions from metal production processes and from the incineration of industrial and hazardous waste. Verification of emission factors will fulfil the provisions of Articles 5 and 11 of the Convention and its results will be used in the public statistics programme on inventory of emissions of air pollutants and for reporting purposes as required by UN ECE/EMEP and the European Environment Agency.

Supervising body: Minister of the Environment.

Implementation body: National Emission Centre.

Costs and their category: 0.06 mln PLN every 3 years (total 0.12 mln PLN); baseline costs.

Source of funding: NFOŚiGW.

Implementation deadline: 2005 and 2008.

Action D4. Analysis of POPs emission reduction in the metallurgy sector.

The review will cover POPs emission levels from processes of secondary aluminium production and steel production in oxygen blown converter furnaces and production of iron ore sinters. The share of this group of processes amounts to 8.5% of total POPs emissions in Poland. The smelting installations emitting POPs are quite numerous. The aim of Action D4 is to determine the actual emission through chemical analyses. The results obtained will be compared with emission factors from different countries and with BAT. This analysis will be the basis for developing the POPs emission reduction plan. This action is connected with the programme for restructuring and privatising the metallurgy industry. In the case of secondary production of aluminium such a programme has not been elaborated. It would be necessary to perform a detailed analysis of technologies to apply them in aluminium processing to replace the chloroorganic compounds still used in some plants. The situation with emissions from this sector has improved considerably, but its share in the total POPs emission is still significant.

Supervising body: Minister of the Environment.

Implementation body: Institute of Environmental Protection in Warsaw, Kraków University of Technology, Metallurgy and Mining Academy in Kraków.

Costs and their category: 0.2 mln PLN; baseline costs.

Source of funding: foreign assistance funds (DANCEE resources).

Implementation deadline: 2004/2005.

Action D5. Verification of HCB and PCB air emission factors.

Changes in technology and modernisation of industries have a considerable impact on the change of emission factors, especially with reference to the main emission sources. Therefore, it is particularly important to regularly update the emission factors, especially for major emission sources. In 2001 the emission factors for HCB were verified at sinter plants and cement factories by measuring HCB emission levels. It is necessary to elaborate national emission factors for secondary metal production. During the last 2 years some emission factors were amended and modified on the basis of measurement data. It is important in the case of PCBs to update the inventory data on electrical equipment containing PCBs (capacitors, transformers), and to verify emission factors for HCB in the secondary production of non-ferrous metals (particularly copper). These factors will be used for public statistics programme on the inventory of emissions of air pollutants and for reporting as required by UN ECE/EMEP, the European Environment Agency and the Stockholm Convention (pursuant to its Articles 5 and 11).

Supervising body: Minister of the Environment.

Implementation body: National Emission Centre.

Costs and their category: 0.06 mln PLN every 3 years (total 0.12 mln PLN); baseline costs.

Source of funding: NFOŚiGW.

Implementation deadline: 2006 and 2009.

Action D6. Review of emission factors for the major sources and determination of total and per unit costs.

The review of the scope of verification of emission factors will cover the major types of emission sources. The results obtained will allow to:

- Indicate emission sources and the scale of measurements essential for the verification of emission factors;
- Prepare a tender specification for carrying out measurements;
- Evaluate the total costs and costs of single measurements.

These emission factors will be used for public statistics programme on the inventory of emissions of air pollutants and for reporting as required by UN ECE/EMEP, the European Environment Agency and the Stockholm Convention (pursuant to its Articles 5 and 11).

Supervising body: Minister of the Environment.

Implementation body: National Emission Centre.

Costs and their category: 0.02 mln PLN every 3 years (total 0.04 mln PLN); baseline costs.

Source of funding: NFOŚiGW.

Implementation deadline: 2006 and 2009.

Action D7. Periodical verification of release factors for PCDDs/PCDFs, HCB and PCBs.

There is insufficient data available on release/emission factors in the case of releases of PCDDs/PCDFs, HCB and PCBs into surface waters, soil, products and wastes/residues. Therefore, it would be necessary to collect more information in this matter. These emission factors will be used for inventorying releases of pollutants into the environment under the public statistics programme and for reporting as required by UN ECE/EMEP and the European Environment Agency.

Supervising body: Minister of the Environment.

Implementation body: National Emission Centre.

Costs and their category: 0.06 mln PLN every 5 years; baseline costs.

Source of funding: NFOŚiGW.

Implementation deadline: 2006.

Action D8. Updating the inventory outline for POPs releases into surface waters and soil.

Review of the necessary scope of information on POPs release sources and on the levels of releases, which is necessary to prepare reports submitted to the Conference of the Parties to the Stockholm Convention in compliance with its Article 5.

Supervising body: Minister of the Environment.

Implementation body: National Emission Centre.

Costs and their category: 0.06 mln PLN every 3 years (total 0.12 mln PLN); incremental costs.

Source of funding: NFOŚiGW.

Implementation deadline: 2006 and 2009.

Action D9. Review of compliance of installations with emission standards and estimation of the costs of control measurements.

The aim of the review is to evaluate compliance with the national law in force in relation to the required scope of measurements in line with the Regulation of the Minister of the

Environment[81]. The results obtained from the analysis will be the basis for: indicating emission sources and the scale of measurements to be performed; preparing tender documents concerning measurements with a description of methods and estimated average costs, including costs of measurements in installations and costs of chemical tests; determining and analysing representative costs. The results will be used for public statistics programme on the inventory of emissions of air pollutants and for preparing inventory reports as required by UN ECE/EMEP, the European Environment Agency and the Stockholm Convention (Article.5).

Supervising body: Minister of the Environment.

Implementation body: appointed by the Minister of the Environment.

Costs and their category: 0.02 mln PLN every 3 years (total 0.04 mln PLN); baseline costs.

Source of funding: NFOŚiGW.

Implementation deadline: 2005 and 2008.

Action D10. Analysis for the justification of introducing or amending POPs emission standards.

The aim of this action is to review international emission standards as well as to justify and determine the scope of introducing additional emission standards to the Regulation of the Minister of the Environment[81]. Furthermore, an analysis for the justification of introducing a ban for open combustion of certain materials/products.

Supervising body: Minister of the Environment.

Implementation body: appointed by the Minister of the Environment.

Costs and their category: 0.02 mln PLN; baseline costs.

Source of funding: NFOŚiGW.

Implementation deadline: 2005.

Action D11. Guidelines on the development of voivodeship databases on sources of POPs releases into the environment from technology processes.

The guidelines will help in establishing electronic registers of POPs emissions released from technological processes. This will enable the implementation of tasks specified in the National Environmental Policy and in regional environmental plans and meet the provisions of Articles 5 and 6 of the Convention.

Supervising body: Minister of the Environment.

Institution preparing the guidelines: appointed by the Minister of the Environment.

Institution implementing the guidelines: voivodes.

Costs and their category: 0.02 mln PLN; baseline costs.

Source of funding: NFOŚiGW.

Implementation deadline: 2005.

[81] Regulation of the Minister of the Environment of 4 August 2003 on emission standards for installations (DzU of 2003 No. 163, item 1584).

Work plan for different actions under Action plan 3.3.7:

Action implementation schedule							
Year	2004	2005	2006	2007	2008	2009	2010
Action	D2 D4	D3; D9; D10; D11	D1; D5; D6; D7; D8		D3; D9	D1; D5; D6; D8	

Coordinator of the entire activity: Minister of the Environment.

Total implementation costs of the activity (2004–2010): 0.92 mln PLN.

Baseline costs: 0.8 mln PLN.

Incremental costs: 0.12 mln PLN.

3.3.8. Activity: measures to reduce releases from stockpiles and wastes

Objective. The objective of this activity is to reduce releases of persistent organic pollutants and POPs-containing substances from stockpiles and wastes pursuant to Article 6 of the Stockholm Convention.

Background

Industrial waste landfill of ORGANIKA–AZOT Chemical Works in Jaworzno. As a result of former production and depositing of waste in the ORGANIKA–AZOT Chemical Works' owned landfill, DDT concentration levels in the soil, ground waters and surface waters locally exceed permissible levels. DDT and its congeners are released from landfilled waste (Chapter 2.3.5). Analyses of mine waters from the JAWORZNO Coal Mine and leachates from the RUDNA GORA industrial waste landfill of the ORGANIKA–AZOT Chemical Works also demonstrate the presence of POPs.

To eliminate releases of POPs from waste it is necessary to take action on eliminating pollution from soil and ground waters and to evaluate best technology options for the removal of these pollutants to ensure effective protection against adverse effects of the landfill (Action F3. in Chapter 3.3.9).

At the present stage, the landfill in Jaworzno is planned to be sealed-up. The proposed technical remediation solutions for the landfill and contaminated areas surrounding the ORGANIKA–AZOT Chemical Works are aimed at:

- Cutting off the inflow of precipitation water and ground water to the mass of deposited waste by creating local depression for ground waters and sealing the landfill with a top-cover to isolate the contaminated areas,
- Catching the polluted waters. In this case additional feasibility study of costs and environmental effects will be required taking account of:
  - limited treatment (water oxidation process with about 80% efficiency[82]);
  - high-efficiency treatment – 99.99% (SCWO[83], GPCR[84], SET[85] processes);

[82] Potential Applicability of Assembled Chemical Weapons Assessment Technologies to RCRA Waste Streams and Contaminated Media EPA-542-R-00-004 August 2000 www.epa.gov.clu-in.org.

- building of phyto-remediation stations (within the plant's site) and a phyto-remediation barrier around the landfill.

Alternative treatment technologies for POPs waste and stocks. Combustion processes are the most frequently used treatment methods for hazardous substances within the Polish waste management system. This is relevant, in particular, to substances containing or contaminated with persistent organic pollutants subject to the Stockholm Convention.

Industrial plants operate mostly incineration installations for chloroorganic compounds that are also capable of incinerating substances covered by the Convention.

Incineration is the most often used treatment method for hazardous waste containing organic compounds of industrial or natural origin. The higher the heat value of the waste, the more effective this method is, meaning smaller expenditures for additional conventional fuel and greater benefits from obtained heating energy. These benefits compensate to a great extent the rising costs of exhaust gas cleaning, enforced by more rigorous standards for the purification of these gases. However, when the amount of waste to be treated is high, causing significant releases of pollutants into the air despite stringent requirements, and the heat value of the waste is low, then new technologies, which do not generate POPs and other pollutants, are put to use, replacing incineration.

Alternative solutions become profitable as opposed to combustion technologies when pollution concentrations in the waste are low, the heat value is low and the amount of homogeneous waste is high. Generally, the costs of installations (expressed per capacity unit) for alternative technologies are the same or approx. 10% higher than that of incineration, whereas maintenance costs are app. 20% lower (as in the case of GPCR[84] technologies).

In order to reduce POPs emissions from treatment processes of waste containing POPs or substances known as precursors of POPs synthesis in technical processes, it is necessary to introduce new, non-thermal destruction methods for the irreversible transformation of POPs and technologies that prevent synthesis and further releases of these substances into the environment. Such a need is particularly relevant to waste generated in processes in which unintentional synthesis and POPs releases take place through gaseous emissions or wastewater. Such a need is also identified in relation to sewage sludge from biological treatment of wastewater, bottom sediments from rainwater sedimentary tanks, sediments from watercourse purification (including excavations from the deepening of channels and ports) which are the largest secondary sources of POPs releases into the environment. These technologies, in particular bio-remediation and phyto-remediation, are essential for soil and ground water clean-up operations, specifically for treatment of residues after the elimination of obsolete pesticide landfills. The following treatment methods are most frequently used for POPs:

- Bio-remediation used for wastewater treatment and soil clean-up; the relatively low cost of the method is its significant advantage;

[83] SCWO - Super Critical Water Oxidation, Foster Wheeler Development Corporation, al._ahluwalia@fwc.com; General Atomis' SCWO Technology, General Atomics dan.jensen@gat.com.

[84] GPCR Gas Phase Chemical Reduction, ELI Eco-Logic Inc., WoodlaS@eco-logic-intl.com.

[85] SET™ Solvated Electron Technology Commodore Advanced Sciences, mjones@commodore.com.

- Chemical POPs decomposition methods based on transformation of organic compounds of chlorine into inorganic salts of chlorine and hydrocarbons[84/85]; the cost of the process varies between 400 and 800 USD/Mg of waste;
- Phyto-remediation applied for the clean-up of POPs contaminated sites, and also areas along road transport routes where permanent releases of, *inter alia*, PCDD/PCDF take place and where remediation should be an on-going process;
- Oxidation of POPs in the aquatic environment – (SCWO process[83]), which is more often used for treating significant amounts of waste with low POPs concentrations. It is used primarily for sewage sludge from wastewater treatment plants, in which rainwater is the main source of POPs, and for surface water bottom sediments. This process allows for 80% reduction of pollutants. Costs for sewage or sediment treatment do not exceed 70–80 USD/Mg and the cost for the setting up of such an installation is expected to be app. 10–20 million PLN.

Management of sewage sludge should be the subject of greatest concern taking into account the great volume of such waste and its negative environmental impact. Due to air emission problems it is expected that direct incineration of such sludge will be restricted and its agricultural use abandoned due to serious environmental and health hazards. Furthermore, facing the development of new wastewater treatment plants depositing sludge in landfills becomes more problematic. The obligation to regulate this issue derives from the provisions of the Stockholm Convention and also from European Union regulations. Under these circumstances it is necessary to consider the possibility of building a sewage sludge treatment facility. A network of such installations should fully eliminate other less environmentally friendly disposal methods for sewage sludge and surface water bottom sediments contaminated with POPs. Present technological capacities allow fully to solve the problem in relation to sewage sludge contaminated with POPs. However, such solutions mean higher costs. Application of the SCWO[83] process is considered to be the most favourable.

Other POPs treatment processes, described in technical literature [27, 36], neither comply with the basic requirement of the Convention demanding irreversible transformation of these substances, nor have sufficient references for their use in practice.

So far Poland has not undertaken research on the possibilities of incorporating alternative technologies into industrial management practices for waste containing POPs. In view of the country's needs regarding POPs waste and residue management it should be taken into consideration that appropriate processing facilities should be developed for:

- Decontamination of electrical equipment, especially capacitors containing PCBs,
- Treatment of POPs waste,
- Bio-remediation and phyto-remediation of sites.

Building of an underground landfill could be an alternative method for solving the problem of PCB-containing capacitors, however, it is not accepted by the Convention and the cost of such a facility is estimated at 200 million PLN. Thus, this option is economically not effective in comparison with the exporting of capacitors for treatment abroad. Another option under consideration is adapting a Cement Plant REJOWIEC to PCB solid waste treatment. Currently, there are no further analyses performed to estimate the costs of such an investment.

In case a decision is made on the need to decontaminate PCB-containing equipment with the use of alternative technologies, application of the GPCR technology seems to be both

economically and environmentally most efficient. This process of PCB reduction by hydrogen is carried out at temperatures around 850–900°C with the presence of water steam. Poland should evaluate the possibility of applying alternative treatment methods to waste showing lower PCDD/PCDF release factors. This evaluation would include:

- Collection of information on alternative processes and preparation of an expertise determining the requirements of their use in Poland;
- Assessment of the national infrastructure and environmental and economic factors in relation to alternative waste treatment methods aiming at PCDD/PCDF emission reduction;
- Organisational and economic analysis of POPs waste management including cost estimates for different treatment technologies with a cost-effect analysis (in terms of compliance with environmental standards);
- Assessment of technical requirements in the field of POPs treatment technologies in the context of multilateral environmental agreements (MEAs), EU legislation and national law;
- Proposals for alternative solutions preventing unintentional formation of POPs in certain technology processes.

Within the NIP a technical report on alternative technologies, which may be considered for treatment of waste or substances contaminated with POPs, will be elaborated. This report will also include conclusions and suggestions concerning justification of the application of these technologies in Poland. It will be limited only to technologies likely to be used in relation to substances subject to the Convention. All the information gathered there may also be relevant to other chloroorganic compounds, as several processes would effectively eliminate chlorine from organic compounds other than POPs. The report will also indicate cases for which the technologies under scrutiny may be used. This analysis should provide conclusions and recommendations for action to be included in the National Waste Management Plan.

However, one should bear in mind that all known and applied alternative waste treatment methods, apart from bio-remediation and phyto-remediation of soils, are significantly less effective economically than the conventional methods based on thermal processes.

The **5 actions** proposed under **Activity 3.3.8** are described below.

Action E1. Review of technology processes in which POPs wastes are generated.

The review will present the causes for POPs releases and exhaust gas and wastewater treatment methods as well as treatment methods for waste produced during these processes. This action allows to implement the National Environmental Policy and regional environmental protection plans more effectively. The results obtained will be the basis for preparing guidance on BAT/BEP.

Supervising body: Minister of the Environment.

Implementation body: appointed by the Minister of the Environment.

Costs and their category: 0.06 mln PLN; baseline costs.

Source of funding: NFOŚiGW.

Implementation deadline: 2005.

Action E2. Guidelines on the principles of managing POPs waste generated as by-products from technology processes.

This action is aimed at the elaboration of guidelines for designing and operating installations (BAT), in which POPs are generated as by-products. An analysis of the need for developing an integrated system for the collection and treatment of POPs wastes produced in technical processes will be required under this Action. Guidelines will help to fulfil relevant obligations of the National Waste Management Plan, regional waste management plans and the provisions of Articles 5, 6, 9 and 10 of the Convention.

Supervising body: Minister of the Environment.

Implementation body: appointed by the Minister of the Environment.

Costs and their category: 0.12 mln PLN; baseline costs.

Source of funding: NFOŚiGW.

Implementation deadline: 2005.

Action E3. Evaluation of the possibilities of applying alternative waste treatment methods in Poland.

This evaluation should comprise technical and economic analysis to justify introducing these methods into practice in co-operation with potential future operators. Such an action is planned under the National Waste Management Plan and it will allow to fulfil the provisions of Article 6 of the Convention.

Supervising body: Minister of the Environment.

Implementation body: appointed by the Minister of the Environment.

Costs and their category: 0.06 mln PLN; baseline costs.

Source of funding: NFOŚiGW.

Implementation deadline: 2006.

Action E4. Stabilization of waste in the ORGANIKA–AZOT industrial waste landfill in Jaworzno.

The aim of the action is to seal up an area of around 14 ha of the landfill and to develop a depression drainage (app. 2.5 km long). For details see background above and project description in Chapter 3.3.17.1.

Initiating body: Minister of the Environment in consultation with the Silesian Voivode.

Control authority: Environmental Protection Inspection.

Responsible body: ORGANIKA–AZOT Chemical Works.

Implementation body: appointed by the Chemical Works.

Costs and their category: 17.0 mln PLN; incremental costs.

Source of funding: business sector (25%), foreign assistance (75%).

Implementation deadline: 2007.

Action E5. Installation for waste treatment based on alternative technology.

The aim of the action is to set up an installation based on a POPs oxidation process under aquatic conditions. The operation of this installation will reduce emissions of POPs from

waste treatment processes, and will allow safe management of waste from flue-gas cleaning, wastewater and sludge treatment. A detailed description of this action is presented in Chapter 3.3.17.2.

Supervising body: Minister of the Environment.

Implementation body: investor.

Costs and their category: 15.0 mln PLN; incremental costs.

Source of funding: own sources (25%), foreign assistance (75%).

Implementation deadline: 2009.

Work plan for different actions under Activity 3.3.8:

Action implementation schedule							
Year	2004	2005	2006	2007	2008	2009	2010
Action		E1;E2	E3	E4		E5	

Coordinator of the entire activity: Minister of the Environment.

Total implementation costs of the activity (2004–2010): 32.24 mln PLN.

Baseline costs: 0.24 mln PLN.

Incremental costs: 32 mln PLN.

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

Objective. The goal of the strategy is to develop procedures facilitating identification of POPs found in unidentified landfills and in equipment still in use (concerns PCBs).

Background. The problem of identifying landfills and wastes containing POPs has been described in Chapters 2.3.5, 3.3.3. and 3.3.8. The on-going identification activities carried out on the basis of available documentation and field controls resulted in the updating of the list of existing obsolete pesticide landfills, which is presented in Annex 4. However, it is expected that there is still a number of landfills that are likely to be identified in the future, finding them would rather be a coincidence. Due to significant costs of such investigation and low probability of finding unknown landfills regular survey in this field is not planned.

Plant protection products based on POPs have been produced in Poland in four chemical plants. According to the information obtained from the managerial staff of these plants POPs are not used in the present production processes. The formerly generated POPs waste, in the form of used packages for the active substances, waste from cleaning installations and the premises are accumulated in small quantities in the industrial waste landfills at the sites of the former producers, i.e. the Chemical Works ORGANIKA–AZOT in Jaworzno, the ANWIL Company in Włocławek and the Nitrogen Plant in Tarnów–Mościce. Therefore these landfills should be subject to permanent control as far as releases to neighbouring ground waters are concerned in order to obtain data on the actual level of POPs releases.

Moreover, POPs waste are very likely to be found also in landfills of at least three other chemical plants (the Organic Industries ROKITA in Brzeg Dolny, the Chemical Works GAMRAT and the Chemical Works in Nowa Sarzyna), but this information requires verification by setting up periodical monitoring.

Identification of articles still in use mainly applies to PCBs. According to the law in force all electrical equipment containing PCBs are specially labelled (Chapter 2.3.2). This duty lies upon their holders.

The **4 actions** proposed under **Strategy 3.3.9** are described below.

Action F1. Assessment of the presence of POPs in selected industrial waste landfills.

This will require detailed specification of information and complementary data obtained from chemical companies through questionnaires on the condition of the stored production wastes contaminated with POPs. This assessment will satisfy the provisions of Article 6a) of the Convention and the National Waste Management Plan as well as regional environmental protection plans.

Supervising body: voivodes.

Control authority: Environmental Protection Inspection.

Responsible body: appointed by GIOŚ.

Costs and their category: 0.1 mln PLN; baseline costs

Source of funding: NFOŚiGW.

Implementation deadline: 2005.

Action F2. Preparation of guidelines on permanent monitoring of POPs-containing industrial landfills, which so far did not prove to cause POPs releases.

Investigations concerning POPs releases into aquatic environment from industrial waste landfills likely to contain POPs that were carried out so far did not reveal such releases (except for the ORGANIKA–AZOT Chemical Works). These landfills require permanent supervision by setting up control wells for testing ground water contamination at the landfill site and within its vicinity. Preparation of guidelines will help in establishing operational monitoring of these landfills (Chapter 3.3.16).

Supervising body: Minister of the Environment.

Implementation body: appointed by the Minister of the Environment.

Costs and their category: 0.1 mln PLN; incremental costs.

Source of funding: NFOŚiGW.

Implementation deadline: 2005.

Action F3. Risk assessment of the ORGANIKA–AZOT Chemical Works' industrial landfill.

Evaluation of the ORGANIKA–AZOT Chemical Works' industrial waste landfill as a source of POPs hazard will cover the characteristics of POPs waste from the former production of the Chemical Works with the specification on production periods and construction study landfill control systems, geological conditions with an indication of possible POPs contamination routes and endangered areas. The assessment results will serve as a starting point for analysing the technical methods for reducing the adverse effects caused by the

landfill (e.g. through stabilization of the waste mass, reclamation or elimination of the landfill to eliminate POPs releases into the environment) by taking account of environmental, economic and social issues. The results obtained will serve as a basis for decision makers for deciding on the implementation of an optimal solution and for applying for foreign assistance funds, e.g. from the EU, GEF, the World Bank. Action F3 results from the National Waste Management Plan and the regional plan for Śląskie (Silesian) Voivodeship, and is in conformity with Article 6 of the Convention.

Control authority: Environmental Protection Inspection.

Responsible body: ORGANIKA–AZOT Chemical Works.

Implementation body: appointed by the Chemical Works.

Costs and their category: 0.14 mln PLN; baseline costs.

Source of funding: business sector (25%), foreign assistance (75%).

Implementation deadline: 2005.

Action F4. Establishing a database on treatment technologies, including alternative solutions, for POPs waste generated as by-products in technology processes.

The database will serve as a tool for decision makers and enterprises (businessmen) for deciding on new installations, taking into consideration the environmental and economic process efficiency of the treatment methods used for POPs waste from flue-gas cleaning and wastewater treatment.

Supervising body: Minister of the Environment.

Implementation body: appointed by the Minister of the Environment.

Costs and their category: 0.12 mln PLN; baseline costs.

Source of funding: NFOŚiGW.

Implementation deadline: 2005.

Work plan for different actions under Strategy 3.3.9:

Action implementation schedule							
Year	2004	2005	2006	2007	2008	2009	2010
Action		F1; F2; F3; F4					

Coordinator of the entire activity: Minister of the Environment.

Total implementation costs of the activity (2004–2010): 0.46 mln PLN.

Baseline costs: 0.36 mln PLN.

Incremental costs: 0.1 mln PLN.

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

Detailed actions regarding PCB-contaminated equipment are proposed under Chapter 3.3.4.

3.3.11. Strategy: identification of contaminated sites (Annex A, B and C chemicals) and remediation in an environmentally sound manner

Issues connected with the identification of contaminated sites are presented in Chapters 2.3.5 and 3.3.9, and partly in Chapters 2.3.1, 2.3.2, 2.3.3 and 2.3.4 with regard to bottom sediments from Odra and Wisła Rivers and Włocławski Reservoir. Actions connected with the remediation of contaminated sites are included in Chapters 3.3.3, 3.3.8 and 3.3.9.

3.3.12. Activity: facilitating or undertaking information exchange and stakeholder involvement

Objective. The aim of this activity is to establish a system of information exchange on POPs at national and international levels.

Background

Legal basis for access to and exchange of information. Pursuant to the provisions of the Convention, Parties should provide public access to and update information on POPs, as well as promote and disseminate all available information regarding persistent organic pollutants. Information on POPs may be circulated within the existing system of information dissemination (Chapter 2.3.8).

Information exchange. The exchange of information shall apply to information significant in terms of: (a) reduction or elimination of production, use and releases of POPs, and (b) potential risks for humans and the environment, including information on accompanying economic and social costs.

In line with the provisions of the Stockholm Convention, information on health and safety of humans and the environment is not regarded as confidential. However, Parties that exchange information, under this Convention, will protect any confidential information as mutually agreed. In Poland protection of certain information subject to confidentiality is regulated by a special Act[86].

To initiate the exchange of information, it should first be obtained from different level administration bodies and entities from outside the administration and then should be adequately inventoried. Information on POPs may be distinguished as: information on pollutants, on release and emission processes, on technologies applied, on health and environmental threats and on substances alternative to POPs. It is necessary, in compliance with the Stockholm Convention, to:

- Further develop the POPs emission inventory system,

[86] Act of 22 January 1999 on the Protection of Confidential Information (DzU of 1999 No. 11, item 95; of 2000 No. 12, item 136, No. 39, item 462; of 2001 No. 22, item 247, No. 27, item 298, No. 56, item 580, No. 110, item 1189, No. 123, item 1353, No. 154, item 1800; of 2002 No. 74, item 676, No. 89, item 804, No. 153, item 1271; of 2003 No. 17, item 155; of 2004 No. 29, item 257).

- Establish a system for gathering information on POPs other than on emissions.

For the purposes of *international information exchange* the following tasks of the national focal point for the Convention can be distinguished:

- Preparation of information on activities performed under the Convention and for the purposes of the Conference of the Parties,
- Taking account of the provisions of Article 9, paragraph 2 of the Convention when signing and implementing bilateral agreements,
- Preparation and regular updating of a list of state authorities involved in similar activities on other international forums.

The *exchange of information at a national level*, similarly to that at the international level, should be based on emission data and other relevant information (non-emission data).

The key role in these activities in relation to information concerning emissions and releases of POPs should be assigned to the National Emission Centre (KCIE) at the Institute of Environmental Protection, and with reference to non-emission information - to the Environmental Information Centre (CIOŚ) at the Ministry of the Environment.

The scope of duties of the existing Environmental Information Centre should be extended and the following actions undertaken:

- Inclusion of POPs issues and information on POPs by collecting and disseminating non-emission information on POPs,
- Assigning CIOŚ the task of maintaining a central database on information regarding the use of the environment,
- Establishment of a joint electronic system supplying the Centre's information database with other Internet data resources owned by other institutions and organizations, with links to information on emissions and releases made available by CIOŚ and other institutions,
- Preparation by the CIOŚ and regular updating of tables of competences, which would include public administration bodies and other entities entitled to carry out tasks on behalf of the public administration,
- Linking, in terms of their functions, the activities of CIOŚ with selected activities carried out by the Information Centre on Environmental Education of the National Fund for Environmental Protection and Water Management,
- The possibility of delegating certain tasks connected with the distribution and dissemination of environmental information on POPs to non-governmental organizations.

The non-emission information on POPs includes, *inter alia*:

- Information on risk assessment and threats connected with POPs, including information in the form of labelling products and substances containing POPs,
- Information on reducing health related risks connected with the presence of POPs in the environment,
- Results of monitoring and research activities,
- Information encouraging elimination of POPs or restricting their use,

- Information about integrated projects on combating pests and diseases in agriculture,
- Information on economic and social effects of the elimination or restriction of the use of POPs and the reduction of their releases and emissions,
- Information on POPs substitutes and risk assessment estimates concerning the impacts of such substitutes on the environment and human health as well as information on economic and social effects of their application,
- Information about producers of POPs substitutes,
- Information on best available techniques (BAT) concerning POPs,
- Information on best environmental practices (BEP) for POPs,
- Information about public administration bodies and other institutions on their competences and responsibilities regarding POPs-related issues (so called competence tables as an instrument facilitating public access to information).

As potential sources of information on POPs, among the available ones, the following registers should be taken into account:

- Publicly accessible registers of hazardous substances, lists submitted to environmental protection authorities for the purpose of calculating fees, and documents drawn up for waste recording purposes;
- Registers maintained by *poviat* governors (*starosts*) containing information about areas where soil pollution standards were exceeded;
- Electronic environmental databases maintained by regional governors (voivodes) and *starosts* within the framework of the State Environmental Monitoring System;
- Register of substances posing special threat maintained by the voivodes;
- Register of hazardous substances, in stocks of industrial companies posing potentially significant risk, managed by the Voivodeship Commands of the State Fire Service;
- Emission measurement and reporting system conducted by the Voivodeship Inspectorates for Environmental Protection (WIOŚ);
- Reporting system on environmental fees for utilizing the environment managed by the voivodeship self-government authorities (Marshal Offices);
- State central database comprising enterprises obliged to apply BAT;
- Voivodeship databases on waste management established by the self-government authorities (Voivodeship Marshals);
- 16 voivodeship databases and one central database on information about the use of the environment managed by the Minister of the Environment;
- Voivodeship databases on PCBs and POPs-containing waste landfills, the creation of which is planned.

To reduce unintentional emissions, particularly of dioxins and furans, promotion and educational activities targeted at effective and environmentally sound heat production methods for housing purposes should be considered, by providing information to the public on threats connected with ineffective combustion of solid fuels and biomass and on reducing

municipal waste incineration. Furthermore, information on proper handling of PCBs and their waste should also be disseminated.

The **2 actions** proposed within **Activity 3.3.12** are described below.

Action G1. Preparation of a plan for the collection and exchange of information.

This plan will satisfy the provisions of the Aarhus Convention and will also take account of the legal requirements resulting from relevant regulations on the protection of confidential information. The outline of the plan was prepared under the GEF Project [43].

Supervising body: Minister of the Environment.

Implementation body: appointed by the Minister of the Environment.

Costs and their category: 0.1 mln PLN; incremental costs.

Source of funding: NFOŚiGW.

Implementation deadline: 2005.

Action G2. Development of a system for the collection and exchange of information.

The aim of this action is to establish a system for collecting and exchange of information, and its implementation. Pursuant to Articles 9, 10 and 11 of the Convention, Parties should establish a system for international exchange of information. For the time being no such operational system of information exchange exists.

Supervising body: Minister of the Environment.

Implementation body: appointed by the Minister of the Environment**.**

Costs and their category: 0.06 mln PLN; incremental costs.

Source of funding: NFOŚiGW.

Implementation deadline: 2006.

Work plan for different actions under Activity 3.3.12:

Action implementation schedule							
Year	2004	2005	2006	2007	2008	2009	2010
Action		G1	G2				

Coordinator of the entire activity: Minister of the Environment.

Total implementation costs of the activity (2004–2010): 0.16 mln PLN.

Baseline costs: 0 mln PLN.

Incremental costs: 0.16 mln PLN.

3.3.13. Activity: public awareness, information and education

Objective. The goal of this activity is to incorporate into the national educational system an information package on POPs-related issues, pursuant to Article 10 of the Convention, to

raise public awareness. An outline for such a package has been prepared under the GEF Project. It will serve as a basis for further work on the package, which will finally be incorporated into the National Strategy for Environmental Education (NSEE) [64].

Background. The need for the development and implementation of a national action plan on education, training and raising public awareness on POPs is a clearly defined obligation imposed on the Parties to the Convention. Pursuant to the "National Strategy for Environmental Protection against Persistent Organic Pollutants" [71] – "*it is necessary to raise public awareness and extend environmental education by introducing issues regarding POPs in the environment*".

One of the main educational goals regarding POPs should be to eliminate or at least to reduce the negative approaches causing POPs emission and releases. The public must become aware of the fact that only "clean" organic matter should be burned and that other types of wastes may only be incinerated in facilities specially designed for that purpose.

The procedure of public participation will be conducted in line with the provisions of the Act – Environmental Protection Law. Below are some of the most important items to be considered:

- Raising awareness of politicians and other decision makers having impact on emission and release reductions;
- Providing the public with information, which according to the provisions of the Convention, is not considered confidential;
- The development and implementation of a variety of educational and training programmes concerning POPs, their health and environmental effects and their substitutes/alternatives, addressed to the general public and to certain target groups, especially women, children, farmers, medical staff, teachers, scientists as well as workers and technical and managerial personnel of enterprises.

The scope of educational activities. Educational activities concerning POPs should focus on the following issues:

- properties and characteristics of POPs,
- their sources,
- application and uses,
- emissions and releases,
- effects and impacts,
- methods for preventing and avoiding threats from POPs,
- health hazards,
- management and treatment of waste containing POPs.

These activities should be of multi-level character, and cover the public in general, since everyone may, to some extent, contribute to the generation of POPs and everyone is threatened by their negative impacts. However, particular attention should be given to the "groups at risk", i.e. scrap collecting persons, construction industry workers and service teams (particularly those handling timber waste, e.g. railroad sleepers) and people involved in the elimination of obsolete pesticide landfills, obsolete pesticide treatment companies, holders of PCB-containing equipment, stokers of coal- or biomass-fired boilers and residents of houses with individual furnaces, stoves and boilers.

The major task to be undertaken within the framework of the NIP regarding the promotion of education, training and awareness raising is the development of an educational programme on POPs. Activities envisaged in this programme should mainly be targeted at the following groups:

- farmers,
- children,
- higher primary level and secondary level school children and academic students,
- teaching and medical personnel,
- users of individual heating systems based on coal-fired stoves.

Some proposals regarding educational programmes are presented in Annex 7.

Awareness raising. Aiming at awareness raising a series of training sessions for selected target groups (e.g. public and private decision makers, businessmen, NGOs) should be carried out. In addition, an Internet website with basic information on POPs should be prepared, together with an information bulletin in hard copy and electronic version, which should be published by the CIOŚ. All this should be supplemented by a series of publications presenting results of scientific, research and development activities and results of monitoring in periodicals for professionals. A significant role in raising public awareness regarding health hazards caused by POPs would be assigned to mass media.

Involving non-governmental organizations is a key element of the action plan for the promotion of education, training and awareness raising with regard to POPs and may be performed in different ways, *inter alia*, by:

- Contracting the services by the public administration, pursuant to the Act on activities profitable to the public and on voluntary organizations;
- Involving NGOs in the process of preparation of programmes at regional and local levels on the protection against POPs emission/release effects, as well as sustainable development programmes for communes (*gminas*);
- Developing programmes and preparing environmental campaigns, and seeking appropriate financial resources for this purpose from foreign assistance funds;
- Carrying out promotion campaigns.

The **5 actions** proposed under **Activity 3.3.13** are described below.

Action H1. <u>Preparation and implementation of a countrywide information and educational campaign concerning hazards posed by POPs.</u>

Pursuant to Articles 5 and 10 of the Convention, the NGOs will prepare and conduct a campaign on hazards posed by POPs to the environment and human health. Within this campaign the following, *inter alia*, actions shall be performed: the preparation and publication of educational and informative materials for schools; preparation and performance of a series of courses and seminars/workshops for selected target groups; developing an Internet web site as well as dissemination of information on health hazards caused by POPs among mass media representatives.

Coordinator: selected NGO.

Implementation body: interested environmental NGOs.

Costs and their category: 0.6 mln PLN in 2005 + 0.04 mln PLN annually (total 0.88 mln PLN); incremental costs.

Source of funding: NFOŚiGW (20%), local budget (30%), foreign assistance (50%).

Implementation period: 2004–2010.

Action H2. Developing and issuing a set of educational materials on handling POPs for schools.

Elaboration and editing educational kits on handling POPs requires defining the topics for presentation and the level of detail of educational materials for different types of schools, i.e. for secondary, high and academic schools. Dissemination of the results of this action will allow teachers to incorporate POPs-related issues into the educational programmes and meet the provisions of Articles 5 and 10 of the Convention.

Supervising body: Minister of National Education and Sport (MENiS).

Implementation body: appointed by MENiS.

Costs and their category: 0.06 mln PLN; incremental costs.

Source of funding: state budget (50%), foreign assistance (50%).

Implementation deadline: 2006.

Action H3. Incorporating POPs risk-related issues into the National Strategy for Environmental Education (NSEE).

Issues connected with health and environmental hazards caused by POPs as well as methods for preventing such hazards will be incorporated into the National Strategy for Environmental Education [64] on the basis of relevant outlines for public and target group education prepared under the GEF Project [42]. Experts in teaching methodology should be involved in amending the Strategy. An amendment shall cover detailed educational materials for primary, secondary and high schools as well as for two target groups, i.e. medical personnel and teachers. The strategy should also include an outline for a public information campaign regarding POPs.

Supervising body: Minister of the Environment.

Implementation body: appointed by the Minister of the Environment.

Costs and their category: 0.06 mln PLN; incremental costs.

Source of funding: NFOŚiGW (50%), state budget (50%).

Implementation deadline: 2005.

Action H4. Implementation of educational programmes on POPs for target groups (teachers and doctors).

These educational programmes are aimed at raising awareness on POPs hazards among teachers of environmental issues and medical doctors dealing with toxicological threats. A draft outline of the educational programme was prepared under the GEF Project [42].

Supervising body: Minister of Health, Minister of National Education and Sport.

Implementation body: Entities appointed by these Ministers.

Costs and their category: 0.2 mln PLN; incremental costs.
Source of funding: state budget.
Implementation deadline: 2006.

Action H5. Preparation and publishing of a guidebook about PCB handling and management, and leaflets on threats posed by dioxins.

This guidebook will be addressed to different target groups throughout the country to provide information on proper PCB handling. It will contain, *inter alia* information about companies involved in PCB elimination in different voivodeships. Leaflets on threats posed by dioxins generated in individual heating systems should provide the following information to the public:

- dioxin formation mechanisms,
- environmental and health risks,
- guidance on risk minimisation,
- methods for avoiding or eliminating adverse effects.

Draft leaflets on PCBs [49] and dioxins [50] to be published have been prepared under the GEF Project. They are addressed to enterprises, local administration and the general public.
Supervising body: Minister of the Environment.
Implementation body: institutions appointed by the Minister of the Environment.
Costs and their category: 0.06 mln PLN; incremental costs.
Source of funding: state budget (20%), NFOŚiGW (30%), foreign assistance (50%).
Implementation deadline: 2004 and 2007.

Work plan for different actions under Activity 3.3.13:

Action implementation schedule							
Year	2004	2005	2006	2007	2008	2009	2010
Action	H1;H5	H1;H3	H1;H2;H4	H1;H5	H1	H1	H1

Coordinator of the entire activity: Minister of the Environment.
Total implementation costs of the activity (2004–2010): 1.26 mln PLN.
Baseline costs: 0 mln PLN.
Incremental costs: 1.26 mln PLN.

3.3.14. Activity: effectiveness evaluation

Objective. The goal of this activity is to establish a system for the evaluation of the effectiveness of activities under the NIP and its verification and updating pursuant to Article 16 of the Convention.

Background. Pursuant to Article 16 of the Convention the terms for evaluating the effectiveness of undertaken action will be defined by the Conference of the Parties. The assessment will be based on national reports and data obtained from monitoring. The document of the Intergovernmental Negotiation Committee UNEP/POPS/INC.7/19, which is prepared for the first session of the Conference of the Parties to the Convention includes a proposal on reporting stating that the first governmental report submitted by 2007 (CoP3) and a report on progress in eliminating PCBs provided by 2009 will be the basis for the first effectiveness evaluation. The present NIP foresees the implementation of a system for periodical assessment of the progress in fulfilling the obligations of the Stockholm Convention.

Establishment of a timetable and methods for periodical evaluation of the progress of the Convention's implementation and preparation of relevant reports in accordance with the rules adopted by the Conference of the Parties to the Stockholm Convention and the European Commission lies within the competences of the Minister of the Environment. The updating of the NIP, preceded by comprehensive progress evaluation, should take place not more often than every four years as the national reports will be submitted to the Conference of the Parties every four years.

The **3 actions** proposed under **Activity 3.3.14** are described below.

Action I1. Preparation of guidelines for the verification and updating of the NIP with due regard to the documents of the Conference of the Parties to the Convention.

The aim of this action is to develop transparent guidelines for updating the NIP, as required by the Conference of the Parties to the Convention. Relevant decisions on the procedures and methods of assessment of the implementation of the NIPs in different countries with the timetable for updating, will be made by the Conference of the Parties (CoP).

Supervising body: Minister of the Environment.

Implementation agency: national secretariat for the Convention.

Costs and their category: 0.02 mln PLN; incremental costs.

Source of funding: NFOŚiGW.

Implementation deadline: 2006.

Action I2. Periodical updating of the National Implementation Plan.

Periodical review and updating of the NIP is required pursuant to Article 7.1 of the Convention. Future decision of the Conference of the Parties will establish rules and procedures for carrying out such reviews. The aim of the updating is to adjust the NIP to the changing socioeconomic conditions and to the technical progress.

Supervising body: Minister of the Environment.

Implementation agency: national secretariat for the Stockholm Convention.

Costs and their category: 0.5 mln PLN every 4 years; incremental costs.

Source of funding: NFOŚiGW.

Implementation deadline: 2008.

Action I3. Periodical updating of the national strategy and policy regarding POPs.

The National Strategy for Environmental Protection against POPs, together with the measures designed for its implementation require periodical updating. The first updating will take into consideration the results obtained under the GEF Project during the preparation of the plan for the implementation of the Stockholm Convention in Poland. Due to rapid economic changes the strategy should be updated every 4 years.

Supervising body: Minister of the Environment.

Implementation body: appointed by the Minister of the Environment.

Costs and their category: 0.12 mln PLN every 4 years (total: 0.24 mln PLN); incremental costs.

Source of funding: NFOŚiGW.

Implementation deadline: 2005 and 2009.

Work plan for different actions under Activity 3.3.14:

Action implementation schedule							
Year	2004	2005	2006	2007	2008	2009	2010
Action		I3	I1		I2	I3	

Coordinator of the entire activity: Minister of the Environment.

Total implementation costs of the activity (2004–2010): 0.76 mln PLN.

Baseline costs: 0 mln PLN.

Incremental costs: 0.76 mln PLN.

3.3.15. Activity: reporting

Objective. The aim is to meet the obligations of the Convention and the European Union legislation concerning the reporting of information on POPs emission and release levels, and on progress in the implementation of the Convention as well as to satisfy the national requirements in this field.

Background

Data collection system. Under the Stockholm Convention Parties are obliged to carry out scientific research and monitoring, as well as to submit to the Conference of the Parties periodical reports on the implementation of the provisions of the Convention, including statistical data (Article 15).

It is necessary to establish a reliable information system ensuring the availability of sufficient and reliable data. Information provided by the system should cover two main areas:

Statistical data on the total production, import and export of all chemical substances listed in Annexes A or B, which may be obtained from public statistics and estimates from research institutes and sector chambers or reliable assessments of such data;

Data on current and forecasted emissions and releases of persistent organic compounds listed in Annex C of the Convention.

The evaluation of current and forecasted emissions and releases of persistent organic pollutants at the country level can be carried out within the framework of the national inventory of pollutants using average emission factors along with the simultaneous establishment and maintenance of registers of sources and release estimates with due consideration of the source categories listed in Annex C to the Stockholm Convention. In line with international regulations such registers (EPER and PRTR) will be developed and implemented at the earliest possible date.

National requirements regarding information on POPs emissions and releases. Domestic needs with regard to information on emissions and releases of POPs are satisfied by:

- National inventory system for emissions and releases,
- Developing registers of individual emission and release sources.

The following registers of individual emission and release sources are developed pursuant to the provisions of the Act – Environmental Protection Law and its relevant regulations:

- Registers of pollutants released into the air. Entities utilising the environment are obliged to keep records, updated on a quarterly basis, on types and quantities of pollutants released into the air and information on the methods used for obtaining such data;
- Registers of environmental fees. These registers are managed by the Marshal Authorities of the voivodeships and they include reports with information on the utilization of the environment (air, water, waste) and data used for determining the fee levels for individual entities; registers contain information about app. 80 thousand economic entities. Voivodeship databases and a central database will be developed containing information on the ways of using the environment.
- Register of integrated permits. The Minister of the Environment manages a register of applications for integrated permits and analyses submitted applications and permits granted. Integrated permits are required for installations or devices, which, due to specific type and scale of activity, are likely to cause significant pollution with regard to different environmental matrices or the entire environment;
- Register of measurements performed in connection with the operation of installations or equipment. Such a register does not exist at present, but steps should be taken towards its development, to enable processing and comparing information on measurements performed by economic entities in connection with the operation of their installations or devices.

International requirements concerning information on emissions and releases. A number of registers already exist or many new ones are planned at the international level for the purpose of reporting as required by the LRTAP Convention, EU Directives, and other international agreements and organisations (OECD). Below is a description of registers regarded as most important from the point of view of the objectives of the Stockholm Convention, i.e. the EPER and PRTR registers.

European Pollution Emission Register (EPER). National registers are being established in the EU member countries within the framework of the European Register (EPER) on the basis of Commission Decision 2000/479/EC[65]. The EPER includes a list of 50 substances (or their groups) released from over 20 major categories of activities. The most important sources, in

terms of POPs emissions/releases, are: metal production and metal processing, the mineral industry, the chemical industry (mainly production of organic compounds, plant protection products and biocides), the electric power industry, waste treatment facilities (especially for hazardous waste) and installations using organic solvents.

Pollutant Release and Transfer Register (PRTR). Within the framework of the Aarhus Convention and on the grounds of the Kiev Protocol signed by Poland and the EU in May 2003 it is planned to develop a pollutant release and transfer register (PRTR). The following activity categories are to be considered in the PRTR:

- energy sector (e.g., refineries, heating plants and other installations with capacities >50 MW),
- production and processing of metals,
- mineral industry,
- chemical industry,
- waste and wastewater management,
- production and processing of paper pulp and wood;
- agriculture and fish and sea farming,
- animal and plant products from the food and beverage sector,
- others (e.g., primary treatment or dying of fabrics and materials > 10 Mg/day).

The PRTR covers a broad list of pollutants (86 substances and groups of substances*),* extending scope of the EPER register, including, *inter alia,* certain substances subject to the Stockholm Convention and/or the Aarhus Protocol, as well as other halogen substances. The register shell be expanded to cover the dispersed sources of emissions and transfer of pollutants on to other environmental components apart from air, i.e. water and soil. Pollutants currently covered by inventories within the framework of selected systems are presented in Table 3.3.15.1.

Table 3.3.15.1. POPs taken into consideration in selected systems

Persistent organic pollutants	PRTR	EPER	Fee list	Stockholm Convention	Large point sources*
Aldrin	x			x	
Chlordane	x			x	
Dieldrin	x			x	
Endrin	x			x	
Heptachlor	x			x	
Mirex	x			x	
Toxaphene	x			x	
DDT	x			x	
Dioxins and furans	x	x	x	x	x
PCBs	x	x	x	x	
HCB	x	x		x	x

* In accordance with the UN ECE/EMEP guidelines [86].

The Stockholm Convention refers to the PRTR register in Article 10, paragraph 5 of the Convention, which states that "*Each Party shall give sympathetic consideration to developing mechanisms, such as pollutant release and transfer registers, for the collection and dissemination of information on estimates of the annual quantities of the chemicals listed in Annex A, B or C that are released or disposed of*".

Planned activities. Poland's accession to the European Union and the obligations under other international agreements create an urgent need for establishing an information system in Poland, which would provide sufficient information, consisting of data that cannot be accessed directly from official statistics due to confidentiality restrictions. The scope of information, which should be included into the register to meet the requirements of the Convention, can be subdivided into four groups/fields:

- Organisational data (name, address, type of activity – Polish Code of Activity, etc.),
- Activities (fuel consumption, use of raw materials, production level),
- Emissions (annual, seasonal, daily, per unit of production),
- Production technology data affecting emission levels.

At present, it is hard to tell the actual number of entities, which should be covered by an inventory system for the purposes of the Stockholm Convention. According to preliminary estimates their total number will be comparable with the number of installations/devices that are obliged to obtain integrated permits. Table 3.3.15.2 illustrates a comparison of estimated numbers of entities depending on the type of register. For the purpose of the Convention, just like for the rest of the described registers, data collected from individual entities are required. This provision enforces the necessity of developing a new information system or adjusting one of the already existing.

Table 3.3.15.2. Estimated numbers of entities expected to be covered by the registers

Register	Number of entities
PRTR	app. 5000
EPER	app. 2000
IPPC	app. 2000

In 1999–2001 alternative concepts have been prepared concerning a data collection system for the purposes of an emission inventory. Many seminars and workshops were held on the development of an information system satisfying the needs of the EPER, PRTR and other emission registers. As a result of discussions carried out between 2001 and 2003 the following most probable options for implementing the planned register of emission sources meeting the needs of the Stockholm Convention were identified by linking the planned register with:

- The system of integrated permits. This requires the extension of the scope of information collected from entities obliged to obtain integrated permits. The development of the register of such entities is complicated due to the fact that some installations can take advantage of derogations, in line with the Accession Treaty, for several years of transitional periods;

- The system of emission fees. A significant advantage of such an approach is that the emission fees system has already been operating for many years and data are available electronically. Developing the planned register would require the extension of the scope of information collected from a selected group of economic entities;
- The duties of installation operators. The duties of installation operators and users of equipment are to a great extent convergent with the information requirements of the planned registers. The operators of installations and the users of devices are obliged[4] to carry out periodical measurements to determine emission levels. In 2003 a new requirement[18] was introduced to carry out emission measurements depending on:
    - the type of installation or equipment,
    - emission standard level for an installation or equipment
    - parameters describing the output or capacity of an installation or equipment.

Based on the review of different options taking into account their suitability for providing information as well as difficulties/costs of implementation, a decision on the register of emission sources and pollutants should be made. Developing a countrywide environmental information system will determine efficient reporting on compliance with all environmental conventions, including the Stockholm Convention. Irrespective of the option, which will be selected, it is necessary to undertake the task of developing a methodology for determining pollutant emissions, especially for those pollutants that were not sufficiently estimated in Poland so far.

The implementation of an information system connected with the register for individual emission sources should involve, *inter alia*, the following activities:

- Developing and introducing adequate legal regulations;
- Ensuring financing;
- Developing and introducing an electronic information management system;
- Training of the staff operating the system.

The **5 actions** proposed under **Activity 3.3.15** are described below.

Action J1. Preparation of national reports for the Conference of the Parties to the Convention.

Reports on activities undertaken in Poland aimed at the implementation of the Stockholm Convention will be prepared according to the rules and guidelines laid down by the Conference of Parties to the Convention (CoP). The first report will be prepared for CoP3.

Supervising body: Minister of the Environment.

Implementation agency: national secretariat for the Convention and a group of experts.

Costs and their category: 0.2 mln PLN every 4 years (total: 0.4 mln PLN); incremental costs.

Source of funding: NFOŚiGW.

Implementation deadline: 2006 and 2010

Action J2. Preparation of reports on progress in the elimination of PCBs.

A report on progress in eliminating PCBs will be submitted to the Conference of the Parties pursuant to Annex A, Part II, sub-paragraph (g) every 5 years. This report will be prepared on the basis of the guidelines adopted by the CoP. It is expected that the first report will be submitted to the fourth CoP.

Supervising body: Minister of the Environment.

Implementation agency: national secretariat for the Convention and a group of experts

Costs and their category: 0.1 mln PLN every 5 years; incremental costs.

Source of funding: NFOŚiGW.

Implementation deadline: 2007.

Action J3. Inventory reports on POPs emissions and releases.

Assessment of the progress in the implementation of the Stockholm Convention requires access to complete information on changes in POPs concentrations in the environment. For this purpose an annual inventory on POPs emissions and releases is carried out for the State Environmental Monitoring System and the public statistics programme on the inventory of emissions of air pollutants and for reporting purposes as required by UN ECE/EMEP, the European Environment Agency as well as in the future for the Global Monitoring Programme pursuant to Articles 5 and 11 of the Stockholm Convention.

Supervising body: Minister of the Environment.

Implementation body: National Emission Centre.

Costs and their category: 0.1 mln PLN annually (total 0.6 mln PLN); baseline costs.

Source of funding: NFOŚiGW.

Implementation period: 2005–2010.

Action J4. Preparation of reports for the European Commission.

Reports on measures taken in Poland in order to implement the provisions of the European Union regarding persistent organic pollutants will be prepared in line with the Community Regulation[68].

Supervising body: Minister of the Environment.

Implementation agency: national secretariat for the Convention and a group of experts.

Costs and their category: 0.1 mln PLN every 3 years (total 0.2 mln PLN); baseline costs.

Source of funding: NFOŚiGW.

Implementation deadline: 2007 and 2010.

Action J5. Development of a data collection system concerning individual activities and POPs emissions from different enterprises.

The review of a number of enterprises to be included in the system, information requirements (on activities, emissions, technologies), and necessary legislative changes will be the basis for elaborating an outline of the system. By preparing such a system Poland will contribute to the development of the EPER/PRTR registers. It will also satisfy the provisions of the implementation programme for the national component of the EPER register[65], the Kiev

Protocol to the Aarhus Convention, which will allow for implementing EU Directives on integrated permits, and on CO_2 emission trade.

Supervising body: Minister of the Environment.

Executing institution: National Emission Centre.

Costs and their category: 0.12 mln PLN; baseline costs.

Source of funding: NFOŚiGW.

Implementation deadline: 2005.

Work plan for different actions under Activity 3.3.15:

Action implementation schedule							
Year	2004	2005	2006	2007	2008	2009	2010
Action		J3; J5	J1;J3	J2; J3; J4	J3	J3	J1; J3; J4

Coordinator of the entire activity: Minister of the Environment.

Total implementation costs of the activity (2004–2010): 1.42 mln PLN.

Baseline costs: 0.92 mln PLN.

Incremental costs: 0.5 mln PLN.

3.3.16. Activity: research, development and monitoring

Objective. The aim is to increase the level of knowledge on the occurrence of POPs in the environment and to provide the decision-makers, through integrated monitoring, information on the state of the environment with regard to POPs contamination, with data on changes in this area pursuant to Article 11 of the Convention.

Background

Research and development. Research activities that are required to be undertaken for the purposes of the implementation of the provisions of the Convention have been divided into two groups depending on the level of progress made regarding preparatory activities for the research projects. Activities K1 to K3 contain certain research projects, which are prepared in the form for immediate submission to the State Committee for Scientific Research (KBN). Research fields identified below as essential for the implementation of the Stockholm Convention have not been equipped with detailed research plans, yet.

Fields for ongoing research on chemical substances subject to the provisions of Stockholm Convention:

- Determination of PCBs in oils used for electrical insulation purposes;
- Methods for the destruction of waste containing PCBs, HCB and other chlorinated compounds covered by the Stockholm Convention;
- Harmful effects of dioxins, PCBs and HCB on humans;

- Application of semi-permeable membrane devices (SPMD) for monitoring of persistent halogenated organic pollutants in aquatic environments;
- Evaluation of the actual presence of PCBs and HCB in the environment and their concentrations in human tissue, food and industrial products.

Research on POPs unintentional emission reduction techniques should also be continued.

New research fields for the Stockholm Convention implementation purposes are as follows:

- Research on biological treatment methods for halogenated chemical compounds remaining as POPs in the environment (with regard to dioxins, PCBs and HCB).
- Monitoring research on concentrations of harmful pollutants - polychlorinated dioxins and furans, PCBs and HCB - in the air of large municipal and rural agglomerations and industrial areas.
- Research on possibilities for POPs treatment by plants and living organisms.
- Demonstration and promotion of best practices for the reduction of hospital waste aimed at the prevention of environmental emissions of dioxins and mercury from medical centres (a multi-national project proposed for GEF funding, in which Poland is to participate).
- Risk assessment connected with POPs intake with food in Poland.
- Research on transformations, primarily of DDT and toxaphene, in soils.
- Determination of the physical and chemical properties of solid fuels and the effects of their combustion techniques on dioxin emissions.

Annex 9 contains a list of research priorities formulated by the European Commission required for the complete implementation of the strategy for dioxins, furans and PCB emission and release reduction. This list may be used as a basis for defining the requirements of Poland in this respect.

Development of POPs monitoring. The need for the development of POPs monitoring derives from the provisions of the Stockholm Convention on the one hand, and from the Global POPs Monitoring Programme on the other. The fundamental goal of the Programme is the identification of spatial distribution and periodical trends of background conditions. Irrespective of the requirements of the Programme it is necessary to trace changes at the level of local POPs sources and hot spots. More specific information on POPs monitoring in Poland is presented in Annex 8.

Establishing the POPs monitoring system requires a decision to be made on incorporating this group of pollutants into the State Environmental Monitoring System (PMŚ). According to its work plan for 2003–2005 the voivodeship inspector for environmental protection should include in the voivodeship environmental monitoring plan substances specified in the Convention, taking into account the specific pollution sources located within the voivodeship concerned.

Air monitoring should focus on the identification of sources and estimation of emission levels by using emission factors. Categories of emission sources have been defined unlike most of the emission factors, which will need to be calculated. Apart from the assessment of emission level it would be essential to establish one or two sites for measuring the background emission in areas regarded as “clean”. The results obtained from these measurement sites could be incorporated into the global POPs monitoring system. Dioxins and furans, PCBs and HCB should mainly be subject to monitoring.

Water monitoring should comprise waters of the main country rivers, coastal waters of the Baltic Sea and selected lakes The primary goal is the determination of pollutant loads discharged through rivers into the sea, which determines the location of measuring points at the river mouths and in the vicinity of larger cities near the coast. To clarify the issues connected with pollution transport samples should also be taken at mid- and upper river courses.

In the case of coastal waters it is recommended to set sampling points at sites chosen for sampling of bottom sediments and biological material to allow for analysis of the relationship between concentration levels in water, sediments and biological material.

Apart from the currently monitored concentration levels of DDT and PCBs the monitoring activities should be extended to include the other substances covered by the Convention. The monitoring system should be based on the existing measurement network.

Due to low concentration levels of certain substances in waters the monitoring activities should be divided into two groups: research and operational activities. The research part should cover periodical measurements of substances with low concentrations, whereas operational monitoring should apply to substances with concentrations exceeding the standards in force or those, which are monitored in the EU. The key problem is the development of release factors for discharges into waters

Pursuant to the work plan of the State Environmental Monitoring System the monitoring programme for bottom sediments should be extended by substances covered by the Convention, especially PCBs, PCDDs/PCDFs and chloroorganic pesticides. Research should in the first place cover sediments in larger water reservoirs and at sites of river mouths (at the estuaries) along the coastline.

The monitoring of soil should be designed on the basis of specific conditions in particular regions of the country, taking into consideration the impacts of local POPs sources and information concerning historical data on the use and manufacture of products containing these substances.

Monitoring of waste landfills, according to the Regulation of the Minister of the Environment[87], should cover the monitoring of surface waters, leachates and ground waters during both the exploitation phase and the post-exploitation phase, as well as single sampling of surface waters and ground waters in the pre-exploitation phase.

In developing the monitoring system for POPs in waste landfills the list of indicative parameters to be monitored should be extended for selected landfills to cover all pollutants classified as persistent organic pollutants.

Biological monitoring in food products, in accordance with the FAO and WHO recommendations [74] is defined as the monitoring of food contamination. It should be carried out on samples representative for specific pollutants and for particular types of food. The monitoring within the food production sector has been established by a special Act[88]. The requirements of monitoring provided by the Convention are identical with the monitoring

[87] Regulation of the Minister of the Environment of 9 December 2002 on the scope, time, methods and conditions for conducting waste landfill monitoring (DzU of 2002 No. 220, item 1858).

[88] Act of 30 October 2003 amending the Act on Food and Nutrition Health Requirements and some other Acts (DzU of 2003 No. 208, item 2020).

requirements implemented in line with the provisions of the Polish environmental legislation, as well as legal acts regulating agricultural production and human health issues.

The monitoring work plan will aim at representative investigation of temporal and spatial variation of POPs by determining bio-concentrations of POPs in vegetable oils and animal fats. Residues of substances covered by the Stockholm Convention according to the final provisions of relevant EU legislation will be subject to testing. Detailed information is presented in Annex 8.

The **8 actions** proposed within **Activity 3.3.16** are described below.

Action K1. Assessment of the levels of POPs emissions from burning solid fuels in individual household heating installations not linked to the central heating systems, and an evaluation on the possibilities for reducing these emissions.

The aim of the action is to supplement research on PCDD/PCDF and PCB emissions from energy production processes of the individual and municipal heating sector, and to determine measures for POPs emission reduction as well as recommended preventive measures. The share of this sector in the country's total emission of POPs specified in Annex C to the Convention amounts to 36.7%. Tests of coal, biomass and coal/biomass mixture burning will be carried out in a certified laboratory and in selected installations with capacities between 200 kW and 50 MW. The results obtained will be used to assess environmental risks caused by POPs emissions depending on the type of fuel used and the combustion technique applied. The project results will allow to:

- identify the best and available combustion techniques,
- verify the quality requirements of fuels applied in individual and central heating installation,
- develop guidelines for the standardisation and certification of fuels and installations,
- develop guidelines for the monitoring and supervision of POPs emission reduction schemes.

This action is associated with the provisions of the National Power Industry Development Programme until 2025 and with the implementation of the provisions of the Climate Convention and depends to a considerable extent on the fuel structure of use in the municipal sector.

Supervising body: Minister of Scientific Research and Information Technology.

Implementation body: Institute of Chemical Processing of Coal, Kraków University of Technology.

Costs and their category: 3.28 mln PLN once every 2 years; baseline costs.

Source of funding: State Committee for Scientific Research (KBN).

Implementation period: 2005 –2006.

Action K2. Social and economic background for POPs management in Poland.

The aim of this action is to determine social and economic costs resulting from the use, depositing, treatment and elimination of POPs. Solving POPs problems has both the economic and social implications. These consequences should be assessed at a national level and at a

scale of individual regions and social groups. This relates, in the first place, to the impact of dioxins and furans from individual household combustion installations, obsolete pesticide landfills, industrial landfills and industrial plants releasing POPs.

Supervising body: Minister of Scientific Research and Information Technology.

Implementation body: selected through tendering/competition

Costs and their category: 0.8 mln PLN; incremental costs.

Source of funding: State Committee for Scientific Research (KBN).

Implementation deadline: 2006.

Action K3. Assessment of environmental threats posed by dioxins and related potential health risks in selected populations in Poland.

Assessment of human exposure to dioxins present in the environment in three selected areas with different dioxin concentration levels will be subject to this research project. The level of dioxins in human blood will be tested. Dioxins can be found in all environmental components creating health hazards through different exposure routes. The results of human blood tests serve as an integrated indicator of the hazards posed by all emission sources and different exposure pathways. Results submitted to the Environmental Protection Inspection and the Sanitary Inspection maybe the basis for establishing an environmental and biological monitoring system for dioxins.

The results of the project could also contribute to the Community strategy [85] aimed at reducing human exposure to these chemicals.

Supervising body: Minister of Scientific Research and Information Technology.

Implementation body: Institute of Occupational Medicine in Łódź.

Costs and their category: 0.8 mln PLN; incremental costs.

Source of funding: State Committee for Scientific Research (KBN).

Implementation period: 2005–2007.

Action K4. Indication of additional areas of research and development activities concerning POPs emission and release issues.

Costs of priority directions of scientific research concerning emissions and releases of POPs shall be periodically reviewed, indicated and assessed.

Supervising body: Minister of the Environment.

Implementation body: appointed by the Minister of the Environment.

Costs and their category: 0.1 mln PLN every 3 years (total 0.2 mln PLN); incremental costs.

Source of funding: NFOŚiGW.

Implementation deadline: 2005 and 2008.

Action K5. Preparing a conceptual outline for POPs monitoring in different environmental components.

Elaboration of the programme for POPs monitoring in the air, water and soil will cover: a measurement and laboratory network, a list of substances to be monitored for each environmental component and frequency of data collection and reporting format. This

programme will be incorporated into the State Environmental Monitoring Programme. Data will serve also for public statistics programme on inventory of emissions of air pollutants and reporting as required by the UN ECE/EMEP, the European Environment Agency and the Stockholm Convention (Article 5).

Supervising body: Chief Inspector for Environmental Protection (GIOŚ).

Implementation body: appointed by GIOŚ.

Costs and their category: 0.2 mln PLN; baseline costs.

Source of funding: NFOŚiGW.

Implementation deadline: 2005.

Action K6. Implementation of POPs monitoring in terrestrial environments.

The monitoring would cover the following elements:

- environmental quality: monitoring of air and soil quality with regard to concentration levels of pollutants subject to the Convention,
- emission/releases of POPs covered by the Convention and measurements of these pollutants at hazardous waste landfills, including obsolete chloroorganic pesticide sites.

Supervising body: Chief Inspector for Environmental Protection.

Implementation body: selected research institutes and appointed voivodeship inspectorates for environmental protection (WIOŚ).

Costs and their category: 5.73 mln PLN + 3.4 mln PLN annually (total: 22.73 mln PLN); baseline costs.

Source of funding: NFOŚiGW (90%), state budget (10%).

Implementation period: 2006–2010.

Action K7. Monitoring of POPs in aquatic environments.

The objective is to determine the level of environmental risk in aquatic environments on the basis of measurements of POPs concentrations in bottom sediments and in living organisms of the main rivers in Poland (including coastal rivers) and the coastal zone of the Baltic Sea (including bottom sediments in ports and channels). Organic substances, such as PCDDs/PCDFs and PCBs are practically not found in surface waters, but they accumulate in large amounts in bottom sediments and in living organisms in aquatic environments. Regular monitoring of these environmental media is required within the framework of the State Environmental Monitoring system.

Supervising body: Chief Inspector for Environmental Protection.

Implementation body: Institute of Meteorology and Water Management.

Costs and their category: 2.2 mln PLN annually (total 13.2 mln PLN); baseline costs.

Source of funding: NFOŚiGW.

Implementation period: 2005–2010.

Action K8. Monitoring of POPs bio-concentration in food products.

Research performed to date within the framework of the food monitoring system proved that POPs are found in seeds of oil plants, in the fat tissue of animals and fish, in animal fats (butter, lard) and in vegetable oils (margarine, oils) as well as in cereal seeds and some vegetables. Their content varies depending on time and location of sampling and requires monitoring. Pursuant to the decision of the Minister of Agriculture the monitoring of contamination of farmland, farm products and food has been performed since 1993 and satisfies the provisions of the European Community strategy for dioxins, furans and PCBs.

Supervising body: Minister of Health in cooperation with the Minister of Agriculture and Rural Development.

Implementation body: to be appointed by the above ministers.

Costs and their category: 7.5 mln PLN + 3.8 mln PLN annually (total 30.3 mln PLN); baseline costs.

Source of funding: state budget.

Implementation period: 2005–2010.

Work plan for different actions under Activity 3.3.16:

Action implementation schedule							
Year	2004	2005	2006	2007	2008	2009	2010
Action		K1;K3;K4; K5;K7;K8	K1;K2;K3; K6-K8	K3; K6-K8	K4; K6-K8	K6-K8	K6-K8

Coordinator of the entire activity: Minister of the Environment.

Total implementation costs of the activity (2004–2010): 71.51 mln PLN.

Baseline costs: 66.43 mln PLN.

Incremental costs: 5.08 mln PLN.

3.3.17. Activity: technical and financial assistance

Objective. The aim of this activity is to achieve support for activities undertaken by enterprises, governmental and non-governmental organisations to satisfy the provisions of the Convention (pursuant to its Articles 12 and 13).

Background. Implementation of the planned measures, particularly in the field of services and capital investments, requires considerable financial resources. It seems unlikely that all associated costs could be fully covered by national sources of funding in the period scheduled for both the implementation of the provisions of the Stockholm Convention and meeting the requirements of the European Union. However, both the Global Environment Facility and the European Union are willing to provide assistance to Poland. The elimination of obsolete pesticide landfills could be considered within the framework of the Integrated Operational

Programme on Regional Development (ZPO-RR), whereas the decontamination of electrical equipment - within the Sectoral Operational Programme on Strengthening Competitiveness of Enterprises (SPO-WKP). It is necessary to disseminate relevant information about these possibilities among voivodeships and interested enterprises.

Foreign assistance may come from the GEF (until 2010), and from the EU Structural Funds, i.e. the European Social Fund (ESF), and the European Regional Development Fund (ERDF) as well as other EU funds, such as LIFE. Additional co-financing of activities connected with education and awareness raising, particularly in relation to activities performed by NGOs, can also be sought through bilateral co-operation with various countries. However, the precondition for obtaining foreign assistance for this kind of activity is the ratification of the Stockholm Convention by Poland.

The review of the activities formulated in this Plan indicates, that the total sum of expected foreign assistance until 2010 is relatively high. Funds expected for organizational, educational and training activities are estimated at over 82 million PLN (Table 3.6.2) and cover: the costs of services (app. 57 mln PLN), investment expenditures (24 mln PLN) and educational and informative activities (0.5 mln PLN).

International assistance package. Fulfilling the provisions of the contract with UNIDO on the implementation of the GEF Project, new project proposals, endorsed by the Minister of the Environment, have been submitted to UNIDO (three investment and service projects and one educational project) to be considered for GEF financing. Considering the current needs a proposal has been made to change the project earlier entitled "Elimination of the most dangerous pesticide landfills and assessment of environmental threats and health risks" to:

3.3.17.1. Stabilization of waste deposited in industrial waste landfill of the ORGANIKA–AZOT Chemical Works in Jaworzno (Action E4 in Chapter 3.3.8).

The aim of the project would be to eliminate POPs releases (DDT and its congeners) from the waste mass deposited in the Rudna Góra landfill within the premises of ORGANIKA–AZOT Chemical Works, the former producer of DDT. The releases are caused by precipitation waters penetrating through the landfill and by ground water flowing through the bottom parts of the waste. The project goal is to close the inflow of waters and eliminate pollution from the surrounding soil and ground waters.

Estimated cost: app. 1200 thousand USD.

Expected launching date of the project: 2007.

Below are the three other projects requested within the aforementioned assistance package:

3.3.17.2. Setting up a semi-commercial installation for POPs oxidation in aquatic environment (Action E5 in Chapter 3.3.8).

At present a project devoted to the elimination of halogen compounds, particularly POPs, by oxidation in aquatic environment is being carried out in Poland. The expected output is a technology project design and pre-design outline of an installation for eliminating waste with low POPs concentrations, which are difficult to separate. In effect, the project financed by the

GEF resources, will include: the development of the technical design for such a POPs oxidation installation and the start-up of its pilot version at a semi-commercial scale.

Expected cost: app. 800 thousand USD.

Expected duration of the project: 2005–2006.

3.3.17.3. Installation for decontamination of PCB-contaminated small-sized electrical equipment. (project not included in the NIP as it exceeds its timeframe).

The initial capacity of this installation is planned at 400 Mg/year. The selection of adequate technology will be made in advance. Activity 3.3.4 of the NIP includes an evaluation of the situation in this field under Action C5.

Expected cost: app. 400 thousand USD.

Expected launching date of the project: 2011.

3.3.17.4. Development of a system of public education and information on POPs in Poland (Actions H1, H2, H3 and H5 in Chapter 3.3.13).

The goal of the project is to disseminate information on the 12 persistent organic pollutants subject to the Stockholm Convention. It should cover information about the threats they pose and methods for the reduction of their emissions/releases and possibilities for their disposal and treatment. For this purpose various media will be used (publications, the Internet, seminars and training activities, educational programmes for young people at different schooling levels and for the public in general). The long-term goal is to raise public awareness at local, regional and national levels. Particular emphasis will be placed on the elimination of obsolete pesticides and PCB-containing equipment, on the identification of pollution sources, including diffuse emission sources of dioxins and furans, such as individual heating systems, on the promotion of best available combustion technologies (BAT) for coal and biomass used in boilers and furnaces with low thermal capacities, incinerators and other waste treatment facilities. The educational activity shall also focus on information regarding the current water, soil, air and product contamination by POPs as well as on the impact of POPs on human health.

Expected cost: app. 120 thousand USD.

Expected launching date of the project: 2005.

3.4. Development and capacity-building proposals and priorities

Priority activities aimed at the complete implementation of the Stockholm Convention, indicate areas where strengthening of the potential is necessary. Full implementation of the National Implementation Plan for the Stockholm Convention, developed in compliance with the provisions of the Convention, requires the strengthening of national capacities with respect to, *inter alia*, reliable information on emissions and releases. This applies to the

improvement of the system on data collection and preparation of emission and release factors, which requires relatively little organizational and financial support. However, this problem will be solved while developing the PRTR system, in which the POPs subject to the Convention represent only a small group of the substances planned to be covered by this system.

Additional technical and financial input as well as human resources will be required to continue the inventory of POPs-containing or POPs-contaminated wastes, stocks and equipment, including equipment contaminated with PCBs. Poland has sufficient technical and professional capacity to implement these tasks but the available financial resources are insufficient.

A particularly difficult situation is observed in the contamination monitoring of biological material (animal feeds, foodstuffs, human tissue). However, efforts must be made to develop and implement new monitoring methods in these fields, which have not been monitored so far on a regular basis and on a countrywide scale. Methodological research and laboratory analyses are expensive and will require additional support.

Elimination of stocks and wastes of obsolete pesticides is considered an urgent task. This process, initiated several years ago, needs acceleration, however the high costs of eliminating pesticide landfills and the reclamation of these landfill sites present a serious obstacle. The significant level of uncertainty with regard to the actual location of some of the pesticide landfills and the amount of deposited obsolete plant protection products poses an additional difficulty. Further investigation in this matter should be carried out, even going beyond 2010.

A similar situation is observed with the reclamation of industrial waste dumps containing POPs, where action has been undertaken only by some of the industrial plants. Without foreign financial assistance implementation of these two tasks will be impossible.

The most difficult and complex task, however, is the reduction of emission from low-emission sources – the main source of dioxin and furan releases into the air in Poland. To solve this problem action needs to be taken to:

- Raise public awareness on the harmfulness of burning impregnated wood and waste in household furnaces and stoves,
- Obtain more reliable information on emission levels from this group of sources; especially on the influence of burning coal with substances /articles containing chlorine in varying concentrations on emissions of PCDDs/PCDFs,
- Modernise heating systems to eliminate individual stoves and furnaces in densely inhabited residential areas,
- Modernise heating systems fired with coal and biomass,
- Eliminate unclassified coal types from individual heating systems,
- Provide public education on threats and risks resulting from the use of stoves and boilers with low thermal efficiency and from the burning of wastes other than the types permitted by relevant legal regulations.

All these activities require considerable financial resources, research on new technologies and their implementation. Taking into account that this problem is not only the concern of Poland, but also remains unsolved in other EU member countries, it seems reasonable to undertake

appropriate steps and try to solve the problem jointly with support from the EU Structural Funds.

Pursuant to Article 11 of Regulation of the European Parliament and of the Council on POPs[68] and to the provisions of the Community Strategy [85], Poland will be entitled to take advantage of financial assistance from the EU for carrying out activities resulting from the Stockholm Convention.

3.5. Timetable for plan implementation and measures of success

The implementation schedule of the National Implementation Plan for the Stockholm Convention can be divided into two periods: during the first phase, covering the years 2004–2007, priority will be given to organisational, legislative and administrative activities, while the second one, going beyond 2007, will focus mainly on activities related to the operational implementation of these activities.

Preparatory legislative and organisational activities should be undertaken in 2004 leading to the ratification of the Stockholm Convention by Poland in 2005. Simultaneously, an assessment is planned on the state of the environment with respect to its contamination by POPs, along with the development of educational and awareness raising programmes. In 2006, *inter alia*, databases should be established and put into operation and implementation of all on-going activities of a continuous nature should be accomplished. The year 2007 will be devoted to the evaluation of progress made in implementing the provisions of the Stockholm Convention and to the preparations of reports, which will have to be submitted to the Conference of the Parties in 2008. A detailed work plan for different activities is presented in Annex 3.

The elimination of obsolete pesticide landfills and the decontamination of PCB-containing equipment will continue in the first phase of the period covering the years 2004–2010 (Annex 10). Due to the project preparation cycle and the process of gathering the necessary funds the remainder of the investment projects connected with the setting-up of an alternative technology installation for waste treatment and with the reduction of the negative impact of the landfill in ORGANIKA–AZOT Chemical Works, will be possible during the second phase of the above period.

3.6. Resource requirements

The overall costs of the implementation of the provisions of the Stockholm Convention in 2004–2010 amount to 219 mln PLN (Table 3.6.1). The implementation costs of the NIP have been divided into resources required for three types of activities, i.e.:

- Organisational costs connected with the management of the implementation of the Convention and facilitating the achievement of the NIP's goals,
- Service costs, which cover the costs of the elimination of obsolete pesticide landfills and PCBs and the decontamination of PCB-containing equipment,

- Capital costs covering the costs of proposed investments to reduce POPs emissions and releases.

Table 3.6.1 presents the annual costs connected with the implementation of the provisions of the Stockholm Convention in Poland divided into above-mentioned types of activities. It shows that the highest expenses (over 45 mln PLN) will have to be covered in 2007, i.e. within two years after the expected ratification of the Convention by Poland.

Table 3.6.1. Implementation costs of the NIP in Poland in different years [in mln PLN]

Type of activity	2004	2005	2006	2007	2008	2009	2010	Total	After 2010 (annually)
Organizational	0.67	20.45	20.65	14.85	11.67	11.29	11.29	90.87	989
Services	13.72	13.72	13.72	13.72	13.72	13.72	13.81	96.13	-
Investments	0	0	0	17.00	0	15.00	0	32.00	-
Total	**14.39**	**34.17**	**34.37**	**45.57**	**25.39**	**40.01**	**25.10**	**219.00**	**9.89**

After 2010 no new projects requiring investment and service activity are planned. Expenditures estimated at app. 9.9 mln PLN annually are expected to be incurred only in connection with on-going organisational activities. Detailed justification for the costs is presented in Annex 10.

Implementation costs of the NIP divided into different categories of activities resulting from the guidelines prepared under the auspices of UNEP/World Bank [88] are presented in Table 3.6.2. These activities cover all actions included in the NIP, for which costs are also presented in Table 3.6.1.

Foreign assistance should be the major source of funding the National Implementation Plan for the Stockholm Convention. Under current conditions it would be difficult to solve the problems connected with the elimination of obsolete pesticide landfills and reduction of risks associated with the storing of POPs wastes in industrial landfills as well as treatment of PCBs and decontamination of PCB-containing equipment by utilizing the national financial resources. Sources for the implementation of activities assigned to “services” and “capital investments” should be obtained from e.g. the EU Structural Funds and the EU Cohesion Fund as well as from the Global Environment Facility (GEF).

The national environmental funds, i.e. a system of funds for environmental protection and water management and the EcoFund Foundation[70] should contribute significantly to the funding of activities specified in this NIP. Relatively high support is expected from NFOŚiGW for funding POPs environmental monitoring and the elimination of obsolete pesticide landfills. The state budget will also play an important role, mainly, in the financing of POPs monitoring in feed and food.

Financial support from enterprises (business sector) for covering the costs of PCB elimination from use with the possibility of applying for assistance from, *inter alia*, the EU Structural Funds within the framework of the Sectoral Operational Programme on Strengthening Competitiveness of Enterprises (SPO-WKP), required for the treatment of PCB-containing

oils and wastes, and for the decontamination of PCB-containing equipment (transformers and capacitors), has also been considered by the NIP.

Table 3.6.2. Implementation costs of activities, covered by the NIP, with their sources of funding in 2004–2010 [in mln PLN]

No.	Activity type/category	State budget	Local budgets	Private/business sector	Environmental funds*	Foreign assistance**	Total
3.3.1	Institutional and regulatory measures	2.97	0	0	0.32	0.10	3.39
3.3.3	Elimination of obsolete pesticide landfills and stockpiles	0	0	0	29.63	29.63	59.26
3.3.4	Treatment of equipment and waste containing PCBs	7.54	0.96	9.22	2.24	27.66	47.62
3.3.7	Reduction of unintentional releases	0	0	0	0.60	0.32	0.92
3.3.8	Reduction of releases from landfills	0	0	8.00	0.24	24.00	32.24
3.3.9	Identification of landfills and articles in use	0	0	0.04	0.32	0.10	0.46
3.3.12	Exchange of information	0	0	0	0.16	0	0.16
3.3.13	Public education and awareness raising	0.27	0.26	0	0.23	0.50	1.26
3.3.14	Effectiveness evaluation	0	0	0	0.76	0	0.76
3.3.15	Reporting	0	0	0	1.42	0	1.42
3.3.16	Research	4.88	0	0	0.20	0	5.08
	Monitoring	32.57	0	0	33.86	0	66.43
Total		**48.23**	**1.22**	**17.26**	**69.98**	**82.31**	**219.00**

* National/Voivodeship Fund For Environment Protection and Water Management.
** Including the European Union funds.

From the point of view of the financing institutions, involved in the implementation of this NIP, it would be appropriate to analyse the fluctuations of costs over the 7-year period of its implementation with respect to each source of funding. The estimated costs are presented in Table 3.6.3. These figures show that the state budget will need to cover the highest costs in 2005, i.e. the year of the expected organisational preparations for lauching full implementation of the NIP. Maximum burden will be shared by the national environmental funds in 2006, whereas the highest contributions from enterprises, local budgets (self-governmental budgets) and foreign assistance funds are expected in 2007.

The costs connected with the fulfilment of the obligations of the Stockholm Convention are divided into two categories:

- ***Baseline costs*** – covering the costs of activities undertaken to satisfy the provisions of the Stockholm Convention and other international agreements executed under the Polish and EU legally binding documents, *inter alia*, the National Waste Management Plan, Directive 79/117/EEC[78] and Directive 96/59/EC[25], Community Regulation on POPs[68] and legal regulations resulting from the statutory activity of the governmental administration;
- ***Incremental costs*** – resulting directly and only from the necessity for fulfilling the provisions of the Stockholm Convention.

Table 3.6.3. Planned annual distribution of costs depending on the sources of funding the implementation of the NIP in 2004–2010 [in mln PLN]

Source of funding	2004	2005	2006	2007	2008	2009	2010	Total
State budget	0.27	***16.06***	9.41	5.95	5.51	5.52	5.51	48.23
Local budget	0.01	0.20	0.01	***0.97***	0.01	0.01	0.01	1.22
Business sector/enterprises	1.31	1.35	1.31	***5.56***	1.31	5.06	1.36	17.26
Environmental funds	4.24	7.96	***15.39***	12.12	10.34	9.95	9.98	69.98
Foreign assistance	8.56	8.6	8.25	***20.97***	8.22	19.47	8.24	82.31
Total	**14.39**	**34.17**	**34.37**	**45.57**	**25.39**	**40.01**	**25.10**	**219.00**

Data concerning these two categories of costs divided into different sources of funding are presented in Table 3.6.4, which shows that costs connected entirely with the ratification of the Stockholm Convention do not exceed 45 million PLN. The state budget will need to contribute app. 14% to the incremental costs. To ensure effective implementation of the NIP it is necessary to obtain international assistance of app. 55% of the costs (*inter alia*, from the European Union and GEF resources) with additional support of the national environmental funds.

Table 3.6.4. Cost categories of the implementation of the NIP in 2004–2010 depending on the source of funding [in mln PLN]

Cost category	State budget	Local budgets	Business sector (enterprises)	Environmental funds	Foreign assistance	Total
Baseline costs	42.19	0	9.26	65.55	57.81	174.81
Incremental costs	6.04	1.22	8.00	4.43	24.50	44.19
Total	**48.23**	**1.22**	**17.26**	**69.98**	**82.31**	**219.00**

Poland will have to cover the other costs of over 174 mln PLN irrespective its ratification of the Stockholm Convention and implementation of the NIP. These costs are based on our obligations deriving from the provisions of the European Union and from the Polish legislation already in force.

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Annex 1.

GOVERNMENT AND KEY STAKEHOLDER ENDORSEMENT DOCUMENTS FOR THE NIP

Warszawa, dnia 24.12 2004 r.

MINISTER ŚRODOWISKA

Jerzy Swatoń

DPEke.072-I-1177/04/ML

Dr Geoffrey E.Mariki
Chief of the POPs Unit
Programme Development
and Technical Cooperation Division
United Nations Industrial
Development Organization

Pragnę poinformować Pana, że w ramach projektu GEF nr GF/POL/01/004 „Umożliwienie działań zmierzających do przyspieszenia prac nad wdrożeniem Konwencji Sztokholmskiej w sprawie trwałych zanieczyszczeń organicznych" zostało zakończone opracowanie Krajowego Programu Wdrażania Konwencji Sztokholmskiej w Polsce.

Program ten został pozytywnie oceniony zarówno przez Komitet Sterujący Projektu jak i konferencję zainteresowanych tą problematyką instytucji (stakeholders workshop).

Na tej podstawie podjąłem decyzję o akceptacji tego programu jako podstawy do dalszych prac nad przygotowywaniem wniosku ratyfikacyjnego Konwencji i wdrażania jej postanowień.

COURTESY TRANSLATION

Dr. Geoffrey E. Mariki
Chief of the POPs Unit Programme Development
and Technical Cooperation Division
United Nations Industrial Development Organization

Dear Sir,

I am pleased to inform you that the preparation of the National Implementation Plan for the Stockholm Convention for Poland under the Project No.: GF/POL/01/004 entitled "Enabling activities to facilitate early action in the implementation of the Stockholm Convention on Persistent Organic Pollutants (POPs)" has been finalized.

The aforementioned NIP obtained a positive opinion both by the Project Steering Committee and the Stakeholders Workshop. I have, therefore, made a decision on the endorsement of this NIP as a basis for further work leading to the ratification of the Stockholm Convention and its implementation.
Yours sincerely,

Jerzy Swatoń,
Minister of the Environment

Sekretarz Stanu
W MINISTERSTWIE ŚRODOWISKA
Główny Geolog Kraju
Krzysztof Szamałek

PEko-075-[illegible] /ml

Warszawa, 26.10.2004 r.

STANOWISKO

KOMITETU STERUJĄCEGO PROJEKTEM GEF „UMOŻLIWIENIE DZIAŁAŃ ZMIERZAJĄCYCH DO PRZYŚPIESZENIA PRAC NAD WDROŻENIEM KONWENCJI SZTOKHOLMSKIEJ W SPRAWIE TRWAŁYCH ZANIECZYSZCZEŃ ORGANICZNYCH"

Komitet Sterujący - nadzorujący merytorycznie realizację projektu GEF pt. „Umożliwienie działań zmierzających do przyśpieszenia prac nad wdrożeniem Konwencji Sztokholmskiej w sprawie trwałych zanieczyszczeń organicznych" (GF/POL/01/004) - po zapoznaniu się z projektem Krajowego programu wdrażania Konwencji Sztokholmskiej przyjmuje projekt do wiadomości i wnioskuje, aby Minister Środowiska wystąpił o ratyfikację Konwencji w sprawie trwałych zanieczyszczeń organicznych, podpisaną przez Polskę w dniu 21 maja 2001 roku w Sztokholmie.

Przewodniczący Komitetu Sterującego

COURTESY TRANSLATION

Warsaw, 26 October 2004

POSITION OF THE STEERING COMMITTEE
OF THE GF/POL/01/004 PROJECT CONCERNING IMPLEMENTATION OF THE STOCKHOLM CONVENTION IN POLAND

The Steering Committee, supervising in terms of merits UNIDO GF/POL/01/004 Project "Enabling activities to facilitate early action on the implementation of the Stockholm Convention on Persistent Organic Pollutants (POPs)", after being acquainted with the draft National Implementation Plan for the Stockholm Convention in Poland takes cognisance of the draft and puts forward the proposal to the Minister of Environment to table the motion on ratification of the Stockholm Convention on Persistent Organic Pollutants signed by Poland on the day of 21st May 2001 in Stockholm.

Krzysztof Szamałek
Chairman of the Steering Committee

V[th] Endorsement Workshop approving the
NATIONAL IMPLEMENTATION PLAN FOR THE STOCKHOLM CONVENTION
(Warsaw, 15 December 2004)

STATEMENT

Participants of the Endorsement Workshop, after being acquainted with the draft of the National Implementation Plan for the Stockholm Convention and after discussing its basic issues do acknowledge that the Plan has been completed in a comprehensive and rational manner.

Considering the above, the participants of the Endorsement Workshop decided to propose to the Government of Poland to approve this Plan, as a basis for further activities connected with the implementation of provisions of the Stockholm Convention on Persistent Organic Pollutants in Poland.

Monika Lesz, M.Sc., Eng.
Chairman of the Endorsement Workshop
Counsellor at the Ministry of Environment

Annex 2.

POLISH LEGISLATION VERSUS THE PROVISIONS OF THE STOCKHOLM CONVENTION

(as of 1 July 2003)

Stockholm Convention		Polish law	Comments
Art.	Provisions of the Convention*	Legal act/regulation, article and the provision	
1	2	3	4
3	*Measures to reduce or eliminate releases from intentional production and use*. Each Party shall: **Paragraph 1.** (a) Prohibit and/or take the legal and administrative measures necessary to eliminate: (i) Production and use of the chemicals listed in Annex A (aldrin, chlordane, dieldrine, endrin, heptachlor, hexachlorobenzene, mirex, toxaphene, PCBs), (ii) Import and export of the chemicals listed in Annex A in accordance with the provisions of paragraph 2; b) restrict production and use of the chemicals listed in Annex B (DDT). **Paragraph 2.** Take measures to ensure: a) That a chemical listed in Annex A or Annex B is imported only for: (i) Sound disposal as set forth in paragraph 1 (d) of Article 6; or (ii) Use for purposes permitted under Annex A or Annex B; b) Export of chemical substances listed in Annex A or Annex B only: (i) For the purpose of safe disposal as set forth in paragraph 1 (d) of Article 6; or (ii) For use or purpose, which is permitted for that Party under Annex A or Annex B; (iii) To a State not Party to this Convention, which has provided an annual certification specifying the intended use of the chemical, and the importing State is committed to protect human health and the environment and comply with the provisions of paragraph 1 of Article 6 and paragraph 2 of Part II of Annex B; c) Prohibit export of chemicals listed in Annex A, for which production and use specific exemptions are no longer in effect, except for the purpose of disposal as set forth in paragraph 1 (d) of Article 6.	**Article 31 paragraph 1 of the Act on Chemical Substances and Preparations**[6] contains an obligation to enact a regulation on the prohibition, restriction and conditions for the production, placing on the market and use of dangerous substances and preparations. The use and placing on the market of substances as constituents of plant protection products is subjected to the **Act on Plant Protection**[7]. The **Regulation of 5 March 2002**[14] prohibited the use of pesticides containing 63 listed bioactive substances, including those that are covered by the Stockholm Convention. **Article 160 paragraph 1** of the **Act – Environmental Protection Law**[4] prohibits the placing on the market or reuse or recycling of substances posing particular environmental threat, specifying PCBs to be regarded as such a substance (**paragraph 2 of Article 160**). In 2003 such a status has been assigned also, *inter alia*, to aldrin, dieldrin, endrin and DDT pursuant to the provisions of the Regulations of the Minister of the Environment[11]. **Article 65** of the **Act on Waste**[5] sets conditions for permitting import of hazardous wastes. Import of waste is restricted to the types of wastes specified in the Regulation of the Minister of the Environment issued under paragraph 4 of Article 65 of the Act on Waste. Import of hazardous wastes may be permitted, *inter alia*, if proved that they are intended for recycling in Poland or abroad, excluding R10 treatment operations specified in an annex to the above Act.	At present the Polish law does not prohibit the production of POPs covered by the provisions of the Convention. Full implementation of the Convention will require issuing, under Article 31 of the Act, a regulation concerning the substances listed in Annex A and Annex B. The existing regulations currently in force derive from the legal acts introduced in 1961, which are regularly revised and updated. It is necessary to meet the provisions of paragraph 3 of Article 160 of the Act by classifying and indicating other controlled substances as posing particular environmental threat to satisfy the obligation under paragraph 1 of Article 3 of the Convention. At present, PCB-containing wastes are not permitted for import, but such a possibility cannot be excluded in the future, taking into consideration the provisions of paragraph 2 of Article 3 in connection with Article 6, paragraph 1 of the Convention, which allow import of substances listed in Annex A or Annex B only for the purpose of safe disposal.

1	2	3	4
	Paragraph 3. Parties shall take measures to prevent the production and use of new pesticides or new industrial chemicals which, taking into consideration the criteria in paragraph 1 of Annex D, exhibit the characteristics of POPs; **Paragraph 4.** Parties shall apply criteria defined in Annex D paragraph 1 for the assessment of pesticides or industrial chemical substances currently in use; **Paragraph 5.** Paragraphs 1 and 2 shall not apply to quantities of chemicals to be used for laboratory-scale research; **Paragraph 6.** Take measures to minimise releases into the environment of substances under specific exemption.		As mentioned in the legal regulations above the use of substances, subject to the Stockholm Convention, as constituents of pesticides is prohibited in Poland.
4	*Register of specific exemptions.* Parties should cooperate with the Secretariat for the Convention, which responsible for maintaining a register of specific exemptions.		Effective after ratification of the Convention.
5	*Measures to reduce or eliminate releases from unintentional production.* Each Party shall develop an action plan within two years of the date of entry into force of the Convention to identify, characterise and address the release of chemicals listed in Annex C (PCDDs/PCDFs, HCB, PCBs) and undertake measures to achieve a realistic and meaningful level of release reduction or source elimination.	**Act – Environmental Protection Law**[4] in its section entitled *Combating pollution* lays down the requirements for installations and equipment in use regarding their compliance with emission standards, technologies used, carrying out emission measurements and submitting reports to competent authorities, a s well as for obtaining appropriate emission permits (**Articles 137-151 and 180-181**). The action plan is determined by the national environmental policy (**Article 13-16 of the Act)** and environmental protection plans (**Articles 17 and 18 of the Act**). Pursuant to **Article 41 paragraph 1 (b) of the Act – Water Law**[9] the discharge into waters and soil of DDT and PCBs, among all the controlled substances, is prohibited. Standards for aldrin, dieldrin, endrin and HCB on their permitted quantities in treated industrial wastewaters have been introduced on the basis of the Water Law (**Regulation of the Minister of the Environment**[16]), as well as – permitted emission factors in treated industrial wastewaters (**Regulation of the Minister of the Environment**[17]),	The regulations in force allow to take measures to reduce or eliminate releases from unintentional production. The relevant regulation on POPs emission standards for installations is to be issued soon. Pursuant to paragraph 2 of Article 206 of the Act – Water Law minimum requirements resulting from BAT, including POPs emissions from installations may be set through a regulation, if such a need derives from the necessity to create countrywide uniform conditions for granting integrated permits. To fulfil the obligation to introduce BAT for new emission sources specified in part II of Annex C of the Convention, within 4 years of its entry into force, the aforementioned regulation should cover such installations.

1	2	3	4
		– highest permitted emission factors (for dioxins and furans) for industrial wastewaters from flu-gas cleaning in processes of thermal transformation of waste (pursuant to the **Regulation**[81] they will become effective on 28 December 2005).	
6	*Measures to reduce or eliminate releases from stockpiles and wastes.* **Paragraph 1**. Each Party shall develop appropriate strategies for identifying: stockpiles, products or articles in use and wastes consisting of or containing chemicals listed in Annex A, B or C; and take appropriate measures to ensure that wastes are disposed of in such a way that the POPs content is destroyed or irreversibly transformed, not permitted to be recovered. **Paragraph 2.** The CoP shall cooperate with appropriate bodies of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal in relation to hazardous waste containing POPs.	Two regulations of the Minister of Economy[26,27] concerning PCBs are in force. They introduced in 2002 an obligation to: – review the existing equipment to determine whether it contains PCBs; – determine the PCB content by using gas chromatography; – label and inventory the PCB-contaminated equipment **Article 162 of the Act – Environmental Protection Law**[4] introduced an obligation to submit to the voivodes information on the types, quantities and locations of PCBs. **The Act on Waste**[5]**:** – prohibits recovery of PCBs **(Article 38, paragraph 1);** – introduces an obligation to remove PCBs from waste before its recycling or treatment **(Article 38, paragraph 2);** – recommends incineration of PCBs in hazardous waste incineration **plants (Article 38, paragraph 4)** with energy recovery**;** – introduces derogations with regard to the prohibition for PCB recovery **(Article 38, paragraph 5);** – enforces an obligation to include information on PCB content in waste in the waste record sheet **(Article 38, paragraph 7).**	It is necessary to prohibit the placing on the market and reuse of other substances listed in Annex A and Annex B of the Convention under the provisions of Articles 160–163 of the Act – Environmental Protection Law. There is no regulation on irreversible transformation or on the prohibition of recycling of the other substances covered by the Convention. This requires undertaking legislative action to amend the Act on Waste, which should exclude recovery of materials from waste containing POPs subject to the Convention, to eliminate the collision of the provisions of the Act with the provisions of Article 6 paragraph 1 (d) of the Convention. This amendment should also provide prohibition of recovery for other substances and products containing POPs to ensure their treatment in line with the requirements of the Convention. The Basel Convention was ratified by Poland on 20 March 1992. The Chife Inspectorate for Environmental Protection is responsible for the Basel Convention and serves as its National Focal Point.
7	*Implementation plans*. Each Party shall develop a plan for the implementation of obligations under the Stockholm Convention to be transmitted to the CoP within two years of the date on which the Convention enters into force for it; and monitor its execution.		The draft National Implementation Plan for the Stockholm Convention is prepared under the GEF Project.

1	2	3	4
8	*Listing of chemicals in Annexes*. By cooperating with the Secretariat for the Convention and the Persistent Organic Pollutants Review Committee Parties may submit proposals for listing chemicals in Annexes A, B or C, satisfying the screening criteria specified in Annex D and develop risk profiles in accordance with Annex E; and prepare risk management evaluations.		Tasks will be formulated by the national focal point (or the national secretariat for the Convention) after the ratification of the Convention.
9	*Information exchange*. Parties shall exchange information directly or through the Secretariat, which will serve as a clearing-house mechanism for information on POPs. Each Party shall designate a national focal point pursuant to paragraph 3 of this Article.		A proposal has been made under the GEF Project concerning the designation of the national focal point.
10	*Public information, awareness and education*. Each Party shall provide information on POPs, educational and public awareness programmes; establish information centres and give consideration to developing pollutant release and transfer registers.	**Articles 77–78 and 19–24 of the Act – Environmental Protection Law**[4] lay down the obligations concerning the access to information on the state of the environment and on the results of the state environmental monitoring system. The **Act on Access to Public Information**[42] contains provisions on the protection of the rights to information on the environment, which is regarded as public information.	A system for collecting information at the level of individual sources, similar to EPER or PRTRs registers is required to maintain record of POPs emission sources and activities
11	*Research, development and monitoring*. Parties shall undertake appropriate research, development, monitoring and cooperation pertaining to POPs, taking into account the need to minimise duplication of effort.	The provisions of **Articles 25–30** of the **Act – Environmental Protection Law** and of **Articles 2 and 23–28 of the Act on Environmental Protection Inspection**[41]**,** create the basis for the system of environmental monitoring as well as for collecting and disseminating information on the environment. **Article 79 of the Act – Environmental Protection Law**[4] contains recommendations for the state administration bodies and R&D institutions to include research programmes on environmental protection in their activities.	
12	*Technical assistance*. Parties shall cooperate to provide appropriate technical assistance to developing Parties and Parties with economies in transition.		Provision of such assistance should be taken into consideration in bilateral agreements on cooperation in the field of environmental protection and management. The Government should create favourable conditions to get Polish enterprises involved in such cooperation.

1	2	3	4
13	*Financial resources and mechanisms.* Parties provide financial support for activities that are intended to achieve the objectives of the Convention. In accordance with its national plans, priorities and programmes. The developed Parties shall provide financial resources to developing Parties and Parties in transition to meet the agreed full incremental costs of implementing measures using a special financial mechanism.		In future subject to political decisions depending on the capabilities of the country.
15	*Reporting.* Each Party shall report on the implementation measures and on the effectiveness of such measures in meeting the objectives of the Convention and provide statistical data on production, import and export of chemicals listed in Annex A and B.		Effective for designated entities after ratification of the Convention.

* An abstract from different articles and paragraphs of the Stockholm Convention imposing certain obligations on the Parties to the Convention

Annex 3.

IMPLEMENTATION TIMETABLE FOR ACTIONS RESULTING FROM THE NIP

No.	Action symbol	Action	Implementation costs of actions under the NIP in different years (in mln PLN)							Total
			2004	2005	2006	2007	2008	2009	2010	
3.3.1. Activity: institutional and regulatory strengthening measures										
1.	A1	Enacting an amendment to the Act – Environmental Protection Law.		0.12						0.12
2.	A2	Enacting a regulation on the prohibition of production and marketing of substances listed in Annex A to the Stockholm Convention.		0.12						0.12
3.	A3	Enacting a regulation aimed at adding the rest of the substances from Annex A of the Stockholm Convention to the Polish legally binding list of substances posing particular environmental threat		0.12						0.12
4.	A4	Enacting a regulation on POPs emission standards for certain types of installations.			0.12					0.12
5.	A5	Enacting a regulation determining minimum requirements as to emissions resulting from BAT, which should be met by new installations referred to in Annex C, Part II of the Stockholm Convention.			0.12					0.12
6.	A6	Enacting a regulation determining the requirements, which the heating equipment used in individual or municipal housing must comply with.				0.12				0.12
7.	A7	Enacting an amendment to the Act on Waste introducing penal responsibility for the violation of the prohibition on recycling of substances covered by the Stockholm Convention, other than PCBs.		0.06						0.06
8.	A8	Issuing regulations at the voivode level determining the type or quality of fuels admitted for use within the given voivodeship or in parts of it.			0.12					0.12
9.	A9	Ratification of the Stockholm Convention.		0.06						0.06

No.	Action symbol	Action	Implementation costs of actions under the NIP in different years (in mln PLN)							Total
			2004	2005	2006	2007	2008	2009	2010	
10.	A10	Participation of representatives of Poland in the work of the subsidiary bodies of the Stockholm Convention.		0.06	0.06	0.06	0.06	0.06	0.06	0.36
11.	A11	Operation of the national secretariat for the Stockholm Convention.	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.35
12.	A12	Coordination of cooperation between the Stockholm, Basel and Helsinki Conventions at the national level.		0.02	0.02	0.02	0.02	0.02	0.02	0.12
13.	A13	Cooperation and coordination of activities concerning BAT.			0.12	0.12	0.12	0.12	0.12	0.60
14.	A14	Operation of an Information Centre on POPs within the Environmental Information Centre (CIOŚ).			0.20	0.20	0.20	0.20	0.20	1.00
3.3.3. Activity: production, import and export, use, stockpiles and wastes of Annex A POPs pesticides (Annex A, part 1 chemicals)										
15.	B1	Preparation of guidelines for the elimination of obsolete pesticide landfills, including its monitoring, and for required documentation.	0.01							0.01
16.	B2	Elimination of landfills and stocks of obsolete pesticides.	8.46	8.46	8.46	8.46	8.46	8.46	8.49	59.25
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)										
17.	C1	Monitoring of data on PCB sources and quantities.	0.20	0.20	0.20	0.20	0.20	0.20	0.20	1.40
18.	C2	Development and management of voivodeship databases on PCBs.		2.00	0.80	0.80	0.80	0.80	0.80	6.00
19.	C3	Review of the possibilities for the identification and inventory of other articles containing over 0.005% of PCBs.				0.12				0.12
20.	C4	Organization of collection stations for small appliances and PCB-containing waste (> 0,005%) that are in the possession of individuals.				3.20				3.20
21.	C5	Speeding-up of PCB elimination and decontamination of PCB-containing equipment.	0.01					0.01		0.20
22.	C6	Decontamination of PCB-containing equipment and treatment of solid and liquid PCB-contaminated waste.	5.26	5.26	5.26	5.26	5.26	5.26	5.32	36.88

No.	Action symbol	Action	Implementation costs of actions under the NIP in different years (in mln PLN)							Total
			2004	2005	2006	2007	2008	2009	2010	
3.3.7. Action plan: measures to reduce releases from unintentional production										
23.	D1	Analysis of technologies used in economic activity with regard to their emission levels.			0.03			0.03		0.06
24.	D2	Evaluation of possibilities for applying alternative methods for PCDD/PCDF emission reduction.	0.12							0.12
25.	D3	Verification of air emission factors for PCDDs/PCDFs.		0.06			0.06			0.12
26.	D4	Analysis of POPs emission reduction in the metallurgy sector.	0.20							0.20
27.	D5	Verification of HCB and PCB air emission factors.			0.06			0.06		0.12
28.	D6	Review of emission factors for the major sources and determination of total and per unit costs.			0.02			0.02		0.04
29.	D7	Periodical verification of release factors for PCDDs/PCDFs, HCB and PCBs.			0.06					0.06
30.	D8	Updating the inventory outline for POPs releases into surface waters and soil.			0.06			0.06		0.12
31.	D9	Review of compliance of installations with emission standards and estimation of the costs of control measurements.		0.02			0.02			0.04
32.	D10	Analysis for the justification of introducing or amending POPs emission standards.		0.02						0.02
33.	D11	Guidelines on the development of voivodeship databases on sources of POPs releases into the environment from technology processes.		0.02						0.02
3.3.8. Activity: measures to reduce releases from stockpiles and wastes										
34.	E1	Review of technology processes in which POPs wastes are generated.		0.06						0.06
35.	E2	Guidelines on the principles of managing POPs waste generated as by-products from technology processes.		0.12						0.12
36.	E3	Evaluation of the possibilities of applying alternative waste treatment methods in Poland.			0.06					0.06

No.	Action symbol	Action	Implementation costs of actions under the NIP in different years (in mln PLN)							Total
			2004	2005	2006	2007	2008	2009	2010	
37.	E4	Stabilization of waste in the ORGANIKA–AZOT industrial waste landfill in Jaworzno.				17.00				17.00
38.	E5	Installation for waste treatment based on alternative technology.						15.00		15.00
3.3.9. Strategy: identification of stockpiles, articles in use and wastes										
39.	F1	Assessment of the presence of POPs in selected industrial waste landfills.		0.10						0.10
40.	F2	Preparation of guidelines on permanent monitoring of POPs-containing industrial landfills, which so far did not prove to cause POPs releases.		0.10						0.10
41.	F3	Risk assessment of the ORGANIKA–AZOT Chemical Works' industrial landfill.		0.14						0.14
42.	F4	Establishing a database on treatment technologies, including alternative solutions, for POPs waste generated as by-products in technology processes.		0.12						0.12
3.3.12. Activity: facilitating or undertaking information exchange and stakeholder involvement										
43.	G1	Preparation of a plan for the collection and exchange of information.		0.10						0.10
44.	G2	Development of a system for the collection and exchange of information.			0.06					0.06
3.3.13. Activity: public awareness, information and education										
45.	H1	Preparation and implementation of a countrywide information and educational campaign concerning hazards posed by POPs.	0.04	0.64	0.04	0.04	0.04	0.04	0.04	0.88
46.	H2	Developing and issuing a set of educational materials on handling POPs for schools.			0.06					0.06
47.	H3	Incorporating POPs risk-related issues into the National Strategy for Environmental Education.		0.06						0.06
48.	H4	Implementation of educational programmes on POPs for target groups (teachers and doctors).			0.20					0.20
49.	H5	Preparation and publishing of a guidebook about PCB handling and management, and leaflets on threats posed by dioxins.	0.04			0.02				0.06

No.	Action symbol	Action	Implementation costs of actions under the NIP in different years (in mln PLN)							Total
			2004	2005	2006	2007	2008	2009	2010	
3.3.14. Activity: effectiveness evaluation										
50.	I1	Preparation of guidelines for the verification and updating of the NIP with due regard to the documents of the Conference of the Parties to the Convention.			0.02					0.02
51.	I2	Periodical updating of the NIP.					0.50			0.50
52.	I3	Periodical updating of the national strategy and policy regarding POPs.		0.12				0.12		0.24
3.3.15. Activity: reporting										
53.	J1	Preparation of national reports for the Conference of the Parties to the Convention.			0.20				0.20	0.40
54.	J2	Preparation of reports on progress in the elimination of PCBs.				0.10				0.10
55.	J3	Inventory reports on POPs emissions and releases.		0.10	0.10	0.10	0.10	0.10	0.10	0.60
56.	J4	Preparation of reports for the European Commission.				0.1			0.1	0.2
57.	J5	Development of a data collection system concerning individual activities and POPs emissions from different enterprises.		0.12						0.12
3.3.16. Activity: research, development and monitoring										
58.	K1	Assessment of the levels of POPs emissions from burning solid fuels in individual household heating installations not linked to the central heating systems, and an evaluation on the possibilities for reducing these emissions.		1.64	1.64					3.28
59.	K2	Social and economic background for POPs management in Poland.			0.80					0.80
60.	K3	Assessment of environmental threats posed by dioxins and related potential health risks in selected populations in Poland.		0.30	0.30	0.20				0.80
61.	K4	Indication of additional areas of research and development activities concerning POPs emission and release issues.		0.10			0.10			0.20
62.	K5	Preparing a conceptual outline for POPs monitoring in different environmental components.		0.20						0.20
63.	K6	Implementation of POPs monitoring in terrestrial environments.			9.13	3.40	3.40	3.40	3.40	22.73

No.	Action symbol	Action	Implementation costs of actions under the NIP in different years (in mln PLN)							Total
			2004	2005	2006	2007	2008	2009	2010	
64.	K7	Monitoring of POPs in aquatic environments.		2.20	2.20	2.20	2.20	2.20	2.20	13.20
65.	K8	Monitoring of POPs bio-concentration in food products.		11.30	3.80	3.80	3.80	3.80	3.80	30.30
TOTAL			**14.39**	**34.17**	**34.37**	**45.57**	**25.39**	**40.01**	**25.10**	**219.00**

Annex 4.

LIST OF OBSOLETE PESTICIDE LANDFILLS TO BE ELIMINATED IN DIFFERENT VOIVODESHIPS OF POLAND

(as of 1 June 2004)

No.	Name of obsolete pesticide landfill[90]	Estimated amount of waste [Mg]
Zachodniopomorskie Voivodeship		**app. 1 298.50[91]**
1	Barnkowo	20
2	Bądkowo	50
3	Brojce	8
4	Chłopowo	n.a.
5	**Dalewo**	60
6	**Dobra k. Nowogardu**	17
7	Dolice	73
8	**Drzonowo**	54
9	**Gołańcz Pomorska**	27
10	**Kołomąć**	21
11	**Kurzycko**	56
12	**Modrzewo**	49
13	Niemierzyno	n.a.
14	Nowa Dobrzyca	100
15	**Osiek Drawski**	57
16	**Osina**[92]	53
17	Piaski	30
18	Pomień	15
19	Rymań I	2.5
20	Rymań II	n.a.
21	**Smolnica**	21
22	Stara Dąbrowa	6
23	Starzyce	20
24	Wierzbica	227
25	**Wiewiecko**	80
26	**Więcław**	210
27	Wisławie	21

[90] Pesticide landfills marked "in bold" are considered to be the priority landfills requiring elimination in the first place.

[91] The total quantity of obsolete pesticide waste deposited in landfills in the given voivodeship has been estimated due to lack of information on certain landfills.

[92] Landfill located on peat.

No.	Name of obsolete pesticide landfill[90]	Estimated amount of waste [Mg]
28	Wołczyn	21
Pomorskie Voivodeship		**app. 180**
1	Drzewiny	15
2	Jęczniki	10
3	Sierżno	135
4	Tuchomie	20
Warmińsko-Mazurskie Voivodeship		**app. 953.10**
1	Czerwonka	31.6
2	Kamiennik Wielki	57
3	Kobiela	21.6
4	**Konopki Wielkie**	189.5
5	**Lipowa Góra**	100
6	Matyski	57.7
7	**Nowe Guty**	25.5
8	Różyna	14
9	**Rywociny**	160
10	Siniec	28.3
11	Węgajty	56
12	Wozławki	15.4
13	**Cierzpięty**	75
14	**Kotkowo**	70
15	**Warlity Wielkie**	20
16	Babięta	31.5
Lubuskie Voivodeship[93]		**0**
Wielkopolskie Voivodeship[94]		**app. 776.50**
1	Czempiń	72
2	Franciszkowo	164
3	Głażewo	25
4	Górnica	40
5	Klotyldzin	36
6	Kopanki	10
7	Lasocice	1.5
8	Młynów	120
9	Niedźwiady	116
10	Nowa Obra	140
11	Ostrolesie	22

[93] According to the Voivodeship Authority all existing pesticide waste landfills have already been liquidated.

[94] Currently, steps have been undertaken towards initiating a tender procedure for the second phase of elimination of the remaining obsolete pesticide landfills within the territory of the voivodeship.

No.	Name of obsolete pesticide landfill[90]	Estimated amount of waste [Mg]
12	Piotrkówko	10
13	Prochy	20
Kujawsko-Pomorskie Voivodeship[95]		**app. 801.50[91]**
1	**Dąbrówka**	3
2	Góry Witkowskie	7
3	**Głębocin**	3.5
4	**Lisie Kąty**	267
5	**Małe Pułkowo**	30
6	Piątkowo	12
7	Puszcza Miejska	17.5
8	**Rogowo**	3.5
9	**Sokołowo**	5
10	Stanomin	42
11	Śliwice	n.a.
12	**Bożacin**	72
13	Małocin	70
14	**Mąkoszyn**	77
15	**Piastowo**	12
16	Jankowo	n.a.
17	Otoczyn	168
18	Płocicz	12
Mazowieckie Voivodeship		**app. 342.20**
1	**Dobieszyn–Cycelówka**	40
2	Duży Las	60
3	**Garlino–Krzywonoś**	80
4	**Grójec**	9
5	Iłża	0.1
6	**Kamion I**	10
7	**Kamion II**	25
8	**Nagórnik / Zajezierze**	60
9	Orońsko	15
10	Osiny	35
11	Podrogów	8

[95] Landfills in this voivodeship have been situated in unsuitable geological conditions. In most cases they are located on permeable formations of sand and gravel. Furthermore, landfills in Lisie Kąty, Bożacin and Piastów are situated within the area of the Main Reservoirs of Ground Waters. Many objects are situated less than 2 km away from large ground water abstraction points. Due to the landfill age (at least 30 years) they pose a serious threat connected with likely migration of the released pollutants into water supply wells. This may be the case especially regarding the following landfills: Lisie Kąty, Grębocin, Rogowo, Małe Pułkowo and Piastowo.

No.	Name of obsolete pesticide landfill[90]	Estimated amount of waste [Mg]
12	Wielgie	0.1
Podlaskie Voivodeship		**app. 79.90**
1	Baciuty	7
2	Folwarki Tylwieckie	5
3	Dębniki	56
4	Ryboły	0.3
5	Bielany	10
6	Łapy	1.3
7	Majdan	0.3
Dolnośląskie Voivodeship		**app. 109.90[91]**
1	**Kraśnik Górny**	2.5
2	**Iwiny**	46
3	Lisowce	n.a.
4	**Składowice**	20
5	Ludwikowice I	1.5
6	Ludwikowice II	39.2
7	Poręba	n.a.
8	Jelenia Góra	n.a.
9	Spalona	0.7
Opolskie Voivodeship		**app. 36.00**
1	Bogdańczowice	16
2	Głuszyna	20
Łódzkie Voivodeship		**app. 245.00[91]**
1	**Bogumiłów**	18
2	Chorzyna	10
3	Cmentarzyk	1
4	Czerniewice	5
5	**Dobków**	25
6	**Jadwinówka**	20
7	Księża Wólka	8
8	Ładzice	n.a.
9	Modlna	15
10	Nowy Świat	7
11	Ochotnik	n.a.
12	**Pawłówek**	5
13	Piotrków Trybunalski	20
14	**Przeząb / Wola Przerębska**	3
15	Radomsko	1
16	**Sepno–Radonia**	50

No.	Name of obsolete pesticide landfill[90]	Estimated amount of waste [Mg]
17	Sierzchów I	15
18	Sierzchów II	20
19	**Strobów**	12
20	Sulmierzyce	n.a.
21	**Wielgomłyny**	3
22	Zadzim / Kazimierzew	7
23	Ruda	n.a.
24	Las	n.a.
25	Bąki	n.a. (uncertain location)
26	Bujny Szlacheckie	n.a. (uncertain location)
27	Niewiesz	n.a. (uncertain location)
28	Poddębice	n.a. (uncertain location)
29	Ptaszkowie	n.a. (uncertain location)
30	Rochówek	n.a. (uncertain location)
31	Wartkowice	n.a. (uncertain location)
Świętokrzyskie Voivodeship[93]		**0**
Śląskie Voivodeship		**app. 124.50[91]**
1	Adamowie / Raszczyce	n.a. (uncertain location)
2	**Grzybowice**	6
3	Lipowa	0.5
4	Pilchowice	10 (uncertain location)
5	Wojkowice	n.a. (uncertain location)
6	**Cieszyn**	50
7	Sośnicowice[96]	58
8	Czatachowa	n.a. (uncertain location)
9	Radzionków	n.a.
Lubelskie Voivodeship[93]		**0**

[96] Only obsolete pesticides are planned for elimination (without the landfill); the landfill is monitored by the Institute of Plant Protection.

No.	Name of obsolete pesticide landfill[90]	Estimated amount of waste [Mg]
Małopolskie Voivodeship[97]		**app. 49.345[91]**
1	**Klonów I**	app. 40
2	**Klonów II**	
3	**Libiąż**	
4	Czchów	0.271
5	Dębno	0.073
6	Gnojnik	0.300
7	Iwkowa	0.251
8	Lipnica Dolna	0.034
9	Szczurowa	0.100
10	Wadowice	3.166
11	Wielka Wieś	n.a.
12	Wojnicz	0.050
13	Zakliczyn	0.100
14	Mucharz	n.a.
15	Racławice	5
16	Uście Solne	n.a.
17	Stryszów	n.a.
Podkarpackie Voivodeship[93]		**0**
TOTAL (166 landfills)		**app. 4996.445**

n.a. – data not available

[97] The first 3 landfills have been physically found and the total amount of waste stored in them has been estimated. The remaining pesticide landfills (13 objects) are most likely to be ground pits, which, at this stage of the investigation, have not been definitely proved to exist. According to very rough estimates the total quantity of landfilled waste amounts to about 20 Mg. This amount does not significantly affect the global mass of pesticide waste requiring elimination in Poland.

Annex 5.

LABORATORIES WITH THE HIGHEST POPs DETERMINATION CAPACITY

(based on questionnaire results on POPs determination capacities, obtained in 2004 under the GEF Project)

No. of questionnaire	Laboratory	PCBs	HCB	PCDDs/PCDFs	Eight remaining POPs
1	WIOŚ Wrocław	all media	all media	–	all
2	WIOŚ Bydgoszcz	surface water, (solid waste) (bottom sediments)	surface water, (solid waste) (bottom sediments)	–	all, except toxaphene
3	WIOŚ Lublin	all media	all media		all
4	WIOŚ Kraków	–	surface water		all
5	WIOŚ Rzeszów	surface water, (solid waste) (bottom sediments)	surface water, (solid waste) (bottom sediments)	all media	aldrin, dieldrin, heptachlor, DDT
6	WIOŚ Białystok	water	–	–	
7	WIOŚ Katowice (Bielsko Biała)	water	–	–	
8	WIOŚ Katowice (Częstochowa)	(surface water)	–	–	
9	WIOŚ Kielce	water	–	–	
10	WIOŚ Olsztyn	water	water	water	
11	WIOŚ Olsztyn (Elbląg)	water	water	–	all
12	WIOŚ Poznań	water	water	–	all, except toxaphene
13	WIOŚ Poznań (Kalisz)	water	–	–	DDT
14	WIOŚ Poznań (Leszno)	(water)	–	–	DDT

No. of questionnaire	Laboratory	PCBs	HCB	PCDDs/PCDFs	Eight remaining POPs
15	WIOŚ Poznań (Konin)	woda	–	–	–
16	WIOŚ Poznań (Piła)	–	–	–	DDT
17	WIOŚ Szczecin	water	(water)	–	all
18	WSSE Gorzów	–	(drinking water)	–	aldrin, heptachlor, DDT
19	WSSE Kraków	–	food	–	aldrin, dieldrin, heptachlor, DDT
20	WSSE Warszawa	water, foods	water, foods	–	aldrin, dieldrin, heptachlor, DDT
21	WSSE Białystok	–	(drinking water)	–	DDT
22	WSSE Kielce	–	food	–	aldrin, dieldrin, endrin, heptachlor, DDT
23	WSSE Olsztyn	–	–	–	aldrin, dieldrin, heptachlor, DDT
24	WSSE Poznań	–	(drinking water)	–	aldrin, dieldrin, endrin, heptachlor, DDT
25	Kraków University of Technology	all media	all media	all media	DDT
26	IETU Katowice	water	water	–	all except for dioxins and furans
27	IMGW Wrocław	(all media)	–	–	DDT
28	IMGW Gdańsk	all media	all media	all media	all
29	IMGW Warszawa	(all media)	–	–	DDT
30	State Geological Institute	water, precipitation, bottom sediments	water, precipitation, bottom sediments	–	all, except for mirex and toxaphene

No. of questionnaire	Laboratory	PCBs	HCB	PCDDs/PCDFs	Eight remaining POPs
31	National Institute of Hygiene Warsaw	(plants) (foods)	(plants) (food)	–	all, except for mirex and toxaphene
32	Institute of Plant Protection, Poznań	–	water, food	–	aldrin, dieldrin, endrin, heptachlor, DDT
33	Institute of Chemical Carbon Processing	–	all media	–	–
34	Institute of Environmental Protection	water, solid waste, bottom sediments	–	–	–
35	Wrocław University of Technology	(water), (solid waste) (bottom sediments)	(water)	–	aldrin, dieldrin, heptachlor, DDT
36	Gdańsk University of Technology	(air), water, (solid waste), bottom sediments, plants	(air), water, (solid waste), bottom sediments, plants	–	all – without DDT except toxaphene & DDT
37	Poznań Medical University	(solid waste), bottom sediments, (plants), foods	–	–	–
38	Marine Fisheries Institute, Gdynia	foods	food	–	heptachlor, DDT
39	Military Institute of Chemistry and Radiometry	all media	(water) (solid waste) (sediments) (food)	all media	endrin, dieldrin, heptachlor, DDT
40	National Foundation of Environmental Protection	all media	all media	all media	all, except mirex
41	Institute of Meat and Fat Industry	(water)	(water)	(water)	all

( ) Text in brackets means the lack of preparedness of a laboratory to be subjected to inter-calibration tests in this respect.

In columns for PCBs, HCB and dioxins and furans, the media, in which the determinations are performed, have been indicated. In the last column: “Eight remaining POPs” information is given the contaminants for which the measurements are performed. The contamination may be determined in the media different than those for PCBs and HCB.

Annex 6.

LIST OF INSTITUTIONS AND ORGANISATIONS INVOLVED IN POPs ISSUES

MINISTRIES	WFOŚiGW (Dolnośląskie Voivodeship) Traugutta 1/7, 50-449 Wrocław Tel. (+48 71) 343 95 88; Fax: (+48 71) 342 63 49
Ministry of the Environment Wawelska 52/54, 00-922 Warsaw Tel. (+48 22) 579 25 63; Fax: (+48 22) 579 22 63	
Ministry of National Education and Sport J. Ch. Szucha Ave. 25; 00-918 Warsaw Tel. (+48 22) 628 04 61; Fax: (+48 22) 629 7241	WFOŚiGW (Kujawsko-Pomorskie Voivodeship) Szosa Chełmińska 28, 87-100 Toruń Tel. (+48 56) 655 42 81 do 85; Fax: (+48 56) 655 42 86
Ministry of Finance Świętokrzyska 12, 00-916 Warsaw Tel. (+48 22) 694 47 20; Fax: (+48 22) 694 56 08	WFOŚiGW (Lubelskie Voivodeship) Spokojna 7, 20-074 Lublin Tel. (+48 81) 74 24 648; Fax: (+48 81) 74 24 649
Ministry of Economy and Labour Trzech Krzyży 3/5, 00-507 Warsaw Tel. (+48 22) 693 54 91; Fax: (+48 22) 693 40 32	WFOŚiGW (Lubuskie Voivodeship) Kożuchowska 4, 65-364 Zielona Góra Tel./Fax: (+48 68) 320 64 17
Ministry of Infrastructure Chałubińskiego 4/6, 00-928 Warsaw Tel. (+48 22) 630 13 32; Fax: (+48 22) 630 13 30	WFOŚiGW (Łódź Voivodeship) Łąkowa 11, 90-562 Łódź Tel. (+48 42) 63 95 110; Fax: (+48 42) 63 95 121
Ministry of Scientific Research and Information Technology Wspólna 1/3; 00-529 Warsaw 53 Tel. (+48 22) 529 27 18; Fax: (+48 22) 628 09 22	WFOŚiGW (Małopolskie Voivodeship) Kanonicza 12, 31-002 Kraków Tel. (+48 12) 422 94 90; Fax: (+48 12) 422 30 46
Ministry of National Defence Klonowa 1, 00-909 Warsaw Tel. (+48 22) 687 42 50; Fax: (+48 22) 687 40 53	WFOŚiGW (Mazowieckie Voivodeship) Wałbrzyska 3/5, 02-739 Warsaw Tel. (+48 22) 645 33 80; Fax: (+48 22) 645 33 90
Ministry of Agriculture and Rural Development Wspólna 30, 00-930 Warsaw Tel. (+48 22) 623 21 53; Fax: (+48 22) 628 87 84	WFOŚiGW (Opolskie Voivodeship) Krakowska 53, 45-018 Opole Tel. (+48 77) 453 76 11; Fax: (+48 77) 45 37 611
Ministry of Foreign Affairs J. Ch. Szucha Ave. 23, 00-580 Warsaw Tel. (+48 22) 523 91 15; Fax: (+48 22) 621 02 17	WFOŚiGW (Podkarpackie Voivodeship) Szopena 51, 35-055 Rzeszów Tel./Fax: (+48 17) 85 22 344
INSPECTIONS AND SERVICES	WFOŚiGW (Podlaskie Voivodeship) Św. Rocha 5, 15-879 Białystok Tel. (+48 85) 74 60 241; Fax: (+48 85) 74 60 166
Bureau for Chemical Substances and Preparations Św. Teresy 8, 91-348 Łódź Tel. (+48 42) 631 46 81; Fax: (+48 42) 631 46 81	
State Plant Health and Seed Inspection Service Wspólna 30, 00-930 Warsaw Tel. (+48 22) 623 23 54; Fax: (+48 22) 626 80 86	WFOŚiGW (Pomorskie Voivodeship) Straganiarska 24, 80- 837 Gdańsk Tel. (+48 58) 305 56 31; Fax: (+48 58) 301 91 92
Chief Environmental Protection Inspectorate Wawelska 52/54, 00-922 Warsaw Tel. (+48 22) 579 23 84	WFOŚiGW (Śląskie Voivodeship) Plebiscytowa 19, 40- 035 Katowice Tel. (+48 32) 25 18 071 do 5; Fax: (+48 32) 25 10 406
Chief Labour Inspectorate Krucza 38/42, 00-926 Warsaw Tel. (+48 22) 661 91 55	WFOŚiGW (Świętokrzyskie Voivodeship) Paderewskiego 20, 25-004 Kielce Tel. (+48 71) 366 15 12; Fax: (+48 71) 366 09 05
Chief Sanitary Inspectorate Długa 38/40, 00-238 Warsaw Tel. (+48 22) 635 45 81; Fax: (+48 22) 635 61 94	WFOŚiGW (Warmińsko-Mazurskie Voivodeship) Świętej Barbary 9, 10-026 Olsztyn Tel. (+48 89) 535 24 59; Fax: (+48 89) 535 29 10
Trade Inspection - Chief Inspectorate Pl. Powstańców Warszawy 1; 00-950 Warszawa Tel. (+48 22) 826-23-30; Fax: (+48 22) 827-22-89	WFOŚiGW (Wielkopolskie Voivodeship) Północna 6, 61-719 Poznań Tel./Fax: (+48 61) 855 26 21
Chief Command, State Fire Service Podchorążych 38, 00-914 Warsaw Tel. (+48 22) 523 39 12; Fax: (+48 22) 523 31 03	WFOŚiGW (Zachodnio-Pomorskie Voivodeship) Solskiego 3, 71-323 Szczecin Tel. (+48 91) 48 615 56; Fax: (+48 91) 48 615 57
FINANCING INSTITUTIONS	***LABORATORIES CONDUCTING POPS ANALYSES***
National Fund for Environmental Protection and Water Management Konstruktorska 3a, 02-673 Warsaw Tel. (+48 22) 849 00 80, 853 37 37; Fax: (+48 22) 849 72 72	Department of Food and Environmental Monitoring Institute of Meat and Fat Industry Jubilerska 4; 04-190 Warsaw Tel. (+48 22) 612 48 55; Fax: (+48 22) 610 23 66
EcoFund Foundation Bracka 4; 00-502 Warszawa Tel. (+48 22) 628 98 53; Fax: (+48 22) 628 50 82	Institute of Industrial Organic Chemistry, Branch Pszczyna Doświadczalna 27; 43-200 Pszczyna Tel./Fax: (+48 32) 21 03081

WIOŚ Laboratory Sienkiewicza 32, 50-349 Wrocław Tel. (+48 71) 372 13 06; Fax: (+48 71) 322 16 17	WSSE Laboratory Mickiewicza 12b; 66-400 Gorzów Wielkopolski Tel. (+48 95) 722 60 57; Fax: (+48 95) 722 46 52
WIOŚ Laboratory Piotra Skargi 2, 85-018 Bydgoszcz Tel. (+48 52) 22 17 44; Fax: (+48 52) 27 05 63	WSSE Laboratory Jagiellońska 68; 25-516 Kielce Tel. (+48 41) 345 23 64; Fax: (+48 41) 345 18 73
WIOŚ Częstochowa Branch Laboratory Rząsawska 24/28, 42-200 Częstochowa Tel. (+48 34) 364 35 12; Fax: (+48 34) 360 42 80	WSSE Laboratory Prądnicka 76; 31-202 Kraków Tel. (+48 12) 616 20 91; Fax: (+48 12) 416 20 93
WIOŚ Laboratory 20 078 Lublin, Obywatelska 13 Tel. (+48 81) 718 62 00; Fax: (+48 81) 718 62 55	WSSE Laboratory Żołnierska 16; 10-560 Olsztyn Tel. (+48 89) 527 95 00; Fax: (+48 89) 527 97 88
WIOŚ Laboratory Plac Szczepański 5, 31-011 Kraków Tel. (+48 12) 421 09 38; Fax: (+48 12) 422 36 12	WSSE Laboratory Libelta 36; 61-705 Poznań Tel. (+48 61) 854 48 18; Fax: (+48 61) 854 48 12
WIOŚ Laboratory Langiewicza 26, 35-101 Rzeszów Tel. (+48 17) 854 36 83; Fax: (+48 17) 850 53 77	WSSE Laboratory ul. Żelazna 79; 00-875 Warszawa Tel. (+48 22) 620 90 04; Fax: (+48 22) 620 37 19
WIOŚ Laboratory Ciołkowskiego 2/3, 15-264 Białystok Tel./ Fax: (+48 85) 742 53 78	WSSE Laboratory Dębinki 4; 80- 211 Gdańsk Tel. (+48 58) 344 73 00; Fax: (+48 58) 302 32 53
WIOŚ Laboratory Czarna Rola 4, 61-625 Poznań Tel. (+48 61) 827 05 00; Fax: (+48 61) 827 05 22	Laboratory of the Wood Technology Institute Winiarska 1; 60-654 Poznań Tel. (+48 61) 849 24 31; Fax: (+48 61) 822 43 72
WIOŚ Konin Branch, Laboratory Wyszyńskiego 3 A, 62-510 Konin Tel. (+48 63) 242 56 86; Fax: (+48 63) 242 23 47	Laboratory of the Institute of Ecology of Industrialised Areas Kossutha 6, 40-832 Katowice Tel. (+48 32) 254 60 31; Fax: (+48 32) 254 17 17
WIOŚ Kalisz Branch, Laboratory Piwonicka 19, 62-800 Kalisz Tel. (+48 62) 764 63 30; Fax: (+48 62) 764 63 32	Laboratory of IMGW Podleśna 61, 01-673 Warsaw Tel. (+48 22) 834 18 51; Fax: (+48 22) 834 18 01
WIOŚ Piła Branch, Laboratory Motylewska 5a, 64-920 Piła Tel. (+48 67) 212 23 12; Fax: (+48 67) 212 72 35	Laboratory of the State Geological Institute Rakowiecka 4, 00-975 Warsaw Tel.: (+48 22) 849 53 51, 849 49 21; Fax: (+48 22) 849 84 90
WIOŚ Leszno Branch, Laboratory 17 Stycznia 4, 64-100 Leszno Tel. (+48 65) 529 58 56; Fax: (+48 65) 529 48 41	Laboratory of PZH Chocimska 24, 00-971 Warsaw Tel. (+48 22) 849 40 51; Fax: (+48 22) 849 74 84
WIOŚ Laboratory Wały Chrobrego 4, 70-502 Szczecin Tel. (+48 91) 430 37 25; Fax: (+48 91) 434 05 54	Laboratory of the Institute of Plant Protection Miczurina 20 a, 60-318 Poznań Tel. (+48 61) 867 57 13; Fax: (+48 61) 867 11 75
WIOŚ Laboratory IX Wieków Kielc Ave. 3, 25-516 Kielce Tel. (+48 41) 344 49 72; Fax: (+48 41) 344 55 34	Laboratory of the Military Institute of Chemistry and Radiometry gen. A. Chruściela 105; 00-910 Warszawa Tel. (+48 22) 516 99 35; Fax: (+48 22) 673 58 51
WIOŚ Laboratory 1 go Maja 13, 10-117 Olsztyn Tel. (+48 89) 527 23 82; Fax: (+48 89) 527 32 84	Laboratory of the Marine Fisheries Institute Kołłątaja 1, 81-332 Gdynia Tel. (+48 58) 620 28 31
WIOŚ Bielsko Branch, Laboratory Partyzantów 117, 43-300 Bielsko Biała Tel./Fax: (+48 33) 812 49 30	Laboratory of the Institute of Environmental Protection Krucza 5/11, 00-548 Warsaw Tel. (+48 22) 625 10 05; Fax: (+48 22) 629 52 63
WSSE Laboratory Legionowa 8; 15-009 Białystok Tel. centr. (+48 85) 732 60 11; Fax: (+48 85) 732 70 22	Laboratory of the Institute Chemistry and Technology of Petroleum and Coal Wrocław Technical Institute Gdańska 7/9, 50-344 Wrocław Tel. (+48 71) 320 65 07; Fax: (+48 71) 322 15 80

Department of Environmental Chemistry National Foundation of Environmental Protection Żwirki i Wigury 101; 02-089 Warsaw Tel./Fax: (+48 22) 822 30 35	Institute of Non Ferrous Metals Sowińskiego 5, 44-100 Gliwice Tel. (+48 32) 238 03 29; Fax: (+48 32) 231 69 33
Laboratory of Environmental Protection Pulp and Paper Institute Skłodowskiej Curie 19/27, 90-570 Łódź, Tel. (+48 42) 638 03 51 lub Tel./Fax: (+48 42) 636 88 31	Institute of Ferrous Metallurgy K. Miarki 12/14, 44-100 Gliwice Tel. (+48 32) 234 51 20; Fax: (+48 32) 234 53 00
Laboratory of the Institute of Chemical Coal Processing Zamkowa 1, 41-803 Zabrze Tel. (+48 32) 271 00 41; Fax: (+48 32)271 08 09	Marine Institute Długi Targ 41/42, 80-830 Gdańsk Tel. (+48 58) 552 00 93; Fax: (+48 58) 301 35 13
Department of Water and Soil Analysis of the Faculty of Chemistry A. Mickiewicza University Michała Drzymały 24; 60-613 Poznań Tel. (+48 61) 829 34 47; Fax: (+48 61) 829 34 00	Institute of Plant Protection Miczurina 20a, 60-318 Poznań Tel. (+48 61) 867 57 13; Fax: (+48 61) 867 11 75
Laboratory of the Faculty of Chemistry Gdańsk University of Technology Narutowicza 18, 80-952 Gdańsk Tel. (+48 58) 345 03 72; Fax: (+48 58) 347 03 57	Institute of Environmental Protection Krucza 5/11, 00-548 Warsaw Tel. (+48 22) 621 36 70; Fax: (+48 22) 629 52 63
Department of Food Analyses Institute of Agriculture and Food Biotechnology Rakowiecka 36; 02-523 Warsaw Tel. (+48 22) 606 38 37; Fax: (+48 22) 849 04 26	Institute of Organic Industry Annopol 6, 03-236 Warsaw Tel. (+48 22) 811 12 31 ext. 288 Fax: (+48 22) 811 07 99
Water Quality Monitoring Section, Institute of Meteorology and Water Management, Wrocław Branch Parkowa 30, 51-616 Wrocław Tel. (+48 71) 32 00 230	Wood Technology Institute Winiarska 1; 60-654 Poznań Tel. (+48 61) 849 24 00; Fax: (+48 61) 822 43 72
Department of Coastal Belt Water Protection, Institute of Meteorology and Water Management Jaśkowa Dolina 29, 80-286 Gdańsk Tel. (+48 58) 341 20 79; Fax: (+48 58) 341 20 78	State Geological Institute Rakowiecka 4, 00-975 Warsaw Tel. (+48 22) 849 53 51 ext. 96; Fax: (+48 22) 849 53 42
RESEARCH DEVELOPMENT INSTITUTIONS Economic University in Cracow, Rakowicka 27, 31-510 Kraków Tel. (+48 12) 293 53 32; Fax: (+48 12) 293 50 50	National Institute of Hygiene Chocimska 24, 00-791 Warsaw Tel. (+48 22) 849 33 32
K. Marcinkowski Academy of Medicine Grunwaldzka 6, 60-780 Poznań Tel. (+48 61) 865 95 66	Mining and Metallurgical University Reymonta 23, 30-059 Kraków Tel. (+48 12) 617 27 56; Fax: (+48 12) 633 63 48
Central Institute for Labour Protection – National Research Institute Czerniakowska 16, 00-701 Warsaw Tel. (+48 22) 623 46 81; Fax: (+48 22) 623 36 95	Kraków University of Technology Team of Trace Analyses Laboratory Warszawska 24, 31 155 Kraków Tel. (+48 12) 628 22 01; Fax: (+48 12) 628 20 56
Military Institute of Chemistry and Radiometry Gen. Chruściela 105, 00-910 Warsaw Tel. (+48 22) 516 99 36; Fax (+48 22) 673 58 51	Łódź University of Technology Wólczańska 175, 90-924 Łódź Tel. (+48 42) 631 37 00; Fax: (+48 42) 636 56 63
Institute of Industrial Chemistry Rydygiera 8, 01-793 Warsaw Tel. (+48 22) 633 92 91; Fax: (+48 22) 633 92 91	Silesian University of Technology in Gliwice Krzywoustego 4; 44-100 Gliwice Tel./Fax: (+48 32) 237 20 94
Institute of Chemical Coal Processing Zamkowa 1, 41-803 Zabrze Tel. (+48 32) 271 00 41; Fax: (+48 32) 271 08 09	Warsaw University of Technology Nowowiejska 20, 00-653 Warsaw Tel. (+48 22) 628 59 85, Fax: (+48 22) 629 29 62
Institute of Building Mechanisation and Rock Mining, Field Branch in Katowice "Centre of Waste Management" Barbary 21 a, 40-053 Katowice Tel. (+48 32) 251 74 54; Fax: (+48 32) 251 75 91	Wrocław University of Technology Gdańska 7/9, 50-344 Wrocław Tel. (+48 71) 320 64 34; Fax: (+48 71) 322 15 80 Faculty of Chemistry Gdańsk University ul. Sobieskiego 18/19; 80-952 Gdańsk Tel. (+58) 345 03 01; Fax: (+58) 345 04 72
Nofer Institute of Occupational Medicine Św. Teresy od Dzieciątka Jezus 8, 90-950 Łódź Tel. (+48 42) 631 48 43; Fax: (+48 42) 631 45 72	Warsaw Ecological Economy Centre Warsaw University Długa 44/50; 00-241 Warsaw Tel. (+48 22) 831 32 01; Fax: (+48 22) 831 28 46

Institute of Labour Medicine and Environmental Health Kościelna 13, 41-200 Sosnowiec Tel. (+48 32) 266 08 85 Fax: (+48 32) 266 11 24	Secretariat of "Responsible Care" Programme in Poland Toruńska 222, 87-805 Włocławek Tel. (+48 54) 237 21 76, 237 35 06 Fax: (+48 54) 237 24 12
Institute of Meteorology and Water Management Podleśna 61, 01-673 Warsaw Tel. (+48 22) 835 49 26 Fax (+48 22) 835 49 26	***INFORMATION CENTRES*** Environmental Information Centre Wawelska 52/54 00-922 Warsaw Tel. (+48 22) 579 22 11; Fax. (+48 22) 57 92 215
NON–GOVERNMENTAL ORGANIZATIONS (NGOs)	***CONSULTING COMPANIES***
Centre of Ecological Law Uniwersytecka 1, 50-951 Wrocław Tel./Fax: (+48 71) 341 02 34	PROEKO Co. Ltd. Environmental Protection Consultants Tamka 16, 00-349 Warsaw Tel. (+48 22) 827 59 00; Fax: (+48 22) 827 58 57
Lowersilesian Fundation of Sustainable Development Białoskórnicza 26 50-134 Wrocław Tel. (+48 71) 343 08 849 Fax: (+48 71) 343 60 35	CHEMEKO Expert and Designing Services Enterprise, Co. Ltd. ul. Toruńska 222; 87-805 Włocławek Tel. (+48 54) 237 35 06; Fax: (+48 54) 237 24 12
Nature Protection League Tamka 37/2 00-355 Warsaw Tel.(+48 22) 828 81 71 Fax: (+48 22) 828 65 80	***COMPANIES DEALING WITH WASTE CONTAINING POPs*** MALEX Waste Treatment Plant Wernera 23, 91-169 Łódź Tel. (+48 42) 714 02 78; Fax: (+48 42) 714 01 49
Consumers Federation, National Council Powstańców Warszawy 1 00-030 Warsaw Tel. (+48 22) 827 68 91	TIGRET Co. Ltd. Rumuńska 29B, 05-816 Michałowice Tel. (+48 22) 753 02 62; Fax: (+48 22) 753 03 94
National Foundation of Environmental Protection Erazma Ciołka 13, 01-445 Warsaw Tel. (+48 22) 877 23 59; Fax: (+48 22) 877 23 59	Chemicals Works ANWIL (hazardous waste incineration plant) Toruńska 222; 87-805 Włocławek Tel. (+48 54) 236 30 91; Fax: (+48 54) 236 19 83,
Waste Prevention Association *"3R"* P.O. Box 54 30 961 Kraków 5 Tel./Fax: (+48 12) 421 09 09, 654 99 86	Chemical Works ROKITA (hazardous waste incineration plant) Sienkiewicza 4, 56-120 Brzeg Dolny Tel. (+48 71) 319 25 12; Fax: (+48 71) 319 25 70
Polish Chamber of Chemical Industry Association of Employers Czackiego 15/17, 00-043 Warsaw Tel. (+48 22) 828 75 06; Fax: (+48 22) 826 73 39	POFRABAT Co. Ltd. Heliotropów 1; 04-796 Warsaw Tel./Fax. (+48 22) 872 26 42
Polish Ecological Club Mariacka 1, 40-014 Katowice Tel./ Fax: (+48 32) 251 75 90	LOBBE Co. Ltd. Koksownicza 16; 42-523 Dąbrowa Górnicza Tel. (+48 32) 795 57 67 Fax. (+48 32) 795 57 68

Annex 7.

AN OUTLINE OF EDUCATIONAL PROGRAMMES ON POPs

Educational programmes for schools

The preparation of programmes requires determination of topics, selection of communication means and deciding on the degree of detail for different educational material packages depending on the types and levels of schools (post-primary, secondary and high schools). And, thus, such programmes should contain the following scope of information for different levels of education:

- **Post-primary schools (*gymnasiums*)** – general information on persistent organic pollutants, such as basic definitions, physical and chemical properties of POPs, their ways of generation, uses and examples of POPs in the environment, their negative environmental and human health impacts as well as possible disposal methods. POPs characteristics should include information on their resistance to physical, biological and chemical destruction processes; their solubility and toxicity.
- **Secondary schools** – apart from the above information the programmes should include broadened information on the physicochemical and toxicological properties of persistent organic pollutants. Programmes for these schools should also include information on generation processes, including unintentional production of POPs, their use in the economy and every day life, emission sources and releases. These programmes should also cover information on POPs circulation in the food web and effects on living organisms, including human health and environmental impacts. Programmes should also include information on acceptable intake of different POPs, with special attention to the effects of exceeding permissible levels;
- **Academic schools** – issues connected with POPs generation sources, environmental pathways, effects of environmental contamination, human health impacts and technical solutions preventing POPs emissions and releases.

Educational programmes, apart from general issues, depending on the type of high schools, should be extended with elements adjusted to their educational interests. The scope of educational programmes for universities of technology should provide knowledge on best available techniques, including techniques and technologies used in the industry and energy sectors, metal processing, construction, production of plant protection products, in the municipal sector (waste incineration) and in transport, which will lead to high level of environmental protection, also in terms of protection against environmental threats and effects caused by POPs.

The programme of education for agricultural academic schools should include detailed information on the composition of chloroorganic pesticides (POPs listed in Annexes A and B to the Convention), about their activity and environmental threats that they pose, resulting from POPs misuse and inappropriate storage and treatment of obsolete pesticides.

Additionally, the programme should provide information on modern measurement methods of POPs in food and feedstuffs, as well as on alternative plant protection products.

Whereas, education programmes designed for medical academies should be based on information on effects of POPs on humans and animals, on ecotoxicity and toxicity, POPs in the food chain, measurement methods for POPs in living organisms, as well as on preventive measures and medication methods.

Educational programmes addressed to different profession groups

Educational activities targeted at teaching staff and medical doctors should cover new training schemes. This should be accomplished by reviewing currently available information dispersed in different educational programmes intended for the two selected profession groups. New outlines should contain the existing data on POPs taking account of new requirements laid down by the Stockholm Convention, as well as the provisions of the Aarhus Protocol:

- New research results and information sources on POPs, legal background for activities taken at international and national levels in the field of environmental protection against persistent organic pollutants; activity areas;
- Persistent organic pollutants:
    - Definitions (characteristics, identification and properties)
    - Current and historical uses,
    - Propagation pathways,
    - Impacts on living organisms and the environment;
- Responsibilities of medical staff/doctors in providing information to the public on health risks caused by the presence of POPs in the environment (preventive measures, diagnosis, medical treatment).

Educational programmes for other target groups

Local self-government administration and other stakeholders should be provided with guidelines for raising public awareness on human health and environmental threats caused by POPs in relation to waste management as well as on possible preventive measures.

Public education on POPs should also include aspects of effective heat generation for household purposes and cover the following issues:

- Hazards caused by ineffective combustion of solid fuels and bio-mass, especially compounds classified as POPs,
- Restrictions for burning household waste, grass-burning, etc,
- Promotion of effective techniques and technologies of heat generation by publishing information materials promoting and enabling selection of environmentally sound and cost effective heating systems for housing purposes,
- Education for the owners of small enterprises producing low capacity heating installations to promote development of such activity.

The framework scheme for educational programme foresees subdivision of the task into two phases. Within the first phase selected target groups should be provided with basic knowledge

on POPs hazards, as public awareness in this field is varies among different groups. Therefore the aim of the first phase is to make the commonly known information on POPs, uniform. The second phase will focus on supplementing, broadening and updating the knowledge on POPs for different target groups.

Methods for raising awareness

Awareness raising, in the first place, requires a series of training courses (sessions) for selected target groups (for example, public and private decision-makers, businessmen, non-governmental organizations) and developing an Internet website with basic information on POPs. Then training programmes should be prepared and training carried out having in mind regular extension of information provided through the Internet and preparation and publishing by the Environmental Information Centre a hard and electronic copy of an information bulletin. All this should be complemented by a cycle of scientific articles propagating the results of scientific research and monitoring published in periodicals directed to experts. Special attention should be given to the development and regular updating of an information package on POPs. This package should be targeted at the public as a whole, but especially decision-makers of appropriate levels of the management staff of enterprises causing POPs emissions. The scope of information transmitted to the target groups should be based on the framework programme covering the same issues as in educational programmes and targeted accordingly to the type of group.

Involving non-governmental organizations into the process should be the key element of the strategy for promotion of education, training and raising awareness on POPs.

Annex 8.

RECOMMENDATIONS REGARDING POPs MONITORING

In developing the extended monitoring system and compiling recommendations concerning the selection of sites, periods and frequency of sampling, it is necessary to take account, *inter alia*, of information on the current and past production and use of substances/preparations containing POPs, current and historical data on emissions in the region, flows of pollutants in the environment (on both local and long-range transboundary fluxes), the level of background concentrations for all investigated environmental components, noted also outside the country. It is important to take into account the position of the organisms in the trophic chain and the distribution of species within the country and its neighbourhood when selecting biological material for testing in order to obtain comparable samples. It is also necessary to ensure a rational linking of the new monitoring scheme with the previously established and operating systems (at local, regional, national and international levels), to make use of the already existing research potential. Monitoring of substances subject to the Stockholm Convention encompasses the following main tasks:

Determining concentrations of POPs covered by the Convention in various environmental media: air, water, bottom sediments, soil and living organisms as well as projections on future trends concerning the concentration levels of these pollutants;

Collection of data on short-term spatial changes and fluctuations allowing to determine the main sources of POPs within the country (and possibly neighbouring areas), circumstances of pollutant emissions, their transportation and determination of their background level;

Observation of levels of pollutants in long-living animals, belonging to the higher levels of the food chain accumulating POPs, to determine the state of environmental pollution by these substances and to undertake comparisons with situations in other regions.

High toxicity potential of the substances covered by the Stockholm Convention, the complex character of the congeners found in field samples and in biological matrix (including food) and the level of their occurrence in sub-trace quantities (picogrammes per gramme of sample), requires extremely sensitive and type-specific analytical analyses. Properly taken samples require labour-consuming processes to isolate the analyte from the matrix, to remove the background compounds through complex and column chromatography, to separate isolated extracts using high resolution gas chromatography (HRGC) and qualitative and quantitative determination by mass spectrometry.

POPs bio-concentration monitoring plan. The monitoring plan anticipates annual sampling of selected foodstuffs, food products and double diets in certain regions throughout the year, so as to collect within a three-year period full research data to carry out risk and exposure assessment for the whole country. After the first year's survey research should be deepened to identify transmission and accumulation pathways of selected compounds in the food chain for farm products containing the highest loads of POPs and groups of products significant in relation to fat consumption. Research shall cover, in a proportional way to their share in the diet, products imported from EU and other countries. Food products referred to in the EU

regulations concerning feed and foodstuffs will be tested. Furthermore, tests of double diets and human milk will be carried out in regions to be monitored.

The monitoring programme will focus on representative tests of time and spatial variability of POPs through determination of POPs bio-concentration in vegetable and animal fat. Such products will, *inter alia*, include:

- Rape seed, rapeseed oil, ground rape seed/rapeseed cake;
- Butter;
- Fresh water and sea water fish, predatory fish with high fat level (e.g. cods, herrings, Baltic salmons, eels, carps);
- Poultry, pigs and wild swines – kidney area fat, back fat;
- Maize and other products of significant share in the diet and of high fat content;
- Double diets;
- Collected human breast milk.

Table 8.1 presents the estimated annual costs of the implementation of the POPs bio-monitoring programme, including costs for single measurements, sampling and sample preparation.

During the initial phase of the development of the POPs monitoring system for wastes, it is recommended to carry out preliminary measurements to evaluate environmental impacts caused by obsolete pesticide landfills or any other landfills identified as sites potentially contaminated with POPs. Individual measurements are also recommended when significant changes linked to a given landfill likely to cause environmental threats are observed, as well as when assessing the state of the environment after the landfill has been removed/eliminated. Monitoring is also required for the obsolete pesticide landfills referred to in Chapter 3.3.8.

Table 8.1. Annual costs of POPs bio-monitoring

No.	Biological material	Number of samples/ analyses annually	Cost of analysis [PLN/year]			Dioxins/furans*	
			Seven PCB congeners	Plant protection products	Dioxin-like PCBs	Number of samples	Cost [PLN]
	Cost per unit [PLN]:		190	190	740		4 960
1.	Rape seed, rape oil, ground rape seed/rape oil-cake	240	45 600	45 600	177 600	48	238 080
2.	Butter	240	45 600	45 600	177 600	48	238 080
3.	Fresh water and sea water fish, predatory fish and/or with high level of fat tissue (e.g. cods, herrings, eels, carps)	240	45 600	45 600	177 600	48	238 080
4.	Poultry, pigs and wild swines – kidney area fat, back fat	240	45 600	45 600	177 600	48	238 080
5.	Maize and other products of significant share in the diet and of high fat content	240	45 600	45 600	177 600	48	238 080
6.	Double diets	240	45 600	45 600	177 600	48	238 080
7.	Collected human milk	240	45 600	45 600	177 600	48	238 080
Total		***1 680***	***336 000***	***336 000***	***1 260 000***	***336***	***1 680 000***
I.	Annual cost of sampling and sample preparation [average150 PLN/sample] [PLN]						252 000
II.	Annual costs of analyses [PLN]						3 548 160
Annual costs of biological monitoring of POPs [PLN]							**3 800 160**

* Assessment of the costs of dioxin and furan analyses, assuming that 20% of samples will be analysed by using HRGC/HRMS techniques.

Annex 9.

RESEARCH PRIORITIES FOR PCDDs/PCDFs AND PCBs

(based on the Community Strategy for Dioxins, Furans and Polychlorinated Biphenyls [85])

RESEARCH PRIORITIES
1. Environmental fate and transport
Atmospheric environment
Measurements of wet and dry deposition
Modelling studies on PCDD/PCDF behaviour in the atmospheric environment
Long range transport (over Europe)
Terrestrial environment
The significance of root uptake, especially in respect of interspecies variability
Assessment of air to soil transfer and of the various deposition mechanisms to vegetation (wet, dry particle, and dry gaseous)
Fate and transport of PCBs and PCDDs/PCDFs in landfills
Studies on the levels of PCDDs/PCDFs associated with burning PCP treated wood
Studies on the levels and sources of PCDD/PCDFs in composted material and the environmental fate of the PCDDs/PCDFs in the composted material and in sewage sludge
Modelling studies of PCDD/PCDF behaviour in the terrestrial environment
Selection of appropriate plants to be used as bio-accumulators of PCBs and PCDD/PCDFs
More measurements of background concentrations of PCBs and PCDDs/PCDFs in vegetation and animal tissue and definition of reference values
Aquatic environment (general research has been very extensive, therefore it is proposed to focus on more specific gaps):
Development of standardised sampling strategies for determining representative PCDD/PCDF concentrations in fish and sediments
Availability of organic carbon-associated PCDDs/PCDFs in sediments for aquatic ecosystem
Modelling studies of PCB and PCDD/PCDF bio-accumulation/bio-magnification in the aquatic environment and the food chain
Degradation of PCBs into metabolites in water and sediments
2. Ecotoxicology and human health
Estimates of human exposure to dioxins and PCBs through ingestion, inhalation, skin contact
The effects of chronic or periodic exposure to PCBs (and metabolites) and to dioxins
Identification of particular vulnerable species as bio-indicators for the monitoring and protection of “at risk” habitats or sites
Elaboration of a methodology to set limit values for lower effect levels in fauna
Upgrading knowledge on bio-accumulation factors in the trophic chain
Establish a Toxic Equivalent Factor for non-coplanar PCB congeners with thyroid interaction or neurotoxicity

RESEARCH PRIORITIES
Significance of climate, agricultural practices and dietary regimes to PCB and dioxin exposure in Southern Member States of the EU, which differ from those of the Northern Member States
Epidemiological studies, including target groups like foetus, infants, etc.
3. Agro-food industry
Studies on the carry-over and establishing pertinent transfer factors for the different PCBs and PCDDs/PCDFs from soil, sediment and feeding stuffs to animals tissues, including fish (e.g. meat, fat) and products (e.g. milk and eggs). Particular attention needs to be paid to the dioxin-like PCBs: – Determination of transfer factors for dioxin-like PCBs from soil and feeding stuffs to animal tissue and products (milk) for cattle (ruminants) – Determination of transfer factors for PCDDs/PCDFs and PCBs (in particular dioxin-like PCBs) from soil and feeding stuffs to animal tissues and products (eggs) for poultry – Determination of transfer factors for PCDDs/PCDFs and PCBs (in particular dioxin-like PCBs) from feeding stuffs to animal tissues and products for pigs – Determination of transfer factors PCDDs/PCDFs and PCBs (in particular dioxin-like PCBs) from sediment and feeding stuffs for fish
Assessment of agricultural or industrial practices (such as hot air feedstuff drying, use of chemical substances like solvents, pelleting aids etc. for the production of feeding stuffs, fermentation, etc) for their potential to produce PCDDs/PCDFs
Quantification of potential PCB and PCDD/PCDF input into animal feedstuff via recyclates such as used edible oils & fats, slaughterhouse wastes etc.
4. Source inventories
Source data on PCBs
Contribution of waste and recycling of waste (including processes) to total emissions into environment /food chain
Contribution of products to total emission into the environment (e.g. cosmetics, pesticides, textiles, plastics, paper, etc.)
Domestic incineration of wood and coal combustion (domestic + industrial)
Reservoir sources (behaviour, degradation processes, decontamination methods, etc.)
5. Analytical aspects
Investigation on cheaper, faster and reliable analytical alternatives and their limitations
Inter-calibration of dioxin laboratories in order to ensure consistent results across Europe
Guidelines/standards for sampling, data generation and reporting
6. Decontamination measures
Decontamination methods for products (mothermilk, fish oil, etc.)
Decontamination methods for soils and sediments
7. Monitoring
Development of a Geographical Information System (GIS) integrated in the global environment GIS strategies

Annex 10.

COSTS OF TREATMENT AND ELIMINATION OF POPs IN POLAND

Non-capital expenditures required for the implementation of the Stockholm Convention

This group of costs primarily covers the costs of legislative, organisational and institutional activities as well as activities connected with research and development, monitoring and education. To determine the costs connected with legislative activities a scale of charges based on the Act on Public Orders[98] was used taking into account the need for further expertise in this field. The required costs of different activities included in the NIP have been estimated by relevant experts.

As it may be concluded from Table 3.6.2, the highest costs are connected with monitoring activities. POPs monitoring is the most costly undertaking of all organisational costs. However, without updated information on the state of the environment in the context of POPs hazards, it will not be possible to demonstrate to the Conference of the Parties progress made in compliance with the provisions of the Convention.

Most of the financing required for carrying out the activities foreseen in this NIP will come from the state budget. Poland will be responsible for raising these funds, and thus the burden of bearing these costs will be shared between the state budget and the voivodeship budgets. Enterprises, the National Fund for Environmental Protection and Water Protection and the Voivodeship Funds should also make their contribution in the funding. It is also possible to take advantage of foreign assistance funds for the implementation of the NIP.

Capital expenditures required for the implementation of the Convention

Costs discussed under this section have been split into two groups: costs of services and capital investments. The first group of costs refers to activities, where no investments are required, and the on-going activities allow for the treatment of POPs waste. This mainly relates to activities connected with the elimination of PCBs from operating and discarded electrical equipment and with the elimination of obsolete pesticides from the environment. In this case costs have been calculated on the basis of information obtained directly from companies involved in the decontamination and treatment of electrical equipment and disposal of liquid PCB waste and pesticide waste, as well as on information obtained from the National Fund for Environmental Protection and Water Management.

The second group of costs - connected with capital investment - deals with the introduction of new solutions, which have not been applied so far in Poland. Such capital expenditures are planned in connection with the prevention of PCDD, PCDF and PCB emissions generated unintentionally, with the reduction of POPs emissions in waste treatment processes, with the management of waste from combustion processes (flue gas cleaning), wastewater treatment and treatment of other POPs containing wastes from industrial landfills.

[98] Act of 10 June 1994 on Public Orders (DzU of 1994 No. 76, item 344; as amended); repealed by the Act of 29 January 2004 – Public Orders' Law (DzU of 2004, No. 19, item 177).

COSTS OF SERVICES

Elimination of PCBs from electrical equipment. The following authorised enterprises are involved in the collection, decontamination and treatment of PCB-containing equipment and waste in Poland:

- ANWIL in Włocławek with an installation for the thermal treatment of PCB-contaminated liquid waste;
- CHEMEKO Co. Ltd. in Włocławek, belonging to the ANWIL Group performing decontamination of transformers and organizing deliveries of PCB waste for treatment in the ANWIL installation (currently CHEMEKO is operating this installation);
- LOBBE Co. Ltd. in Dąbrowa Górnicza operating a facility for the thermal processing of industrial and hazardous waste;
- Chemical Works ROKITA Co. Inc. in Brzeg Dolny with an installation for the thermal treatment of liquids containing PCBs;
- POFRABAT Co. Ltd. in Warsaw dealing with the collection of PCB-containing capacitors containing PCBs and exporting them for complete destruction; in 1999–2001 about 170 Mg of PCB-containing capacitors have been exported to France.

Treatment of PCB-containing liquid wastes. Thermal transformation of liquid waste containing PCBs is performed by:

1) **CHEMEKO Co. Ltd. in Włocławek**

Maximum capacity of the treatment installation:	1000 Mg/year
Treatment cost:	6000–8000 PLN/Mg (depending on the total PCBs content of waste).

2) **LOBBE Co. Ltd. in Dąbrowa Górnicza**

Maximum capacity of the treatment installation:	3000 Mg/year
Treatment cost:	2500 PLN/Mg (liquid waste must have a heating value greater than 25 MJ/kg).

3) **Chemical Works ROKITA Co. Inc. in Brzeg Dolny**

Maximum capacity of the treatment installation:	5000 Mg/year
Treatment cost:	app. 5500 PLN/Mg (it may vary depending on the total PCBs content of waste).

The above compilation shows that the total capacity of operating installations for treating PCB-containing liquid waste in Poland amounts to 9000 Mg/year. According to the "Preliminary Plan for the Elimination of PCBs" [29], the total amount of these wastes (oils removed from transformers, discarded capacitors and other equipment, such as switches, rectifiers, waste oils and liquids from decontamination processes) is estimated in Poland at 3000 Mg. This means that, annually, each of the listed facilities is capable of treating this amount of waste by itself. Overall capacities of the existing installations are 3 times higher than the existing stocks of liquid PCB waste in Poland.

The cheapest option of treatment is incineration in the hazardous waste incineration plant in Dąbrowa Górnicza. In this case the cost of treatment is 2-3 times lower than the cost of thermal transformation of waste in any other installations. Since the incineration plant in Dąbrowa Górnicza operates only since 2003, it is expected that the other two companies treating hazardous waste will revise their cost offers and reduce their waste treatment charges to stay on the market. Thus, treatment costs for all liquid PCB waste in Poland, taking into account the cheapest option, would amount to 7.5 million PLN, excluding the cost of transport, which is insignificant compared to incineration costs. According to data obtained from the Chemical Works ROKITA and the LOBBE Company costs connected with transport are estimated at 3 PLN/km. Taking into account that the average distance to the incineration plant is 200 km and there is about 12 Mg of liquid waste in an average tank, we end up with a unit cost of 50 PLN/Mg. Incorporating the transport cost into the earlier estimate we obtain the total treatment cost for liquid PCB waste in Poland, amounting to 7.65 million PLN. Assuming that PCB waste should be completely eliminated by 2010 and that the same amount of waste is incinerated annually we end up with an average annual cost of app. 1.1 million PLN.

Treatment of capacitors containing PCBs. Currently such waste is exported for destruction abroad. This is carried out by POFRABAT Ltd. For the year 2003 the maximum amount was set at 230 Mg (the limits are set on annual basis). The cost of treatment is 10-16 thousand PLN/Mg. This price depends on the cost of services offered by the foreign partners of the company (transport companies), on the exchange rate of USD/PLN, the amount of PCBs transported, on the state of the contaminated equipment received, on the scope of work required for its dismantling and preparing for transport, and on environmental fees that are obligatory abroad. The services include: supplying metal containers for transport, transport from the production company to the place of temporary storage, storage, transport to France and treatment in the French company – TREDI.

Between 1999 and 2001 the POFRABAT Company exported about 170 Mg of capacitors with PCBs to France. In 2002 the limit was set at 300 Mg, while in 2003 at 230 Mg. So far these capacities have not been fully used, as Polish companies were not interested in handing over capacitors for treatment. This situation may change in view of Polish legal regulations in force and after the ratification of the Stockholm Convention. Its implementation, along with the possibility of obtaining foreign financial resources, will encourage the holders of PCB equipment and waste to dispose of them in an environmentally sound manner.

Taking into account the current annual limit set by French authorities, the elimination of all identified Polish capacitors, on similar terms, would take 6 years, i.e. until 2009. The annual costs of this operation would in this case amount to about 3 million PLN.

Table 3.3.4.1 shows that the total mass of capacitors and other equipment containing PCBs requiring treatment amounts, presently in Poland, to 1.38 Gg. Assuming that the average cost of treatment is 13 thousand PLN/Mg, the total cost of solving the problem of capacitors would require an input of 17.94 million PLN. If the problem were to be solved by 2010, then the annual costs of this operation would be app. 2.56 million PLN.

Decontamination of PCB-containing transformers. Decontamination is carried out by CHEMEKO Co. Ltd. from the ANWIL Group. The maximum capacity is 50 transformers discarded as scrap (taking into account the limited size of a transformer: up to 6 Mg of weight and 3.8 metres high) and 200 transformers planned for further use with rated power up to 4 MVA. The installation capacity for treating liquid oil containing PCBs is 1000 Mg/year. The

cost of treatment is app. 6000 PLN/transformer plus 6–8 PLN/kg of PCB-containing oil (these prices do not include costs of laboratory analyses, which vary between 250–300 PLN/sample).

The decontamination of transformers discarded as scrap is carried out in a technology line of "installations for the recovery of hydrogen-chloride from chloroorganic compound wastes" in ANWIL. In this case the total cost of treatment consists of the costs of laboratory analyses, collection and decontamination of transformers, separating wooden elements impregnated with PCBs from transformers and thermal treatment of these parts, as well as safe management of metal parts regarded as non-hazardous waste.

Decontamination of transformers intended for further use is carried out on the premises of the client. In this case the price incorporates the quantitative and qualitative analyses of oils, the whole decontamination process, the filling of transformers with new, PCB-free oils and the preparation of equipment for operation.

Irrespective of the location of contaminated transformers, whether on the premises of ANWIL or on the premises of the client, the price of a single transformer cleaned up remains the same, i.e. 6000 PLN. Considering that there are app. 1882 transformers and other equipment to be decontaminated and that their total mass amounts to app. 5652 Mg[99], the total cost of the process amounts to app. 11.29 million PLN.

If both transformers intended for further use and those to be discarded as scrap were to be treated jointly the duration of the decontamination process in Poland would be estimated at 5 years, considering the use of the maximum capacity of ANWIL. The average annual cost of this process until 2010 would amount to 1.61 million PLN.

There is a possibility for exporting small transformers discarded as scrap for treatment abroad. It is estimated that the costs of such services (including costs of decontamination) would be close to the cost of export and treatment of capacitors containing PCBs, and is estimated at app. 13000 PLN/Mg. In this case the remaining parts of the transformers are not deposited in Poland.

The total cost of the elimination of PCBs (accumulated in discarded electrical equipment and those still in use) from the environment would amount to – according to calculations – about 36.88 million PLN. For these estimates only methods already applied in Poland for the decontamination and treatment of equipment and wastes contaminated with PCBs were considered, for alternative solutions were found to be either more expensive or not even rough estimates were available as to the costs incurred. The cost analysis does not include a certain amount of equipment, which, although have been identified, have not been evaluated for their mass and PCB content.

The annual costs of activities analysed are estimated at 5.26 million PLN. This estimate refers to the implementation period lasting from 2004 to 2010. The industry and private sector will be mainly charged with the costs of implementing this priority The equal distribution of planned expenditures over the years is obviously a simplification. In reality the tasks, hence the annual costs, will depend on the government and the pressure exerted by the industry on decision makers to create mechanisms supporting these activities.

Removal of obsolete pesticides from the environment. Obsolete pesticides deposited many years ago in pesticide landfills have undergone processes resulting in large amounts of toxic

[99] It was assumed that the average mass of equipment for decontamination is app. 3 tonnes.

mixtures of pesticides belonging to different chemical groups. The elimination of an obsolete pesticide landfill means an integrated action that solves the problem of obsolete pesticides once and for all. In practice three operations are required to clean up a pesticide landfill:

- Extraction, packing, preparation for transport, transportation and treatment by incineration of the pesticide waste accumulated in pesticide landfills and storehouses; this is the only rational method to eliminate these substances,
- Dismantling of the concrete construction of the pesticide landfill followed by extraction, transport and decontamination of the soil from the landfill site, and disposal of concrete residues,
- Reclamation of the area surrounding the removed landfill.

According to data gathered by the State Geological Institute (PIG) pesticide landfills are holding at present app. 7500 Mg of pesticide waste - this amount has been taken into account in this analysis.

The average cost of the destruction of 1 Mg of obsolete pesticides with the use of technologies applied in projects financed by the National Fund for Environmental Protection and Water Management during 1999–2002 was 13358 PLN. This cost was estimated on the basis of executive cost-calculation sheets for 12 projects. The most significant elements included: the cost of transport, incineration, site remediation, purchasing of protective suits, operation costs of equipment, purchasing special containers and monitoring. According to an ongoing project that is financed by NFOŚiGW: "Elimination of closed down landfills of hazardous waste", the average total cost of elimination of obsolete pesticides is 10344 PLN/Mg, where the cost of incineration alone is 4166 PLN/Mg. Two options for the elimination of obsolete pesticides have been taken into consideration based on data and information from the Institute of Plant Protection, and information on service prices offered by LOBBE from Dąbrowa Górnicza:

- Export and thermal destruction in the Netherlands, Belgium or Germany, as practiced so far;
- The use of the thermal industrial and hazardous waste treatment installation of the LOBBE Company at Dąbrowa Górnicza.

A comparison of these two options is illustrated in Table 10.1. Costs presented in the table were calculated per 1 Mg of pesticides from an "average pesticide landfill" (the total costs of all operations for all landfills divided by the total mass of pesticides therein). It is clear that the costs of activities, such as site remediation, depend on the type of landfill (concrete rings, land pits, stores or stockpiles). For stores the costs connected with extraction and site reclamation are much lower than in the case of land pits or landfills made of concrete well rings. However, due to lack of detailed data average costs are presented below without any specification for different types of landfills. Therefore the costs of reclamation below should be treated only as rough estimates (these are average costs of reclamation for several dozen landfills, which contained app. 3000 Mg of obsolete pesticides, in total).

The data on treatment costs abroad come from the final reports of projects financed by NFOŚiGW, whereas information on treatment costs in Poland comes from the LOBBE Company. The cost of incinerating obsolete pesticides (classified, in terms of toxicity, as class I and II) is 2500 PLN/Mg in the case of a certain type of waste. If the waste does not comply with certain conditions, an additional charge is taken, depending on the physical and chemical

properties of the treated waste and it varies from 50 to 600 PLN/Mg. The price of 2500 PLN/Mg has been taken into account in the cost analysis.

Table 10.1. A comparison of two disposal options for obsolete pesticides

Specification	Cost of waste treatment abroad	Cost of waste treatment in Poland
Total cost (for 7 500 Mg)	80.25 mln PLN	59.25 mln PLN
Cost per Mg of waste	10 700 PLN/Mg	7 900 PLN/Mg
Incineration cost per Mg	4 500 PLN/Mg	2 500 PLN/Mg
Cost of transport* per Mg	900 PLN/Mg	100 PLN/Mg
Land reclamation** cost per Mg	2 800 PLN/Mg	2 800 PLN/Mg
Extraction + segregation + loading cost per Mg	2 500 PLN/Mg	2 500 PLN/Mg

Source: estimates of the NFOŚiGW and the LOBBE Company's bidding proposal.

* Average transport cost – for abroad: transport to the Netherlands, Belgium or Germany (Leverkusen); for Poland: transport to Dąbrowa Górnicza. Transport cost for Poland has been estimated on the basis of information obtained from the two companies: LOBBE and ROKITA (the average transport distance for Poland was estimated at 400 km).

** Reclamation of contaminated sites includes the following activities:

- Extraction, transport and decontamination of polluted soil;
- Dismantling, transport and treatment of the solid structure of the pesticide landfill;
- Filling the emptied pits with clean soil; macro-levelling the site and introducing vegetation (forestation, tree planting);
- Geological analyses and monitoring.

The LOBBE incineration plant in Dąbrowa Górnicza has a capacity to eliminate 2000 Mg of pesticides annually. When the quantities of waste are high the incineration prices may be negotiated. The company operates the only installation in Poland that can incinerate pesticides in accordance with binding regulations on the basis of an integrated permit. The structure of the installation meets the criteria of best available techniques.

The performed analysis shows that the cost of eliminating obsolete pesticides within the country is about 25% lower than abroad (7900 PLN/Mg). This is mainly due to the lower incineration prices in Poland and – to a smaller extent – lower transport costs. Domestic capacity (2000 Mg/year) is sufficient in the context of the obligations of the Stockholm Convention. The cost of eliminating pesticide landfills within the country by domestic incineration would amount to about 59.25 million PLN.

The National Waste Management Plan envisages complete elimination of the existing obsolete pesticide landfills by 2010. This allows to determine the annual cost of this operation at about 8.46 million PLN.

However, one must bear in mind that by deciding on treatment of pesticides abroad we also eliminate the problem of the incineration slag. The quantity of this waste amounts to app.

15%–19% of the primary amount of waste and is considered hazardous. Furthermore, there is additional emission from waste incineration, although the high quality of the process guarantees minimal environmental impact. Both of these aspects should be taken into consideration in the price calculation provided by the LOBBE Company (for the purposes of this Plan the cost of LOBBE services also includes safe depositing of the slag).

The total costs of services (Table 10.2) of direct elimination of POPs in Poland are estimated at 96.13 million PLN, of which 36.88 million PLN is needed to eliminate PCBs contained in the still in use and discarded electrical equipment, and 59.25 million PLN is required to eliminate obsolete pesticides from the environment.

Table 10.2. Costs of services

Action and its number	Option	Sources of funding	Costs [mln PLN]
C6 Treatment of liquid waste containing PCBs	Thermal transformation of liquid waste containing PCBs in Poland	Foreign assistance 75% Enterprises 25%	7.65
C6 Treatment of capacitors containing PCBs	Treatment abroad	Foreign assistance 75% Enterprises 25%	17.94
C6 Decontamination of transformers containing PCBs	Decontamination in Poland	Foreign assistance 75% Enterprises 25%	11.29
B2 Elimination of pesticide landfills and stocks of obsolete pesticides	Incineration in Poland or transport and treatment abroad	Environmental funds 50% Foreign assistance 50%	59.25*
Total			96.13

* Cost calculated for the cheaper option – incineration within the country.

Average annual costs of decontamination and elimination of PCB-containing equipment and waste are estimated at app. 5.26 million PLN, considering that the problem is to be solved by 2010 (Table 10.4). To eliminate obsolete pesticides deposited within the territory of Poland the average annual service costs will amount to app. 8.46 million PLN for the covered period. Thus, the total annual cost of services required to achieve the goals of both priorities until 2010 will amount to app. 13.72 million PLN. The burden of bearing costs, in the case of PCB elimination, will be assigned mainly to enterprises, especially to power plants. Companies are eligible for foreign assistance in the execution of these tasks (mainly from the EU Structural Funds). With reference to the elimination of obsolete pesticide landfills, environmental protection funds at various levels are expected to be the main sources of financing. However, taking into account the position of the European Union expressed in Article 11 of 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, it may be expected that the EU will also provide assistance for solving this problem. Therefore, the present NIP

foresees 75% or 50% share of foreign assistance in the funding of service activities (Table 10.2).

INVESTMENT COSTS

Investment activities for the reduction of POPs emissions from the processes of waste treatment and management of waste deriving from the cleaning of flue gases, wastewater treatment and processing of other POPs-containing waste are considered jointly, because the characteristics of pollutants subject to these activities allow, to a substantial degree, for applying one type of technology for their elimination.

Taking into account the solutions proposed by experts, the investment cost of building an installation based on the process of oxidation of organic pollutants in water was estimated at 15 million PLN, and the year 2009 was proposed for launching the project (Table 10.3).

The NIP envisages the sealing-up of the existing waste landfill containing POPs at the ORGANIKA–AZOT Chemical Works in Jaworzno to reduce POPs releases into the environment. It has been proposed to undertake the following investments tasks: sealing-up the RUDNA GÓRA landfill (an area of 14 ha) and building a depression drainage system for this area (2.5 km long). The cost of investment has been estimated at 17 million PLN. The required scope of work includes: levelling work, excavations, transportation and preparation of a 0.5 metre thick loam isolation and geo-membranes; delivering of humus and planting low-growing plants, as well as carrying out drainage works (depression drainage 3 metre deep with collective wells and pumping station). The starting of the project is scheduled for 2007.

Table 10.3. Capital expenditures

Action and its number	Option	Sources of funding	Expenditures [mln PLN]
E5 Reduction of POPs emissions in waste treatment processes	Putting into operation an installation based on alternative technology	Foreign assistance 75% Enterprises 25%	15
E5 Management of waste from flue gas cleaning, wastewater treatment and processing of other wastes containing POPs			
E4 Stabilization of waste in ORGANIKA–AZOT Chemical Works' industrial waste landfill	Sealing up of 14 ha surface area + depression drainage over 2.5 km	Foreign assistance 75% Enterprise 25%	17
Total			**32**

Enterprises will be the sources of funding for all of these capital investment projects. However, they will require support and it is expected that assistance will be provided from foreign sources and co-financing from the National Fund for Environmental Protection and Water Management. As the first two projects are considered a novelty in terms of application

in Poland a considerably high share (75%) of foreign assistance in their financing may be expected. The total capital expenditure for the above three projects are estimated at 32 million PLN (Table 10.3).

Table 10.4 presents a summary of planned capital expenditures and costs of services for the different years of the implementation period.

Table 10.4. Timetable for the implementation of services and capital investment actions included in the NIP

No.[100]	Actions	Option	Expenditures in consecutive years [million PLN]							Total expenditures [million PLN]
			2004	2005	2006	2007	2008	2009	2010	
TIME SCHEDULE FOR COSTS OF SERVICES										
C6	Treatment of liquid waste containing PCBs	Thermal transformation of liquid waste in Poland	1.09	1.09	1.09	1.09	1.09	1.09	1.11	7.65
C6	Treatment of capacitors containing PCBs	Treatment abroad	2.56	2.56	2.56	2.56	2.56	2.56	2.58	17.94
C6	Decontamination of transformers containing PCBs	Decontamination in Poland	1.61	1.61	1.61	1.61	1.61	1.61	1.63	11.29
B2	Elimination of pesticide landfills and stocks of obsolete pesticides	Incineration in Poland	8.46	8.46	8.46	8.46	8.46	8.46	8.46	5.25
Total cost of services			**13.72**	**13.72**	**13.72**	**13.72**	**13.72**	**13.72**	**13.81**	**96.13**
TIME SCHEDULE FOR CAPITAL EXPENDITURES										
E5	Reduction of POPs emissions in waste treatment processes	Putting into operation an installation using alternative technology						15		15
E5	Management of waste containing POPs									
E4	Stabilization of waste in ORGANIKA–AZOT Chemical Works' industrial waste landfill	Bottom-sealing the landfill and installing a drainage system				17				17
Total capital expenditures						**17**		**15**		**32**

[100] Number according to the numbering of actions used in Annex 3.

Annex 11.

CONSULTATION PROCESS FOR THE NIP

1. An Inception Workshop on the "Implementation of the Stockholm Convention" initiating the execution of the GEF Project in Poland was held on **21–22 March 2002 in Warsaw**. A two-day meeting created a good opportunity to enhance public awareness on risks posed by persistent organic pollutants at a national level, and to develop business contacts within the Project. Around 70 representatives of institutions throughout the country involved in POPs-related issues, including decision makers, representatives of the industry, R&D institutes, non-governmental organisations and international experts attended the Workshop.
2. An Inventory Workshop intended to review all reports that had been accomplished to date under the Project took place on **2 December 2002 in Warsaw**. Its aim was to discuss the problems that the experts involved in the Project faced in the course of their inventory activities.
3. "Priorities of the National Implementation Plan for the Stockholm Convention" were discussed at a National Priority Validation Workshop, which was held on **26 May 2003 in Warsaw**. Its major aim was to evaluate the criteria, priorities and goals proposed, which were to be considered in the NIP. Additionally, the results of the second phase inventory of POPs covered by the Convention were presented during the Workshop, with the general overview of the situation with POPs in Poland. The invited experts discussed the approach proposed and presented a positive opinion regarding the criteria and priorities emphasising their importance for proper designing of the Plan for the implementation of the provisions of the Stockholm Convention.
4. A Consultation Workshop on the "National Implementation Plan for the Stockholm Convention – preliminary draft" was convened on **15 January 2004 in Warsaw**. Its main goal was to present the preliminary draft of the NIP to discuss the approach and solutions proposed, and to take note of the comments, suggestions and amendments for further improvement of the draft. The Workshop was attended by 83 representatives of institutions involved in POPs-related problems. Comments supplied during the meeting were taken into consideration in the draft NIP submitted for review to UNIDO.
5. The National Project Manager, Prof. Maciej Sadowski, presented the preliminary draft version of the NIP at a workshop on **24 February 2004 in Vienna**. His aim was to collect comments to take them into account in the further work on the Plan. That presentation, which was the first out of the three projects carried out simultaneously in the Czech Republic and in Hungary, was successfully approved by UNIDO experts.
6. The results obtained under the GEF Project (i.e. POPs inventory results, major goals and priorities of the NIP and successive drafts of the Plan) were presented by the Coordinator – National Project Manager at a number of meetings with the Project Steering Committee. The Committee was designated by the Minister of the Environment to coordinate and supervise the Project. It is chaired by the State

Secretary Mr. Krzysztof Szamałek and consists of representatives of all the stakeholders: ministries and public institutions involved, scientists, the industry sector and NGOs. Comments provided by the members of the Steering Committee were taken into account during the preparation of the Project.

7. The last Endorsement Workshop under the GEF Project was held on **15 December 2004 in Warsaw**. Its aim was to present the final draft "National Implementation Plan for the Stockholm Convention" to the stakeholders (representatives of governmental institutions, universities, research institutes, laboratories, organizations and companies) for discussion on the ways of its implementation under the actual Polish conditions. The draft was subject to final endorsement.

Annex 12.

ABBREVIATIONS AND ACRONYMS

Abbreviation	Meaning
Aarhus Convention	Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (UN ECE)
Aarhus Protocol	Protocol on Persistent Organic Pollutants to the Convention on Long-range Transboundary Air Pollution (UN ECE)
ADI	Acceptable Daily Intake
ANWIL	Chemical Works former Nitrogen Works WŁOCŁAWEK
APCS	Air Protection Control System
Basel Convention	Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (UNEP)
BAT	Best Available Techniques
BEP	Best Environmental Practices
BIP	Public Information Bulletin *(Biuletyn Informacji Publicznej)*
CIOP	Central Institute for Labour Protection – National Research Institute *(Centralny Instytut Ochrony Pracy – Państwowy Instytut Badawczy)*
CIOŚ	Environmental Information Centre at the Ministry of the Environment (*Centrum Informacji o Środowisku*)
Climate Convention	United Nations Framework Convention on Climate Change (UNFCCC)
CoP	Conference of the Parties
CORINAIR	CORe INventory AIR emission
CORINE	*COoRdination d'INformation Environnementale* – an experimental programme for gathering, coordinating and ensuring the consistency of information on the state of the environment and natural resources in the European Community
2,4-D	2-methyl-4-chlorophenoxyacetic acid
DANCEE	Danish Environmental Protection Agency
DDD	1,1-dichloro-2,2-bis(4-chlorophenyl)ethane
DDE	1,1-dichloro-2,2- bis(4-chlorophenyl)ethene
DDT	1,1,1-trichloro-2,2- bis(4-chlorophenyl)ethane
DFE	Lowersilesian Foundation for Sustainable Development (NGO) (*Dolnośląska Fundacja Ekorozwoju)*
DIOŚ	Department of Environmental Protection Instruments, Ministry of the Environment *(Departament Instrumentów Ochrony Środowiska)*
d.m.	Dry matter
DMDT	1,1,1-trichloro-2,2- bis(metoxyphenyl)ethane
DNOC	4,6-dinitro-o-cresol

Abbreviation	Meaning
DPE	Department of Environmental Policy, Ministry of the Environment *(Departament Polityki Ekologicznej)*
DSB	Permissible concentration in human biological material
DWZ	Department of International Co-operation, Ministry of the Environment (*Departament Współpracy z Zagranicą)*
DzU	Official Journal of Laws of the Republic of Poland *(Dziennik Ustaw Rzeczypospolitej Polskiej)*
DZW	Department of Water Resources, Ministry of the Environment (*Departament Zasobów Wodnych w Ministerstwie Środowiska)*
EC	European Community
EDI	Estimated Daily Intake
EEA	European Environment Agency
EINECS	European Inventory of Existing Commercial Chemical Substances
EIONET	European Environment Information and Observation Network
ELINCS	European List of Notified Chemical Substances
EMEP	Co-operative program for monitoring and evaluation of the long-range transmission of air pollutants in Europe
EPER	European Pollutant Emission Register
ERDF	European Regional Development Fund
ESF	European Social Fund
EU	European Union
FAO	Food and Agriculture Organization
GAW/WMO	Global Atmosphere Watch/ World Meteorological Organization
GC-ECD	Gas chromatography/electron capture detection (used for e.g. PCBs)
GC-MSD	Gas chromatography/mass spectrometry detection (used for e.g. PCBs)
GEF	Global Environment Facility
GIORiN	Chief Inspector for Plant Health and Seed Inspection Service (or Chief Inspectorate for Plant Health and Seed Inspection Service) *(Główny Inspektor Ochrony Roślin i Nasiennictwa lub Główny Inspektorat Ochrony Roślin i Nasiennictwa)*
GIOŚ	Chief Inspector for Environmental Protection (or Chief Inspectorate for Environmental Protection) *(Główny Inspektor Ochrony Środowiska lub Główny Inspektorat Ochrony Środowiska)*
GIS	Chief Sanitary Inspector or Chief Sanitary Inspectorate *(Główny Inspektor Sanitarny lub Główny Inspektorat Sanitarny)*
GLP	Good Laboratory Practice
GLW	Chief Veterinary Surgeon *(Główny Lekarz Weterynarii)*
GNP	Gross National Product

Abbreviation	Meaning
GUS	Central Statistical Office *(Główny Urząd Statystyczny)*
HCB	hexachlorobenzene
HCH; (γ-HCH)	Hexachlorocyclohexan; Lindane
HELCOM	Helsinki Commission - Baltic Marine Environment Protection Commission
HELCOM/EGAP	Helsinki Commission /Group of Experts on Airborne Pollution of the Baltic Sea Area
Helsinki Convention	Convention on the Protection of the Marine Environment of the Baltic Sea Area
HPLC	High performance liquid chromatography
HRGC	High resolution gas chromatography
IARC	International Agency for Research on Cancer
IChP	Industrial Chemistry Research Institute *(Instytut Chemii Przemysłowej)*
IChPW	Institute for Chemical Processing of Coal *(Instytut Chemicznej Przeróbki Węgla)*
IETU	Institute for Ecology of Industrialized Areas *(Instytut Ekologii Terenów Uprzemysłowionych)*
IMGW	Institute of Meteorology and Water Management *(Instytut Meteorologii i Gospodarki Wodnej)*
IMN	Institute of Non-Ferrous Metals *(Instytut Metali Nieżelaznych)*
IMP	Institute of Occupational Medicine *(Instytut Medycyny Pracy)*
IMPiZŚ	Institute of Occupational Medicine and Environmental Health (*Instytut Medycyny Pracy i Zdrowia Środowiskowego)*
IMŻ	Institute of Ferrous Metallurgy *(Instytut Metalurgii Żelaza)*
IOMC	Inter-Organization Programme for the Sound Management of Chemicals (UNEP, MOP, FAO, WHO, UNIDO, OECD)
IOR	Institute of Plant Protection *(Instytut Ochrony Roślin)*
IORN	State Plant Health and Seed Inspection Service *(Inspekcja Ochrony Roślin i Nasiennictwa)*
IOŚ; IEP	Institute of Environmental Protection *(Instytut Ochrony Środowiska)*
IPO	Institute of Industrial Organic Chemistry *(Instytut Przemysłu Organicznego)*
IPPC	Integrated Pollution Prevention and Control
IR	Infrared spectrometry

Abbreviation	Meaning
ISiPCh	Inspector for Chemical Substances and Preparations *(Inspektor ds. Substancji i Preparatów Chemicznych)*
IUPAC	International Union of Pure and Applied Chemistry
KBN	State Committee for Scientific Research (*Komitet Badań Naukowych)*
KCIE	National Emission Centre at the Institute of Environmental Protection *(Krajowe Centrum Inwentaryzacji Emisji w IOŚ)*
KGPSP	National Headquarters (or Chief Commandor) of the State Fire Service *(Komenda Główna Państwowej Straży Pożarnej lub Komendant Główny Państwowej Straży Pożarnej)*
Kiev Protocol	Protocol on Pollutant Release and Transfer Registers (PRTR) to the Aarhus Convention (UN ECE)
KPGO	National Waste Management Plan *(Krajowy plan gospodarki odpadami)*
LC	Liquid chromatography
LIFE	Financial Instrument for the Environment
LOAEL	Lowest-observed-adverse-effects level (concentration)
LRTAP Convention	Convention on Long-range Transboundary Air Pollution (UN ECE)
MAR	Maximum acceptable residue
MCPA	2-methyl-4-chlorophenoxyacetic acid
MENiS	Minister of National Education and Sport *(Minister Edukacji Narodowej i Sportu)*
MF	Minister of Finance *(Minister Finansów)*
MGiP MGPiPS	Minister of Economy and Labour (currently) *(Minister Gospodarki i Pracy)* formerly Minister of Economy, Labour and Social Policy (Minister Gospodarki, Pracy i Polityki Społecznej)
MI	Minister of Infrastructure *(Minister Infrastruktury)*
MNiI	Minister of Scientific Research and Information Technology *(Minister Nauki i Informatyzacji)*
MON	Minister of National Defence *(Minister Obrony Narodowej)*
Montreal Protocol	Montreal Protocol on Substances that Deplete the Ozone Layer to the Vienna Convention (UNEP)
MP	Polish Monitor – similar to „DzU" (see above) an Official Journal for publishing regulations, orders, statements and other legally binding official documents in Poland *(Monitor Polski)*
MPV	Maximum Permitted Value

Abbreviation	Meaning
MRiRW	Minister of Agriculture and Rural Development *(Minister Rolnictwa i Rozwoju Wsi)*
MRL	Maximum Residue Limit
MSWiA	Minister of Interior Affairs and Administration *(Minister Spraw Wewnętrznych i Administracji)*
MSZ	Minister of Foreign Affairs (*Minister Spraw Zagranicznych)*
MŚ	Minister of the Environment *(Minister Środowiska)*
MZ	Minister of Health *(Minister Zdrowia)*
NFOŚiGW	National Fund for Environmental Protection and Water Management *(Narodowy Fundusz Ochrony Środowiska i Gospodarki Wodnej)*
NGOs	Non-Governmental Organizations
NIP	National Implementation Plan for the Stockholm Convention
NOAEL	No-observed-adverse-effects level (concentration)
NSEE	National Strategy for Environmental Education *(Narodowa strategia edukacji ekologicznej)*
NZPO ROKITA	At present Chemical Works ROKITA *(Zakłady Chemiczne ROKITA S.A.)*
OECD	Organization for Economic Cooperation and Development
OTZO	Waste Prevention Association *"3R"* (NGO) *(Ogólnopolskie Towarzystwo Zagospodarowania Odpadów "3R")*
PAHs	Polycyclic aromatic hydrocarbons
PCBs	Polychlorinated biphenyls
PCDDs	Polychlorinated dibenzo-p-dioxins (dioxins)
PCDFs	Polychlorinated dibenzofurans (furans)
PCNB	Pentachloronitrobenzene
PCP	Pentachlorophenol
PCT	Polychlorinated terphenyls
PEC	Predicted environmental concentration
PIG	State Geological Institute *(Państwowy Instytut Geologiczny)*
PIP	National Labour Inspection *(Państwowa Inspekcja Pracy)*
PIS	State Sanitary Inspection *(Państwowa Inspekcja Sanitarna)*
PK	Kraków University of Technology *(Politechnika Krakowska)*

Abbreviation	Meaning
PKD	Polish Activity Classification *(Polska Klasyfikacja Działalności)*
PKE	Polish Ecological Club (NGO) *(Polski Klub Ekologiczny)*
PLN	Polish Zloty (according to average exchange rate of the National Bank of Poland BP as of 31.12.2003 used in the NIP: 1 USD = 3.7405 PLN)
PMŚ	State Environmental Monitoring System *(Państwowy Monitoring Środowiska)*
PNEC	Predicted no-effect concentration
POPs	Persistent organic pollutants
Preparation	The term „preparation" means, in case of pesticides, a mixture or solution composed of two or more substances containing one or more active substances, which, in accordance with the Stockholm Convention, may be chemical individual or a mixture of chemical individuals. In respect of such preparations in Poland often the term "ready form" of pesticides (plant protection products) is used. Application of pure active substances as pesticides is not practiced. It is necessary, almost in each case, to match, along with active substances, an adequate composition of supporting substances (solvents, carriers and emulsifiers), to make the safe and comfortable use possible.
PRTR	Pollutant Release and Transfer Registers
PVC	Polyvinyl chloride
PZH	National Institute of Hygiene *(Państwowy Zakład Higieny)*
PZGS	Poviat Association of Commune Co-operatives *(PowiatowyZawiązak Gminnych Spółdzielni Samopomoc Chłopska)*
Rotterdam Convention	Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (UNEP/FAO)
SC	Customs Service of the Republic of Poland *(Służba Celna Rzeczypospolitej Polskiej)*
SNAP	Selected Nomenclature for Air Pollution
SPMD	Semi-Permeable Membrane Device
SPO-WKP	Sectoral Operational Programme on Strengthening Competitiveness of Enterprises *(Sektorowy Program Operacyjny Wzrost Konkurencyjności Przedsiębiorstw)*
Stockholm Convention	Stockholm Convention on Persistent Organic Pollutants (UNEP)
Substances	Substances mean chemical compounds (chemical individuals or mixtures of chemical individuals of similar biological activity) obtained in technical processes. These substances may contain, and contain in most cases indeed, contaminants generated during the production process depending on the selectiveness of that process. In relation to pesticides, these contaminants include HCB, PCBs, PCDDs, PCDFs generated in trace quantities during production processes. This is also relevant

Abbreviation	Meaning
	for the production of polychlorinated biphenyls. In the latter case quite close relations exist between the amount of pollutants (PCDDs and PCDFs) and the content of chlorine in PCB molecules.
SWOT analysis	Strengths, Weaknesses, Opportunities and Threats Analysis
TDI	Tolerable Daily Intake
TEQ	Toxic Equivalent
UN ECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
UNEP Chemicals	UNEP Chemicals Programme
UNIDO	United Nations Industrial Development Organization
US EPA	US Environmental Protection Agency
UV-B	Ultraviolet solar radiation having biological effects
Vienna Convention	Vienna Convention for the Protection of the Ozone Layer (UNEP)
WFOŚiGW	Voivodeship Fund for Environmental Protection and Water Management *(Wojewódzki Fundusz Ochrony Środowiska i Gospodarki Wodnej)*
WHO	World Health Organization
WIOŚ	Voivodeship Inspectorate for Environmental Protection *(Wojewódzki Inspektorat Ochrony Środowiska)*
WMO	World Meteorological Organization
WSSE	Voivodeship Sanitary and Epidemiological Station *(Wojewódzka Stacja Sanitarno-Epidemiologiczna)*
ZPO-RR	Integrated Operational Programme on Regional Development (*Zintegrowany Program Operacyjny Rozwoju Regionalnego*)