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## **International POPs Elimination Project**

*Fostering Active and Efficient Civil Society Participation in  
Preparation for Implementation of the Stockholm Convention*

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# **Country Situation Report on POPs in Ukraine**

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## **About the International POPs Elimination Project**

On May 1, 2004, the International POPs Elimination Network (IPEN <http://www.ipen.org>) began a global NGO project called the International POPs Elimination Project (IPEP) in partnership with the United Nations Industrial Development Organization (UNIDO) and the United Nations Environment Program (UNEP). The Global Environment Facility (GEF) provided core funding for the project.

IPEP has three principal objectives:

- Encourage and enable NGOs in 40 developing and transitional countries to engage in activities that provide concrete and immediate contributions to country efforts in preparing for the implementation of the Stockholm Convention;
- Enhance the skills and knowledge of NGOs to help build their capacity as effective stakeholders in the Convention implementation process;
- Help establish regional and national NGO coordination and capacity in all regions of the world in support of longer term efforts to achieve chemical safety.

IPEP will support preparation of reports on country situation, hotspots, policy briefs, and regional activities. Three principal types of activities will be supported by IPEP: participation in the National Implementation Plan, training and awareness workshops, and public information and awareness campaigns.

For more information, please see <http://www.ipen.org>

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The views expressed in this report are those of the authors and not necessarily the views of the institutions providing management and/or financial support.

This report is available in the following languages: English Summary and Full report in Russian

# Country Situation Report on POPs in Ukraine

## SOURCES OF ENVIRONMENTAL RELEASES OF POPs

The problem of POPs is fairly relevant for Ukraine, as the problem is associated with well developed agriculture, and the prominent roles that the power industry and metallurgy play in the national economy. However, the highest priority tasks are associated with management of accumulated stockpiles of banned and obsolete pesticides.

### Pesticides

Unusable pesticides (UPs) incorporate three groups: banned pesticides (*Group A*), obsolete pesticides (*Group B*), unidentifiable pesticides and their mixtures (*Group C*).

According to official statistics, as of 01.01.2003, the accumulated stockpiles of UPs in Ukraine reached 20,000 tons (the figure refers to stockpiles in the agro-industrial sector only), including:

- Group A - about 30%, ~ 6,000 tons
- Group B – about 20%, ~ 4,000 tons
- Group C – about 50%, ~ 10,000 tons.

The share of substances of 1st to 3rd hazard grades reaches about 95% of groups of A and B pesticides.

The problem of unusable pesticides in Ukraine has some specific features: high amounts of UPs in storage facilities and broad soil contamination in regions.

In recent time, the intensity of pesticide application in Ukraine decreased almost 5-fold.

In 2002 - 2003, bodies of the Ministry of Agrarian Policy, the Ministry of Environment and the Public Health Ministry conducted the inventory of UPs. As at 01.12.2003, in Ukraine, 20,900 tons of UPs were stored (these substances were earlier delivered for agricultural applications). These pesticides are stored in 4983 storages of agricultural facilities of different ownership forms throughout the country's territory. These pesticides incorporate POPs pesticides, namely: DDT – about 2,000.0 tons (about 10% of the overall amount); heptachlor – 13.4 tons (about 0.07%); hexachlorobenzene – 1.0 ton (about 0.005%); endrin – 1.1 ton (about 0.005%).

### Hexachlorobenzene

Hexachlorobenzene belongs to the group of 12 POPs covered by the Stockholm Convention. The pesticide was applied as an insecticide and a fungicide. Mixtures of hexachlorobenzene with other preparations were used for seed treatment. Besides that, hexachlorobenzene was used as an industrial chemical (similar to PCBs).

In the course of the inventory prepared in the framework of the GEF/UNEP project "Support of Measures for Development of the National Plan of Implementation of the Stockholm Convention in Ukraine",

information was gathered on the burial of 11,087.6 tons of hexachlorobenzene (1st hazard grade) in the territory of the toxic waste dump of "Oriana-Galev" Co. in Ivano-Frankovsk Oblast.

The Company generated hexachlorobenzene as a by-product of production of carbon tetrachloride and polyethylene and buried it at the toxic waste dump. The toxic waste dump (5.15 hectares) was operational from 1973 to 2000. In 1999, the production lines that generated hexachlorobenzene were decommissioned. The last batches of hexachlorobenzene were buried at the waste dump in November 2000.

In order to prevent infiltration of the pollutants from the waste dump to groundwater and surface water bodies, the waste dump was surrounded by a vertical clay waterstop (0.7 m thick and 10 m deep), reaching the water-tight soil layer. As a result, the waste dump is located within a water-tight pit. According to the technical requirements of waste dump operations, hexachlorobenzene was buried in sealed metal barrels and covered by a 1 m thick layer of soil. Examination of the waste dump did not reveal any signs of removal of the metal barrels.

### **Polychlorinated biphenyls (PCBs)**

PCBs have been never produced in Ukraine, but, similarly to other industrialised countries, these compounds were broadly used in different industrial sectors. The potential risks of PCBs impacts are associated with their use in open/damaged installations, with potential leaks or evaporation from transformers, capacitors, heat exchangers, and other equipment items, with their depressurisation, etc. According to official inventory data, in the territory of the country, there are:

1002 transformers, containing 2,051,160 kg of PCBs;

102032 capacitors, containing 250,047.5 kg of synthetic dielectric liquids

There are no sanitary standards in Ukraine for PCBs levels in environmental media. Sanitary standards of the former USSR for workplace zone air are still in force - 1 mg/m<sup>3</sup> (2nd hazard grade), as well as maximum allowed concentrations (MACs) for surface water bodies (sources of technical-grade water) - 0.001 mg/l. Besides that, there are no sanitary standards for dioxins and furans in Ukraine (by-products of thermal decomposition of PCBs and other industrial processes involving chlorine).

Analysis of information, collected in the course of implementation of the GEF/UNEP project "Support of Measures for Development of the National Plan of Implementation of the Stockholm Convention in Ukraine" suggests that there are only 2 industrial facilities in Ukraine, that have licenses/permits for elimination of PCB-containing waste - "Elga" Co. (Shostka) and "The East Ukraine Industrial Company" (Donetsk). Unfortunately, it was impossible to ascertain whether the above companies maintain sound environmental monitoring systems of the environmental impacts of their processes. Information on operating/planned technologies of these companies is not sufficient to make an independent expert assessment of their compliance with international requirements for environmentally safe technologies.

### **Sources of dioxin generation and releases**

Data of Tables 4 and 5 show assessments of overall releases of PCBs and hexachlorobenzene (2002) and dioxins (1990 and 2002), made in the course of implementation of the GEF/UNEP project "Support of Measures for Development of the National Plan of Implementation of the Stockholm Convention in Ukraine".

Table 4

**Overall emissions of PCBs and hexachlorobenzene (2002)**

Sources (categories)	PCBs emissions (kg)	Emissions of hexachlorobenzene (kg)
Capacitors	3548.25	
Transformers	600.00	
Waste incineration	1.38	552.8
Coal burning (households)	37.75	0.26
Lignite burning (households)	0.42	
<b>Total</b>	<b>4196.98</b>	<b>553.17</b>

Table 5

**Estimated releases of PCDDs/PCDFs in 1990 and 2002**

Sources (categories)	<b>1990</b>				
	Annual releases (g TEQ)				
	Air	Water	Soils	Products	Waste
Incineration of solid municipal waste	44.000	0.000	0.000	0.000	453.2
Ferrous/non-ferrous metallurgy	1028.925	0.000	0.000	0.000	763.6
Generation of electric power/heat	104.683	0.000	0.000	0.000	0.0
Production of mineral products	5.408	0.000	0.000	0.000	2.3
Transport	9.832	0.000	0.000	0.000	0.0
Uncontrolled burning	0.234	0.000	0.187	0.000	0.0
Chemical production	0.042	0.000	0.000	0.185	104.0
Miscellaneous	0.004	0.000	0.000	0.000	0.0
Waste dumps	0.000	0.000	0.000	0.000	0.0
<b>Total</b>	<b>1193.1</b>	<b>0.0</b>	<b>0.2</b>	<b>0.2</b>	<b>1323.2</b>

Sources (categories)	2002				
	Annual releases (g TEQ)				
	Air	Water	Soils	Products	Waste
Incineration of solid municipal waste	14.692	0.000	0.000	0.000	141.8
Ferrous/non-ferrous metallurgy	714.678	0.000	0.000	0.000	471.3
Generation of electric power/heat	46.906	0.000	0.000	0.000	0.0
Production of mineral products	1.640	0.000	0.000	0.000	0.7
Transport	7.945	0.000	0.000	0.000	0.0
Uncontrolled burning	0.228	0.000	0.182	0.000	0.0
Chemical production	0.016	0.000	0.000	0.185	41.2
Miscellaneous	0.006	0.000	0.000	0.000	0.0
Waste dumps	0.000	0.000	0.000	0.000	0.0
<b>Total</b>	<b>786.1</b>	<b>0.0</b>	<b>0.2</b>	<b>0.2</b>	<b>655.0</b>

The above data confirm that the production decline of the early 1990s was accompanied by a reduction in toxic releases. However, it is necessary to note that dioxin releases more seriously depend on raw materials and efficiency of pollution control installations than on overall volumes of flue gases. Besides that, in parallel with generally decreasing production at major industrial facilities, small facilities launch their production operations - they use smaller furnaces and their flue gases might contain substantial levels of dioxins (as small facilities generally do not use adequate pollution control installations).

In Ukraine, potential dioxin releases in regions of high concentration of major production facilities cause the most serious concerns (Donetsk - Dnieper region, particularly Donbass). Overall, all industrial facilities of the region emit annually about 2 million tons of toxic substances, or more than 60 tons/km<sup>2</sup> (or 321 kg per 1 resident of the region). Metallurgic facilities, coke plants and thermal power plants "enrich" air by dioxins and benz(a)pyrene that may generate long-term adverse health effects. (*A.Soloviov. The Technology Garden //Zerkalo Nedeli. Oct.28-24 2003.- 40 (465).*)

### Waste incineration plants

Now, waste incineration plants are considered as key sources of dioxin releases. Waste incinerators may release dioxins and generate hexachlorobenzene and PCBs. Identification of these toxic substances in areas where they have been never used may be attributed to operations of waste incineration plants.

In 1980s, the former USSR purchased 15 waste incineration plants in the former Czechoslovakia to construct them in major cities. Five waste incineration plants were planned for construction in Ukraine (Kiev, Kharkov, Sevastopol, Dnepropetrovsk and Donetsk). The Donetsk plant has not been constructed. However, the other four cities moved ahead. Waste incineration plants in Kharkov and Sevastopol were decommissioned, while the Dnepropetrovsk plant undergoes reconstruction works.

In Kiev, "Energia" waste incineration plant has been operating since 1987. The estimated annual capacity of the plant reaches 350 thousand tons of solid municipal waste, while now the plant processes 170 - 190 thousand tons of waste annually. Waste is incinerated in 4 boiler units with cylindrical rotating grates, that process up to 15 tons of waste per hour.

Control of toxic emissions is a relevant problem of the waste incineration plant. Table 6 shows typical components of flue gases, generated by waste incineration in ChKD-DUKLA boiler units (*Movchan N.M., Bezruk Z.D., Dashkovskiy A.A., Primiskiy V.F., 2005*).

Table 6

**Products of incineration of solid municipal waste**

Components	Concentrations, g/m <sup>3</sup>		Toxicity indices (C/MAC)	
	Average	Max.	Average	Max.
Carbon monoxide	0.5	2.5	100	500
Nitrogen oxide	0.14	0.16	1647	1882
Sulphur dioxide	0.018	0.095	36	190
Benzene	1.32	3.0	880	2000
Toluene	1.86	6.0	3100	6000
Acetone	0.7	0.8	2000	2285
Particulate matter	-	0.056	-	373
Chlorine compounds (HCl)	0.385	0.648	1925	3215
Fluorine compounds (HF)	0.0037	0.005	185	250

"Energria" waste incineration plant is located within the city area and belongs to the most hazardous industrial facilities of Kiev. The plant operates the system of automatic control that maintains permanent environmental monitoring and regulates incineration processes by varying fuel to air ratios, based on results of gas analysis in the incineration zone. Unfortunately, the range of controlled components (see Table 6) does not incorporate organochlorine compounds that pose the most serious health and environmental risks. Besides that, even minor releases of dioxins result in their accumulation in environmental media as dioxins remain unchanged for decades. As a result, even the safest waste incinerators are surrounded by contaminated zones (up to 1.5 km).

**ADVERSE HEALTH IMPACTS OF POPs**

Numerous studies of health impacts of pesticides in Ukraine were conducted by major research facilities of the country (L.I. Medved Institute of Environmental Health and Toxicology, the Institute of Occupational Health, etc). Results of these studies suggest that land contamination and POPs accumulation in the human body are mainly associated with DDT and its derivatives.

The majority of Ukrainian residents are affected by past pesticide contamination, that affects human health. Now, levels of these compounds in environmental media, food and human body tend to decrease. Research results suggest that in the period of intensive application of organochlorine pesticides (1950s – 1970s) the average estimated individual human daily intake of DDT reached 0.62 mg per capita (or 226.3 mg/year). In other words, at that time, DDT human daily intake exceeded the safe threshold by 2-fold for adults and by 4-fold for children. In the period from 1973 to 1990, when organochlorine preparations were restricted and replaced by other classes of pesticides, the relevant estimated individual daily intake of DDT reached 0.02 mg (7.3 mg/year). The latter figures also exceeded safe levels for adults and children. Since 1991, application of persistent organochlorine pesticides in agriculture was prohibited completely. In the latter period, estimated individual daily intakes of DDT reached 0.014 mg/day (or 5.11 mg/year).

According to state standards, safe daily intakes of DDT are set as 0.3 mg for adults (109.5 mg/year) and 0.15 mg for children (54.7 mg/year). Therefore, in the last decade, estimated human DDT intakes did not exceed safe levels for adults and children as defined by state standards.

Unfortunately, available test data suggest that in 36.4% of cases, infants' DDT intake with breast milk exceeded the safe daily intake level, while intakes of PCBs and dioxins exceeded the WHO safe daily dose (4 pg/kg body weight) by 25 – 35 times.

Unfortunately, lack of systemic monitoring data does not allow assessment of levels of PCBs and dioxins in environmental media and food products. However, results of tests of breast milk samples (12 ng/kg fat), suggest that these substances may pose substantial health risks to the residents of Ukraine.

## **THE NATIONAL LEGISLATION ON POPs MANAGEMENT**

Analysis of the due legislation of Ukraine on legal regulation of POPs management shows that there are no specialised laws and regulations on POPs management matters. POPs are referred to in general legislative acts on waste management.

The definition of POPs is provided in Order No. 177 of the Ministry of Ecology and Natural Resources of Ukraine of May 10, 2002 *"On Approval of the Manual on Procedures of State Registration of Sites/Facilities that Adversely Affect or May Affect Human Health and Ambient Air, Types and Amounts of Pollinates in Air Emissions"*.

Analysis of other legal acts of Ukraine on POPs-related matters their categorization as program documents.

Order No. 211 of the Public Health Ministry of Ukraine of August 19, 1999 *"On Establishment of the Centre of Environmental Health and Toxicology of Dioxins and other Persistent Organic Pollutants"* stipulated establishment of the Centre of Environmental Health and Toxicology of Dioxins and other Persistent Organic Pollutants under L.I. Medved Institute of Environmental Health and Toxicology.

Decree No. 1072/2000 of the President of Ukraine of September 14, 2000 approved *"The Program for Integration of Ukraine to the European Union"*. Section 11.1.7 (Chemicals) stipulates the following short-term (2000 - 2001) and medium-term (2002 - 2003) priorities:

- development of a draft Law of Ukraine on Chemical Security;
- introduction of the European methodology of emission inventories and the new system for registration of POPs releases to air (the authors' note: *in the framework of implementation of the POPs Protocol to the Convention on Long-range Transboundary Air Pollution, signed in 1998*).

Some legislative acts of Ukraine refer to sanitary requirements to handling of certain POPs. The due legislation of Ukraine does not provide for a list of chemicals to be banned for production and use, except banned pesticides and chemicals that fall under specific legal acts, e.g. international treaties on non-proliferation of chemical weapons.



## POPs MANAGEMENT PROJECTS IN UKRAINE: RESULTS AND EXPERIENCE

In 1996 – 1998, the Working Group for Sustainable Agriculture, the Project of Environmental Policy and Technology (USAID) and the Project for Promotion of Sustainable Development of Ukraine operated in Ukraine. Their activities established the underlying base for development of solutions to address the problem of unusable pesticides in Ukraine.

In 1999 – 2003, the Ukraine - Denmark project *Mitigation of Risks of Stockpiles of Obsolete and Banned Pesticides in Ukraine* was implemented in Ukraine (DANCEE, DEPA). The Ministry of Ecology and Natural Resources of Ukraine was the beneficiary of the project.

In the framework of the project implementation, the Danish Company COWI and structural units of the Ministry of Ecology and Natural Resources of Ukraine (the Inter-ministerial Environmental Centre and the National Centre for Management of Hazardous Waste), with participation of other research institutions, organisations, agencies and the general public developed the Action Plan for Reduction of Risks Associated with Stockpiles of Unusable Pesticides in Ukraine. The Action Plan was developed in the context of the National Program for Management of Hazardous Waste that was finally approved by the Verkhovna Rada of Ukraine on September 14, 2000. Besides that, in the framework of the project, the pilot project for establishment of the temporary pesticide storage facility was implemented (Lozovaya, Kharkov Oblast).

In August 2004, an international partnership project of US EPA and the Ukrainian Science and Technical Centre was launched in Ukraine (*Management of Residual Agricultural Chemicals and Neutralisation of Unusable Pesticides in Cherkassy and Lvov Oblasts*).

In 2002, the Government of Ukraine applied to UNEP Chemicals, proposing to launch PCBs inventory works in Ukraine. The proposal was supported and, according to the Memorandum of Understanding between the Ministry of Ecology and Natural Resources of Ukraine and UNEP Chemicals, implementation of *PCBs Inventory Project in Ukraine* was launched. The National Centre for Management of Hazardous Waste was delegated responsibility for the project implementation.

Since September 2003, under management of UNEP and with financial support of the Global Environmental Facility (GEF), the project, *Support of Measures for Development of the National Plan of Implementation of the Stockholm Convention in Ukraine* is under way in Ukraine. The project seeks to ensure development of the National Plan of Implementation of the Stockholm Convention. The Plan's development should initiate the process of ratification of the Stockholm Convention by the Verkhovna Rada of Ukraine.

Activities and projects of non-governmental organisations of Ukraine at international, national and local levels are of particular relevance for discussion of experience and results of POPs management projects.

National environmental NGO "MAMA-86" had launched its POPs-related activities in 1999. In autumn-1999, the NGO joined the platform of the International POPs Elimination Network (IPEN) and its representatives participated in the third Session of the International Negotiating Committee (INC-3) to negotiate development of *the International, Legally Binding Instrument on International Actions on Some Persistent Organic Pollutants*, that later became the Convention on POPs. These activities were continued, representatives of MAMA-86 participated in INC-4; INC-5; the Diplomatic Conference of Plenipotentiaries

(Stockholm, May 22 – 23, 2001) when the Stockholm Convention was signed; and in the first Conference of Parties of the Stockholm Convention (May 2005).

Since 2004, MAMA-86 served as the national co-ordinator of IPEN in Ukraine

In May 2004, IPEN launched implementation of the International POPs Elimination Project (IPEP).

Having joined these activities, MAMA-86 implemented the project *"Partnerships between NGOs and Research Institutions for Capacity Building to Reduce Adverse Health and Environmental Impacts of POPs"*, as a component of the global IPEP project.

It is worth noting the initiatives of the regional organisations of the National environmental NGO "MAMA-86", associated with inventories of storage facilities of unusable pesticides and assessments of POPs health risks.

In order to initiate public awareness-raising of POPs and the Stockholm Convention, in the framework of IPEP, the International POPs Elimination Network (IPEN), organised the International Day of Actions against POPs (on Earth Day, April 22, 2005).

In the framework of implementation of the GEF/UNEP project *Support of Measures for Development of the National Plan of Implementation of the Stockholm Convention in Ukraine*, the Public Information Task Force was organised and started to operate.

Research and Information Centre "Ecology. Woman. Peace" organised publication of the monthly electronic newsletter "Persistent Organic Pollutants (POPs) in Ukraine and in the World." The newsletter provides information on the project implementation results and has more than 500 subscribers.

In July 2004, "Democracy and Development" Centre, with support of "Inmark - Information and Marketing" Co., implemented the social study "Public Awareness and Information on Actual and Potential Health and Environmental Impacts of POPs" in Kiev, Donetsk, Dnepropetrovsk, Vinnitsa, Ivano-Frankovsk oblasts and AR Crimea. Results of the social study were published in a brochure.

"Ecology Media Group" Centre produced the informational video-film "the Triple Price of POPs". The video-film was distributed among 30 regional TV stations; it was presented at the first Conference of Parties of the Stockholm Convention (May 2005, Uruguay); at the eighth International Forum on HCCH and Pesticides for EECCA Countries (May 2005, Bulgaria), and in the course of other events. The video-film "The Triple Price of POPs" was awarded 3rd degree Diploma for environmental films at 12th International TV Festival "AgroWorld – 2005".

The West Ukraine Charity Fund for Environmental Information and Awareness Raising "WETI" (Lvov) for several years implemented "Pesticide-free Carpathian Region" actions for protection of the Carpathian Mountains. These actions incorporate implementation of broad information campaigns, production of films, publication of information materials, primary inventories of storage facilities for unusable pesticides in protected areas of the Carpathian region, organisation and holding of public hearings to attract the attention of the general public, the academic community and authorities to the problem of pesticide contamination of the region and actions to address the problems.

## **STATUS OF RATIFICATION OF THE STOCKHOLM CONVENTION**

Ukraine signed the Stockholm Convention on May 23, 2001. As a result, the country became eligible for provision of grant funding from the Global Environment Facility (GEF) for development of the National Plan of Implementation of the Stockholm Convention.

The plan would allow generalising results and experiences of previous projects for development of actions to eliminate POPs-related risks, specific technical solutions for elimination of POPs; and to optimise all options for development of the national action plan to address the problem of POPs. Finally, the plan would provide necessary preconditions for ratification of the Stockholm Convention by Ukraine and fulfilment of relevant international commitments under the Convention.

## **RECOMMENDATIONS AND PROPOSALS OF NGOs AND PREVENTION OF THEIR ADVERSE ENVIRONMENTAL AND HEALTH IMPACTS**

### **Analysis of the national legislation in the sphere of POPs management shows that:**

1. Notwithstanding the decline of chemical production since 1990s, we still face the problem of potential health and environmental impacts of chemicals. As a result, the general public and decision-makers need to have reliable and easily accessible information on production and export/import of hazardous chemicals.
2. It is necessary to develop a dedicated state strategy for POPs management that should account for highly toxic properties and adverse health and environmental impacts. It is necessary to develop national legislative acts to regulate POPs management. It is necessary to develop programs to control POPs levels in environmental media and POPs releases.
3. It is necessary to develop and approve the National Plan of Implementation of the Stockholm Convention.
4. It is necessary to reject application of incineration technologies for elimination of POPs and other types of hazardous waste; it is necessary to develop and apply alternative technologies that do not generate POPs or other hazardous substances.
5. Information on production of chemicals is not the only indicator of their potential health and environmental impacts, as a result, it is necessary to collect information of releases at all stages of the life-cycle of chemicals - from production to use and waste disposal.
6. It is necessary to ensure full control of environmental movements for dioxins and dioxin-like substances; it is necessary to develop methods for minimisation of dioxin releases, waste-free utilisation of dioxins, as well as to impose a moratorium for production of new dioxin-like substances, to identify priority dioxin-generating facilities for decommissioning or modernisation.
7. POPs elimination projects should be prioritised, it is necessary to stipulate opportunities for extension of the primary list of POPs (the dirty dozen).

8. It is necessary to organise the system of control and notification on application of pesticides.
9. It is necessary to develop mechanisms to inform consumers on effects of chemicals - components of different products and goods.
10. It is necessary to improve the system of waste collection and utilisation. The society should more broadly apply the precautionary principle instead of the contemporary waste management system.
11. In order to facilitate the process of improvement of laws and regulations in the sphere of waste management and its harmonisation with international requirements, the following actions may be recommended:
  - In the course of development of the system of waste management in Ukraine, it is necessary to improve legislative mechanisms of regulation of waste management services and supervisory bodies.
  - To apply mechanisms, allowing the recycling of waste that reduces environmental pollution and generates positive economic and environmental effects.
  - To improve systems of collection and treatment of municipal waste, including the introduction of waste separation for secondary processing. This progressive approach would allow the separation of secondary materials for direct processing.
  - To ensure environmentally sound storage of unusable waste in compliance with sanitary requirements, in order to reduce associated adverse health and environmental impacts.
  - To allocate funds for implementation of projects for disposal/utilisation of toxic waste only after completion of their sanitary and environmental assessments.
  - In the sphere of organisational approaches to compliance with sanitary standards and rules for prevention of adverse health and environmental impacts, relevant scientific research and development of the classification of toxic waste should account for the following parameters:
    - sources of environmental releases of toxic chemicals (production processes, transportation, storage, application);
    - parameters of contaminated objects (soils, water, transport, constructions and household objects, etc.);
    - nature of pollutants in environmental media (highly toxic, persistent, unstable, radionuclides, etc.);
    - analysis of chemical properties of pollutants (physical and chemical properties, biodegradation, biotransformation);
    - sources of human intake of pollutants (air, soil, food products, water).
  - To develop a database of the most hazardous production facilities and waste storages in Ukraine.
  - To organise rehabilitation of sites with accumulated waste stockpiles, particularly toxic waste sites.
  - To raise awareness of relevant authorities and the general public of waste-related problems, in order to provide timely and reliable information, to conduct seminars and lectures on threats and risk assessments associated with waste management; to raise awareness and consumer culture levels.
  - To improve legislative mechanisms of regulation of waste management services and supervisory bodies.

12. It is necessary to ensure international co-operation for elimination of POPs-related risks in order to get finance and technical assistance.

**Proposals were developed for improvement of the national legislation in the sphere of POPs management and fulfilment of commitments under the Stockholm Convention:**

- To implement the full "inventory" of the Ukrainian legislation in order to identify laws and regulations, associated with management of chemicals and chemical waste, including POPs.
- To address legislative gaps and contradictions in the sphere of management of chemicals and chemical waste, including POPs. [For example, according to the due legislation, emissions/discharges of 1 ton of aldrin to air or water bodies are subject to environmental charges at the level of UAH 3 or \$0.6 (Decree No. 303 of the Cabinet of Ministers of Ukraine of March 1, 1999 "*On Procedures of Estimation of Rates of Environmental Charges and Recovery of these Charges*").]
- To develop regulations on use of PCBs in equipment items. Existing Rules of Design of Electric Equipment and Installations for Special Facilities - DNAOP 0.00-1.32-01 - approved by Order No. 272 of the Ministry of Labour and Social Policy of Ukraine, specify that "Oil-filled installations and instruments may be applied in all fire-prone zones of all classes (except oxygen facilities and lifting gear, where application of such installations and instruments is prohibited". The Stockholm Convention stipulates that the Parties should avoid application of PCBs in equipment items and in fire-prone zones (PCBs are common components of dielectric liquids).

**Recommendations and proposals on management of stockpiles of POPs were developed:**

Now, it is possible to conduct a detailed comprehensive inventory and identify storage facilities of unusable pesticides, to ensure their safe storage, to develop and introduce safe alternative POPs elimination technologies.

Besides that, it is necessary to organise a system of control and notification on pesticide application.

It is necessary to support initiatives of NGOs for identification of unauthorised storages of unusable pesticides. Their information should become a component of the general inventory of unusable pesticides. Information of NGOs on unauthorised storages of unusable pesticides should be accounted for and should form a base for sound decisions of governmental authorities. NGOs should monitor implementation of these decisions.

Utilisation of PCBs-containing equipment items is a more difficult problem than utilisation of stockpiles of obsolete pesticides. Therefore, at the first stage, it is necessary to implement a comprehensive inventory and to develop a system of measures for decision-making on their neutralisation.

Accounting for the fact, that PCBs may cause substantial adverse health and environmental effects, in the course of development of the national action plan on these pollutants, it is necessary to stipulate that chief managers of facilities (regardless their ownership forms) should report the following information to oblast-level directorates of the Ministry of Environment of Ukraine and relevant directorates of sectoral ministries and agencies:

- information on sources of PCBs: production, production output and locations;
- PCBs applications and stockpiles;

- quantitative information and locations of waste dumps, where PCBs containing items are disposed;
- information on releases of PCBs (e.g. emissions, discharges, leaks, etc.);
- monitoring data.

It is clear, that actions for prevention of adverse effects of use/storage of PCBs would require joint efforts of different specialists (environmentalists, chemical technology experts, public health specialists, etc.) Efficiency of these actions would substantially depend on adequate assessment of the problem of PCBs in Ukraine that in its turn, would require reliable information on amounts and application of these pollutants in specific industries and in agriculture.

NGOs might provide substantial assistance in the search for this type of information. It is necessary to engage NGOs in public awareness raising activities. NGOs should inform members of the general public on PCBs-associated risks. It is appropriate to inform NGOs on the need of their assistance in the course of identification of unauthorised storages/waste dumps of PCBs-containing equipment items or waste.

In order to organise a system of control in the sphere of toxic waste management, it is necessary to ensure participation of NGOs and international experts in independent assessments of operational or planned industrial facilities for treatment/elimination of PCBs-containing waste, to recommend relevant ministries and agencies to approve environmental and sanitary standards for levels of PCBs and dioxins in industrial emissions and discharges, environmental media and biological objects, accounting for applicable international requirements.

### **Recommendations and proposals on reduction of adverse health impacts of POPs were developed:**

Lack of adequate monitoring data on POPs levels in environmental media would necessitate co-ordinated efforts for compilation and interpretation of existing information on POPs and their health impacts.

Accounting for a broad range of health problems, associated with POPs impacts, it is necessary to inform members of the general public on adverse health effects of toxic chemicals in order to develop programs for protection of human health from toxic effects of POPs. Serious efforts are needed to make environmentally sound management of toxic chemicals an integral component of principles of sustainable development and improvement of living standards. Otherwise, continued use of toxic chemicals would generate further problems, associated with environmental contamination. Therefore, all public health programs should incorporate environmental protection components.

The health of future generations is of decisive importance for stability and progress of all countries and the whole human civilisation, therefore, it is necessary to develop preconditions for a safer and more environmentally healthy future for children. To this end, even now, it is necessary to make a few simple steps - to apply the precautionary principle for children's environment, to reduce application of household chemicals, to be cautious in the course of purchase of household items and food.

### **Analysis of public awareness of the problem of POPs suggests:**

- ordinary citizens are poorly aware of the problem of POPs;
- there is no strategy for public information on the problem of POPs;
- it is necessary to close the gap in awareness of the problem of POPs and the Stockholm Convention by implementation of the Concept of Environmental Education of Ukraine;

- it is necessary to develop specialised curricular courses on POPs problems for secondary schools and higher education facilities;
- POPs-related issues are not addressed in curricular courses of education and refresher training facilities for teachers of natural sciences, geography and ecology;
- there are no education manuals and popular books on the problem of POPs;
- it is necessary to co-ordinate joint efforts of the general public, authorities, research and education facilities in order to raise public awareness of the problem of POPs and options to reduce adverse health and environmental impacts of POPs.

**It is necessary** to develop comprehensive measures for raising public awareness of the problem of POPs and the Stockholm Convention, to enhance the role of joint efforts of the general public, authorities, research and education facilities in raising public awareness of the problem of POPs, to enhance the role of education facilities in promoting of holistic environmental views, culture and knowledge of young people.