



TOGETHER
for a sustainable future

OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.



TOGETHER
for a sustainable future

DISCLAIMER

This document has been produced without formal United Nations editing. The designations employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations Industrial Development Organization (UNIDO) concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries, or its economic system or degree of development. Designations such as “developed”, “industrialized” and “developing” are intended for statistical convenience and do not necessarily express a judgment about the stage reached by a particular country or area in the development process. Mention of firm names or commercial products does not constitute an endorsement by UNIDO.

FAIR USE POLICY

Any part of this publication may be quoted and referenced for educational and research purposes without additional permission from UNIDO. However, those who make use of quoting and referencing this publication are requested to follow the Fair Use Policy of giving due credit to UNIDO.

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

22732



International Forum
On Strategies And Priorities for
Environmental Industries

Bratislava, 12-14 June 2002



organized by the

MINISTRY OF ENVIRONMENT OF THE SLOVAK REPUBLIC

and the

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

Introductory Paper

**UNIDO Programmes on
Persistent Organic Pollutants
(POPs)**

by
Zoltan Csizer
UNIDO

**ROUNDTABLE I
REGIONAL INITIATIVE**

**Establishment of a Fund for the
Disposal of Obsolete Stockpiles of
Persistent Organic Pollutants (POPs)
in Central & Eastern Europe (CEE)**

The views expressed in this document are those of the author~~s~~ and do not necessarily reflect the views of the Secretariat of the United Nations Industrial Development Organization (UNIDO).

The designations employed and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations Industrial Development Organization concerning the legal status of any country, territory, city or area, or of its authorities, or concerning the delimitation of its frontiers or boundaries.

Mention of firm names or commercial products does not imply endorsement by UNIDO.
This document has not been edited.

Persistent Organic Pollutants (POPs)

The issue

Persistent Organic Pollutants (POPs) are synthetic chemical substances with unique and harmful characteristics. They pose severe risks to human health and the environment due to their toxicity, their persistence, their ability to travel long distances on air and water currents, and their propensity to bioaccumulate in food chains. They include some of the world's most harmful chemicals including highly toxic pesticides such as DDT; industrial chemicals such as PCBs; and unintended by-products of industrial processes and incineration such as dioxins and furans. POPs are the "worst of the worst" of toxic substances. They are highly toxic to wildlife and humans. They have become common contaminants in fish, dairy products, and other foods around the world.

Last year in Stockholm, representatives from 92 countries agreed to sign the Stockholm Convention on POPs to reduce or eliminate releases of twelve POPs substances, the so-called "dirty dozen". Among these twelve, four are unintentionally generated by-products, generated by human activities and listed in Annex C of the Stockholm Convention: Polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/PCDF), Hexachlorobenzene (HCB) [CAS No: 118-74-1] and Polychlorinated biphenyls (PCB). While HCB is a single chemical compound, PCDDs have 75 different theoretical combinations (congeners), PCDFs have 135 congeners, and PCBs have 209. It should be noted that the toxicity and also the resistance against destruction (persistence) varies widely among the congeners. Only 7 of the 75 congeners of PCDDs and 10 of the 135 possible congeners of PCDFs are thought to have dioxin-like toxicity.

POP by-products will be formed and released unintentionally in all technological processes and/or natural biological and photochemical processes including human activities when heat is applied, transferred or exchanged in the presence of chlorine and organic substances. For example, any combustion or incineration process may generate POP by-products; composting could generate POP by-products from microbial activity on chlorinated phenolic compounds. Likewise, the photolysis of the black liquor of olive processing, which is rich in highly chlorinated phenols, generates POP by-products.

POPs are ubiquitous. Everyone has a body burden of POPs that their ancestors never had. POPs levels tend to be highest in species at the top of the food chain, such as eagles, polar bears, killer whales and human beings. Because POPs break down very slowly, they will be present in the environment for a long time to come, even if all new sources were immediately eliminated. There is evidence that many people worldwide may now carry enough POPs in their body fat where POPs accumulate to cause serious health problems, including reproductive and developmental problems, cancer, endocrine and immune system disruption, abnormal behaviour, and neurological problems. The developing embryo is most sensitive to the harm POPs can cause.

POPs, when released into the environment, can be transported by air and water currents to places far from their point of origin. Their journey through the environment is not a simple process but typically consists of a number of "hops" each consisting of three stages: evaporation, transport in the atmosphere and condensation at lower temperatures. Scientists have called this phenomenon the "grasshopper effect". In this way, POPs can travel long distances and become widely dispersed in a matter of days or weeks on air currents, and more slowly in rivers and by ocean currents. The arctic, antarctic and mountain areas represent the ultimate fate of these chemicals.

Municipal sewer systems and sewage treatment plants (STP) act as collection systems for industrial waste and agricultural runoff that can contain POPs. STPs are not designed to destroy POPs instead they accumulate in the sludge (solid wastes) or end up in the air if sludge is incinerated. When there is no advanced sewage treatment POPs and other contaminants are discharged directly from sewage outfalls into the ocean.

Plastics containing chlorine such as PVC release dioxins, furans and other unintentionally generated POPs by-products, all deadly poisons when incinerated without appropriate precautions. Furthermore, toxins, which disrupt the natural hormone systems of human beings and wildlife may be released over time from plastic waste dumped into landfills.

With the evidence of long-range transport of these substances to regions where they have never been used or produced, and the consequent threats they pose to the environment globally, the international community has called for urgent action to reduce and/or eliminate releases of these chemicals. Because they are so long-lived and toxic, POPs are inherently impossible to "manage". The key is to prevent production as soon as possible and reduce human and wildlife exposure as much as possible.

There are alternatives for all POPs, and alternative approaches to manufacturing and waste disposal that do not generate POPs. UNIDO is confident that such uses can be phased out over time and replaced with proven, non-POPs alternatives. Nevertheless, introducing alternatives poses a technological and financial challenge, especially in developing countries and countries with economies in transition.

The Stockholm Convention

After more than two years of intensive negotiations, the "Conference of Plenipotentiaries", meeting in Stockholm 22-23 May 2001, adopted the "Stockholm Convention on Persistent Organic Pollutants (POPs)". The 151 countries that have to date signed the convention represent a very high level of political commitment to move towards ratification. Each party to the Convention is required, as a first step, to develop a National Implementation Plans (NIPs), which sets out the priorities and action plans the party has prepared to meet its obligations under various articles of the convention.

Article 6 of the Stockholm Convention text addresses the identification and management of POPs waste, nine of which are pesticides (Aldrin, Dieldrin, Endrin, Chlordane, Heptachlor, DDT, Mirex, Hexachlorobenzene and Toxaphene), which for the most part, are now obsolete. The Convention requires that such wastes be managed in a manner protective of human health and the environment. Parties must develop strategies for identifying stockpiles, products and articles in use, and wastes covered by the Treaty, after which they must manage the stockpiles in a safe, efficient, and environmentally sound manner. The Treaty requires that disposal of such wastes be done in such a way that the POPs content is destroyed or irreversibly transformed so it is no longer a POP, or otherwise disposed of in an environmentally sound

Personal Action on POPs to Reduce Risk

The World Wide Fund For Nature /World Wildlife Fund (WWF) gave some hints how to reduce individual risk of POPs. The task is difficult because POPs already in the environment will be around for decades. Our current body burden of POPs is very difficult, if not impossible, to reduce. But we can reduce our exposure to POPs and help stop more POPs from getting into circulation. To reduce the risks of POPs the following suggestions should be considered:

1. **Try to eat lower on the food chain or avoid fats.** This will reduce lifetime accumulation of POPs and is especially relevant for children. In this respect some countries have issued guidelines that should be followed in the consumption of fatty fish.
2. **Choose unbleached paper products** (including personal hygiene products) or those bleached without the use of chlorine. Chlorine bleaching processes unintentionally generate POPs by-products such as dioxins, furans and others.
3. **Avoid polyvinyl chloride (PVC or vinyl) plastics.** This might be an impossible task given that there is an almost endless list of common vinyl items include packaging material, water pipes and other utility items, window frames, wall and doors, Venetian blinds and shower curtains, flooring, wall coverings, blood and infusion bags, medical equipment, credit cards, office supplies, garden and other furniture items, furniture coverings, auto parts, children's toys, etc. Don't burn the above listed items.
4. **Don't reuse old utility poles** for garden and construction projects and don't burn them. In this respect some countries have issued wood preservation guidelines that should be followed.
5. **Avoid using weed killers containing POPs chemicals.** A useful hint for the customers is to check the label for the active ingredient 2,4-D; they may contain dioxins and other POPs by-products.

manner when destruction or irreversible transformation does not represent the environmentally preferable option or the persistent organic pollutant content is low.

The Convention on POPs sets out obligations (except where exemptions apply) to:

- reduce or eliminate the manufacture, use, import, export, and the offering for sale of the pesticides: Aldrin, Chlordane, DDT, Dieldrin, Endrin, Heptachlor, Hexachlorobenzene, Mirex, Toxaphene and the industrial chemical, PCBs;
- restrict the production and use of: DDT (temporary exemption being for DDT use for malaria vector control); PCBs (exemption being PCB-containing transformers in use); and
- develop management plans with a view to minimizing releases of by-product POPs (dioxins and furans) from destruction and industrial processes.

Countries with adequate infrastructure, such as a regulatory and assessment scheme for pesticides and industrial chemicals, must (for those substances with POPs properties), promote reductions, use of alternatives, and pollution prevention.

In Article 6 of the Convention, the parties are required to develop both an inventory and a comprehensive management plan for stockpiles of unused pesticides and other POPs. Similarly, there is a requirement to identify sites contaminated with POPs and where cleanup is undertaken, do it in an environmentally sound manner. Pursuant to Article 7, Parties are required to develop an action plan and submit it within two years and review and update this plan in accordance with future decisions of the Parties.

In Article 12 of the Convention, the Parties recognize that rendering timely and appropriate technical assistance in response to requests from developing country Parties and Parties with economies in transition is essential to the successful implementation of the Convention.

The Convention further specifies that the Global Environment Facility, shall, on an interim basis, be the principal financial mechanism in order to assist eligible Parties through the provision of financial resources with the implementation of the convention.

The Rationale of UNIDO s Action

United Nations Industrial Development Organization (UNIDO) has practical, hands-on experience, unique among UN Specialized Agencies working with developing countries and countries in transition, in the provision of assistance for the introduction of best available techniques; industrial process changes; substitute or modified materials and products; cleaner production methods; and the environmentally sound management and minimization of wastes.

UNIDO also has a core group of staff with expertise relevant to the areas covered by the Convention, and especially technical assistance in these areas.

The 8th session of UNIDO General Conference held in Vienna, Austria from 29 November to 3 December 1999 adopted the resolution GC.8/Res.2 Global Environment Facility and Technical Cooperation Activities. This resolution requested the Director-General of UNIDO:

- (a) To mobilize available resources to increase the participation of UNIDO in identifying, preparing and executing Global Environment Facility projects;
- (b) To actively cooperate with the World Bank, the United Nations Development Programme and the United Nations Environment Programme in their respective focus areas, with particular attention to the capacity-building activities implemented by the United Nations Development Programme;

- (c) To strengthen dialogue and cooperation with the Global Environment facility secretariat in order to explore possible further cooperation lines of common and mutual interest.
- (d) To explore possibilities to increase cooperation with national Global Environment Facility focal points in Member states.
- (e) To identify Global Environment Facility-related cooperation opportunities between UNIDO and other competent organizations in order to create further synergies and strengthen the pool of expertise to be put at the disposal of Member States for the identification, formulation and execution of Global Environment Facility projects;
- (f) To submit a report on the progress made to implement the activities outlined in the present resolution to the Industrial Development Board at its twenty-second session.

The resolution GC.8/Res.2 greatly facilitated the development of UNIDO activities in the area of POPs. UNIDO could participate in the POPs intergovernmental negotiations (INC.3, INC.4 and INC.5) and the issue of POPs has been presented in UNIDO Round Table-Marginalization Versus Prosperity held during the 23rd Session of Industrial Development Board (IDB), Vienna, 14-16 November 2000. The issue paper entitled "UNIDO's efforts towards the Implementation of the Persistent Organic Pollutants (POPs) Convention" received very positive response from UNIDO member states and consequently it became part of the Emerging and Future UNIDO Initiatives-Proposal on New Regional Programmes submitted by the Director-General to the IDB.

In the IDB conference room paper on Emerging and Future UNIDO Initiatives there is the following statement: "UNIDO has traditionally dealt with the reduction, phase out and elimination of POPs through its Cleaner Production Programmes even before such acronym was coined.

UNIDO activities in the area of POPs were really facilitated by the GEF Council decision in May 2000 when UNIDO was awarded the status of Executing Agency with Expanded Opportunities *inter-alia* in recognition of its comparative advantage in the area of POPs. In early 2001 UNIDO became a member of the GEF Inter-Agency Task Force on POPs that developed the Guidelines for Enabling Activities for the Stockholm Convention. Consistent with the decision to make UNIDO an Executing Agency with Expanded Opportunities, the **GEF Council in May 2001 approved the direct access of UNIDO to GEF resources for expedited Enabling Activities on POPs.**

The 9th session of UNIDO General Conference held in Vienna, Austria from 3 to 7 December 2001 adopted the resolution GC.9/Res.2 Medium-Term Programme Framework, 2002-2005. This resolution encouraged the Director-General of UNIDO in the area of Cleaner and Sustainable Industrial Development to devote, *inter alia*, particular attention to the following:

- Assist Member States, in those aspects related to sustainable industrial development strategies and technologies, in the implementation of the international instruments, such as the Stockholm Convention on Persistent Organic Pollutants *inter-alia*, through the development of environmental norms and standards;
- Continue to cooperate with the Global Environment Facility and to provide services to Member States in all Global Environment Facility focal areas where UNIDO has a comparative advantage.

In the Global Forum event of the 9th session of UNIDO General Conference a case study on POPs was presented on the services that UNIDO offered to respond to the Stockholm Convention and the proposed UNIDO activities in future. The presentation received strong support from the delegates to UNIDO General Conference.

UNIDO Services Offered to Respond to the Convention

UNIDO has offered a wide range of services in terms of programmes and projects that facilitated the reduction and elimination of POPs releases from intentional production and use as well as non-intentional production as by-products. An illustrative summary of past and on-going activities relevant to the Stockholm Convention is given as follows:

1. The "Regional Network on Pesticides in Asia and the Pacific (RENAP) project covering 15 countries in the region and executed by UNIDO has been instrumental in bringing in the newer technologies needed to replace the persistent organochlorine and other toxic pesticide compounds and to treat obsolete pesticide stockpiles and contaminated sites. It should be noted that the question of appropriately dealing with pesticides categorized as POPs was first discussed in the Tripartite Review meeting of RENAP in Nantong, the People's Republic of China in 1995 with the participation of the representatives of the Government of Canada, and as such it was one of the very early international events on POPs.

Based on very sound technical back up information provided by the RENAP project, the question of a viable economic alternative was the major consideration when the Government of India decided in April 1997 to ban hexachlorobenzene (HCB), CAS No.118-74-1, as 30,000 Mt of active ingredient production capacity with 500,000 Mt of formulated material was being eliminated from agriculture and vector control. UNIDO suggested the use of bio- and botanical pesticides through the Integrated Pest Management Programme (IPMP), which was then adopted in Vietnam. In India DDT has also been banned in agriculture, yet large quantities of DDT acquired for the National Malaria Eradication Programme are being used in agriculture. There are also residual stocks of HCB, which are being used unauthorized not only in India but also in the adjacent countries, e.g. Nepal and Bangladesh. Despite these difficulties, the very successful RENAP programme has made a significant impact in China, Indonesia, the Republic of Korea, Myanmar, Thailand, the Philippines and POP pesticides have been banned or severely restricted and the IPMP gathered significant momentum.

Based on the experience gained through the RENAP project, UNIDO will continue its efforts to reduce or eliminate the releases of POP pesticides from manufacturing processes and to ban or restrict their use in Asia and the Pacific region. A similar approach could be followed in other regions.

2. The global network of National Cleaner Production Centres (NCPCs) has been growing steadily since it was founded, jointly by UNIDO and UNEP in 1994. To date, 23 such Centres have been established, and further centres will be established in the coming years. UNIDO is in regular contact with both recipient and donor countries about extending this NCPC network further. The main objective for the Centres is to be catalysts for cleaner production in their respective countries. They do this by undertaking activities aimed at raising awareness, by offering practical training and direct assistance to enterprises requesting cleaner production services, and through policy advice to local and national authorities. They may also create national networks of cleaner production partners and more local centres. Their major target group is the manufacturing sector, with a particular focus on small and medium-sized enterprises, but they work with certain service sectors as well as with national and municipal government agencies. The centres work on the traditional issues of waste, water pollution and air pollution reduction as well as on savings in resource and energy consumption.. The mission of the Centres makes them ideal partners for work on POPs, particularly concerning the reduction/elimination of POP-containing industrial wastes or emissions and the production/industrial use of alternatives to POPs. UNIDO intends to draw on the NCPCs and to use the network to intervene in all industrial aspects of POPs. Specifically they could also work in a systematic manner on issues related to inventories of obsolete stockpiles of POP pesticides and PCBs including the facilitation of take-back operations.

UNIDO intends to consult with national authorities in charge of the NCPCs, in order to build capacity in the NCPCs to gather data on the industrial production, import and export of POPs. These data will be used *inter-alia* to prepare assessments of stockpiles of POPs and to elaborate models for estimating quantities of POPs released into air, land, water and in products. A key reliability element of these estimations will lie in the method used to extrapolate results from tested demonstration facilities to national estimates; here the

practical experience of the NCPCs with the technologies and equipment used in local industry will be invaluable.

The NCPCs would also work with the relevant authorities to prepare action plans for the reduction or elimination of releases and stockpiles of POPs, and for the environmentally sound management of any residual POPs. The priorities set in these action plans could reflect, among other things, the differing toxicity/hazard posed by the various releases of POPs. Since many of the POPs are often found as complex mixtures of individual substances, for risk assessment purposes the NCPCs will develop or adapt toxicity equivalency procedures to describe the cumulative toxicity of these mixtures.

Based on its long experience in cleaner production and in its programmes to transfer environmentally sound technologies, UNIDO intends to promote the most effective technologies, raw material changes, and waste management practices that reduce or eliminate the generation of POPs, and that in principle could be eligible for GEF funding. As a baseline, Part V of Annex C of the Stockholm Convention is the obvious choice that gives considerations and criteria on which these Best Available Techniques (BAT) and Best Environmental Practices (BEP) may be judged.

Financial assistance under the Stockholm Convention will be based on a calculation of the full Incremental Costs associated with implementing measures to fulfil Convention obligations. In simple terms, Incremental Costs might be calculated as the difference between, on the one hand, the costs entailed by a country in meeting Convention obligations and, on the other hand, the amount that would have been spent by the country (for similar utility) if it were not a Party to the Convention and had no obligations under it. However, the Convention also suggests that agreed Incremental Costs are as much the outcome of a negotiation as they are precisely calculable figures.

Methodologies for the incremental cost calculation have been developed for the climate change focal area of GEF. Similar attempts have been made for the other GEF focal areas, such as Biodiversity and International Waters, but these have not yet been introduced for mandatory use. Since the Stockholm Convention addresses issues related to the full range of industrial activities, the development of a methodology for incremental cost calculation is of paramount importance. Without a practical methodology the implementation of the Stockholm Convention might not be able to enter the investment phase and therefore it would not be able to fulfil the expectations for reducing and wherever feasible eliminating emissions of POP by-products. UNIDO has extensive experience in the development and use of incremental cost calculations for industry and is willing to assist the GEF in establishing such methodologies for its focal area on POPs.

3. UNIDO has been involved in the early 1990s in reducing and eliminating PCBs in a number of developing countries including Malaysia, Thailand and Vietnam. In many of the more industrialised nations POP wastes are routinely burnt in incinerators and eliminated by other combustion technologies, e.g. boilers, metal furnaces, cement kilns. There is concern that these 'open-system technologies generate high levels of POPs emissions through either incomplete combustion or transformation to 'new POPs by-products such as Dioxins and Furans.

Considerable stockpiles of dangerous POPs exist in many countries around the world. These may be, for example, obsolete pesticides that have been banned from use or discarded electrical equipment, such as transformers and capacitors, containing PCBs. In many cases, these stockpiles are in inadequately managed and poorly maintained giving rise to the threat of release to the environment.

To address these concerns, UNIDO has been instrumental in promoting non-combustion technologies for destroying POPs. Technologies likely to win scientific, commercial, regulatory approval and civil society acceptance will, we believe, be those that:

- operate in essentially closed systems so that uncontrolled releases of POPs and other hazardous substances are avoided and programmed emissions are non hazardous;

- conform to the terms of the Stockholm Convention by achieving very high or total destruction efficiencies (DEs) for POPs and other substances of concern. This means that they not only eliminate gaseous emissions of POPs and other toxic pollutants but they also effectively eliminate releases of these pollutants as solid or liquid wastes.

We are aware that, in recent years, a number of technologies that can be used in the destruction of POPs and some other persistent toxic substances have emerged and been commercialised.

In February 2001, GEF Project Development Funds (PDF-B) were granted to prepare in the Philippines and Slovakia a global UNIDO/UNDP/GEF project entitled: *Demonstration of Viability and Removal of Barriers that Impede Adoption and Effective Implementation of Available, Non-combustion Technologies for Destroying Persistent Organic Pollutants.*

The proposed Project will destroy a large stockpile of PCBs in each of the two countries. The Project will do this utilizing commercially available non-combustion technologies that meet Project criteria. The Project will also help remove barriers to the further adoption and effective implementation of such technologies.

The Project recognizes that, in recent years, new technologies that can be used in the destruction of stockpiles of POPs (and some other species of persistent toxic substances) have emerged and been commercialised. With regard to these new technologies, the Project Document states:

“Some of them have operating characteristics that make them far superior to incinerators. They appear to be capable of being operated in ways that avoid problems that have been associated with the expert and public opposition to incinerators and other combustion technologies. These technologies can directly destroy POPs that are present in obsolete chemical stockpiles and in contaminated wastes and can be combined with other cleanup technologies to destroy POPs (and certain other PTS) trapped in soils and sediments.

The Project Document identifies two specific characteristics that should be demonstrated, at a minimum, by the destruction technologies selected by the Project:

1. *They operate in systems that are essentially closed. This means that uncontrolled releases of POPs and other substances of concern can be avoided and all residues from the destruction process (gaseous, solid and/or liquid) can be contained, analyzed and, if necessary, further processed prior to release. It also means that the technology can avoid the periodic “upsets that plague incinerators and other open destruction processes.*
2. *They can achieve total destruction efficiencies (DEs) for POPs and other substances of concern that approach 100%. This means that they not only effectively eliminate gaseous, air-emissions of POPs and other toxic pollutants of concern but they also effectively eliminate releases of these pollutants as solid wastes and as liquid wastes.*

The Project Document suggests that available and effective technologies that demonstrate the above two characteristics are most likely to win broad acceptance within civil society.

Based on the experience gained through this Project, UNIDO will promote and assist in the adoption of suitable non-combustion technologies. These will be applied within the framework of the African Stockpile Project (ASP). The PDF-B phase of this project has recently been approved by GEF for the World Bank, who will act as implementing agency. The overall executing agency is WWF in close cooperation *inter-alia* with FAO, UNEP, and UNIDO

Proposed Process to Establish Terms of Reference for Waste Disposal Technologies under the ASP

UNIDO has been requested to take the lead in a process that will establish Technology Terms of Reference (TOR) including criteria, guidelines and standards for technology selection, deployment, operation and monitoring under the ASP.

A. ISSUES TO BE ADDRESSED

Over the last 10-15 years a number of non-combustion technologies have been developed that have been demonstrated to effectively treat POPs wastes (including pesticides) in countries such as Canada, USA, Australia and Japan. A useful country example is provided by Australia, which does not permit the incineration of such hazardous wastes. Since the early 1990s all of Australia's PCB and pesticides wastes have been treated solely through commercial non-combustion means.

However, many of the non-combustion technology vendors are not as well capitalized as the traditional disposal companies offering incineration and they have found it difficult to break into the larger disposal markets like the European Union where there is a large incineration overcapacity in the market. This is one significant reason why such processes have not become more widely available (or known) throughout the world.

Under the ASP, large quantities of obsolete pesticides wastes, containing persistent organic pollutants (POPs), other persistent toxic substances (PTS) and other hazardous materials will be treated, disposed of, and/or destroyed.

The primary output of the ASP Technology TOR exercise will be criteria, guidelines and standards for the selection, deployment, operation, and monitoring of facilities that receive ASP funds (or contracts supported by ASP funds) to treat, dispose of and/or destroy wastes containing POPs, other persistent toxic substances and/or other hazardous materials.

B. DIFFERENT CIRCUMSTANCES MIGHT REQUIRE DIFFERENT APPROACHES

There are a number of different possible ways that treatment, disposal and destruction activities might take place. The Technology TOR process will need to establish appropriate criteria and guidelines for each of them; and it will need to decide which (if any) of the criteria and guidelines will apply to all of them. The possible ways that ASP wastes will be treated, disposed of and/or destroyed include:

1. Wastes may be packed up and shipped from Africa to an OECD country for disposal, treatment and/or destruction in a facility that is already operating and that already has a permit to treat wastes containing POPs, other PTS, and other hazardous materials;
2. Wastes may be sent for treatment, disposal and/or destruction to a facility in an African country that is already operating and that already has a permit to treat wastes containing POPs, other PTS, and other hazardous materials;
3. A new facility that is not presently operating or permitted may be set up, permitted and utilized in an African country for treatment, disposal and/or destruction using ASP funds and/or to service ASP-funded contracts;
4. An existing facility in an African country that is not presently used to treat wastes containing POPs, other PTS, and other hazardous materials may be modified and granted a permit to enable it to treat ASP wastes.

When the ASP considers a proposal to address some particular obsolete pesticide stockpile, it will need to evaluate which one or more of the above approaches should be employed.

C. WASTE HANDLING, TRANSPORT AND STORAGE

Beyond addressing the immediate acute stockpiles problem, African countries will need to develop strategies for managing hazardous waste in the long term. This may involve the establishment of facilities in country or sub-regionally. The development of such strategies and facilities from scratch provides a unique opportunity to consider technology options other than the current standards of incineration and landfill.

An additional concern is the long distance transportation of obsolete pesticides and the risk of accident en-route. The consequences of a spillage of obsolete pesticides during overland transport would be extremely serious, while such a spillage occurring during marine transport would be devastating. One important question to be asked in the context of the ASP is, can this initiative stimulate a move towards a more sustainable, non-polluting approach to hazardous waste management, and how far does ASP wish to go towards implementing such options?

There are also technology decisions that must be made that relate to waste handling, transport, and storage. This is an important topic because inappropriate procedures and technologies for waste handling, transport and storage can result in large releases of POPs, PTS and other hazardous materials which will have negative environmental and health impacts. In fact, such releases might be as great or even much greater than anticipated releases resulting from inefficiencies in the operation of a destruction or treatment facility.

Any waste destruction or treatment facility must incorporate adequate on-site handling and storage components. These components can be addressed during consideration of criteria and guidelines for selection, deployment, operation, and monitoring of waste disposal facilities.

4. UNIDO services are also offered to establish inventories of POPs by-products. To analyze the situation, reliable and systematic data are required. Therefore the first step to be taken is to develop (using existing inventories) a full POP by-products inventory. As a basis we could use the excellent inventory of sources of dioxin in the United States by the U.S. EPA for *industry sector specific emissions*. However, this is only a partial inventory because it excludes the intermediate products or waste streams and includes, with the exception of the pulp and paper wastewaters, only stack emissions. According to some EU sources the U.S. inventory correctly estimates the air emissions and products but significantly underestimates the industry specific emissions to land (soil) and water, including sediment. It follows that any inventory should be designed to determine the total amounts of POP by-products, and include all emission routes.

The UNEP "Standardized Toolkit for Identification and Quantification of Dioxin and Furan Releases (Draft prepared by UNEP Chemicals, January 2001) was developed to address these concerns and takes into account POPs by-products released to air, water, land and with products and residues. This methodology is a very transparent tool to estimate releases and may be usefully employed to meet inventory obligations under the Stockholm Convention. Of course, its applicability to the industry in a particular country needs to be verified with direct measurements of representative samples taken from actual industrial sources. If the results of the chemical analysis are not statistically significantly different from those estimates obtained using the UNEP Toolkit then the data could be used to populate the country's POPs by-products inventory. The availability of such a reasonably complete and analytically verified POP by-products inventory would then enable developing countries and countries with economies in transition to decide what might be the best way to decrease emissions or, wherever feasible, to eliminate them.

5. Finally, UNIDO services are offered to analytical testing capacity building. Compliance of the Parties to the Convention with their obligations entails institutional capacities to carry out required analytical sampling and testing in relation to POP by-products. An important issue to be addressed is ways to strengthen this analytical capability in developing countries. In addition, validation methodologies as well as international certification or accreditation of the laboratories should be subject to further effort. In this regard, the UNIDO could assist the establishment of international, regional and/or national reference laboratories specialized for the chemical analytical testing of POP by-products.

In this context it would seem critical to make an attempt to harmonize US and EU analytical testing methodologies or at least define which analytical methods could be eligible for GEF funding. UNIDO intends to develop an initiative to address these issues.

By-Products – the Challenge

Some provisions of the Stockholm Convention require phase-out and elimination of the production and use of certain pesticides and some other chemicals whose production and use in many countries has already stopped or has been in decline for decades. Some other provisions require proper disposal and destruction of residual stockpiles and wastes that contain these substances. The proper implementation of these provisions – an often challenging and costly task – will bring closure to some significant toxic legacies of the past.

On the other hand, Article 5 and Annex C of the Stockholm Convention fall into a different category. This Article specifies the measures Parties must take to reduce and eliminate releases of POPs that are produced as unintentional byproducts of certain human activities – dioxins, furans, hexachlorobenzene (HCB), and polychlorinated biphenyls (PCBs). This Article (together with several other provisions, such as, for example, Article 8 on listing new chemicals; Article 13 on financial resources and mechanisms; the DDT provisions of Article 3 and Annex B; and some others) is very forward looking. It is not, at all, a legacy issue. Rather, Article 5 of the Stockholm Convention advances a future vision of sustainable development, cleaner production and chemical safety.

Over the past three decades, the EU, the US and a few other countries have considerably reduced the rate at which dioxins are released to the environment in their jurisdictions. As a result, the levels of dioxins found in the environment, in the food supply and in the body tissues of their human populations have declined from the historic high points reached in the 1970s. That's the good news.

The bad news is that, in these countries, dioxins are still present in the environment, in ordinary food, and in human bodies at levels with the potential to cause serious harm to human health and to the environment. Furthermore, it appears that many of the methods that were employed in these countries to reduce dioxin releases may be reaching limits of the kind imposed by the law of diminishing returns. In the absence of newer approaches and newer ways of thinking, the trend toward release reductions in these countries may be slowing or stopping. Dioxin levels in their environment, food supplies and human populations may be tending toward a plateau that is still unacceptably high: a plateau at levels that can still cause substantial health and environmental injury.

In these countries, the progress that has been made in reducing dioxin levels from their historic high points has required very large investments of both public and private funds. Public funds are often used for extensive dioxin monitoring and testing, and they are also used to put in place ambitious and expensive regulatory, control and enforcement regimes. Large expenditures of public and private funds are also used to install and operate costly pollution control equipment. Still, despite these measures and the reductions they have achieved, the results are still unsatisfactory and large segments of civil society remains very dissatisfied with the performance of government and industry.

In most developing countries and countries in transition, however, the situation is very different. In many, if not most, it appears that the total release of dioxins to the environment is not declining, but may be rapidly rising, year after year. Dioxin sources, their rates of release, and the levels of dioxins in the environment, in food and in human populations have not been well documented because most developing countries and countries in transition lack both the funds and the technical capacity to monitor or test dioxin releases from facilities and/or monitor dioxin levels in the environment, in food and in humans. Without baseline data, and without capacity for monitoring and testing, it becomes very difficult for most countries to design and effectively implement measures to regulate and control dioxin releases. In addition, many of the approaches used in the U.S. and EU to control and reduce releases from large stationary sources, such as waste incinerators, require massive capital and operating investments from the private sector, municipal authorities, national governments and others on a scale that is beyond the reach of comparable groups in most countries. In this regard, the approaches used by the U.S., the EU and some others to reduce dioxin releases from their historic high points may not be practically replicable in most of the rest of the world.

If the approaches used by the US and the EU to reduce dioxin releases from their historic high points cannot be widely replicated in other countries, then different approaches must be taken. Otherwise, the world trend will not be toward reduction of total dioxin releases to the environment. Rather, total dioxin releases may continue to rise with no end in sight. This is especially of concern if one assumes that current rising trends (in many countries) in the per capita production, use, and disposal of synthetic chlorinated materials (e.g. chlorinated plastics, pesticides, solvents, bleaching agents, etc.) will continue unabated.

It would be a tragedy if developing countries and countries in transition experience a rapidly rising trend in total dioxin releases and a corresponding rising trend in dioxin levels in their environments, food supplies, and populations. If this were to happen, it would impose an additional and substantial burden on the public health, environment and economies of countries struggling to alleviate poverty and achieve sustainable development. Still, there is valid reason for concern that dioxins in the environments of developing countries will continue to increase, approaching and possibly even greatly exceeding the historic high points that were experienced by the U.S. and the EU during the 1970s. In addition, the further down this track developing countries travel, the more costly it will become to reverse course.

Such a public health disaster can be avoided if the Stockholm Convention is appropriately understood and implemented, so that, as countries industrialize, priority consideration is given to *prevention* and *substitution*. Developing countries can avoid creating new dioxin sources and expanding existing sources, thereby minimizing total dioxin releases. In the long term, *prevention* is the most cost-effective approach, and it is the approach that is most compatible with sustainable economic development and poverty alleviation.

Policies that are based on *prevention* and *substitution* represent a common sense approach. Measures to prevent dioxins from being produced are more desirable, more practical and, in the long-term, more cost-effective than introducing end-of-pipe measures that require national authorities to attempt the management and control of substances that they have no capacity to detect or monitor. This provides a strong motivation to support *prevention* and *substitution* measures that avoid dioxin formation.

Article 5 and Annex C of the Stockholm Convention establish a goal of the continuing minimization of dioxin releases and, where feasible, their ultimate elimination. They also establish, as a core strategy for achieving this goal, the design and implementation of policies of *prevention* and *substitution* based on the understanding that these should be given priority consideration over end-of-pipe approaches that attempt to manage and control dioxin releases.

Proposed UNIDO activities

In this section we provide an illustrative list of the proposed activities to be undertaken in the coming years, to be funded by a combination of GEF and donors/partners.

UNIDO was the first UN agency to submit POPs Enabling Activities project proposals for expedited approval by GEF. The first proposal was prepared for China in March 2001, and a number of subsequent proposals were approved by the GEF in 2001 and are currently under implementation. UNIDO will continue to assist countries requesting this high priority activity. During the process of the development and formulation of project proposals on POPs Enabling Activities, UNIDO has promoted awareness among high-level government decision makers. It has held special briefing sessions for stakeholders both of the donor community and of developing countries and countries with economies in transition. It has delivered training

programmes in several developing countries with regard to POPs. These actions will continue as we receive further requests from countries seeking our assistance.

It should be noted that in the area of POPs only enabling activities, capacity building and pilot demonstration activities can be funded by GEF before the Stockholm Convention comes into force.

Enabling Activities

The development and formulation of the National Implementation Plan is the main objective of the GEF POPs Enabling Activity projects that should lead to the ratification of the Stockholm Convention. UNIDO is assisting developing countries and countries with economies in transition that lack the capacity and expertise to prepare the National Implementation Plans, focusing on the following aspects:

- (a) The process of developing the National Implementation Plan and information dissemination within the country; budgetary requirements and work plan.
- (b) The national coordination mechanism to be put in place for the implementation of the Convention,
- (c) The identification and involvement of the key stakeholders in the country, including relevant ministries, NGOs, the private sector, industrial and agricultural associations, etc;
- (d) The POPs situation in the country with regard to the production, use, import and export of pesticides and PCBs, stocks of pesticides and PCBs, contaminated sites, emissions of dioxins, furans and PCBs into air, soil and water;
- (e) The assessment of the country's infrastructure, such as legal frameworks, inspection systems, testing facilities, local commercial systems, development of new environmentally-friendly technologies.

To date GEF has approved 22 POPs Enabling Activities proposals submitted by UNIDO. These are as follows:

- Africa
1. Central African Republic
 2. Congo Brazzaville
 3. Ghana
 4. Lesotho
 5. Niger
 6. Nigeria
 7. Tanzania
 8. Togo
- Arab
9. Algeria
- Asia
10. China
 11. Indonesia
 12. Laos
 13. Nepal
- Europe
14. Armenia
 15. Croatia
 16. Czech Republic
 17. Hungary
 18. Macedonia
 19. Poland
 20. Romania
- Latin America
21. Bolivia
 22. Guatemala

The volume and complexity of the information to be collected during preparation of the National Implementation Plans in so many countries necessitates consideration of data management to facilitate information exchange among the developing countries and countries with economies in transition. The start of Enabling Activities projects in several countries has been paralleled by such an initiative within UNIDO. The UNIDO database on POPs will be used for information dissemination, as a tool for decision-making processes and as a resource for developing and formulating projects related to the implementation of the Stockholm Convention. The fully developed database will be made accessible for member states and to the public at large.

Pilot Demonstration Projects

In addition to projects aiming at strengthening country-based capabilities in the formulation of National Implementation Plans, the GEF encourages the preparation of so-called demonstration projects that evaluate the viability and effectiveness of specific phase-out measures, and transfer environmentally sound technologies through successful implementation. UNIDO has been very active in this area and one global demonstration project has already been approved. The project entitled "Demonstration of viability and removal of barriers that impede adoption and effective implementation of available, non-combustion technologies for destroying persistent organic pollutants in the Philippines and Slovakia is under implementation.

UNIDO is developing and formulating several other pilot demonstration projects of global and regional interest in close consultation with the Scientific and Technical Advisory Panel (STAP) of the GEF.

Projects approved by the GEF or in various stages of formulation may be characterised within one of the following categories:

- Environmentally sound POPs disposal technologies
- Botanical or biological replacements for POPs-based pesticides
- Bio- and phyto remediation of POPs contaminated wastes and soils
- Cleaner production to remove POPs emissions from industrial and agro-processing industries

It is anticipated that projects will be developed in the coming years based on needs identified through Enabling Activities and the research and development activities described above.

Establishment of a fund for the disposal of obsolete stockpiles of persistent toxic substances, especially POPs in Central and Eastern Europe (CEE)

Obsolete pesticides stock is a major burden to the environment. It is estimated that the total global obsolete stock is over 500,000 tonnes. The total global costs for treating these stocks, based on an estimated cost of US\$ 3,000 per tonne, would be in the order of US\$1.5 billion. The obsolete pesticides stored in underground wells, old warehouses, former military facilities, and even unsecured ground pits is an important environmental issue in Central and Eastern Europe. The toxic chemicals may leach and contaminate water resources and pose a serious threat for human and environmental health.

In Central and Eastern Europe there is an estimated several hundred thousand tonnes of obsolete pesticides stock but the real amounts are certainly higher, because in many countries the waste stored at certain manufacturers and distributors facilities, and at landfill sites, where production wastes often have been deposited, could not be accessed. The estimated volumes of obsolete pesticides in a few selected CEE countries, as presented in the 6th International HCH and Pesticides Forum in Poznan, Poland, 20-22 March 2001, clearly show this uncertainty:

| Country | Obsolete pesticides (estimated tonnage) | Type of waste |
|----------------|--|-------------------------|
| Bulgaria | 4,000 | |
| Macedonia | 33,000-38,000 | HCH production residues |
| Poland | 50,000-60,000 (160,000?) | HCH production residues |
| Romania | 1,030 | |
| Slovenia | 350-400 | |

The situation in Hungary and Slovak Republic is not known but both governments recently agreed to co-operate in a so-called pilot inventory project, sponsored by the Dutch Ministry of Environment and Housing. This project will be limited to 2 designated areas, where 2 NGO s will co-ordinate works. The project is estimated to give a first impression of the real situation in the 2 countries. The project will go on in continuous exchange with UNIDO and IHPA, so that any duplication and overlap is avoided.

The International HCH [hexachlorocyclohexane] and Pesticide Association (IHPA) has made a major effort to raise international awareness on the problems of obsolete pesticides in Central-Eastern Europe (CEE) and New Independent States (NIS). The 6th International HCH & Pesticides Forum held in Poznan, Poland in March 2001 recognised:

- that obsolete pesticides pose severe threats to human health, the environment and development in CEE and NIS;

- that many of the governments in these countries lack the technical, financial and logistical resources to address these inherited problems;
- that addressing these problems requires a national, systematic, strategic and integrated approach towards obsolete pesticides in line with the implementation of the forthcoming POPs convention in which all stakeholders are involved and with appropriate public information and participation;
- part of such a strategic approach is the establishment and implementation of an action plan including nation wide inventories of stocks of obsolete pesticides based on the international accepted standard (e.g. FAO) after which appropriate treatment is applied as well as strategies for prevention of accumulation of stocks;
- that there is also a need for agreed strategies and action plans on the sustainable use of pesticides;
- that in most of the CEE and NIS countries there is no detailed, nation wide inventory of obsolete stocks available and that in most of those countries appropriate mechanisms for treatment are not available;
- that over the last decade, the Forum has successfully brought together scientists, governmental representatives, IGOs and NGOs, agrochemical industry and other stakeholders;
- that there is an urgent need for:
 - more intensive and co-ordinated collaboration with bilateral donors, the European Institutes and other International organisations and countries from outside the region, and
 - structures (sub)regional collaboration.

The participants of the Forum recommended:

- that CEE and NIS countries explicitly express the political will to address the problem of obsolete pesticides as a matter of urgency, and to develop and implement national strategic approaches to address this problem, including detailed nationwide inventories;
- that the HCH and Pesticides Forum together with representatives of the recipient countries and involved stakeholders will work towards a mechanism of a (sub)regional organisation that will provide:
 - annual or biannual regional meetings to take stock of the developments in this field, and in particular in this region, and to catalyse new developments that may offer a solution to the handling of obsolete pesticides,
 - a web site with:
 - i. the actual situation and developments in the CEE and NIS countries,
 - ii. links to other relevant web sites,
 - iii. information on different priority issues, such as:
 1. inventories
 2. decision making support tools
 3. technical solutions
 4. preventive strategies
 5. transformation strategies towards sustainable agriculture
 6. research programmes
- a regional advisory Committee with the task to:
 - i. organize the regional meetings
 - ii. develop and maintain the web site
 - iii. provide information and advice upon request of the CEE and NIS
- a regional resources centre, which also hosts the Secretariat of the Steering Committee and the regional web site;

- that countries outside the region and IGOs assist the CEE and NIS in the elimination of stocks of obsolete pesticides and preventing their recurrence, among others by assisting in developing national action plans as well as (sub)regional collaboration;
- that these countries also develop and/or strengthen programmes on sustainable management of pesticides, including: production, import, distribution, application and disposal.

The Committee on the Environment, Public Health and Consumer Policy of the EU Parliament discussed the recommendations made in Poznan on 15 June 2001, and followed them up by send a letter to the ambassadors of the 10 Accession Countries on July 2001. However, only a few countries have responded. The reasons of the very limited response might be due to:

- the insecurity of the concerned authorities to report on their respective country status before completing of their National Implementation Plans (NIPs) to be financed through GEF POPs Enabling Activities;
- the pressure on the 10 Accession countries to fulfil the requirements for membership of the EU.

IHPA discussed this issue in Brussels in November 2001 with representatives of the Commission, who clearly stated that:

- the countries should to approach the Commission themselves;
- the countries never brought up the issue of POPs during their negotiations on accession; and
- the Commission hopes to receive more reactions by mid-2002.

In order to break this deadlock IHPA and UNIDO agreed to prepare a concept for a regional project which could facilitate implementation of the recommendations of the Poznan meeting by disposing of obsolete POPs stockpiles. UNIDO has also started a dialogue with GEF, to gauge their interest in financing such a programme. GEF has expressed that they would in principle be interested to co-finance such a project and a broad partnership among donors and agencies would need to be established because the magnitude of the problem in CEE is so much bigger than in Africa that a more cautious approach is warranted.

Recently, members of the Committee on the Environment, Public Health and Consumer Policy of the EU Parliament, made an official appeal to the EU-Commissioner of Environment, stating the following main items:

- The presence of enormous amounts of obsolete pesticides in all Central and Eastern European countries needs a special initiative by the European Union;
- Asking "if the European Commission could pay permanent attention to the existence of these materials in Central and Eastern Europe to give these countries the capability to fulfil the obligations in the framework of the Persistent Organic Pollutants Protocol ;
- Proposing that " the European Union should take the lead in proposing initiatives on the solution of obsolete pesticides in Europe and in the countries of the so called Third World ;
- Proposing that "A move by the European Union could bring more dynamic in these issue .

Furthermore, the Committee on the Environment, Public Health and Consumer Policy of the EU Parliament has officially adopted on April 24th following amendments of the report on "The State of Enlargement Negotiations" and has called on the Committee on Foreign Affairs, Human Rights, Common Security and Defence Policy, as the committee responsible to incorporate the amendments included in the following issues on obsolete pesticides:

Paragraph 6b. Urges the Commission to take steps for the elimination of stocks of obsolete pesticides in the accession countries, confirmed by new reports (HELCOM, DANCEE), and to establish forms of cooperation for an international strategy for the region with the present acting international stakeholders on the implementation of the Stockholm Convention (GEF/UNIDO/UNEP Chemicals);

Paragraph 90a. Calls on the government of Poland to discuss an action plan with the Commission to decide how to eliminate 50,000 - 60,000 tonnes of obsolete pesticides spread over the country.

The fact that in CEE many of the POPs chemicals were manufactured and exported at large commercial scale the negative consequences are even more serious and have to be addressed in line with the Stockholm Convention on a regional basis. For CEE accession countries into EU country-by-country approach in dealing with the technically and technologically complex issue of POPs, relying at least at a certain extent on international development funds, could be a very lengthy process. A country has to develop and formulate project proposals, seek funds, and deal with IGOs, contractors and other relevant agencies individually. A regional program to be delivered in partnership with international organizations, NGOs and regional partners might reduce or overcome many of these foreseeable delays by building on shared experience, cooperation, economy of scale and synergy between the participating organizations and other entities.

Perhaps most important is the need to reduce/remove the threats to the health of humans and the environment posed by these obsolete pesticides. Providing a coordinating mechanism can create synergies, avoid overlaps and duplication, achieve economies through longer term planning and delivery, avoid project development and formulation in isolation, etc. A comprehensive and well planned, coordinated and executed clean-up program such as this can add a sustainability element (through prevention program elements), and lay a solid foundation in the accession countries for the broader context of the sound management of chemicals. It will also facilitate in many instances the delivery of a key component(s) of the NIP as required by the Stockholm Convention.