IPEN

The International POPs Elimination Network

THE POPS HANDBOOK for the STOCKHOLM CONVENTION on PERSISTENT ORGANIC POLLUTANTS

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Welcome to updated version of the electronic IPEN POPs Handbook.

The International POPs Elimination Network's Handbook for the Stockholm Convention on Persistent Organic Pollutants is a resource document, prepared jointly by a number of IPEN's Participating Organizations. It is offered in the spirit of global community partnerships and capacity building.
The International POPs Elimination Network is a network of more than 350 public interest NGOs in 65 countries, united in support of a common POPs Elimination Platform.

The text of the platform is available in several languages on IPEN's website at http://www.ipen.org

While the Handbook was prepared in the spirit of the IPEN Platform, the specific views represented here are not necessarily shared by all of IPEN's Participating Organizations. We thank the various individuals and groups for the time they have devoted to helping prepare the materials that are included.

In this updated version of the Handbook, you will find a description of each of the Convention articles and the final text. You will also find case studies selected to illustrate key issues, and helpful contacts to consult for more detailed information. If you wish to discuss the contents of any of the case studies or issue papers contained in the Handbook, please contact the specific listed author directly. Otherwise questions or comments can be directed to the:

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IPEN's website is also a useful resource that you may find of value in your important work of protecting the earth from POPs pollution.
IPEN's website address is http://www.ipen.org

The official UNEP website for POPs is available at http://irptc.unep.ch/pops/

INTRODUCTION

The POPs Handbook - all you need to know about the Stockholm Convention on Persistent Organic Pollutants

The Stockholm Convention on the Persistent Organic Pollutants (2001) is a legal instrument to phase out and eventually eliminate the ‘dirty dozen’ persistent organic pollutants; PCBs, DDT, hexachlorobenzene, dioxin and furans, dieldrin, aldrin, endrin, chlordane, heptachlor, toxaphene, mirex.

These chemicals pose a significant risk to human health and the environment. Known as "poisons without passports", they are particularly hazard because of their common characteristics. They are toxic to humans and wildlife. They are persistent and remain intact for long periods of time, resisting break down. Having a high 'lipid' or fat solubility, they accumulate in the bodies of humans, marine mammals, and other wildlife. They are found at higher concentrations at the higher levels of the food chain. They are passed from mother to the fetus in the womb and to the child through breastmilk. POPs can cause nervous system damage, diseases of the immune system, reproductive and developmental disorders, as well as cancers.

POPs are semivolatile and mobile. They are widely distributed through the environment, travelling great distances on wind and water currents. Through global distillation, they travel from temperate and tropical regions to the colder regions of the poles.

The case studies selected, illustrate some of the issues concerning the persistent organic pollutants. Some are ‘success stories’ which demonstrate what can be achieved when communities work together to solve common problems and there are examples of the implementation of effective alternatives to POPs or POPs producing technologies.

The Handbook also provides a list of IPEN contact groups and position papers as well as a summary of available non-incineration destruction technologies.

A Short History of the POPs negotiations

The convention has its origins in the United Nations Conference on Environment and Development (UNCED) (Earth Summit) in held in Rio in 1992 and the adoption of Agenda 21. It was also the culmination of many years of campaigning and lobbying by public interest, health and scientific non government organisations.

In May 1995, the Governing Council of the United Nations Environment Program (UNEP) released its
Decision 18/32 -25 on POPs noting :

- Chapter 17 Agenda 21, the Protection of the Oceans which identifies reduction and elimination of emissions and discharges of organohalogens and other persistent organic pollutants as a priority action,
- Chapter 19 Agenda 21, concerned with the environmentally sound management of toxic chemicals and
- the precautionary approach as stated in Principle 15 of the Rio Declaration on Environment and Development

UNEP invited the International Programme on Chemical Safety (IPCS), a joint program of the International Labour Organisation (ILO), the World Health Organisation (WHO) and UNEP, as well as the Intergovernmental Forum on

Chemical Safety (IFCS) and their ad hoc working group to initiate a process for short-listing potential POPs. The shortlist was to draw on the UN Economic Commission for European Convention on Long-range Transboundary Air Pollution adopted Geneva 3/11/l979.

The group aimed to :

- consolidate information on POPs, analyse their pathways and origins, review their transport and global deposition
- examine sources, risk/benefits, production and use;
- evaluate substitutes, their availability, costs and efficacy
- assess strategies and appropriate policies,
- consider the special needs of developing countries and those with economies in transition and
- review the results and outcomes of the Washington Conference on Land Based Sources of Marine Pollution

The Washington Conference held in 1995 was an intergovernmental meeting to adopt a global program of action for the protection of the marine environment from land-based activities, including persistent organic pollutants. The Conference acknowledged that POPs are transported globally by air and sea, resulting in increasing concentrations far from the original site of use or release.

Paragraph 17 of the Washington Declaration on the Protection of the Marine Environment from Land-based Activities, committed Governments to:

"Acting to develop, in accordance with the provisions of the Global Programme of Action, a global, legally binding instrument for the reduction and/or elimination of emissions, discharges and, where appropriate, the elimination of the manufacture and use of the persistent organic pollutants identified in decision 18/32 of the Governing Council of the United Nations Environment Programme. The nature of the obligations undertaken must be developed recognizing the special circumstances of countries in need of assistance. Particular attention should be devoted to the potential need for the continued use of certain persistent organic pollutants to safeguard human health, sustain food production and to alleviate poverty in the absence of alternatives and the difficulty of acquiring substitutes and transferring of technology for the development and/or production of those substitutes,"

In February 1997, UNEP's Governing Council noted with appreciation the assessment process on the initial list of twelve persistent organic pollutants. The conclusions and recommendations made by the Ad Hoc Working Group on Persistent Organic Pollutants of the Intergovernmental Forum on Chemical Safety were accepted.

The Executive Director was requested to convene an intergovernmental negotiating committee (INC) with a mandate to prepare an international legally binding instrument for implementing international action initially beginning with twelve specific persistent organic pollutants.

The Governing Council also noted the need to develop science-based criteria and a procedure for identifying future POPs and requested the intergovernmental negotiating committee to establish an expert group (CEG).

Aware of the serious concerns of the international community regarding the risks posed by the initial list of twelve persistent organic, the Governing Council requested that the intergovernmental negotiating committee commence its work by early 1998.

In June 1998, the first intergovernmental negotiating committee (INC1) was held in Montreal. This was followed by INC2 in Nairobi in January 1999, INC3 in Geneva

September 1999 and INC4 in Bonn, March 2000. The final negotiation session was held in South Africa in December 2000. The Stockholm Convention on Persistent Organic Pollutants (POPs) opened for signature at the Diplomatic Meeting in Stockholm on the 21-23rd May 2001 and was signed by 90 countries. Canada ratified the Convention at the same time. The Stockholm Convention on Persistent Organic Pollutants must be ratified by at least 50 countries before coming into force. A final text was accepted with the following highlights:

- Precaution as the guiding principle and operationalized throughout the Convention,
- Funding commitments to enable full participation of all countries,
- Elimination of intentionally produced POPs,
- Ultimate elimination of the POPs byproduct where feasible,
- Environmentally sound management and disposal of POPs wastes including stockpiles, products, articles in use, and materials contaminated with POPs.
- Strict limitations and bans on trade except for the purpose of environmentally sound disposal or in other very limited circumstances.
- Limited and transparent exemptions.

DESTRUCTION TECHNOLOGY

POPs Stockpiles - The Problem

There are significant stockpiles of industrial and agricultural POPs around the globe with the worldwide stockpile of obsolete pesticides in non OECD countries being estimated at greater than 100 000 tonnes by the FAO.

Criteria for POPs Destruction Technologies

The destruction of POPs stockpiles and environmental reservoirs requires the use of destruction technologies ***that do not, themselves, cause hazards, generate POPs or otherwise threaten or injure health and/or the environment.***

Technical criteria should be used to assess proposed destruction technologies.

- Destruction efficiencies of effectively 100 percent for the chemicals of concern. The determination of 100 percent destruction efficiency is necessarily based on findings of no detectable concentrations of the chemicals of concern in any and all residues, using the most sensitive analytical techniques available worldwide. Analyses of the unmodified residues must be carried out sufficiently frequently to ensure compliance with this criterion during startups, shutdowns and routine operations.

- Complete containment of all residues for screening and, if necessary, reprocessing to ensure that no residues contain detectable levels of chemicals of concern or other harmful constituents, such as newly formed persistent organic pollutants or other hazardous substances.

- No uncontrolled releases.

Determining the extent to which a technology meets these criteria during both preliminary tests and routine operations has many aspects including but not limited to the following:

- scientific and engineering expertise;
- equipment and facilities for sampling and analysis of the materials to be destroyed and all residues of the destruction process;
- stringent operating guidelines; and
- comprehensive regulatory framework, including enforcement and monitoring requirements.

Community-based public participation must be an integral part of the entire process starting with stockpile evaluation and site selection and continuing through monitoring and compliance.

Traditional disposal methods for POPs stockpiles

Traditional management methods for POPs wastes include: long term storage; disposal in landfills and deep well injection; and incineration in hazardous waste incinerators, cement kilns, metal furnaces and boilers.

Table 1. Selection of traditional POPs disposal methods.

Technology	Comments
Storage	In addition to spills and leaks, volatilization of POPs from storage sites is problematic, particularly in tropical climates. Even in a temperate climate, chemicals are known to lead to releases into the environment despite the use of the best available preventive measures.
Landfill	For persistent substances, burial in landfills is not a destruction technology; it is only a method of containment. Constituents in buried wastes can and do escape into the surrounding environment, primarily through leaching into groundwater and volatilizing into the air. Landfill fires may be a significant source of dioxins and POPs release to atmosphere and groundwater.
Deep wells	Chemical releases from such deep wells are not uncommon, no methods for predicting the paths or speeds with which injected wastes may migrate into groundwater or escape to the surface. Little is known about the long-term chemical behaviour of chemicals that have been injected down deep wells.
Cement kilns	Dioxin emissions from cement kilns burning hazardous wastes are significantly higher than non-waste burning facilities. Dioxins have been detected in solid residues. FAO warn that disposal of hazardous materials, such as obsolete pesticides, by burning in cement kilns is *often not applicable in a safe and/or cost-effective manner.*
High temperature incineration	Modern incinerators are commonly described as destroying POPs and similar chemicals very efficiently. However, recent tests suggest that incinerators achieve destruction efficiencies that are considerably lower than those achieved by certain non-combustion technologies. Dioxins and other POPs released in stack gases and solid residues.

Modern POPs destruction technologies

Evidence of the environmental and public health impacts of incinerators, cement kilns and similar combustion systems has created strong public opposition to incineration. This factor as well as increasing infrastructural needs, particularly those associated with the management of air emissions and other residues, has encouraged the development of other destruction technologies. Some of the more recently developed technologies offer significant advantages in both performance and costs over combustion in dedicated incinerators and cement kilns. It is important to note, however, that the resource demands for facility siting and construction, performance testing, operation, routine monitoring of operations, and other infrastructural needs of both conventional and modern destruction technologies render both unsuitable for continued, long-term use, as in the disposal of domestic and industrial wastes.

A selection of modern destruction technologies is shown in Table 2.

Table 2. Selection of modern POPs destruction technologies.

Technology	Process
Gas-phase chemical reduction	Hydrogen reacts with chlorinated organic compounds, such as PCBs, at high temperatures, yielding primarily methane and hydrogen chloride. High destruction efficiencies. All emissions and residues are captured for assay and reprocessing, if needed.
Electro-chemical oxidation	At low temperature and atmospheric pressure, electrochemically-generated oxidants react with organochlorines to form carbon dioxide, water and inorganic ions. High destruction efficiencies. All emissions and residues can be captured for assay and reprocessing, if needed.

Molten metal	Organochlorines and other materials are oxidized in a vat of molten metal, yielding hydrogen, carbon monoxide, ceramic slag and metal by-products. Destruction efficiencies are not known, but DREs are high.[1]
Molten salt	Organochlorines and other materials are oxidized in a vat of molten salt, yielding carbon dioxide, water, molecular nitrogen, molecular oxygen, and neutral salts. Destruction efficiencies may be high.
Solvated electron process	Free electrons in a solvated electron solution convert contaminants to relatively harmless substances and salts. Destruction efficiencies vary from 86 to 100 percent. All emissions and residues can be captured for assay and reprocessing, if needed.
Supercritical water oxidation	Under high pressure and temperature, organochlorines and other materials are oxidized in water. Destruction efficiencies are unknown, but DREs are high. All emissions and residues can be captured for assay and reprocessing, if needed.
Plasma arc	Organochlorines and other materials are oxidized at very high temperatures. Destruction efficiencies are unknown, but DREs are high. Dioxins have been identified in process residues.
Catalytic hydrogenation	Organochlorines are reacted with hydrogen in the presence of noble metal catalysts, yielding hydrogen chloride and light hydrocarbons. High destruction efficiencies.
Base catalyzed dechlorination	Organochlorines are reacted with an alkaline polyethylene glycol, forming a glycol ether and/or a hydroxylated compound, which requires further treatment, and a salt. Dioxins have been identified in process residues, but are retained and can be re-treated.

[1] Destruction efficiencies are determined by considering the occurrence of undestroyed chemicals of concern in all gaseous, liquid and solid residues; for DREs, only gaseous residues are considered.

Further information and resources:

- IPEN Backgrounder and Elimination platform :http://www.ipen.org/ipen_platform.htm

- Costner, P., Luscombe, D., and Simpson, M., "Technical Criteria for the Destruction of POPs Stockpiles," Greenpeace International, 1998. http://www.who.int/ifcs/isg3/d98-17b.htm

- CMPS&F "Appropriate Technologies for the Treatment of Scheduled Wastes", Review Report No.3, Prepared for Environment Australia, August 1996. http://www.ea.gov.au/

- US EPA Technology Remediation website: http://clu-in.org

- US Federal Remediation Technologies Roundtable: http://www.frtr.org/

- FAO stockpile paper: http://www.who.int/ifcs/isg3/d98-42b-anx2.htm