SAICM
Global Outreach Campaign

An NGO Guide to Persistent Organic Pollutants

A Framework for Action To Protect Human Health and the Environment From Persistent Organic Pollutants (POPs)

By Jack Weinberg,
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1. Foreword

This booklet is about a class of environmental pollutants that are called "*persistent organic pollutants*" or "*POPs*." POPs are toxic chemical pollutants that contaminate the environment in all regions of the world. POPs accumulate in the body tissues of wildlife and people; they cause human disabilities and diseases; and they disrupt sensitive ecosystems. In 2002, a global treaty called the Stockholm Convention on Persistent Organic Pollutants[1] (Convention) was adopted by the world's governments to protect human health and the environment from POPs.[2]

The intended audience for this booklet is leaders and members of organizations of civil society for which chemical safety issues are – or should be – topics of concern. Such organizations include: public health and environmental advocacy organizations; organizations of medical and healthcare professionals; organizations representing communities or constituencies potentially impacted by toxic chemical exposure; trade unions; and others.

The booklet is part of a series addressed to relevant nongovernmental organizations (NGOs) and organizations of civil society (CSOs), especially those in developing countries and countries with economies in transition. The purpose of these booklets is to encourage NGOs and CSOs to engage in chemical safety campaigns and projects as part of a global NGO effort to promote the implementation of the Strategic Approach to International Chemicals Management (SAICM), a global policy and strategy adopted in 2006 by more than 100 governments with the aim of changing how chemicals are produced and used in order to minimize the harmful impacts of toxic chemical exposure on human health and the environment.[3]

Six international NGO networks are collaborating in the global campaign. They are: Health Care Without Harm (HCWH); the International POPs Elimination Network (IPEN); the International Society of Doctors for the Environment (ISDE); the Pesticide Action Network (PAN); Women in Europe for a Common Future (WECF); and the World Federation of Public Health Associations (WFPHA).

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Jack Weinberg
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October 30, 2008

[1] See Stockholm Convention web site at: http://www.pops.int/
[2] Stockholm Convention objective, see Convention text (from web site above), Article 1.
[3] The text of the SAICM core documents and the report of the meeting that adopted them are available in the six United Nations Languages at: http://www.chem.unep.ch/saicm/SAICM%20texts/SAICM%20documents.htm. An NGO Guide to SAICM is available in the six United Nations Languages at: http://www.ipen.org/campaign/education.html

2. An Introduction to POPs

Persistent organic pollutants (POPs) are a class of highly hazardous chemical pollutants that are recognized as a serious, global threat to human health and to ecosystems. Some POPs are pesticides; some are industrial chemicals; and some are unintentionally produced byproducts that are formed during certain combustion and chemical industry processes. Some examples of POPs are DDT, PCBs and dioxin.

POPs are widely present in the environment in all regions of the world. Every person carries a body burden of POPs, mainly in his or her fatty tissues. Most fish, birds, mammals and other forms of wildlife are also contaminated with POPs.

POPs in the environment pollute the everyday food supply, especially fish, meat, butter and cheese. When people eat POPs-contaminated foods, the POPs accumulate in their fatty tissue. Mothers pass on POPs from their own bodies to their offspring. In humans and other mammals, POPs enter and contaminate the fetus while it is still in its mother's womb. Since breast milk also contains POPs, infants are further exposed to POPs while nursing.[*] In non-mammal species, POPs are passed from the mother to offspring though the eggs.

POPs have the potential to harm humans and other organisms even at concentrations that are commonly found in ordinary foods. There is good medical evidence linking the following human illnesses and disabilities to one or more of the POPs:[4]

- Cancers and tumors including soft tissue sarcoma, non-Hodgkin's lymphoma, breast cancer, pancreatic cancer and adult onset leukemia;
- Neurological disorders including attention deficit disorder, behavior problems such as aggression and delinquency, learning disabilities and impaired memory;
- Immune suppression;
- Reproductive disorders including abnormal sperm, miscarriages, pre-term delivery, low birth weight, altered sex ratios in offspring, shortened period of lactation in nursing mothers and menstrual disorders; and
- Other diseases including increased incidence of type II diabetes, endometriosis, hepatitis and cirrhosis.

[*] Note: It is recommended that mothers nonetheless continue to nurse their infants. Important nutrients that are contained in breast milk provide the infant with positive benefits that generally outweigh the negative impacts of the POPs. Therefore, mothers are still encouraged to breastfeed unless otherwise instructed by their physician.

[4] For specific information linking a particular POP to a particular disease or disability, see the *Toxicant and Disease Database* maintained by the Collaborative on Health and the Environment at: http://database.healthandenvironment.org/

POPs are most harmful to the developing fetus causing health impairments, such as neurological disorders and deficits, which continue throughout the child's entire life. POPs are also particularly harmful to infants, children, women, the ill-nourished and some other populations.

2.1 DDT, PCBs and Dioxins

Public concerns about POPs began to surface in the 1960s and '70s when three chemical pollutants – DDT, PCBs and dioxin – began to attract substantial public attention. In her 1962 book *Silent Spring*, Rachel Carson documented how the pesticide DDT destroyed bird populations, disrupted ecosystems and caused cancers and other human illnesses. In 1964, a Swedish researcher, Soren Jensen, who was trying to study DDT levels in human blood, found that a mysterious group of chemicals in his samples was interfering with his analyses. On further examination, these chemicals turned out to be polychlorinated biphenyls (PCBs), a family of industrial chemicals widely used at that time in electrical transmission systems and other applications.

As other scientists continued looking, both DDT and PCBs were found to be widely present in both wildlife and human body tissues. Both were linked to numerous diseases and health deficits. Scientists, NGOs and members of the public began to express concerns and as a result, many countries – especially many highly industrial countries – banned the continued production and sale of DDT and PCBs in the 1970s and '80s.

In the 1970s, dioxin*, another chemical with similar properties (but more highly toxic), also began to attract attention and concern. Dioxin* is a chemical that has never been intentionally produced for any use (except for very small quantities produced as laboratory reference standards). However, during the Vietnam War, human exposure to dioxin became associated with rare forms of cancer and unexpectedly high rates of some other illnesses in US Airmen and Vietnamese civilians. Despite initial denial by the US military, these injuries were eventually linked to the 77 million liters of Agent Orange and other herbicides that the US Air Force had sprayed on Vietnam for defoliation between 1962 and 1971.

Agent Orange and some of the other herbicides were used were found to contain dioxin as an unintended contaminant; this dioxin was identified as the likely source of the illnesses. While it was the harm to the American Airmen that initially drew widespread attention, far greater harm was suffered by the millions of Vietnamese living in the sprayed areas. According to estimates provided by the Government of Vietnam, 400,000 people were killed or maimed by the defoliants; 500,000 children were born with birth defects ranging from retardation to spina bifida; and a further two million people have suffered cancers or other illnesses.[5]

* In this booklet, we use the word "dioxin" to include polychlorinated dibenzodioxins (PCDDs), polychlorinated dibenzofurans (PCDFs), and other unintentionally produced chemicals with similar toxicological properties.

[5] Reported in the Globe and Mail, July 11, 2008, see: http://www.theglobeandmail.com/servlet/story/RTGAM.20080711.worange1107/BNStory/Front/home/?pageRequested=all

2.2 The Common Properties that all POPs Share

DDT, PCBs and dioxins are chemicals that share a number of properties in common. Eventually, the term "*persistent organic pollutant*" or "*POP*" has come to be used as a general term for the entire class of chemicals that share these properties.

POPs are organic chemical compounds, which means that they have a chemical structure that contains carbon and hydrogen. They share four particular properties in common:

1) **Persistent:** POPs are chemical pollutants that resist physical, chemical and biological degradation. Therefore, once a POP enters the environment, it remains there for a long time.

2) **Bioaccumulative:** POPs are chemical pollutants that easily dissolve in fats (lipophilic). They accumulate in the body tissues of living organisms to concentrations that are much higher than those in the surrounding environment.

3) **Subject to Long-Range Transport:** POPs are chemical pollutants that can travel long distances in the environment and can cause harmful contamination at locations far distant from where the chemical originally entered the environment. POPs are mainly transported long distance on air currents, but they can also be transported by water currents or by migratory species.

4) **Likely to have Adverse Affects:** POPs are chemical pollutants with the potential to cause harm to human health and/or to ecosystems.

In general, chemicals that are considered POPs fall into one or more of three categories. Some POPs have been or continue to be produced intentionally for use as pesticides, including insecticides, herbicides and fungicides. Some POPs have been or continue to be produced for use as industrial chemicals. Additionally, some POPs are unintentionally produced as unwanted byproducts in certain chemical industry processes, or unintentionally produced during combustion processes, including incineration, when chlorine or some other halogen (e.g. bromine, fluorine) is present.

2.3 POPs in the Environment

In the 1980s and '90s, scientists studying the North Sea, the Baltic Sea, the Great Lakes of North America and the circumpolar Arctic region saw patterns of severe disruptions in these regional aquatic ecosystems. They identified persistent chemical pollutants as the cause, including DDT, PCBs and dioxins as well as other synthetic organic chemical pollutants with similar properties, and also mercury. Since the chemicals causing these problems shared similar characteristics, scientists and policy-makers agreed that trying to control these chemical pollutants one by one does not make sense. Many concluded that the only way to restore the integrity of these ecosystems would be to control the entire class of chemical pollutants that share these common characteristics. They gave this class of chemicals the name "*POPs*."

Scientists noted that many fish and wildlife species in these ecosystems were suffering severe population declines because these species were losing the ability to reproduce. The remnant populations often exhibited tumors, birth defects, behavior disorders (such as inability to properly rear their young) and various diseases. Since human physiology is similar in many ways to that of the wildlife they were studying, scientists began to also investigate the impacts of these chemical pollutants on human health. They were initially particularly interested in studying the health of people whose diets included fish and wildlife harvested from POPs-contaminated ecosystems. These studies revealed that human health was also being harmed.

2.4 Long-Range Transport

Researchers investigating how POPs enter impacted oceans, seas and lakes initially thought that the main sources were industrial waste discharge pipes, sewer system overflows and contaminated water that had run-off from farmers' fields and urban streets. Instead, they discovered that most of the POPs (and the mercury) disrupting aquatic ecosystems was entering as fallout from the air. In many cases, the main environmental sources of these POPs were nearby. However, scientists were surprised to discover that some of the POPs entering these ecosystems came from far-distant sources and had entered the impacted ecosystems after traveling on air currents for thousands, or even tens of thousands, of kilometers.

POPs are able to travel long distances on air currents because they are volatile enough to evaporate into the air and/or they easily attach to airborne dust particles. However, POPs are not volatile enough to remain permanently in the atmosphere (as do, for example, CFCs and other ozone depleting substances). POPs travel on air currents for either a short distance or a long distance, but then, when the temperature cools or when it rains, POPs in the air fall back to earth. Sometimes POPs remain on the earth's surface for only a short time, and then evaporate back into the air, skipping again and again between the air and the surface in what has been called the "grasshopper effect." In general, POPs evaporate more easily at warmer locations and they fall out more easily in colder locations. As a result there is a general tendency for POPs to migrate from warmer regions to colder regions. Once consequence is that there exists severe POPs pollution in the Arctic region even though POPs have been rarely produced or used there.[6]

2.5 Bioaccumulation

Although POPs have the potential to skip around the globe and travel from warmer regions to colder regions, POPs mostly enter the environment at locations fairly near their original source. When POPs fall from the air, they sometimes land on the surface of water bodies, and they sometimes land on grasslands, tundra, forests or farmers' fields. In all these locations, POPs become part of the food web.

When a living organism eats food that has been contaminated by POPs, the pollutant is not easily excreted, metabolized or broken down, but rather, accumulates in the organism's body tissues. This process is called bioaccumulation. For example, a cow might eat 100 kilograms of grass per day. Along with the grass, the cow eats the POPs

[6] For a more detailed explanation see: http://www.ourplanet.com/imgversn/86/wania.html

that have fallen from the air onto the grass. These POPs then accumulate in the cow's fatty tissues. In cows raised for their milk, the POPs are transferred to the milk. In cows raised to be used as meat, the POPs accumulate in the fatty portion of the meat. For this reason, when EU researchers evaluate data on human exposure to dioxins in Northern Europe, they consider the major route of exposure to be what they call the "air-grass-cow-human-pathway."

Bioaccumulation can also contribute to a process that is called bio-magnification. Whenever a larger creature eats a smaller creature, the predator species ingests all the POPs that are present in its prey. In the marine environment and other aquatic ecosystems, the POPs that enter from the air are initially taken up by small micro-organisms. These are then eaten by larger organisms, then small fish, then large fish, and then sometimes by birds or mammals. The average concentration of POPs in a predatory species will tend to be around ten times higher than the average concentration of POPs in its prey. Since the food web has many steps, this causes bio-magnification and very high concentrations of POPs in top predator species. According to Environment Canada, POPs contaminants in the eggs of some fish-eating birds may be as much as 25 million times the concentrations found in the waters where the fish live.[7]

When an ecosystem is contaminated by POPs, the people living in that ecosystem will also be contaminated. Because many indigenous peoples in northern and north-temperate climates live in regions that are highly POPs-contaminated, and because many depend on fish and wildlife for a large part of their diets, they are often the most adversely impacted. According to a study carried out by the Arctic Monitoring and Assessment Program and others, Indigenous Peoples of the Arctic North may have the highest POPs exposure levels of any people on earth. [8] On the other hand, POPs pollution also causes significant human exposures to people living in warmer climates, especially those who eat milk products, fish or meat.

2.6 Endocrine System Disruption

Wildlife biologists were the first researchers who realized the extent of the harms caused by POPs. Many of them, most notably Theo Colburn, started to recognize that the health impacts they were seeing in fish and wildlife were also occurring in humans.[9] Until that time, most medical research on the human health effects of synthetic organic chemicals focused almost exclusively on cancers. Much less attention was given to associations between persistent organic chemicals in the environment and other human diseases and disabilities. Colburn's studies and findings led her to conclude that humans and wildlife both are threatened by POPs in the environment. Her studies focused on health impacts

[7] See: http://ncrweb.ncr.ec.gc.ca/soer-ree/English/indicator_series/techs.cfm?tech_id=9&issue_id=2&accessible=on

[8] See: *Persistent Toxic Substances, Food Security and Indigenous Peoples of the Russian North, Final Report,* Arctic Monitoring and Assessment Programme, 2004, at: http://www.amap.no/documents/index.cfm?action=getfile&dirsub=%2FPersistent%20Toxic%20Substances%2C%20Food%20Security%20and%20Indigenous%20Peoples%20of%20the%20Russian%20North&filename=Chapter1sv.pdf&CFID=76476&CFTOKEN=73060024&sort=default

[9] An interview with Theo Colburn on the topic or endocrine disruption can be found at: http://www.pbs.org/wgbh/pages/frontline/shows/nature/interviews/colborn.html

other than cancer, and she developed a new understanding of how chemical pollutants cause harm through a mechanism that she called *endocrine system disruption.*[10]

The endocrine system is a group of small organs in animals and people that produce and release substances called "*hormones.*" These serve as biochemical signals that regulate several biological functions such as: development, growth, metabolism and certain tissue functions. Colburn noted a similarity between many of the symptoms she observed in the fish and wildlife exposed to POPs and what would be observed in an organism whose endocrine system was malfunctioning. Colburn suggested that synthetic chemicals present in the environment cause disruptions of the endocrine system. Some of these chemicals trick the body's cells into thinking a natural hormone is present when it is not, and they thereby trigger an inappropriate response. Other synthetic chemicals interfere with natural hormones or block the ability of the body's cells to recognize them, and they thereby prevent the appropriate response.[11&12]

These findings challenged many well-established ideas in the field of toxicology, and they explained a mechanism by which extremely low dose exposures to some toxic chemicals can contribute to a number of health impairments including: developmental dysfunctions in the fetus and in infants; learning and behavioral disorders; reproductive deficits; immune system dysfunctions; and several diseases. Based on Colburn's research and also the research of numerous others, the world's medical and scientific communities has slowly begun to recognize the degree to which human environmental exposure to POPs and certain other chemical pollutants represents a significant threat to human heath.

2.7 POPs become a Global Issue

As indicated above, public demands on governments to control all chemicals that have POPs characteristics began primarily on a regional basis in response to investigations into disruptions of the North Sea, the Baltic Sea, the Great Lakes of North America and the Arctic. In these regions, public health and environmental NGOs joined hands with organizations representing indigenous peoples and with numerous scientists and researchers to raise awareness about POPs and to pressure governments to act.

Serious concerns about POPs also arose independently in other regions. In the countries of Central and Eastern Europe and Central Asia that had been part of the former Soviet sphere, physicians, scientists, NGOs and civil society organizations (CSOs) also raised a public alarm about POPs. In many of these countries, PCBs and POPs pesticides remained in common use long after they had been banned or restricted in most other highly industrial regions. Dioxin was recognized to be a serious problem in this region because its combustion processes were generally poorly controlled, and because

[10] The theory of endocrine system disruption was first presented to the scientific community in 1991 in the Wingspread Consensus Statement: http://8e.devbio.com/article.php?ch=22&id=217

[11] A popular presentation of the theory of endocrine disruption is presented in a book by Colburn and others, *Our Stolen Future*, Duttun, NY, 1996. There is also an *Our Stolen Future* website that website tracks the most recent developments in the field at: http://www.ourstolenfuture.org/

[12] For an overview of studies on endocrine system disruption as of 2002, see the *Global assessment of the state-of-the-science of endocrine disruptors*, prepared by the International Programme on Chemical Safety at: http://www.who.int/ipcs/publications/new_issues/endocrine_disruptors/en/

measures taken by the region's chemical industry to minimize dioxin formation in their chemical manufacturing operations had not been fully implemented. There also existed many, poorly controlled stockpiles of POPs pesticides, POPs chemicals and POPs-contaminated wastes. As a result, numerous highly POPs-contaminated areas were experiencing high rates of pollution-related diseases.

POPs also emerged as an issue in many countries of Latin America, Asia and Africa. NGOs associated with the Pesticide Action Network (PAN) and others working on agricultural and pesticide issues focused attention on the dangers of POPs pesticides. The NGO Greenpeace became active in many developing countries in the 1980s and '90s with campaigns against incinerators and open waste burning, placing strong emphasis on the hazards caused by the dioxin that they release. The World Wildlife Fund also helped raise awareness about POPs in many developing countries. As awareness about POPs grew, national and local environmental organizations and public health organizations in many developing countries in all regions took up the issue. This, together with growing public pressure, made national governments more willing to act.

3. Negotiating and Establishing the Stockholm Convention on POPs

Efforts to establish a global, legally-binding POPs treaty began in earnest in the mid-1990s with the primary initiative coming from the Nordic countries. The arguments they advanced in favor of a global POPs treaty were straightforward and simple. POPs travel long distances in the environment on wind currents and by other means. They can cause serious harm to human health and ecosystems at locations far distant from their original source. Therefore, no government, acting alone, can protect its own people and its national environment from POPs. This creates both the need and the justification for global action on POPs. It soon became apparent that the only practical solution would be to establish a global, legally-binding treaty to control and eliminate POPs.

3.1 Securing Intergovernmental Commitments to Establish a POPs Treaty

In May 1995, in response to efforts by the Nordics and their international NGO allies, the Governing Council of the United Nations Environment Program (UNEP GC) adopted a resolution recognizing that POPs are a major and increasing threat to human health and the environment.[13] The resolution identified an initial list of 12 POPs, and it invited the Intergovernmental Forum on Chemical Safety (IFCS) to assess realistic response strategies and to report back its findings.

In November 1995, the issue of POPs was raised again at a large international conference convened in Washington, DC, to develop a global plan of action (GPA) to protect the marine environment from land-based activities. This conference, which was attended by Environment Ministers from around world, recognized that POPs are a significant source of harm to the marine environment and adopted the *Washington Declaration on Protection of the Marine Environment from Land-Based Activities* which, for the first time, established a clear intergovernmental commitment to develop a global, legally-binding treaty on POPs.[14]

In 1996, in response to the invitation from the UNEP Governing Council, the IFCS convened an Ad Hoc POPs Working Group to fully assess global strategies to address POPs. This working group secured participation by governments from all regions, and it also encouraged full participation by NGOs and industry trade associations. After debate and negotiations, the working group adopted a detailed set of recommendations to the UNEP GC starting with the conclusion that international action, including a global legally binding instrument, is required to reduce the risks to human health and the environment arising from the release of the 12 specified POPs.[15]

These recommendations outlined in some detail the elements that a global POPs treaty should contain, and they included a recommendation that the new treaty should establish

[13] Decision 18/32, See: http://www.chem.unep.ch/pops/indxhtms/gc1832en.html
[14] *Washington Declaration on Protection of the Marine Environment from Land-Based Activities*, see http://www.gpa.unep.org/documents/washington_declaration_english.pdf
[15] See: www.who.int/entity/**ifcs**/documents/general/adhoc_en.doc

criteria and a procedure for identifying additional POPs beyond the initial 12 that had been specified. In February 1997, the UNEP GC received the IFCS report and adopted its recommendations in their entirety. It then requested that the UNEP Executive Director convene an Intergovernmental Negotiating Committee (INC) that would prepare the treaty.[16]

3.2 Negotiating the POPs Treaty

The POPs Intergovernmental Negotiating Committee met for the first time in June 1998 in Montreal, Canada. Delegates from nearly one hundred governments attended and participated. NGOs working on health and environmental issues from all regions of the world also attended the first POPs INC. Prior to its opening session, these NGOs held their own meeting. They adopted an NGO platform – the POPs Elimination Platform[17] – that expressed the urgency of global civil society concerns about POPs and that described the elements a good POPs treaty should contain. This NGO meeting also founded a new network – the International POPs Elimination Network or IPEN [18] – which united NGOs from all regions in an advocacy campaign to support the agreed common platform and to coordinate NGO efforts to positively influence the intergovernmental negotiating process.

The POPs INC met five times over a period of nearly three years. At its fifth meeting, held in December 2000 in Johannesburg, South Africa, a final consensus agreement was reached on the text of the Convention. NGOs associated with IPEN were able to play an informal but influential role in the negotiating process, and were pleased with the results. Four months later, in May 2001, a Diplomatic Conference was held in Stockholm, Sweden, where high level government officials formally adopted what came to be called the *"Stockholm Convention on POPs."*[*]

3.3 Convention Entry into Force

Although the Convention was adopted in May 2001, it did not immediately enter into force. For the next three years, national parliaments of countries around the world debated whether to ratify the Convention. In many cases they also reviewed national laws and regulations, and made revisions to them as needed to make them consistent with the obligations spelled out in the Convention. Finally, three years after its adoption, in May 2004, a sufficient number of governments had ratified that the Convention to allow it to formally enter into force.

Governments that have ratified the Convention are called "*Parties*." Convention Parties meet on a regular basis in what is called the "*Conference of the Parties*" or "*COP."* At the time of this writing, the Convention has more than 150 Parties.[19]
In agreeing to become a Party to the Convention, a government makes a formal commitment, which must be reflected in its national laws, to abide by the Convention's provisions and to implement its measures and obligations.

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[16] See: http://www.pops.int/documents/background/gcdecision/19_13c/gcpops_e.html
[17] See: http://www.ipen.org/ipenweb/library/4_5_ipen_doc_10.html
[18] See IPEN's web site at: http://www.ipen.org/
[*] The full text of the Stockholm Convention on POPs can be downloaded from the web in all six United Nations languages at: http://www.pops.int/
[19] For a list of Stockholm Convention Parties see: http://www.pops.int/reports/StatusOfRatifications.aspx

4. What the Stockholm Convention Says

The following is a summary presentation of the provisions and obligations set forth in the Stockholm Convention on POPs. The full Convention text can be found on the Convention web site.[20]

4.1 The Stockholm Convention's Objective

The Convention starts with a simple presentation of the Convention's objective. It states:

> "*Mindful of the precautionary approach as set forth in Principle 15 of the Rio Declaration on Environment and Development,*[21] *the objective of this Convention is to protect human health and the environment from persistent organic pollutants*."[22]

4.2 POPs Control and Elimination

The Convention establishes an initial list of 12 chemical substances that have POPs characteristics and it establishes obligations by governments that are Party to the Convention to control these chemicals. It additionally recognizes that the initial list is not a complete list of all POPs. The Convention therefore establishes criteria that will be used to identify other chemicals that also have POPs characteristics, and it establishes a procedure to expand the initial list of 12 of POPs to include other chemicals the meet its criteria in order to subject them to similar controls.[23]

4.3 Elimination of the Nine POPs Listed in Annex A

Chemicals that are controlled by the Convention are listed in one or more of three annexes to the Convention: Annexes A, B and C. Annex A is a list of nine intentionally produced POPs that are subject to elimination. Seven of these have been produced for use as pesticides. They are: aldrin, chlordane, dieldrin, endrin, heptachlor, mirex and toxaphene. Two of these have been produced primarily for use as industrial chemicals. They are hexachlorobenzene (HCB) and polychlorinated biphenyls (PCBs).

For each chemical listed in Annex A, Parties to the Convention are obliged to prohibit its production and use.[24] They are also obliged to prohibit its import and export other than for purposes of environmentally sound disposal in accordance with Convention provisions.[25] However, the Convention does not control small quantities of listed chemicals when they are to be used in laboratory-scale research or as reference standards.[26] Additionally, when a chemical that is listed in Annex A occurs as an

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[20] See: http://chm.pops.int/
[21] The RIO principles, including Principle 15, can be found on the UNEP web site, see: http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=78&ArticleID=1163
[22] Stockholm Convention Article 1
[23] Stockholm Convention Article 8, and Annexes D, E & F
[24] Stockholm Convention Article 3, paragraph 1 (a), subparagraph (i)
[25] Stockholm Convention Article 3, paragraph 1 (a), subparagraph (ii) and paragraphs 2 & 3 (The Convention provisions on environmentally sound disposal are addressed in Article 6)
[26] Stockholm Convention Article 3, paragraph 5

unintentional trace contaminant in a product, Parties are not required to ban that product's production, use export or import.[27]

The Convention does allow Parties to apply for and receive certain specific exemptions to their obligations to prohibit production and use of the POPs listed in Annex A.[28] The exemptions that are allowable are listed in a Register of Specific Exemptions.[29] This register, which is maintained by the Secretariat, includes the names of each Party that has requested and received a specific exemption, describes each specific exemption granted, and lists its expiry date.[30]

The only way that a government can request and receive a specific exemption is to request it in writing at the time the government first becomes a Party to the Convention.[31] The specific exemption then expires no later than five years after the date it was granted. A government may request an additional five year extension, and such a request may be granted, but only by a decision of the Conference of the Parties.[32]

4.4 Provisions Governing PCBs

PCBs are listed in Annex A, but they are treated somewhat differently from the other POPs listed in this Annex.[33] All Parties to the Convention are prohibited from intentionally producing PCBs. Parties may, however, allow the continued use of PCBs contained in equipment such as transformers or capacitors through the year 2025,[34] and they are not obliged to finally dispose of and destroy all PCB-containing waste until the year 2028.[35] However, Parties are prohibited from exporting or importing PCB-containing equipment other than for purposes of their environmentally sound disposal.[36] Parties are also prohibited from allowing PCBs contained in a piece of equipment to be recovered and used in other equipment.[37]

The Convention encourages Parties not to wait until 2025 to eliminate PCB-containing equipment, but to act more quickly. Parties are requested to make a determined effort to identify, label and remove from use equipment containing PCBs starting with those that contains five liters or more of PCB containing liquids. The highest priority should go to such equipment whose liquid contains 10% or more of PCBs; the next priority to those whose liquid contains .05% PCBs or more.[38] Parties are also requested to promote measures to remove leaking equipment from use and to ensure that no PCB-containing equipment will be used in areas where food or feed is produced or processed. Parties are

[27] Stockholm Convention Annex A, Part I, note (i)
[28] Stockholm Convention Article 4 and Annex A
[29] The Convention register of specific exemptions is maintained by the Secretariat and is posted on the web at: http://www.pops.int/documents/registers/specexempt.htm
[30] Stockholm Convention Article 4, paragraph 2
[31] Stockholm Convention Article 4, paragraph 3
[32] Stockholm Convention Article 4, paragraphs 4 & 7
[33] Stockholm Convention Annex A, Part II is devoted specifically to the topic of PCBs
[34] Annex A, Part II, paragraph (a)
[35] Annex A, Part II, paragraph (e)
[36] Annex A, Part II, paragraph (c)
[37] Annex A, Part II, paragraph (d)
[38] Annex A, Part II (a), subparagraphs (i) & (ii)

also encouraged to promote measures to prevent fires in PCB-containing equipment and to promote inspection of equipment for leaks.[39]

Parties must report every five years on their progress in eliminating PCBs. The COP will consider these reports and will review progress toward the elimination of PCBs at regular intervals.[40]

4.5 Provisions Governing DDT

DDT is the only chemical listed in Annex B of the Convention, the *Restriction Annex*. The use of DDT for the control of malaria and some other disease vectors is what the Convention terms an *acceptable purpose*, so long as certain conditions are met.[41] The goal of the Convention, however, is to reduce and ultimately eliminate the use of DDT.[42]

The Convention requires that the production and use of DDT be eliminated except for Parties that have notified the Secretariat that they intend to produce and/or use it exclusively for purposed permitted by the Convention.[43] The Convention Secretariat maintains a register listing the countries that have given such notification.[44] These Parties are obliged by the Convention to only use and/or produce DDT when all of the following conditions are met:

- √ DDT is used exclusively for disease vector control;
- √ DDT is used only in accordance with World Health Organization (WHO) recommendations and guidelines;
- √ The use of DDT is locally safe and effective; and
- √ Affordable alternatives are not available.[45]

A Party may notify the Secretariat at any time that it wishes to use DDT under the above listed conditions; it must also notify WHO.[46] Each Party that has given such notification must report every three years to the Convention Secretariat and to WHO on the amount of DDT is has used, the conditions of use, and the relevance of DDT usage to the country's disease management strategy.[47]

Each of the Parties that use DDT is additionally encouraged to develop an action plan to:

[39] Annex A, Part II (b)
[40] Annex A, Part II, paragraphs (g) & (h)
[41] Annex B, Part I
[42] Annex B, Part II, paragraph 5
[43] Annex B, Part II, paragraphs 1 & 2
[44] This Register is available on the web at: http://www.pops.int/documents/registers/ddt.htm
[45] Annex B, Part II, paragraph 2
[46] Annex B, Part II, paragraph 3
[47] Annex B, Part II, paragraph 4

- √ Develop a regulatory or other mechanism that will ensure that DDT is used only for disease vector control;

- √ Implement suitable alternative control mechanisms and strategies; and

- √ Strengthen health care and reduce the incidence of the disease which DDT is being used to control.[48]

The Convention asks Parties with the capability to do so, to promote research and development into safe alternatives to DDT, including chemical and non-chemical products, methods and strategies. These should be relevant to the conditions of the countries still using DDT for vector control, and they should contribute to reducing the human and economic burden of disease.[49] Every three years, the COP, in consultation with WHO, will evaluate whether there is still a continued need for the use of DDT in disease vector control.[50]

In addition to the exemptions that permit the production and use of DDT for an acceptable purpose (as described above), DDT production and use can also be given a specific exemption following the rules for specific exemptions that cover the chemicals listed in Annex A. The only use of DDT that qualifies for a specific exemption is its use as an intermediate ingredient in the manufacture of the pesticide, dicofol.[51]

4.6 Exemptions for Use as Closed-system Site-limited Intermediates

In addition to *specific exemptions* and *acceptable use* exemptions, the Convention defines a third category of exemption. A POPs chemical can be produced and used as what the Convention terms: a *closed-system site-limited intermediate.* The only POPs for which this category of exemption can be applied are DDT and HCB.[52] Both are permitted to be produced and used for this purpose for a period longer than is granted by a specific exemption providing that certain conditions apply:

- √ The DDT or HCB must be used as an intermediate ingredient in the production of another chemical

- √ Both production and use must take place at the same location (site-limited);

- √ The production and use must take place in a closed-system;

- √ No significant quantities of the DDT or HCB should reach humans and the environment; and

[48] Annex B, Part II, paragraph 5 (a), subparagraphs (i), (ii), and (iii)
[49] Annex B, Part II, paragraph 5 (b)
[50] Annex B, Part II, paragraph 6
[51] Annex B, Part I
[52] Annex A, note (iii), states that this provision does not apply to a chemical listed in Annex A if it has an asterisk after its name. All chemicals listed in Annex A have such an asterisk, other than HCB. Annex B, note (iii) applies specifically to DDT.

- √ The DDT or HCB must be chemically transformed during its use so that the final chemical produced by the process does not exhibit POPs characteristics.

The Convention Secretariat must be notified that such manufacturing is taking place. It must be informed of the total amount of the production and use, and it must be provided with information about the closed-system site-limited process, including the amount of any trace contamination of the starting POP in the final product. The Secretariat will make these notifications available to the COP and the public. The continued production and use of the POP must cease within ten years of the notification unless an additionally ten year extension is requested. An extension, if requested, is subject to review and approval by the COP.[53]

4.7 Provisions Governing Dioxin and other Unintentionally Produced POPs

Some POPs can be produced unintentionally and released to the environment during combustion or during some chemical processes. Annex C lists four such unintentionally produced POPs that Parties to the Convention must control. Two of them, dioxins and furans, are never intentionally produced (except for laboratory purposes).[54] Two others, PCBs and HCB, are listed in both Annex A and Annex C, because they are produced both intentionally and unintentionally.

The Convention's goal for unintentionally produced POPs is their continuing minimization and, where feasible, ultimate elimination.[55] Parties to the Convention are obliged to develop an action plan to advance toward this goal, and they are obliged to implement the plan.[56] As part of the plan, each Party should develop and maintain a national inventory of sources of unintentionally produced POPs together with an estimate of releases. Parties should evaluate the effectiveness of national laws and policies that contribute to managing these releases and develop strategies aimed at minimizing these releases. They should review every five years the success of these strategies in meeting Convention obligations and report the results of this review to the COP.[57]

Parties are obliged to promote measures that will reduce the releases of unintentional POPs or eliminate their sources.[58] Parties are also obliged to promote the development of substitute or modified materials, products and processes to prevent the formation and release of unintentionally produced POPs.[59] More specifically, Parties are obliged to promote the use of best available techniques (BAT) and best environmental practices

[53] Annex A, note iii; and Annex B, note iii
[54] The Convention lists these in Annex C, Part I, as polychlorinated dibenzo-p-dioxins (PCDD) and dibenzofurans (PCDF). There are 75 different PCDD congeners; there are 135 PCDF congeners. They are generally formed and released to the environment in mixtures. The concentration of dioxins and furans in a mixture is usually reported as their toxic equivalent (TEQ). This measure compares the toxicity of the mixture to that of the most toxic of all dioxins, 2,3,7,8-tetrachloro-para-dibenzo dioxin.
[55] Article 5, chapeau
[56] Article 5 (a)
[57] Article 5 (a) including paragraphs (i), (ii), (iii) & v)
[58] Article 5 (b)
[59] Article 5 (c)

(BEP) to control the unintentional POPs sources identified in its inventory, and Parties are obliged to require the use of BAT to control certain sources.[60]

The Convention lists certain source categories (in Part II of Annex C) that have the potential for comparatively high formation and release of unintentionally produced POPs to the environment. These are:

- √ Waste incinerators for municipal, hazardous and medical waste and sewage sludge;
- √ Cement kilns firing hazardous waste;
- √ Production of pulp that uses chlorine bleach; and
- √ Certain thermal processes in the metallurgical industry - secondary copper production, sinter plants in iron and steel manufacture, secondary aluminum production and secondary zinc production.[61]

Starting four years after the Convention enters into force for a Party (for those governments that have been Party to the Convention since if first entered into force, this is May 2008), each Party has the obligation to require the use BAT for any newly constructed or substantially modified facility that falls into any of the above listed source categories.[62]

The Convention contains a brief and general definition of BAT,[63] and it provides some general guidance on BAT in Annex C, Part V. It instructs the Convention COP to develop a general guidance document on BAT which Parties are obliged to take into consideration when applying BAT. In 2007, the COP adopted these Guidelines on Best Available Techniques which are available on the web.[64]

Parties are given flexibility in defining how BAT will be nationally applied. However, each Party has a formal obligation to define BAT in some way, and it must do so taking into account the guidance provided by the Convention and by the adopted Guidelines. Based on a Party's own definition of BAT, it must promote the use of BAT standards for all dioxin sources listed in its national inventory, and it must require the use of BAT for new facilities in the source categories listed in Part II of Annex C (as described above).

4.8 Provisions Governing Stockpiles and Wastes Containing POPs

[60] Article 5 (d) and (e)
[61] Annex C, Part II, (a), (b), (c), & (d)
[62] Article 5 (d) and 5 (f), subparagraph (vi)
[63] Article 5 (f), subparagraph (i), (ii), (iii) & (iv)
[64] See: http://www.pops.int/documents/guidance/batbep/batbepguide_en.pdf. This is the only full and downloadable version of these Guidelines on the Convention web site and is still designated as a draft. However, the individual chapters of these Guidelines can be found at:
http://chm.pops.int/Programmes/BATBEP/ProcessesProcedures/tabid/187/language/en-US/Default.aspx

For all POPs listed by the Convention, Parties are required to develop and implement strategies to identify existing POPs stockpiles, and to develop strategies for identifying products in use that contain or are contaminated with POPs and POPs containing wastes.[65] POPs stockpiles must be managed in a safe, efficient and environmentally sound manner. These stockpiles must be treated as POPs containing wastes as soon as the POPs they contain are no longer covered by an exemption. Stockpiles of DDT should be treated as POPs contaminated waste when the Party is no longer registered with the Convention as using DDT for disease vector control.[66]

Parties are required to take measures so that POPs-containing wastes, including products upon becoming wastes, are handled, collected, transported and stored in an environmentally sound manner.[67] POPs containing wastes must be disposed of in such a way that the POPs content of the waste is destroyed or irreversibly transformed and no longer exhibits POPs characteristics. However, other means of environmentally sound disposal are permitted if the destruction and irreversible transformation of the POPs containing waste is not the environmentally preferred option; or if the POPs content of the waste is low.[68] Disposal operations that would allow for the potential recovery, recycling, reclamation or reuse of the POPs content of the waste are strictly prohibited.[69] Export of POPs-containing wastes is allowed only for the purpose of environmentally sound disposal as specified above.[70]

The Stockholm Convention Conference of the Parties is mandated to cooperate closely with the appropriate bodies of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal to:

- √ Establish the limit values needed to ensure that following the destruction or irreversible transformation of POPs-containing waste, it will no longer exhibit POPs characteristics;

- √ Determine what disposal methods can be considered *environmentally sound disposal* as this term is used in the paragraph above; and

- √ Establish limit values for POPs listed by the Convention that define *low POPs content* as referred to above.

4.9 National Implementation Plans

Each Party to the Convention is required to develop a National Implementation Plan (NIP) for implementing its obligations under the Convention and must submit its plan to the COP within two years of the date the Convention enters into force for that Party.[71]

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[65] Article 6 (a) & (b)
[66] Article 6 (c)
[67] Article 6 (d), subparagraph (i)
[68] Article 6 (d), subparagraph (ii)
[69] Article 6 (d), subparagraph (iii)
[70] Article 3, paragraph 2 (b)
[71] Article 7, paragraphs 1 (a) & (b)

Each Party shall then review and update its NIP on a periodic basis.[72] In developing and updating its NIP, each Party should consult national stakeholders, including women's groups and groups involved in the health of children.[73] The action plans that Parties are required to develop to minimize and eliminate the formation and release of dioxin and other unintentional POPs should be incorporated into the NIPs. They should include dioxin source inventories as well as strategies to promote and, in some cases, require BAT for new sources.[74]

4.10 Identifying and Listing Additional POPs for Elimination or Control

Any Party may submit to the Convention Secretariat a proposal that nominates an additional chemical to be listed by the Convention. In developing its proposal, a Party may receive assistance from other Parties or from the Secretariat. [75] The proposing Party should provide a statement giving its reasons for concern about the nominated chemical and a short statement on the need for its global control.[76] The Party should identify the chemical that is being nominated for inclusion in the Convention and provide trade names, commercial names, synonyms and its Chemical Abstracts Service (CAS) Registry number. The nomination should identify the chemical's structure, its isomers and, where applicable, the structure of the class.[77] It should additionally provide information that demonstrates that the nominated chemical meets the Convention's Screening Criteria.[78]

Screening Criteria Each nomination should provide information about the chemical, including, at a minimum, information relevant to the following screening criteria:

√ ***Evidence that the chemical is persistent*** in the environment. This may include evidence that the chemical has:
- A half-life in water greater than two months;
- A half-life in soil greater than six months;
- A half-life in sediment greater than six months; or
- Other evidence that the chemical is sufficiently persistent to justify its consideration as a candidate for inclusion in the Convention.

√ ***Evidence that the chemical bioaccumulates.*** This may include::
- Evidence that the chemical has a bio-concentration factor in aquatic species greater than 5,000 or equivalent laboratory data (log KOW greater than 5);
- Other reasons for concern, such as high bioaccumulation potential in non-aquatic species, high toxicity or high eco-toxicity; or
- Environmental monitoring data from living species indicating that the chemical has bioaccumulation potential.

[72] Article 7, paragraph 1 (c)
[73] Article 7, paragraph 2
[74] Article 5, paragraph 1 (a)
[75] Article 8, paragraph 1
[76] Annex D, paragraph 2
[77] Annex D, paragraph 1 (a)
[78] Annex D

√ ***Evidence that the chemical has the potential for long-range environmental transport.*** This may include:

- Measurements that the chemical is present in the environment at levels of potential concern in locations distant from the sources of its release;
- Monitoring data showing that long-range environmental transport of the chemical may have occurred by air, water or migratory species, and that following this transport, the chemical has the potential for transfer to a receiving environment; or
- Evidence that the chemical has properties (or model results) that demonstrate its potential for long-range environmental transport and transfer to a receiving environment. (In cases where long-range transport is through the air, the chemical's half-life in air should be greater than two days.)

√ ***Evidence that the chemical has adverse effects.*** This may include:

- Evidence of the chemical's adverse effects to human health or the environment sufficient to justify its inclusion in the Convention; or
- Toxicity or eco-toxicity data that indicate the potential for damage to human health or to the environment.[79]

The Secretariat will examine all nominations received to verify that the proposal contains the minimum required information. If the Secretariat determines that it does, it will forward the proposal to a Committee that has been established by the COP to review such proposals: the POPs Review Committee (POPRC).[80]

The POPRC will review the nomination and will decide whether or not it is satisfied that the (above listed) screening criteria have been fulfilled. If it is satisfied, the POPRC will then initiate a process to prepare a Risk Profile for the chemical. If it is not satisfied, the proposal will be set aside.[81] If a proposal is set aside, any Party may re-nominate the chemical. If the proposal is set aside a second time, any Party can challenge the decision of the POPRC and the matter will be taken up by the next COP.[82]

Risk Profile Before the POPRC begins preparing the risk profile, the Secretariat will make available to all Parties and observers (including NGO observers), the information that was collected relevant to the screening criteria as well as the results of the POPRC's evaluation of the nomination. Parties and observers will be invited to submit information that may be relevant in preparing the risk profile.[83] The POPRC will then proceed to prepare a draft Risk Profile whose purpose is to evaluate whether the nominated chemical is likely, as a result of long-range environmental transport, to cause significant human health or environmental effects such that global action is warranted. The preparation of the Risk Profile includes a more detailed evaluation of the information provided to satisfy

[79] Annex D, paragraph 1 (b), (c), (d), and (e)
[80] Article 8, paragraph 2
[81] Article 8, paragraph 4
[82] Article 8, paragraph 5
[83] Article 8, paragraph 4 (a)

the screening criteria. It also includes, to the extent possible, the following types of information:

- √ ***Sources***, such as:
  - Production data including quantities and locations;
  - Uses; and
  - Information on releases, discharges and emissions

- √ ***A Hazard assessment*** of the chemical as it is found in the environment at locations of concern, including a consideration of its possible interactions with other chemicals;

- √ ***Monitoring data;***

- √ ***Exposure information*** detailing exposures to the nominated chemical that result from long-range transport including information on the extent to which the transported chemical might become biologically available;

- √ ***Risk information*** such as risk evaluations, profiles or assessments carried out by a government or an international agency, labelling information, or hazard classification; and

- √ ***The Status*** of the chemical under international conventions.[84]

The draft of the Risk Profile will be circulated to Parties and observers. Then, after collecting technical comments from them, the POPRC will complete the Risk Profile taking into account the comments received.[85]

Based on the Risk Profile, the POPRC will then consider whether the chemical is likely, as the result of long range transport, to cause significant adverse impact on human health and the environment such that global action is warranted. In carrying out this consideration, the POPRC will apply the Precautionary Approach, that is, lack of full scientific certainty should not prevent it from taking a decision. If the POPRC decides that international action is, indeed, warranted, it will then begin to collect socio-economic information and prepare a Risk Management Evaluation that includes an evaluation of possible control measures. If it decides international action is not warranted, Parties and observers are notified, and a Party may go to the COP and request reconsideration.[86]

Risk Management Evaluation

In preparing the Risk Management Evaluation, the POPRC should consider all possible control measures, including management options and including elimination. It should also collect information on relevant socio-economic considerations related to the various possible control measures. This information should take into account the different

[84] Annex E
[85] Article 8, paragraph 6
[86] Article 8, paragraphs 7 & 8

capabilities and conditions of different Parties, and it should include considerations such as:

- √ ***The Efficacy and efficiency*** of possible control measures to meet risk reduction goals, including:
  - The technical feasibility of proposed control measures; and
  - Their costs, including health and environmental costs;

- √ ***Alternatives***, including both alternative products and alternative processes. This should include a consideration of their:
  - Technical feasibility;
  - Costs, including environmental and health costs;
  - Efficacy;
  - Risk;
  - Availability; and
  - Accessibility;

- √ ***The impacts on society*** of implementing possible control measures including both positive and negative impacts. This should include a consideration of:
  - Health impacts, including public health, environmental health and occupational health;
  - Agricultural impacts, including aquaculture and forestry;
  - Impacts on biodiversity;
  - Economic impacts;
  - How possible control measures impact national sustainable development objectives; and
  - Social costs;

- √ ***The waste and disposal implications***, such as obsolete stockpiles and the cleanup of contaminated sites. This should include a consideration of:
  - Technical feasibility; and
  - Costs;

- √ ***Access to information*** and public education;

- √ ***The capacity of Parties*** to control and monitor the chemical; and

- √ ***National or regional actions*** that have already been taken to control the nominated chemical, including information on alternatives and other relevant risk management information.[87]

Listing a POP When the Risk Management Evaluation is complete, the POPRC will give further consideration to the information about the nominated chemical contained in both

[87] Annex F

the Risk Profile and the Risk Management Evaluation. It will then prepare a recommendation to the COP on whether the chemical should be listed in Annex A (which would make it subject to elimination), Annex B (which would make it subject to restriction), or Annex C (which would treat it as an unintentionally produced POP subject to continuing minimization, and where feasible, ultimate elimination). In some cases, the POPRC might recommend listing a chemical in more than one of the Annexes.

The COP will take due account of the recommendations of the POPRC, including any scientific uncertainty. It will then decide in a precautionary manner whether to list the nominated chemical, and it will specify the related control measures in Annexes A, B and/or C.[88]

The decision by the COP to list an additional POP will be made as an amendment to one or more of Annexes A, B and/or C, and the amendment will enter into force one year after its adoption. Any Party may give notification within the year that it is not able to accept such an amendment and may thereby opt out.[89] Additionally, some Parties have declared at the time that they ratified the Convention that no amendment to Annexes A, B and/or C will enter into force for them until they have made an affirmative decision to ratify the amendment.[90] For such Parties the amendment to the Annex will enter into force 90 days after the Party has ratified it.[91]

4.11 National Regulation of Chemicals that Exhibit POPs Characteristics

The Convention additionally requires that each Party, if it has a national regulatory regime for pesticides and/or industrial chemicals, regulate chemicals with POPs characteristics, taking into consideration the criteria contained in Annex D, paragraph 1. For newly introduced pesticides or industrial chemicals, the aim of such required regulation would be to prevent its production and use.[92] For pesticides and industrial chemicals currently in use, Parties should take into account a chemical's POPs characteristics in conducting assessments.[93]

4.12 Information Exchange and Public Information

The Convention instructs Parties to exchange information relevant to the reduction or elimination of POPs and also information on alternatives to POPs including their risks and their economic and social costs. Parties are to designate a person or office that will serve as the national focal point for these exchanges, and the Convention Secretariat will facilitate exchanges. When information is exchanged for Convention purposes, any information relating to the health and safety of humans and the environment will not be considered confidential. However, when Parties exchange other relevant information, they may protect the confidentiality of the information.[94]

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[88] Article 9
[89] Article 22, paragraphs 3 (b) & (c), and paragraph 4
[90] This is permitted under Article 25, paragraph 4. For a list of Parties that have exercised this option, see the declarations following the list of Convention Signatories and Parties at: http://www.pops.int/reports/StatusOfRatifications.aspx
[91] Article 22, paragraph 4
[92] Article 3, paragraph 3
[93] Article 3, paragraph 4
[94] Article 10

Each Party, within its capabilities, is supposed to promote and facilitate:

- √ Awareness about POPs among its policy and decision makers;
- √ Public availability of information on POPs;
- √ The development and implementation of educational and public awareness programs about POPs, including information about their health and environmental effects and about their alternatives, with special attention given to providing educational programs for women, children and the least educated;
- √ Opportunities for the public to participate in programs that address POPs, including opportunities for the public to provide input to national programs the relate to the implementation of the Convention;
- √ POPs-related training to workers, scientists, educators and technical and managerial personnel;
- √ The development and exchange of educational and public awareness materials at national and international levels; and
- √ The development and implementation of education and training programs at national and international levels.[95]

Parties are additionally requested to give sympathetic consideration to developing mechanisms, such as pollutant release and transfer registers (PRTR), for the collection and dissemination of information on estimates of the annual quantities of POPs that are released or disposed in their country.

4.13 Research, Development and Monitoring

The Parties are instructed to encourage or undertake research, development, monitoring and cooperation on POPs, alternatives to POPs and candidate POPs. This may include:

- √ POPs sources and releases to the environment;
- √ Monitored levels of POPs in humans and the environment, and also, trends in these levels;
- √ The environmental transport, fate and transformation of POPs;
- √ Effects of POPs on human health and the environment;

[95] Article 10, paragraph 1

- √ Socio-economic and cultural impacts of POPs;
- √ Research and development on POPs release reduction and elimination; and
- √ Harmonized methodologies for preparing inventories of POPs sources, and analytical techniques for the measurement of POPs releases.[96]

Parties are additionally encouraged to support and further develop international programs, networks and organizations aimed at defining, conducting, assessing and financing POPs-related research, data collection and monitoring. Efforts should be made to strengthen national scientific and technical research capabilities and to promote access to, and the exchange of, POPs-related data and analyses. Research should be undertaken aimed at alleviating the ill effects of POPs on reproductive health.[97]

Additionally, since many developing countries and countries with economies in transition have limited access to financial and technical resources, cooperation should be undertaken to improve their capability to participate in these efforts. The results of POPs-related research, development and monitoring activities should be accessible by the public on a timely and regular basis and Parties should cooperate in storing and maintaining this information.[98]

4.14 Technical Assistance

According to the terms of the Convention, the Parties formally recognize that successful implementation of the Convention will only be possible if requests for technical assistance by developing country Parties and Parties with economies in transition receive timely and appropriate responses. Therefore, Parties will cooperate to provide such technical assistance in order to enable these countries to develop and strengthen their capacity to implement Convention obligations. Parties will establish appropriate arrangements for this purpose and for promoting relevant technology transfer. These arrangements will include the establishment of regional and sub-regional centers.[99]

4.15 Financial Assistance

Each Party, insofar as it can, is also instructed to provide funds and incentives to support national activities in its country to achieve the objective of the Convention.[100]

The developed country Parties agree to provide new and additional financial resources that will be used to enable developing country Parties and Parties with economies in transition to fulfill their Convention obligations. These funds are to be provided in a way that takes into account the need for the adequate, predictable and timely flow of funds

[96] Article 11, paragraph 1
[97] Article 11, paragraph 2 (a), (b) & (d)
[98] Article 11, paragraph 2 (c), (e) & (f)
[99] Article 12
[100] Article 13, paragraph 1

and the importance of burden sharing among the contributing Parties. They will be used to compensate recipient Parties for what is termed, their incremental costs.[101]

The term *incremental costs* is an amount that is negotiated between an international funding agency and a recipient to support project activities within a developing country or a country with an economy in transition to fulfill its convention obligations. While the term is never precisely defined in the Convention text, broadly speaking, the incremental cost is supposed to equal the added costs that result from a country being a Party to the Convention. The "increment" is supposed to equal the difference between what would have been spent in a country if it were not a Party to the Convention and the amount that needs to be spent to enable a country to meet its Convention obligations.[*]

The Convention recognizes that developing country Parties will be able to effectively implement their Convention commitments only insofar as developed country Parties fulfill their commitments to provide financial resources, technical assistance and technology transfer. The Convention acknowledges that sustainable economic and social development and the eradication of poverty are the overriding priorities of the developing country Parties, while also recognizing the need to protect human health and the environment.[102] Additionally, in providing financial assistance, Parties agreed to take full account of the specific needs and special situation of the least developed countries and the small island developing states.[103]

The financial obligations established by the Convention define a mechanism for providing adequate and sustainable financial resources to assist developing country Parties and Parties with economies in transition implement the Convention. This mechanism will operate under the authority and guidance of the COP, and will be accountable to it. Its operation may be entrusted to one or more entities, as may be decided upon by the Conference of the Parties. Financial contributions to the mechanism by developed country Parties will be in addition to other financial transfers to developing country Parties and Parties with economies in transition.[104] The COP will regularly review the effectiveness of this mechanism, its ability to address changing needs, the level of funding and the effectiveness of the institutions entrusted to operate it. Based on these reviews, the COP will take action, if necessary, to improve the effectiveness of the mechanism.[105] The Global Environmental Facility (GEF) is entrusted with the operation of this financial mechanism, on an interim basis, until such time as the COP decides otherwise.[106]

4.16 Reporting and Effectiveness Evaluation

[101] Article 13, paragraph 2

[*] The concept of *incremental costs* is used by the Global Environment Facility (GEF) which funds activities that are deemed to provide Global Environmental Benefits above and beyond their national benefits. It is not a precise concept, but rather, the framework for a negotiation. A discussion of the concept can be found on the GEF web site at: http://www.gefweb.org/Operational_Policies/Eligibility_Criteria/Incremental_Costs/incremental_costs.html

[102] Article 13, paragraph 4

[103] Article 13, paragraph 5

[104] Article 13, paragraph 6

[105] Article 13, paragraph 8

[106] Article 14

Each Party is required to report to the COP on the measures it has taken to implement the provisions of the Convention, and on the effectiveness of those measures in contributing to the achievement of Convention objectives. These reports will include firm data or a reasonable estimate of the total quantities of production, import and export for each of the intentionally produced POPs. To the extent that it is practical, the report will provide a list of the countries from which the reporting country has imported listed POPs and the countries to which it has exported them.[107]

The Parties are supposed to periodically evaluate the effectiveness of the Convention. In order to facilitate this, arrangements are to be made to gather or make available monitoring data on the presence of POPs in the environment and data on POPs global environmental transport. Monitoring programs to gather this data will be implemented on a regional basis, as appropriate, and their results will be reported to the COP. They will make use of existing monitoring programs to the extent that this is possible. The effectiveness evaluation will then make use of these regional monitoring reports and also of nation reports submitted to the COP.[108]

4.17 The Conference of the Parties

A COP will be convened after the Convention enters force and it will meet at regular intervals as it decides. Extraordinary meetings of the COP may be held at other times at the written request of a Party whose request is supported by at least one third of the Parties. The COP will decide its own rules of procedure and its financial rules by consensus. It will review and evaluate the implementation of the Convention. It will undertake the duties and tasks that have been set forth for it in the Convention. It will review the reports of Parties on the measures Parties have taken to implement the Convention, and it will consider and undertake additional actions that may be needed to achieve the objectives of the Convention.

The COP will establish the POPs Review Committee whose members will be government -designated experts in the field of chemicals assessment or chemicals management; and it will do so on the basis of an equitable geographic distribution. The COP will be responsible for establishing the terms of reference, organization and operation of the POPRC. The POPRC will make every effort to adopt its recommendations by consensus. However, if all efforts to reach consensus have been exhausted, it may adopt recommendations by a two-thirds vote of members present and voting.

The United Nations specialized agencies and governments that are not party to the Convention may be represented at the COP as observers. Any other body or agency qualified in the matters covered by the Convention, whether it is national or international, governmental or nongovernmental, may inform the Secretariat that it wishes to be represented at the COP as an observer; and it will be admitted to the COP unless at least one third of the Parties present object. The admission and participation of observers will be subject to the rules of procedure adopted by the COP.[109]

[107] Article 15
[108] Article 16
[109] Article 19

4.18 The Convention Secretariat

The Convention provides for a Secretariat. Its functions are to:

- √ Make arrangements for meetings of the COP and its subsidiary bodies and to provide them with services as required;
- √ Facilitate assistance to Parties in implementing the Convention, on request, and particularly for developing country Parties and Parties with economies in transition;
- √ Ensure necessary coordination with the secretariats of other relevant international bodies;
- √ Prepare and make available to the Parties periodic reports based on information received in national reports and other available information;
- √ Enter into administrative and contractual arrangements as may be required for the effective discharge of its functions under the overall guidance of the COP; and
- √ Perform the other secretariat functions identified in the Convention and other functions assigned to it by the COP.

5. The Present Status of Stockholm Convention Implementation

The decision by the world community to establish the Stockholm Convention on POPs was important and historic. The Convention is the first global, legally-binding treaty that requires governments to control, with the aim to eliminate, a class of chemicals because they cause harmful toxic pollution. The fact that more than 150 governments have already ratified the treaty and accepted its obligations indicates growing world recognition of the need to better manage and control potentially toxic chemicals in order to prevent exposures that can cause serious harm to human health and ecosystems.

Much work, however, still needs to be done to fully implement the Convention. Its objective – to protect human health and the environment from POPs – has not nearly been achieved. The list of 12 POPs that the Convention initially identified for control is not a complete list of all POPs that are produced and that continue to harm human health and ecosystems. These, rather, were the first POPs that received public attention in the 1960s and '70s. Since that time, scientists have identified numerous other chemicals with POPs properties, some of which are continuing to be produced in large quantities and are accumulating in the environment at alarming rates. Therefore, numerous additional POPs will need to be listed by the Convention and globally controlled. (The topic of listing additional POPs is taken up in Chapter 7. An Appendix at the end of the booklet provides profiles on the nominated additional POPs at the time of this writing.)

Unfortunately, much work still remains to be done to control the initial 12 POPs. The information provided in the booklet on the status of Convention implementation is based on a review carried out in late summer and early fall of 2008. At that time, it appeared that production and use of five of the 12 initial POPs had already been virtually eliminated (aldrin, dieldrin, endrin, heptachlor and toxaphene) and that two more would likely soon follow (chlordane and mirex). However, it also appeared that much still needs to be done to virtually eliminate the remaining five of the initial 12 POPs (DDT, PCBs, HCB, dioxins and furans).

√ DDT, HCB and PCBs are still widely used for exempted purposes;

√ DDT and HCB are still produced in large quantities for exempted uses;

√ Convention provisions aimed at minimizing and ultimately eliminating dioxin and other unintentionally produced POPs have thus far been often poorly or incompletely implemented;

√ Many obsolete POPs stockpiles, POPs wastes, and sites contaminated with one or more of the 12 initial POPs still need to be identified, cleaned up and made subject to environmentally sound disposal;

√ There have been systematic efforts to define what the Convention terms "*low POPs Content*" in a manner that is not protective of public health and the environment, and that is therefore inconsistent with the Objective of the Convention. If these efforts succeed, they will undermine Convention provisions requiring the disposal of POPs wastes and stockpiles in such a way that their POPs content is destroyed or irreversibly transformed; and

√ There have been problems with the adequacy, predictability and timely flow of funds needed to enable developing country Parties to implement their Convention obligations, particularly least developing countries and small island developing states.

5.1 Aldrin, Dieldrin, Endrin, Heptachlor and Toxaphene

Production and use of five of the listed POPs pesticides appear to have been virtually eliminated. These are: aldrin, dieldrin, endrin, heptachlor and toxaphene. None of the Convention's 150 Parties has filed for any specific exemption for any of them, nor can any of these Parties file for such an exemption at a future date, since specific exemptions can only be requested at the time a government initially becomes a Party. None of these five chemicals qualify for exemption for use as a site-limited, closed loop intermediate.[110] And it does not appear that there is any current production of these chemicals in any non-Party country.

Some of these five POPs may still be present in obsolete stockpiles and still require environmentally sound disposal. There also may be some cases where these POPs are present in obsolete stockpiles and are illegally diverted for use. However, in general terms, the production and use of these five POPs pesticides appear to have been virtually eliminated.

5.2 Chlordane and Mirex

Only one country has registered with the Convention Secretariat as a producer of chlordane or mirex. China informed the Secretariat when it ratified the Convention that it produces approximately 500 tonnes of chlordane per year; and approximately 10 to 30 tonnes of mirex per year. China and Botswana informed the Secretariat that they continue to use chlordane for purposes of termite control; China and Australia that they use mirex for termite control.[111]

The Chinese Government informed the Convention Secretariat in July 2008, that it does not intend to extend its specific exemption to produce chlordane and mirex after the exemption expires in May 2009. It also indicated that it will not seek to extend its specific exemption to allow the continued use chlordane and mirex for termite control after that date.[112] To our knowledge, neither chlordane nor mirex is being produced in any non-Party country. Therefore, other than quantities of chlordane or mirex that might

[110] In Annex A, the name of each is followed by an asterisk. According to note (iii), chemicals with an asterisk do not qualify for such an exemption.
[111] See Convention Register of Specific Exemptions: http://www.pops.int/documents/registers/specexempt.htm
[112] See note from the Ministry of Environmental Protection of China to the Stockholm Convention Secretariat at: http://chm.pops.int/Portals/0/Repository/gen_announcements/UNEP-POPS-GEN-AN-CHINA-1.English.PDF

still exist in stockpiles or wastes, it appears chlordane and mirex will also soon be virtually eliminated.

5.3 HCB

The Convention Register of Specific Exemptions indicates that no country ever requested or received any specific exemption to permit continued intentional production or use of HCB. The Convention, however, does permit HCB to be produced and used without a specific exemption if the Convention Secretariat is notified that it is being produced for use as a site-limited, closed loop intermediate. In February 2005, China informed the Secretariat that it produces and uses between 3 and 4 million kilograms per year of HCB with about 98% being used as the intermediate in the production of Na-PCP.[*&113]

The information provided by China to the Secretariat, as it appears on the Convention website (at the time of this writing, September 2008), is incomplete.[114] The Convention requires that notifications of this kind include information on the nature of the closed-system, site-limited process and on the amount of HCB contained in the final product. The notification, as listed, contains no information on the amount of HCB in the final product, and does not provide useful information on the nature of the closed-system, site-limited process. Nor does it state how the remaining 2% of the HCB that is produced is used.

Besides the need to address and resolve issues related to the continued intentional production and use of HCB, there are also some special concerns about existing HCB waste stockpiles. Historically, large quantities of HCB have been produced as a waste by-product of chlorination processes in chemical manufacture. Two very large stockpiles of HCB waste containing more than 10,000 tonnes each have been identified: one in Australia and one in the Ukraine.[115] Further investigation is needed to determine whether additional large HCB waste stockpiles exist in other countries and whether all chemical manufacturing processes that produce large quantities of HCB wastes have been discontinued or modified.

5.4 PCBs in Equipment

No Party to the Convention has notified the Secretariat that it continues to intentionally produce PCBs, and it appears that intentional PCB production has ended worldwide. On the other hand, the Convention permits the continued use of PCBs in equipment until a final phase-out date of 2025; the final disposal and destruction of PCB wastes need not be completed until 2027.

PCBs have been used in most countries in a number of applications. The largest of these has been for use as a dielectric fluid in transformers and capacitors. Most countries still

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[*] Other names for Na-PCP include: sodium pentachlorophenate; PCP sodium salt; Dowicide G; and CAS # 131-52-2. Na-PCP is used mainly as a wood preservative, microbiocide, algaecide, fungicide, molluscicide, fungicide, herbicide or disinfectant. The Pesticide Action Network (PAN) lists Na-PCP as a "Bad Actor Chemical."

[113] See Table for Listing Notifications of Production and Use of Closed-System Site-Limited Intermediates, at: http://www.pops.int/documents/registers/closedsys.htm

[114] IBID

[115] See www.basel.int/techmatters/**hcb**/guidelines/techguid020205.doc

have substantial quantities of old, PCB-containing equipment in use or in stockpiles. At the time of this writing, approximately 75 Parties to the Convention have provided the Convention Secretariat with their National Implementation Plans (NIPs). Many of these NIPS include information on national inventories of PCB-containing equipment in use or in waste stockpiles together with national plans to address them.[116]

The Third Stockholm COP decided that all Parties should submit reports to the Convention Secretariat on their progress in eliminating PCBs no later than 31 July 2007.[117] By August 2008, according to the listing on the Convention web site, less than 25% of all Parties (33) had submitted these reports.[118]

It appears, from the poor response to the request for reports and from a review of the posted NIPs, that many countries lack good inventories of the PCB-containing equipment still in use and of the PCB wastes and PCB-containing equipment no longer in use. It additionally appears that many countries have not yet substantially implemented priority efforts to identify, label and remove from use equipment that contains large quantities of high concentration PCBs. Nor does it appear that most Parties have yet fully removed leaking equipment from use or removed PCB-containing equipment from areas where food or feed is processed.

5.5 DDT for Disease Vector Control

Three countries are listed in the Convention DDT Register as having notified the Convention Secretariat that they produce DDT for use in disease vector control.[119] Fifteen Party countries are listed in the register has having notified the Secretariat that they use DDT for disease vector control.[120] The Convention Secretariat, in cooperation with WHO, maintains a web site that is to provide national reports on DDT production and use.[121] Among the DDT producing countries, China states that it has committed itself to eliminate the production, distribution and use of DDT with a phase out target date of 2014.[122] India, the other major DDT manufacturing country, and the largest user of DDT for disease vector control, indicates that it is facing increasing mortalities and morbidities from malaria and may increase its use of DDT. India's report provides no data on whether Indian exports DDT and to other countries.[123]

DDT Expert Group Report An expert group was established by the Convention to assess the production and use of DDT and its alternatives for disease vector control. A

[116] Most of the submitted Convention National Implementation Plans are on the web at: http://www.pops.int/documents/implementation/nips/submissions/default.htm
[117] See COP3 meeting report, decision SC-3/18 on Reporting at: http://www.pops.int/documents/meetings/cop_3/meetingdocs/report/default.htm
[118] These can be found in Part C of reports listed at: http://www.pops.int/Art15/ListNationalReports.aspx
[119] See Stockholm Convention DDT register at: http://www.pops.int/documents/registers/ddt.htm. The listed countries are China, Ethiopia and India, however, it appears that Ethiopia merely formulates DDT from stocks imported from China.
[120] The Party countries that are listed (as of September, 2008) as using DDT for disease vector control are: Botswana, China, Ethiopia, India, Madagascar, Marshall Islands, Mauritius, Morocco, Mozambique, Myanmar, Senegal, South Africa, Swaziland, Uganda, and Yemen.
[121] See: http://www.chem.unep.ch/ddt/ProfileCriteria.html
[122] See: http://www.chem.unep.ch/ddt/DDTProfiles/China.html
[123] See; http://www.chem.unep.ch/ddt/DDTProfiles/India.html

report by this expert group to the Third Stockholm Convention Conference of the Parties, May 2007,[124] estimated that the total global production of DDT for vector control in 2005 was slightly more than 6,000 tons. According to this report, DDT manufacture was known to take place in China and India, and it was suspected that North Korea also manufactures approximately 300 tons of DDT per year. South Africa and Ethiopia formulate DDT with ingredients imported from China. South Africa exports DDT to some African countries.

The report estimated that approximately 5,000 tons of DDT was used in 2005, but the experts preparing the report had no data for six countries. Most of the DDT that is used for vector control is used in India.

In total, approximately, 22 countries continue to use DDT for disease vector control. Four of the countries that have notified the Convention of their intent to use DDT for disease vector control may not be using it, but rather, may be storing it against a possible future need. On the other hand, some Parties to the Convention may be using DDT without having reported this to the Secretariat. The experts concluded that the use of DDT for malaria vector control may be increasing and may continue to do so, not only because new countries may introduce the use of DDT in their malaria control programs, but also because current DDT using countries may expand their programs.

How Best to Control Malaria It is certainly true that malaria is a devastating disease. This is why the Convention permits indoor, residential spraying with DDT for malaria control when locally safe, effective and affordable alternatives are not available.[125] However, in most circumstances, DDT is not the most effective means of malaria control. When public health resources are available to control malaria, better approaches are often possible using a combination of physical controls, environmental sanitation interventions, the control of breeding sites within drainage systems, biological control methods, and other methods. A project to demonstrate these kinds of approaches was implemented in various malaria-prone locales in Central America in the countries of Belize, Costa Rica, El Salvador, Guatamala, Honduras, Mexico, Nicaragua and Panama. The use of DDT was eliminated in these countries and, at the same time, malaria incidences in the demonstration areas decreased by 61%.[126]

Pro DDT Advocacy Unfortunately, some politically conservative international advocacy organizations with a history of general opposition to environmental programs continue to attack the Convention and promote the use of DDT as the preferred means of malaria control.[127] These advocates rarely acknowledge that indoor spraying with DDT may be ineffective in controlling malaria under some local conditions. They generally also deny

[124] See UNEP/POPs/COP.3/24 at: http://www.pops.int/documents/meetings/cop_3/meetingdocs/default.htm
[125] Annex B, Part II, paragraph 2
[126] See the Global Environment Facility web site at: http://www.gefweb.org/Outreach/Talking_Points/06/november/english/Alternatives_to_DDT_story.html
[127] An article describing the pro-DDT advocacy entitled: *Rehabilitating Carson*, by Quiggin and Lambert, can be found at: http://www.prospect-magazine.co.uk/article_details.php?id=10175. An example of an extreme version of conservative pro-DDT advocacy can be found at: http://www.21stcenturysciencetech.com/articles/summ02/DDT.html. A more typical conservative case of pro-DDT advocacy can be found at: http://www.american.com/archive/2007/november-11-07/the-case-for-ddt

that DDT causes harmful human health effects of its own.[128] These advocates influenced United States Government aid agencies to promote DDT use, and for a time, were even able to influence the World Health Organization which announced in 2006 that it had given DDT a "clean bill of health for controlling malaria."[129] WHO, however, has since clarified that it continues to support the goal of reducing reliance on DDT in line with the Convention.[130]

Some Reasons Why DDT Use is Growing Pro-DDT advocacy is only one among many reasons that a number of governments may be turning to DDT for malaria control or may be expanding their DDT spraying programs. Others are:

√ DDT is long-lasting and relatively cheap to purchase;

√ DDT spraying can be organized in military fashion at the national level without the need to establish effective, community-based public health and vector control infrastructures;

√ Malaria incidence is growing in many countries, due to climate change and other reasons;

√ Poor countries often lack the infrastructure, the know-how, and the financial and technical resources needed to fully and effectively utilize preferable alternative malaria control strategies; and

√ Donor countries and institutions have, on the whole, failed to provide countries in need, sufficient financial and technical assistance to allow them to pursue preferable malaria control strategies.

5.6 DDT as an Intermediate

Besides granting exemptions that allow the use of DDT in disease vector control, the Convention also allows exemptions to produce DDT for use as an intermediate ingredient in the manufacture of the pesticide dicofol. There are two different kinds of exemptions that can be granted for this use.

Governments may request and receive a specific exemption upon becoming a Party to the Convention. These specific exemptions do not place any restrictions on the DDT and dicofol manufacturing processes but expire five years after they take effect. The Convention additionally permits the production of DDT for use in making dicofol without a specific exemption under conditions where the production and use is site-limited and takes place in a closed system. Parties, however, must notify the Convention Secretariat of this production and must provide information about dicofol production

[128] A review of some DDT health effect studies has been compiled by the Pesticide Action Network: http://www.panna.org/ddt/health

[129] See: http://www.who.int/mediacentre/news/releases/2006/pr50/en/

[130] See: *Strengthening malaria control while reducing reliance on DDT,* WHO, Geneva, October 2007: http://www.who.int/ipcs/capacity_building/ddt_statement/en/

processes in their country. Once such notification is given, a Party may permitted this dicofol production to continue for ten years, and it may apply to the COP for ten year extensions.

At the time they became Parties to the Convention, both China and India requested and received specific exemptions to manufacture DDT for use as an intermediate in the manufacture of dicofol. These specific exemptions allowed China and India to produce DDT for use in the production of dicofol without any requirement that this takes place in a closed system. China's specific exemption expires in May 2009, and India's in April 2011.[131] India's request indicated that it will produce 150,000 kilograms (kg) of DDT per year under its specific exemption. China's request indicated that it will produce and uses a total of between 2,400 and 3,200 kg of DDT per year in the production of dicofol.[132] It stated (May 2004) that 60% of Chinese production and use of DDT for the manufacture of dicofol takes place in a non-closed system which is why the specific exemption was requested.[133] It appears that the dicofol that has been produced in China in non-closed systems contains 10% DDT as an impurity.[134] However, China has notified the Convention Secretariat that it will not extend its special exemption to produce dicofol in non-closed systems past May 2009.[135]

Brazil, China and India have each additionally notified the Convention Secretariat of its intention to produce DDT in a site-limited closed system for use in the production of dicofol.[136] Brazil gave its notification in September 2004, China in February 2005, and India in October 2006.

Brazil stated that it has one company that can produce dicofol with a production capacity of 200 kg dicofol per day. However, Brazil reports no production of dicofol in the two years preceding its request for the exemption. China reports, as indicated above, that it produces between 2,400 and 3,200 kg of DDT annually for use in the manufacture of dicofol. India reports 150,000 kg of annual DDT production for this use.

Parties that apply for a closed-loop, site-limited exemption are supposed to provide the Secretariat with information on the nature of the closed-system process and on the amount of trace DDT present in the dicofol as an impurity.[137] India and Brazil reported that the amount of DDT present as an impurity in the dicofol they produce does not

[131] See: http://www.pops.int/documents/registers/specexempt.htm
[132] See: http://www.pops.int/documents/registers/closedsys.htm. The register states that China produces 3,000-4,000 kg per year of which 80% goes for dicofol production.
[133] See: http://www.pops.int/documents/registers/specexempt.htm
[134] This information may be out of date. It is given provided in a description, dated May 2004, of a GEF-funded project to support Improvement of Production Technology of Dicofol from DDT, at: http://www.gefonline.org/projectDetailsSQL.cfm?projID=2629
[135] See note from the Ministry of Environmental Protection of China to the Stockholm Convention Secretariat at: http://chm.pops.int/Portals/0/Repository/gen_announcements/UNEP-POPS-GEN-AN-CHINA-1.English.PDF
[136] See: http://www.pops.int/documents/registers/closedsys.htm. It appears that India may have reported the same production of DDT for use in dicofol twice, once as a special exemption and again as a site-limited closed loop exemption.
[137] Annex B, Part I, note (iii)

exceed 0.1%.[138] China provided no information on this. Neither Brazil nor China provided, as is required, information that describes how their processes meet the closed-loop, site-limited restriction. India has provided a limited amount of such information.

5.7 Dioxin and Other Unintentionally Produced POPs

Dioxin and other unintentionally produced POPs continue to be formed and released to the environment at levels of concern in all countries. Unfortunately, the full implementation of the dioxin-related provisions of the Convention appears to be lagging.

At the time of this writing, only 75 Parties to the Convention have submitted their NIPs to the Convention Secretariat;[139] and only 33 Parties have submitted their required reports on the measures they have taken to implement the provisions of the Convention.[140] Based on a review of the NIPs and National Reports posted on the Convention web site, it appears that many Parties have still not prepared their dioxin action plans and have not begun to implement key Convention obligations that are aimed at reducing and eliminating dioxin formation and release.

National Dioxin Inventories The first required component of a national dioxin action plan is the preparation of a national dioxin source inventory. If a country's dioxin inventory is grossly inaccurate, then its dioxin action plan will inappropriately prioritize the wrong dioxin sources and will fail to achieve desired dioxin reduction and elimination objectives. It appears that the dioxin source inventories being prepared by many countries may be highly inaccurate and may greatly overstate dioxin releases from certain non-industrial sources. As a result, these inventories may relatively understate dioxin releases from important industrial sources.

Most Parties do not have the technical and financial capability to actually measure dioxin releases from sources in their countries. Therefore, most calculate national dioxin releases by categorizing potential dioxin sources in their countries and by then estimating the dioxin released from each source based on dioxin emissions factors found in the UNEP *Standardized Toolkit for Identification and Quantification of Dioxin and Furan Releases.*[141]

Unfortunately, in the opinion of IPEN and of many public health and environmental NGOs with an interest in these issues, the emission factors in the UNEP toolkit tend to greatly overestimate dioxin releases from certain non-industrial sources. As a result, many national inventories greatly underestimate the relative importance of dioxin emissions from the four industrial source categories that the Convention prioritizes for action: waste incinerators; cement kilns firing hazardous waste; production of pulp using

[138] The information for Brazil is found in the register of site-limited closed systems, see: http://www.pops.int/documents/registers/closedsys.htm. The information for India is not found in this register, but is present in the India DDT profile: see http://www.chem.unep.ch/ddt/DDTProfiles/India.html
[139] See: http://www.pops.int/documents/implementation/nips/submissions/default.htm
[140] Information on measures to control dioxin are contained in Part B of the National Reports posted at: http://www.pops.int/Art15/ListNationalReports.aspx
[141] See: http://www.pops.int/documents/guidance/toolkit/ver2_1/Toolkit-2005_2-1_en.pdf

chlorine bleach; and certain thermal processes in the metallurgical industry.[142] A study commissioned by NGOs associated with IPEN tested this hypothesis.[143]

The four non-industrial sources whose dioxin emissions many NGOs believe the UNEP Dioxin Toolkit greatly overestimates are: forest and grass fires; open burning of agricultural residue; open burning of domestic waste; and landfill and dump fires. The study begins with a thorough review of the scientific literature on dioxin emissions from these non-industrial sources and finds that the Toolkit's emission factors for these sources are much too high, in many cases by an order of magnitude or more. Based on its review of the scientific literature, the study proposes more appropriate alternate emission factors for each of these four selected non-industrial sources.

The study then continues with three case examples that show how the toolkit's inappropriately high emission factors for these identified non-industrial sources distort national dioxin inventories. The study recalculates national dioxin inventories for three Latin American countries – Argentina, Mexico and Cuba – using its own more appropriate alternative emission factors for the four selected non-industrial sources.

Argentina's official dioxin source inventory was prepared using the UNEP Toolkit emission factors. It found that 79% of all dioxin emissions in Argentina come from four non-industrial sources, including uncontrolled domestic waste burning, grassland and moor fires, forest fires and agricultural residue burning. However, when the study recalculated national emissions of these four sources using the more appropriate alternative emission factors, the results changed dramatically. In the recalculated inventory, the total emissions from these four non-industrial sources fell from 79% to less than 25% of total national emissions. More importantly, the industrial sources prioritized for action by the Convention – sources that made only a minor contribution to national dioxin emissions in Argentina's official national dioxin inventory – rose in the recalculated inventory to a full 60% of total national dioxin emissions.

Mexico's dioxin inventory was also prepared using UNEP Dioxin Toolkit emission factors. In it, the selected non-industrial sources again show up as the main national sources of dioxin emissions and account for 75% of the total. When recalculations are made using the study's more appropriate alternative emissions factors, the dioxin emissions from these non-industrial sources fall to approximately 25% of the total. In the recalculated inventory, the main sources of dioxin emissions in Mexico are the industrial sources prioritized by the Convention and amount to more than 70% of total national dioxin emissions.

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[142] Parties are obliged to ***require*** the use of best available techniques for new facilities in these source categories, but are obliged only to ***promote*** best available techniques and best environmental practices to control other dioxin sources, see Article 5 (d) and Annex C Part II

[143] The study, commissioned by the Mexican NGO, RAPAL, is: *Estimating Releases and Prioritizing Sources in the Context of the Stockholm Convention: Dioxin Emission Factors for Forest Fires, Grassland and Moor Fires, Open Burning of Agricultural Residues, Open Burning of Domestic Waste, Landfill and Dump Fires*, by Pat Costner, at: http://www.ipen.org/ipepweb1/library/ipep_pdf_reports/7mex%20estimating%20dioxin%20releases%20english.pdf

The report also looked at Cuba. In its official national dioxin inventory prepared using UNEP toolkit emission factors, the selected non-industrial sources account for more than 50% of national dioxin emissions. When a recalculation was made using the study's more appropriate alternative emission factors, these same sources account for less than 7% of the total.

Similar recalculations have not been made for other countries. However, many public health and environmental NGOs active on POPs-related issues believe that the serious flaws in the UNEP Dioxin Toolkit's emission factors frequently produce biased national dioxin inventories that suggest that the industrial dioxin sources prioritized by the Convention for action are not very important under national conditions. These biased inventories can easily lead policy makers to the inappropriate conclusion that they should delay or avoid taking national action to control the industrial dioxin sources that are prioritized for action by the Convention.

The view that forest fires, grass fires and the burning of agricultural residues are major sources of dioxin in the environment has been promoted by the chlorine chemistry industry for many years.[144] But it is an unrealistic view. Dioxins have only shown up in the environment at levels of concern in the years following industrialization. On the other hand, forest fires, grass fires and the burning of agricultural residues have been common since antiquity. Studies of dioxins in lake sediments in industrial countries indicate that significant quantities of dioxins and furans only began to appear in the environment in the nineteenth century corresponding in time with the rising large-scale use of soft coal. Levels of dioxin increased rapidly after the 1930s corresponding in time to the development and growth of the synthetic chemical industry. Finally, in some cases, dioxin levels in the environment started to decline in countries and regions where regulatory controls were imposed on industrial sources.[145] These trends clearly suggest that the most significant dioxin sources are industrial facilities and not the combustion of natural biomass.

Obligation to Require BAT for Certain Industrial Sources Some of the Convention obligations aimed at controlling releases of dioxin and other unintentionally-produced POPs are relatively soft. Parties are required to promote substitution and the use of best

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[144] Scientists working for the Dow Chemical Co. – the world's largest producer of chlorine-containing chemicals – first advanced this view in 1978 in what they called "the trace chemistries of fire" hypothesis. (Crummett, 1982). See USEPA *1994 EPA Dioxin Reassessment - Exposure Document*, Volume II, Chapter 3, Sources, at: http://www.cqs.com/epa/exposure/v2chap3.htm

[145] A study by Rose et al of lake sediments in Scotland found that dioxin and furan concentrations started to increase above pre-industrial background levels during the 1860s and 1870s and reached a peak in the 1950s–1960s. See *An historical record of polychlorinated dibenzo-p-dioxin (PCDD) and polychlorinated dibenzofuran (PCDF) deposition to a remote lake site in north-west Scotland, UK*, from *Science of the Total Environment*, Vol. 198, Issue 2, 30 May 1997, Pages 161-173, at http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V78-3SWK06G-G&_user=10&_rdoc=1&_fmt=&_orig=search&_sort=d&view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=7a0a56afc5ff9e9cfa17253dba2659b4.
A USEPA study by Cleverly, et al, examining lake sediments in the US found that dioxin and furan concentrations begin to rise in the 1930s and 1940s, see: *A Time-Trends Study of the Occurrences and Levels of CDDs, CDFs andDioxin-like PCBs in Sediment Cores From 11 Geographically Distributed Lakes in the United States*, at: http://www.epa.gov/ncea/pdfs/sedcore.pdf

available techniques (BAT) and best environmental practices (BEP) to prevent the unintended formation and release of POPs. All Parties, within two years of the Convention's entry into force, are obliged to develop and subsequently implement an action plan to control the dioxin sources that are identified in their national dioxin inventory.[146] For most Parties, the two-year period ended in May 2006, but it appears many have not yet completed this action plan.

The Convention additionally contains firm and explicit obligations to control dioxin releases from the four prioritized industrial sources that are discussed in the preceding section. Starting four years after the Convention enters into force, each Party must require the use of BAT for all new or substantially modified incinerators, cement kilns firing hazardous waste, pulp mills using chlorine bleach, and certain thermal processes in the metallurgical industry. For most countries – those that were Party to the Convention when it entered into force – this obligation entered into force in May 2008. Unfortunately, it appears that many Parties have not implemented this obligation in a meaningful way.

Parties are given considerable flexibility and are permitted to define BAT in a manner that is consistent with their national conditions so long as they do so in a way that is consistent with Article 5 and Annex C of the Convention and that takes into account the Guidelines on BAT and BEP that were adopted by the Convention's COP.[147] Many highly industrial countries had already adopted their own versions of BAT for industrial dioxin source categories even before there was a Convention, and many require that all facilities that fall into these source categories utilize technologies and techniques that are consistent with their national BAT standards. However, most developing countries and countries with economies in transition appear not to have yet established national BAT standards for the four industrial sources prioritized for action by the Convention. Nor have many yet established any national law, regulation or other legal instrument that effectively requires that new facilities in these four source categories use BAT even though the deadline for doing so has passed.

5.8 POPs Stockpiles and Wastes

The Convention requires the cleanup and proper disposal of obsolete POPs stockpiles and POPs wastes. It includes provisions that these wastes be handled, collected, transported and stored in an environmentally sound manner. It also requires that the POPs content of the wastes be destroyed or irreversibly transformed such that it no longer exhibits POPs characteristics.

Low POPs Content The Convention requires that after the treatment of POPs waste, it should no longer exhibit POPs characteristics. This has been interpreted to suggest the need for a threshold limit on the quantity of POPs in the residues produced when POPs wastes are treated. The Convention also permits a relaxed standard for the *environmentally sound disposal* of POPs when the POPs content of the waste is low. To

[146] Article 5 (a)
[147] The Convention BAT provisions are fond in Article 5 (d), (e) & (f) and in Annex C, Part V. The Guidelines on BAT and BEP adopted by the Convention are found at: http://www.pops.int/documents/guidance/batbep/batbepguide_en.pdf

address these issues, there have been attempts to define *low POPs content* threshold limits, and this has become a subject of controversy.

The Basel Convention has suggested that wastes be considered to have *low POPs content* if they contain less than 15 parts per billion (ppb) of dioxin, or less than 50 parts per million (ppm) of other POPs.[148] Most environmental and public health NGOs have opposed this definition considering it much too high. They note that this definition ignores that fact that such wastes are highly hazardous, can contribute to the long-range transport of POPs, and can cause serious harm to public health and the environment. As such, this definition of *low POPs content* would be inconsistent with the objective of the Convention.

The Convention Third COP considered these proposed Basel Convention definitions, but neither adopted nor rejected them. Rather, it took note of the Basel Convention definition of *low POPs content* and other related decisions and it encouraged the Basel Convention to continue its work on these issues.[149] As a result, there remains ambiguity about how to define *low POPs content*, and as a consequence, there is also ambiguity about what can be considered to be the *environmentally sound disposal* of POPs stockpiles and wastes.

These are important considerations because the proper disposal of obsolete POPs stockpiles and wastes can be expensive. Those responsible, therefore, virtually always select the least costly available disposal option that they expect will eliminate their liability. An inappropriate definition of *low POPs content* creates a loophole that allows responsible parties to select disposal options that may be less costly, but that leave behind substantial POPs residues. This is inconsistent with the intent of the Convention and permits the use of POPs waste disposal options that can not truly be considered environmentally sound. Such disposal options result in significant new releases of POPs to the environment which are harmful to human health and ecosystems. Also, so long as these less costly options are allowed, superior POPs waste disposal technologies that are able to destroy all the POPs content of the waste, and that leave behind virtually no POPs residues may remain economically non-viable.

An inappropriate definition of *low POPs content* also opens the door for permitting the production and sale of products that contain unacceptably high levels of POPs as contaminants. It further facilitates the export of hazardous, POPs-contaminated wastes from developed to developing countries. For these and other reasons, if the definition of *low POPs content* that was proposed by the Basel Convention is permitted to stand, the Convention's objective will have been undermined and serious harm to human health and ecosystems will result.

Funds to Cleanup POPs Stockpiles and Wastes At the time of this writing, the total of all funds granted by the Global Environmental Facility (GEF) to governments for cleanup

[148] See UNEP/POPS/COP.3/INF/7; Basel Convention Updated general technical guidelines for the environmentally sound management of wastes consisting of, containing or contaminated with persistent organic pollutants (POPs); Section III; at: http://www.pops.int/documents/meetings/cop_3/meetingdocs/default.htm

[149] See the Report of the Stockholm Convention, Third Conference of the Parties, decision SC-3/7, at: http://www.pops.int/documents/meetings/cop_3/meetingdocs/report/default.htm

and disposal of POPs stockpiles and wastes is greater than USD $135 million – nearly half of all the funds allocated by the GEF in its role as the financial mechanism for the Convention.[150] Some of the funded projects support identifying and disposing of obsolete pesticide stockpiles; some address PCB management and disposal; some demonstrate POPs destruction technologies; and some address POPs-contaminated sites.

Unfortunately, only a small portion of all obsolete POPs stockpiles and wastes will be addressed by these projects which, all together, take place in a total of less than 25 countries. In many of these countries, the approved projects will only address a fraction of the country's POPs stockpiles and wastes. Furthermore, some of the countries with the most and the largest obsolete POPs stockpiles and contaminated sites, such as, for example, Russia and the Ukraine, are not yet included. Much still needs to be done to fully implement the Convention provisions addressing obsolete POPs stockpiles and wastes.

5.9 Financial and Technical Assistance

During the negotiation of the Convention, concerns relating to the need for adequate financial and technical assistance were uppermost in the minds of delegates from developing countries and, to a lesser extent, those from countries with economies in transition. A key Convention provision that was agreed to address these developing country concerns states:

> *The extent to which the developing country Parties will effectively implement their commitments under this Convention will depend on the effective implementation by developed country Parties of their commitments under this Convention relating to financial resources, technical assistance and technology transfer.*[151]

Inadequate Funds It appears, unfortunately, that there have been failures on both sides. Many developing countries are not yet effectively implementing all of their obligations under the Convention; and, on the other hand, many developed countries are not meeting their commitments to adequately provide financial and technical assistance. Fortunately, the COP has a mandate to review, on a regular basis, the financial mechanism established by the Convention.[152] Hopefully, the COP will address this double failure during these reviews.

A big part of the problem is that the total quantity of financial and technical assistance that has been made available to enable developing country Parties to fulfill their Convention obligations is inadequate to the job. One reason for that is that the United States, the largest donor country, is not yet a Party to the Convention and it has resisted efforts by other donor countries to increase the total amount of funds available to the GEF to provide assistance to POPs-related projects. Another reason is that donor countries have – with good reason – given significant attention to providing financial

[150] This information is based on the database of GEF-funded Projects, as of July, 2008. The database lists projects and the amounts allocated to them and can be found at: http://www.gefonline.org/home.cfm
[151] Article 13, paragraph 4
[152] Article 14, paragraph 8

support for climate change-related efforts aimed at reducing greenhouse gas emissions. Some feel that they can only substantively address one global environmental crisis at a time, but this is short-sighted. The world is facing multiple significant global environmental threats. Each has the potential to cause critical and irreversible harm to human health and ecosystems. Every delay in providing adequate support for POPs elimination will mean that the harm will grow – especially in developing countries. The longer the delay in providing adequate financial and technical support, the greater will be the harm and the more costly will be the eventual remedy.

GEF Funding The GEF, in 2001, started providing grants to countries considering the ratification of the Convention for what it called: *Enabling Activities.* Over the first seven years of its POPs focal area, the GEF has approved a total of 171 POPs projects and granted a total of USD $301.5 million.[153] Most of these projects – nearly 130 of them – were for Enabling Activities. These projects enabled the large majority of the world's developing countries and countries with economies in transition to prepare national POPs inventories, develop NIPs, and establish institutional infrastructures that would be needed to implement the Convention. Approximately $60 million was devoted to Enabling Activity projects. This comes to approximately 20% of all POPs-related funds that the GEF has granted to date. On the whole, this has been a useful and comprehensive program that has enabled most of the world's governments to become engaged with the Convention and its objectives.

However, beyond enabling activities, the GEF has approved only about 40 other POPs Projects.[154] National projects have been approved in 18 countries, with multiple projects in some countries. Additionally, the GEF has approved eight global POPs Projects and six regional POPs projects.

As indicated above, approximately half of all POPs-related project funds approved by the GEF have gone to address the cleanup and disposal of POPs stockpiles and wastes. Approximately 30% of GEF-approved funds for POPs projects have gone to support efforts other than Enabling Activities and POPs waste-related projects.

One country, China, has been given 12 GEF-approved POPs projects totaling $83.5 million. This amounts to more than 25% of all POPs-related funds the GEF has approved. (This figure includes the funds granted to China for its Enabling Activities and for POPs waste management and disposal projects.) $12 million has been provided to China for a project to phase-out the use of DDT in anti-fouling paints, even though the Convention provides no exemption for this use. Another $6.25 million is approved for a project to improve production technology to manufacture dicofol from DDT.

[153] All the data in this section is based on GEF Project database as of July, 2008. The database can be found at: http://www.gefonline.org/home.cfm

[154] This number includes Full Projects and Medium Size Projects, but does not include NGO POPs projects funded by the GEF Small Grants Program (SGP).

At the same time, the GEF has so far approved only three projects that address good methods for malaria control avoiding the use of DDT. These total $13.5 million[155] which is less than 5% of all GEF POPs funds granted so far. Also, the GEF has so far approved three projects that address the use of BAT and BEP for the sources of POPs prioritized by the Convention for a total of about $24 million.[156] Country needs appear to be greater than the funds the GEF has available. As a result, the GEF appears to lack sufficient funds to support the full incremental costs that would be incurred by developing countries and countries with economies in transition that wish to fully implement their Convention obligations.

More Effective Delivery of Financial and Technical Assistance While the main difficulty impeding effective Convention implementation is the inadequate amount of financial and technical assistance available, a further difficulty is that the procedures for accessing financial and technical assistance are complex, difficult, inefficient and slow. Issues of both the adequacy of financial and technical support and also its practical accessibility will need to be addressed to ensure full Convention implementation.

Reforms will be needed to ensure that amount of funds and technical support made available to developing countries and countries with economies in transition becomes adequate, and to ensure that access to the Convention financial mechanism is less complex and burdensome. Nonetheless, there is much important progress that can be made in implementing the Convention even before such reforms are made. To be sure, NGOs and representatives of civil society have an important role to play in pressing to improve financial and technical support for Convention implementation. At the same time, they can and should also press for early action in many areas where important progress can be made under present conditions.

[155] The GEF Project Database cited above lists three such regional projects: one for Ethiopia, Madagascar and Eritrea ($5.87 million); one for Sudan, Morocco, Yemen, Djibouti, Egypt, Syria, Jordan and Iran ($5.56 million); and one for Georgia, Kyrgyzstan and Tajikistan ($2.045 million).

[156] The GEF Project Database includes one national project in China on *Environmentally Sustainable Management of Medical Waste* for $12 million; one global project *Demonstrating and Promoting Best Techniques and Practices for Reducing Health-care Waste to Avoid Environmental Releases of Dioxins and Mercury* for $11 million; and one project in Vietnam on *Introduction of BAT and BEP methodology to demonstrate reduction or elimination of unintentionally produced POPs releases from the industry* for $0.8 million.

6. How Organizations of Civil Society Can Contribute to POPs Elimination

The above status review on progress toward eliminating the initial 12 POPs suggests that much work still needs to be done. It is disappointing that some Parties are not fully complying with their Convention obligations or even submitting required reports. Nonetheless, the Convention can be viewed as an important early step in establishing a global environmental governance regime to protect human health and ecosystems from the injuries that result from toxic chemical exposure. In many cases, the Parties that have thus far failed to fully comply with their Convention obligations generally lack the experience, know-how and institutional infrastructures that would be needed for them to nationally implement any sound chemicals management regime. In this regard, efforts aimed at helping enable such countries to fully comply with their Convention obligations serve not only to provide protection from POPs, but also have the added benefit of helping build up the national institutional infrastructures that they will need to achieve other important national chemical safety objectives.

More than 150 countries have ratified the Convention, including most of the world's developing countries. Doing so, in many cases, has made chemical safety a more important national issue than it previously was. When it ratified the Convention, each Party took a decision at the highest national level – by its parliament and/or its national executive – to acknowledge that POPs represent a serious threat to human health and the environment. Each Party made a high-level decision to control POPs and, to the extent possible, to eliminate them. Each also decided that Convention obligations will be formally incorporated into the country's laws and policies.

As we know, the fact that a country has decided to incorporate the obligations of the Convention into its national laws and policies does not automatically mean that these obligations will actually be enforced, and it does not mean that agreed-upon commitments to control and eliminate POPs will be effectively implemented. But ratification is an important step. It greatly strengthens the influence and the effectiveness of those in society – both dedicated government officials and also representatives of civil society – who believe in the objective of the Convention and wish to help secure its achievement. The challenge for NGO and CSOs is to find ways to effectively utilize the opportunities provided to them by the Convention. What follows are some ideas about things that NGOs and CSOs can do.

6.1 Pesticide POPs

Civil society has an important role to play in monitoring for the presence of stockpiles containing one or more POPs pesticides in their country or their district. Many countries have large numbers of old stockpiles of obsolete pesticide that are often not in good condition and often are not actively managed. Sometimes these stockpiles are open or are leaking to the environment. Sometimes the locations of these stockpiles are unknown to government authorities; and in many cases, there is no record of what pesticides are present in old pesticide stockpiles. Frequently, these stockpiles contain POPs pesticides.

In a number of countries, NGOs and CSOs have already made important contributions to Convention implementation by identifying the location of obsolete pesticide stockpiles, characterizing their contents and condition, notifying responsible government authorities, and advocating for their proper cleanup and disposal. NGOs and CSOs in many more countries can and should do this. An *NGO Manual* addressing key issues, information and resources relating to obsolete pesticide stockpiles was prepared by the Pesticide Action Network for use by African NGOs.[157] Another comprehensive NGO manual was produced for use by NGOs in the Russian Federation by the NGO, Eco-Accord.[158] Much of the content of these manuals may be useful to NGOs in other regions.

NGOs and organizations of civil society can also contribute to Convention implementation by investigating whether any of the banned POPs pesticides are still available on local markets and/or are still being used. If sale or use is found or suspected, an NGO or individual may wish to report this to an appropriate national government official and/or directly inform the Convention Secretariat. In most cases, however, it is best to first confirm whether the pesticide found to be for sale or in use is actually one of the POPs pesticides. This is because pesticides on the market in many countries are often poorly or inaccurately labeled, and there have been cases in which vendors claiming to be selling a POPs pesticide are actually selling something else. Confirmation usually requires finding a laboratory that can analyze the suspected pesticide. In many cases, an NGO or CSO that finds or suspects the sale or use of a banned POPs pesticide may wish to first communicate with another NGO with relevant experience and seek help in taking appropriate next steps. PAN or IPEN can often help in identifying an appropriate NGO partner to work with.

6.2 DDT

The Convention permits the restricted use of DDT for disease vector control, primarily to control malaria carrying mosquitoes. Malaria remains a deadly disease in many countries, especially in Africa. Every year, more than 500 million people become severely ill with malaria, and every year more than one million people die of malaria, mostly infants, young children and pregnant women and most of them in Africa.[159] The NGOs and NGO networks committed to achieving POPs elimination fully support local, national and international efforts to prevent and control this killer disease.

Monitor and Document How DDT is Actually Used Under the provisions of the Convention, DDT manufacture and use is restricted. The Convention allows DDT use only for disease vector control, only in accordance with World Health Organization guidelines, and only when locally safe, effective and affordable alternatives are not available. In countries where DDT is still available, it would be most useful for NGOs and CSOs to monitor and document how DDT is actually used.

[157] *NGO Manual*: http://www.africastockpiles.net/docs/c112/
[158] *Methodological Recommendations for Non-governmental Organisations on Conducting Primary Inventories of Banned and Obsolete Pesticides*, http://accord.cis.lead.org/english/pop/mr/index.htm
[159] See WHO Malaria Fact Sheet at: http://www.who.int/mediacentre/factsheets/fs094/en/index.html

There have been persistent rumors that in some countries, DDT is being diverted for use in agriculture. To our knowledge, however, these rumors have not been well-documented. It should be noted that there is only one technique for using DDT in disease vector control that the WHO supports: indoor residual spraying (IRS); that is, spraying DDT on the inside walls of buildings.[160] The Convention permits this use in Party countries that have notified the Secretariat that they intend to use DDT for disease vector control. A list of countries that have provided this notification is maintained by the Secretariat and is available on the web.[161] It would be very useful if CSOs would document any uses of DDT in countries not listed in this register. In countries that are listed in this register, it would be very useful if CSOs would document any uses of DDT that take place other than IRS for malaria control.

If NGOs in countries not listed in the register discover that DDT is being used, or if NGOs in countries that are listed discover that DDT is being diverted for uses other than those approved by the Convention and WHO, it would be very helpful it they would carefully document what they have found. In the first instance, if it is appropriate to do so, they may wish to present this documentation to authorities within their national government. They may also wish to forward their documentation to the Secretariat of the Convention and to the WHO. At the same time, it would be very helpful if they would contact PAN and IPEN and provide information on what they have found and what steps they have taken. Based on NGO and civil society monitoring, if evidence is found indicating that DDT is still being used for purposes other than IRS for disease vector control, and if these uses persist, NGOs may wish to present the information to the Convention Conference of the Parties and to the international public through the media.

WHO advises that a decision to use DDT for indoor residual spraying for malaria control should be based on the local conditions. Before a decision to use DDT is made, the decision-makers should have a good understanding of the risks and benefits associated with the use of DDT in the particular locality.[162] This suggests that in countries that have decided to use DDT for disease vector control, and that have notified WHO and the Convention of this, it is still necessary to make decisions whether to use DDT in a particular locality based on a concrete evaluation of local circumstances. NGOs and CSOs can usefully monitor and document how local decisions to use of DDT for IRS are made and whether decisions taken are locally appropriate.

Promote and Demonstrate Alternatives Another important role for NGOs and CSOs is to promote the demonstration and development of alternative vector control strategies, as well as other methods for controlling and preventing malaria, that are superior to the use of DDT. A major reason that malaria remains such a devastating disease, especially in regions of Africa, is that the amount of funds and resources devoted to combating malaria over the past 30 years has been inadequate. Therefore, NGOs and organizations in all regions of the world should campaign to greatly expand the amount of funds and

[160] See WHO publication, *Ten Things You Need to Know About DDT Use Under the Stockholm Convention*, at: http://www.who.int/malaria/docs/10thingsonDDT.pdf
[161] See Stockholm Convention DDT register at: http://www.pops.int/documents/registers/ddt.htm
[162] See WHO publication, *Frequently asked questions on DDT use for disease vector control*, at: http://www.who.int/malaria/docs/FAQonDDT.pdf

resources devoted to malaria control, especially in Africa. They should also campaign to ensure that a substantial portion of this expanded funding is devoted to the development, demonstration and promotion of superior methods for preventing and controlling malaria.

Promote a Better Understanding of DDT's Harmful Effects Proponents of widespread use of DDT for malaria control often deny that there is any reliable evidence linking DDT exposure with significant human disease. This claim draws strength from the fact that there have been relatively few good studies that directly examine the health impacts of DDT exposure from indoor residual spraying. There do exist, however, numerous studies that link DDT exposure to human health injury. These studies, and their relevance to the debate about health effects associated with the use of DDT in IRS, are detailed in a recent review article in *The Lancet* by Rogen and Chen, medical researchers at the United States National Institute for Environmental Health Sciences.[163]

Rogen and Chen also published an important research article in the journal, *Emerging Infectious Diseases* which makes an estimate of DDT health impacts from IRS spraying for malaria control. The study considered the effects of possible increased preterm births and shorter duration of lactation that may result from maternal exposure to DDT. It estimated that this may cause increases in infant deaths of the same order of magnitude as the decreases that might be derived from effective malaria control.[164] These articles were criticized by proponents of DDT spraying. Rogen and Chen replied, saying:

> *We believe that public-health decisions should be based on the best scientific information currently available, not on assertions of safety taken from general observations made decades ago. …*
>
> *We believe, with support from published data that have evolved over the past decade or so, that maternal exposure to DDT at levels known to occur from indoor residual spraying could shorten duration of lactation and increase preterm birth. The studies showing those associations are methodologically reasonable and appeared in prominent, peer-reviewed journals. Since they are few in number and done in North America, they have not shown causality, nor can they predict definitively, what will happen in Africa. But if DDT does shorten lactation and increase preterm birth in Africa, it will increase infant mortality; whether that increase is small in relation to lives saved from malaria vector control is a matter for research.*[165]

The assertion that DDT, when used for malaria control, causes no harmful health impacts has been made so frequently that it is routinely repeated as fact by the press, by sectors of the educated public, and even in some WHO documents.

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[163] See: *Review: Health Risks and Benefits of DDT*, by Dr Walter J Rogan MD and Aimen Chen MD, in *The Lancet*, 2005; 366:763-773, at: http://www.thelancet.com/journals/lancet/article/PIIS0140673605671826/fulltext

[164] See Aimin Chen and Walter J. Rogan, *Nonmalarial Infant Deaths and DDT Use for Malaria Control*, in *Emerging Infectious Diseases*, Vol. 9, No. 8, August 2003, at: http://www.cdc.gov/ncidod/EID/vol9no8/pdfs/03-0082.pdf.

[165] See *Correspondence: Risks and benefits of DDT – Authors' reply*, in *The Lancet*, 2005; 366:1772, at: http://www.thelancet.com/journals/lancet/article/PIIS0140673605677239/fulltext

It is proper for NGOs and CSOs to insist on a full public presentation and discussion of both the potential benefits and the potential harms associated with local decisions to use DDT in malaria control. They should insist that all the evidence be taken into account and that the decisions taken be based on a well balanced consideration. Assertions about the safety of DDT taken from general observations made decades ago should be challenged. However, all debates about the human health impacts of DDT should take place in the context of mutual agreement that malaria is a terrible disease and all efforts must be made to control it. In the end, DDT will be phased out and will no longer hold attraction only when funds and resources are made available to enable more effective methods to control, prevent and treat malaria.

6.3 PCBs

As indicated earlier, Parties to the Convention are allowed to permit the continued use of PCB-containing equipment through the year 2025; and they are not required to finally dispose of all PCB liquids and wastes until the year 2028. NGOs and CSOs can encourage governments to act more quickly to phase out PCB-containing equipment and to properly dispose of all PCB wastes. In many countries, they can also play a useful role in helping identify PCB-containing equipment in use, in storage and at waste sites.

The Convention, although it does not require Parties to fully phase-out the use of PCB-containing equipment until 2025, does call upon them to make determined efforts to act more quickly, especially to identify and label PCB-containing equipment with more than five liters of liquids, and with PCB concentrations in those liquids of more than .05%. They are further encouraged to remove such equipment from use giving priority to those with higher PCB concentrations. Parties are additionally encouraged to properly dispose of equipment that has been taken out of use as soon as possible.[166]

In most countries, almost all the remaining PCB-containing equipment is more than 30 years old and subject to leaks and to fires, especially if not properly inspected and maintained. In many countries, governments do not have complete inventories of PCB-containing equipment, and in many cases, they do not have good knowledge about which of the transformers and capacitors in use in their country contain PCBs. In some countries, NGOs and CSOs have helped government officials identify PCB-containing equipment in specific localities or in the country at large. NGOs who wish to carry out similar activities in their locality or country may find two guidance documents prepared by the Convention Secretariat to be useful. The most recent and thorough of these is entitled: *PCB Transformers and Capacitors: From Management to Reclassification and Disposal.* The other is entitled: *Guidelines for the Identification of PCBs and Materials Containing PCBs.* Both can be downloaded from the web.[167]

The Convention specifically indicates that PCB-containing equipment should be removed from areas where food or feed is produced or processed.[168] There have already been

[166] Annex A, Part II, (a) (i) & (ii); and (e)
[167] http://www.pops.int/documents/guidance/
[168] Annex A, Part II, (b) (ii)

several incidents where PCBs have leaked into food or feed causing severe health crises. In 1968 in Western Japan and in 1979 in Taiwan mass poisonings occurred that caused widespread and severe health injury because rice oils used for cooking had been contaminated with PCBs from leaking equipment.[169] In 1999, another serious incident, one that came to be called the *Belgian dioxin crisis*, occurred when PCB-contaminated animal fats were used to make chicken feed.[170] NGOs can play an important role in preventing similar disasters by promoting targeted efforts to ensure that PCB-containing equipment and wastes are removed from all areas where food or feed is produced or processed.

The Convention also indicates cause for concern when PCB-containing equipment is used in populated areas including schools and hospitals. The Convention additionally recommends that measures be instituted to protect PCB-containing equipment from electrical failure which could result in fire, and to carry out regular inspections for leaks.[171] However, in many countries, electrical failures occur frequently. It is also often difficult to ensure frequent, thorough, and reliable inspections. Therefore, NGOs and CSOs may wish to undertake campaigns to promote the expedited removal of PCB-containing equipment from all populated areas with priority going to schools, hospitals and similar locations.

The NIP that most Convention Party countries prepared often includes a national plan for managing equipment, materials and wastes containing PCBs. In many cases, the NIP also contains a more or less thorough national inventory of PCB-containing equipment. Most of the NIPs that have been prepared by Parties are available on the web.[172] NGOs and CSOs with a possible interest in addressing national or local PCB issues are encouraged to download and review their country's NIP. Doing so may provide helpful information, may suggest whether NGO engagement on this issue would be useful, and may suggest what kinds of activities to undertake.

An evaluation of the thoroughness and the quality of the national PCB inventory that is found in a country's NIP might indicate whether or not it might be helpful for CSOs in a country to undertake their own PCB inventory activities. Reviewing the NIP might also, in some cases, enable NGOs to identify locations of PCB-containing equipment of special concern. Time has passed since most Parties prepared their NIPs and therefore, NGOs, might request from their governments a copy of any subsequent or more detailed inventory that has been made. Although different governments may respond differently to such requests, the Convention indicates that information of this kind should be publicly available.[173]

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[169] See Y Masuda, *Health status of Japanese and Taiwanese after exposure to contaminated rice oil*, in *Environmental Health Perspectives* 1985 May; 60: 321–325, at http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1568546
[170] See Nik van Larebeke, et al, *The Belgian PCB and Dioxin Incident*, in *Environmental Health Perspectives*, 2001 March Volume 109, Number 3, at: http://www.ehponline.org/members/2001/109p265-273vanlarebeke/vanlarebeke-full.html#con
[171] Annex A, Part II, (b) (iii)
[172] http://www.pops.int/documents/implementation/nips/submissions/default.htm
[173] Article 10, paragraph 1 (b), and Article 9, paragraph 5

Parties to the Convention are required to provide reports to the Convention every five years on their progress in eliminating PCBs. Reports which have been submitted are available on the web.[174] However, the initial reporting deadline has past and most countries have not yet submitted their reports at the time of this writing. This suggests that many countries may be behind schedule in implementing their PCB management plans. In such cases, NGO and CSO efforts to press governments to act sooner rather than later to take PCB-containing equipment out of use and to properly dispose of it would be very positive.

6.4 Dioxins and Other Unintentional POPs

Of the 12 POPs initially listed by the Convention, it appears that a process is in place that will, over time, eventually achieve the global elimination of the intentional manufacture of the ten that are produced for use. No substantial process, however, has yet been made toward achieving the Convention's goal of the continuing minimization of environmental releases of dioxin and, where feasible, their ultimate elimination.[175]

During the negotiations that established the Convention, NGOs campaigned to ensure the Convention would include dioxin provisions that are substantive. Now, during the implementation phase, NGOs and CSOs will need to again campaign to secure the necessary commitments from Parties and relevant intergovernmental organizations to properly and conscientiously implement the very good dioxin-related Convention provisions.

Identifying Dioxin Sources Each Party to the Convention is required to prepare and maintain a national inventory of dioxin sources and an estimate of releases from those sources. When most countries do this, they rely on the methodology and emission factors presented in a UNEP publication, the *Standardized Toolkit for Identification and Quantification of Dioxin and Furan Releases.*[176] As indicated earlier, IPEN-associated NGOs and NGO experts who work on dioxin issues believe that this toolkit is seriously flawed and produces distorted results which lead some Parties to mistakenly believe that in their countries, forest fires, grass fires and open burning of agricultural residue are their most significant unintentional POPs sources, and that waste incinerators and the other sources prioritized by the Convention are relatively unimportant.

International NGO experts associated with IPEN will continue to make arguments and present evidence that the emission factors contained in the UNEP dioxin toolkit should be corrected and that national dioxin inventories should be revised to reflect these corrections. However, even before these corrections are made, there are useful activities that NGOs can undertake in their countries and localities. The provision of the Convention that instructs Parties to prepare national dioxin inventories, states that they should do so taking into consideration the source categories listed in Annex C of the

[174] These are found in Part C of the reports posted on the web at: http://www.pops.int/Art15/ListNationalReports.aspx
[175] This goal is stated in the preamble to Convention Article 5
[176] http://www.pops.int/documents/guidance/toolkit/ver2_1/Toolkit-2005_2-1_en.pdf

Convention. [177] Annex C prioritizes four industrial source categories as having the potential for comparatively high formation and release of dioxin.[178] These are:

- √ Incinerators that burn municipal waste, hazardous waste, medical waste or sewage sludge;
- √ Cement kilns firing hazardous waste;
- √ Production of paper pulp using chlorine bleach; and
- √ Certain thermal processes in the metallurgical industry
  - o Secondary copper production,
  - o Sinter plants in the steel industry,
  - o Secondary aluminum production, and
  - o Secondary zinc production.

NGOs and CSOs may wish to verify that all facilities in their country that fall into the above four source categories are included in their country's national dioxin source inventory. They also may wish to campaign and advocate for effective measures to control or eliminate dioxin releases from these sources.

Best Available Techniques The Convention's primary method for minimizing dioxin releases is use of what it terms *"best available techniques"* or *"BAT."* The Convention obliges Parties to promote the use of BAT for all potential dioxin sources, and it obliges them to require the use of BAT for all new or substantially modified facilities in the prioritized source categories listed above. The Convention provides some definitions and some general guidance on what is meant by BAT,[179] but it allows Parties to determine what constitutes BAT under their national circumstances. However, Parties are to do so taking into account both the general guidance contained in Annex C of the Convention and also more detailed Guidelines adopted by the COP.[180]

After a long and thorough process, an expert group whose members included experts from governments, NGOs and impacted industries reached agreement on draft guidelines which were then presented to the third Conference of Parties, May 2007.[181] This draft was then adopted by the COP and is available for use by Parties. The Guidelines are more than 400 pages in length and too complex to summarize here. The document is technical, but it is not too difficult for an educated lay person to read, understand and use. Those NGOs with concerns about facilities in their locality or country with the potential to release dioxins to the environment should take the time to become familiar with its relevant sections. The Guidelines document provides detailed technical information and guidance about what can be considered best available techniques for all seventeen of the

[177] Article 5 (a) (i)
[178] Annex C, Part II
[179] The definitions are in Article 5 (f); the general guidelines are in Annex C, Part V.
[180] Article 5 (d) & (e)
[181] See: http://www.pops.int/documents/guidance/batbep/batbepguide_en.pdf.

source categories identified by the Convention in Annex C. [182] It provides very detailed information and guidance addressing the four industrial source categories that have been prioritized for action by the Convention.

Special attention should be given to Section II of the Guidelines which takes up the *Consideration of Alternatives in the Application of Best Available Techniques*.[183] This section elaborates the following statement in Annex C:

> *When considering proposals to construct new facilities or significantly modify existing facilities using processes that release chemicals listed in this Annex* (that is, dioxin and other unintentional POPs) *priority consideration should be given to alternative processes, techniques or practices that have similar usefulness but which avoid the formation and release of such chemicals*.[184]

The Guidelines describe in some detail an approach Parties might use in giving consideration to alternatives. NGOs may wish to advocate that this approach be used when there is a proposal to construct a new facility in their community or country with the potential to generate and release dioxin to the environment, especially if good alternatives can be identified that do not generate and release dioxin. Such an approach is especially useful in response to proposals to construct new incinerators. The Guidelines document also includes a section on *Waste Management Considerations* that suggests it is better to undertake actions to prevent, avoid and reduce the generation of waste than it is to build incinerators.[185]

Overall, the Guidelines are a good tool that NGOs can use and refer to in efforts to promote the use of best available techniques, including substitution with alternatives, when addressing both existing and proposed facilities that have the potential to generate and release large quantities of dioxin.

National Instruments to Require the Use of BAT When the Convention was adopted, Parties were given a grace period of up to four years to implement their obligation to require the use of BAT for any proposed new facility (or for any substantially modified existing facility) in the four prioritized industrial source categories.[186] For most Parties, the four-year grace period ended in May 2008. Nonetheless, it appears that many, possibly most, developing and transition country Parties have not yet substantively implemented this obligation.

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[182] In addition to the four prioritized dioxin source categories, the document provides guidance on applying BAT to: open burning of waste; burning of landfill sites; several thermal processes in the metallurgical industry that are not included in the priority list; residential combustion sources; fossil fuel-fired utility and industrial boilers; firing installations for wood and other biomass fuels; specific chemical production processes, especially production of chlorophenols and chloranil; crematoria; motor vehicles, particularly those burning leaded gasoline; destruction of animal carcasses; textile and leather dyeing (with chloranil) and finishing (with alkaline extraction); shredder plants for the treatment of end of life vehicles; smouldering of copper cables; and waste oil refineries.
[183] Guidelines, Section II B, page 19
[184] Annex C, Part V B (b)
[185] Guidelines, Section III C (ii), page 30
[186] Article 5, paragraph (d)

In order to implement this obligation, a government must first establish the national BAT standards that it will enforce for the four prioritized industrial source categories. It then must promulgate some national instrument, such as a binding regulation or a law, that requires anyone proposing to build a new facility (or modify an existing one) within the source categories prioritized by the Convention to do so in conformity with the established national BAT standards.

It appears that most Parties have not yet established national BAT standards for the four prioritized industrial source categories, and have not promulgated laws or regulations requiring that they be used. NGOs may wish to enter into dialogue with relevant government officials to inquire whether and how this Convention obligation is being implemented. If the official indicates that implementation is taking place, the NGO may request information about the national BAT standards that are being enforced for the four prioritized industrial source categories, may inquire about the national law or regulation that is used to require these standards be followed, and may ask about the mechanism of enforcement. On the other hand, if the NGO is told that this Convention obligation is not yet being nationally implemented, it may wish to enter into dialogue with government officials about plans and approaches for its implementation.

It would be most helpful if NGOs from different countries shared with one another the information they receive in response to such requests. (The IPEN Secretariat and IPEN dioxin working group can facilitate such sharing.) By comparing how different developing and transition governments implement (or plan to implement) the BAT requirement, NGOs can begin to develop a better understanding of the status of implementation of the Convention's dioxin provisions. Comparing information can also be useful to NGOs who wish to advocate for full and effective national implementation of the Convention's BAT provisions.

In some cases, local communities and/or national NGOs find themselves opposing a proposal to build or modify an incinerator or other facility that falls into one of the four prioritized industrial source categories. In such cases, it would be most useful for the NGO to inquire about how their government is implementing the Convention BAT provisions. If their government has already established national BAT standards, the NGO may wish to explore whether the proposed new facility is consistent with these standards. In such cases, the NGO may also wish to explore whether national BAT standards are consistent with the BAT provisions and guidelines of the Convention. On the other hand, in cases where no national BAT standard has yet been established, NGOs may wish to advocate that, in the interim, the BAT Guidelines adopted by the Convention be used.

6.5 Awareness-Raising and Public Participation

The Convention contains specific provisions about awareness-raising and public participation. Parties are obliged to promote and facilitate public awareness programs about POPs including their health and environmental impacts, and their alternatives. Target audiences for such programs may include different sectors of society, but the Convention singles out women, children and the least educated for special attention.[187]

[187] Article 10, paragraph 1 (c)

NGOs are often in a good position to carry out POPs awareness-raising activities. NGOs working with IPEN have already undertaken project activities in sixty developing and transition countries that included elements of POPs-related public information, education, capacity-building and awareness-raising. Reports on these activities can be downloaded from the web.[188]

One particular type of activity that NGOs have undertaken in many countries is to prepare and disseminate *POPs hotspot reports*. NGOs who prepare POPs hotspot reports begin by identifying in their country or locality one of the following: a POPs-contaminated site; a facility that releases POPs to the environment; or a widespread practice that releases POPs to the environment and/or exposes workers or community members. The NGO then investigates and characterizes the identified hotspot and, in some cases, collects and analyzes samples and/or undertakes community mapping activities. The results are then detailed in a report along with proposed strategies and policies aimed at cleaning up the hotspot and/or instituting changes in order to prevent future POPs releases. These reports are presented to government officials. They are also often used in POPs education and public awareness activities with nearby or adversely impacted communities and constituencies (such as workers, peasants, farmers, etc.). In some countries, NGOs also use these reports in media strategies to draw attention to the POPs hotspot and the proposed remedies. NGOs associated with IPEN have prepared POPs hotspot reports about stockpiles of obsolete pesticides, informal sector practices, old or abandoned factories, POPs pesticides in agriculture, waste incineration, dumpsites, and many others.[189]

The Convention also obliges Parties to promote and facilitate public participation in national efforts to address POPs, including opportunities for providing input to national Convention implementation.[190] In some countries, NGOs have been permitted to directly participate in the inter-ministerial committees that develop and update Convention NIPs. In some other countries, NGOs have been given opportunities to provide consultation or written inputs to these committees. While in a few countries, NGOs have been completely excluded from the process, this has so far been the exception and not the rule.

Most countries have already prepared their initial NIP. These plans, however, will need to be periodically updated and many decisions still need to be made regarding how the plan will be implemented. In many countries, NGOs and CSOs have already been recognized by their government authorities as national stakeholders in Convention implementation. It is still timely and appropriate, however, for new and additional NGOs to also seek such recognition and to find roles for themselves in future national Convention planning and implementation activities.

Some countries have a well established history of NGO stakeholder participation in activities such as Convention implementation. In other countries, NGO stakeholder

[188] Access to numerous reports on NGO public education activities can be found on the web site of the International POPs Elimination Project at: http://www.ipen.org/ipepweb1/projects/projectsindex_public%20information.html
[189] Access to numerous NGO POPs hotspot reports can be found on the web site of the International POPs Elimination Project at: http://www.ipen.org/ipepweb1/projects/projectsindex_pops%20hotspots.html
[190] Article 10, paragraph 1 (d)

participation is still a new thing. Sometimes, when an NGO has met resistance to its efforts to secure a stakeholder roll, staff members of intergovernmental organizations have been willing to encourage government officials to provide the NGO with meaningful opportunities for input and participation.[191] This has particularly been possible when the national government is receiving received financial support from the Global Environment Facility for POPs-related projects. In some cases, the IPEN Secretariat can help facilitate useful contacts between NGOs and the relevant IGOs.

[191] IGOs that have sometimes been helpful at the national level in assisting NGOs secure meaningful participation and input into Convention implementation activities include: the United Nations Environment Program (UNEP); the United Nations Development Program (UNDP); the United Nations Industrial Development Organization (UNIDO) and the World Bank.

7. **Listing Additional POPs in the Stockholm Convention**

The Convention's initial list of 12 POPs is a starting point. There are other chemicals with POPs properties that are still being produced and used. A number of these additional POPs represent severe threats to human health and ecosystems which makes it urgent that they too be controlled and eliminated. Fortunately, the Convention has criteria and a procedure for identifying additional chemicals with POPs characteristics, and for imposing global, legally-binding measures to control them.

As indicated earlier, any Party may nominate a chemical for inclusion in the Convention. Parties and observers are then invited to present evidence about nominated chemicals to the POPs Review Committee, an expert group that reviews each nominated chemical. The mandate of the POPRC is not only to review nominated chemicals, but also to provide recommendations to the COP on whether to add the nominated chemical to the Convention and what control measures to take. In preparing its recommendation, the POPRC must determine whether the nominated chemical is likely, as a result of long-range environmental transport, to cause significant adverse human health and/or environmental effects such that global action is warranted. It is to do this taking into account Convention guidance including the instruction that the lack of full scientific certainty shall not prevent the POPRC from making such a decision.[192]

Several chemicals have already been nominated for addition to the Convention. Some are no longer widely used and their nominations may not encounter significant resistance. Others are still produced and used in large quantities. Proposals to add these to the Convention are challenged by economic interests with a stake in their continued production and use. Corporations and other enterprises that produce and market nominated chemicals do what they can to prevent the chemicals they manufacture from being listed and/or to extend their period of production and use as long as possible. They use industry-supported experts to provide evidence to the POPRC suggesting that there are doubts about whether a nominated chemical possesses POPs characteristics and about whether it causes harm to human health or ecosystems. Also, when the POPRC considers possibly control measures for a chemical, industry representatives argue that there are many essential uses of the nominated chemical for which no good alternatives exist, and that therefore, a decision to phase it out will cause serious economic and social harm.

NGO experts associated with the International POPs Elimination Network and Pesticide Action Network also participate in the process that reviews nominated chemicals, and they do so with a small fraction of the resources available to industry. NGO experts generally gather evidence to support the claim that a nominated chemical does have POPs characteristics, and does cause real harm to humans and/or ecosystems. They additionally collect and present information about available alternatives to show that a nominated chemical can be phased-out without causing socio-economic harm. In many cases, NGO experts must also review claims made by industry experts and respond to any that may be false or misleading.

[192] Article 8, paragraph 7 (a)

Besides presenting evidence, NGO experts also have another important role. They participate in the POPs review process not only as experts, but also as advocates for the protection of human health and ecosystems. NGO observers to the POPRC, as well as industry observers, are given the opportunity to review and to comment upon all draft decisions and to participate in the plenary discussions of the POPRC. Besides playing a technical role, NGO experts also serve as the conscience of the Committee. They remind POPRC members of the harms POPs cause, and they encourage members to make precautionary decisions that are protective of human health and ecosystems.

IPEN and PAN have, so far, been able to mobilize only a relatively small pool of NGO experts to play this important role. Other interested NGOs with the necessary technical capabilities and resources are encouraged to contribute to the international pool of NGO experts working to ensure the proper listing of all chemicals with POPs characteristics. In addition, there are also important contributions that can be made by NGOs working solely at the country or community level. In countries where a nominated chemical is produced or used, national or local NGOs can gather and provide to IPEN and PAN important information about the harms these chemicals cause under their national conditions, and about available alternatives that would allow the nominated chemicals to be phased-out without causing undue socio-economic harm.

Finally, the POPRC only has the authority to make recommendations to the COP. It is the COP that takes the actual decision on whether or not to list a nominated chemical and what kinds of controls should be enacted. Chemical industry lobbyists will talk to national delegates to the COP before and during its meetings, and will seek to persuade them to either oppose taking a decision to add a chemical or to allow only weak enforcement measures to be adopted. It is important that NGOs and representatives of civil society also talk to their country's delegates to the COP. They can discuss with them the nominated chemicals that the COP will be considering, and they can provide them with information about the chemicals and about the issues and arguments that will likely arise when the COP debates the nomination. IPEN and PAN will prepare fact sheets and other materials before each meeting of the COP that can be used to help with this.

At the time of this writing, 12 chemicals with POPs characteristics have been nominated for addition to the Convention. These chemicals are at various stages in the review process. Information on nominated POPs and their status in the review process can be found on the Convention web site.[193] Updated information from a health and environmental NGO perspective are also available on the IPEN web site.[194] Profiles of the chemicals nominated so far are included as an appendix at the end of this booklet.

[193] See: Chemicals in the review process at:
http://chm.pops.int/Convention/POPsReviewCommittee/Chemicalsunderreview/tabid/242/language/en-US/Default.aspx
[194] http://www.ipen.org

8. International NGO Networks

NGOs and CSOs with an interest in contributing to POPs elimination in their country or locality can often benefit from participation in one or more of the international NGO networks that work on these issues.

√ *The International POPs Elimination Network*[195] is a global network of public interest non-governmental organizations united in support of a common POPs Elimination Platform. It provides NGOs information and support on the full range of issues relevant to Stockholm Convention implementation.

√ *The Pesticide Action Network*[196] is a global network of nongovernmental organizations, institutions and individuals working to replace the use of hazardous pesticides with ecologically sound and socially just alternatives. It can provide information and help on POPs pesticide issues including obsolete pesticide stockpiles and issues related to DDT and malaria.

√ *Health Care Without Harm*[197] is a global coalition working to protect health by reducing pollution in the health care sector. It has expertise in issues related to proper medical waste management and treatment, including good alternatives to medical waste incinerators.

√ *The Global Alliance for Incinerator Alternatives* (GAIA)[198] is an international alliance of individuals, NGOs, community-based organizations, academics and others working to end the incineration of all forms of waste and to promote sustainable waste prevention and discard management practices. It can provide information and assistance to community groups and NGOs who wish to oppose an incinerator and/or who wish to promote or implement non-incineration waste management alternatives.

√ *The World Federation of Public Health Associations*,[199] which maintains an ongoing POPs project, is an international, nongovernmental, multi-professional and civil society organization bringing together public health professionals interested and active in safeguarding and promoting the public's health.

√ *The International Society of Doctors for the Environment*[200] is an environmental NGO of medical doctors whose purpose is help defend the environment both locally and globally and to educate and update physicians and the general public on key environmental issues, including POPs

[195] http://www.ipen.org/
[196] http://www.pan-international.org/
[197] http://www.noharm.org/
[198] http://www.no-burn.org/
[199] http://www.wfpha.org/
[200] http://www.isde.org/

√ *Women in Europe for a Common Future*[201] is a network of women's and environmental organizations in 30 countries throughout Central Asia and Europe which strives for a *Healthy Environment for All*.

[201] http://www.wecf.eu/

9. **Conclusion**

The Stockholm Convention is the first global, legally binding treaty that obliges governments to control a class of chemicals in order to protect human health and ecosystems from the injuries that result from toxic exposure. The initiative to establish a global POPs treaty came originally from governments and NGOs in northern countries. Their first concern was that POPs contamination in the Arctic and in north temperate seas and lakes was disrupting ecosystems and was harming the health of the people living in and around them. Because POPs travel long distances in the environment, no purely national or regional control measures could be sufficient; a global treaty was needed.

On the other hand, it appears that the greatest beneficiaries of the Convention may be developing countries and countries with economies in transition. While it is true that POPs can travel long distances on air and/or ocean currents, and can cause harm at locations far distant from their source, it is also true that POPs cause serious harm to people and ecosystems at and near the locations where they are produced and used. Prior to the Convention, people and even government officials in many developing countries had very limited awareness and understanding about the human health and environmental harms caused by POPs. Many countries also lacked the know-how and the capacity to effectively control POPs. The Convention has served to raise global awareness about the problem of POPs, and it has helped many governments begin to establish effective national POPs-control regulatory regimes. In some countries, the national institutional infrastructures that are being put in place to support Convention implementation can also help provide a foundation upon which a more wide-ranging national regulatory control regime can be built to ensure the safe management of all potentially toxic chemicals that are nationally produced, imported and/or used.

The Convention is in its infancy, and much still needs to be done to ensure that it is effectively implemented. Also, much still needs to be done to expand the list of POPs controlled by the Convention so that all chemicals with POPs characteristics and the potential to cause serious harm are listed. This unfinished business creates both a responsibility and an opportunity for NGOs and other CSOs whose missions include protecting public health and/or protecting the environment. Most governments are Parties to the Convention and have already agreed at a high political level to implement it. This opens up space in which NGOs can campaign and advocate for effective POPs control measures and, in some countries, it allows NGOs to find roles for themselves in assisting their governments implement the Convention.

This booklet was prepared by a consortium of international NGO networks which recognize that even though POPs represent a serious global problem, there are many non-POPs chemicals that also cause serious harm to human health and ecosystems. They see civil society contributions to Convention implementation activities as being important in their own right and also, at the same time, see them as a good vehicle to provides experiences and building blocks upon which a global civil society movement can be built working for a future where all toxic chemicals are sufficiently controlled to no longer be significant sources of harm to human health or ecosystems.

10. Afterward: NGOs and the Strategic Approach to International Chemicals Management (SAICM)

Soon after the Stockholm Convention was adopted, many governments indicated to the United Nations Environment Program that an international strategic approach would be useful to ensure the sound management of other potentially toxic chemicals. This led to the convening in Dubai, in 2006, of an International Conference on Chemicals Management (ICCM). At the ICCM, Environment Ministers, Health Ministers and other high-level delegates from all regions adopted the Strategic Approach to International Chemicals Management, a global program of action to protect human health and the environment from harms caused by exposure to toxic chemicals of all kinds.[202] The agreed objective of SAICM is to:

> "[A]*chieve the sound management of chemicals throughout their life-cycle so that, by 2020, chemicals are used and produced in ways that lead to the minimization of significant adverse effects on human health and the environment."*

Both NGOs and industry trade associations were permitted to fully participate, along side government delegates, in the preparatory meetings where the SAICM text was initially drafted and negotiated, and also in the ICCM, itself. In the end, SAICM was adopted by consensus agreement of delegations from more than 100 governments, and also delegations of NGOs and industry trade associations. Some portions of the SAICM were weaker or less comprehensive than what participating NGOs would have preferred. Nonetheless, health and environmental NGOs familiar with the process agreed that SAICM can be a very useful tool that civil society in all countries can use in their efforts to advance a wide range of chemical safety objectives.

In January 2008, representatives of six international NGO networks met in Toronto and agreed to launch a *Global SAICM Outreach Campaign* to encourage NGOs and civil society organizations in all countries to engage in efforts toward achieving the SAICM objectives and a *Toxics Free Future*. One agreed element of the campaign is to produce a series of educational booklets on chemical safety topics. A booklet titled *An NGO Guide to SAICM* has already been produced and is available in several languages.[203] This present booklet has also been produced as part of the campaign.

A second element of the campaign is an NGO/CSO Common Statement on SAICM that was adopted by the six international NGO networks. This statement was prepared as a tool to introduce civil society organizations to SAICM and to encourage them to commit themselves to working for a future where exposure to toxics chemicals is no longer a source of harm to human health and ecosystems. A goal of the campaign is to secure at

[202] SAICM is comprised of three core documents: the Dubai Declaration on International Chemicals Management; the SAICM Overarching Policy Strategy; and the SAICM Global Plan of Action. These can be found on the web at: http://www.chem.unep.ch/saicm/SAICM%20texts/SAICM%20documents.htm. The SAICM has a Secretariat based in Geneva to facilitate its implementation, and it maintains a web site at: http://www.chem.unep.ch/saicm/.
[203] The booklet is available in Arabic, Chinese, English, French, Spanish and Russian at: http://www.ipen.org/campaign/education.html

least 1,000 endorsements of the common statement from NGOs and CSOs in at least 80 countries. The text and endorsement form for the *Global Common Statement* follow:

NGO/CSO Global Common Statement on The Strategic Approach to International Chemicals Management[204]

Recognizing that "fundamental changes are needed in the way that societies manage chemicals,"[205] Environment Ministers, Health Ministers and other delegates from over 100 governments together with representatives of civil society and the private sector declared in Dubai, February 6, 2006, that "the environment worldwide continues to suffer from air, water and land contamination, impairing the health and welfare of millions."[206] They adopted the *Strategic Approach to International Chemicals Management* (SAICM), a global plan of action whose stated goal is: "to achieve the sound management of chemicals throughout their life-cycle so that, by 2020, chemicals are used and produced in ways that lead to the minimization of significant adverse effects on human health and the environment."[207]

The SAICM addresses both agricultural and industrial chemicals; covers all stages of the chemical life-cycle of manufacture, use and disposal; and includes chemicals in products and in wastes.

We, (*Name of organization*) _____ , a civil society organization, join in this global effort to work for a future where exposure to toxic chemicals is no longer a source of harm.

We agree with the SAICM:

- On the need to take action to "prevent the adverse effects of chemicals on the health of children, pregnant women, fertile populations, the elderly, the poor, workers and other vulnerable groups and susceptible environments."[208]
- On the need to "apply the precautionary approach"[209] and "give priority consideration to the application of preventive measures such as pollution prevention."[210]
- On the need to address the "lack of capacity for managing chemicals in developing countries and countries with economies in transition, dependency on pesticides in agriculture, exposure of workers to harmful chemicals and concern about the long-term effects of chemicals on both human health and the environment."[211]
- With the commitment to "promote and support the development and implementation of, and further innovation in, environmentally sound and safer alternatives, including

[204] The *Strategic Approach to International Chemicals Management* (SAICM) comprises three core texts: *The Dubai Declaration*, which expresses the commitment to SAICM by Ministers, heads of delegation and representatives of civil society and the private sector; The *Overarching Policy Strategy*, which sets out the scope of SAICM, the needs it addresses and objectives; and A *Global Plan of Action*, which sets out proposed work areas and activities for implementation of the Strategic Approach. These texts can be found in all UN languages at: http://www.chem.unep.ch/saicm/SAICM%20texts/SAICM%20documents.htm

[205] SAICM Dubai Declaration paragraph 7

[206] SAICM Dubai Declaration paragraph 5

[207] SAICM Overarching Policy Strategy paragraph 13

[208] SAICM Overarching Policy Strategy paragraph 7 (c)

[209] SAICM Overarching Policy Strategy paragraph 14 (e)

[210] SAICM Overarching Policy Strategy paragraph 14 (f)

[211] SAICM Dubai Declaration paragraph 6

cleaner production, informed substitution of chemicals of particular concern and non-chemical alternatives."[212]

- On the need to promote "adequate transfer of cleaner and safer technology"[213] and with a call to make available both "existing and new sources of financial support."[214]
- On the need to promote "capacity-building, education and training and information exchange on sound management of chemicals for all stakeholders."[215]
- That "the sound management of chemicals is essential if we are to achieve sustainable development, including the eradication of poverty and disease, the improvement of human health and the environment and the elevation and maintenance of the standard of living in countries at all levels of development."[216]
- With the commitment to "promote and support meaningful and active participation by all sectors of civil society, particularly women, workers and indigenous communities, in regulatory and other decision-making processes that relate to chemical safety."[217]
- With the commitment to facilitate access to "information and knowledge on chemicals throughout their life cycle, including the risks that they pose to human health and the environment."[218]

We commit ourselves and call upon all stakeholders including governments, non governmental organizations, the private sector, intergovernmental organizations and others to work together to implement SAICM policies, and to reform domestic chemicals assessment and management laws, policies and practices to achieve the 2020 goal in all countries.

[212] SAICM Overarching Policy Strategy paragraph 14 (j)
[213] SAICM Overarching Policy Strategy paragraph 10 (b)
[214] SAICM Overarching Policy Strategy paragraph 19
[215] SAICM Global Plan of Action, Executive Summary, paragraph 8 (i)
[216] SAICM Dubai Declaration paragraph 1
[217] SAICM Overarching Policy Strategy paragraph 16 (g)
[218] SAICM Dubai Declaration paragraph 21

Global Outreach Endorsement Form

Organization's name	
Country and headquarters address	
Contact (name and email address)	
Website (if any)	

Geographic Area of Organization's Work

[] Locality, State, Province or Region of Country

[] National

[] Regional (two or more countries)

[] International

Name of Geographic Area :_____

Type of Organization (check one)

[] Environmental Organization

[] Health Advocacy Organization

[] Development Organization

[] Professional Organization

[] Peoples Organization

[] Trade Union

[] Consumer's Organization

[] Other _____

Possible Chemical Safety Issue Areas of Interest
(check as many as apply)

[] Promoting improved national legislation, regulations and/or enforcement aimed at achieving the SAICM 2020 goal;

[] Protecting farmers, peasants, workers and/or communities from harms caused by exposure to harmful agricultural chemicals;

[] Protecting children, the general public and the environment from harms caused by exposure to toxic metals such as lead, mercury and cadmium;

[] Protecting human health and/or ecosystems from harms caused by exposure to persistent organic pollutants and other toxic chemicals of concern;

[] Protecting workers from occupational exposures to toxic chemicals;

[] Monitoring the presence of toxic chemicals in consumer products; in humans; and/or in the environment;

[] Promoting waste minimization and sound waste management, such as zero waste strategies, aimed at protecting the public from harms caused by polluting facilities and practices such as open burning, waste dumping, inappropriate landfills, and polluting incinerators.

(Please return endorsement to: ipen@ipen.org)

11. Appendix: Profiles of the Nominated POPs

A total of twelve chemicals have been nominated by Parties for listing as POPs by the Stockholm Convention. The following are brief profiles of the nominated chemicals.

11.1 Lindane and its Isomers

Lindane is a pesticide that has been nominated to be added to the Stockholm Convention list of POPs in Annex A. It is an insecticide with POPs characteristics. It is in relatively widespread use for controlling a broad spectrum of plant-eating and soil-dwelling pests, public health pests and animal parasites. Since it is an old chemical, lindane has no remaining patents and so is relatively cheap. Its persistence is often considered to be an advantage in pest control rather than an environmental hazard.[219] Lindane is also used in shampoos to control head lice in children.[220] While lindane was previously manufactured in many countries, it appears that India and China are the only two remaining countries where lindane is still produced.[221]

Acute exposure to Lindane affects the central nervous system with symptoms that include vomiting and diarrhea followed by convulsions. Direct exposure to lindane in small amounts has been associated with headaches, nausea, dizziness, tremors and muscular weakness.[222] Most evaluations of the carcinogenicity of lindane have concluded that lindane might cause cancer.[223] Reported lindane impacts in animal studies include liver toxicity (hepatotoxic), immune system toxicity, (immunotoxic), reproductive and developmental effects.[224]

The Stockholm Convention POPs Review Committee has already determined that lindane satisfies the Convention's persistence criteria and that there is sufficient evidence that it also meets the Convention bioaccumulation criterion and criterion on potential for long-range environmental transport.[225]

Two isomers of lindane have also been nominated for inclusion in the Convention in Annex A: alpha and beta hexachlorocyclohexane (alpha HCH and beta HCH). These isomers have no current intentional use. However, they are created as waste products in the production of lindane. For each ton of lindane that is produced, up to eight tons of

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[219] See *Lindane Fact Sheet*, PAN UK, http://www.pan-uk.org/pestnews/Actives/Lindane.htm
[220] See *Beware of Lindane*, by Terri Mauro, http://specialchildren.about.com/od/medicalissues/a/lindane.htm
[221] See *Lindane Risk Profile*, Adopted by the Persistent Organic Pollutants Review Committee at its second meeting, November 2006: http://chm.pops.int/Convention/POPsReviewCommittee/Chemicalsunderreview/Riskmanagementevaluations/tabid/243/language/en-US/Default.aspx and also *Lindane Risk Management Evaluation*, Adopted by the Persistent Organic Pollutants Review Committee at its third meeting November 2007: http://chm.pops.int/Portals/0/Repository/poprc3/UNEP-POPS-POPRC.3-20-Add.4.English.PDF
[222] *Lindane Fact Sheet* (see above)
[223] *International Agency for Research on Cancer (IARC) - Summaries & Evaluations*, http://www.inchem.org/documents/iarc/suppl7/hexachlorocyclohexanes.html
[224] For a more detailed review of lindane health impacts, see U.S. Department of Health and Human Services, Agency for Toxic Substances and Disease Registry, *Toxicological Profile for Alpha- Beta-, Gamma-, and Delta-Hexachlorocyclohexane, http://www.atsdr.cdc.gov/toxprofiles/tp43.pdf*
[225] See *Decision POPRC-1/6: Lindane*, http://www.pops.int/documents/meetings/poprc/chem_review/Lindane/Lindane_AnnexD_e.pdf

these isomers are produced. Since they have no use, they have mostly ended up as hazardous waste, often in uncontrolled dump sites in many different parts of the world. The exact amount of HCH waste is not known, but it has been estimated to be in the range of 1.6 to 4.8 million tons.[226] Both isomers have POPs characteristics very similar to lindane and may be more toxic than lindane.

11.2 Endosulfan

Endosulfan is a pesticide that has been nominated to be added to the Stockholm Convention list of POPs. It is a broad-spectrum non-systemic insecticide with contact and stomach action. It is used to control sucking, chewing, and boring insects on a wide variety of vegetables, fruits, grains, cotton, and tea, as well as ornamental shrubs, vines, and trees.[227]

Endosulfan is one of the main causes of poisoning in humans in many countries. Many deaths have resulted from occupational and accidental non-occupational exposure, as well as self-poisoning, in a number of countries in Africa, Asia and Latin America. Reported chronic effects of endosulfan in humans include birth defects, congenital reproductive disorders, long-term brain damage, recurrent convulsions, epilepsy, autism, delayed sexual maturity, endometriosis, menstrual disorders, early menarche, male breast enlargement, various cancers, congenital intellectual disability, cerebral palsy, psychiatric disturbances, and vision impairment and loss. Endosulfan toxicity is increased with protein-deficient diets, which are a problem in some of the countries in which endosulfan is still used.[228]

Endosulfan has also been reported to cause many deaths in animals, including fish, wildlife, pets, and livestock, as well as congenital deformities, miscarriages, infertility, stunted growth, and dwindling populations. Endosulfan is very toxic to aquatic organisms especially juveniles, and its use results in disruption of the aquatic food chain. It is also toxic to amphibians, reptiles, snails, aquatic plants, coral reef organisms, birds, bees, earthworms, and beneficial insects and microorganisms, and is incompatible with integrated pest management.[229]

Endosulfan has POPs characteristics:

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[226] See: International HCH & Pesticides Association, *The Legacy of Lindane HCH Isomer Production,* http://www.ihpa.info/docs/library/Lindane%20Main%20Report%20DEF20JAN06.pdf

[227] Tomlin, C.D.S. (editor). 1994. The Pesticide Manual, 10th Edition. British Crop Protection Council and The Royal Society of Chemistry, United Kingdom. The Bath Press, Bath, cited in California Environmental Protection Agency draft *Endosulfan Risk Characterization Document*, http://www.cdpr.ca.gov/docs/emon/pubs/tac/tacpdfs/endosulfan/endosulfan_fate.pdf

[228] Pesticide Action Network, *Information for the consideration of Endosulfan*, submitted to the Stockholm Convention POPRC, http://chm.pops.int/Portals/0/Repository/Endosulfan2008/UNEP-POPS-POPRC-END-08-PANI.English.PDF

[229] IBID

√ The estimated half-lives in soil for the combination of endosulfan and its toxic residues ranged from nine months to six years.[230] This indicates that endosulfan meets the Convention's criteria for persistence.

√ Bioaccumulation modeling demonstrates significant biomagnification of endosulfan by air-breathing organisms in the lichen – caribou – wolf food chain.[231] In addition, bioaccumulation has been observed in some animals such as fish.[232] This combination of bioaccumulation potential with high toxicity and ecotoxicity indicates that endosulfan meets the Convention criteria for bioaccumulation.[233]

√ Several literature sources report concentrations of endosulfan in various environmental media from Arctic regions. It has been detected in the tissues and blood of polar bears from Norway, and in the blubber of minke whales.[234] This indicates endosulfan meets the Convention criteria for long range transport.

√ Endosulfan is a very toxic chemical for nearly all kind of organisms and has the potential to cause endocrine disruption in both terrestrial and aquatic species.[235] This indicates that endosulfan meets the Convention criteria for adverse effects.

Endosulfan meets all Stockholm Convention criteria and global action is warranted. Therefore, endosulfan should be listed as a POP by the Convention.

11.3 Brominated Flame Retardants

Four chemicals that are used as flame retardants have been nominated to be added to the Stockholm Convention. They are: pentabromodiphenyl ether (PentaBDE), hexabromobiphenyl (HBB), octabromodiphenyl ether (OctaBDE) and hexabromocyclododecane (HBCDD). All four have been used as additives in plastics and textiles to resist the spread of fire.

Pentabromodiphenyl Ether (PentaBDE)

PentaBDE is used as a flame retardant additive in flexible polyurethane foam for furniture and upholstery. It is also used in packaging and in non-foamed polyurethane casings and electronic equipment. It is additionally used in specialized applications in textiles and in industry. PentaBDE is widely present in the environment and it is also

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[230] *Proposal for listing Endosulfan in the Stockholm Convention on POPs*, submitted by the European Union, http://chm.pops.int/Convention/POPsReviewCommittee/Chemicalsunderreview/NewProposals/tabid/245/language/en-US/Default.aspx

[231] Kelly BC, Ikonomou MG, Blair JD, Morin AE, Gobas FAPC, (2007) Food-web specific biomagnification of persistent organic pollutants, Science, 317: 236 – 239 http://www.sciencemag.org/cgi/content/abstract/317/5835/236

[232] *Proposal for listing Endosulfan in the Stockholm Convention on POPs*, submitted by the European Union, http://chm.pops.int/Convention/POPsReviewCommittee/Chemicalsunderreview/NewProposals/tabid/245/language/en-US/Default.aspx

[233] POPs Review Committee Evaluation of endosulfan against the criteria of Annex D http://chm.pops.int/Convention/POPsReviewCommittee/Chemicalsunderreview/NewProposals/tabid/245/language/en-US/Default.aspx

[234] *Proposal for listing Endosulfan in the Stockholm Convention on POPs*, submitted by the European Union, http://chm.pops.int/Convention/POPsReviewCommittee/Chemicalsunderreview/NewProposals/tabid/245/language/en-US/Default.aspx

[235] IBID

commonly found in human body burden sampling. Because of the evidence of its toxicity, PentaBDE has been a concern to governments and civil society in many regions of the world.[236]

PentaBDE can be released into the environment during its manufacture. It is also regularly released to the environment during: the manufacture of the polyurethane-containing products to which it is added; during the use of these products; and after the products have been discarded as waste. When PentaBDE is present in soil and sediments, it is bio-available. It enters the food chain and both bioaccumulates and bio-magnifies. As a result, high levels of pentaBDE have been found in top predator species. PentaBDE is widespread in the global environment and is found in humans in all regions of the world. Its presence rapidly increased from the early 1970s to the middle or end of the 1990s. Levels in North America and the Arctic are still rising.[237]

Vulnerable ecosystems and species are impacted by PentaBDE and it has been found at levels high enough to be of concern within individual members of some endangered species. Toxicological studies have demonstrated it has reproductive toxicity, neurodevelopmental toxicity and effects on thyroid hormones in aquatic organisms and in mammals.[238]

Humans can be exposed through contaminated food; through the use of products that contain PentaBDE; and from contact with indoor air and dust which is frequently contaminated with PentaBDE. Once ingested, PentaBDE is transferred from mothers to embryos and lactating infants. It is thought that the human groups most vulnerable to pentaBDE are pregnant women, embryos and infants.[239]

Because PentaBDE has been shown to posses all POPs characteristics such that global action is warranted, the POPs Review Committee has recommended to the Convention Conference of the Parties to list it as a POP in Annex A, making it subject to elimination.

Hexabromobiphenyl (HBB)
HBB has been mainly been used as an additive to ABS plastics and coated cables in electrical products and in polyurethane foam for auto upholstery. [240] HBB is highly persistent and bioaccumulative and a wide variety of Arctic wildlife contains it including fish, birds, ringed seal, mink whale and polar bear.[241] Chronic toxic effects include endocrine disruption, liver toxicity, hypothyroidism in exposed workers, and breast cancer in exposed women. It appears that because of regulations, HBB appears to be no

[236] See: *Commercial Pentabromodiphenyl Ether Risk Management Evaluation*, adopted by the Persistent Organic Pollutants Review Committee at its third meeting, November, 2007: http://www.pops.int/documents/meetings/poprc/chem_review.htm
[237] See*: Risk profile on commercial pentabromodiphenyl ether*, adopted by the Persistent Organic Pollutants Review Committee at its second meeting, November 2006: http://www.pops.int/documents/meetings/poprc/chem_review.htm
[238] IBID
[239] IBID
[240] See *Hexabromobiphenyl Risk Management Evaluation*, Adopted by the Persistent Organic Pollutants Review Committee at its third meeting, http://www.pops.int/documents/meetings/poprc/chem_review.htm
[241] IBID

longer produced or used.[242] However, HBB has been nominated to the Stockholm Convention for listing in Annex A to prohibit unknown production, prevent reintroduction, and regulate management and disposal of wastes.[243]

Octabromodiphenyl Ether (OctaBDE)
Commercial grade OctaBDE is a mixture of several polyprominated dipenyl ethers including substances containing six, seven, eight, and nine bromines. Increasing evidence suggests similar toxicological profiles and therefore, equivalent hazards and concerns, between PBDEs such as OctaBDE and PCBs.

It appears that all production of OctaBDE has stopped in developed countries. Its major producer, a company in North America, stopped production in 2004.[244] The likely reason for the decision was strong opposition from civil society, growing government concerns, and the realization that regulatory controls were coming.

OctaBDE has been mainly been used as a flame retardant additive in plastics, specifically in ABS polymers. In general the OctaBDE makes up 12-18% of the weight of the final product. Typical applications are housings for office equipment and business machines.[245]

Like PentaBDE, OctaBDE can be released into the environment during its manufacture; the manufacture of products to which it is added; during the use of these products; and after the products have been discarded as waste. In addition, components of the OctaBDE mixture may be released to the environment by debromination of commercial DecaBDE which is widely used in electrical equipment.[246] There are concerns over release of OctaBDE resulting from export of electronic waste to developing countries.[247]

The complexity of the commercial OctaBDE mixture presented difficulties in assessing various POPs characteristics of the individual components due to the lack of information. The POPs Review Committee has recommended listing key components of the mixture, HexaBDE and HeptaBDE (six and seven bromines), in Annex A of the Convention after concluding that they are likely as a result of long-range environmental transport to lead to significant adverse human health or environmental effects.[248]

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[242] See *Hexabromobiphenyl Risk Management Evaluation*, Adopted by the Persistent Organic Pollutants Review Committee at its third meeting, http://chm.pops.int/Portals/0/Repository/poprc3/UNEP-POPS-POPRC.3-20-Add.3.English.PDF
[243] IBID
[244] See: *Commercial Octabromodipheynyl Ether Risk Profile, adopted by the Persistent Organic Pollutants Review Committee at its third meeting*, http://www.pops.int/documents/meetings/poprc/chem_review.htm
[245] *European Union Risk Assessment Report, Diphenyl Ether, Octabromo deriv.* http://ecb.jrc.it/DOCUMENTS/Existing-Chemicals/RISK_ASSESSMENT/REPORT/octareport014.pdf
[246] See: *Commercial Octabromodipheynyl Ether Risk Profile, adopted by the Persistent Organic Pollutants Review Committee at its third meeting*, http://www.pops.int/documents/meetings/poprc/chem_review.htm
[247] *Risk Management Evaluation for Commercial Octabromodiphenyl Ether, adopted by the Persistent Organic Pollutants Review Committee at its fourth meeting*, http://chm.pops.int/Convention/POPsReviewCommittee/Chemicalsunderreview/Riskmanagementevaluations/tabid/243/language/en-US/Default.aspx
[248] IBID

Hexabromocyclododecane (HBCD)
HBCD is mainly used as a flame retardant additive in expanded and extruded polystyrene, primarily in treated polystyrene insulation boards for buildings and vehicles. It is also used in textile coatings and in high impact polystyrene electrical and electronics equipment.[249]

HBCDD has POPs characteristics:

√ Its half lives in aerobic sediment exceeded six months after correction to 12C.[250] This indicates that HBCD meets the Convention persistence criteria.

√ The bio-concentration factor of HBCDD was calculated to be 18,100 in fathead minnow and between 9,000 and 13,000 in rainbow trout. According to the available monitoring data, HBCDD bio-magnifies in the aquatic food web and it has an experimental logKow of 5.62.[251] This indicates that HBCD meets the Convention bioaccumulation criteria.

√ HBCD was found in skipjack tuna of the North Pacific with a spatial distribution that highly correlates with the distribution of listed Stockholm POPs (coplanar PCBs, chlordane and PCDFs). HBCD has also been found in the eggs of the Atlantic puffin and the herring gull in remote regions of the Norwegian Arctic in concentrations that have been rising rapidly since the early 1980's. This indicates that HBCDD meets the Convention criteria for long range transport.

√ HBCD is very toxic to aquatic organisms and it causes adverse effects to sediment organisms at exposure levels found in the environment. In laboratory tests on mammals, HBCDD was found to have a harmful impact on the liver and thyroid gland; and it can cause developmental neurotoxic (behavior) effects at low exposure levels.[252] This indicates that HBCDD meets the Convention criteria for adverse effects.

The available evidence indicates that HBCD meets all Stockholm Convention criteria and that there are grounds for concern sufficient to warrant global action.

11.4 Perfluorooctane Sulfonate (PFOS)

Perfluorooctane Sulfonate (PFOS) has been nominated for addition to the Stockholm Convention along with 96 other related chemical substances that degrade to PFOS in the environment. PFOS and these related chemicals are, or have been, used for: fire fighting foams, carpets, leather goods, apparel, textiles, upholstery, paper, packaging, coatings, coating additives, industrial and household cleaning products, pesticides, photographic

[249] See: *Summary of the proposal for listing hexabromocyclododecane (HBCDD) in Annex A to the Convention*, UNEP/POPS/POPRC.4/11 http://chm.pops.int/Portals/0/Repository/poprc4/UNEP-POPS-POPRC.4-11.English.PDF
[250] See: *Hexabromocyclododecane as a possible global POP*, prepared for the Nordic Council of Ministers and submitted to the POPRC by Norway: http://chm.pops.int/Portals/0/Repository/HBCDD/UNEP-POPS-POPRC-HBCDD-08-NOR-A1.English.PDF
[251] IBID
[252] IBID

applications, semiconductor manufacturing, hydraulic fluids, catheters and metal plating.[253]

The Stockholm Convention POPs Review Committee has already concluded that PFOS is likely, as a result of its long-range environmental transport, to lead to significant adverse human health and environmental effects, such that global action is warranted: [254]

√ PFOS and PFOS-related substances can be released to the environment when manufactured. They are also released during their use in industrial and consumer applications, and from the disposal of the chemicals or of products or articles containing them after their use.

√ PFOS is extremely persistent and has shown no degradation under any environmental condition that has been tested.

√ Highly elevated concentrations of PFOS have been found in top predators including the polar bear, seal, bald eagle and mink. High concentrations have been found in Arctic animals, far from anthropogenic sources and monitoring data shows highly elevated levels of PFOS in various parts of the northern hemisphere. PFOS also fulfils the Convention's specific criteria for atmospheric half-life.

√ PFOS toxicity to mammals has been demonstrated in studies using low dose repeated exposures. It has been shown to have rat reproductive toxicity with mortality of pups occurring shortly after birth. PFOS is also toxic to aquatic organisms.[255]

The claim has been made that some uses of PFOS and its related compounds are critical and that no substitutes exist. In its deliberations, the POPRC has not been able to reach a decision on whether to list PFOS in Convention Annex A, the elimination annex; or to list it in Annex B which would subject PFOS to restrictions but not necessarily elimination.

NGOs have been advocating listing PFOS in Annex A not in Annex B. PFOS is so persistent that when it enters the environment it will remain there virtually forever. An Annex B listing would permit a potentially large number of permitted uses of PFOS, and would permit them to continue for an indefinite period of time. This would likely result in substantial and continuing increases in the amount of PFOS present in the global environment.

An Annex A listing would also permit some continued use of PFOS for certain critical uses. These would be permitted based on time-limited, possibly renewable, special exemptions. However, under this approach, if a Party has a special exemption and wishes to renew it, the Party would need to go to the Conference of the Parties and request the

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[253] *PFOS Risk Management Evaluation*, Adopted by the Persistent Organic Pollutants Review Committee at its third meeting, November 2007: http://www.pops.int/documents/meetings/poprc/chem_review/PFOS/PFOS_RME_e.pdf
[254] IBID
[255] IBID

renewal. When it does so, it would be called upon to provide evidence demonstrating that the use remains critical and that satisfactory alternatives are still not available. This would set in motion a process that would eventually lead to the elimination of further production and use of PFOS.

11.5 Short-Chain Chlorinated Parrafins (SCCPs)

Short-Chain Chlorinated Parrafins (SCCPs) have been nominated for addition to the Stockholm Convention. They are used as metalworking lubricants; in paints, adhesives and sealants; as leather fat liquors; in plastics and rubber; in flame retardants; and in textiles and polymeric materials. They can enter the environment when they are manufactured. They also enter the environment when they are used and when products containing them become wastes.[256]

SCCPs meet the criteria of the Stockholm Convention to be listed as POPs:

√ The estimated half-life of SCCPs in air ranges from 0.81 to 10.5 days. SCCP residues have recently been detected in sediment cores that date back to the 1940s, evidence that SCCPs can persist in sediments for more than 50 years. SCCPs meet the Convention criterion for persistence in sediment and are also sufficiently persistent in air for long-range transport to occur.

√ Laboratory derived bio-concentration factors for SCCPs ranged from 1900-138,000 depending on the species and congener tested. Field derived bioaccumulation factors for lake trout ranged from 16,440-26,650 Modeled bioaccumulation factors were greater than 5,000 for all SCCPs. Laboratory, field and modeled data all indicate that SCCPs can accumulate in biota.

√ SCCPs have been detected in the air, sediment and mammals in the Arctic. SCCPs have also been measured in the sediments of remote Arctic lakes. Modeled results indicate that the atmospheric half-lives for the major SCCP homologues are greater than two days. These and other results indicate that SCCPs undergo long-range transport.

√ Freshwater and marine invertebrates are particularly sensitive to SCCPs. Severe liver damage was observed in trout with 0.79 to 5.5 µg/g SCCPs in whole fish tissue. The International Agency for Research on Cancer considers some homologues of SCCPs to be possible human carcinogens. These and other results indicate that SCCPs have adverse effects sufficient to justify their being listed by the Convention. [257]

SCCPs meet all Stockholm Convention POPs criteria and there are sufficient grounds for concern to warrant global action.

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[256] *Draft Risk Profile for Short-Chained Chlorinated Paraffins*, Persistent Organic Pollutants Review Committee, http://chm.pops.int/Convention/POPsReviewCommittee/Chemicalsunderreview/Riskprofiles/tabid/244/language/en-US/Default.aspx

[257] IBID

11.6 Pentachlorobenzene (PeCB)

Pentachlorobenzene (PeCB) has been used in the past as a pesticide and flame retardant and it has also been used in combination with PCBs in dielectric fluids for electrical equipment. It is not known whether PeCB is still intentionally used for these purposes. It is found, however, as an unintentional impurity in several pesticides including pentachloronitrobenzene (quintozene), Clopyralid, Atrazine, Chlorothalonil, Dacthal, Lindane, pentachlorophenol, Picloram and Simazine. PeCB is also unintentionally produced and released to the environment by waste incinerators; barrel burning of household waste; pulp and paper mills using chlorine-based bleaches; iron and steel mills; petroleum refineries; and activated sludge from waste water treatment facilities.[258]

PeCB has POPs characteristics:

√ The estimated half-life of PeCB in the atmosphere is 45 to 467 days; its estimated half life in water is 194 to 1380 days. The half life of PeCB days in an aerobic loamy sand soil was found to be 194 to 345.[259] These results indicate PeCB meet the Convention persistence criteria.

√ Bio-concentration factors for PeCB range from 1085 - 23000 L/kg for fish; 833 – 4300 L/kg for mollusks, and 577 – 2258 L/kg for crustaceans. PeCB has reported log K_{ow} values between 4.88 and 6.12.[260] These results indicate PeCB meet the Convention bioaccumulation criteria.

√ Based on measured concentrations in air samples, it was estimated that PeCB can travel 13,338 km through air. This distance is larger than that of the POPs pesticides dieldrin, DDT and heptachlor that were also investigated in the same study. PeCB has been detected in mosses, fish, penguin eggs, seals and predatory mammals in the arctic and Antarctic regions.[261] These results indicate PeCB meet the Convention criteria for long-range transport.

√ Within the European Union PeCB is classified as a substance which is very toxic to aquatic organisms..[262] There is sufficient information to conclude that PeCB has adverse effects.

Taken together, the data indicates that PeCB meets the Stockholm Convention POPs criteria and warrants global action. The POPs Review Committee has recommended listing PeCB in Annex A and Annex C.[263] Listing PeCB in Annex A would prevent

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[258] *Report of the Persistent Organic Pollutants Review Committee on the work of its third meeting Addendum, Risk profile on pentachlorobenzene,* November, 2007: http://chm.pops.int/Convention/POPsReviewCommittee/Chemicalsunderreview/Riskprofiles/tabid/244/language/en-US/Default.aspx

[259] IBID

[260] IBID

[261] IBID

[262] IBID

[263] See *Pentachlorobenzene Risk Management Evaluation*, adopted by the Persistent Organic Pollutants Review Committee at its fourth meeting,

reintroduction PeCB production and use, and regulate wastes containing it. Listing in Annex C would subject PeCB to the measures in Article 5 and establish the goal of continuing minimization and, where feasible, ultimate elimination of PeCB releases.

11.7 Chlordecone

Chlordecone is a pesticide that is also known as Kepone, Merex, and Curlone and is closely related to mirex, a pesticide listed in the Convention. It appears that Chlordecone is no longer produced or used, although it has been used in the past in various parts of the world for the control of a wide range of pests. Chlordecone has been used extensively in the tropics for the control of banana root borer. It has also been used as a fly larvicide; as a fungicide; and to control potato beetles, the rust mite, and the potato and tobacco wireworm. Chlordecone has also been used in household products such as ant and roach traps.[264]

Chlordecone has a high potential for bioaccumulation and is not expected to degrade in aquatic environments or soil.[265] Due to the lack of monitoring data on chlordecone in the Arctic, modeling was used to indicate the potential for long-range environmental transport. Chlordecone is highly toxic to aquatic organisms. It is neurotoxic, immunotoxic, and causes reproductive effects and liver cancer.

The POPs Review Committee has recommended listing chlordecone in Annex A.[266] This would regulate remaining stocks and prevent future reintroduction of production and use.

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http://chm.pops.int/Convention/POPsReviewCommittee/Chemicalsunderreview/Riskmanagementevaluations/tabid/243/language/en-US/Default.aspx

[264] See *Chlordecone Risk Management Evaluation*, adopted by the Persistent Organic Pollutants Review Committee at its third meeting, http://www.pops.int/documents/meetings/poprc/chem_review.htm

[265] See *Chlordecone Revised Risk Profile*, adopted by the Persistent Organic Pollutants Review Committee at its third meeting, http://chm.pops.int/Portals/0/Repository/poprc3/UNEP-POPS-POPRC.3-20-Add.10.English.PDF

[266] See *Chlordecone Risk Management Evaluation*, adopted by the Persistent Organic Pollutants Review Committee at its third meeting, http://www.pops.int/documents/meetings/poprc/chem_review.htm