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### PERSISTENT ORGANIC POLLUTANTS

In 1992, the United Nations Conference on Environment and Development (UNCED) endorsed Agenda 21 as the plan of action to deal with the pressing problems of environment and development facing the world. Chapter 19 "Environmentally Sound Management of Toxic Chemicals, Including Prevention of Illegal International Traffic in Toxic and Dangerous Products" provides guidelines for action by governments, with the cooperation of the international agencies.

Following the recommendations of the Intergovernmental Forum on Chemical Safety (IFCS), the United Nations Environment Program (UNEP) Governing Council approved Decision 19/13C (1997), promoting international action to protect human health and the environment through measures to reduce and/or eliminate releases of persistent organic pollutants (POPs). The World Health Assembly endorsed the IFCS recommendations as presented in the Report of the Director General and approved Resolution WHA50.13 (1997) "Promotion of chemical safety, with special attention to persistent organic pollutants." The WHO resolution calls upon Member States to involve health officials in national efforts to follow up in the implementation of the UNEP Decision and includes other important actions that governments may take, leading to the reduction and safe management of POPs. The resolution also requests the Director General to conduct and support activities to assist Member States in their efforts.

This Report summarizes the present knowledge regarding POPs, with particular attention to their possible adverse effects on human health. It also refers to the actions being taken by international agencies at global, regional, and country levels. Finally it presents the activities proposed to be carried out by PAHO in support of the Member States, for the safe handling and disposal of POPs.

The Executive Committee is requested to examine the report, and to express its views, particularly regarding the approach and activities proposed by PAHO to assist the Member States, and to recommend modifications or additions that may enhance the technical cooperation of the Organization.

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## **1. Introduction**

In 1992 the leaders of more than 100 countries gathered in Rio de Janeiro, Brazil, at the United Nations Conference on Environment and Development (UNCED92), and endorsed Agenda 21 as the plan of action to deal with the pressing problems of environment and development that the world was facing. Chapter 19 of this Agenda is entitled “Environmentally Sound Management of Toxic Chemicals, Including Prevention of Illegal International Traffic in Toxic and Dangerous Products.” Implementation of Agenda 21 is primarily the responsibility of Member States, with the cooperation of the international agencies.

Of special importance in relation to the sound management of chemicals is the 1997 World Health Assembly Resolution WHA50.13 “Promotion of Chemical Safety, with Special Attention to Persistent Organic Pollutants.” This resolution is in response to the recommendations and information on international action made by the Intergovernmental Forum on Chemical Safety (IFCS) to the World Health Assembly and to the United Nations Environment Program (UNEP) Governing Council. The Assembly, after having considered the report of the Director-General on persistent organic pollutants (POPs), endorsed the recommendations of the IFCS to the Assembly on POPs, as presented in the report of the Director-General. UNEP’s Governing Council approved Decision 19/13C (1997), promoting international action to protect human health and the environment through measures to reduce and/or eliminate releases of POPs.

## **2. Understanding the Importance of Persistent Organic Pollutants**

Persistent organic pollutants are highly stable toxic organic compounds that resist photolytic, chemical, and biological degradation. They are also characterized by high lipid solubility, which results in accumulation in fatty tissues of living organisms. POPs contaminate air, food, water and soil, and they are easily transported by water and air. Releases in one part of the world can be transported through the atmosphere to regions far away from the original source. Of the pollutants released into the environment every year by human activity POPs persist for years at background levels causing long-term exposures. There is also the concern that, particularly in developing countries, stockpiles of unwanted pesticides, including DDT, and other toxic chemicals have accumulated. In many cases the containers are decaying and the contents leaching into the soil and watercourses, affecting aquatic and human life. Because of all these characteristics POPs are considered dangerous substances that merit priority action.

Twelve POPs have been identified as requiring the most urgent attention. These are DDT, aldrin, chlordane, dieldrin, dioxines, endrin, furans, heptachlor, hexachlorobenzene, mirex, polychlorinated biphenyls (PCBs), and toxaphene.

Most human exposure to the 12 POPs noted is attributed to the food chain. Contamination of food may occur through environmental pollution of the air, water and soil, or through unauthorized use of organochlorine pesticides on food crops. Milk contamination, including mother's milk, with POPs is a worldwide phenomenon.

Among the many health effects of POPs are birth defects in humans and animals, cancer, a wide range of biological effects, allergies and hypersensitivity, and diseases of the central and peripheral nervous systems. Reproductive disorders are thought to result from chemicals that function as "endocrine disrupters." Possible interference with development and the immunological system of children is of particular concern.

The International Agency for Research on Cancer (IARC) has evaluated DDT as a possible carcinogenic to humans and included it in Group 2B. This means that there is inadequate evidence in humans for the carcinogenicity of DDT but there is sufficient evidence in experimental animals for the carcinogenicity of DDT. The data that IARC considered is data on slightly excess risks for lung cancer found among workers at DDT production facilities in the United States of America with an elevated risk for non-Hodgkin's lymphoma in relation to potential exposure to DDT. An elevated risk for malignant lymphoma was also found at a case control study in northern Sweden, with adjustment for exposure to herbicides. Epidemiological data on cancer risks associated with exposure to DDT are suggestive of carcinogenicity, but limitations in assessments of exposure in the studies and the finding of small and inconsistent excesses complicate an evaluation. The slight excesses of respiratory cancer seen among cohorts exposed to DDT are based on differences of five or fewer cases between exposed and unexposed groups.

The cohort and case-control studies that have become available since the last evaluation was made in 1987 (see IARC, 1987) add to some extent to the concern about DDT. Most of these investigations were not specifically designed to evaluate the effects of DDT; consequently, the findings for DDT were not reported as fully as would have been desirable.

However, the carcinogenicity of DDT in experimental animals has been tested adequately in mice, rats, and hamsters. Following oral administration to mice, it caused liver-cell tumors, including carcinomas, in animals of each sex. In one study, the incidence of lung carcinomas was increased and in three studies the incidence of malignant lymphomas was increased. The incidence of liver tumors was increased in mice following subcutaneous injection of DDT. Other relevant data also has been considered for evaluation. As the liver is the target organ for the chronic toxicity of DDT, this compound induced liver microsomal enzymes in rodents and primates and increased the frequency of enzyme-positive foci in the liver, and it impaired reproduction and/or development in mice, rats, rabbits, dogs, and avian species.

According to recent data from poison control centers from different parts of the world, cases of organochlorine pesticide poisoning are mainly due to aldrin, dieldrin, HCB, and chlordane. It should be pointed out that there is no specific antidote available for treatment of acute intoxications due to any of the 12 specific POPs.

Most of the available data about DDT residues in breast milk and dairy products showed this substance is present in the majority of the samples tested. A study conducted in Mexico in the 1970's, to measure total DDE and DDT in mother's milk determined that the levels varied from 3.20 to 3.26 mg/kg (ppm) in total milk. Another study done in 1995 demonstrated that the levels in mother's milk, using a lipid base, were 0.594 mg/kg for women residing in Mexico City. In contrast, for women residing in tropical areas of Mexico, the average levels were 5.02 mg/kg. However, it should be noted that significant differences exist between countries and between regions of the same country. As an example, a study of 175 mother's milk samples analyzed in Zimbabwe showed that 98% of the samples had important levels of DDT and that the levels in that country were 25 times higher than those found in the United States of America. Some of these differences are related to the use of DDT for public health campaigns or to existing stockpiles of the product.

Time trend studies made in two West German cities and Sweden have shown a decrease of the levels of DDT in mother's breast milk by 80%, 90%, and 50%, respectively.

POPs in the environment originate mainly from anthropogenic activities, such as the manufacture and use of certain organic chemicals, pulp and paper manufacture using chlorine, the production and application of pesticides, leaks, spills, and dumping. With worldwide sales of some US\$ 1.5 trillion annually, the chemical industry is a vital part of the modern industrial economy, providing a range of goods and services essential to our lifestyle. The number of different chemicals in production is on the rise and the dramatic growth in both the quantities and the variety of substances being released into the environment increases the potential for damaging human health and the environment. It has been estimated that around 70,000 are produced regularly and that many new ones are added every year.

The United States and Canada have been conducting environmental quality studies in the Great Lakes basin for several decades. During the 1970s the use of the Great Lakes as a disposal site for agricultural, industrial and domestic wastes became an increasingly widespread concern due to the detrimental effects on fish and wildlife and the potentially adverse effects on human health. In the mid-1970s concentrations of PCBs in some Great Lakes fish had been high enough to warrant advisories to restrict consumption of these fish, particularly by children and women of childbearing age. Although fish tissue concentrations of DDT and PCBs have been declining since the mid-1970s, the presence of toxic substances in the Great Lakes continues to be a significant concern in the 1990s.

There have been 362 contaminants identified in the Great Lakes system; of these, approximately one-third have been evaluated for their toxic effect on aquatic life, wildlife, and human health. In 1985, the International Joint Commission (IJC) classified 11 of the most persistent and widespread toxic substances as “critical Great Lakes pollutants.” Eight of these are POPs.

Several epidemiological investigations have been conducted to investigate the association between water pollutants in the Great Lakes and the health of people in the Great Lakes states. These studies have demonstrated increased tissue levels of toxic substances (body burdens) in these populations that may be associated with, or potentially result in, reproductive, developmental, behavioral, neurologic, endocrinologic, and immunologic effects. Of special importance are the maternal and infant studies conducted in Lake Border States. These studies have produced a wealth of information on the subject. For instance, in the Michigan Maternal and Infant Cohort Study, maternal consumption of Great Lakes fish was associated with reduced birth weight, reduced head circumference, and reduced gestational age. There were also several other potential complications noted in child development.

The document "State of knowledge report on environmental contaminants and human health in the Great Lakes" prepared by Canada presents several conclusions. For example in newborns, prenatal exposure to PCBs and accompanying accumulation of contaminants derived from fish and other sources can interfere with certain immune functions and can impair muscular strength and reflexes, leading to developmental delays during infancy and childhood. These contaminants can also reduce the ability of affected children to deal with unfamiliar or stressful situations and can reduce their neuromuscular development, learning ability, and intelligence.

In summary, the evidence about the likely health effects of POPs is growing steadily. Humans encounter a broad range of environmental exposures, frequently to a mixture of chemicals at the same time. Much work remains to be done on the study of the human health impact of exposure to POPs, particularly in view of the broad range of concomitant exposure experienced by humans. Nevertheless, the weight of existing scientific evidence has been judged sufficient to warrant immediate actions to reduce the risks to human health. There is general agreement that exposure to certain POPs can have the potential for a significant impact on human health either in the short or long term. High overexposure at the point of use of some POPs can lead to acute effects, including death, while at lower exposure levels long-term effects may occur. However, low level exposure is of great concern, as it may produce long-term effects on large population groups.

### **3. Importance of Resolution WHA50.13 to Member States and PAHO**

Resolution WHA50.13 calls upon Member States to involve the health officials in national efforts to follow up and implement the decisions the UNEP and WHO Governing Bodies relating to the currently identified persistent organic pollutants. It also includes other important actions that the governments may take, leading to the reduction and safe management of POPs. In this context WHO resolution specifically asks Member States “to ensure that the use of DDT is authorized by governments for public health purposes only, and that, in those instances, such use is limited to government-authorized programs that take an integrated approach and that strong steps are taken to ensure that there is no diversion of DDT to entities in the private sector.”

The resolution, among other important and related aspects, also asks the Director-General of WHO to cooperate with Member States in facilitating the exchange of information on chemicals and to enhance technical cooperation with Member States for the determination of their capacity-building and implementation of programs for the management of chemical risk, in collaboration with participants in the Inter-Organization Program for the Sound Management of Chemicals (IOMC) and with other organizations.

Summing up, the main challenges for Western Hemisphere governments and for PAHO are:

- To find and apply alternative approaches to the control of vector-borne diseases that are effective, economical and applicable within the special situation of the countries of the Region, including the reduction of the reliance on POPs and the use of integrated pest management approaches, in accordance with the WHO guidelines.
- To carry out ecologically sound disposal of pesticides used for the control of disease vectors that may have accumulated in stockpiles, keeping in mind the expense and the lack of facilities that exist in the countries of the Region, and that the use of the “prior informed consent” procedure may facilitate collaboration between countries that have such facilities and those that do not have them.
- To consider the use of health authorities to act as advisors and controllers of the release of pesticides that have health effects for humans.

In order to assist countries find alternatives to POPs, the United Nations Environment Program maintains an Information Clearinghouse on Persistent Organic Pollutants. The Web site is updated on a regular basis with information received from governments, international organizations, and nongovernmental organizations.

At the regional level, the Pan American Network for Environmental Waste Management (REPAMAR) is an initiative of PAHO and the German Government, established for the purpose of cooperating with Member States in the minimization of waste production and in promoting environmentally adequate management of waste in order to contribute to sustainable human development. REPAMAR is based at the Pan American Center for Sanitary Engineering and Environmental Sciences (CEPIS) in Lima, Peru. Through REPAMAR, countries can access support to deal with stockpiles of POPs and other important chemical residues.

#### **4. Actions at Global Level: The International Response**

After the United Nations International Conference on Environment and Development in 1992, the international agencies took several actions in response to the mandates of Chapter 19, by-and-large establishing mechanisms for coordination and cooperation among agencies, at the same time that intergovernmental bodies were organized to address the problems of chemicals in the environment.

In 1994, the Intergovernmental Forum on Chemical Safety (IFCS) was established during the International Conference on Chemical Safety convened in Stockholm, Sweden. High level representatives from more than 100 countries identified priorities for action in Agenda 21, Chapter 19, and defined mechanisms for implementation of its recommendations.

In 1995, IOMC was established to promote coordination among international organizations involved in implementing Chapter 19 of Agenda 21. The IOMC's current membership includes the Food and Agriculture Organization of the United Nations (FAO), the International Labor Organization (ILO), the United Nations Industrial Development Organization (UNIDO), the United Nations Institute for Training and Research (UNITAR), UNEP, and WHO, among others.

Technical meetings on POPs were convened in Washington, D.C. (October 1995), and in Canberra, Australia (March 1996), and an open meeting was held in Manila, Philippines (June 1996).

The IFCS concluded that there was sufficient evidence for international action, including global legally binding instruments. The recommendations were forwarded to UNEP's Governing Council and to the World Health Assembly. Both agreed that immediate action should be initiated to protect human health and environment, as noted in the resolutions of the respective Governing Bodies.

The Intergovernmental Negotiating Committee (INC) for an Internationally Binding Instrument for Implementing International Action on POPs held its first session



from 29 June to 3 July 1998 in Montreal, Canada. Representatives of 95 countries, including 18 from the Americas, attended. In addition, a number of UN bodies and specialized agencies (including WHO), some intergovernmental organizations, and a large number of nongovernmental organizations (NGOs) also attended.

Decision 18/32 of the UNEP Governing Council (1995) invited IOMC to work with IPCS to institute an expeditious assessment process, initially of the 12 POPs identified as priority. To implement Decision 18/32, UNEP established an international working group including representatives from government, intergovernmental organizations, and NGOs, representing industries, public interest groups, and scientific organizations from around the world. The working group was later adopted by IFCS.

## **5. Actions at Regional Level**

UNEP's Governing Council Decision 19/13C (1997) calls on UNEP to initiate a number of immediate actions, including the exchange of information on POPs.

UNEP and IFCS determined that an effective way to begin information exchange on POPs and to prepare governments for the upcoming negotiations on the subject was to jointly conduct a series of regional awareness workshops for developing countries and countries with economies in transition across the globe. Eight regional workshops were conducted between late 1997 and June 1998.

In the Region of the Americas, a workshop was held in Cartagena, Colombia, 27-30 January 1998 for Central America and the Caribbean. This workshop was attended by 16 countries from the Americas (Barbados, Belize, Colombia, Costa Rica, Cuba, Ecuador, Guatemala, Jamaica, Mexico, Nicaragua, Panama, Peru, Saint Kitts and Nevis, Suriname, Trinidad and Tobago and Venezuela). A second workshop was held in Puerto Iguazú, Argentina, 1-3 April 1998 for Argentina, Brazil, Chile, Paraguay, and Uruguay. Both workshops were sponsored by IOMC (including WHO/PAHO) and IFCS. UNEP and the Government of Colombia and Argentina were in charge of the organization. The US-EPA/PAHO project provided finance and technical support.

The workshops, including the two held in the Region, highlighted the need for effective action against hazardous materials. The representatives of the countries agreed on the need for effective programs to protect human health and the global environment from the risks of persistent organic pollutants. One of the key conclusions from the workshops is that countries often lack information about sources and releases of POPs because of the severe shortage of adequately equipped laboratories and trained personnel, and that extensive financial and technical support is required. In all regions there is also lack of adequate destruction capacity for POPs.

## **6. Actions at Subregional and Intercountry Levels**

Canada, Mexico, and the United States of America have developed North American Regional Action Plans (NARAPs) on DDT, chlordane, and PCBs.

The objective of the NARAP on DDT is to reduce the exposure of humans and the environment to DDT and its metabolites through joint efforts of the three countries and a cooperative approach that includes the sharing of experiences with other countries of the Americas. This NARAP proposes to accomplish this objective through phased reduction leading to eventual elimination of DDT used for malaria control in Mexico, as well as the elimination of illegal uses of DDT. This NARAP supports a holistic approach to malaria control, bringing together an integrated pest control management strategy for the vector as well as the full spectrum of related public health activities and services; a regional perspective that encourages sharing experiences with other Caribbean and Latin American countries and involving them to ensure that malaria continues to be controlled throughout the Region; and participation in and building upon related global initiatives.

The action plans are also intended to help facilitate the meaningful participation of the public, including nongovernmental organizations; business and industry; provincial, state and municipal governments; academia; and technical and policy experts, in accordance with the spirit of cooperation reflected in the North American Agreement on Environmental Cooperation.

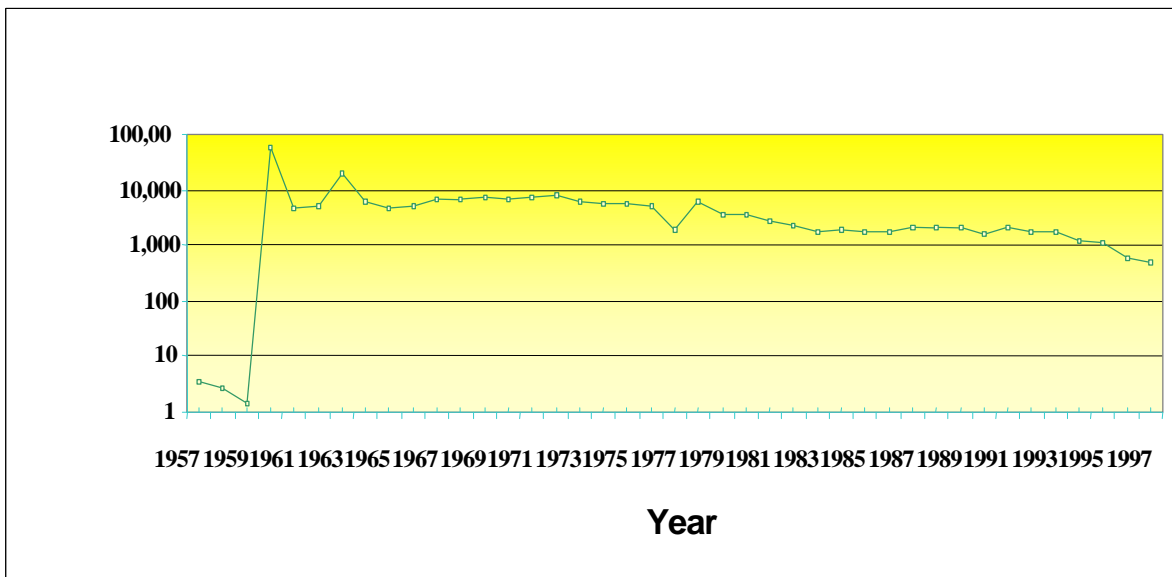
## **7. Actions at Country Level**

In the Region of the Americas, a joint US-EPA/PAHO project supported case studies in several countries. A preliminary report has been prepared based on the case studies of Brazil, Chile, Costa Rica, Mexico, Nicaragua, Trinidad and Tobago, and Uruguay. The case study reports vary significantly from one country to another, however some common situations and concerns can be identified. In general the reports demonstrate awareness and show concern about health risks as a result of exposure to a variety of toxic chemicals. These also provide an illustration of the impact of POPs in a given country and of the capacity to respond to protect public health. In most cases severe prohibitions or total restrictions on the usage of one or more of the POPs were reported. Several of the base studies reported the existence of POPs residues in the environment, mostly from previous heavy use. Those findings are evidence of the potential for long-term human exposure and the risk of adverse health effects on the exposed population. The existence of stockpiles in some countries and the lack of destruction facilities are other important concerns.

**8. Actions Proposed for PAHO in Support of Member States**

The basis for support to Member States will be primarily oriented by Resolution WHA50.13 and the needs of Member States, expressed collectively and individually, and more specifically identified by the Ministries of Health, in order to deal with the challenge of finding viable, economic and effective alternatives for dealing with disease vectors, reducing or eliminating the use of pesticides, and finding equitable means of disposing of unwanted stockpiles, primarily of DDT. Although DDT use for malaria control has decreased dramatically in the Region since 1960 (Figure 1), significant amounts are still being used for vector control, and in illegal uses in agricultural pursuits. Some countries report the existence of stockpiles of DDT, but the information is incomplete.

**Figure 1. DDT Use in Latin America and the Caribbean for Malaria Control Programs, 1957-1997**



Source: PAHO, Status of Malaria Programs in the Americas, Reports, I-XLV (1957-1996)  
\*1995: 1153.1 tons, 1996: 597.41 tons

The following is proposed for PAHO's cooperation with Member States:

- Continue support to the actions conducted by WHO, UNEP, IFCS, and other agencies in relation to Resolution WHA50.13, particularly with respect to the protection of public health.

- Support the ministries of health in looking for alternatives for the control of disease vectors, including the promotion of a regional network of collaborating centers to conduct research on viable, economic and effective integrated approaches for the control of vectorborne diseases, and carrying out studies on cost effectiveness (economical and with minimal damage to health) and environmental management.
- Assist ministries of health in finding and applying appropriate, economic, and ecologically sound management of pesticides, particularly DDT, promoting the application of the “prior informed consent” procedure among countries that have disposal facilities and those that do not have them, as necessary.
- Promote the dissemination of information, utilizing up-to-date systems, and the practical application of technology for alternative methods for the control of disease vectors.
- Promote and support the sharing of expertise among countries for upgrading and sharing laboratories for the identification of chemicals, particularly pesticides in human tissue, food, and the environment.
- Promote and assist in the development of an epidemiological and toxicological information network on chemical substances, including pesticide-related diseases and intoxication.
- Promote intersectoral action for the safe production, handling, and use without risk of pesticides, and for regulatory control.
- Support the preparation of health staff to facilitate their incorporation in the national efforts to follow up on the implementation of Resolution WHA50.13.
- Promote research, data collection and information dissemination on long-term effects of POPs.
- Keep the Governing Bodies of PAHO and WHO informed on the progress made in the implementation of Resolution WHA50.13, on regional activities, and on the support provided to Member States.

For PAHO, implementation of the above actions will be a joint effort of the PAHO/WHO Representatives in the countries, the Division of Health and Environment (HEP), including CEPIS, and the Division of Disease Prevention and Control (HCP). HEP will cooperate in aspects related to environment and health and HCP, in the research and

application of solutions for the control of vectors, minimizing or eliminating the use of POPs. This initiative would be linked to those related to POPs being conducted by other international agencies such as FAO, ILO, the Organization for Economic Cooperation and Development (OECD), and UNEP, and by bilateral programs, with the aim of insuring the protection of human health.