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# Foreword

In most developing countries, large stocks of obsolete pesticides have accumulated over the years as a result of prolonged storage or because they have been banned from use. Obsolete pesticides are hazardous waste. Owing to the absence of environmentally sound disposal facilities in developing countries, the quantity of obsolete pesticide stocks is constantly on the increase. Storage conditions rarely meet internationally accepted standards and drums are often stored in the open exposed to harsh weather conditions which accelerate the wear and tear of containers. Many containers deteriorate and leak their liquid contents into the soil, eventually severely contaminating groundwater and the environment, while the powder contents of worn or torn bags and cardboard boxes are often dispersed into the environment by wind or rain. Most stores are in the centres of populated urban areas or close to public dwellings or bodies of water. The total quantity of obsolete pesticide stocks in non-Organisation for Economic Co-operation and Development (OECD) countries is estimated to be well in excess of 100 000 tonnes of which 20 000 to 30 000 tonnes are in Africa. A significant share of these stocks are leftovers of pesticides supplied under various aid arrangements. The problem is colossal and a concerted global effort is required to minimize the damage.

In 1993, with financial assistance from the Government of the Netherlands, FAO started a project to develop strategies for addressing the problem of obsolete pesticide stocks. As part of this project, and as a result of its findings, a donor consultation was convened from 12 to 14 December 1994 to solicit cooperation from the international community.

The three-day meeting was attended by representatives of donor countries, aid agencies and international organizations. Representatives of regional organizations in Africa provided an overview of the magnitude of the problem and FAO presented the first results of an inventory of obsolete stocks in Africa and the Near East. Disposal methods and strategies for prevention of further accumulation were discussed, as were mechanisms for cooperation and coordination and the role of FAO as a clearing house. The attending agencies welcomed proposals for cooperation, coordination and a regular exchange of information. In a resolution the meeting called on governments and aid agencies to help prevent a further accumulation of stocks of obsolete pesticides and to assist countries to dispose of their present stocks.

In the second half of 1995, FAO published guidelines on prevention of accumulation of obsolete pesticide stocks. Guidelines on the safe and environmentally sound disposal of obsolete pesticides, a collaborative effort of FAO, WHO and UNEP, are expected to follow soon.

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# Abbreviations

**DANIDA**

Danish International Development Agency

**DGIS**

Directorate General International  
Cooperation

**DLCO-EA**

Desert Locust Control Organization  
for Eastern Africa

**EU**

European Union

**GIFAP**

International Group of National Associations  
of Agrochemical Manufacturers

**GTZ**

German Agency for Technical Cooperation

**IATA**

International Air Transport Association

**ICAO**

International Civil Aviation Organization

**IMO**

International Maritime Organization

**IPM**

Integrated Pest Management

**IRLCO-CSA**

International Red Locust Control  
Organization for Central and Southern  
Africa

**IRPTC**

International Register of Potentially Toxic  
Chemicals

**NGO**

Non-governmental organization

**OECD**

Organisation for Economic Co-operation  
and Development

**PPD**

Plant Protection Directorate

**ULV**

ultra-low-volume

**UNCED**

United Nations Conference on  
Environment and Development

**UNEP**

United Nations Environment Programme

**USAID**

United States Agency for International  
Development

**USEPA**

United States Environmental Protection  
Agency

**WHO**

World Health Organization

# Introduction

Most developing countries are facing problems with obsolete stocks of pesticides that are regarded as a severe threat to the environment and public health. Safe and environmentally sound disposal facilities are rarely available in developing countries. Governments wishing to address this problem often lack standards and directions and over recent years FAO has been requested repeatedly by its Member States for advice. As a result of these requests a project, GCP/INT/572/NET, on "Prevention and Disposal of Obsolete and Unwanted Pesticide Stocks in Africa and the Near East: Phase 1" was established with funding from the Government of the Netherlands. The aim of this two-year project is to lay a foundation for more comprehensive multilateral efforts. Project activities planned include:

- compiling an inventory of obsolete pesticide stocks in Africa and the Near East;
- evaluating disposal methods;
- preparing guidelines on prevention of the accumulation of obsolete pesticide stocks;
- pilot disposal operations;
- increasing donor involvement in this issue and in the establishment of a framework for cooperation;
- coordinating among aid agencies.

Factors contributing to the accumulation of obsolete pesticides include:

- inappropriate and uncoordinated pesticide donations;
- substandard storage facilities;
- poor stock management and ineffective planning of requirements;
- inadequate distribution mechanisms;
- inappropriate use of pesticides.

The problem of obsolete pesticide stocks is far-reaching, global and urgent. Long-term effects may have widespread implications and incalculable adverse effects on human health and the environment. It is therefore necessary that this important issue be addressed without delay.

It was against such a background that a consultation meeting was convened for donor agencies, relevant UN agencies and other international organizations.

## OBJECTIVES OF THE MEETING

The objectives of the consultation were to provide a forum for exchange of information and discussion and

to enhance cooperation and coordination among agencies involved in pesticide disposal. In more detail the objectives were to:

- exchange experiences gained in already completed pesticide disposal activities;
- exchange information on present and future activities in the sphere of disposal;
- act as a forum for discussion on the further development of pesticide disposal strategies;
- coordinate activities more fully and develop a framework for donor cooperation in large-scale disposal operations;
- identify ways of attracting financial backing;
- examine ways of reaching a global consensus on responsible pesticide donations in order to avoid the further accumulation of obsolete stocks.

It is envisaged that a second consultative meeting will be held in early 1996.

## PARTICIPANTS

The Director-General of FAO invited relevant aid agencies and public international organizations. About 15 organizations attended the meeting and several others expressed interest but were unable to attend because of other obligations. A list of participants is presented in Annex 6.

With the exception of three participants from Africa and the Near East, all participating organizations covered their own costs for attending the meeting.

## Opening address

The meeting was formally opened by Mr Sombroek, Director Land and Water Development Division (AGL), who, on behalf of the Director-General of FAO, welcomed the participants and thanked the Government of the Netherlands for funding the meeting. "On behalf of the Director-General of FAO, Mr Jacques Diouf, I wish to welcome you to the first FAO meeting on Prevention and Disposal of Obsolete and Unwanted Pesticide Stocks in Africa and the Near East.

There may be well over 100 000 tonnes of obsolete pesticides in non-OECD countries. These are no less than chemical time-bombs. Leakage, seepage and various accidents related to pesticides are quite common and widespread. The implication to human health and the environment is potentially grave.

In Africa alone, up to 20 000-30 000 tonnes of obsolete pesticides are estimated to exist, excluding contaminated soil, materials and containers. This situation is both very grave and urgent. A concerted international effort is the only remedy both to clean up this situation and to avoid further accumulation of pesticides.

A large proportion of accumulated obsolete pesticides in Africa are part of a series of consignments or donations that have become leftovers. Most of them could not be used because they were not needed at the time of import, their shelf-life had expired while awaiting pest outbreaks and so forth. Some are part of emergency assistance or are a component of aid arrangements not requested by the recipients. There is a whole range of collective responsibilities: the recipient governments, donor countries, aid agencies and agrochemical companies have all contributed in some ways. To alleviate this situation, a massive global mobilization of resources is needed. A consensus also needs to be developed on suitable, environmentally acceptable disposal strategies. At this stage, much interest, hope and commitment have been expressed in support of a global effort but only a few have taken initiatives for action on prevention and disposal.

At this juncture, I wish to take the opportunity to say that FAO would like to express its deep appreciation to the Government of the Netherlands for its financial support and for having made possible, through FAO, the beginning of international cooperation in the

development of strategies for the removal of obsolete pesticides. This first meeting is the result of that support.

I also wish to mention with appreciation the efforts made to date to remove obsolete wastes. These include the removal and safe disposal by GTZ/USAID and Shell Company of 56 000 litres of dieldrin from the Niger in 1991, the removal by FAO of 50 000 litres from Uganda in 1993 and the removal and disposal of obsolete pesticides by GTZ from at least two countries in Africa.

Obsolete pesticides are drawbacks to the development effort of many developing countries mainly because of lack of both resources and expertise. The removal of waste pesticides and their disposal in an environmentally safe manner may not be considered development-oriented. On the other hand, if people engaged in agriculture are affected, if the environment becomes hazardous and uninhabitable, if human life and animals are at risk, if water and soil are contaminated, development schemes are also bound to fail.

Therefore, in view of the urgency, the global importance and the magnitude of the problem, FAO has convened this meeting to provide a forum for discussions and understanding, for the exchange of information and experiences and for the discussion of strategies for cooperation and coordination of activities, with the objective of saving resources and avoiding duplication of efforts.

Once again, on behalf of FAO and the Director-General, I wish to express my thanks and appreciation for your patience, for the effort you have made to attend this meeting, for being ready to listen, to understand and to share the collective responsibilities, for being eager to realize the common problem which is important and for which we need common effort and commitment. Without these qualities, it will be difficult to make advances in solving the huge problem of obsolete pesticides.

The information you may be exchanging with each other and the motivation and drive you may be experiencing during this meeting can be the foundation for the development of the global effort required to clean up pesticide wastes caused by human beings.

I wish you a very successful meeting and a very enjoyable stay in Rome."

# The FAO project for prevention and disposal of obsolete pesticide stocks in Africa and the Near East

A. Wodageneh, Project Coordinator

Six decades have gone by since the discovery, development and introduction of chemical pesticides in the late 1930s led to the notion that pest problems were over. Since then a variety of chemicals have been developed and introduced while the intensification of agricultural production systems has caused rapidly increasing use of pesticides.

The negative side-effects of increased pesticide use include: a steady accumulation of stockpiles of obsolete pesticides; severe contamination of the environment; an increasing number of poisoning cases; the rapid development of resistant pest strains; and, for several crops, even a destabilization of production as a result of pesticide-induced pests.

In Africa and the Near East, obsolete pesticides have become a source of great environmental concern. The variety, quantities and distribution of pesticides vary from region to region and from country to country, but the overall environmental impact is always negative and hazardous. As well as the obsolete pesticides themselves, there are huge quantities of heavily contaminated soil, empty containers and other contaminated materials.

Common reasons for accumulation of obsolete stocks include:

- the banning of pesticides that are still in storage;
- the prolonged storage of products with a short shelf-life;
- difficulties in forecasting outbreaks of pests, particularly with regard to migratory pests such as locust, grain-eating birds and armyworms;
- inappropriate assessment of pesticide requirements;
- insufficient application capacity;
- the use of inappropriate formulations or containers;
- excessive donations, i.e. inappropriate, untimely and uncoordinated donations;
- the late arrival of donations (out of season);
- inadequate storage facilities;

- lack of staff trained in storage management;
- ineffective distribution and marketing systems for pesticides;
- the lack of systematic and controlled stock-taking.

Some stocks are over 20 years old and are kept in poor conditions with few or no safety precautions. Some are left in the open and lack shade and security. Containers are often badly corroded or otherwise deteriorated. Generally, employees or handlers are not given adequate protective equipment and are therefore unable to handle emergencies. Often they are not aware of the occupational and environmental impact of leakage. Contamination of soils or groundwater may have severe and irreversible effects on human health and render production systems unusable. Such contamination may spread widely through groundwater and other water bodies.

In view of the grave and threatening situation, a quick response is required to contain and dispose of obsolete pesticides. Such actions need to be taken in a manner that is safe to human health and the environment. At present the recommended disposal method is through high-temperature incineration in a rotary kiln, but most developing countries do not have such facilities. Incinerators are often too costly and cannot be justified for the relatively small quantities of waste generated by developing countries. In many cases the solution will therefore be shipment of waste to a dedicated hazardous waste incinerator in an industrialized country.

The safe containment and environmentally sound disposal of obsolete pesticides are generally beyond the financial and technical means of developing countries. In recognition of these limitations, a growing number of countries are requesting assistance from FAO in addressing the problem of obsolete pesticide stocks.

Data from other regions indicate that the problem of obsolete pesticides is not limited to a specific geographical region; the problem also exists in Eastern Europe, Asia and Latin America.

**BOX 1****Issues involved**

The costs of environmentally sound disposal operations are in most cases beyond the financial capacities of developing countries. Therefore, assistance is required, both technically and financially.

A large proportion of the present obsolete stocks result from pesticide donations. It is therefore believed that there is an international responsibility to assist recipient countries in addressing the problem.

Costs of the disposal of obsolete stocks in Africa alone are estimated to exceed US\$100 million. The problem therefore requires a multidonor approach and a longer-term commitment.

The problems caused by obsolete pesticides are not confined to a limited number of countries or to isolated environmental conditions. They are international problems that need international solutions and concerted international effort, cooperation and commitment.

Ecological and environmental awareness needs to be fostered at international level. Following the UN Rio Summit of 1992, this issue is gaining international, regional and national attention and importance and many countries are becoming increasingly aware of environmental problems. Several donor agencies have expressed interest in the problems of obsolete pesticides and welcomed a FAO proposal of developing a plan of action for the prevention and disposal of obsolete pesticide stocks. Among the countries that expressed interest the Government of the Netherlands was the first to respond to FAO's call for financial support for the project. This resulted in a two-year Phase I project under the title "Prevention and Disposal of Unwanted Pesticide Stocks in Africa and the Near East". The project became operational in July 1994. Although requests for assistance are coming in from countries outside these regions, activities are restricted to the project area.

**THE PROJECT**

Phase I of the project is designed to complete the groundwork for coordination and to enhance the involvement of interested donor countries and affected countries through bilateral and multilateral assistance. Its objectives are:

- preparation of inventories of obsolete stocks;
- identification of environmentally sound disposal

methods;

- development and introduction of strategies for the prevention of further accumulation of obsolete stocks;
- implementation of two or three pilot disposal operations;
- development and introduction of a coordinated multidonor plan of action for containment and disposal of obsolete pesticide stocks in Africa and the Near East.

**THE OBJECTIVES****Inventories**

Inventories of obsolete pesticide stocks are being made in Africa and the Near East. They include an assessment of the condition of the stocks and indicate the magnitude of the problem as well as offering a basis for the prioritization and planning of containment and disposal operations.

**Identification and review of disposal methods**

Various disposal methods were assessed by a panel of experts meeting, organized jointly by FAO, the United Nations Environment Programme International Register of Potentially Toxic Chemicals (UNEP/IRPTC) and the World Health Organization (WHO) in October 1994. The results of the meeting will be published as *Technical guidelines on the disposal of obsolete pesticides* and are expected to be available before the end of 1995.

**Prevention of further accumulation of obsolete stocks**

The causes of accumulation of obsolete stocks have been studied and form the basis of two documents aimed at assisting countries to prevent further such accumulation. The documents are: *Guidelines on prevention of accumulation of obsolete pesticide stocks* and a *Training module on pesticide storage and stock planning*.

In two or three pilot countries, specific activities may be undertaken to increase the prevention of accumulation of obsolete pesticide stocks. Such activities may include: training in storage management and assessment of pesticide requirements; analysis of causes of accumulation in the country concerned, with advice on preventing such accumulation in the future; and advice on how to improve storage facilities.

**Pilot disposal operations**

Pilot operations for the containment and disposal of



obsolete pesticide stocks will begin in 1995 for two or three selected countries. So far, Yemen and Zambia have been selected. The purpose of the pilot operations is to generate experience in complicated procedures and techniques. The experience gained will then be made available to interested parties as Lessons Learnt Documents.

Disposal operations will be subcontracted to specialized companies and will comply with the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, the International Maritime Dangerous Goods Code and European Emission standards.

**Establishment of working group on pesticide disposal**

*The need for a consultative meeting.* The far-reaching magnitude of the problem is obvious and its urgency is beyond doubt. The issue is important and cannot be overlooked or considered either lightly or in isolation because, if unattended, the long-term effects will have wider implications and incalculable adverse effects on human health and the environment. Every delay in addressing the problem will increase the costs of solving it and a concerted international response and commitment should be mobilized.

The Consultative Meeting was convened in order to promote a coordinated multidonor approach.

# The situation with regard to obsolete pesticides in Africa and the Near East

As well as describing the actual situation with regard to obsolete pesticides in Africa and the Near East, case-studies presented by representatives of regional organizations for locust control also provide some background to the causes of accumulation. Dr Karrar, Director of the Desert Locust Control Organization for Eastern Africa (DLCO-EA), was unable to attend the meeting, but submitted a paper.

## PRESENTATIONS BY REPRESENTATIVES OF REGIONAL ORGANIZATIONS IN AFRICA AND THE NEAR EAST

### International Red Locust Control Organization for Central and Southern Africa

E. Byaruhanga, Director, IRLCO-CSA

There are nine member countries of the International Red Locust Control Organization for Central and Southern Africa (IRLCO-CSA), namely, Botswana, Kenya, Malawi, Mozambique, Swaziland, Uganda, the United Republic of Tanzania, Zambia and Zimbabwe. The problem of obsolete and unwanted pesticides within IRLCO-CSA member countries is serious and requires urgent action, for which assistance from outside will be needed.

Over the years, IRLCO-CSA acquired various insecticides for use against locusts. Some of these became superseded by new groups of more efficient pesticides and were withdrawn from use. However, these pesticides were not disposed of, but were simply stored away pending decisions as to what was to be done with them. This practice continued for years and in due course IRLCO-CSA found itself with huge quantities of obsolete pesticides. A rough survey of obsolete stocks kept by IRLCO-CSA found that Zambia has 10 000 kg of DDT, 11 000 kg of lindane and granules and nearly 40 000 kg of endosulfan. Mozambique has similarly huge stocks of unwanted parathion, DDT, toxaphene, etc. The list is long and comprehensive surveys are needed to determine exact amounts. The task will be difficult and expensive.

IRLCO-CSA's obsolete stocks also include up to

70 000 litres of DNOC, most of which, with assistance from the German Agency for Technical Cooperation (GTZ), has been collected from various locations in Tanzania and Zambia, repacked and stored pending transportation for disposal. The intention is to incinerate the DNOC in a cement kiln in Dar-Es-Salaam, Tanzania.

The obsolete pesticides kept by IRLCO-CSA member countries are in scattered locations within each country. As in most other countries in Africa, stocks were originally imported for migratory pest control, crop spraying, animal dipping, vector control, public health purposes and so on, and very often, they were donated by outside donor agencies, in good faith. Unfortunately, when donations were received, no proper assessments were made concerning the needs of the recipient countries in dealing with pesticides over either the short or long term. Pesticides were donated in excess of the amounts required, were not suitable to solve the particular problem or were supplied in inappropriate containers which made the in-country distribution process more difficult. Containers were often of poor quality and could not withstand prolonged periods of storage. Since these problems were not considered sufficiently at the time of donation, the IRLCO-CSA countries are now left with large stocks of obsolete pesticides.

As with any other unwanted commodity, no one takes care of obsolete pesticides. Moreover, the facilities and means for safe keeping are not available and in some cases stocks are kept unsecured, unsorted and in a very haphazard fashion. Sometimes pesticides are stored out in the open and containers may leak. The people responsible for pesticide stores are not well trained to appreciate the possible dangers both to themselves and to the environment and, in any case, do not have the means at their disposal to solve such problems.

### Desert Locust Control Organization for Eastern Africa

A. Munir Karrar, Director, DLCO-EA

**Introduction.** In the 1960s, DLCO-EA introduced spraying as the preferred and standard pesticide delivery

technique versus baiting and dusting for the control of desert locust outbreaks in Eastern Africa. DLCO-EA used the ultra-low-volume (ULV) methods for spraying small doses of oil-based BHC formulations and similar formulations of dieldrin were also used extensively for the control of locusts. The use of these two pesticides was justified for economic reasons and for their effectiveness in the control of hopper bands. They remain effective for long periods and cover extensive areas of infestation, but, because of their inherent tendency to cause adverse effects in the environment, both BHC and dieldrin were then banned from use in locust control operations.

Over the years, DLCO-EA has acquired large quantities of dieldrin and BHC either by direct purchasing or through donations. Leftovers of both have accumulated in various strategic stores of member countries because the cost of environmentally safe disposal methods is too high for DLCO-EA.

DLCO-EA pesticide stocks identified as obsolete currently include BHC, dieldrin and malathion, which is estimated at 138 795 litres.

The Plant Protection Directorate (PPD) in Eritrea is believed to have a total of about 59 300 litres of liquid pesticides and 20 000 kg of powder which need to be checked for their identity and viability. Some 39 200 litres are scattered across the country.

In order to have reliable figures, inventories need to be taken from all member countries of DLCO-EA (Tanzania, Kenya, Uganda, Ethiopia, Somalia, Eritrea, the Sudan and Djibouti). Djibouti, in particular, might have unidentified large quantities of obsolete pesticides.

Most of the storage sites under DLCO-EA control are located in areas of very high temperature and humidity which affect the chemical, physical and biological properties of insecticides. This has necessitated regular checking and monitoring of the insecticides kept in member countries. Results of some analyses indicated that accelerated degradation of the active ingredients is quite common and pesticides, although unfit for pest control, are very hazardous to the environment and human life. Furthermore there are a huge number of containers that have deteriorated as a result of corrosion caused by climatic factors and the impact of the chemical pesticides themselves. The high cost of new, good-quality containers has made it impossible to avoid keeping pesticides in older and unsafe drums.

DLCO-EA needs funds and technical assistance for the disposal of the obsolete insecticides and empty containers currently causing problems in its member

countries. There is also a need for improved storage facilities and better management to ensure the safety of pesticides in the future.

**Storage facilities and the need for disposal.** Most stores are very old and overstocked and many lack the basic facilities which are essential for safety and control of the health hazards associated with pesticides. The design, size and construction of stores vary greatly from place to place and most do not meet standard requirements. Consequently, inadequate storage conditions have greatly accelerated the deterioration of pesticides and pesticide containers. Obsolete pesticides occupy valuable storage space which can be used for other purposes or for new, safer pesticide stocks.

The Council of Ministers of the DLCO-EA adopted the recommendation of the 21st Session of its Technical Committee (15 to 19 May 1989) for safe disposal of obsolete pesticides in the region, but the means and the technical expertise is lacking for the recommendation to be implemented.

High-temperature incineration is the preferred disposal method, but the costs involved put it out of the reach of most developing countries.

#### BOX 2

##### The need for expertise

Disposal cannot be left in the hands of people who lack basic knowledge of the chemistry of pesticides. Application of the basic principles of engineering that govern incineration is necessary to manage effectively disposal by means of incineration. Methods such as burning, burying, chemical treatments and landfilling, without adequate knowledge, supervision and experience of experts should be avoided. Otherwise the consequences could be dangerous, more complicated, hazardous and, above all, much more expensive. The best alternative is to seek the advice of an expert and to comply strictly to technical guidelines that are internationally accepted.

#### Case-study: the Sudan

M.G. Butrous, Plant Protection Directorate, Sudan

As well as being responsible for plant protection, the PPD in the Sudan also plays an important role in the control of locusts, rats, birds, water hyacinth and stored product pests. Over the years, a large variety of pesticides

have been imported into the country either as donations or through procurement by the government. The use of pesticides for locust control over the last 30 years has resulted in the accumulation of huge quantities of obsolete pesticides.

In 1987-88 and 1988-89 large quantities of liquid wastes were incinerated by Shell Chemical Company of the Sudan in a burner that had been evaluated and recommended for the purpose. It was estimated, however, that the burner was only capable of destroying up to 80 percent of any liquid pesticides. Incineration was therefore to take place in remote and uninhabited areas and only in the months of November to March when the direction of winds are predictable.

The total quantity of obsolete pesticides held by PPD and the different irrigation schemes in the Sudan is estimated at 760.38 tonnes and 547.6 m<sup>3</sup> of contaminated soils. Obsolete pesticides include 300 cylinders of methylbromide and 8.82 tonnes of poisonous bait. In addition, there are an estimated 7 785 empty 200-litre drums and 2 302 empty 25-litre drums. These figures do not include obsolete stocks in the south of the Sudan or stocks held by other public entities or private companies.

With the exception of some stocks which were rehabilitated with assistance from the Government of the Netherlands, most pesticide stores are unsuitably constructed and often located close to habitation areas and/or water courses. Fences are either poorly constructed or totally lacking. Often there is little or no security to prevent access for unauthorized adults, children or animals. Electricity, water, emergency shower facilities, fire-fighting equipment, protective clothing and first aid facilities are not available in almost all the sites. Stacking of pesticide drums in all locations is either poor or inappropriate.

Although the Pesticide Disposal Committee has approved incineration by means of a mobile burner as the best way of disposing of liquid pesticides, since January 1992, Shell Chemical Company has been unable to transfer its burner to the Sudan Gezira Board (the largest irrigated scheme in the Sudan) because the efficiency of the burner was found to be far below an acceptable standard and it lacked flame-gas treatment devices. Because the burner could no longer be used and owing to the high cost of environmentally sound alternatives, it was decided that the pesticide wastes, kept in various scattered locations should be decanted, repacked and kept secured under local storage conditions until alternative disposal means could be identified. In collaboration with authorities from the Ministry of

Health, some sites were selected for the purpose of continued storage.

A survey conducted by PPD, found unsecured empty containers of different sizes and ages scattered on open ground at most sites, particularly in the irrigated schemes. It was found that empty containers were usually disposed of in one of the following ways:

- they were passed on to the Ministry of Irrigation for use in flow regulation of irrigation canals;
- they were used as fuel containers after rinsing with diesel oils (this is one of PPD's most frequent methods of disposal);
- they were sold at auction for non-domestic use. Revenue from auctions was usually invested for construction of houses for members of staff employed by the irrigation schemes.

To improve the situation, the following were proposed:

- all storage sites should be provided with security and better shade;
- all empty containers should be kept strictly within fenced areas until disposed of or recycled as soon as facilities are available;
- all empty containers should be returned to the main stores immediately after the pesticides are used for the purposes for which they are intended;
- drums should be thoroughly drained of liquids;
- poor-quality, rusted or corroded pesticide drums should be disposed of by being punctured at the bottom and top, crushed, burned and buried underground;
- good-quality drums should be decontaminated by an alkaline solution and rinsed with water;
- decontaminated drums must not be used for storing food or drinking water;
- adequate numbers of good, new empty drums should be kept at each site to replace any drums containing pesticides that are leaking;
- a ministerial decree should be issued to restrict the use of the empty containers.

*Note.* Some of the above recommended methods for the disposal of containers do not agree with accepted standard practices of disposal of wastes or hazardous substances. Pesticide containers must be crushed immediately following use of their contents and subsequently destroyed by means of incineration. Empty containers should never be sold to the public for public use, nor should they be buried or introduced to open burning. Drained out liquids should be considered as toxic wastes and should therefore neither be spilled or

poured into soils. Both drained out liquids and containers should be disposed of in compliance with the standard procedures and containers can be recycled if appropriate recycling facilities exist. (A. Wodageneh)

## RESULTS OF INVENTORY OF OBSOLETE PESTICIDES IN AFRICA AND THE NEAR EAST

A. Wodageneh, Project Coordinator

The total quantity of obsolete pesticides in non-Organisation for Economic Co-operation and Development (OECD) countries is estimated by the project to be well over 100 000 tonnes. The estimate for Africa in 1992 was 20 000-30 000 tonnes. However, in order to have detailed, complete and more reliable figures concerning obsolete pesticides, particularly in Africa and the Near East, FAO in cooperation with its representation offices in various countries and with the governments of the countries concerned has begun

conducting surveys in over 60 countries in Africa and the Near East (see Annex 1). The survey was initiated in late August 1994 and will continue until completed. Inventories compiled are shown in Table 1. Note should be taken that figures in the column concerning estimated quantities of contaminants, are calculated by adding percentages to quantities of obsolete, unwanted and/or banned pesticides identified under each condition.

The inventories in Table 1 may increase or decrease according to further investigation of the situation, the possibility of further accumulation of obsolete pesticides and developments regarding contaminants and assessment of disposal companies at time of disposal.

Figures for the Congo and Malawi are incomplete and based on results from a limited number of locations.

Disposal operations are neither easy to organize nor simple to operate and the costs of incineration are normally too high for the countries concerned. Generally both technical and financial assistance will be required.

TABLE 1  
Summary of results of survey of obsolete pesticides

Country	No. of sites affected	Varieties of pesticide (types)	Quantities (kg/litres)	Total (tonnes)
Benin	20	21	67 281	67
Botswana	1	7	25 256	25
Burkina Faso	24	55	53 571	54
Burundi	2	5	57 690	58
Cameroon	20	10	225 206	225
Congo	7	1	1 793	2
Equatorial Guinea	22	23	145 616	146
Eritrea	29	24	203 124	203
Ethiopia	143	67	425 786	426
Gambia	7	Various 5*	23 250	23
Iraq	16	5	232 207	232
Lebanon	Various	Various	9 300	9
Madagascar	4	14	75 749	76
Malawi	11	27	126 893	127
Mauritania	11	10	257 167	257
Morocco	25	176	2 265 040	2 265
Mozambique	48	127	442 880	443
Namibia	1	1	245 000	245
Niger	4	25	51 598	52
Qatar	1	7	5 363	5
São Tome and Principe	1	4	3 420	3
Senegal	8	Various 21*	260 000	260
Swaziland	2	35	9 292	9
Zanzibar		Disposed of 270 tonnes by the Netherlands Government		0
Togo	7	21	84 792	85
Tunisia	21	Various 5*	870 224	870
Yemen*	22	129	180 000	180
Zambia	5	8	299 403	299
Zaire	5	9	590 558	591
<b>Total</b>	<b>467</b>		<b>7 237 459</b>	<b>7 237</b>

\*Various applies to a selection of unidentifiable pesticides.

# Presentations by agency representatives on pesticide disposal activities

## USAID

J.K. Jensen, Office of Pesticide Programs, USEPA

The United States Agency for International Development (USAID) has been involved in disposal operations in Pakistan and the Niger and has made reconnaissance visits to Guinea-Bissau and El Salvador.

## Pakistan

In 1987, USAID sponsored a technical evaluation team to travel to Pakistan to study how the unwanted, overaged pesticides stored throughout the country should be handled. The team visited 28 storage sites in the Punjab and greater Karachi area and estimated that they contained a total of 5 000 tonnes of pesticide products and 3 000 tonnes of contaminated materials that required disposal. The team recommended consolidation of stocks and disposal using one of three technologies: a lined landfill, estimated to cost US\$8.3-8.4 million; a transportable incinerator, estimated to cost US\$17.5-17.6 million; and a cement kiln (no cost estimated).

Most of the pesticides for disposal were acquired in the 1970s by the Government of Pakistan in support of its programme for free or subsidized distribution. The anticipated demands never materialized and great quantities accumulated in storage. In 1980, the government's new agriculture policy started to withdraw subsidies for pesticides and to shift pesticide procurement to the private sector, resulting in improved acquisition of pesticides over the long term. The shift to the private sector, however, combined with the government's policy of not allowing the use of pesticides stored for more than two years, significantly contributed to the huge stocks of overage pesticides that require disposal.

Because of the inherent long-term monitoring problems with lined landfills and the limited portability and potentially harmful emissions of transportable incinerators, the Office of Foreign Disaster Assistance of USAID decided to sponsor a pilot project in a rotary cement kiln, with the intention of demonstrating this technology for use in developing countries.

The objectives of the demonstration were to show that: a cement kiln destroys pesticides efficiently and completely; the cement product is in no way affected by the process; and stack gas emissions are within the range of established standards. One of Pakistan's most modern cement factories, located at Dera Ghazi Khan, the Punjab, was the site of the USAID-sponsored pilot pesticide disposal project. With the agreement of the Environmental Protection Agency of the Punjab and the Ministries of Agriculture, Production and Finance, 13 776 litres of organophosphate and 2 940 litres of organochlorine pesticides as well as 200 litres of an amide were collected from seven storage sites in November 1989. The pesticides were burned during the normal process of cement making in December 1989.

Project planning involved an environmental assessment and logistics plan. Collection and transport were preceded by safety training of workers and the pesticides were injected into the burning zone as a "cocktail"; the organophosphates at a rate of up to 3 litres a minute and the organochlorines at a rate of 1.3-2 litres a minute. The burn itself was uneventful and was accomplished over the course of five days. The costs were not calculated, as this was solely a pilot burn.

A total of 16 916 litres of pesticides were collected over a three-day period from seven stores in the Punjab and transported to a cement kiln where they were burned intermittently over the course of five days. Analysis showed that emissions of pollutants regulated by the Environmental Protection Agency of the Punjab did not exceed agency standards. Destruction removal efficiency results were very close to incinerator standards in the United States. Analysis of process samples (dust and clinker) was excellent and the cement product was free of detectable contaminants.

The following recommendations are made for future test burns:

- *Improve the selection of pesticides for a pilot burn.*

For a pilot burn, it is recommended that a large quantity of a uniform, high-grade waste pesticide be used and that the burn be restricted to one

organochlorine compound and one organophosphate, rather than involving the cocktail of pesticides used in Pakistan. One way to do this is to have enhanced early sampling of waste pesticides.

- *Be prepared for problems with injection and delivery systems.* Rather than testing free-flowing liquids as intended, USAID burned a variety of chemicals, some with less than ideal viscosity (i.e. it was a sludge). The atomizing nozzle was originally designed for low viscosity liquids, so that the end of the injection gun introduced the pesticide directly into the fuel stream at the hottest part of the kiln flame. Instead, the waste product should be blended in a dedicated tank, equipped with an agitator and the mixture fed into the fuel line just before it enters the kiln. The line should be equipped with a cut-off valve.
- *Investigate power supply reliability.* When using a cement kiln for waste disposal, a reliable power supply is essential. The kiln for the pilot burn was plagued with power interruptions.
- *Formalize institutional agreements early.* The burn in Pakistan was affected by management changes in certain ministries. Government acceptance of the feasibility study does not necessarily guarantee approval from a new group of officials.
- *Improve communication with the media, the public and labour unions.* USAID underestimated the need to have a communication strategy for the media, community leaders and labour unions. Local newspapers erroneously reported that an American project was burning American toxic wastes and this led to worker unrest at the kiln and the arrival of unsolicited trucks with full pesticide drums at the gate of the cement plant.

### The Niger

In 1988, the USAID office in the Niger was approached by the Worldwide Fund for Nature with a report of leaking dieldrin barrels at a site near the Tamgak nature reserve in the northern Niger. The report concerned old stocks of pesticide for locust control. In 1989-90, USAID, in collaboration with the Government of the Niger, safely centralized known dieldrin stocks at two locations in the Niger and the Royal Dutch Shell Companies (Shell) then suggested that dieldrin be removed from the Niger and destroyed at a commercial incineration facility. This resulted in the Niger Dieldrin Disposal Programme which was a joint effort of USAID, the Government of the Niger, Shell and GTZ. The programme, which took place over a 15-month period

in 1990-91 collected, removed and safely destroyed 56 000 litres of dieldrin held in the Niger.

The operation consisted of three phases: the collection of information and a field assessment visit conducted and financed jointly by Shell and USAID; the development of the preparation of the actual disposal plan, an environmental assessment and procurement of delivery contracts for the collection/shipping tanks (isotanks) and support equipment; and the actual collection and consolidation operation that began in mid-May 1991.

The 56 000 litres of dieldrin left Agadez for Lomé, Togo on 6 June 1991. Political problems in Togo prevented the direct routing of the convoy, made up of four isotanks, one freight container and four support vehicles, to Togo but, in spite of this, the dieldrin did arrive at the port in Lomé via Benin on 18 June and was loaded on to a ship bound for Europe on 26 June 1991. Incineration of the dieldrin was completed in the Netherlands by the middle of August 1991. There were no significant technical problems in the collection and movement of unwanted pesticides from extremely isolated locations, such as northern Niger, to Europe for incineration.

The full cost of the Niger programme was approximately US\$9.41 per litre of dieldrin destroyed. At least 30 percent of this amount was associated with the first-time development of a disposal programme and an additional 15 percent represented the cost of transporting the tanks and supplies from the coast in Lomé, Togo, to Agadez, the Niger, and back (approximately 4 200 km round trip).

The following lessons were learnt for future disposal operations:

- *Donor-industry and developing-country cooperation.* Once administrative hurdles are recognized, donors, developing countries and industry can productively work together to achieve a mutual goal.
- *Pesticides for disposal.* In the Niger, only dieldrin was disposed of, although there were other pesticides that were marked for disposal. Future disposal operations should dispose of all unwanted pesticides.
- *Private sector.* Private-sector involvement should be maximized.

### Guinea-Bissau

In June 1990, the Government of Guinea-Bissau requested technical assistance from USAID on the importation, storage and handling of pesticides and on a feasibility study of disposal options for unwanted pesticides and their containers. Most, if not all, of the pesticides in Guinea-Bissau were donated by multilateral and bilateral organizations and the European

Community. Generally, these pesticides had been stockpiled in the country for many years under poor storage conditions and the government was uncertain of the integrity of the products and their containers. There was no in-country capacity for analysis of pesticide formulations and there were no private-sector activities involving the manufacture, formulation or distribution of agricultural pesticides in Guinea-Bissau.

USAID made an inventory of obsolete pesticides in Guinea-Bissau. In total there were just over 9 tonnes, of which 6 400 litres were carbaryl donated in 1988 for the locust campaign in West Africa. The carbaryl (called Sevin 4-Oil) was formulated for aerial application but, because the locust outbreak was more serious in other West African countries, the spray plane and agitating pump destined for Guinea-Bissau never arrived and the carbaryl was not used. The carbaryl drums were stored in a secure warehouse and were in good condition. The active ingredient of the formulation, however, had settled and the government was unable to get the carbaryl back into suspension. This eliminated the possibility of using the product for other locust control uses, such as to coat grains, make baits or use in ground equipment.

USAID recommended returning the stocks of carbaryl to the manufacturer in the United States, who would be able to reformulate the product if it was received before the expiry of its shelf-life. The manufacturer had agreed to pay all costs, including transportation, but, in spite of this no-cost option, the government was hesitant to follow through with the return-to-sender option because of the value of the drums. The economic reality is that a new 200-litre steel drum costs from 100 000 to 200 000 pesos (US\$50 to \$100) in the local market in Bissau. Considering that a semi-skilled worker, such as a government driver, earns about 36 000 pesos a month (US\$18), the carbaryl drums are extremely valuable. No feedback has been received as to whether, in the end, the carbaryl was shipped out or not.

For the relatively small quantities of pesticides other than carbaryl, USAID recommended potentially safe alternative uses and provided sources of additional information in this respect. Many of the pesticides could be used to control pests where the exact dosage rate is not critical. For example, dichlorvos could be sprayed on the inside of walls and ceilings of mud grain storage bins to limit pest infestation, phoxim is registered for controlling stored product pests in granaries and for armyworm control and dicofol can be used against the cassava green spider mite, which was identified in 1990 as a major pest problem in Guinea-Bissau.

### **El Salvador**

In 1993, the Government of El Salvador identified significant quantities of unwanted pesticides, most of which were in deteriorating containers, at various locations around the country. They were concerned about the risks posed by these unwanted pesticides and uncertain how to assess the risks and develop appropriate mitigation options given the limited resources available in El Salvador. Assistance from USAID was requested to conduct a feasibility study of disposal options.

The causes of pesticide disposal problems in El Salvador can be linked to overstocking, poor inventory control, questionable results from formulation analysis, lost drum labels and failing containers. Other causes of problems with pesticide disposal are the wastes remaining after a pesticide formulating plant has closed, poor-quality products, poor storage conditions, excessive storage periods, lower than expected pest incidence and the banning of product use. There was no evidence that the disposal problems in El Salvador were caused by pesticide donations.

The aims of the pesticide disposal feasibility study were to: assess the risks from unwanted pesticide stocks; develop practical, cost-effective management options; provide technical guidance on these options; provide practical facility clean-up guidance; and train government officials in assessment techniques.

The team conducting the feasibility study was composed of representatives from USAID, the United States Environmental Protection Agency (USEPA), the Government of El Salvador and GTZ. The team visited eight storage/disposal sites located across the country.

At two sites, 24 800 litres of malathion were stored in containers in good condition. The malathion was purchased in 1989 for locust control and the government was concerned about the condition of the formulation. Subsequent analysis by GTZ verified that the formulation was still good. Conditions at another site appeared worse than they really were because the site was cluttered with empty containers. At three sites, pesticides had been buried.

The total amount of pesticides identified for disposal was 15 tonnes, comprising: 2 400 litres of methylethyl parathion; 800 litres of methyl parathion; 11 600 litres of liquids with no label; and 200 litres of heptachlor.

Various disposal options were reviewed and site-specific recommendations for pesticide disposal and storage clean-up were presented to the government for implementation.

Although there are storage sites in El Salvador where pesticides require disposal, the overall quantity of



pesticides identified for disposal and the risks they pose are less than in some developing countries. Under the leadership of trained government personnel using the proposed options, the clean-up of many contaminated sites and the management of unwanted stocks is technically feasible if funding is forthcoming.

The following are the lessons learnt from this activity:

- *Initial inventory.* The initial inventory conducted by the government was very helpful in terms of improving the efficiency of the team. However, it is not without problems, as evidenced by the burial of inventoried products at one site.
- *Site assessments.* It was valuable having a form developed for a site assessment and government officials present to discuss site-specific recommendations, including storage facility clean-up.
- *Funding for disposal.* This activity was a feasibility study. No additional donor funding was available to implement the recommendations.
- *Problems in implementation.* Be prepared for problems in the implementation of any operation. In El Salvador, the government official trained and most qualified to conduct a disposal operation was not allowed to participate in the actual government organized clean-up of the site that was cluttered with empty containers. Problems occurred that could have been prevented if the most knowledgeable person had been allowed to participate.

## GTZ

G. Vaagt, Project Leader

GTZ is operating a pesticide disposal project. Its objective is the development of concepts and proposals for the disposal of obsolete pesticides and their containers in an environmentally acceptable manner.

### Major project activities

The main activities of the project are:

- elaboration of strategies for managing obsolete products;
- development, testing in practice and publicizing of methods, in particular alternative technologies, suitable for implementation;
- testing and use of the disposal resources already available in the countries concerned;
- support and promotion of the transfer of information concerning experience and technologies in the developing countries;
- raising the awareness of the counterpart organization

for this environmental aspect and promoting readiness for adequate disposal;

- advancement of international cooperation;
- proposal of preventive measures to avoid future accumulation of stocks of obsolete pesticides.

### Project design

The project is a supraregional pilot project with a time frame of 1991 to 1996.

Expertise and funds for test runs, demonstration and training exercises will be contributed.

### Key issues

The main issues of the project are the promotion of preventive measures, safeguarding activities and the view of pesticide disposal as an element of pesticide management.

### Completed operations

The following pesticide disposal operations have been completed:

- The Niger, 1991, disposal of 60 tonnes of dieldrin in cooperation with USAID;
- Madagascar, 1992-93, disposal of 70 tonnes of dieldrin;
- Mozambique, 1994, disposal of 160 tonnes of obsolete monocrotophos/DDT and contaminated solids;
- Mauritania, 1994, safeguarding of approximately 30 tonnes of insecticides through redrumming.

Studies, assessments and proposals have been completed for:

- Morocco in 1992 with USAID;
- Yemen in 1993;
- Brazil in 1993-94 with other GTZ projects;
- Albania in 1993 on behalf of the German Ministry for Environment;
- El Salvador and Nicaragua in 1994;
- Zambia in 1994 with other GTZ projects.

### Ongoing activities

The following activities are ongoing:

- Benin, disposal of highly contaminated soil;
- Zambia and Tanzania, disposal of obsolete DNOC;
- The Sudan, refilling of methylbromide from usable gas cylinders into new cylinders.

### General remarks and conclusions

The following conclusions can be drawn:

- obsolete pesticides are hazardous waste;

- disposal options should be linked to the specific waste product;
- the involvement of the original producer of the pesticide should be sought.

These orientation procedures should be followed:

- careful planning (consideration of administrative delays, weather conditions, public perception, interest of the press, infrastructure, etc.);
- the link between disposal and prevention;
- training approaches, e.g. in stock management.

A video entitled *Pesticide disposal Madagascar* was produced by the project.

## FAO

H.P. van der Wulp, Consultant

### Background

Background information was provided on the FAO operation in 1993 to dispose of 50 000 litres of dieldrin that was owned by the tsetse control department of Uganda and that could not be used after its use was banned. Slides, a fact sheet, a description of the operation and the lessons learnt were presented.

The operation was subcontracted to a United Kingdom-based company with a dedicated hazardous waste incinerator. The total cost was US\$196 000, which included costs of a preparatory visit and monitoring of the operations by an independent consultant appointed by FAO.

The total input of international technical experts was three person months, including staff provided under the subcontract with the company (preparations required two persons in Uganda for 10 days and one person at FAO Headquarters for one week; field operations required two persons in Kampala for one week, four persons in the field for one week and one person at FAO Headquarters for one week). Overhead and administrative support at FAO Headquarters are not included in this figure.

In summary, the scenario for the operation included the following steps:

- preparatory visit;
- follow-up activities;
- field operations.

### Preparatory visit

It took ten days for an FAO consultant and a representative of the contracted company to:

- inspect site and stock and assess transport routes;
- check national regulations concerning the transport of hazardous waste;

- brief the ministries responsible for agriculture, foreign affairs and the environment and the hospital nearest to the site;
- assist the Ministry of Foreign Affairs on formalities concerning the Basel Convention;
- prepare a scenario for the operation, including a timetable and identification of risk factors for delays;
- prepare a final budget.

### Relevant follow-up activities

Follow-up activities involved:

- the national counterpart office, concerning import/export permits, exemption of duties and taxes and police escort for the convoy;
- FAO Headquarters for processing of the contract for Rechem;
- the contracted company for procurement and shipment of materials and equipment, preparation of shipping documents and customs formalities and transport arrangements.

### Field operations

Further preparation in Kampala took five days to ensure:

- confirmation of administrative aspects;
- establishment of a coordinating team and division of tasks and responsibilities;
- arrangements for eventualities and emergencies.

Travel to Fort Portal (centre of the contracting company) took one day, repacking and on-site clean-up activities five days and transport back to Kampala two days. It was noted that disposal costs are likely to be higher for countries that have a variety of products spread over a number of sites.

Furthermore, it was indicated that FAO is investigating possibilities for disposal operations in Yemen, Zambia, the Gambia, Senegal and Mauritania under various collaborative arrangements. In Zambia about 60 to 80 tonnes of obsolete and deteriorated pesticides are kept by the Zambian Cooperative Federation (ZCF). These are stored outside, are unsecured, are causing serious contamination and pose a threat to the Lusaka city water supply. The problem has been recognized by government and needs to be addressed urgently. Senegal and Mauritania have an estimated total of 250 000 litres of dieldrin, which is stored in the open in deteriorated drums, some of which are already leaking (see Annex 2 for a summary of disposal operations undertaken).

Chapter 4

# Evaluation of recommended disposal methods

B. Bender, UNEP/IRPTC, Geneva

In October 1994, FAO, UNEP and WHO jointly organized an expert panel meeting to review draft guidelines on the disposal of bulk quantities of obsolete pesticides in developing countries and draft guidelines on the disposal of small quantities of pesticides at farm level. Ms Bender made a brief presentation of the outline of these guidelines. The main sections of the

*Guidelines on the disposal of bulk quantities of obsolete pesticides in developing countries* are: compiling inventories; containment and storage of obsolete pesticides, including sections on the safe handling of leakage, cleaning up of contamination and safe temporary storage; evaluation of disposal techniques; and prevention.

# Activities of international organizations relevant to pesticide disposal

## UNEP/IRPTC

IRPTC was established by UNEP in 1976. Its central unit, known as the Programming Activity Centre, was set up in Geneva. After UNCED in 1992, IRPTC also became part of a newly established UNEP programme on toxic chemicals and waste management. One of IRPTC's key activities is the development of data profiles on chemical substances (including information on regulatory controls). Information is also available on recommended disposal methods for individual products and IRPTC provides a query-response service.

## BASEL CONVENTION

The following is a summary of a paper received from the UNEP Secretariat to the Basel Convention.

### Background

The Basel Convention is first and foremost a global environmental treaty that strictly regulates the transboundary movements of hazardous wastes and makes obligations on parties for ensuring the environmentally sound management and disposal of hazardous wastes.

The convention recognizes that the most effective way of protecting human health and the environment from the danger posed by such wastes is the reduction of their generation to a minimum in terms of quantity and/or hazard potential. This, together with the environmentally sound management of the hazardous wastes nonetheless generated, is the underlying philosophy behind the objectives set in the convention. In this respect, the Basel Convention stipulates three main interdependent and mutually supportive goals that have to be fulfilled:

- transboundary movements of hazardous wastes should be reduced to a minimum consistent with their environmentally sound management;
- hazardous wastes should be treated and disposed of as close as possible to their source of generation;
- hazardous waste generation should be reduced and minimized at source.

Recognizing the increasing desire and demand of the international community for the prohibition of transboundary movements of hazardous wastes and their disposal, especially in developing countries, the second meeting of the Conference of the Parties, held from 21 to 25 March 1994 in Geneva, less than two years after the entry into force of the convention (May 1992), adopted a decision establishing the immediate prohibition of all transboundary movements of hazardous wastes that are destined for final disposal from OECD to non-OECD countries.

The transboundary movement of hazardous wastes destined for recycling or recovery operations is to be phased out by 31 December 1997 and prohibited as from that date. This transitional period has been seen as necessary to enable those concerned with such movements to take appropriate measures consistent with the environmentally sound management of wastes.

At its second meeting the Conference of the Parties adopted 27 decisions which constitute a comprehensive work programme in the sphere of the environmentally sound management of hazardous wastes and which contain legal, technical and financial components that are essential for the effective and efficient implementation of the Basel Convention. The mandate of the Legal Working Group was extended in order to finalize its work on a protocol on liability and compensation to be submitted to the next meeting of the Conference of the Parties scheduled for September 1995. The conference adopted a manual to facilitate the implementation of the convention and a strategy to prevent and monitor illegal traffic in hazardous wastes. The parties have also accepted a model national legislation in order to assist parties and non-parties to revise their national legislation in relation to the management of hazardous waste.

Decisions were taken to pursue the selection of sites for the establishment of regional centres for training and technology transfer regarding the management of hazardous wastes and the minimization of their generation and on assisting parties to develop training

programmes on the implementation of the convention and the environmentally sound management of hazardous wastes. One of the main tasks of the secretariat is to cooperate with, assist and respond to the needs of the parties in the implementation of the convention and of the decisions adopted by the meetings of the Conference of the Parties. In view of the fact that the implementation of the convention and its supporting decisions also have an impact on countries that are not Party to the Convention, the secretariat plays an active role in assisting them or by providing information or guidance on the environmentally sound management of hazardous wastes and its related institutional and legal requirements.

#### WHO

H.R. Rathor, Regional Adviser, Chemical Safety and Vector Biology and Control, WHO/EMRO

WHO publishes health and safety guides that contain data for individual products. These guides are very useful as reference material when organizing disposal operations.

A special report was presented by Mr Rathor, Regional Adviser on Chemical Safety and Vector Biology and Control, at the WHO Eastern Mediterranean Region Regional Office (WHO/EMRO). In his presentation, Mr Rathor provided some examples of obsolete stocks in the Sudan, Yemen and Pakistan (see also p. 10-12 and p. 13-16).

It was emphasized that most developing countries do not have the technical and financial resources to arrange for shipment to a dedicated hazardous waste incinerator in a developed country. In this connection, Mr Rathor stressed the importance of conducting analysis before declaring pesticides obsolete. Products may not have completely lost their efficacy and may still be usable. For instance, old stocks of DDT, malathion and fenitrothion could possibly still be used for public health programmes if analysis would confirm that they are still safe and usable, even at reduced efficacy.<sup>1</sup> Use of such pesticides would make great savings on expensive disposal operations and on the importation of pesticides for public health programmes. Such analysis could be requested from a WHO collaborating centre for pesticide analysis.

<sup>1</sup> Malathion should be tested for the presence of isomalathion, a breakdown product that increases the product's toxicity and may make it unsuitable for a variety of purposes.

The importance of cooperation among WHO, UNEP and FAO on this matter was underlined.

#### FAO

G.E. Wyrwal, Agricultural Officer (Pesticide Information), Plant Protection Service, AGPP, FAO

#### The code of conduct on the distribution and use of pesticides

The objectives of the code are to set forth responsibilities and establish standards of conduct for all public and private entities engaged in or effecting the distribution and use of pesticides, particularly where there is little or no adequate national law to regulate pesticides. The code describes the shared responsibility of governments, industry, trade and international institutions to work together so that the benefits obtained from the necessary and acceptable use of pesticides are achieved without significant adverse effects on people or the environment. The standards of conduct set forth by the code encourage responsible trade practices and assist countries to establish controls that regulate the quality and suitability of pesticide products needed in the country and to address the safe handling and use of such products. The code of conduct is voluntary, its basic function is as a point of reference, particularly until such time as countries have established adequate regulatory infrastructures for pesticides.

The panel is composed of four working groups: the group on pesticide specifications; the group on registration requirements; the group on application standards; and the joint FAO/UNEP group on prior informed consent.

The expert group on pesticide specifications meets annually to review proposed specifications which have been prepared through consultations with government scientists, the pesticide industry through GIFAP and, when appropriate, with individual manufacturers. By mid-1994, 170 specifications were available. To facilitate the development and use of these specifications, FAO published a *Manual on the development and use of FAO specifications for plant protection products*. The manual contains detailed definitions and other background information on basic procedures and technical principles. It provides advice, instruction and information to all those involved in the development or application of specifications for plant protection products.

#### FAO specifications for plant protection products

FAO specifications are published for pesticides and

related formulations with the objective of ensuring, as far as possible, that the pesticides complying with them are satisfactory for the purpose for which they are intended. Specifications provide: a basic standard of quality for the buying and selling of pesticides; assistance in the official approval and acceptance of pesticides; assistance to manufacturers in dealing with national and other specifications; and cover protection for vendors against inferior products and against the linkage between biological efficacy and specification requirements.

The FAO specifications for plant protection products are designed to reflect generally acceptable product standards. They may be used as an international point of reference against which products can be judged, either for regulatory purposes or in commercial dealings, thus helping to prevent trade in inferior products. They define the essential chemical and physical properties linked to certain biological requirements for a product and are also useful references for analysing old products to determine whether they are still usable. For a list of FAO specifications see Annex 3.

#### **Guidelines on good labelling practice**

The guidelines provide detailed advice for the preparation of labels and incorporate information on pictograms. They are separated into four sections which:

- identify the objectives in preparing a label;
- identify the information that must appear on the label;
- provide instructions on writing labels that are of maximum clarity and that take into consideration the knowledge of users;
- discuss toxicity and hazard classifications and product/user categories.

They also include examples of labels, hazard statements, agricultural practice statements and summaries of specific and generic label contents. Poor labels are a reason for pesticides not being used and becoming obsolete. Compliance with the FAO guidelines will help avoid this.

#### **Guidelines on tender procedures for the procurement of pesticides**

The code of conduct does not address the issue of procurement procedures as such, however, it does make specific reference to the conditions or factors which must be considered in tendering, bidding and purchasing products. The draft guidelines on tender procedures for the procurement of pesticides attempt to identify and include certain basic principles and practices that are of

fundamental importance to all procurement operations. They were developed by a task force and were the subject of a workshop in Montpellier in April 1994. The guidelines are published as provisional guidelines and are subject to approval in the near future.

The objective of the guidelines is to address the basic principles and practices that should be followed by those procuring and supplying pesticides and they are designed to ensure that pesticides obtained are of the quality required, that they are adequately packaged and labelled and that the cost of the selected product is justified. Guidelines should be used not only by private procurers but also, or perhaps mainly, by relevant government agencies and others concerned and should be acceptable at both the national and international level.

For copies of *Guidelines on tender procedures for the procurement of pesticides*, *List of guidelines developed in support of the FAO code of conduct on the distribution and use of pesticides* and *Code on specifications for plant protection products* requests may be sent to the Chief, Plant Protection Service, FAO, Viale delle Terme di Caracalle, Rome, Italy.

#### **Pesticide bank**

G.E. Wyrwal, Agricultural Officer (Pesticide Information), Plant Protection Service, AGPP, FAO

**Background.** A pesticide bank arises out of three main factors:

- previous locust campaigns have resulted in strategic stocks accumulating in many affected countries;
- strategic stocks have also accumulated in countries where infestation was probable;
- in some cases declining locust infestation has left large quantities of unused stocks of insecticides or the total quantity and type of formulation did not allow full use of the stocks.

**Modalities of the pesticide bank.** The control activities to be carried out by the pesticide bank's national and/or international implementing authority comprise:

- continuous monitoring of the insecticide stocks available in countries that are endangered by desert locusts;
- continuous monitoring of the consumption of insecticides per day, per week and per fortnight;
- continuous monitoring of scheduled insecticide shipments;
- in the case of a clearly foreseeable shortage of

insecticides, the release of a shipment from the pesticide bank;

- replenishment of the pesticide bank as necessary.

**Tender procedure.** The procedures for tender are as follows:

- quantities are variable;
- there are no storage costs as there are no formulated products;
- promised delivery to airport and departure within three days;
- delivery to all relevant airports of locust-affected countries;
- the contract is valid for 180 days;
- replenishment of stock guaranteed for one year with the same options.

**Problems.** The pesticide bank faces the following problems and issues:

- the price per litre, including transport, is around US\$2 higher compared to standard tender, fixed destination and normal delivery after order procedures;
- sufficient financial resources are required;
- financial resources cannot be tied to specific countries;
- funds are to be as flexible as possible in order to keep open the possibility of delivering to any country in urgent need of insecticides;
- donors have to realize that special funds (expendable equipment) are required for this purpose.

**Negotiations.** The price per unit can be reduced through regular renewal of tender procedure for the pesticide bank. The pesticide bank should not be contracted to just one company; regular tender should continue. Towards the end of the locust plague, there was an indication that:

- transport costs can still be optimized through full, instead of partial, loading of the aeroplane and through the use of freight aircraft with huge pesticide tanks;
- transport costs per unit of insecticide can be optimized.

**Advantages of the pesticide bank.** A pesticide bank has the following advantages:

- no storage of pesticide is required, not even at the point of manufacture;
- close monitoring of stock consumption and scheduled

shipments mean that undesired shipment of pesticides (oversupply) is unlikely to occur;

- at the end of the plague there is no obsolete stock and no disposal or related costs;
- pesticide companies are very interested in getting orders from pesticide banks, even though delivery terms and costs are different;
- options include no obligation to buy the order if it was not used and extensions to the period for which the contract is valid, beyond the usual six months;
- even though additional costs of US\$2 per litre are incurred by the pesticide bank, these are likely to be outweighed by savings on costs that would otherwise be incurred for the disposal of obsolete stocks or repair of damage caused by heavy contamination of soils and water as a result of leaking obsolete stocks.

# Donor policies on pesticide donations: pest and pesticide management

R.C. Hedlund, Integrated Pest Management adviser, USAID

This paper was initially prepared for USAID by Rich Tobin, Winrock International. It examines the environmental consequences of the pesticide policies of bilateral donor agencies that are designed to promote agricultural trade or production in sub-Saharan Africa. The analysis focuses on bilateral development assistance in France, Germany, Japan, the United Kingdom and the United States.

Particular attention is paid to USAID policies from 1961 to the present. In the 1960s, USAID was reluctant to impose United States values or policy preferences on recipients of United States assistance. Throughout the decade, USAID allowed all recipients of its assistance to purchase any pesticides they desired and to determine how these pesticides would be used within their borders. In 1971, USAID developed a “positive list” of commodities, including pesticides that were eligible for agency financing.

By 1994, the approved list contained more than 90 different active ingredients available in almost 275 different package and unit sizes. From July 1972 until March 1976, USAID financed approximately 9 000 tonnes of pesticides. In 1995, four United States environmental groups filed suits against USAID alleging the agency had been negligent in considering the potential environmental impacts of its procurement of pesticides. USAID lost the suit and was required to prepare an environmental impact statement on its pesticide procurement policies. One result of this was USAID’s decision to issue comprehensive regulations governing the environmental assessment of all its activities, including pesticide procurement.

Final regulations were published in 1976 (in 22 Code of Federal Regulations, Part 216) and are referred to as Reg. 16. The regulations strongly discourage procurement of pesticides for purposes other than specific project assistance. Since the publication of Reg. 16, only one non-project assistance procurement of pesticides has been approved, for the emergency use of pesticides in a disaster relief programme in Bolivia.

USAID hopes that Reg. 16 will encourage bilateral donors, especially Japan which provides as much as 50 to 75 percent of total imports of pesticides to many African countries, to follow its example.



# Draft guidelines on prevention of accumulation of obsolete pesticide stocks

H.P.H. van der Wulp, Consultant, FAO

With the exception of a few newly industrialized countries, none of the developing countries have facilities for the safe and environmentally sound disposal of obsolete, unwanted and banned pesticides, and they cannot afford to ship them abroad for destruction in a dedicated hazardous waste incinerator. Countries with obsolete pesticides are stuck with them so more and more of them are requesting donors and aid agencies for financial and technical assistance in disposing of their obsolete stocks. Although agencies may be prepared to provide financial or technical assistance with the clean-up of present obsolete stocks, it is unlikely, and undesirable, that they will establish a regular system of assisting with the clean-up of obsolete stocks that accumulate in the future. The longer-term solution to disposal problems lies in preventing accumulation of obsolete pesticide stocks.

Both UNCED's *Agenda 21: Chapter 20* on environmentally sound management of hazardous waste, and the Basel Convention on the Control of Transboundary Movements of Hazardous Waste and their Disposal, put heavy emphasis on the importance of avoiding the generation of hazardous waste.

To assist parties in preventing obsolete pesticide stockpiles, FAO is preparing guidelines on prevention of accumulation of obsolete pesticide stocks. These guidelines will supplement technical guidelines on the disposal of bulk quantities of obsolete pesticides, which are currently being prepared jointly by FAO, UNEP and WHO. Initially, the guidelines on prevention are being distributed as a project publication and have the title of provisional guidelines.

The provisional guidelines start with a description of the magnitude of the problem followed by an overview of causes of accumulation. These fall roughly into six categories:

- regulatory and administrative measures;
- donations or purchases in excess of requirements;
- unsuitable products;
- inadequate stores and poor stock management;

- inadequate coordination by aid agencies;
- commercial interests of the pesticide industry and hidden factors.

Recommendations containing both technical and policy elements address:

- the governments of developing countries;
- donor countries and aid agencies;
- the pesticide industry.

The main recommendations are to:

- keep stocks as small as possible by:
  - i) reducing pesticide use, where possible;
  - ii) avoiding overstocking;
  - iii) evaluating distribution systems;
  - iv) reducing surplus stocks and other not directly usable stocks.
- avoid getting inappropriate products;
- ensure proper storage and handling;
- anticipate the effects of banning products.

In addition, donors and aid agencies are recommended to improve coordination with recipient countries, with other agencies and within agencies themselves.

Other FAO activities relevant for prevention include tender guidelines and the development and introduction of the pesticide bank concept.

# The role of FAO in mechanisms for international cooperation

A. Wodageneh, Project Coordinator

## GLOBAL VIEW OF THE PESTICIDE SITUATION

The German Association of Chemical Industries 1993-94 annual report, indicates that the value of world chemical pesticides sold was 37 billion deutsche marks, which at the current rate of exchange is about US\$ 23 000 million. The distribution of this value by region is summarized in Table 2 and Figure 1.

Effective and efficient use of pesticides depends on the ability, awareness and expertise of the ultimate users. In Africa, where almost 90 percent of the

population depend on farming and farming related activities for their livelihoods and where there is little or no information on the inherent implications of pesticides, a large proportion of imported chemical pesticides are wasted. Of the total figure of US\$672 million-worth of pesticides imported into Africa in 1993-94, at least 40 percent, or US\$269 million-worth, might have been wasted. Part of this may have been lost through inefficient application and part might have become obsolete. Such incidents aggravate the already grave issue of obsolete pesticides.

Examples of the seriousness of the problem can be taken from on-site examinations and from various documented pictures taken where serious incidents of obsolete pesticide problems existed.

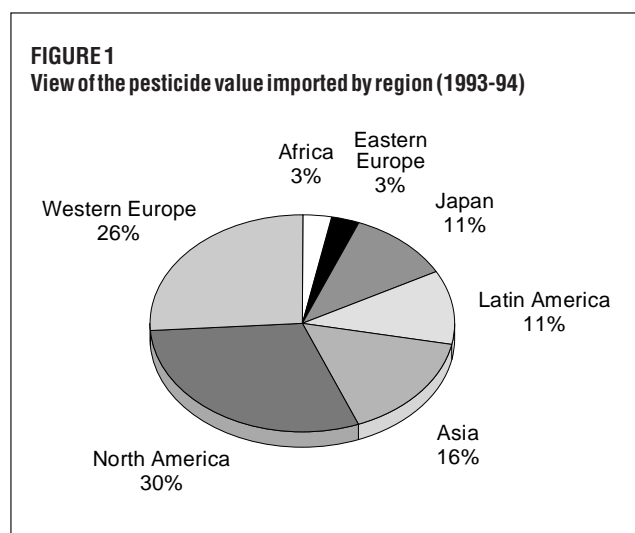
Most of the affected countries that realize the urgency and seriousness of the problem are totally incapable of solving the problems by themselves and are constantly submitting requests for assistance. Invariably all countries need expertise, appropriate guidance and financial backing. The weekly *Time* magazine recently reported that sub-Saharan Africa, with a population of almost 500 million, produces less than Belgium, with a population of only 10 million, and exports less than Hong Kong, whose population is only 5 million. Africa needs help because it has the most serious problem from obsolete pesticides as a by-product of the pesticide treadmill and one of the causes of seriously curtailed development in food production resulting from basic ecological interferences.

Some of the basic problems relating to pesticides have been summarized with suggested solutions in Annex 5. The provision of means and ways for comprehensive control and for achieving the objectives will only be possible if an international collaborative undertaking is made. Otherwise the problems will remain with no solution in sight.

In seeking a solution and in attempting to develop mechanisms and approaches for international cooperation in prevention and disposal of obsolete

TABLE 2  
Summary of the value of pesticides imported by region (1993-94)

Region	Market share (%)	Value (million US\$)
Africa	3	672
Eastern Europe	3	672
Japan	11	2 464
Latin America	11	2 464
Asia	16	3 584
Western Europe	26	5 824
North America	30	6 720
<b>Total</b>	<b>100</b>	<b>22 400</b>



pesticides, FAO is well set to play a role in providing criteria and a forum for collaboration and coordination. Such a forum should have a purpose, a common goal and a common front for a common problem.

### SCOPE FOR COOPERATION AND COORDINATION

H.P. van der Wulp, Consultant, FAO

#### Pesticide disposal issues

Pesticide disposal issues are receiving increasing international attention and political support. They are no longer seen as negative efforts that consume development funds but rather as a necessary way of avoiding disasters that would otherwise have serious repercussions on the development process of affected countries. There is a growing consensus that disposal problems should be regarded as an international environmental issue requiring a concerted effort from the donor community.

The increasing international attention is reflected in the number of important international policy documents that emphasize the urgency of the problem and the need for donors to act. Such policy documents include:

- UNCED, *Agenda 21: Chapter 20 (Environmentally sound management of hazardous wastes including prevention of illegal international traffic in hazardous waste)*;
- UNEP, *Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal*;
- OECD, *Guidelines for aid agencies on pest and pesticide management*, 1995;
- World Bank, *Guidelines and best practice No. 4.03; Agricultural pest management*, 1993;
- Lomé IV, Title 1; Article 40;
- ACP-EEC Resolution ACP-EEC 722/92/fin;
- ACP-EEC Resolution ACP-EEC 971/93.

These documents give shared responsibility to donors, aid agencies and recipient countries to clean up the present obsolete stocks and to avoid a buildup of new obsolete stocks.

The problem of obsolete pesticide stocks has also been recognized by the pesticide industry. The International Group of National Associations of Agrochemical Manufacturers (GIFAP) published a booklet on the issue; Shell assisted with the clean-up of dieldrin in the Niger and Madagascar; several companies cleaned up some of their own stores in Africa. There are also indications of a new development in the Philippines, where companies are apparently buying

back stocks of endosulfan after the use of the product was banned.

The importance of cooperation and coordination has been stressed. The Madagascar and Uganda operation benefited from the experience gained in the Niger, leading to a cost reduction from about US\$640 000 in the Niger to US\$196 000 in Uganda.

At several international fora, FAO has been asked to facilitate and coordinate activities aimed at the prevention and disposal of stocks of obsolete pesticides. In reply to these requests FAO initiated the current project and the meeting on prevention and disposal of obsolete and unwanted pesticide stocks in Africa and the Near East was one of its activities.

A presentation was made of FAO's perception of its coordinating role in enhancing cooperation in prevention and disposal of stocks of obsolete pesticides. The presentation was a starting point for further discussion of FAO's role and the outcome of the discussion provided the following set of functions.

#### Reference centre

FAO should act as a reference centre for information on:

- detailed stock records;
- experiences of strategies to prevent the accumulation of obsolete pesticide stocks;
- experiences of disposal methods;
- experiences of disposal contractors;
- laboratory services for sample analysis;
- experiences of disposal operations;
- organization, logistics, timing and budgets;
- required material and equipment;
- administrative matters, such as the Basel Convention.

#### Raise awareness among FAO Member States

FAO should undertake activities to raise awareness among developing countries, donor countries and aid agencies of the problems related to obsolete pesticides, and promote policies and strengthen capabilities in prevention of accumulation of obsolete pesticide stocks in developing countries.

#### Enhance cooperation and coordination

FAO should organize annual meetings for donors and aid agencies involved in, or interested in, pesticide disposal. The objectives of such meetings will be to:

- exchange information, experience and lessons learnt;
- explore cooperation on ongoing activities;
- act as a think-tank on disposal and prevention strategies.

### **Initiation and/or implementation of disposal operations**

The initiation of disposal operations involves identifying stocks that require urgent repacking and/or disposal and bringing these to the attention of donors. Where necessary the following will be required:

- assessment of the costs of specific disposal operations;
- preparation of scenarios for specific disposal operations;
- bringing together interested donors to fund specific disposal operations (donors then either implement such operations themselves, or request FAO to organize the operation);
- establishment of a portfolio of urgent operations (including a description of the problem, the proposed disposal method and an assessment of costs). Donors can then fund specific projects from the portfolio.

The implementation of disposal operations involving donors who do not want to organize such operations themselves requires the contracting of a disposal firm and the monitoring of the operation. A trust fund could be established for this purpose.

### **Interest**

There was general interest in the portfolio formula. It was indicated that portfolio projects should have an indicative budget and timetable, that the budget should be broken down as much as possible and that background and justification should be given. Furthermore, it was mentioned that it might be useful to describe the history of the problem and the origin of the pesticides. It would also help if reference were made to national and international obligations under treaties and conventions (e.g., if there is a risk for wetlands, refer to the Ramsar Convention) and to the environmental and health hazards, along with a cost estimate of damage likely to be caused if no action is taken. Proposals for disposal operations can, in most cases, best be presented to the missions of aid agencies in the countries concerned.

GTZ, the Overseas Development Agency National Resources Institute (ODA/NRI) and the WHO Regional Office in Alexandria, agreed to send information to FAO concerning their analytical facilities. They will also send their sampling instructions.

The WHO Regional Office in Alexandria expressed its interest in organizing a regional workshop on the prevention of the accumulation of obsolete pesticide stocks.

In reply to questions concerning the role of industry,

it was explained that FAO is planning a separate meeting with GIFAP early in 1996. Participants asked to be informed about the outcome of the meeting with GIFAP and it is expected that this association of the chemical industries will produce something tangible.

It was generally felt that both the pesticide industry and the NGO sector should be involved in the next meeting.

To enhance the exchange of information it was suggested that participants actively involved in the preparation and implementation of disposal operations keep in regular contact with each other through E-mail or otherwise.

FAO was requested to make a checklist of guide lines on disposal operations. This checklist could be updated or improved every time new lessons are learnt. Agencies interested in organizing disposal operations could then request the latest version of the checklist from FAO.

### **Triangulation**

A discussion was held on triangulation. Triangulation refers to arrangements in which a donor funds the repacking and movement of a stock of pesticides from a country that has an excess stock to a country in direct need of the product concerned. There is little experience with this type of arrangements and it was concluded that such arrangements have a potential to decrease excess stocks, but that there is a risk that they be used by one country to dump bad stocks on others. It was also feared that such practices would not encourage preventive measures. It was pointed out that triangulation arrangements may be difficult in cases of liability when it may not be clear who should be responsible if anything happens with pesticides during transport.

However, the concept of triangulation could be interesting in some specific cases. Arrangement to minimize the risk of abuse could include:

- repacking into new containers specified by the recipient country;
- a certificate of analysis by an independent laboratory to be submitted to the recipient country prior to shipment of the stock;
- provision of samples to the recipient country, prior to shipment of the stock.

## Chapter 9

# Conclusions

Delegates<sup>2</sup> who attended the consultation meeting held in Rome from 12 to 14 December 1994 organized under the auspices of FAO, unanimously adopted the following points:

- stocks of obsolete and unwanted pesticides are a serious environmental problem with international dimensions;
- a large share of these pesticides are leftovers from pesticide donations provided under aid programmes;
- all major donors and aid agencies in one way or another have been involved;
- the problem of obsolete and unwanted pesticide stocks is an international issue which recipient countries, aid agencies, donor countries and the pesticide industry have a joint responsibility to address;
- reduction and prevention of the generation of hazardous waste as called for in UNCED Agenda 21 must be a priority.

Recipient countries, donor governments, aid agencies and the pesticide industry were called upon to:

- prevent the accumulation of obsolete and unwanted pesticides by implementing the recommendations of the provisional FAO *Guidelines on prevention of accumulation of obsolete pesticide stocks*;
- support project activities to dispose of existing stockpiles of obsolete pesticides in developing countries and countries in transition in a safe and environmentally sound manner;
- strengthen capacities and capabilities in recipient countries as a primary measure to prevent accumulation of obsolete and unwanted pesticide stocks and in support of the further implementation of the *International Code of Conduct on the Distribution and Use of Pesticides*.

Requests were made to FAO to encourage and enhance cooperation and coordination among parties involved in, or interested in, addressing the problem of obsolete and unwanted pesticide stocks. This would include:

- facilitation of disposal operations for obsolete stocks;
- facilitation of the development and implementation of strategies for prevention of accumulation of obsolete and unwanted pesticide stocks;
- provision of services as a reference centre for information on pesticide disposal matters;
- organization of meetings as necessary for parties involved in, or interested in, pesticide disposal activities;
- identification of obsolete stocks that require urgent action on the basis of human health and environmental concerns, and initiation of disposal operations and strategies for prevention of accumulation of obsolete and unwanted pesticide stocks by bringing together government authorities, aid agencies and other interested parties.

Requests were also made to strengthen capacities and capabilities of developing countries and countries in transition to prevent accumulation of obsolete pesticide stocks.

<sup>2</sup> The Representative of Japan stated that he could not underwrite the resolution without clearance from the Government of Japan.

# Annexes

## 1. COUNTRIES INVOLVED

### Africa

Angola (S/E)  
 Benin (F)  
 Botswana (E)  
 Burkina Faso (F)  
 Burundi (F)  
 Cameroon (F)  
 Cape Verde (F)  
 Central African Republic (F)  
 Chad (F)  
 Congo (F)  
 Côte d'Ivoire (F)  
 Equatorial Guinea (S)  
 Eritrea (E)  
 Ethiopia (E)  
 Gabon (F)  
 Gambia (E)  
 Ghana (E)  
 Guinea-Bissau (F)  
 Guinea (F)  
 Kenya (E)  
 Lesotho (E)  
 Liberia (E)  
 Madagascar (F)  
 Malawi (E)  
 Mali (F)  
 Mauritania (F)  
 Mauritius (E)  
 Morocco (F)  
 Mozambique (E)  
 Namibia (E)  
 Niger (F)  
 Nigeria (E)  
 Rwanda (F)  
 Sao Tome and Principe (F)  
 Senegal (F)  
 Sierra Leone (E)  
 South Africa (E)  
 Swaziland (E)  
 Togo (F)  
 Uganda (E)  
 United Republic of Tanzania (E)

Zaire (F)  
 Zambia (E)  
 Zimbabwe (E)

### Near East and Africa

Algeria (F/A)  
 Bahrain (A)  
 Djibouti (A/F)  
 Egypt (A)  
 Iraq (A)  
 Jordan (A)  
 Kuwait (A)  
 Lebanon (A)  
 Libyan Arab Jamahiriya (A)  
 Morocco (F/A)  
 Oman (A)  
 Qatar (A)  
 Saudi Arabia (A)  
 Somalia (A/E)  
 Sudan (A)  
 Syrian Arab Republic (A)  
 Tunisia (F/A)  
 United Arab Emirates (A/E)  
 Yemen (A)

### Others

Afghanistan  
 Pakistan

### Notes:

(E) = English spoken  
 (F) = French spoken  
 (A) = Arabic spoken  
 (S) = Spanish spoken

## 2. OVERVIEW OF DISPOSAL OPERATIONS UNDERTAKEN

### USAID

- Pakistan Test burn in cement kiln completed
- The Niger Disposal of dieldrin completed
- Morocco Feasibility for use of cement kiln study completed
- El Salvador Reconnaissance visit and disposal advice
- Guinea-Bissau Reconnaissance visit and disposal advice

### GTZ

- Malaysia Test burn in cement kiln completed
- Zambia/Tanzania Incineration of DLCO stocks in cement kiln initiated

### Completed operations

- The Niger 1991 Disposal of 60 tonnes of dieldrin in cooperation with USAID
- Madagascar 1992-93 Disposal of 70 tonnes of dieldrin
- Mozambique 1994 Disposal of 160 tonnes of obsolete monocrotophos/ DDT and contaminated solids
- Mauritania 1994 Safeguarding of approximately 30 tonnes of insecticides through redrumming/refilling

### Completed studies, assessments and proposals

- Morocco 1992 With USAID
- Yemen 1993
- Brazil 1993-94 With other GTZ projects
- Albania 1993 On behalf of the German Ministry for Environment
- El Salvador/
- Nicaragua 1994
- Zambia 1994 With other GTZ projects

### Ongoing activities

- Benin Disposal of highly contaminated soil
- Zambia/Tanzania Disposal of obsolete DNOC
- The Sudan Refilling of methylbromide from usable gas cylinders into new cylinders

### DGIS

- Zanzibar Disposal operation under preparation

### DANIDA

- Mozambique Survey of obsolete stocks in cooperation with GTZ

### EU

- Bhutan Disposal operation under preparation

### FAO

- Uganda 1993 Disposal of dieldrin completed
- Yemen 1995-96 Preparations for disposal operation ongoing

### 3. FAO SPECIFICATIONS FOR PLANT PROTECTION PRODUCTS

CODE:AGP:CP/		DDT (emulsions)	72
2,4-D	310 <sup>2</sup>	DDT + gamma - HCH	94
2,4,5-T	100	DDT+parathion-methyl+camphechlor	68
2,4-DB	100	deltamethrin	243
2,4-D + 2,4,5-T	100 <sup>3</sup>	demeton	54
2,4-DB + MCPA	100 <sup>3</sup>	demeton-S-methyl	54
2,4-D + dichlorprop	100 <sup>3</sup>	desmetryn	87
2,4-D + mecoprop	100 <sup>3</sup>	diazinon	223
2,3,6-TBA	100	dicamba	59
alachlor	300 <sup>1</sup>	dichlofluanid	240
aldicarb	219	dichlorprop	100
aluminium phosphide	244	dichlorprop + MCPA	100 <sup>3</sup>
ametryn	61	dichlorvos	239
amitrole	81	dimefox	74
atrazine	61	dimethoate	246
azinphos-ethyl	242	dinobuton	207
azinphos-methyl	242	dinoseb	79
benomyl	204	dinoterb	248
bentazone	307 <sup>2</sup>	dioxathion	212
bifenox	308 <sup>2</sup>	diquat	50
bioresmethrin	210	disulfoton	232
bromacil	309 <sup>2</sup>	diuron	93
bromophos	70	DNOC	79
butachlor	208	DNOC with petroleum/oil products	79
camphechlor	43	D-Transallethrin	80
captafol	205	dodine	236
captan	249	endosulfan	228
carbaryl	231	endrin	46
carbendazim	220	ethion	201
carbetamide	225	ethoxyethylmercury chloride	
chlorbenseide	56	seed treatments (tentative)	86
chlordane	47	ethoxyethylmercury	
chlorfenvinphos	66	silicate seed treatments (tentative)	86
chlorotoluron	245	fenitrothion	233
chlorpropham	73	fenoprop	100
chlorpyrifos	203	fenoprop + mecoprop	100
chlorthiamid	67	fenthion	234
copper		fentin acetate	238
ammonium carbonate	251	fentin hydroxide	238
copper carbonate basic	251	fenvalerate	305 <sup>1</sup>
copper oxychloride	251	ferbam	82
copper sulphate	251	fluchloralin	211
cuprous oxide	251	fluometuron	245
cyanazine	226	folpet	227
dalapon sodium salt	75	gamma-BHC(emulsions)	72
DDT	37	(gamma-BHC lindane grade)	247
DDT + camphechlor	68	gamma-HCH	94



gamma-HCH (lindane) seed treatments	95	parathion-methyl	241
gamma-HCH + captan	95	permethrin	306 <sup>1</sup>
gamma-HCH + mercury seed treatments(tentative)	95	petroleum oil products	69
gamma-HCH+thiram/seed treatments	95	phenmedipham	90
glyphosate	301 <sup>1</sup>	phenthoate (tentative)	89
glyphosate (correction)	311 <sup>2</sup>	phenylmercury acetate seed treatments(tentative)	86
HEOD (Dieldrin)	36	phosalone	230
HEOD(dieldrin)+mercury seed treatments(tentative)	95	piperonyl butoxide	39
heptachlor	47	pirimiphos-methyl	221
HHDN (Aldrin)	38	prometryn	61
isoproturon	250	propachlor	303 <sup>1</sup>
lime sulphur	58	propanil (tentative)	92
lindane	247	propargite	206
linuron	93	propazine	61
magnesium phosphide	244	propham	73
malathion	229	propineb (tentative)	97
mancozeb(tentative)	85	propoxur	65
maneb	82	Pyrethrum	39
MCPA	312 <sup>3</sup>	schradan	74
MCPA + MCPB	100	seed treatment formulations containing gamma-HCH	95
MCPB	100	seed treatment gamma-HCH+mercury	95
mecarbam	200	simazine	61
mecoprop	100	smoke generators	
mercurial seed treatments (tentative)	86	and tablets containing DDT	94
metam-sodium	82	sodium chlorate	75
metamitron	313 <sup>2</sup>	sulphur	58
methoxychlor (tentative)	91	terbutylazine	304 <sup>1</sup>
methoxyethylmercury chloride seed treatments (tentative)	86	terbutryn	61
methoxyethylmercury silicate seed treatments (tentative)	86	thiometon	78
metolachlor	302 <sup>1</sup>	thiram	82
metribuzin	314 <sup>2</sup>	thiram (seed treatments)	95
metroprotryn	61	trichlorfon	237
mevinphos (tentative)	96	trifluralin	235
monocrotophos	224	zineb	82
monuron	93	ziram	82
naled	202		
nicotine	77		
nicotine sulphate	77		
oxydemeton-methyl	98		
paraquat	50		
parathion	241		

## Notes:

<sup>1</sup> = in AGP: CP/various 1992<sup>2</sup> = in AGP: CP/307-314<sup>3</sup> = in view of the new specifications for 2,4-D + MCPA, the validity of these specifications is under review

Data are as of December 1994

#### **4. GUIDELINES DEVELOPED IN SUPPORT OF THE FAO CODE OF CONDUCT ON THE DISTRIBUTION AND USE OF PESTICIDES**

1. The registration and control of pesticides (1985)
2. Addenda to the registration and control of pesticides (1988) to be incorporated with No. 1
3. Initial introduction and subsequent development of a simple national pesticide registration and control scheme (1991)
4. Legislation on the control of pesticides (1989)

##### **Guidelines related to the development and evaluation of data considered in the registration process**

5. Efficacy data for the registration of pesticides for plant protection (1985)
6. Pesticide residue trials to provide data for the registration of pesticides and the establishment of maximum residue limits (1986) superseded by No. 23
7. Revised guidelines on environmental criteria for the registration of pesticides (1989) superseded in part by No. 22
8. Post-registration surveillance and other activities in the field of pesticides (1988)

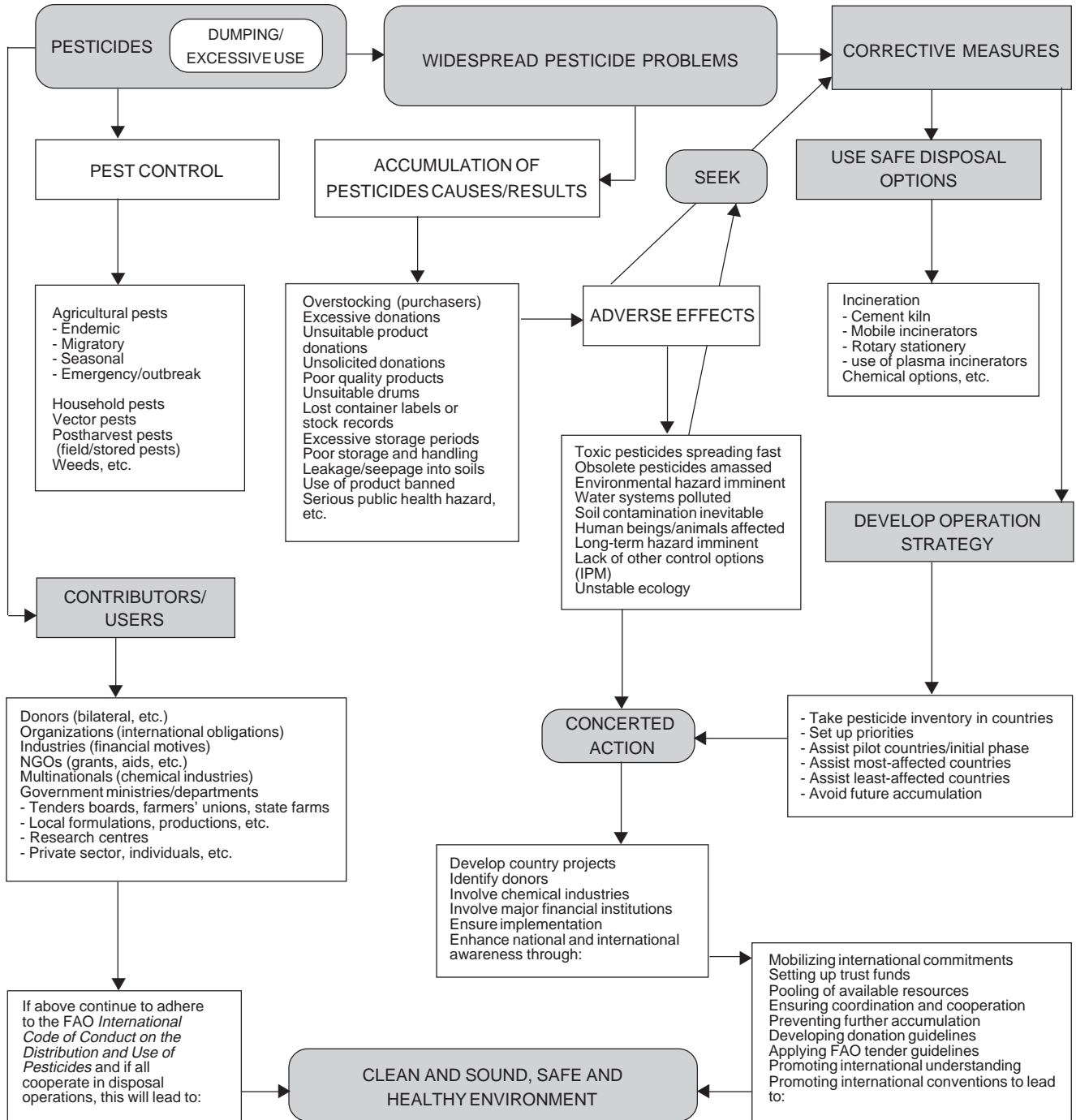
##### **Guidelines developed in support of post-registration activities**

9. Retail distribution of pesticides with particular reference to storage and handling at the point of supply to users in developing countries (1988)
10. Revised guidelines on good labelling practice (1994) this GL superseded: Good labelling practice for pesticides (1985) and Pictograms for pesticide labels (1988)
11. The packaging and storage of pesticides (1985) superseded in part by No. 19
12. Good practice for ground and aerial application of pesticides (1988)
13. Personal protection when working with pesticides in tropical climates (1990)
14. Disposal of waste pesticides and pesticide containers on the farm (1985) superseded by No. 20
15. Registration of biological pest control agents (1988)
16. Provisional guidelines on tender procedures for the procurement of pesticides (1994)
17. Manual on the development and use of FAO specifications for plant protection products Third Edition, FAO Plant Production Paper No. 85 (1987) superseded by No. 18
18. Manual on the development and use of FAO specifications for plant protection products Fourth Edition, FAO Plant Production Paper

##### **New guidelines under development**

19. Guidelines on safe handling of pesticides during formulation, storage, transport and sale
20. Disposal of pesticide containers and small quantities of pesticides wastes: guidance for small farmers and extension services
21. Disposal of bulk quantities of pesticides in developing countries
22. Annex to the FAO guidelines on environmental criteria for the registration of pesticides
23. Guidelines on producing pesticides residues data from supervised trials (1990)

5. SOLUTIONS TO THE PESTICIDE TREADMILL THAT AFFECTS DEVELOPING COUNTRIES



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## 7. TIMETABLE OF THE CONSULTATION MEETING

### Lebanon Room, FAO Headquarters, Rome; 12 to 14 December 1994

Monday 12 December	Tuesday 13 December	Wednesday 14 December
<b>9.15-9.30 am</b>	<b>9.00-9.45 am</b>	<b>9.00-10.00 am</b>
Opening and welcome <b>W.G. Sombroek</b> , Director AGL	Disposal methods: summary of conclusions concerning disposal of bulk quantities of pesticides by FAO, UNEP and WHO drawn from the Expert Panel in Pesticide Disposal, Geneva, October 1994 <b>B. Bender</b> , UNEP	Mechanisms and approaches for international cooperation in prevention and disposal of obsolete pesticides and the role of FAO <b>A. Wodageneh</b> ; <b>H.P. van der Wulp</b>
<b>9.30-10.00 am</b>	<b>9.45-10.30 am</b>	<b>10.00-10.30 am</b>
Election of Chairman and Rapporteur Adoption of Agenda	Short introductions from representatives of international organizations on their activities relevant to disposal issues relevant issues to disposal, etc. <b>B. Bender</b> , UNEP; <b>H. Rathor</b> , WHO; <b>Others</b> , TBA	Coffee break
<b>10.00-10.30 am</b>	<b>10.30-11.00 am</b>	<b>10.30 am - midday</b>
Coffee break	Coffee break	Discussion on cooperation and coordination
<b>10.30-11.00 am</b>	<b>11.00 am - midday</b>	<b>Midday - 12.30 pm</b>
Introduction to the meeting, objectives of the meeting and presentation of FAO project "Prevention and disposal of obsolete pesticide stocks in Africa and the Near East" <b>A. Wodageneh</b> , Project Coordinator (GCP/INT/572/NET)	Short introductions from representatives of technical departments in FAO on activities relevant to disposal issues <b>N.A. van der Graaff</b> , Chief Plant Protection Service FAO specifications for plant protection services Tender guidelines on procurement of pesticides <b>G. Wyrral</b> , Plant Protection Service Pesticide bank arrangements to reduce on-site pesticide stocks for locust control	Conclusions and statements from participants
<b>11.00 am - midday</b>	<b>Midday - 2.00 pm</b>	<b>12.30-1.00 pm</b>
Presentations by representative of regional organizations in Africa and the Near East <b>E. Byaruhanga</b> , IRLCO-CSA; <b>G. Butrous</b> , Sudan; <b>A. Karrar</b> , DLCO-EE	Lunch break	Formulation of draft recommendations by the Secretariat
<b>Midday - 12.30 pm</b>	<b>2.00-2.30 pm</b>	<b>1.00-2.00 pm</b>
Presentation of first results of the FAO inventory of obsolete stocks in Africa and the Near East <b>A. Wodageneh</b>	Presentation of draft guidelines on prevention of accumulation of obsolete pesticide stocks <b>H.P. van der Wulp</b>	Lunch break
<b>12.30-2.00 pm</b>	<b>2.30-3.30 pm</b>	<b>2.00-2.30 pm</b>
Lunch break	Discussion on draft guidelines on prevention of accumulation of obsolete pesticide stocks	Adoption of recommendations Date of next meeting
<b>2.00-3.30 pm</b>	<b>3.30-4.00 pm</b>	<b>2.30 pm</b>
Experiences of pesticide disposal Presentations by agency representatives on planned/ongoing/finalized disposal activities <b>J.K. Jensen</b> , USAID/USEPA; <b>G. Vaagt</b> , GTZ pesticide disposal project; <b>H.J. van der Wulp</b> , FAO; <b>Others</b>	Coffee break	Closing
<b>3.30-4.00pm</b>	<b>4.00-5.00 pm</b>	
Coffee break	To be announced	
<b>4.00-5.30 pm</b>		
Experience with disposal operations, continued Discussions		
<b>5.30-8.00 pm</b>		
Cocktails		