ISSN 1020-4105

FAO PESTICIDE DISPOSAL SERIES 11

Country guidelines

Food and Agriculture Organization of the United Nations

Contents

Chapter 1

Background

Almost every developing country and economy in transition has stocks of obsolete pesticides. These pesticides have no use in their current location or have become unusable for various reasons.

All pesticides are hazardous to some degree and, particularly if they are misused or overused, can cause harm to human health and the environment. Obsolete pesticide stockpiles present additional hazards because they may include out-dated chemicals that have been banned because of their toxic effects, or the pesticides may have deteriorated, causing particular danger to human beings and the environment.

Prevention of obsolete pesticide stockpiles is essential and depends on the collaborative efforts of governments, pesticide manufacturers and distributors, international organizations, non-governmental organizations (NGOs), donors and end-users themselves. No single entity can solve the problem on its own. However, historical factors have led to the accumulation of obsolete pesticide stockpiles in many countries and the situation now needs to be urgently addressed. Delays will aggravate current problems by incurring further deterioration of stocks, causing more harm to public health and the environment.

Dealing with obsolete pesticides in an appropriate manner is costly and technically complex and external assistance from outside the country concerned is inevitably needed. Obtaining such assistance can be a lengthy process and may not always be successful.

While a country is seeking and awaiting this external assistance much can be done to prepare for the eventual cleanup operation. This preparatory work can also stabilize the situation so that any further environmental contamination and health hazards from leaking pesticides are halted.

A country that takes appropriate action before approaching donors demonstrates a commitment to solving the problem of obsolete pesticides and to preventing their recurrence. Donors view this positively. In addition, taking appropriate action early will reduce the costs of cleanup operations and help to build capacity in the country for the management of pesticides and hazardous waste.

This publication outlines the measures to be considered before individual countries request external financial and technical assistance in order to dispose of obsolete pesticide stocks and before measures are established to prevent their recurrence.

Chapter 2

The importance of addressing the problem of obsolete pesticide stocks

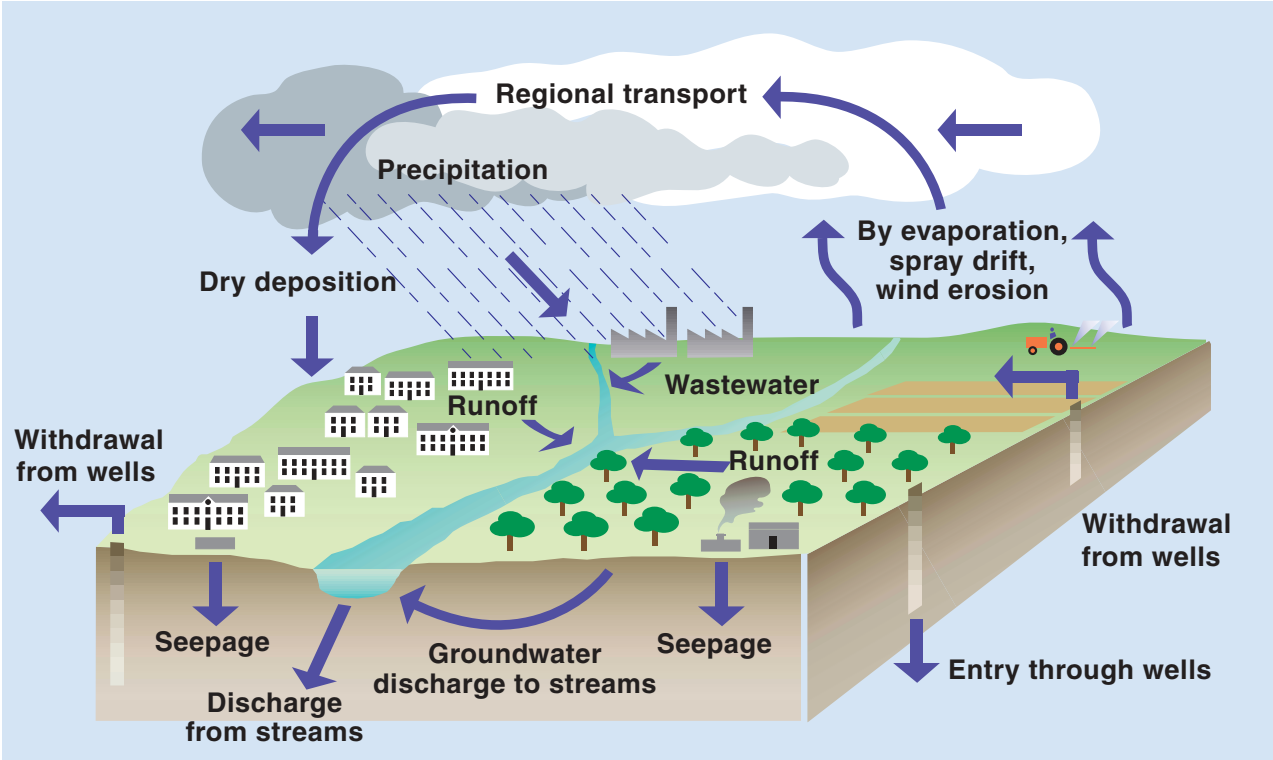
PROTECTION OF HUMAN HEALTH

Removing obsolete pesticide stocks will protect human health. Pesticides in their normal state are harmful to human beings in various degrees. People exposed to pesticides may suffer short-term acute health effects such as nausea, headaches, sore eyes, skin rashes and dizziness. In some cases exposure to pesticides may cause cancer, reduced fertility, nerve or organ damage, unconsciousness and even death.

Obsolete pesticides often include out-dated chemicals, which are highly toxic. Many of these chemicals have been banned because of their toxicity, yet are still found in large quantities in numerous countries. Obsolete pesticides that have deteriorated may also sometimes generate decomposition products that are extremely toxic.

Stockpiles of obsolete pesticides often include leaking containers that allow the pesticides to be dispersed in the environment with the result that people living and working nearby may be exposed to these pesticides and suffer consequent health problems. The leaked pesticides may also get into drinking-water supplies from rivers, lakes or underground aquifers. People drinking this contaminated water will suffer adverse health effects. Similarly, food derived from crops or livestock that have been contaminated by pesticides may be toxic for consumers. Many obsolete pesticides are also kept in unguarded stores or out in the open where children, adults and animals can easily and frequently come into contact with highly toxic chemicals.

How pesticides can penetrate the environment



PROTECTION OF THE NATURAL ENVIRONMENT

Pesticides in the environment can have adverse effects on wildlife through direct exposure to chemicals, or through indirect exposure in food or water. Animals may become sick or die, and there may also be deleterious effects on the natural environment.

Natural ecosystems are complex and consist of many layers of interacting organisms. Damage to any one of the organisms in an ecosystem may have an impact throughout the ecosystem. For example, if herbicides damage a particular type of vegetation, which certain insect larvae choose as their food source, those insects may move to another environment in search of their preferred food. A particular bird species may choose these insect larvae as food during a particular phase of their development, but will eat a wide range of pest insects as adults. If the preferred larvae disappear from the environment, the birds may also disappear and pest numbers may increase as a result of fewer predators being present. This particular example is based on research findings in the United Kingdom and demonstrates the potentially very complex effects of pesticides on the environment.

Stockpiles of obsolete pesticides differ from the normal application of pesticides in agriculture or health care, mainly because large quantities of these hazardous chemicals are located in one place. Any leakages or damage caused to the stockpile could result in serious acute local contamination. If the chemicals reach rivers or sea water, or they evaporate following spillage, they may be transported over long distances and contaminate the ecosystem.

As long as the stocks remain where they are and continue to deteriorate and leak, the damage caused will increase. Safe containment and removal of obsolete pesticide stocks are therefore essential for environmental protection.

ECONOMIC BENEFITS

Obsolete pesticide stockpiles are an economic burden as well as a danger to health and the environment. The money spent on buying the original pesticides – which then become obsolete – is effectively wasted, and the opportunity of buying other potentially useful goods with that money is lost.

Furthermore, the storage of obsolete pesticides incurs a cost in terms of space that cannot be used for other more productive purposes. Where the pesticides are guarded or effort is put into maintaining the stocks, for example by transferring pesticides from leaking drums to new containers, more costs are incurred.

Replacing obsolete pesticides with new products to control pests (both chemical and non-chemical) again uses funds that could have been used for other purposes had these obsolete pesticides still been available for use.

The costs of health care and environmental remedies where obsolete pesticides have caused damage are difficult to calculate, but are high. Similarly, where workers have become exposed to obsolete pesticides they may no longer be able to work or may be less productive; there is therefore a loss in productivity with an associated cost.

Where obsolete pesticides exist, they also create a continuing barrier to sustainable development. Contamination of water and soil resources by pesticides damages the fundamental requirements of sustainable development. The source of the contamination must therefore be removed.

Finally there are heavy costs associated with the safe containment, removal and destruction of obsolete pesticides. Inexpensive options are likely to cause more severe contamination and it is therefore essential to employ the best methods of treatment, however costly.

Allowing pesticides to become obsolete, maintaining obsolete stocks and disposing of them, thus all incur heavy financial costs. Not dealing with the problem does not ultimately reduce costs and may in fact increase them. It is therefore extremely important to address the problem of obsolete pesticides in a country or region as quickly and effectively as possible.

Chapter 3

Taking responsibility

Once it has been recognized that obsolete pesticides present unacceptable health and environmental problems in a country, action should be taken to remedy the situation and prevent its recurrence.

Safe removal and the destruction of obsolete pesticides are technically complex and costly. Most developing countries will require external technical and financial assistance. However, the agencies that are able to provide such assistance will not be willing to take full responsibility for a cleanup operation, or for ensuring that the problems do not recur.

The relevant authorities in the countries where obsolete pesticide stockpiles exist must take responsibility for the problem, regardless of the causes. They must determine the level of priority given to the issue of obsolete pesticides in relation to other issues that may compete for funds or technical resources.

The affected country must take the responsibility for dealing with obsolete pesticides and preventing their recurrence. External agencies can provide financial or technical support, but cannot impose their will on the recipient country.

TAKING THE LEAD

A single agency must take the lead in dealing with obsolete pesticides in a country. The obsolete pesticide stocks may be owned by several agencies and other agencies may have an interest in the removal of the pesticides. The process of removing obsolete pesticide stocks and preventing their recurrence should be an inclusive one, with the full involvement of all stakeholders. However, a single authority should lead the process and should be the point of communication for external agencies as well as the coordinator of internal activities.

INSTITUTIONAL SUPPORT

Experience has shown that, in common with many other types of project, obsolete pesticide disposal and prevention are successful where institutional support is given to the project at the highest level. Ministerial endorsement instils confidence in a project and demonstrates to the outside world, as well as to the local population, that the issue is being taken seriously.

Obsolete pesticides are created as a result of mismanagement. The responsibility may lie with suppliers, donors, ministry staff, farm managers, storekeepers or other organizations or individuals. When ministers or senior managers give their support to solving these problems, an important message is transmitted, demonstrating that the situation is unacceptable, and that a change in culture is expected and supported in order that it does not recur.

High-level institutional support does not suggest that blame for creation of the stockpiles will be assigned to others. Assigning blame is likely to lead to denial of the problem, hiding of stockpiles or illegal and irresponsible dumping of stocks. Collective responsibility for both the creation and the solution of the obsolete pesticides problem is the most constructive way forward.

INCLUDING STAKEHOLDERS

Dealing with obsolete pesticide problems and preventing their recurrence will involve many different types of organizations, such as government ministries for agriculture, health, environment and industry, intergovernmental organizations (such as the Food and Agriculture Organization of the United Nations [FAO], United Nations Industrial Development Organization [UNIDO], United Nations Environment Programme [UNEP], United Nations Development Programme [UNDP]), donors, development organizations, public interest groups (NGOs) and pesticide manufacturers and distributors (see Box 1).

It is important to include all relevant organizations from the earliest stages of any project so that disagreements can be avoided and effective progress can be made. Inclusion of stakeholders generally takes the form of a National Committee under a lead agency (see Taking the lead, above). The committee should meet regularly and be the guiding body that monitors and approves obsolete pesticide project activities. It should not necessarily be expected to identify or design appropriate activities since this is best done by experienced personnel appointed to manage the project. As a

reflection of the high-level institutional support given to these activities (see Institutional support, above), committee members may be appointed by the relevant minister or director, who may also chair the committee.

BOX 1

Organizations to be considered for membership of a national coordinating committee on the prevention and disposal of obsolete pesticides

- Government ministries
  - Agriculture
  - Health
  - Environment
  - Industry
  - Development
- Intergovernmental organizations
  - FAO
  - Secretariat of the Basel Convention
  - UNDP
  - UNEP
  - UNIDO
  - UN Institute for Training and Research (UNITAR)
  - World Health Organization (WHO)
- Public interest organizations
  - Environmental NGOs
  - Health NGOs
  - Development NGOs
  - Media
- Private sector
  - Pesticide manufacturers
  - Importers and distributors
- Development organizations
  - NGOs
  - International organizations
- Donors
- National or regional agencies
  - Migratory pest control
  - Disease vector control
  - Pesticide registration
  - Environmental monitoring
  - Waste management

Chapter 4

Using existing processes and resources

The disposal of obsolete pesticides is a complex, expensive and potentially hazardous process, and implementing prevention measures requires extensive resources and expertise. Nevertheless, a great deal of work has already been done in many countries and by many organizations so that there is already a body of experience to draw upon. No country should have to "reinvent the wheel" by designing projects from scratch or thinking through all the steps necessary for the implementation of a project. The following list indicates key sources of information for reference, which in turn may supply additional resources. It is important to use these resources fully to avoid mistakes, duplication of effort and to save money and time.

FAO

The FAO representation in a country should be the first port of call for any government or organization wishing to deal with obsolete pesticides. The FAO Obsolete Pesticides Programme based in Rome is acknowledged as the lead body in matters related to the prevention and disposal of obsolete pesticide stocks in developing countries. FAO-led activities on obsolete pesticides include:

- Organizing and running workshops and consultation meetings to raise awareness and generate action on obsolete pesticides in affected countries and regions.
- Publishing guidelines on the prevention and management of obsolete pesticides (see Resource list in Annex 1).
- Initiating and coordinating completion of national inventories of obsolete pesticide stockpiles.
- Initiating and formulating disposal projects for FAO member countries.
- Supervision, monitoring and follow-up of disposal and prevention operations in the field.
- Liaison with donors and industry to generate support for disposal and prevention operations.
- Public outreach to raise awareness of the problems of obsolete pesticides globally.

UNITAR

UNITAR supports the development of National Profiles for assessing the national infrastructure for the management of chemicals. These profiles are prepared through a participatory process involving all relevant stakeholders in a country. UNITAR has prepared guidelines for the preparation of National Profiles (see Annex 1) and can assist in the process. The Intergovernmental Forum on Chemical Safety (IFCS) also encourages the preparation of such profiles.

The important benefit of these profiles is that they encompass all issues concerning the management of chemicals and highlight gaps and priorities for action. In some cases obsolete pesticides are identified as a priority, but in many countries other chemical management issues take precedence. Priority decisions must be taken by individual countries.

A National Profile is a starting-point for all action associated with chemical management; from it countries are then able to develop an action plan. This plan should be transparent and have well-identified targets, and it can be used to mobilize resources. UNITAR can assist with and is developing guidelines for this process.

UNEP CHEMICALS

The main focus of UNEP Chemicals activities in relation to obsolete pesticides relates to the implementation of the requirements of the Stockholm Convention on Persistent Organic Pollutants (POPs). Seventy-five percent of POPs are pesticides, and between 20 and 30 percent of quantified obsolete pesticide stockpiles are POPs. There is therefore significant overlap and interest in obsolete pesticides.

Countries seeking support from donors and intergovernmental agencies to deal with POPs will be expected to ratify the Stockholm Convention.

Principal UNEP Chemicals activities that relate to obsolete pesticides are:

- financial support for FAO's work in Latin America;
- inventory-taking in accordance with the FAO defined format in the Russian Federation;
- awareness-raising with regard to obsolete pesticides in the framework of the POPs negotiation process;
- partnership in the Secretariat of the Rotterdam Convention;
- participation in the Inter-Organization Programme for the Sound Management of Chemicals (IOMC) coordinating group on obsolete pesticides.

UNEP Chemicals has also been instructed by IOMC/IFCS to look at stockpiles of chemicals other than pesticides and polychlorinated biphenyls (PCBs). Such stockpiles may not be designated as hazardous waste, but may be industrial by-products, unwanted chemicals or pure chemicals for use in industrial processes. Their management may have implications with regard to the management of obsolete pesticides.

In addressing POPs and other chemical management, UNEP is exploring possible funding sources that may also support obsolete pesticide management.

On the technical front, UNEP is looking at chemical destruction technologies and has compiled a list of existing PCB destruction facilities. The organization is also compiling information about possible alternatives to POPs. Where these are pesticides, UNEP is assisting the lead agencies in this work: FAO for agricultural pesticides and WHO for health pesticides.

UNEP recognizes that the Stockholm Convention will place a burden on countries to deal with stockpiles and sources of POPs, and find replacements for their existing uses. The Convention will generate resources to support these activities. At the same time, while these areas of activity are a priority for UNEP Chemicals, the organization recognizes that its own priorities cannot be imposed upon individual countries, and they must decide their own order of priorities for action. This stance closely mirrors that of UNITAR (see above).

WHO

The health sector is a major user of pesticides but is often overlooked in processes related to the better management of pesticides. WHO is particularly concerned about this and proposes that *national health authorities always be included in training and awareness-raising exercises dealing with obsolete pesticides.*

Dichlorodiphenyltrichloroethane (DDT), which is one of the POP pesticides and is also commonly found in obsolete pesticides stockpiles, is still used in many developing countries for the control of malaria vector mosquitoes. While WHO is leading efforts in the search for alternatives to DDT through its DDT working group, and the effective control of malaria through the Rollback Malaria Programme, it is also aware that DDT continues to be used. There is concern at present that the sources of new DDT are limited and there is often no information as to whether they meet WHO standards. However, WHO also wishes to prevent the transfer of DDT from obsolete pesticide stockpiles to active use in the health sector without the most stringent controls, and to prevent long-term reliance on DDT in the sector. The DDT working group has been advised to liaise with the pesticide industry and its representative organizations with regard to ongoing, high-quality DDT supplies for as long as they continue to be needed.

Destruction technology for obsolete pesticides, POPs and other hazardous materials is also of concern to WHO, partly because incinerators generate dioxins and furans, which harm health, and partly because the health sector also generates hazardous clinical waste that requires disposal. According to WHO, dioxin levels in developing regions such as Africa are currently low. It is desirable that they remain so, and therefore WHO is not advocating widespread installation of incinerators that might produce more dioxins. While it is preferable that waste be dealt with close to its source, WHO accepts that the lack of adequate facilities in developing countries means that waste needs to be exported for destruction in the industrialized countries.

WHO should be contacted for advice on:

- replacing DDT use in vector control;
- integrated vector control strategies designed to minimize reliance on chemical pesticides;
- destruction technology for clinical waste, pesticides and other hazardous materials.

UNIDO

UNIDO helps developing countries to develop the infrastructure for hazardous waste management. The thrust of UNIDO's approach is to minimize waste production by applying clean production methods and better controls. Where waste exists or continues to be generated, reuse and recycling are promoted. The organization advocates waste treatment close to the source whenever possible.

UNIDO is wary of advocating the use of any specific technology for waste destruction. Most existing technologies such as incineration or landfill are seen as potentially polluting or temporary solutions. Its programmes are therefore based on waste minimization and there is hope that the non-combustion technologies may offer a solution.

UNIDO will be the executing agency for a Global Environment Facility (GEF) funded programme to demonstrate non-combustion technology for the destruction of POPs in developing countries. The project has been developed in collaboration with NGOs and will provide an important technological boost that might provide a solution to the destruction of obsolete pesticides and POPs in developing countries.

As a technical agency, UNIDO does not finance programmes but can help countries that prioritize environmental and waste management issues to develop proposals for integrated packages to be used to raise donor funds. The integrated pollution control programmes developed by UNIDO, inventory waste sources, produce a manual of best practices and train authorities. These programmes primarily focus on industrial waste streams, but need not exclude pesticides.

UNIDO helps to promote cleaner and safer pesticide production and is also supporting the production of botanical pesticides such as neem, which has the potential to generate income and replace imported chemical pesticides in marginal areas. *Bacillus thuringiensis* (Bt) and other biopesticide production are also promoted, as is the development and use of safer pesticide application technology.

UNIDO has created a network of Clean Production Centres in conjunction with UNEP in 19 countries worldwide. These provide technical advice on clean production issues locally. The centres should be contacted for advice on hazardous waste management, pesticide production and hazardous waste destruction technology.

BASEL CONVENTION

The Secretariat of the Basel Convention has established regional centres that aim to support Parties to the Convention in its implementation. They are able to offer guidance and advice on hazardous waste management issues. They will also direct Parties to other sources of advice and information such as FAO on pesticides or UNIDO on industrial processes.

DONOR INITIATIVES

Some bilateral and multilateral donors direct their funds to supporting specific initiatives that may be relevant to aspects of the prevention and disposal of obsolete pesticides. Efforts should be made to identify such initiatives at an early stage of the project and incorporate them or build on them as appropriate. Examples might include regional projects to dispose of obsolete pesticides, regional integrated pest management (IPM) programmes in specific crops or regional biodiversity protection programmes. These projects and donors might be approachable for funds but even if these are not forthcoming such initiatives should be noted and referred to in project proposals to indicate awareness of relevant and wider issues.

NATIONAL INITIATIVES

National initiatives may have been taken to address issues directly relevant to the prevention and disposal of obsolete pesticides. While pesticide issues are generally within the remit of a country's Ministry of Agriculture, other ministries may have addressed issues such as chemical management, hazardous waste management, health protection or environmental protection. These initiatives should be accounted for through the National Coordinating Committee and incorporated into the development and implementation of the project to deal with prevention and disposal of obsolete pesticides where relevant.

Chapter 5

Assessing the problem

Once a country has acknowledged and prioritized its obsolete pesticide problem for action, identified a lead organization, generated institutional support and established a framework for stakeholder inclusion, a series of preliminary activities must be carried out before appropriate measures are taken. These activities can be carried out at relatively low cost and with limited external assistance. Their completion before donor assistance is called for will demonstrate commitment from the country to address the issue.

TRAINING

Before staff are sent to the field to carry out any work with obsolete pesticide stocks they should be adequately trained. They should understand the hazards associated with the work and how to protect themselves and the environment. They should also be familiar with the requirements of an inventory so that all relevant information is collected.

A training course specifically designed for this purpose has been developed by the FAO Obsolete Pesticides Programme in Rome (see contact details in Annex 1).

Projects dealing with obsolete pesticides aim to remove an unacceptable hazard from the environment. People working to remove this hazard should not be exposed to unacceptable hazards themselves and training is therefore essential.

INVENTORY

An important first step to dealing with obsolete pesticides in a country is to understand the scope and nature of the problem. This can only be achieved by carrying out a comprehensive inventory of obsolete pesticide stocks.

The inventory should only be carried out by trained personnel who are given the protective equipment needed to carry out the work in complete safety. It should also include all obsolete pesticide stocks regardless of ownership. Therefore if the lead agency is, for example, the Ministry of Agriculture, efforts should be made to identify obsolete pesticides that might be held by the Ministry of Health, the private sector or others.

The information gathered in completing the inventory should be entered on the form developed by FAO (see Annex 3). It is important that this form be used for several reasons:

- Formulating and costing a disposal project is entirely dependent on accurate inventory data.
- Raising funds from different sources to pay for disposal can depend on very specific data such as manufacturer or country of origin of the pesticides.
- Specific action taken to deal with obsolete pesticides can depend on the type, condition and quantity of individual pesticides.
- Planning a disposal operation requires accurate information on quantities, condition, type and location of the obsolete pesticides.
- Priorities for action can be set on the basis of information gathered in the inventory. For example, if there is a high risk of water contamination or a risk of people being exposed to chemicals then a high priority should be assigned to a site.

An inventory of obsolete pesticide stocks should be based on actual field data gathered at every site where stocks exist. Every effort should be made to identify all storage sites. An inventory that is based on existing records is likely to be inaccurate and out of date, because the situation in the field changes constantly. Old stocks often disappear through theft or leakage and new obsolete stocks are created as products exceed their expiry date or become damaged.

Together with information on the obsolete pesticides themselves, the inventory should include a map and description of the storage sites and photographs. This will help in prioritization of remedial action and in planning a cleanup operation.

IDENTIFYING CAUSES

Pesticides become obsolete for a variety of reasons. It is important to understand why pesticides have become obsolete in a particular country so that these causes can be corrected to prevent any future occurrence. Some of the causes are given below.

Over-ordering or oversupply

Over-ordering or oversupply arise from purchasing systems that are not properly aware of actual pesticide needs in the field. Sometimes errors occur in ordering

processes and in some cases officials may be persuaded to buy more pesticides than are actually needed.

Uncoordinated donations or purchases

Uncoordinated donations or purchases occur when suppliers, whether commercial or donors, do not coordinate their activities, leading to more pesticides than are actually needed or duplicate supplies. It is sometimes difficult to refuse donations, even though they may be inappropriate, but it is important not to accept pesticides that do not exactly match national or local needs.

Poor storage

Poor storage of pesticides can lead to faster deterioration because of temperature fluctuations, physical damage or contamination. Pesticides should always be stored in appropriate conditions in accordance with FAO guidelines.

Inappropriate package size or formulations

Pesticides are sometimes supplied in large containers that small-scale farmers cannot use, or in formulations that cannot be applied using locally available equipment.

Product deterioration

Pesticides deteriorate with time and have a limited shelf-life beyond which their efficacy or safety cannot be assured without laboratory analysis. Poor storage and container damage accelerate product deterioration.

Legal controls subsequent to supply

If farmers, retailers or other pesticide holders own stocks of a chemical which is banned, it immediately becomes obsolete. Consequently, they must be either given time to use the products they hold, or be provided with facilities for disposing of the banned products safely.

Having identified the causes of obsolescence and accumulation of pesticides in a country, the relevant authorities should take steps to address those causes with the aim of preventing further accumulation of obsolete pesticides.

OWNERSHIP

It is important to identify the current owners of any obsolete pesticide stocks in a country so that they can give permission for the stocks to be disposed of. Their help will also be needed to gain access to stores to complete the inventory, and when disposal and cleanup activities take place. It may be appropriate also to include owners of large stocks as stakeholders in the national committee.

GETTING PEOPLE TO DECLARE THEIR STOCKS

Disposal operations funded by external donors are one-off activities that will not be repeated. It is therefore crucial that all existing obsolete pesticides are identified and included in the inventory of products for disposal.

Some owners of pesticides may be worried about declaring their stocks as they may include banned or illegally imported products, or the owners may have unwittingly broken laws in other ways. If stocks that require disposal are not declared, they may enter the market-place as dangerous and unregulated pesticides, or they may be secretly dumped and thereby create a potentially serious hazard to health and the environment. One method that has been used successfully in some countries to encourage owners of obsolete pesticide stocks to declare them openly is to declare an amnesty. This assures the people concerned that no legal action will be taken against them regardless of the products involved. It also provides the owners with a safe and legitimate way of disposing of their unwanted and obsolete products.

COSTS

While it has been stated above that the tasks required in assessing the problem of obsolete pesticides can be carried out at a relatively low cost, there are nevertheless some costs involved in the purchase of equipment, use of resources and the development of infrastructure. These expenditures are essential for the safe and effective completion of the assessment process. They will also build capacity in the handling of hazardous materials and pesticide management for the future and are therefore a worthwhile investment.

The expenditures involved include the following items:

- Training for inventory taking
  - Hiring experienced trainers
  - Travel, accommodation and subsistence for trainers and participants
  - Training facilities (room, projection, etc.)
  - Training equipment and documents
- Personal protective equipment
  - Overalls, masks, gloves, boots and goggles in sufficient supply to allow replacement of contaminated disposable equipment and damaged equipment

- Vehicles, fuel and personnel
  - Allocation of vehicles and staff time to complete the inventory
- Other equipment for inventory-taking
  - Disposable cameras and film-developing costs
  - Inventory forms, site plan forms and risk assessment forms
- Emergency equipment
  - First aid
  - Overdrums for leaking drums
  - Plastic sheeting/bags to contain leaking dry products
  - Spillage containment equipment
  - Fire extinguishers
- Central office staff and equipment
  - Staff to manage and coordinate inventory-taking
  - Vehicles and fuel allocation
  - Administrative staff to input data and provide secretarial services
  - Computer equipment
- Publicity and educational material
  - Outreach to radio, newspapers, television
  - Publication of material, e.g. leaflets and posters
- Management

TIMEFRAME

Adequate time should be allowed for the preparation and execution of the inventory and assessment phase of an obsolete pesticides project. Depending on the size of the country, the quantity of obsolete pesticides and their distribution throughout the country, this phase may take between two and six months. Work during this early phase of the project should not be rushed as this may compromise the quality of the operation. But neither should the work be allowed to drag on for a long period, since this will erode the momentum of the project and the cooperation of partners and stakeholders may be lost.

Efficient planning and management should ensure that the task is completed in a timely and effective manner. If this is the first project of its kind undertaken in a country, it may be appropriate to appoint an experienced project manager who has worked on similar projects elsewhere, to work with local counterparts who will learn from the manager.

Chapter 6

Addressing causes

Preventing the creation of obsolete pesticide stocks is as important as disposing of existing stocks. Countries seeking technical and financial support to dispose of obsolete pesticides will be expected to demonstrate that they are also putting in place measures designed to prevent future creation and accumulation of obsolete pesticides.

The following list briefly provides potential solutions to the key causes of obsolete pesticides. There may be other measures that countries can take, but the measures taken should first address the causes of obsolete pesticides in that country, and should also build on the experience of other countries that have dealt with their obsolete pesticides and consider implementing additional prevention measures.

AGRICULTURAL POLICY (IPM)

Countries should adopt policies and support strategies for agricultural production that can contribute to a reduction in the use of and reliance upon synthetic chemical pesticides to the extent possible.

Integrated pest management (IPM) refers to a pest management system that, in the context of the associated environment and the population dynamics of the pest species, utilizes all suitable techniques and methods in as compatible a manner as possible and maintains the pest populations at levels below those causing economically unacceptable damage or loss.

Where chemical pesticides are relied upon as a primary pest control measure, substantial efforts are needed to develop alternative pest management systems and convince farmers of their efficacy. These efforts are likely to include mobilization of research, training, extension and production facilities in support of an IPM strategy. This mobilization of such extensive and diverse resources can generally only succeed through government intervention and therefore institutional support from parliament, ministers, government departments and other institutions is vital.

MIGRATORY PESTS

One of the major causes of accumulation of obsolete pesticide stocks has been the holding of strategic pesticide stocks to use against migratory pest infestation. When the infestations do not occur, the stored pesticides eventually pass their expiry date and ultimately become obsolete.

Alternative strategies for the control of migratory pests exist or are under development. These include the use of biological control agents in place of pesticides; arrangements with pesticide producers to mobilize new pesticides quickly instead of storing products for long periods; rotation of stocks to prevent products from becoming obsolete; and improved monitoring for prior notification of impending pest infestation.

Countries currently holding strategic pesticide stocks for the control of migratory pests should review their current strategies with the assistance of FAO or other relevant agencies so as to eliminate or reduce reliance on strategic stocks.

Disease vectors

Every effort must be made to control diseases of humans and livestock that are transmitted by insects or other animals since they can be devastating to communities in developing countries. In many instances control measures include methods designed to kill the vectors of the diseases (the animals that transmit the disease), and this commonly includes the use of pesticides.

While chemical pesticides can be effective against disease vectors, over-reliance on pesticides can also result in serious problems such as pest resistance, impacts on non-target organisms and environmental contamination. In the long term these unintended impacts can make pesticides ineffective.

Countries should consider reducing their reliance on chemical pesticides for the control of disease vectors by developing integrated vector control systems such as those promoted by WHO. These will reduce the quantities of pesticides required and will also help to move towards the use of less hazardous pesticides than those used in the past.

IMPORT CONTROLS

Most pesticides are imported to the majority of developing countries. Imported pesticides should be

required to meet all the requirements of national pesticides control legislation and international controls such as the Code of Conduct on the Distribution and Use of Pesticides; the Rotterdam, Basel and Stockholm Conventions; and industry codes of good practice.

A common source of obsolete pesticides is illegally imported products. These may not be approved for use in the importing country, they may be labelled in a foreign language, they may be banned or damaged or they may fail to meet national or international standards for other reasons.

Efforts should be made by national authorities to stop illegal imports of pesticides. This may be more successful if improved border controls or harmonized pesticide registration schemes are developed with neighbouring countries. Customs staff should be trained appropriately to control pesticide imports.

PRODUCTION OF PESTICIDES

Where pesticide production facilities exist in a country, there may be benefits to the local economy, but there may also be associated disadvantages for health and the environment. An objective assessment of the benefits and costs of such production facilities therefore needs to be made. In some cases governments, industry and international agencies have encouraged the development of local pesticide production plants only to find that they are economically unviable, or that they produce products in substandard conditions that put workers' health at risk.

All relevant controls should be imposed on local pesticide producers to ensure that their products meet with regulatory requirements, and that the production facilities meet national and international health, safety and environmental protection standards.

Where local production facilities meet the appropriate standards, it may be possible to develop collaborative strategies that can help countries to develop more effective migratory pest control or disease vector control systems. This might include producing particular pesticides that are compatible with integrated control systems, or holding active ingredient stocks for rapid formulation and mobilization in the event of migratory pest infestation.

REGULATION

Pesticides are potentially hazardous chemicals used by large numbers of people who often lack training. Pesticides are also intentionally dispersed in the environment. It is therefore extremely important to impose controls over the way in which pesticides are supplied and used.

Most countries have some form of pesticide regulation in place. Countries seeking support for disposal operations should ensure that regulations controlling all aspects of pesticide supply and use are in place. Enforcement of regulations is also important but can place a heavy demand on resources. Countries should enforce their pesticide regulations as far as is practicable, but where a lack of resources limits enforcement this should be noted and built into prevention measures that accompany disposal projects.

QUALITY CONTROL

Substandard pesticides pose an extreme hazard to health and the environment and also risk deteriorating more rapidly than high-quality ones. Cheaper products may also be supplied in poor-quality packaging that is more likely to be damaged in storage or during transit. Other factors such as labelling and poor product stewardship may also contribute to the rapid obsolescence of substandard products.

Quality control of pesticides should form an integral element of registration and import controls. Countries must develop the capacity to analyse pesticides at the expense of producers or importers, and substandard products should not be allowed to enter the supply chain.

DONATIONS

Donations of unsolicited, excess or uncoordinated pesticides frequently lead to the creation of obsolete stocks. Financial contributions are also sometimes tied to the procurement of agricultural inputs including pesticides. This practice has also led to excessive supplies that have contributed to obsolete stockpiles.

Countries should ensure that pesticide donations only include products that are approved for use on relevant crop pest combinations; that quantities supplied do not exceed projected use for a single season a year; and that donated pesticides do not distort the market and lead to excessive use or stockpiling. Tied aid should be directed towards procuring equipment and inputs other than pesticides. Developing countries should refuse to accept donations of pesticides that are inappropriate to their needs.

STORAGE

Poor storage of pesticides can lead to accelerated deterioration of products and the creation of obsolete

stockpiles. It is essential that pesticides be kept in stores that fully comply with FAO (1996a; see Annex 1) or with other appropriate guidelines. Government-owned pesticide stores should be checked for compliance and be modified as necessary. Regulations to determine pesticide storage conditions and the licensing of private pesticide stores should be considered and private stores should also be inspected and modified.

Good stock management is an important factor in preventing the creation of obsolete pesticide stocks. The principle of first in-first out should be applied in all pesticide stores so that the first products to arrive are the first to be used, while more recent products are used only when older products have been exhausted.

TRAINING

All tasks related to pesticide management require training. Governments should invest in providing training for public sector staff responsible for enforcement of regulations, storage and stock management, import controls and quality control. The private sector should also invest appropriately in training.

Training should not be seen as a one-off exercise but should be regularly reviewed and updated.

CONTAINERS AND UNUSED PESTICIDES

Empty pesticide containers and small quantities of unused or unwanted pesticides constitute hazardous waste and mechanisms need to be put in place to facilitate sound management of this waste. These mechanisms should be compliant with FAO guidelines (FAO, 1999a; see Annex 1), based on the principle of removing hazardous waste from end-users – who lack the resources and expertise to manage it properly – and returning it to the supplier. Common widely used practices include burial and burning of empty pesticide containers. This is not considered to be acceptable practice and alternative strategies as proposed in the FAO guidelines should be adopted. It is important to address this issue on an ongoing basis in order to prevent the accumulation of hazardous waste.

Chapter 7

International commitments

A number of international instruments have been developed that address the aspects of chemical and waste management. The instruments themselves and the infrastructure that supports their implementation are specifically geared towards helping developing countries. However, any country seeking support from donors or intergovernmental agencies to deal with obsolete pesticide disposal and prevention will be expected to ratify and implement the instruments below in their national legislation.

BASEL CONVENTION

The Basel Convention deals mainly with the control of transboundary movements of hazardous waste as well as with the environmentally sound management and minimization of hazardous waste. Obsolete pesticides clearly fall within the scope of the Convention. An area of interest to the Parties to the Basel Convention concerns the export of obsolete pesticides considered hazardous wastes in the exporting country for reuse in importing countries. The Conference of Parties of the Basel Convention has given the Secretariat a mandate to help solve obsolete pesticide problems in developing countries.

Information and advice on the ratification and implementation of the Basel Convention can be obtained from the Secretariat of the Basel Convention in Geneva or from regional centres that have been established globally. Contact details can be found in Annex 1.

ROTTERDAM CONVENTION

The Rotterdam Convention on the Prior Informed Consent (PIC) Procedure for Certain Hazardous Chemicals and Pesticides in International Trade is designed to help prevent the unwanted import of banned, severely restricted or extremely hazardous pesticides and chemicals to developing countries.

Unwanted pesticides and older and more hazardous pesticides make up a high proportion of obsolete pesticide stockpiles. The Convention works by requiring exporters to notify the relevant authorities in importing countries when they wish to supply pesticides or other chemicals that have been included in the PIC list. Chemicals on the PIC list have been banned or severely restricted in at least two countries from different geographical regions. In addition, developing countries can propose chemicals that are particularly hazardous under conditions of use that apply in their country.

The Rotterdam Convention is an important tool in helping countries to regulate pesticide and other chemical imports and use. Such measures can in turn help to prevent the creation and accumulation of obsolete pesticide stocks.

Countries are strongly encouraged to ratify the Rotterdam Convention, and many donors may require it as a prerequisite to funding projects related to obsolete pesticides.

The Secretariat of the Rotterdam Convention is jointly hosted by FAO in Rome and UNEP in Geneva. Contact details are given in Annex 1.

STOCKHOLM CONVENTION

The Stockholm Convention on POPs aims to stop the production and use of chemicals that are included in the Convention. At present there are 12 chemicals of which 9 are pesticides, one is an industrial chemical (PCB) and two are by-products of manufacture or destruction of certain chemicals (dioxin and furan).

Many of the pesticide POPs feature prominently in obsolete pesticide stockpiles because they are old and are generally banned for use in most countries.

The Stockholm Convention was signed in May 2001 and is now open for signature and ratification. It will come into force when 50 countries have ratified.

A precondition for receiving support from programmes that aim to support developing countries in dealing with POPs is ratification of the Stockholm Convention.

The Secretariat of the Stockholm Convention is hosted by UNEP Chemicals in Geneva. Contact details are given in Annex 1.

IMDG

The International Maritime Dangerous Goods (IMDG) Code was developed as a uniform international code for the transport of dangerous goods by sea. It covers

such matters as packing, container traffic and stowage, with particular reference to the segregation of incompatible substances.

The Code lays down basic principles; detailed recommendations for individual substances, materials and articles; and a number of recommendations for good operational practice, including advice on terminology, packing, labelling, stowage, segregation and handling, and emergency response action. The provisions of the Code offer reliable advice to a whole range of industries and services including manufacturers, packers, shippers, feeder services such as road and rail, and port authorities.

The Code, which was first published in 1965, has become the standard guide to all aspects of handling dangerous goods and marine pollutants in sea transport. As such it is recommended to governments for adoption or for use as the basis for national regulations. The Maritime Safety Committee (MSC) of the International Maritime Organization (IMO) recently decided, in principle, to make sections of the Code mandatory, aiming at an entry-into-force date of 1 January 2004.

The Code has undergone many changes over the years, both in format and content, in order to keep up with the rapid expansion of the shipping industry. It is therefore essential for relevant government authorities to keep abreast of new developments.

Contact details for publications, information and advice and training are listed in Annex 1.

REGIONAL AGREEMENTS

Certain regional agreements, as well as international instruments, may have a bearing on actions taken by a country to deal with its obsolete pesticides and implement prevention measures. Examples include the Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement of Hazardous Wastes within Africa; the Izmir Protocol on the Prevention of Pollution of the Mediterranean Sea by Transboundary Movements of Hazardous Wastes and their Disposal; and the Waigani Convention to Ban the Importation into Forum Island Countries of Hazardous and Radioactive Wastes and to Control the Transboundary Movement and Management of Hazardous Wastes within the South Pacific Region.

Countries should ensure that they are aware of, signed up to and implementing the appropriate measures associated with these regional agreements.

Chapter 8

Developing solutions

Several projects to dispose of obsolete pesticides and implement measures to prevent new accumulation of stockpiles have been carried out in developing countries during the last decade. As a result much experience has been gained and should be used to ensure that future projects are carried out in a timely, cost-effective and environmentally sound manner.

GETTING ADVICE

Expertise in the removal of obsolete pesticides and other hazardous waste from developing countries is limited. The complexity of these operations means that only a few commercial disposal companies and individual experts have been involved.

It is therefore *crucial* to seek expert advice from experienced individuals or companies at all stages. This involves preliminary assessment of the problem, development of project proposals, funding and execution of disposal operations and development and implementation of effective prevention measures.

It is not possible to include a definitive list of experts here. Countries are therefore strongly advised to contact the FAO Obsolete Pesticides Programme in Rome for advice. Contact details are given in Annex 1.

AVOIDING MISTAKES

Mistakes have sometimes been made when inappropriate action was taken in dealing with obsolete pesticides. Examples include burial of pesticides, burning in local incinerators that are not equipped to deal with hazardous waste and reformulation of products in unsafe conditions. The consequences of such errors can at best be expensive remedial operations and at worst they can be irreversible contamination of the environment and damage to human health.

Avoiding such errors again depends on seeking and obtaining good advice from independent and experienced experts. Some individuals and companies claiming to be experts in the field have been known to give poor advice and to carry out inappropriate and damaging cleanup operations.

The first source of advice on such matters again should be the FAO Obsolete Pesticides Programme in Rome. Staff in this programme can recommend reputable companies or consultants. Contact details are given in Annex 1.

REALISTIC TIMEFRAME

Dealing with obsolete pesticides properly can take a significant amount of time. From the time when a government recognizes the existence of the problem to the completion of disposal and implementation of prevention measures has been known to take seven years. The involvement of intergovernmental agencies such as FAO, and foreign donors may require certain processes to be followed that can take several months. Countries may be required to ratify international instruments such as the Basel, Rotterdam and Stockholm Conventions and implement local legisla-tion to enforce them – this may take months or even years. Planning a comprehensive project and issuing international tenders are also time-consuming processes.

It is important to recognize that the completion of an effective programme for the prevention and disposal of obsolete pesticides in a country will take a significant amount of time. Rushing the process is likely to lead to errors and substandard work.

PREPARING A PROPOSAL

Proposals for prevention and disposal operations for obsolete pesticides have been prepared for several developing countries. Models therefore exist for guidance.

A number of key issues should form part of any proposal:

- Inclusion of *all* obsolete pesticide stocks in the country and a plan for total removal and remediation of contaminated sites as far as possible. This is because such operations are difficult to fund and will not be repeated.
- Prevention of future accumulation of obsolete pesticides is as important as removal of existing stockpiles. Prevention must therefore be a significant component of the project.
- Compliance with relevant international, regional and national legislative instruments must apply to all aspects of the project.

- Government contributions must complement donor funds. These may be in kind and/or in cash and will demonstrate the commitment of the government to this issue.
- Stakeholder involvement should be built into the project from the very earliest stages. In some countries projects have failed because certain stakeholders have been excluded.
- A comprehensive environmental assessment of any proposed activities should be carried out. This should allow comparison of different options considered and provide justification for those selected.
- Organizational structure of the project including designation of responsibilities and the methods to be used for selecting appropriate contractors and personnel.
- Realistic budgets.
- Realistic timeframes.

Box 2 contains an outline of a proposal that can be used as a model or adapted as necessary for country-specific projects.

BOX 2
Model proposal outline

1. Introduction
2. Findings and recommendations of preparatory phase
3. Project proposal
   - 3.1 Operational strategy
   - 3.2 Phases of the project
   - 3.3 Organizational structure including stakeholder involvement
   - 3.4 Project supervision
4. Project cost
5. Project timeframe
6. Obligations of the government, e.g.
   - 6.1 Ratification of relevant conventions
   - 6.2 Counterpart contributions
7. Beneficiaries from the project
8. Annexes, e.g.
   - 8.1 Terms of reference for project management/contractors
   - 8.2 Organigram showing collaboration of various parties
   - 8.3 Map of country showing location of stocks

It may also be helpful to link projects to other national objectives such as improved agricultural production based on IPM, hazardous waste management, chemicals management and other relevant issues. In this way additional agencies and donors can be involved in developing, implementing and funding the project.

FUNDING

Experience shows that the cost of disposal operations in developing countries is approximately US$3-5/kg or litre of waste. Therefore, clearing 100 tonnes of obsolete pesticides is likely to cost US$300 000-500 000, and to clear 1 000 tonnes will cost between US$3 and 5 million.

The actual costs vary in relation to factors such as the nature of the chemicals and their condition, location of the stockpiles and accessibility, and national infrastructure (roads, electricity, etc.). Economies of scale can help to reduce unit costs and it is therefore advisable to consider developing collaborative projects with neighbouring countries, or with other owners of hazardous wastes in a country. In this way a disposal company may quote a lower price per unit of waste and the total cost is shared between countries or owners of the waste.

Funding for obsolete pesticide projects is generally derived from the same sources that fund development. These include bilateral and multilateral donors, development banks, intergovernmental organizations and some private sources. In many cases donors will fund a programme of work that is negotiated in advance with the government. It is therefore essential to build obsolete pesticide projects into the national development programme at an early phase so that the project can be included in the negotiated development package.

It may also be possible to fund a project wholly or partly for prevention and disposal of obsolete pesticides under initiatives supporting wider chemical management or hazardous waste issues. Examples might include the Stockholm (POPs) Convention, Basel Convention, National Waste Management strategies, etc. Similarly, it may be possible to generate funding for specific elements of the project such as implementation of a national IPM policy or construction of pesticide stores from funding sources that may not be able to commit funds to disposal.

All potential avenues should be explored in the search for full project funding. It is unwise to start work on a disposal project unless all the required funding is secured in advance. This is because it is likely to be more difficult to find funds to complete an unfinished job in the future.

PROJECT MANAGEMENT

Projects for prevention and disposal of obsolete pesticides are technically and logistically very complex. The materials being dealt with are hazardous,

handling and movement of obsolete pesticides may increase the hazards, and there are complex operational and legal issues to be accounted for. Any work carried out without comprehensive knowledge of appropriate protection and mitigation measures, legal aspects and best practice could put workers, members of the public and the environment in great danger. It is therefore essential that competent and experienced persons manage the project.

Most of the individuals and companies with the necessary experience are from OECD countries where disposal of hazardous waste and remediation of contaminated sites have been most frequently carried out. Nevertheless, while it is likely that the overall project management will be provided by an expatriate, it is important for developing countries to provide counterpart staff who can learn and contribute to capacity building in this area.

SAMPLE PROJECT MANAGEMENT SPECIFICATION

Qualifications and experience

A degree in chemistry or a related subject.
Preferably a higher degree related to waste management.
Experience in handling pesticides.
A minimum of five years' experience in project management of pesticide disposal operations.
A minimum of five years' experience in managing teams of mixed-ability personnel in pesticide disposal operations.
Excellent presentation skills, both verbal and written.
Familiarity with international regulations concerning waste transportation.
Knowledge of waste disposal technologies.
Knowledge of FAO obsolete pesticide guidelines.
Training in the International Maritime Dangerous Goods (IMDG) Code.
Experience in budget control and assessment of suppliers.
Training in International Quality Standard ISO 9000.
Experience in health and safety and the development of task-based risk assessment for pesticide operations.
Experience in selection and use of personal protective clothing.
Experience in training staff and development of training plans.

Responsibilities

Phase 1

Development of a detailed training plan for crop protection staff and appointment of specialist training suppliers as required.
Development of a detailed critical time flow analysis for Phase 1.
Development of safe working practices, risk assessments and procedures to allow work to progress according to the highest international health, safety and environmental standards.
Training of selected local counterparts on the above.
Supervision of the training programme and monitoring of examinations.
Supervision of the upgrade of the regional stores to be used for centralization of stocks.
Monitoring of spillage control precautions implemented at the stores.
Development of a stock control mechanism to ensure all waste is segregated as required.
Selection of equipment and drawing up of tender requirements to allow procurement by FAO headquarters.
Monitoring of the repackaging, transportation and offloading activities in the field.
Regular quality assurance (QA) visits to the various stores to ensure all safe working practices are being followed.
Weekly reporting of progress according to the critical time flow analysis developed at the start of the operation.

Phase 2

Supervision of pesticide analysis using appropriate analytical techniques.
Supervision of the development of standard methods of analysis.
Supervision of the training of laboratory personnel in the use of the listed equipment.
Supervision of the accreditation to ISO 9000 for laboratory activities.

Phase 3

Evaluation of high temperature incinerator suppliers.
Development of a competitive tender for the disposal operation.
Evaluation of the working methods of the bidders.
Evaluation of all aspects of the bids to ensure they are reasonable and fair.

Phase 4

Inspection of all protective equipment to ensure that it is suitable for the purpose.
Inspection of all packaging material and inspection of test certificates to ensure compliance with the IMDG Code.
Inspection and comments on risk assessments and

working methods to be employed at all working sites.
Inspection of all vehicles used for transportation of waste to ensure they are safe.
Monitoring of daily progress to ensure the project time frame is met.
Monitoring of day-to-day activities and advising on aspects of health, safety and the environment.
Supervision of video coverage and assistance in editing and scripting of the project video.
Generation of a final report highlighting lessons learned for future operations.

CONTRACTORS

There are few contracting companies that are experienced in dealing with the removal and disposal of hazardous waste from developing countries. As has already been emphasized, these projects are complex and require extensive knowledge and experience as well as access to specialist equipment. Disposal contracts should not be awarded to companies without these essential requirements.

While cost is an important factor, bids from contractors must also be assessed on the technical ability of the bidder and on the evidence of their ability to deliver according to the specifications of the contract.

Experience in assessing bids is also important and the project manager or an experienced agency in the sector, such as FAO, should guide the process. Assessing and selecting contractors to carry out work related to an obsolete pesticides project should include all stakeholders as identified in the section Including stakeholders on p. 5.

Chapter 9

Implementing solutions

By this stage the problem of obsolete pesticides has been identified, its scope has been assessed and a project to deal with the stockpiles and prevent their recurrence has been formulated. The management and oversight structures for the project have been created, a manager has been appointed and contractors selected. Implementation of the full-scale project can now commence, and this chapter identifies issues that need to be addressed during this phase.

INVOLVING STAKEHOLDERS

As described in the section on p. 5, all relevant stakeholders should be engaged from the earliest stages of the process. Their involvement is crucial during the planning and development phases so that when implementation commences there is full agreement on the methods to be used in dealing with obsolete pesticides and in preventing their recurrence. As implementation progresses stakeholder involvement must continue. If regular and frequent meetings are not possible, stakeholders should be kept informed of progress through written reports. They should also have an effective communication route to discuss issues with a member of the project management team.

NATIONAL COMMITMENTS

National commitments, as described in Chapter 3 in the sections on Taking the lead and Institutional support, should continue into and throughout the implementation phase. Although external agencies and contractors will probably provide expertise, funds and possible overall project management, the government of the country should see the project as a national initiative. It is clear that most developing countries will be unable to make significant financial contributions towards the project. Nevertheless, contributions in kind can take many forms and in many cases can be crucial to the success of a project. Examples are given below.

Local staff

Local staff are familiar with the country in ways that external agencies are not, as regards language, culture and customs, geography, climate, health issues, administrative processes and available resources. Their contribution should be on two levels:

Senior counterpart staff

Two or three key personnel should be made fully available to the project for its duration, i.e. they should be released from other commitments so as to be available when needed. They will be members of the project management team and will contribute through their local knowledge to the effective planning and implementation of all the project elements. In return for their contribution they will receive training and gain experience in areas that will benefit the country in the future.

Senior counterparts will typically be educated to postgraduate level (master degree or doctorate) and hold middle management positions in relevant ministries (agriculture, environment and health).

Operational staff

In addition to senior counterpart staff, local staff will be needed to work onsite to assist foreign contractors in carrying out their work. Assistance should be provided in recruiting and training these people in interpretation, health monitoring, transport and other relevant matters that may arise.

Operational staff will be required to carry out manual work such as moving and packing obsolete pesticides and cleaning storage sites. They will receive appropriate health and safety training and be equipped to carry out the work safely. Training and equipment will be the responsibility of the contractor or agent appointed to carry out the cleanup operation.

Although operational staff do not require academic training, they will typically be high-school or college graduates and able to understand and follow instructions. They must understand that they will be working in hazardous conditions and failure to comply with instructions and working rules could lead to injury to themselves or others.

In participating in the work these staff will gain experience in handling hazardous materials – a valuable contribution to national capacity building.

Office facilities

The hub of activities for the project should be in a permanent office with communication facilities and secretarial support. This should be provided by the ministry leading the project and should be fully available throughout the project.

Office equipment including computers, communications equipment and furniture may be built into the project budget.

Vehicles

Large projects covering a wide geographic area and large quantities of obsolete pesticides may be able to budget for the purchase of vehicles to support the project. However, smaller projects will need to rely on vehicles to be provided by the government. Even where projects own their own vehicles, they may need additional transport facilities, for example to transport workers and chemicals between sites.

Storage facilities

As obsolete pesticides are removed from their storage sites and repacked in preparation for transport, they will require interim storage. Similarly, if stocks of obsolete pesticides are distributed in relatively small quantities in several stores, they will need to be collected at a single site for final sorting and packaging. The government and other agencies owning stocks and stores should make these collection sites and interim stores available to the project.

Duty and tax exemption

Disposal operations require a great deal of equipment, including personal protective equipment, packaging materials, specialist materials for dealing with emergencies, weighing equipment, moving equipment and so on.

Much, if not all, of the above will need to be imported to countries where operations are being carried out. The government authorities should ensure that all imports related to the project are exempt from duties and taxes and that their passage into the country is made as efficient as possible.

Foreign visitor permits

Expatriate personnel will undoubtedly be involved in project management, planning and execution and may also need to enter and leave the country several times during the course of the project. Government authorities should provide multiple entry visas and facilitate the efficient passage of project personnel through passport controls and customs.

Security

The equipment and materials used in disposal operations have a high value. Since expatriate staff managing projects will be unfamiliar with local conditions, government authorities must provide resources to ensure the security of both personnel and equipment. These resources include appropriate sites for storage of materials and equipment, security guards for stores and for personnel and secure accommodation for personnel.

Government authorities should advise on precautions that expatriate personnel need to take during their time in the country, such as where to stay, areas to avoid and national security requirements (e.g. curfews, photography restrictions, documentation to be carried, religious customs and requirements).

Chapter 10
Wider issues

HAZARDOUS WASTE MANAGEMENT

Obsolete pesticide stockpiles represent a critical hazardous waste issue that needs to be addressed in a particular way. However, since countries dealing with obsolete pesticides may have other critical problems such as stockpiles of industrial waste and POPs chemicals such as PCBs, it may be relevant to address other critical issues of this nature at the same time. Advice should be sought so that concerned countries can make informed decisions as to whether to incorporate these issues.

Countries are also continuously producing hazardous waste from industry, hospitals, regular pesticide use and other sources. An analysis of the national hazardous waste matrix should be made to determine the sources and types of waste being generated, and a management strategy developed. This will necessitate expert advice from agencies such as UNIDO, UNEP and the Secretariat of the Basel Convention.

It is important to differentiate between the critical and ongoing problems of hazardous waste, since the solutions applied to the two may be very different. Nevertheless, attention to critical issues should act as a catalyst for addressing ongoing issues and thus prevent the future recurrence of critical problems.

MONITORING RESULTS

The success of a disposal operation for obsolete pesticides can be easily measured by quantifying the removal of stocks. During the course of a disposal operation it is also important to monitor working standards to ensure that the health of workers and the general public is protected and that the environment is not harmed as a result of the operation.

Monitoring the success of prevention measures is more complex, yet equally important. However, each of the prevention measures proposed in Chapter 6 has certain indicators against which success can be measured. For example, how many farmers who previously relied on pesticides are now using IPM methods? To what degree has the quantity of chemical pesticides used in migratory pest control or disease vector control been reduced? Are all pesticides on the market registered and monitored for quality? How many pesticide applicators have received training? What proportion of empty pesticide containers is returned to suppliers?

Continual monitoring will help to ensure ongoing compliance with accepted standards and improvement in the disposal of obsolete pesticide stocks.

Annex 1
Resource list

FAO

Contact details:

Obsolete Pesticides Programme
AGPP
Food and Agriculture Organization of the United Nations
Viale delle Terme di Caracalla
00100 Rome
Italy
Tel.: (+39) (0)6 5705 5192
Fax: (+39) (0)6 5705 6347
E-mail: Alemayehu.Wodageneh@fao.org

FAO Pesticide Disposal Series – available online at: www.fao.org/WAICENT/FAOINFO/AGRICULT/AGP/AGPP/Pesticid/Disposal/default.htm

FAO. 1995**.** *Prevention of accumulation of obsolete pesticide stocks. Provisional guidelines.* FAO Pesticide Disposal Series No. 2. 31 pp.

FAO. 1996a. *Pesticide storage and stock control manual.* FAO Pesticide Disposal Series No. 3. 32 pp.

FAO. 1996b. *Disposal of bulk quantities of obsolete pesticides in developing countries. Provisional technical guidelines.* FAO Pesticide Disposal Series No. 4. 44 pp.

FAO. 1999a. *Guidelines for the management of small quantities of unwanted and obsolete pesticides.* FAO Pesticide Disposal Series No. 7. 25 pp.

FAO. 2000. *Assessing soil contamination. A reference manual.* FAO Pesticide Disposal Series No. 8. 209 pp.

FAO. 2001a. *Baseline study on the problem of obsolete pesticide stocks*. FAO Pesticide Disposal Series No. 9. 36 pp.

Other FAO publications

FAO. 1999b. *Obsolete pesticides: problems, prevention and disposal*. CD-ROM.

FAO. 2001b. *Inventory of obsolete, unwanted and/or banned pesticides. Prevention and disposal of obsolete and unwanted pesticide stocks.* Database.

GERMAN AGENCY FOR TECHNICAL COPERATION (GTZ)

Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH
Dag-Hammarskjöld-Weg 1-5
65760 Eschborn
Germany
Tel.: (+49) (0)6196 79-0
Fax: (+49) (0)6196 79-1115
www.gtz.de/english/

GTZ. 1993a. *The safe disposal of non-agricultural professional pesticides and their empty containers*. British Agrochemicals Association, UK. 8 pp.

GTZ. 1993b. *Prevention and elimination of obsolete pesticide stocks in developing countries*, by H.P. van der Wulp. Amsterdam, Global Legislators' Organization for a Balanced Environment (GLOBE).

GTZ. 1999. *Obsolete pesticides – a dangerous legacy: results of a pilot project on the disposal of obsolete pesticides*. December.

INTERNATIONAL MARITIME DANGEROUS GOODS (IMDG) CODE

International Maritime Organization
4 Albert Embankment
London SE1 7SR
United Kingdom
Tel.: (+44) (0)20 7735 7611
Fax: (+44) (0)20 7587 3210

E-mail correspondence from Member Governments, NGOs and IGOs

Technical inquiries from Member Governments, intergovernmental organizations and organizations in consultative status with IMO should be made at info@imo.org in the first instance. They will then be routed to the relevant officer for appropriate action.

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT (OECD)

2, rue André Pascal
F-75775 Paris Cedex 16
France
www.oecd.org/ehs/

OECD. 1995. *Guidelines for aid agencies on pest and pesticide management.* OECD Development Assistance Committee Guidelines on Aid and Environment, No. 6. Paris.

ROTTERDAM CONVENTION (PIC)

Secretariat of the Rotterdam Convention
AGPP
FAO
Viale delle Terme di Caracalla
00100 Rome
Italy
Tel.: (+39) (0)6 5705 3441
Fax: (+39) (0)6 5705 6347
E-mail: pic@fao.org
www.pic.int

UNEP Chemicals
11-13 chemin des Anémones
1219 Châtelaine, Geneva
Switzerland
Tel.: (+41) 22 917 8183
Fax: (+41) 22 797 3460
E-mail: pic@unep.ch

SECRETARIAT OF THE BASEL CONVENTION (SBC)

PO Box 356
15 chemin des Anémones
1219 Châtelaine, Geneva
Switzerland
Tel.: (+41) 22 917 8218
Fax: (+41) 22 797 3454
E-mail: sbc@unep.ch
www.unep.ch/basel/

SBC. 1994. *Basel Convention on the control of transboundary movements of hazardous waste and their disposal, 1989, and decisions adopted by the first (1992) and second (1994) meetings of the conference of parties*. Geneva.

SBC. 1995a. *Implementing the Basel ban: the way forward.* Prepared for the Global Workshop on the Implementation of Decision II/12, 15-17 March 1995, Dakar, Senegal. Greenpeace International.

SBC. 1995b. *Guidance in developing national and/or regional strategies for the environmentally sound management of hazardous wastes*. Geneva.

SBC. 1995c. *Guidance document on transboundary movements of hazardous wastes destined for recovery operations*. Basel Convention Series No. 95/002. Geneva.

SBC. 1996. *Meeting for the promotion of ratification of the Basel Convention and the establishment of Regional Centres for training and technology transfer.* Report of meeting. Brits, South Africa, 22-26 July 1996. Pretoria, South Africa, Department of Environmental Affairs and Tourism. 25 pp.

SBC. 1997. *Technical guidelines on specially engineered landfill (D5).* Basel Convention Series No. 97/004. Geneva.

SBC. 1998. *Final report. Project "Assistance to developing countries in implementing the Basel Convention and in preparing hazardous waste management plans"*. Basel Convention Series No. 98/004. Geneva.

SBC. 1999. *Technical guidelines on physico-chemical treatment (D9); biological treatment (D8).* Basel Convention Series No. 99/007. Geneva.

SBC. *Technical guidelines on incineration on land (D10).* Revised version. Basel Convention Series. (to be published)

STOCKHOLM CONVENTION (POPs)

UNEP Chemicals
11-13 chemin des Anémones
1219 Châtelaine, Geneva
Switzerland
Tel.: (+41) 22 817 8190
Fax: (+41) 22 797 3460
E-mail: pops@unep.ch
www.unep.ch/pops

UNITED NATIONS (UN)

www.unece.org/trans/main/dgdb/dgsubc/c3doc_2001.html

UN. 1995. *Recommendations on the transport of dangerous goods*. 9th ed. New York and Geneva.

UNITED NATIONS ENVIRONMENT PROGRAMME (UNEP)

UNEP Chemicals
11-13 chemin des Anémones
1219 Châtelaine, Geneva
Switzerland
Tel.: (+41) 22 917 8170
Fax: (+41) 22 797 3460
E-mail: chemicals@unep.ch
www.chem.unep.ch/irptc/default.htm

UNEP/IRPTC. 1985. *Treatment and disposal methods for waste chemicals*. Geneva.

UNEP. 1998. *POPs: regulatory actions and guidelines concerning persistent organic pollutants*. Geneva. June.

UNEP. 1999a. *Dioxin and furan inventories*. Geneva. May.

UNEP. 1999b. *Regionally based assessments of persistent toxic substances*. Geneva, UNEP Chemicals. September.

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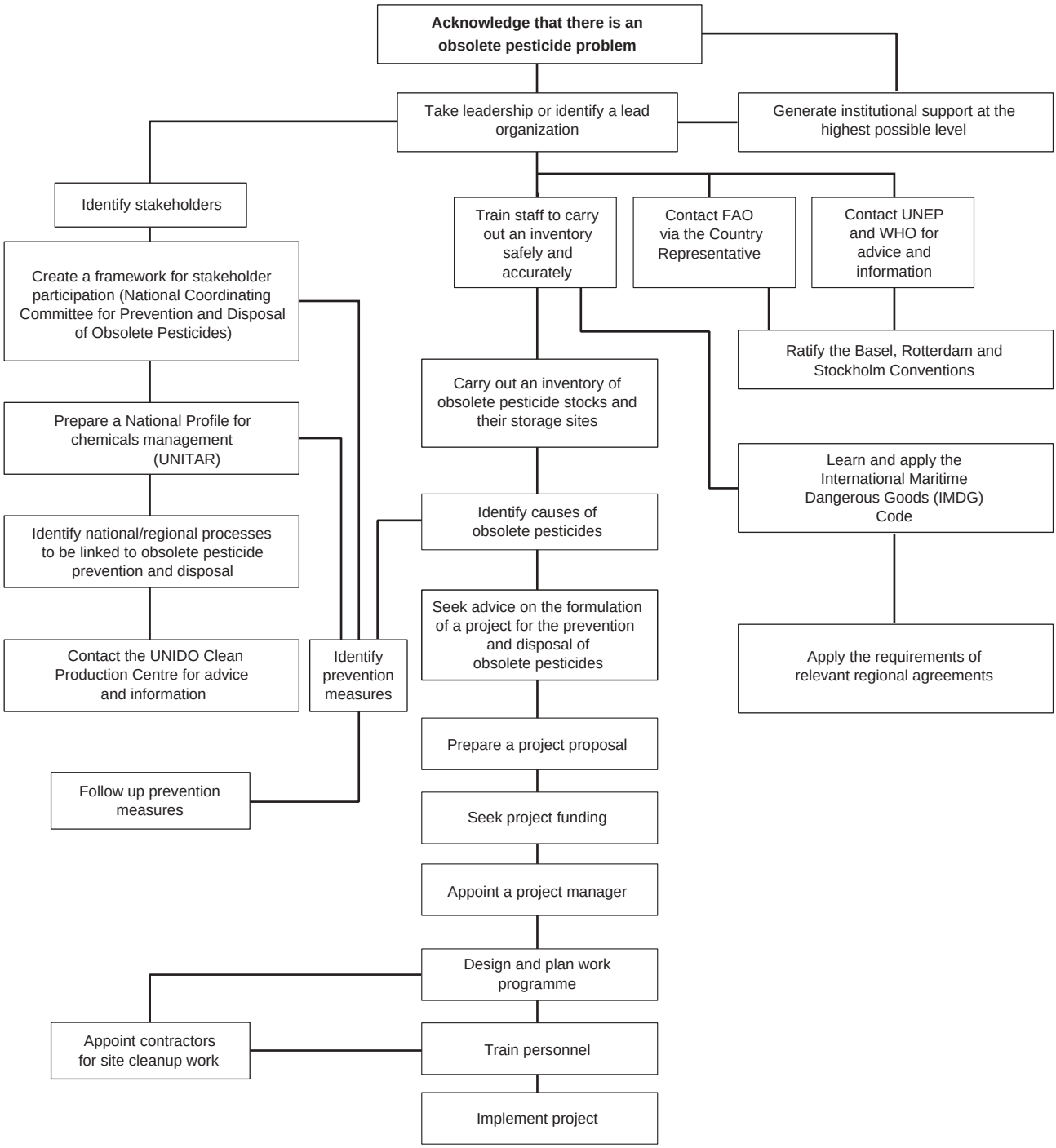
Annex 2

Sequence of events

1. Acknowledge that there is an obsolete pesticide problem
2. Take leadership or identify a lead organization
3. Generate institutional support at the highest possible level
4. Contact FAO via the Country Representative
5. Identify stakeholders
6. Create a framework for stakeholder participation (National Coordinating Committee for Prevention and Disposal of Obsolete Pesticides)
7. Train staff to carry out an inventory safely and accurately
8. Carry out an inventory of obsolete pesticide stocks and their storage sites
9. Identify causes of obsolete pesticides
10. Prepare a National Profile for chemicals management (United Nations Institute for Training and Research [UNITAR])
11. Identify national processes to be linked to obsolete pesticide prevention and disposal
12. Identify regional processes to be linked to obsolete pesticide prevention and disposal
13. Contact the United Nations Environment Programme (UNEP) and the World Health Organization (WHO) for advice and information
14. Contact the United Nations Industrial Development Organization (UNIDO) Clean Production Centre for advice and information
15. Ratify the Basel Convention
16. Ratify the Rotterdam Convention
17. Ratify the Stockholm Convention
18. Learn and apply the International Maritime Dangerous Goods (IMDG) Code
19. Apply the requirements of relevant regional agreements
20. Seek advice on the formulation of a project for the prevention and disposal of obsolete pesticides
21. Prepare a project proposal
22. Seek project funding
23. Appoint a project manager
24. Design and plan work programme
25. Train personnel
26. Appoint contractors for site cleanup work
27. Implement project
28. Follow up prevention measures

The flow chart on the following page gives a suggested programme for implementation of this sequence of events. This programme is likely to vary in each country and should take account of ministerial responsibilities, measures that are already in place, relevant stakeholders, activities of various intergovernmental organizations and other relevant factors.


Acknowledge that there is an obsolete pesticide problem
Take leadership or identify a lead organization
Generate institutional support at the highest possible level
Identify stakeholders
Train staff to carry out an inventory safely and accurately
Contact FAO via the Country Representative
Contact UNEP and WHO for advice and information
Create a framework for stakeholder participation (National Coordinating Committee for Prevention and Disposal of Obsolete Pesticides)
Ratify the Basel, Rotterdam and Stockholm Conventions
Carry out an inventory of obsolete pesticide stocks and their storage sites
Prepare a National Profile for chemicals management (UNITAR)
Learn and apply the International Maritime Dangerous Goods (IMDG) Code
Identify causes of obsolete pesticides
Identify national/regional processes to be linked to obsolete pesticide prevention and disposal
Seek advice on the formulation of a project for the prevention and disposal of obsolete pesticides
Contact the UNIDO Clean Production Centre for advice and information
Identify prevention measures
Apply the requirements of relevant regional agreements
Prepare a project proposal
Follow up prevention measures
Seek project funding
Appoint a project manager
Design and plan work programme
Appoint contractors for site cleanup work
Train personnel
Implement project

Annex 3

Inventory form

Obsolete, unwanted and/or banned pesticide stocks in _____

Inventory updated: Month _____Year_____

1 No	2 Site/store affected	3 Common name	4 Commercial name	5 Formulation	6 Chemical group	7 Toxicity group (WHO)	8 Type of container	9 Condition of container	10 Number of containers	11 Quantity (kg)	12 Quantity (litres)	13 Year manufactured batch/lot no.	14 Country, manufacturer, donor, source	15 Comments/remarks
1														
2														
3														
4														
5														
6														
7														
8														
9														
10														
11														
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13														
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20														
29														
30														
31														
31														

Note:

[1] Heavily contaminated soil should be considered as obsolete pesticide stocks and therefore estimates taken from each affected site and recorded along with pesticides kg in column 11.

[2] Where possible include all the 12 POPs in the inventory.

[3] Use question marks (?) where information is lacking

[4] Use *unknown* for unknown or unidentified stocks

Total containers: no., kg, litres	0	0	0
Combined total in kg/litres			0
Pieces of containers	0	XXXX	XXXX
Grand total in tonnes			0