

Practical Guideline  
on Environmentally  
Sound Management of  
**Obsolete  
Pesticides**

In the Latin America  
and Caribbean Countries

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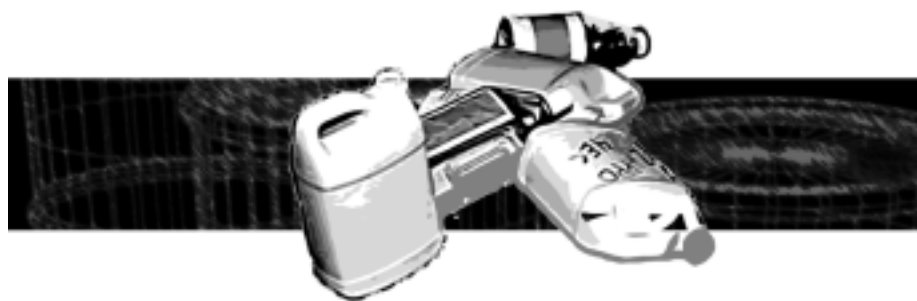
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# Prologue



The present publication aims to provide a practical guideline on the environmentally sound management of obsolete pesticides within the Latin America and Caribbean countries, and takes into consideration related aspects such as identification and stockpiles management, their handling as hazardous wastes, treatment alternatives, exportation, generation prevention and the obligations laid down by the international conventions of Basel, Stockholm and Rotterdam.

The guideline is addressed to experts from different public or private agencies who are related to several aspects deriving from obsolete pesticides management.

This publication presents a compilation of information obtained from different sources, especially FAO documents, Stockholm and Basel Convention, and hazardous wastes management in general. In particular it deals with the questions and recommendations that arose from the workshop entitled "Regional Co-operation for the Environmentally Sound Management of Pesticides Stockpiles, as a Contribution to the Stockholm and Basel Compliance through the Exchange of Experiences within the Latin America region" held in Caracas, Venezuela, from the 8 to 10 September 2004. The workshop conclusions and recommendations are presented in Annex I to this document.

The guideline elaboration jointly with the mentioned workshop is part of a Case Study the Basel Convention Coordinating Center for Latin America and the Caribbean did on transfer of technology. The Case Study was done with the purpose of contributing to the Feasibility Study on Technical Assistance that the Secretariat of Stockholm Convention did to implement capacity building and technology transfer in developing countries.

Acknowledging the problems obsolete pesticides stockpiles mean to the region, that a great number are persistent organic pollutants, and recognizing Venezuela's experience in dealing with them, the Basel Convention Coordinating Centre chose all this to develop the Case Study.

# Acknowledgement

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A special mention must be done to the experts that participated in the Venezuela's workshop, as they shared their experiences they made substantial contributions for the elaboration of this practical guideline.



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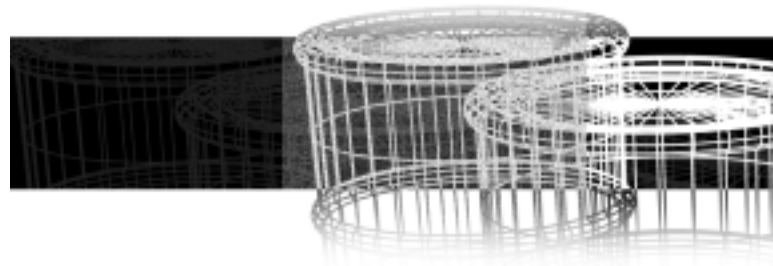
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# 1. Introduction



## Pesticides

The International Code of Conduct on the Distribution and Use of Pesticides defines **pesticide** as:

"Any substance or mixture of substances intended for preventing, destroying or controlling any pest, including vectors of human or animal disease, unwanted species of plants or animals causing harm during or otherwise interfering with the production, processing, storage, transport or marketing of food, agricultural commodities, wood and wood products or animal feedstuffs, or substances which may be administered to animals for the control of insects, arachnids or other pests in or on their bodies. The term includes substances intended for use as a plant growth regulator, defoliant, desiccant or agent for thinning fruit or preventing the premature fall of fruit, and substances applied to crops either before or after harvest to protect the commodity from deterioration during storage and transport".

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## Obsolete Pesticides

For the purpose of this guideline, "**obsolete pesticides**" are defined as those pesticides that can no longer be used for their intended purpose or wanted to be used and therefore must be disposed of.

"**Obsolete pesticides**" include:

- ① Outdated technical pesticides or formulations (generally products have a shelf-life of two years from the date of release).
- ② Pesticides that have been withdrawn through banning or that have been severely restricted.
- ③ Deteriorated products:
  - ➔ those that have undergone physical or chemical changes that result in phytotoxic effects on the target crop, or an unacceptable hazard to human health or environment.
  - ➔ those that have undergone an unacceptable loss of biological efficacy.
  - ➔ those whose physical properties have changed to such an extent that it can no longer be applied with standard application equipment.

- ④ Unwanted pesticides, even though they still can be used.
- ⑤ Unidentified products.
- ⑥ Products contaminated with other substances.

It is also considered:

- ⑦ Pesticides wastes generated in fire events or other accidents.
- ⑧ Materials strongly contaminated with pesticides.
- ⑨ Wastes from the production or formulation of pesticides.

Because of their characteristics "**obsolete pesticides**" are hazardous wastes, and therefore they must be managed as such.

## Types of Obsolete Pesticides Stockpiles

- ① **Small quantities resulting from use.** This group comprises those obsolete pesticides generated by producers, experimental stations or research institutes. Generally this means small quantities whose generation is disperse and fluctuating, but it is also expected that this waste stream is more or less the same in the different areas through time.
- ② **Obsolete pesticides generated in trade operations.** These pesticides are found at identified pesticides trading companies but disperse throughout the countries. Their generation is directly related to the companies' activities in relation to product stockpiles management and generally because of prices, small quantities are involved.
- ③ **Wastes from production or formulation of pesticides.** These wastes are generated as a result of industrial activities. Their generation is a function of pesticides production, they are at a fixed facility and completely characterized.
- ④ **Wastes from accidents.** Accidents are the origin of these wastes. They might be generated during transport, by fire, spills or other accidents within the storing area. Their generation is eventual and disperse, quantities range from a few to several and the wastes are basically well characterized.
- ⑤ **Deteriorated products.** These are products that have deteriorated as a result of different circumstances: bad storage conditions that changed their physico-chemical properties and therefore they can no longer be applied. The generations is eventual and disperse, the quantities are variable and basically the wastes characteristics are known.
- ⑥ **Deposits.** These are warehouses of different characteristics where quantities range from a few tens of kilograms to various tons of obsolete pesticides. Generally they were generated in the past but they still can be generated because of bad buying policies, inadequate deposits and poor stock management and also due



to confiscation. Obsolete pesticides can be found in public or private facilities in any part, they might be part of an inventory or not and sometimes they might not even be identified. The abovementioned comprises old industries deposits, under no activity and that has become environmental liabilities. This is an heterogeneous group due to the types of products, quantities, containers and active ingredients conditions, storage conditions and the risk they represent.

- 7 **Burials.** This kind of disposal method was used in the past in various countries. This is usually named "contaminated site" but on account of the high soil contamination that can be present, burials might be considered as stockpiles. The buried quantities as well as the affected area and the risks involved are different from site to site. Additionally, the areas identification can also be difficult.

## Risks related to obsolete pesticides

Pesticides are a wide range of chemicals with different degree of hazard, from extremely to slightly hazardous.

**Hazard** is the intrinsic properties of a pesticide that gives it toxic properties. The toxic properties imply the capacity of producing adverse effects on living organisms in short, medium and long term.

**Risk**, in relation to a pesticide, is the likelihood to cause adverse effects on organisms and it is a function of the exposure. The level of risk for a certain organism is a function of its hazard and the magnitude of exposure.

***Risk = f (Hazard, Exposure)***

From the above the risks are very much related to the way pesticides are managed and therefore it can be prevented or minimized.

In terms of hazard there is no difference between an obsolete pesticide deposit or a deposit of usable pesticides. However, an obsolete pesticide deposit implies a higher risk because usually the storage or containers conditions are not good. Therefore the chances of exposure substantially increase.



# 2. Conventions

## Basel, Stockholm and Rotterdam



Over the past 30 years, the production, generation and trade of chemicals and wastes has exponentially grown up, with the consequent concern of governments and people, especially on account of the risks at the time chemicals or wastes are being transported, handled or disposed of. To give answers to some of the mentioned aspects the international community drove its way to various global legal instruments.

This chapter contains summaries of three international agreements that directly address several chemicals and hazardous wastes issues. These agreements deal, among others, with pesticides and their wastes, and this chapter particularly shows their relationship with obsolete pesticides management.

In response to these concerns, during the last decades the United Nations Environment Programme (UNEP) has given special attention to chemicals and hazardous wastes. Within this framework three multilateral agreements, currently in force are mentioned here. They provide global measures to protect human health and the environment, and they tackle with some aspects of the chemicals and wastes life cycle. These agreements are the **Basel Convention** on the control of transboundary movements of hazardous wastes and their disposal, **Rotterdam Convention** on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade and the **Stockholm Convention** on Persistent Organic Pollutants.

### Basel Convention

**Basel Convention** on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal was adopted in Basel, Switzerland in 1989 and came into force in May 1992 becoming an international commitment of those countries Parties to the Convention. The Basel Convention has become the most important multilateral agreement on wastes, establishing a global regulatory regime to minimize the generation, manage hazardous wastes in an environmentally sound manner and control of their transboundary

movements. It has a broad scope and has developed lists to classify wastes based upon their hazard characteristics and specific lists of wastes within its scope. By September 2004, the Basel Convention has 163 contracting Parties.

## Rotterdam Convention

**Rotterdam Convention** on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade started as a voluntary information exchange program in the 80s, and came into force in 2004, February 24 and by September that year, 77 countries are Parties to the Convention. Its objective is to protect human health and the environment from specified hazardous chemicals by promoting shared responsibility among Parties in the international trade. The convention tries to facilitate relevant and precise information exchange and includes procedures for formally obtaining and distributing decisions among import and export countries trading specific chemicals. Now 24 chemicals used as pesticides, 6 severely hazardous pesticides formulation and 11 industrial chemicals are subject to Rotterdam Convention and it is expected that the list will be enlarged.

## Stockholm Convention

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**Stockholm Convention** came into force in May 2004, and it is considered as a major success because of its objective, to reduce and completely eliminate 12 persistent organic pollutants (POPs) considered particularly toxic, 9 of them are pesticides, 2 are industrial chemicals and the other 2 belong to two families of chemicals unintentionally form and released, with no commercial use generated in combustion processes and some chemical reactions.

POPs are characterized by their long lifetimes (persistence) in the water, soil or sediments or air and the Convention establishes that a contaminant is persistent if its half-life in water is greater than two months or that its half-life in soil is greater than six months, or that its half-life in sediment is greater than six month.

## Scope and linkages among the three conventions

The following chart contains general provisions of each convention in relation to those pesticides and wastes that are included in their lists.

| Convention       | Pesticides and Wastes   | Provisions  |
|------------------|---|---|
| <b>Basel</b>     | <p><b>Wastes</b> resulting from the production, formulation and use of biocides and phytopharmaceuticals (Y4), including waste pesticides and herbicides which are off-specification, outdated or unfit for their originally intended use. (A4030)</p> <p><b>Wastes</b> resulting from the production, formulation and use of wood-preserving chemicals. (Y5, A4040)</p> <p><b>Wastes</b> from phenols; phenols compounds including chlorophenols. (Y39)</p> <p><b>Wastes</b> from organohalogen compounds. (Y45)</p>         | Control of transboundary movements of wastes using established procedures. Waste generation minimized. Management, treatment and disposal of wastes in an environmentally sound manner. |
| <b>Stockholm</b> | <p><b>Organochlorinated pesticides:</b> Aldrin, Dieldrin, Chlordane, Endrin, Heptachlor, Hexachlorobenzene, Mirex, Toxaphene, DDT.</p>  | Ban production and use. Register of specific exemptions. Measures to reduce or eliminate releases from stockpiles and wastes.   |
| <b>Rotterdam</b> | <p><b>Pesticides:</b> Aldrin, Dieldrin, Chlordane, Heptachlor, Hexachlorobenzene, DDT, 2,4,5 T, Captafol, Chlordimeform, Chlorobenzilate, Dinoseb and Dinoseb salts, 1,2-dibromoethane, Fluoroacetamide, HCH (mixed isomers), Lindane, Mercury compounds (inorganic mercury compounds, alkyl mercury compounds and alkyloxyalkyl and aryl mercury compounds), Pentachlorophenol.</p> <p><b>Severely Hazardous Formulations:</b> Monocrotophos, Methamidophos, Phosphamidon (isomers E and Z), Methylparathion, Parathion.</p> | Prior Informed Consent Procedure for import countries. Information exchange.  |

**Basel Convention** aims at:

- ➔ Minimizing wastes generation taking into consideration social, technical and economic aspects.
- ➔ Assuring the use of adequate facilities for disposal operations, wherever the activity take place.
- ➔ Looking after people involved in wastes management and adoption of necessary measures to prevent pollution.
- ➔ Assuring transboundary movements are reduced to a minimum consistent with their environmentally sound management.

In relation to stockpiles or wastes consisting of, containing or contaminated with persistent organic pollutants (POPs), **Stockholm Convention** establishes that:

1 In order to ensure that stockpiles and wastes are managed in a manner protective of human health and the environment, each Party shall:

- ➔ Develop appropriate strategies for identifying stockpiles and wastes.
- ➔ Take appropriate measures so that the wastes, including products and articles upon becoming wastes, are:

Handled, collected, transported and stored in an environmentally sound manner.

Disposed of in such a way that the POPs content is destroyed or irreversibly transformed so that they do not exhibit the characteristics of POPs or otherwise disposed of in an environmentally sound manner when destruction or irreversible transformation does not represent the environmentally preferable option or the persistent organic pollutant content is low.

Not permitted to be subjected to disposal operations that may lead to recovery, recycling, reclamation, direct reuse or alternative uses.

Transported across international boundaries taking into account relevant international rules, standards and guidelines.

2 The Conference of the Parties shall cooperate closely with the appropriate bodies of Basel Convention to establish levels of destruction and irreversible transformation and determine what they consider to be the methods that constitute environmentally sound disposal.

**Rotterdam Convention** is aimed at promoting shared responsibility and cooperation among Parties in respect to their international trade of certain hazardous chemicals by facilitating relevant information exchange .

The three conventions have points of contact and there is some overlap among the three in relation to their scope, chemicals and wastes included in their lists.

Particularly the Basel Convention and Stockholm Convention are related in various aspects. First the chemicals and wastes included in Stockholm Convention are all in Basel lists, where they are viewed from a waste perspective. However, as these two conventions refer to certain stages of chemicals life cycle, some intersection occurs, and at the time of managing wastes, the countries use tools deriving from both conventions.

These three conventions show the international community concern in relation to minimizing/avoiding risks deriving from an environmentally unsound management of chemicals and wastes. Nevertheless, even though the three conventions have an increasing number of Parties committed to meet the convention's objectives and conscious of the problem and needed measures, many countries, especially the developing ones, lack the necessary infrastructure, capacity or resources to deal with chemicals and wastes management in an integrated manner. Anyway each of the abovementioned conventions present challenges and give opportunities to move forward offering a wide range of tools, not only basic ones such as awareness raising but also opening doors to local, national and regional discussion and to coordinate proposals and finally leading countries to develop rules to regulate different aspects of chemicals and wastes life cycle and therefore reach the objective of protecting human health and the environment.





# 3. Inventories of Obsolete Pesticides Stockpiles



## Identification of Stockpiles

There are different mechanisms to identify obsolete pesticides stockpiles:

- ➔ The knowledge of the institutions.
- ➔ Reports filed by the population.
- ➔ Making planned inventories.
- ➔ Stockpiles declaration under regulations in force.

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Institutions related to obsolete pesticides have different range of knowledge about the types of stockpiles within their countries. Local governments usually are the ones having relevant information.

Reports filed by the population are usually associated to large deposits which are easily accessible to the population who sense them as a risky element. In such case the deposit turns into a social problem, regardless the degree of sanitary or environmental risk. Generally this kind of problem is mainly present in those countries which imported large amounts of pesticides or received considerable donations during the 50s or 60s to fight pests which were either not used or the stock whereof were badly managed. Other countries which had their own producers or formulators and which ceased their activities for different reason, are added to the list.

Furthermore, obsolete pesticides stockpiles identification can result from a programmed activity such as the elaboration of inventories. This activity can vary in reach depending on the background of the country. Many Latin American countries have developed inventories with FAO support that cover just a portion of the total universe and at present, most of them have begun the elaboration of national inventories within the framework of

the National Implementation Plans under Stockholm Convention. Even though the Convention only contemplates POPs pesticides, the information surveys generally include all products.

Another way to identify stockpiles is through the information that generators are obliged to report in attention to legal framework in force in the country. Generally, in case of existing legal framework related to hazardous wastes, big generators are included, but not those that generate small quantities.

## Stockpiles Inventory

**Definition:** An obsolete pesticide stockpile inventory consists of a list which includes different types of stockpiles, storage site, types of products and wastes present, quantities, storage condition and risks. The inventory is a management tool that allows to obtain accurate information needed to make a diagnosis of the stockpiles condition, assess the magnitude of the problem, prioritize and draw up action plans.

**Scope:** The scope under which the inventory can vary is very wide, including all or only part of the different types of stockpiles, covering the whole country or part of it, comprising every possible place or just those with high probability of occurrence. Besides the inventory can include all stockpiles present in the country of those higher than a certain volume. The scope also refers to the type or quality of information gathered, which will depend on the methodology used. Establishing types and conditions of products present in some deposits or burials will require laboratory analysis, on the other hand products and wastes quantification in a certain accuracy degree may require additional work, and may not be included within the scope.

**Updating:** Meanwhile the volume and type of stockpiles is dynamic, an inventory represents an specific moment in time, and therefore it is necessary to implement a mechanism of updating information. This is a management tool too in the way that the stockpiles evolution and the implemented programmes incidence can be followed. The updating mechanism depends on the importance and priority given to the problem.

**Limitations:** Sometimes stockpiles owners refuse to declare as they see the obsolete pesticides as a problem and this means that the information gathered in the inventory may be not complete. Even worse some owners may try to get rid of them using illegal procedures and have no afterward responsibilities. In other cases no owners exist, making the product identification harder. Finally the inventory will have the limitations emerging from the abovementioned scope.

# Inventory planning

## Previous steps

Implementing an inventory of obsolete pesticides stockpiles require several previous steps:

- ① Establish a group that will have the responsibility of promoting the inventory.
- ② Design a strategy to obtain political commitment and financial resources.
- ③ Establish a coordination mechanisms between Environment, Health and Agriculture areas.
- ④ Design a strategy to obtain other institutions related to this issue support.

Once this steps have been accomplished, the basis or project to develop the inventory shall proceed, defining the scope, methodological steps, activities and timetable according to the available budget.

## Scope

Planning an inventory starts by defining its scope. This will be a result of the management assessment of pesticides in the country and the available human resources and budget, the following information is therefore required:

- ➔ General data about pesticides use in the country, considering the historical background on the issue, the geography, agricultural background (crops, kinds of producers), registers (pesticides, import, formulators or manufacturers, traders), trade unions, cooperatives or associations.
- ➔ Technical and legal framework applicable in the country.
- ➔ Budget and limitations for executing the inventory well known.

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## Methodology

The second step consists on the **definition of the methodology used to obtain the information**, in relation to the scope proposed.

Some key aspects to be considered are:

- ➔ Training of those involved in the inventory execution.
- ➔ Involving the local or municipal levels to obtain information.
- ➔ Defining a communication strategy adequate to the target public.
- ➔ Establishment of intermediate steps to assess the scope and make the corrective actions that may be required.

Other relevant aspect to consider is using inventory forms. As an example, the **two standardized inventory forms for gathering information** that FAO has developed are mentioned below:

- ① **Product form:** name of active ingredient; formulation type; concentration; quantity; age; and condition.
- ② **Storage form:** features and condition of the deposit; assessment of the extent of contamination; available utilities; material and equipments.

A copy of this forms is included in Annex 3.

For the information processing, the elaboration of a data base which includes electronic files to introduce results and group them in different ways is recommended because the inventory shall contain information needed to make decisions at a larger stage.

For each source of obsolete pesticides different strategies should be developed:

- ➔ Enterprises that import, formulate, distribute or trade pesticides are clearly identified and are relatively easy to contact and survey in a personal way. In cases where trade unions, or associations exist, it is recommended to contact them previously and have their support, sometimes the primary communication with the enterprises may be done through these institutions.
- ➔ Research institutes, experimental stations and storage places belonging to public entities are also easily identified and they can be surveyed in a personal way.
- ➔ At producers level, making a census (taking into account the whole universe) requires plenty of time and resources, and in this case making an estimation based on statistical sampling may be convenient. Information regarding these establishments can be obtained through Statistical Institutions. The size of the sampling will be a function of the error considered as acceptable. Personalized surveys can be used as a procedure to obtain information or the traditional mail can be used to send the forms. It is important to bear in mind that the percentage of answers is very low, the compiled information has low quality and it is necessary to validate in an administrative manner each survey. It is convenient, here as well, to contact the related associations, federations or cooperatives so as to have the sector support.

In every case, preparing announcement letters is necessary and each letter's contain should be defined accordingly to the different addressees.

In cases where determining types and conditions of products require check up visits and laboratory analysis or in cases where quantification of products and wastes with a certain accuracy degree requires additional work, the recommendations mentioned in Chapter "Management of Obsolete Pesticides Stockpiles Deposits" should be seen.

# 4. Management of Obsolete Pesticides Stockpiles Deposits



This chapter describes the methodological steps and practical aspects related to the management of obsolete pesticides stockpiles deposits, from their characterization to the stockpiles' conditioning for destruction.

The most general situation is here considered and this situation refers to a deposit with unknown contents and with the existence of a spill. The way to solve other cases shall result by simplifying the latter situation, except for burials where contaminated sites expert participation is needed.

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## Preliminary diagnosis

It starts by collecting documental information and establishing contacts with local stakeholders to **obtain the background** of the deposit.

The next step is the **visual evaluation of the site**, taking the following security measures:

- ➔ Unnecessary risks should not be taken.
- ➔ Allow sufficient ventilation prior entering.
- ➔ Use at least: muffler, goggles and gloves, and if possible dispensable overall.

Divisions responsible for the attention and inspection of deposits shall have to be duly qualify and equipped with adequate personal protection gear.

The visual evaluation of the deposit must offer the following information:

- ➔ Physical description of the facilities where the deposit is, including its conditions.
- ➔ Description of location in or near (houses, water bodies, underground water intake, and other relevant elements).
- ➔ Containers and wastes location.

- ➔ Information arising from labels on containers (manufacturer, active ingredient, formulation, concentration, age, importer).
- ➔ Condition of container and wastes stock.
- ➔ Primary quantification (volume, quantity and types of containers).
- ➔ Information of leakage and contamination traces.
- ➔ Photographic register.

The result of this step shall be a preliminary evaluation that shall establish the potential risks, allow defining the necessary actions to be taken to elaborate a more detailed diagnosis if necessary.

Elaborating a final diagnosis may require complementary actions such as characterization and stockpiles quantification. It may be also necessary to implement immediate actions to contain the pollution if the situation requires doing so.

## Complementary actions

According to the type and condition of the deposit and it's contained, as well as the characteristics of the location in or near, the following actions could be necessary:

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- ➔ Sampling to analytically establish the properties and composition of unidentified products or degree of deterioration of products and wastes.
- ➔ Making any task that helps with the better or worse volume quantification of materials present.
- ➔ Sampling soil and/or water and carrying out the analysis to establish degree of contamination.

This step requires precise planning in a way that the needed information is obtained in an optimized way, and therefore it must be done by a group of trained people.

The use of local capacities is recommended for the qualitative and quantitative verification of chemicals and wastes stockpiles. In such aim, generally there are laboratories for pesticides analysis in the Ministries of Agriculture as well as in some Universities.

It shall be necessary to:

- ➔ Identify one or more laboratories for pesticides analysis.
- ➔ Estimate costs of sampling and analysis.
- ➔ Establish the number of samples needed.
- ➔ Define quantification tasks.

- ➔ Draw up a budget.
- ➔ Find resources.
- ➔ Implement work.
- ➔ Assess results.

In first place, expert technicians shall be appointed for the characterization of stockpiles. The experts shall enter the site equipped with their personal protective gears adequate to the potential risks previously identified. It is recommended to contact technicians from the Ministry of Agriculture specialized in pesticides, technicians from the Ministry of Environment specialized in wastes management and risk assessment, as well as experts from the Ministry of Work or Health specialized in personal protective measures.

## Pollution Containment

In those cases where existence of leakages that are causing clear contamination problems are detected it shall be necessary to implement containment measures.

Some actions that shall be done are as follow:

- ➔ Public access shall not be allowed and entrance restricted.
- ➔ For open air stockpiles contact with rain water or particles swept away by wind shall be avoided and they shall be covered using canvases.
- ➔ Rain water draining shall be turned aside by constructing ditches, so that the water does not get in touch with stockpiles.
- ➔ The product draining shall be interrupted using absorbent materials (soil, sand, sawdust or especial products).

All persons involved in these work should use protective gears accordingly to the potential identified risks, avoiding product contact.

## Final Diagnosis and Action Plan

Once the previous steps are finished, the following information shall be available:

- ➔ Features of deposit.
- ➔ Products and wastes characterized and quantified.
- ➔ Contaminated sites identified.
- ➔ Relevant social and environmental aspects of the location in or near.

This information assessment will allow making conclusions regarding the deposit situation and the risks involved. Afterwards, based upon the assessment, an **Action Plan** shall be elaborated. The plan shall define the necessary steps for destruction and/or final disposal of stockpiles; it shall include an environmental assessment of the site and define the remediation measures if they are required.

In order to be able to elaborate an **Action Plan** it shall be necessary to have a technical team to cover the following aspects:

### **Technological aspect**

Assess the characteristics and behavior of the chemicals involved.

Compile similar experiences in the world and particularly in the region.

Define the necessary levels of treatment.

Evaluate the available infrastructure in the country for the conditioning, transport and treatment of hazardous wastes.

Evaluate the alternatives for treatment and disposal out of the country.

Evaluate health and environmental risks in the affected place.

Establish remediation measures.

### **Economic aspect**

Identify possibilities to obtain funding and international cooperation, available funds that may allow the application of the action plan. Establishment of alternatives associated to the costs to facilitate decision-making.

### **Legal aspect**

Considerate the regulatory framework both, at a national and international level.

### **Social aspect**

Considerate the social pressure and opinion.

Establish communication strategies at state, private and community level.

Local capacity building, so as to implement alternative techniques or treatments, is essential, particularly in case of small quantities. In that sense, it is very important to promote public confidence so as to implement. Exchange of experiences within the region is also strongly recommended.



## Temporary storage

Obsolete pesticides stockpiles can not always be removed for elimination and/or final disposal immediately. It takes some time to design and execute an Action Plan that will depend on the risks stockpiles represent, social pressure and available resources.

There is no destruction or final disposal facilities in most Latin American countries and as the products must be exported, funds to do so are needed. It can also happen that the quantities found do not justify export procedures (for instance when the quantity is less than a ton).

Besides, decisions to research treatment alternatives or destruction at country level are feasible, and apart from funds, time for research and the correspondent environmental authorities' approval is required.

Sites should be stabilized, to reduce risks and to prevent environmental contamination and accidents occurrence, waiting for a definitive solution that establishes the final fate of the obsolete pesticides and wastes present.

The deposit stabilization comprises the following actions:

- ① Containment (repackaging) of products in deteriorated containers.
- ② Clean up of spills.
- ③ Packaging of contaminated materials.
- ④ Reallocations within the same deposit or transportation to any other temporary storage.

Unless the conditions within the deposit do not allow, it is convenient to do these activities in the same place.

The repackaging procedure shall depend on the containers conditions and final fate, and it is subject to regulations governing made by destruction or final disposal enterprises and to sea or terrestrial transport requirements. If it is not possible, at this stage, to establish the stockpiles final fate, it is at least required that containers meet transport requirements. Spills must be cleaned up, packaged together with other contaminated products and managed as hazardous wastes.

It could be convenient to have **centralized temporary deposits**, well conditioned and managed, so that the situation is better controlled.

In order to establish the conditions any deposit of these nature should meet, similar criteria as those applied to common pesticides deposits must be adopted. The following should be considered:

- ➔ Well ventilated and closed places.
- ➔ Impermeable floors.

- ➔ Ramps to contain leakages.
- ➔ Danger signs.
- ➔ Safety locks.
- ➔ Fire fighting equipment.
- ➔ Products should be arranged in blocks, stored on pallets with aisles between them and the stacking recommendations should be observed.

## Work execution

### 🔗 SECURITY PRACTICES

#### **Area delimitation**

It is convenient to separate the deposit in working areas taking into account possible contamination: hot zone (this is the zone where the contaminated materials were originally and where they are going to be handled), cool zone (intermediate area) and cold zone (operational zone with no contamination).

4

#### **Clear procedures**

Tasks must be clearly defined and workers need to be trained for doing them. Spills containment, clothes cleaning and skin decontamination procedures should be available.

#### **Preventive measures**

- ➔ The deposit should be ventilated before entering.
- ➔ Risk should be assessed before starting the activities.
- ➔ Personal protection gear should be appropriately defined.
- ➔ Work in teams of at least two persons.
- ➔ Workers should be medically examined before and after involvement in this kind of activities.
- ➔ Smoking, eating or drinking is not allowed during the procedure.
- ➔ Personal protection gear must be decontaminated after getting out the hot area.
- ➔ Hands and face must be cleaned after the activity.

## Equipments and working clothes cleaning

In case of contamination, all the equipments and working clothes shall be carefully washed and waters collected for later treatment.

Dispensable equipments or highly contaminated should be disposed of as hazardous wastes.

### ⇨ MATERIALS AND EQUIPMENT

The following materials and equipments must be available:

- First aid materials (first aid box, shower, eyewash bottle).
- Appropriate personal protective gear.
- Shovels and brooms.
- Detergent for site clean-up.
- Absorbent materials for spill control.
- Appropriate bags and containers (tanks or drums) to repack pesticides from deteriorated containers and to pack contaminated soil and materials.
- Organic solvent resistant pumping equipments and large funnels to transfer liquids.
- Drum spanners (device to open drums).
- Fire extinguisher.
- Vacuum cleaner.

Depending on the magnitude and conditions of the deposit, freight elevators, special equipment to lift and press drums, chipping equipment for contaminated pallets and excavators to remove soil may be necessary.

Also the use of extractor fans should be needed to guarantee a free of vapors and toxic dusts working area.

### ⇨ PERSONAL PROTECTIVE GEAR

#### Respiratory protection

They shall be used according to what is needed: dust masks, half-face or full face masks and filter cartridges (against dust and toxic vapors). The dust masks are dispensable, but the filter cartridges have a lifetime and attention must be paid to replace them.

### Eye protection

Goggles or face shields need to be used depending on the risks the operator is exposed to.

### Hands protection

Chemical-resistant impermeable gloves shall be used. Nitrile or neoprene gloves are recommended, as they offer good protection against a wide range of pesticides.

### Shoes

Chemical-resistant impermeable boots must be used. Leather footwear is unsuitable because it absorbs some pesticides and cannot be decontaminated afterwards.

### Head protection

Helmet must be used in all operations.

### Body protection

Chemical-resistant overalls must be used (preferably dispensable). It is necessary to use high protection equipments for skin, eyes, respiratory system when high concentrations of toxic material are in the environment. These equipments are hermetically sealed suits against fumes, resistant to chemicals, with facial masks, gloves and boots incorporated and also autonomous respiratory equipment for oxygen supply.

## 4

### CONTAINERS' CONDITIONING OPERATIONS

The containers' conditioning operations include:

- ① Repackaging
- ② Reallocation within the same deposit
- ③ Conditioning for transport operations

These operations are to be done only by trained people, working in teams of at least two, all persons involved in the clean-up should wear appropriate protective clothing according to the risks and they must be medically examined.

#### Repackaging

Repackaging is aimed at preparing the product for temporary storage or transport for final destination.

Once the final destination is set, it is necessary to establish the **conditioning requirements for transport**. Even though transport determines some conditioning requirements, the selected treatment may condition the type of primary containers to be used.

In case of export, containers approved according to United Nations Recommendations on Transport of Dangerous Goods shall be used.

Small glass containers can be placed inside bigger containers, using absorbent material to stuff. This operation is done manually.

Big containers can be placed inside bigger ones or pour their contents into another container. In case of drums, where it is not possible to do this operation manually, a special freight elevator needs to be used.

Samples for laboratory analysis shall be taken if necessary.

Once the pesticide is repackaged, labeling shall be done. In cases where the pesticide is going to be exported labeling must follow the United Nations Recommendations on the Transport of Dangerous Goods. The label shall indicate composition, origin, generator and warning notes according to the major risk deriving from management.

Empty containers and contaminated pallets will be treated as hazardous wastes and decontamination, destruction or final disposal procedure must be established. Metallic drums can be compacted and the pallets chipped so as to reduce volume.

### **Reallocation within the same deposit**

The new labeled containers shall be transported to the storage area. Stacking procedures shall be followed depending on each type of container.

### **Conditioning for transport operations**

In case of export, the freight must be conditioned and placed in containers, bearing in mind their sizes and the weight distributions recommendations.

For local transport the freight must be conditioned to comply with national requirements for the different means of transport.

4

## PROCEDURES FOR CLEANING UP SPILLS

In case of spills all material must be collected and the floor cleaned. The instructions below should be followed:

- ① Unauthorized persons should be kept away from the contaminated area.
- ② Deposits should be well ventilated.
- ③ Read the instructions on the product label or Material Safety Data Sheets and the handling recommendations.
- ④ Work in teams of at least two persons. All persons involved in the clean-up should wear appropriate protective clothing.
- ⑤ Mop up the leaked product with absorbent material.
- ⑥ Contain the leaking drum in an over drum or pump its contents into another drum.

- 7 Lay a ring of absorbent material around and remove all the material after all liquid has been absorbed. Put together with a shovel and repack it.
- 8 Wet the area with a small quantity of detergent solution, and then allow it to be absorbed. Remove and pack these materials.

Absorbent materials used to contain are regarded as hazardous wastes.

# 5. Guides for Managing Identified Stockpiles



This Chapter develops guides for decision making on final disposal of identified obsolete pesticides stockpiles.

In general terms obsolete pesticides stockpiles should be managed as hazardous wastes, and **Management Plans** are necessary to guarantee their environmentally sound management.

## Waste Management Plan

Each stockpile identified shall have a specific **Waste Management Plan** according to their characteristics, treatment and final disposal capacities within the country and to national and international rules for managing hazardous wastes.

The **Waste Management Plan** involves a previous definition of all the enabling operations for an environmentally sound final disposal of the stockpiles identified and the wastes generated as a result of the deposit conditioning.

As in any waste management system, special attention shall be focused on the chemical composition of the wastes, the volume to be treated and their physical state. In particular the following aspects should be taken into account:

| Aspect                  | Specification  |
|-------------------------|--|
| Physical state          | Liquid, solvent specified.                               |
|                         | Solid - semi solid, humidity content determination       |
| Composition             | Active ingredients present in the waste.                 |
|                         | Decomposition products.                                  |
|                         | Other contaminants.                                      |
| Volume                  | Total volume or weight of waste to be treated.           |
|                         | Quantity of contaminant present in the waste.            |
| Frequency of generation | Find out if it was once, rarely or frequently generated. |

When formulating the Management Plan, the first analysis is aimed at determining if viable local capacity for final disposal of the identified stockpiles exists. If no local alternative exists, export to a country that authorizes the receipt and has the treatment and/or final disposal capacity will be considered. **Chart 1** shows a general flowchart towards final destination.

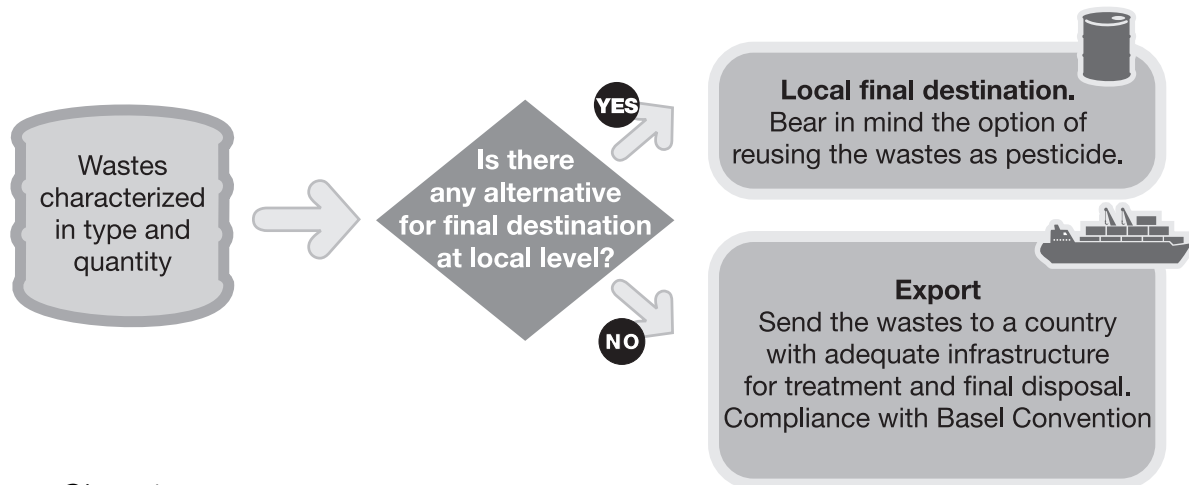


Chart 1

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In those cases where export is the only possible option at one precise moment, other alternatives within the country should be investigated in a parallel way.

## Procedure for Assessing Treatment Alternatives for Final Disposal at Local Level

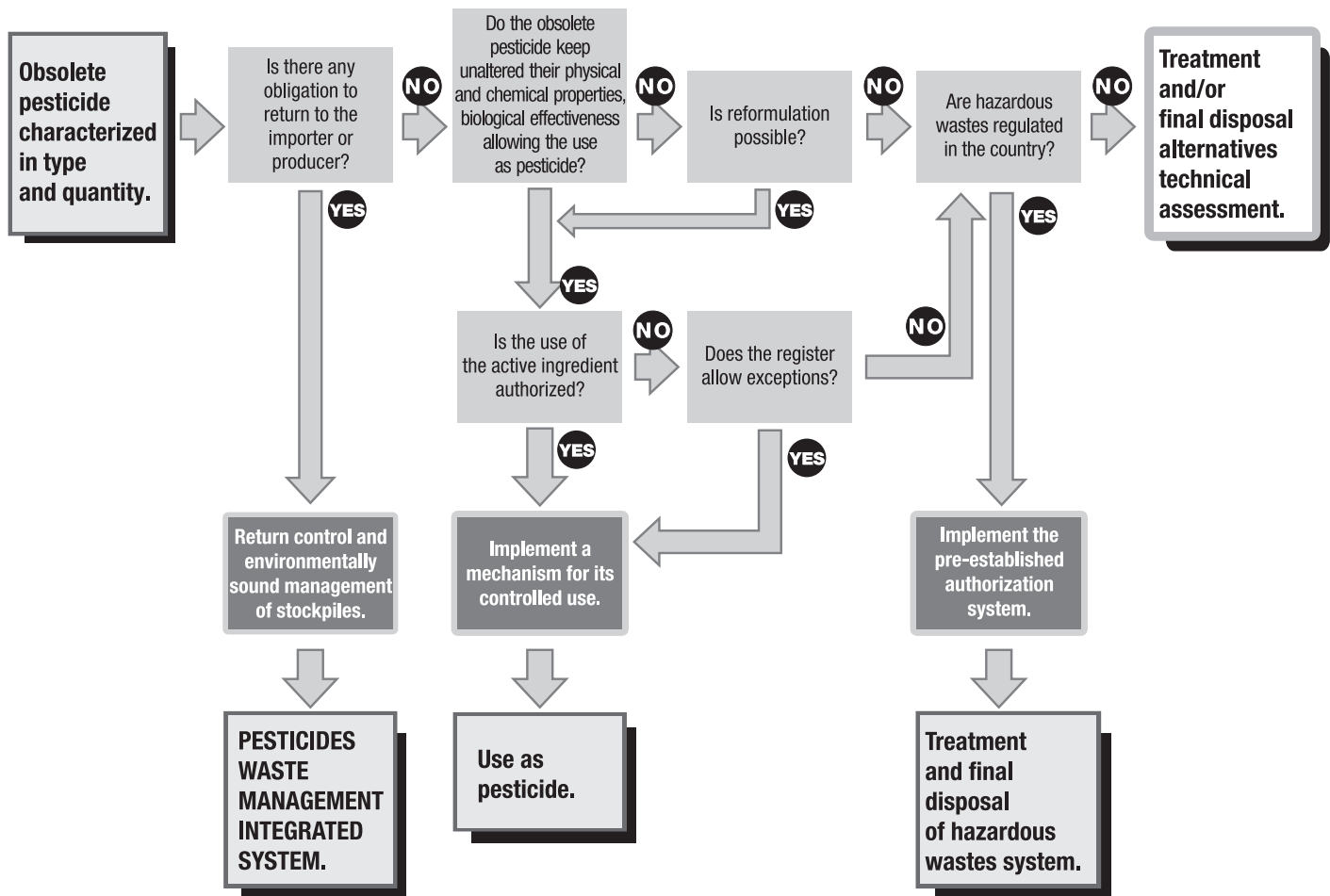
The possibilities to manage obsolete pesticides will depend principally on these stockpiles characteristics, the management and treatment of hazardous wastes regulatory framework and the local infrastructure for treating those wastes. In particular the following aspects shall be considered:

- ➔ Pesticides register or use authorization system so that the possibility of using the obsolete pesticides can be assessed.
- ➔ The existence of a hazardous wastes management integrated system that establishes the obligation to return wastes to the pesticides importer or manufacturer.
- ➔ Hazardous wastes treatment and final disposal policies.
- ➔ Existing infrastructure for hazardous wastes treatment.



At the time of defining the final fate of the obsolete pesticides stockpiles, the alternatives that the country offers shall be analyzed. **Chart 2** shows a diagram where the different options for obsolete pesticides management are shown and they are described below:

Chart 2 *Obsolete pesticides management alternatives*



#### USE AS PESTICIDE

Before analyzing the waste treatment and/or final disposal it is essential to assess the possibility of using the compound for the use it was originally produced for (as a pesticide). Therefore its biological effectiveness needs to be determined, and its physical state and chemical composition need to be analyzed in order to see if they are adequate and verify if the active ingredient is authorized or if it is possible to permit it for pesticide use as an exception.

In case its physical and chemical properties show the pesticide is not adequate for using it directly as pesticide, reformulation shall need to be analyzed. It is then recommended

to get in touch with those companies that manufacture or formulate pesticides in the country and assess their capacity to introduce the obsolete pesticide in any of the processes already functioning.

If it is possible to use the stockpile as a pesticide, directly or through its reformulation, this is the recommended option for its management, and the application process shall be followed up in order to verify the pesticide effective elimination.

#### ☞ PESTICIDE WASTES MANAGEMENT INTEGRATED SYSTEM

A pesticide wastes management integrated system is a system implemented within a country for managing wastes generated in production, distribution, trade or use of pesticides. These systems, in general, involve the implementation of a user return system through reception points and centralizing the wastes management within the producers or importers.

In case the country has a pesticide wastes management integrated system, the stockpiles shall be guided to get into the system, except when the obsolete pesticides characteristics do not allow the entrance to the system.

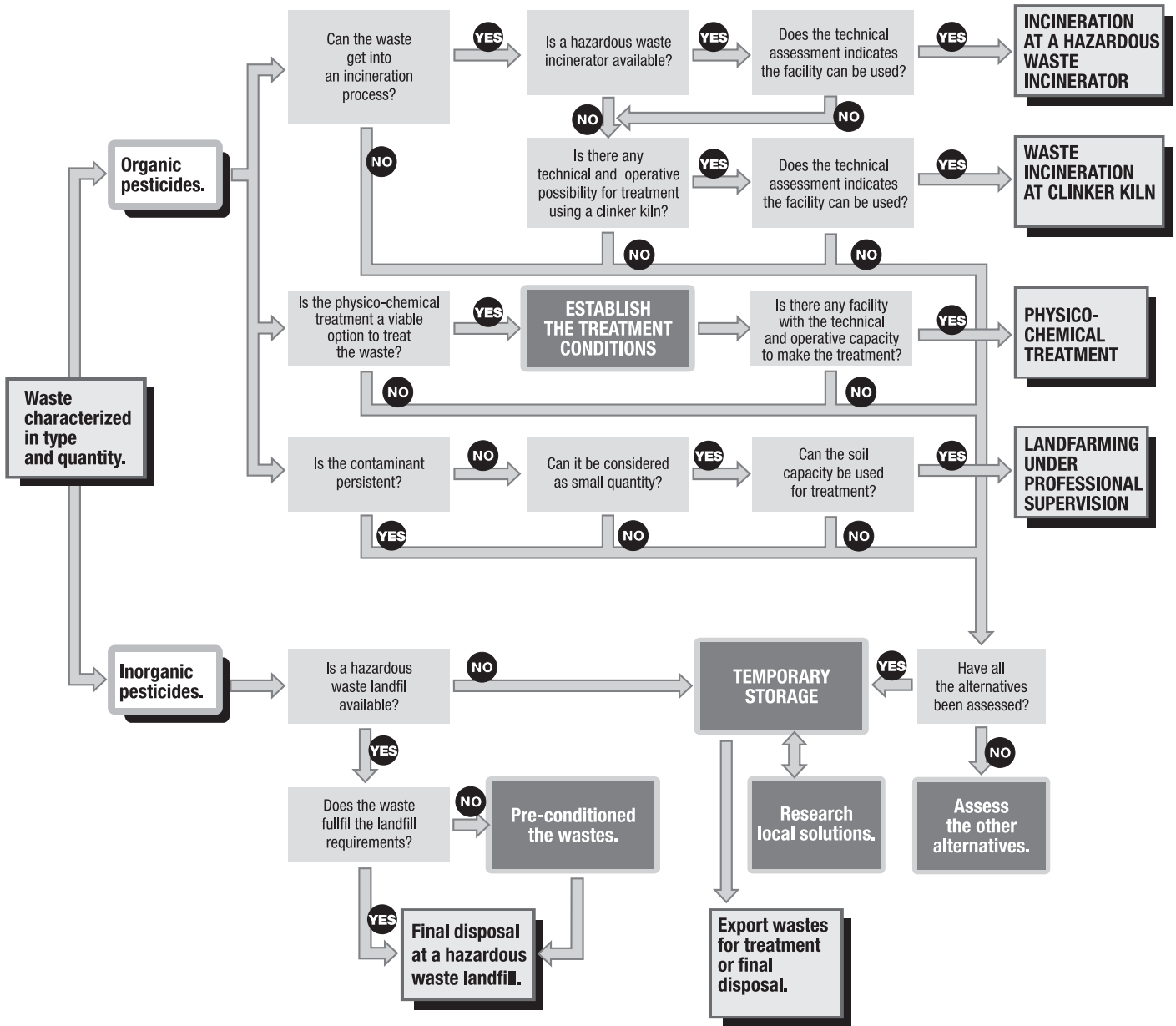
Implementing pesticides wastes integrated systems involves a set of procedures and the establishment of specific infrastructure to manage wastes contaminated with pesticides. Bearing in mind that these systems, in general, are designed to manage wastes generated by products that are object of internal trade, it may happen that there is no capacity to treat or dispose of some unauthorized chlorinated pesticides.

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#### ☞ TREATMENT AND FINAL DISPOSAL OF HAZARDOUS WASTES SYSTEM

Any country with a regulatory framework for the management, treatment and final disposal of hazardous wastes shall have a greater easiness to manage such wastes in attention to pre-established rules and shall have at least a minimum infrastructure to treat and finally dispose of. Without prejudice of the abovementioned, it is essential to bear in mind the need to assess the installed capacity for treatment and final disposal of hazardous wastes for each pesticide stockpile identified taking into account the variability of compounds that may appear their hazard and volume. In this sense, the diagram presented in **chart 3** can help to the assessment of technical alternatives.

Chart 3 *Obsolete pesticides management.*  
*Treatment and/or final disposal alternatives technical assessment.*



➤ TREATMENT AND FINAL DISPOSAL ALTERNATIVES ASSESSMENT

**Chart 3** shows a decision tree aiming at supporting the search for local treatment and/or final disposal solutions.

This stage refers to the analysis of the different final disposal options and shall have into account a set of criteria. The most important ones are listed below:

|                      |  |
|----------------------|--|
| <b>Technological</b> | Technology effectiveness for transforming or environmentally sound containing the waste. |
|                      | Installed capacity or necessary infrastructure to manage the identified volumes.         |
| <b>Environmental</b> | Technology environmental impacts and risks related to its use.                           |
| <b>Social</b>        | Reject social level of the viable technological alternatives.                            |
| <b>Economic</b>      | Viable technological alternatives costs.   |

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In any case the chosen technological options shall have authorization according to country regulations. In case there is no specific regulation, international accepted guidelines should be followed.

# 6 ■ Treatment and Final Disposal Alternatives



**Waste Treatments** consists of transformation processes aim at modifying the wastes' original characteristics. The treatments methods can be gathered in the following categories:

- ➔ Physico-chemical treatments
- ➔ Biological transformation
- ➔ Thermal treatments

Each treatment process will produce other wastes-atmospheric emissions, wastewaters and solid wastes - that will require a special management according to the quantity of contaminant present in them.

**Final disposal** involves the confinement of wastes in a hazardous waste landfill, which means a solid waste disposal facility especially designed.

## Physico-chemical treatments

A physico-chemical treatment involves the physical and chemical processes that can modify either the chemical or physical properties of a waste.

If the treatment is exclusively physic (for instance solid-liquid separation or drying) it will be on the first line of action in a waste management plan, because it will have the objective of conditioning the waste to get into another treatment or to the final disposal system.

The chemical treatment, generally is associated to physical processes, and being itself a waste transformation process throughout a set of chemical compounds addition that leads the desire objective. In a waste management system the chemical treatment may have different roles:

- ➔ Allow a compound recovery for later use as raw material in another process.

- ➔ Reduce the waste hazard through its components transformation.
- ➔ Transform the waste into a material that fulfils the necessary conditions to get into another treatment or final disposal system.

There are plenty of physico-chemical treatment alternatives: phase separation processes, processes that involve oxidation-reduction reactions, precipitation, neutralization and ionic exchange among others. These processes are designed for one or more specific contaminants treatment and will have particular restrictions depending on the whole physical and chemical characteristics of the waste. An alternative may be chosen as a function of the specific technical analysis, taking into considerations pre-established criteria.

## Landfarming

The soil has a great variety of microorganism communities, which are able to degrade, certain organic contaminants, if they are not recalcitrant or toxic to the microorganism. Additionally to bacteria, there are other organisms such as protozoa that also intervene in degradation processes.

The waste landfarming technique involves using the soil natural, physical, chemical and biological properties to degrade wastes, being the soil the treatment media.

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The technique consists of the application of a biodegradable organic waste, in a controlled rate to the superficial layer of the soil. The climate conditions (temperature and precipitation) are external variables that conditioned the treatment.

Landfarming will have the following **main restrictions**: the waste shall not have persistent pollutants and a small quantity in attention to the necessary area to implement the treatment.

This technique shall be used only after a previous assessment of the pesticide degradation capacity in soil and the potential intermediate products that may be generated during the treatment process. It is essential to identify an appropriate application area (avoiding pesticide migration in the environment) so as to minimize the associated risks and make sure the procedure is done under supervision of a specialist.

# Thermal treatments

High temperature incineration and wastes co-processing in cement kilns are the most common thermal treatments.

## ✦ HIGH-TEMPERATURE INCINERATION

Incineration is understood as the processing of wastes in any technical unit, fixed or mobile equipment that involves combustion processes at high temperature.

Incineration is aimed at destroying organic compounds through high temperature combustion, producing oxidation of organic matter into carbon dioxide, water and other by products, generating also solid waste (ashes and slag of non combustible material). Incineration is a complex process that must be carefully designed and operated. There are different kinds of incinerators and each of them has limitations in relation to type and quantities of wastes to process.

From the effectiveness of combustion point of view, the most important operational variables for an incinerator are: temperature, residence time and turbulence. These variables will directly affect the efficiency of the destruction system and therefore generating incomplete combustion products, which will be part of the incinerator gases emissions.

Hazardous waste incinerators, especially those that process solids must have not less than two combustion chambers. The primary chamber generally operates at temperatures around 800° C and the secondary combustion chamber between 1100 y 1200 °C. Generally the gas residence time in the secondary chamber must be for at least 2 seconds.

So as to meet the international emission standards, incinerators must have sophisticated atmospheric emissions treatment systems and the appropriate emissions control equipment.

It is important to remember that more toxic compounds than the original product can appear in emissions; this is the case of polychlorinated dibenzodioxins and polychlorinated dibenzofurans (dioxins and furans). These contaminants have become one of the most controversial aspects when incinerators are to be installed, however it is important to take into account the following aspects:

- ➔ Dioxins and furans are generated in any combustion process, being uncontrolled combustion the most critical one.
- ➔ Incineration development and therefore the incorporation of more technologies have included systems that quickly cool the gases and help preventing these contaminants generation.
- ➔ Dioxins and furans emissions are basically conditioned by the type of wastes to be incinerated, the incinerator design, the operational parameters of the process and the atmospheric emissions treatment system used.

Using the incineration alternative as a waste treatment system shall depend on the waste characteristics and the incineration facility. In particular the following aspects need to be taken into account:

- ➔ The waste is able to go into an incineration process (this means the waste is an organic pesticide and does not contain quantities of metals that can volatilize during the process). Besides these general aspects, incineration specific conditions for the active ingredients contain in the obsolete pesticide shall be verified.
- ➔ The incinerator must be designed for treating hazardous wastes, in particular the right temperature, turbulence and residence time parameters need to be accomplished. Additionally specific restrictions for certain groups of compounds must be verified.
- ➔ The incinerator operates in an appropriate manner. In case of doubts, verification can be done using a specific test.
- ➔ The incinerator must have treatment and atmospheric emission control systems appropriate with the wastes it processes.
- ➔ Emission atmospheric standards in the country shall be accomplished, or if there are no national rules, international standards may be used.

6

#### ☞ CEMENT KILN CO-PROCESSING

The incineration done in cement kilns is called wastes co-processing in attention that the same clinker (intermediate product obtain in cement production) production unit is used for the purpose of waste combustion.

The cement industry is widely distributed around the world. It is a high energy consumption industry where different types of traditional fuels are used, and it is common to use some fractions of wastes as alternatives fuels.

Cement is produced in a high temperature oven through the calcination of a mineral mixture consisting of calcium carbonate, silicon oxide, aluminum oxide, iron oxide and producing an intermediate product called clinker that reaches temperatures around 1450 °C. For this purpose it is necessary that combustion gases reach temperature of about 1650° C and that the temperature is kept above 1100° C for a period of 2 to 5 seconds.



The differences between processes are basically the way to prepare the mineral mixture prior calcination, and then we have two big categories: wet processes and dry ones. In the first ones the raw material is mixed with water and the humidity percentage is between 30 and 35 % and within the dry processes the raw material is previously grinded and homogenized. This last technology substantially diminishes the energy consumption, it was developed more recently and therefore the ovens have a more modern technology. Additionally dioxins and furans emissions are lower if the dry process is used, and this one would be considered as an environmentally sound option.

The process characteristics mean that this technology is feasible for treating wastes, because it accomplishes the temperature, turbulence and residence time established requirements for hazardous wastes incineration. Additionally the clinker presence, of alkaline characteristics, allows the retention of contaminants within the product.

Even though the clinker oven technical conditions may be considered adequate for treating hazardous wastes, it is necessary to take into consideration that cement plants are not designed for that purpose, but for producing cement. For this reason some transformation at plant level are required, for instance facilities accommodation to receive wastes and do their quality control, adding feeding systems to the oven, installing appropriate emission control systems for hazardous wastes incineration and training people.

There are restrictions in relation to the type and quantity of wastes to feed the oven, based on the cement quality, damage to clinker oven elements or instability of the productive process.

Another important aspect to take into consideration is the resistance this alternative as well as incineration in specialized units have within the organized civil society, which may bring up the issue that enterprisers look down on the possibility of co-processing hazardous wastes.

The following chart summarizes some relevant aspects that are important to take into consideration at the time of assessing this alternative.

| Aspect                                 | Description   |
|--|---|
| <b>Technological and environmental</b> | Verify if the waste is able to get into an incineration process (organic pesticide, low metal contains that can volatilize during the process). Besides some specific incineration conditions need to be verify for the active ingredient/s that constitute the obsolete pesticide. |
|  | Identify plants that use the dry process to produce clinker in order to assure that a better atmospheric emission control is done minimizing dioxin and furans generation.  |
|  | Assess if the enterprise has experience on hazardous waste treatment and if it agrees in accepting wastes contaminated with pesticides.   |
|  | Analyze the available charge system within the facility and if it is appropriate for the wastes wanted to be treated.   |
|  | Check the adequate functioning of the facility when producing cement, verifying there is no environmental problem in normal conditions when the clinker oven is using both traditional or alternatives fuels. In case any problem is identify, this is not an alternative to use.   |
|  | Check the restrictions that may exist from a quality point of view, of the facility or the process in order to analyze the compatibility between the waste and the cement production.   |
| <b>Social and worker health</b>        | Assess the cement plant workers perception and the working place safety conditions. Take into account that trained personnel in managing hazardous wastes is needed.  |
|  | Asses the social perception in case there are previous records of pesticides or other hazardous wastes treatment in cement kiln and in case they perception is negative analyze which will the consequences be if the selected option would be this one.                            |
| <b>Management</b>                      | The company must take into account implementing safety rules for managing hazardous wastes, that involve storage safety aspects, workers health and process control.  |

## Other treatment alternatives

In addition to the treatment systems previously described, other technological alternatives, recently developed, may be considered as so if they are commercially available. Some of them are listed below:

- ➔ **Basic catalytic decomposition.** It is based on the catalytic treatment of a liquid or solid in presence of a high melting point hydrocarbon and sodium hydroxide.
- ➔ **Gas-phase chemical reduction.** The method is based on a gas-phase reduction reaction of hydrogen with organic compounds at high temperatures. Liquids as well as solids including contaminated soil can be treated.
- ➔ **Molten salt oxidation.** It is an oxidation process without flame, reaching between 700 y 1000 °C, where organic substances are oxidized by oxygen in a reaction chamber with alkaline molten salt.
- ➔ **Plasma arc technology.** The wastes are fed inside the arc and temperatures of 3,000 to 15,000 °C can be reached causing the decomposition of organic wastes through their volatilization and later combustion or by pyrolysis depending on the design of the process.

## Hazardous waste landfills

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A hazardous waste landfill is a designed engineered facility, constructed and operated to confine hazardous wastes in the ground. It basically consists of one or several cells for final disposal and a set of infrastructure elements to receive, condition wastes, incoming waste control and functioning assessment.

In order to be considered a hazardous waste landfill, the landfill shall at least have the following elements:

- ➔ Double bottom liner impermeabilization system.
- ➔ Leachate collection, removal and treatment system.
- ➔ Leak detection system.
- ➔ Gas collection and conduction system.
- ➔ Run-on control system capable of preventing flow onto the active portion of the landfill.
- ➔ Impermeabilization system for closure.

Each landfill will have waste acceptance criteria according to the cells characteristics and the received waste compatibility.

Assessing this option as final destination system must take into consideration that the hazardous waste landfill meets the minimum security conditions to manage hazardous wastes and that the wastes meet the acceptance conditions. In case the conditions are not met, an assessment on the feasibility to pre-treat and condition the wastes in order to meet the requirements shall be done.

# 7. Export of Obsolete Pesticides



Those obsolete pesticides that need to be exported for destruction in countries with appropriate technologies must follow Basel Convention requirements.

Additionally wastes must be packaged, labeled and transported in conformity with generally accepted and recognized international rules and standards. In particular United Nations Recommendations on the Transport of Dangerous Goods must be implemented.

The Basel Convention has established a **control system of transboundary movements of hazardous wastes** based on a **written consent procedure prior to the movement**. This procedure includes a written notification from the Competent Authority of the country of export to the Competent Authority of the country of import and transit if appropriate. The country of export can not consent to any transboundary movement before having the written authorization from the mentioned authorities.

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## Competent Authority of Country of Export

From the Competent Authority of Country of Export point of view, the procedure starts at the moment they receive a request from the person interested in exporting wastes, accompanied by a form entitled “**notification document**”, which provides information regarding type, quantity and characteristics of wastes subject to the movement, generator, reason for export, means of transport, country of import, countries of transit and insurances. The Competent Authority of the country of export is responsible of sending the request jointly with the notification document to the Competent Authority of the country of import and countries of transit. After the consent is received a second document, “**movement document**” shall be issued, and it shall accompany the wastes during the movement and up to the re-utilization, recycle, elimination or final disposal is implemented. The movement document is aim at providing specific information on a particular consignment including specific data about the carriers, passage through customs offices and control points involved. Annex 2 shows in full detail the information each document must bring.

## Other stakeholders

The abovementioned procedure not only involves Basel Convention Competent Authorities of the countries related to the movement, but also other national and/or local authorities are integrated to the control circuit. It is of special interest the role that Customs Departments play, as they use customs code they are able to identify, classify and verify the different goods that pass through, not only in import operations but also transit within the different national jurisdictions. Currently the World Customs Organization has incorporated to the harmonized system nomenclature a list of wastes subject to Basel Convention. Some other regional organizations, such as MERCOSUR, have adopted regional customs codes for pesticides under Stockholm and Rotterdam Convention, contributing to improve the notifications of allowed movement as well as to stop illegal traffic of chemicals and wastes under different regional and international conventions and agreements.

## Procedures

A list of steps that any exporter of obsolete pesticides is required to follow to meet Basel Convention requirements are listed below.

- 1 Contact a disposer of hazardous wastes which is located in a country with no hazardous wastes import bans. The disposer must have a license subject to its country regulations.
- 2 Conclude a contract with the disposer, specifying environmentally sound management of the wastes subject to the movement. The contract shall clearly establish the rights and obligations of each part and it will be subject to the corresponding authorizations.
- 3 Contact a company to carry out the transport of hazardous wastes and establish a tentative route, indicating countries of transit. Verify that those countries have no bans in relation to the introduction of hazardous wastes to their territories, if any country presents this limitation; the route needs to be modified.
- 4 Conclude a contract with the carrier.
- 5 Make the necessary arrangements to conclude an insurance, bond or guarantee, to provide for immediate funds for alternative management of the waste in cases where the shipment and disposal cannot be carried out as originally intended. Besides, many countries require the insurance to cover emergencies such as leakages or ruptures, and also guarantees for environmental remediation.
- 6 Contact the Competent Authority of the country of export to obtain the **notification and movement document forms**, and information on pertinent details.

- 7 Prepare the notification documents (exporter, importer and transit) and present them to the Competent Authority of the country of export at least two months prior the movement is planned. The latter Competent Authority shall send the notifications to the other Competent Authorities involved. States of transit have 60 days to provide an answer and if they do not do it a tacit consent shall be assumed and the movement shall be allow through the States of transit territory.
- 8 Answer any additional information requested by the Competent Authorities involved.
- 9 Wait for the Competent Authorities written consents.
- 10 Complete the **movement document** to accompany each consignment.
- 11 Start the export. The carrier shall complete de movement document upon receipt of waste.
- 12 Wait for the consignment movement document filled and sent by the disposer upon receipt of waste.
- 13 Wait for a copy of the consignment movement document filled and sent by the disposer upon completion of disposal.
- 14 Ask the Competent Authority to release the financial guarantee.





# 8. Prevention of Obsolete Pesticides Generation



In first place a list of reasons that historically have contributed to the generation of different types of obsolete pesticides stockpiles is presented and after a series of recommendations in order to prevent or minimize the problem are proposed.

## Causes of generation

- Banning or severe restriction of pesticides use which are still in commerce.
- Promotions presented by industry and distributors.
- Inaccurate assessment of needs and excessive quantities purchased.
- Excessive donations.
- Insufficient application capacity.
- Inadequate storage conditions, bad management of stocks, particularly in public institutions.
- Damage of containers during handling.
- Inadequate products or containers.
- Bureaucratic problems.
- Confiscations.
- Accidents.
- Changes in types of crops.
- Regulatory frameworks based on expiry dates.
- Lack of awareness of the inherent dangers of pesticides and the risks they represent.

## Generation preventive measures

The first preventive measure to avoid accumulation of obsolete pesticides stockpiles is to review whether pesticide use is actually required or any other alternative is feasible. In this sense much progress has been made in the development and implementation of Integrated Pest Management for various crops, making possible the minimization of pesticides use.

If it is possible the use of obsolete pesticides stockpiles should be prioritized over its elimination, verifying their physico-chemical properties and adjusting the dose if necessary. Before determining that elimination is going to take place, all technical or legal alternatives that may be applied case by case shall be considered.

The causes of accumulation of obsolete pesticides stockpiles analysis lays the basis to establish a series of “good management practices” recommendations aimed at preventing or minimizing wastes. The following is the list of the mentioned recommendations:

- ➔ Implement campaigns aimed at users, trade people and distributors to promote the good use of pesticides and an adequate stock management.
- ➔ Develop training programs to improve the control of stock as well as the conditions and management of pesticides stores, especially in government property.
- ➔ Legislation must consider the chemical’s complete cycle, so that it is enforceable at all stages, thus avoiding the generation of obsolete pesticides. A pesticides register or any system, that in one way or other, authorize the entry and/or the use of pesticide in the country is a very useful tool to prevent obsolete pesticides generation.
- ➔ Legislation should incorporate the concept that the generator is responsible of the obsolete pesticides and the harmful impact on human health and the environment deriving from them.
- ➔ Establish refunding mechanism, by which producers, formulators, importers, packers and distributors are obliged to take care of empty containers and leftovers of products generated by users.
- ➔ Legislation should be reviewed for the expired pesticides not to become obsolete, watching not only the expiry dates but also the biological effectiveness concept.
- ➔ Prior to banning the use of a given pesticide, there should be a minimum usage period so as to allow for the stock to run out.
- ➔ The mechanisms to return unwanted pesticides to their country of origin should be agreed upon within the Customs Departments to prevent them from becoming obsolesces.

- ➔ The confiscation of expired pesticides should be avoided and the corresponding responsibilities should be established when necessary.
- ➔ Control of donations and promotions in order to avoid the acquisition of products that are near their expiry date.
- ➔ Adequate labeling of products with special care for the products' expiry date should be mandatory.
- ➔ Lasting containers in compliance with handling conditions and whose design contribute to the prevention of wastes and allow an environmentally sound elimination should be mandatory.
- ➔ Proper size of containers in relation to the volume being handled.
- ➔ Proper planning of needs and minimum levels of stocks.
- ➔ Establish mechanisms to allow a quick products supply.
- ➔ Promote Clean Production Agreements to favor the compliance with the associated regulations, and the adequate management of stocks, with the advantage for farmers of presenting products that comply with the international regulations and demands.
- ➔ Establish mechanisms to allow, if possible, the use of obsolete pesticides after their reformulation.



# 9. References



Basel Convention on the control of transboundary movements of hazardous wastes and their disposal. Text and annexes. UNEP. [www.basel.int](http://www.basel.int)

Baseline study on the problem of obsolete pesticide stocks. FAO, 2001.

Destruction and decontamination technologies for PCBs and other POPs wastes under the Basel Convention. A training manual for hazardous waste project managers. Secretariat of the Basel Convention, 2002.

Disposal of bulk quantities of obsolete pesticides in developing countries. Provisional Guidelines. UNEP - FAO - WHO, 1996.

Environmental Management. Environmental assessment of sites and organizations. ISO 14015, 2001

Environmental Toxicology. Risk assessment and Environmental Remediation. The University of Arizona. 2001.

General technical guideline for environmentally sound management of wastes consisting of, containing or contaminated with persistent organic pollutants (Draft), Technical Working Group, Basel Convention, 2004.

Guidelines for the management of small quantities of unwanted and obsolete pesticides. UNEP - FAO - WHO, 2000.

Hazardous waste management. M. LaGrega, P. Duckinham, J. Evans. Mac Graw-Hill, Inc, 1994.

International Code of Conduct on the Distribution and Use of Pesticides. FAO 1990.

Inventario, caracterización y reenvasado de plaguicidas obsoletos albergados en almacenes ubicados en las poblaciones de Camatagua, Tocuyito y el Genizo, Venezuela. Manual de inspección para inspector coordinador e inspectores residentes. Ministerio del Ambiente y de los Recursos Naturales - Venezuela, 2001.

Managing obsolete stocks of crop protection products. CropLife International, 2004.

Obsolete pesticide stockpiles in Africa: The urgent need for action. Africa Stockpile Programme, 2003.

Prevención y control de la contaminación ambiental por el manejo de plaguicidas y residuos provenientes de los mismos. Decreto Reglamentario 1443, Colombia, 2004.

Prevention and disposal of obsolete and unwanted pesticide stocks in Africa and Near East. FAO, 1997.

Promoción de la minimización y manejo integral de residuos peligrosos. SEMARNAP, México, 1999.

Provisional guidelines for the prevention of accumulation of obsolete pesticides stocks. FAO, 1996.

Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade.

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Standard handbook of hazardous waste treatment and disposal (2nd Ed.) - Harry M. Freeman - 1997.

Stockholm Convention on Persistent Organic Pollutants (POPs), Text and annexes. UNEP Chemicals, 2001. [www.pops.int](http://www.pops.int)

Waste minimization opportunity assessment manual, US-EPA, 1988.

# Annex 1



**WORKSHOP: “Regional Cooperation for the Environmentally Sound Management of Obsolete Pesticides, as a Contribution to the Compliance with the Stockholm and Basel Convention, through the Exchange of Experiences among the Latin American Countries”**

Caracas, Venezuela  
8 - 10 September, 2004

## Conclusions y Recommendations

### 1. IDENTIFICATION OF STOCKPILES

There are different mechanisms to identify stockpiles or deposits of obsolete pesticides, such as the knowledge of the institutions, reports filed by the population and making inventories.

The filed reports are generally associated to large deposits which are easily accessible to the population who sense them as an element of risk. In such case, the deposit becomes a social problem, independent from the degree of sanitary and environmental risk.

These kind of problem generally arise in those countries which imported large amounts of pesticides in the 50s and 60s or that received large donations of products to fight pests which were either not used or the stock whereof were not properly managed. There were other countries which had their own producers or formulators and which ceased their activities for different reasons. As an example we could mention stockpiles in Venezuela, Nicaragua and El Salvador.

Furthermore, the identification of obsolete pesticides stockpiles can result from a programmed activity such as the elaboration of inventories. This activity can vary in reach depending on the background of the country. Many countries have made inventories that cover just a portion of the total universe. At present, most of them have begun the elaboration of national inventories within the framework of the National Implementation Plans under the Stockholm Convention. Despite the fact that the Convention only contemplates POPs pesticides, information surveys generally include all products.

Planning an inventory starts by obtaining general information on the use of pesticides in the country and defining the aim of the inventory and of the universe to be surveyed, considering the historical background on the issue, geography, agricultural background

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(crops, kinds of producers), registers (pesticides, import, formulators or manufacturers, commercialisers), trade unions, cooperatives or associations, among others. It is also necessary to know the technical and legal framework applicable in the country.

The second step consists on the definition of the methodology used to obtain the information, including training the participants in the activity in relation to the background obtained in the previous phase and to the aims proposed.

Involving the local or municipal levels to obtain information and to define a communication strategy using mass communication media adequate to the target public are keys to the success of the inventory.

A partial generation of results is suggested while carrying out the inventory in order to determine the correct advance of the same and / or to modify the actions to be taken for the achievement of the initially planned objectives.

It is necessary to bear in mind that the inventory is dynamic and that it is necessary to have an ongoing programme to update the data as frequently as shall be determined depending on the evaluation of the initial results.

FAO has elaborated standardized forms for information surveys which are available in public access documents. Likewise, at a regional level, Chile has recently finished elaborating its inventory and the work is available to those interested.

Once the inventory has been finished, the next stage is the analysis of the results and the generation of a Plan of Action which shall determine the procedure to be followed with the found stocks. It is very important to have a multidisciplinary team to work on the elaboration of the Plan of Action and to support and supervise the execution of the activity.

## 2. MANAGEMENT OF OBSOLETE PESTICIDE STOCKPILE DEPOSIT

In Latin America there are at least two concrete experiences of management of large obsolete pesticide deposits. One in Venezuela, where a series of methodological steps led to the identification, quantification, conditioning, transport and export for the final disposal or elimination of the stock of obsolete pesticides corresponding to three deposits, which totaled 1,000 tons of different products. In this case, the destination country was Germany.

The other experience was developed in Nicaragua, where the export was around 500 tons of obsolete pesticides for their incineration in Finland and Netherlands.

Based on the detailed analysis of the Venezuela project and the experience in the rest of the countries, a series of methodological steps have been identified as well as some recommendations, all of which are listed below.

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## **Preliminary diagnosis**

It starts by collecting documental information and establishing contacts with local stakeholders to obtain the background of the deposit. It is convenient to consider cultural aspects that might make the identification easier or more difficult. If possible, identify responsibilities regarding environmental liabilities.

The next step is the visual evaluation of the site, taking the security measures that might arise from the analysis of the documental information. Those divisions responsible for the attention and inspection of deposits shall have to be duly qualified and equipped with adequate personal protection gear.

The result of this step shall be a preliminary evaluation which shall establish potential risks, allow to define the necessary actions to be taken to elaborate a more detailed diagnosis if required, as well as to take immediate actions to contain the contamination source if necessary.

## **Final Diagnosis**

In the first place, expert technicians shall be appointed for the characterization of the stockpiles. The experts shall enter the site equipped with the personal protection gear adequate to the potential risks previously identified. It is recommendable to contact technicians from the Ministry of Agriculture specialized in pesticides, technicians from the Ministry of the Environment specialized in waste management and risk assessment, as well as experts in labor security and health.

Once the technical team has been defined, it shall proceed to the elaboration of an inventory of stock (identifying and quantifying the chemicals and wastes), to the confirmation of the conditions they are in and the general state of the deposit, as well as to the characterization of the environment both, from the environmental and the social point of view.

Next the risk shall be assessed and an action plan shall be devised with its corresponding environmental assessment.

The use of local capacities is recommended for the qualitative and quantitative verification of chemicals and wastes. In such aim, there are laboratories for pesticide analysis in the Ministries of Agriculture as well as in some universities.

## **Action Plan**

In order to be able to elaborate an Action Plan it shall be necessary to have a technical team to cover the following aspects:

### ***Technological aspect***

Characteristics and behavior of the chemicals involved.

Similar experiences in the world and particularly in the region.

Definition of the necessary levels of treatment.

Evaluation of the infrastructure available in the country for the conditioning, transport and treatment of hazardous wastes.

Evaluation of the alternatives for treatment and disposal out of the country.

Evaluation of the technological alternatives from the economic and environmental point of view.

Evaluation of health and environmental risks in the affected place.

Remedial measures.

### ***Economic aspect***

Identification of possibilities to obtain funding and international cooperation, available funds that shall allow the application of the management plan.

Establishment of alternatives associated to the costs to facilitate decision-making.

Evaluation of the possibility to transfer costs to the international companies that manufacture the products involved.

### ***Legal aspect***

Consideration of the regulatory frameworks both, at a national and international level.

### ***Social aspect***

Consideration of the social pressure and opinion.

Establishment of communication strategies at state, private and community level.

Local capacity building is recommended to be able to apply alternative treatment techniques, specially for small amounts. In such sense, it is important to foster confidence and trust on the population to be able to put these technologies into practice.

Institutional coordination must be encouraged among the Environment, Health and Agricultural areas.

It is also necessary to encourage experience exchange and training at regional level in order to have experts in the different areas.

The procedure manuals for obsolete pesticide management generated in Venezuela are important tools but it is also necessary to have an orientation guide to set a standard base for the countries regarding the points to be considered to manage their own stockpiles.

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The disposition of the Government of Venezuela and particularly that of the technicians involved in the Pesticide Project to transfer their experience to the countries of the region is extremely valuable and positive.

Environmental assessment of the site and the definition of remedial measures must necessarily be included as another element in the Plan of Action. In such sense, it is recommendable to gather the experiences developed in each of the countries in the identification and management of contaminated sites. Uruguay makes its experience in said field available.

### 3. ELIMINATION, TREATMENT AND DISPOSAL

Despite the existence of proved technologies for the elimination of organic pesticides (incineration in special ovens) and final disposal of inorganic pesticides (hazardous wastes landfills or deep mines), it is necessary to further the research and development of alternative technologies, particularly for the management of small amounts, which could be more convenient for the countries in the region.

It is necessary for the countries to build capacities to face these problems and to earn the trust of the society, since the society often resists the implementation of a certain technology, either due to lack of information or to lack of trust.

Viable alternatives shall have to be researched in accordance with the requirements, the possibilities and the characteristics of each country, considering both social and cultural parameters.

A good example is the use of co-incineration in –specially conditioned- cement kilns for POPs pesticides and other organic pesticides which are technically viable but rejected by the society in many countries.

In all cases it is recommendable to avoid final disposal in hazardous wastes landfills if other technologies are available.

Regional cooperation is necessary to foster the exchange of experiences among the countries to promote the development of alternative technologies.

Furthermore, it is important to promote research and to help obtain the necessary resources, either directly from an international cooperation institution or through the generation of competitive projects at an international level.

It is understood that the manufacturer of the chemical is the one to provide the information about the technologies for its destruction and this obligation should be incorporated to the pesticide legislations in all countries. The legislation should also establish clearly the responsibility of the holder of the chemical to destroy it, should it become obsolete.

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#### 4. GENERATION PREVENTION

The following is a list of recommendations to avoid the generation of obsolete pesticides stockpiles:

Implement campaigns aimed at users, trade people and distributors to promote the good use of pesticides and an adequate stock management.

Develop training programs to improve the control of stockpiles as well as the conditions and management of pesticide deposits, specially in government property.

The legislation must consider the chemical's complete cycle, so that it is enforceable at all stages, thus avoiding the generation of obsolete pesticides.

Legislation should be reviewed for the expired pesticides not to become obsolete, watching not only the expiry dates but also the biological effectiveness concept.

In such cases as it might be possible, the use of a pesticide should be prioritized over its elimination, verifying its physico-chemical properties and adjusting the dose if necessary. All applicable technical and legal alternatives should be considered for each case, prior to determining whether the chemicals or hazardous materials should be treated or conducted to their final disposal.

The mechanisms to return unwanted pesticide to their country of origin should be agreed upon with the Customs Departments to prevent them from becoming obsolete.

The confiscation of expired pesticides should be avoided and the corresponding responsibilities should be established when necessary.

The development of a legal framework must be fostered to establish the responsibility of the companies regarding environmental liabilities.

A register of pesticides or a system to authorize the entry and /or use of pesticides in the country is a very useful tool to avoid the generation of obsolete pesticides.

Control of donations and promotions in order to avoid the acquisition of products that are near their expiry date.

Proper planning of the activities to be developed, both for commercialisers and for users.

Adequate labeling of products with special care for the product's expiry date and for the clarity of the instructions.

Prior to banning the use of a given pesticide, there should be a minimum usage period so as to allow for the stock to run out.

Clean Production Agreements can favor the compliance with the associated regulations, and the adequate management of stockpiles, with the advantage for farmers of presenting products that comply with the international regulations and demands.



# Annex 2

## Documents to export Basel Convention (information required)



### 1. Notification document

- ① Reason for waste export.
- ② Exporter of the waste (name, address, telephone or fax number).
- ③ Generator of the waste and place of generation (name, address, telephone and fax number).
- ④ Disposer of the waste and actual site of disposal (name, address, telephone and fax number).
- ⑤ Intended carrier(s) of the waste (name, address, telephone and fax number).
- ⑥ Country of export of the waste, Competent Authority.
- ⑦ Expected countries of transit, Competent Authority.
- ⑧ Country of import of the waste, Competent Authority.
- ⑨ General or single notification.
- ⑩ Projected date(s) of shipment(s) and period of time over which the waste is to be exported and proposed itinerary, including the point of entry and exit (in case of a general notification covering several shipments, either the expected dates of each shipment or, if this is not known, the expected frequency of the shipments will be required)
- ⑪ Means of transport envisaged (road, rail, sea, air, inland waters)
- ⑫ Information relating to insurance.
- ⑬ Designation, physical description and composition of the waste (the nature and the concentration of the most hazardous components in terms of toxicity and other hazard presented by the waste both in handling and in relation to the proposed disposal method). Information on any special handling requirements, including emergency provisions in case of accidents. Waste identification code according to Annex VIII of Basel Convention, Y code, H code, UN class and number, shipping codes.
- ⑭ Type of packaging envisaged.

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- 15 Estimated quantity in weight/volume (in case of a general notification covering several shipments, both the estimated total quantity and the estimated quantities for each individual shipment will be required).
- 16 Process by which the waste is generated (insofar as this is necessary to assess the hazard and determine the appropriateness of the proposed disposal operation).
- 17 Method of disposal as per Annex IV of Basel Convention.
- 18 Declaration by the generator and exporter that the information is correct.
- 19 Information transmitted (including technical description of the plant) to the exporter or generator from the disposer of the waste upon which the latter has based his assessment that there was no reason to believe that the wastes will not be managed in an environmentally sound manner in accordance with the laws and regulations of the country of import.
- 20 Information concerning the contract between the exporter and the disposer.

## 2. Movement document

- 1 Exporter of the waste (name, address, telephone and fax number).
- 2 Generator(s) of the waste and site of generation (name, address, telephone and fax number).
- 3 Disposer of the waste and actual site of disposal (name, address, telephone and fax number).
- 4 Carrier(s) of the waste (name, address, telephone and fax number).
- 5 Subject of general or single notification.
- 6 The date the transboundary movement started and date(s) and signature on receipt by each person who takes charge of the waste.
- 7 Means of transport (road, train, inland waterway, sea, air) including countries of export, transit and import, also point of entry and exit where these have been designated.
- 8 General description of the waste (physical state, proper UN shipping name and class, UN number, identification in relation to Annex VIII of Basel Convention, Y number, H number as applicable).
- 9 Information on special handling requirements including emergency provision in case of accidents.
- 10 Type and number of packages.
- 11 Quantity in weight/volume.
- 12 Declaration by the generator or exporter that the information is correct.
- 13 Declaration by the generator or exporter indicating no objection from the Competent Authorities of all States concerned which are Parties.
- 14 Certification by disposer of receipt at designated disposal facility and indication of method of disposal and of the approximate date of disposal.

# Annex 3

## Standard inventory forms for recording obsolete pesticides - FAO



### 1. Product form

A product sheet needs to be completed for each product (if one product is kept in different types of containers, one sheet should be completed for each one).

|   |                       |
|---|-----------------------|
| SHEET NUMBER:   | DATE:                 |
| OWNER OF THE PRODUCT:   | STORAGE SITE:         |
| LABELS ON CONTAINERS:<br>Complete information/incomplete information/label/ not readable/ label missing |                       |
| TRADE NAME:   | ACTIVE INGREDIENT(S): |
| FORMULATION TYPE:   | CONCENTRATION:        |
| MANUFACTURER:   | BATCH NUMBER:         |
| MANUFACTURE DATE:   | ARRIVAL DATE:         |
| CONTAINER TYPE:   | UNIT SIZE:            |
| NUMBER OF CONTAINERS:   | QUANTITY:             |
| ORIGIN: purchased by Government / received as donation (name donor):                                    |                       |
| Imported by private company (name company):   |                       |
| CONDITION OF PESTICIDE: usable / unknown /deteriorated  |                       |
| CONDITION OF CONTAINER: good / minor damage / serious damage  |                       |
| transportable / not transportable   |                       |
| Description of damage:  |                       |
| HAVE CONTAINERS BEEN OPENED? Yes/ some / no / not certain   |                       |
| REASON FOR NOT USING THE PRODUCT:   |                       |
| expired / deteriorated / banned / wrong formulation   |                       |
| no need / stock too large / no longer recommended   |                       |
| Other:  |                       |
| REMARKS:  |                       |
|   |                       |
|   |                       |
|   |                       |

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## 2. Deposit or store information

A storage form should be completed for each store.

| SHEET NUMBER:   |                  |                             |                 |          |                     |
|---|------------------|-----------------------------|-----------------|----------|---------------------|
| NAME OF STORE:  |                  |                             |                 | DATE:    |                     |
| TOWN:   |                  |                             | OWNER OF STOCK: |          |                     |
| NAME OF PERSON WHO CONDUCTED THE INVENTORY:   |                  |                             |                 |          |                     |
| FEATURES OF STORE:<br>doors lockable / sufficient ventilation inside / concrete floors / doors ramps  |                  |                             |                 |          |                     |
| AVAILABLE UTILITIES: running water / electricity / lighting   |                  |                             |                 |          |                     |
| AVAILABLE MATERIAL:<br>pump / shovels / spill control material / spare containers and bags / fire fighting equipment                                      |                  |                             |                 |          |                     |
| AVAILABLE PROTECTIVE GEAR:<br>boots / gloves / overalls / goggles / dust masks / vapour masks   |                  |                             |                 |          |                     |
| DESCRIPTION OF LEAKAGE AND CONTAMINATION: (Incl. extent of floor contamination inside and outside the store): .....                                       |                  |                             |                 |          |                     |
| SPECIAL HEALTH OR ENVIRONMENTAL CONSIDERATIONS:   |                  |                             |                 |          |                     |
| LOCATION IN OR NEAR:<br>urban area / water catchment area / important water body. Describe:.....  |                  |                             |                 |          |                     |
| SUMMARY TABLE OF PRODUCTS:  |                  |                             |                 |          |                     |
| To obtain a quick overview of stocks at each store it is advisable to transfer key data from individual products forms to a summary table as given below. |                  |                             |                 |          |                     |
| Active ingredient (common name)   | Formulation type | Concentration (g/l or g/kg) | Unit size       | Quantity | Container condition |
| _____   | _____            | _____                       | _____           | _____    | _____               |
| _____   | _____            | _____                       | _____           | _____    | _____               |
| _____   | _____            | _____                       | _____           | _____    | _____               |
| _____   | _____            | _____                       | _____           | _____    | _____               |
| _____   | _____            | _____                       | _____           | _____    | _____               |
| _____   | _____            | _____                       | _____           | _____    | _____               |
| _____   | _____            | _____                       | _____           | _____    | _____               |

