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**PEST MANAGEMENT GUIDELINES  
OF THE  
AGENCY FOR INTERNATIONAL DEVELOPMENT**

**Washington, D.C. 20523**

**Summer 1991**

## **PREFACE**

**These pest management guidelines were prepared in response to the need for a more uniform and informed approach to pest management activities conducted and/or supported by the Agency for International Development and its missions abroad. The information herein was gathered and compiled by Drs. William Overholt, Allan Showler, and Benjamin Waite (contracted as plant protection specialists to work in A.I.D.'s Office of Agriculture, Bureau for Science and Technology), and Dr. Hiram Larew in A.I.D.'s Science Advisors Office. Reviews were provided by agricultural, policy, and environmental officers within A.I.D./Washington, various USAID Missions and the U.S. Environmental Protection Agency.**

## CONTENTS

PREFACE	i
CONTENTS	ii
FIGURES AND TABLES	v
ACRONYMS	vi
EXECUTIVE SUMMARY	vii
CHAPTER I	
PEST MANAGEMENT POLICY OF A.I.D. . . . . .	1
INTRODUCTION . . . . .	1
POLICY . . . . .	2
Specific IPM Strategies . . . . .	3
Host Country Legislation . . . . .	3
Training . . . . .	3
Pesticide Selection . . . . .	3
Local Currency for Pesticide Procurement . . . . .	4
Donor Coordination . . . . .	4
Pesticide Storage, Handling, Application, Labeling, Transport, and Disposal and Monitoring Human Health . . . . .	4
CHAPTER II	
STRATEGIES FOR PEST MANAGEMENT . . . . .	5
EXCLUSION/QUARANTINE . . . . .	5
ERADICATION . . . . .	5
Sterile Insect Releases . . . . .	6
Chemical Control . . . . .	6
Host Destruction . . . . .	6
MANAGEMENT OF ESTABLISHED PESTS (IPM) . . . . .	6
TACTICS OF PEST MANAGEMENT . . . . .	7
Biological Control . . . . .	8
Host Resistance . . . . .	8
Cultural Control . . . . .	9
Physical/Mechanical Control . . . . .	9
Chemical Control . . . . .	9
Insect Behavior Modification . . . . .	10
Genetic Engineering . . . . .	10
CHAPTER III	
REGULATIONS FOR ENVIRONMENTAL REVIEW FOR A.I.D.-FINANCED PROCUREMENT OR USE OF PESTICIDES . . . . .	11
INTRODUCTION . . . . .	11
RELATION OF USEPA REGISTRATION STATUS TO ENVIRONMENTAL PROCEDURES . . . . .	11
ISSUES TO BE ADDRESSED IN AN IEF . . . . .	13
THE SCOPING EXERCISE . . . . .	14
ISSUES TO BE ADDRESSED IN AN ENVIRONMENTAL ASSESSMENT (EA) . . . . .	15
EAs AND PROJECT AMENDMENTS . . . . .	15
EXEMPTIONS FROM 22 CFR PART 216 . . . . .	15

<b>ROLE OF AGENCY ENVIRONMENTAL STAFF</b> . . . . .	<b>15</b>
Mission and Regional Office Environmental Officers . . . . .	15
Bureau Environmental Coordinator . . . . .	16
Agency Environmental Coordinator . . . . .	16
<b>CHAPTER IV</b>	
<b>PEST MANAGEMENT IN PROJECT DESIGN</b> . . . . .	<b>17</b>
<b>KEY CONSIDERATIONS</b> . . . . .	<b>17</b>
<b>DOCUMENTS</b> . . . . .	<b>19</b>
Country Development Strategy Statement (CDSS) . . . . .	19
Action Plan (AP) . . . . .	19
New Project Document . . . . .	19
Project Identification Document (PID) And Initial Environmental Examination (IEE) . . . . .	20
Project Paper (PP) And Environmental Assessment (EA) . . . . .	20
Project Agreement (PROAG) . . . . .	20
Annual Budget Submissions (ABS) . . . . .	21
Congressional Presentations (CP) . . . . .	21
<b>UMBRELLA PROJECTS</b> . . . . .	<b>21</b>
<b>NON-PROJECT ASSISTANCE</b> . . . . .	<b>21</b>
<b>CHAPTER V</b>	
<b>PESTICIDE MANAGEMENT</b> . . . . .	<b>22</b>
<b>PESTICIDE CLASSIFICATION</b> . . . . .	<b>22</b>
Target Organism . . . . .	22
Chemical Group . . . . .	22
Formulation . . . . .	22
Toxicity . . . . .	22
<b>MONITORING HUMAN EXPOSURE TO PESTICIDES</b> . . . . .	<b>23</b>
<b>USEPA LEGAL CLASSIFICATION</b> . . . . .	<b>26</b>
<b>A.I.D. REGULATIONS</b> . . . . .	<b>27</b>
<b>PESTICIDE REGULATION IN DEVELOPING COUNTRIES</b> . . . . .	<b>27</b>
<b>HUMAN SAFETY AND AWARENESS</b> . . . . .	<b>28</b>
<b>RECOMMENDATIONS FOR HANDLING PESTICIDES SAFELY</b> . . . . .	<b>28</b>
Pesticide Application . . . . .	28
Pesticide Storage . . . . .	29
Pesticide Transport . . . . .	30
Pesticide Spill . . . . .	31
<b>DISPOSAL OF PESTICIDES AND EMPTY CONTAINERS</b> . . . . .	<b>31</b>
Empty Containers . . . . .	31
Unwanted Pesticide . . . . .	32
<b>CHAPTER VI</b>	
<b>EMERGENCY OPERATIONS AND DISASTER DECLARATIONS</b> . . . . .	<b>35</b>
<b>DEFINITIONS</b> . . . . .	<b>35</b>
Pest Emergency . . . . .	35
Pest Disaster . . . . .	35
<b>FORECASTING DISASTERS/EMERGENCIES</b> . . . . .	<b>36</b>
<b>PEST CONTROL OPERATIONS</b> . . . . .	<b>36</b>
Foreign Disaster Relief . . . . .	36
Response Coordination . . . . .	36

Continuing Crop Protection Responsibility . . . . .	37
USG Environmental Regulations . . . . .	37
Environmental Impact . . . . .	37
Avoiding Excess Pesticide Stocks . . . . .	37
<b>GUIDELINES FOR ACTION IN PEST DISASTERS . . . . .</b>	<b>38</b>
<b>References Cited . . . . .</b>	<b>40</b>
<b>Appendix A: Regulation 216</b>	
<b>Appendix B: References and Sources of Assistance</b>	
<b>Appendix C: Summaries and Tables of Contents of Selected Environmental Reviews</b>	
<b>Appendix D: Preparation of Initial Environmental Examinations (IEE) and Environmental Assessments (EA) for USAID Projects</b>	
<b>Appendix E: Major Chemical Groups and Formulations of Pesticides</b>	
<b>Appendix F: FAO International Code of Conduct on the Distribution and Use of Pesticide</b>	

**FIGURES AND TABLES**

**FIGURES**

Figure 1. A.I.D. Environmental Review Process for Pesticide Use . . . . . 12

Figure 2. Project Identification Process . . . . . 18

**TABLES**

Table 1. EPA Labeling Toxicity Categories by Hazard Indicator . . . . . 24

Table 2. WHO Classification System According to Acute Toxicity . . . . . 25

## ACRONYMS

ABS	Annual Budget Submission
AFR	Africa Bureau (AID/W)
A.I.D.	U.S. Agency for International Development
AID/W	A.I.D. Headquarters in Washington, D.C.
ANE	Asia and Near East Bureau (now split into ENE and APRE)
AP	Action Plan
APHIS	Animal and Plant Health Inspection Service (USDA)
APRE	Asia/Pacific and Private Enterprise Bureau (AID/W)
BEC	Bureau Environmental Coordinator
BHC	Benzene Hexachloride
CDSS	Country Development Strategy Statement
CEQ	Council on Environmental Quality
CFR	U.S. Code of Federal Regulations
CP	Congressional Presentation
CPSS	Central Program Strategy Statement
EA	Environmental Assessment
EIS	Environmental Impact Statement
ENE	Europe and Near East Bureau (AID/W)
EPA	U.S. Environmental Protection Agency (also, USEPA)
FAO	Food and Agriculture Organization of the United Nations
FDA	Food and Drug Administration (U.S. Dept. of Health)
FFDCA	Federal Food, Drug and Cosmetic Act
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FODAG	Office of the U.S. Permanent Representative to the United Nations Food and Agriculture Organization (A.I.D. Liaison Office with FAO in Rome)
IEE	Initial Environmental Examination

IPC	Integrated Pest Control (European terminology for IPM)
IPM	Integrated Pest Management
LAC	Latin America and Caribbean Bureau (AID/W)
LD <sub>50</sub>	Lethal dose for 50% of the population. The lower the LD <sub>50</sub> , the more toxic the pesticide.
NEPA	National Environmental Policy Act
NGO	Non-Governmental Organization
OECD	Organization for Economic Cooperation and Development
OFDA	Office of U.S. Foreign Disaster Assistance (AID/W)
PEA	Programmatic Environmental Assessment
PID	Project Identification Document
PP	Project Paper
PPQ	Plant Protection and Quarantine (division of APHIS)
PROAG	Project Agreement
RD/AGR	Bureau for Research and Development, Office of Agriculture (AID/W)
REDSO	Regional Economic Development Services Office
ROCAP	Regional Office for Central American Programs (Eastern and Southern Africa, Western and Central Africa)
TDY	Temporary Duty
ULV	Ultra Low Volume
USAID	A.I.D. Country Missions
USDA	U.S. Department of Agriculture
USEC	United States Economic Commission
USEPA	U.S. Environmental Protection Agency
USG	United States Government
WHO	World Health Organization



## EXECUTIVE SUMMARY

Many A.I.D. projects deal with pest problems that can reduce the quality and yield of crops and affect livestock and humans. The purpose of the Pest Management Guidelines is to provide information to A.I.D. personnel on the design and implementation of environmentally and economically sound pest and pesticide management activities.

The Guidelines should be consulted during project development and implementation. They clarify numerous A.I.D. policies and procedures, present pest and pesticide management issues, and identify techniques available to manage pests and pesticides. **These Guidelines are not meant to replace or revise the detail and scope of A.I.D.'s existing policies and procedures.**

The goal of A.I.D.'s environmental and natural resources policy is to assist developing countries to conserve and protect their environment and natural resources, and to encourage long-term economic growth by managing resources for sustainable yields. In attempting to support sustained productivity while protecting the environment, a systematic approach to pest control is essential.

Chapter I provides a synopsis of A.I.D.'s policy as it relates to pest management activities in developing countries. A.I.D.'s policy encourages the incorporation of mitigative measures, such as Integrated Pest Management (IPM) in project design prior to project authorization and implementation. In implementing IPM tactics, A.I.D. policy emphasizes using minimal amounts of carefully selected pesticides, and, where possible, nonchemical control tactics, developing infrastructure for pest and pesticide management, communicating U.S. policy to other nations, and supporting host country efforts to study improved pest management methods. A.I.D. policy supports the creation of host country laws and regulations that maximize pesticide efficacy while minimizing adverse environmental impacts.

Chapter II describes three general approaches to pest management: exclusion, eradication, and management of established pests. There are many available tactics that can be incorporated into IPM strategies, including biological, cultural, physical/mechanical, and chemical methods.

Chapter III focuses on procedures to ensure that potential environmental consequences of A.I.D.-financed activities are identified and considered by A.I.D. and the host country prior to project or activity implementation. The procedures that guide this policy are in 22 CFR Part 216. Section 117 (c) of the Foreign Assistance Act and Section 533 (g) of the 1991 Appropriation Act requires that A.I.D. review its project, programs, and activities in accordance with 22 CFR 216 which includes instructions for examining A.I.D. projects that involve the use or procurement (includes procurement or use of equipment and technical assistance in connection with pesticide use, storage, transport, and disposal) of pesticides. **Project officers must always consult and comply with 22 CFR Part 216 during the design and implementation of activities involving the use or procurement of pesticides.**

Where pesticide procurement or use is planned, the environmental review process must address a range of concerns, including USEPA registration status, how the pesticide can be used as part of an IPM program, method(s) of application, acute and long-term toxicological hazards and measures to minimize them, nontarget effects, availability of alternative control methods, host country pesticide and environmental regulations, training of pesticide users, and provisions for monitoring the use and effectiveness of the pesticide.

A.I.D. environmental staff include Mission and Regional Office environmental officers, Bureau environmental officers, and the Agency Environmental Coordinator. Each plays a role in A.I.D. environmental concerns, and should be consulted as appropriate.

Chapter IV discusses how pest management concerns fit into project design and briefly describes the A.I.D. documents required. An integrated approach to pest management often involves research, training, and evaluation, all of which require planning and budgeting. A.I.D. officers who design and implement projects must consult 22 CFR Part 216. The recipient country should be involved in project planning.

Chapter V indicates that there are a wide variety of pesticides which can be classified into different groups using various criteria, including target organism(s), chemistry, formulations, and toxicity. Chapter V also discusses testing procedures for persons occupationally exposed to organophosphate and carbamate pesticides by monitoring the level of the enzyme acetylcholinesterase in the blood. Pesticide regulation in developing countries is an important element of pest and pesticide management. The principal method for controlling the types of pesticides available in a country is by regulating importation, manufacture, and sale through a mandatory registration process and by enacting legislation for in-country manufacturing and formulation.

Public safety and awareness regarding pesticide use is very important. Chapter V provides general recommendations for handling pesticides during application, storage, transport, and disposal. Preliminary guidelines for accidental spills are also given.

Under certain conditions, many pest species can multiply rapidly, producing a plague that can overwhelm control efforts. Outbreaks of desert locusts in Africa and Asia illustrate this phenomenon. Also, when a pest is introduced into an area of the world where it did not formerly exist, the lack of natural defenses may result in potentially devastating plague conditions, as in the case of the screwworm fly in North Africa (introduced from South America). In such situations, emergency operations are often necessary to circumvent massive pest-related damage.

Chapter VI provides guidelines for A.I.D. action in pest emergencies and disasters. Formulating an appropriate A.I.D. response requires a clarification of whether the situation is an "emergency" or a "disaster." In emergency (and non-emergency) situations, A.I.D. Bureaus and Missions may provide support for bilateral or regional pest management programs. Under the authority of A.I.D. Handbook 8, the Office of U.S. Foreign Disaster Assistance (OFDA) will provide funds when a disaster is declared by the U.S. Ambassador. Because emergency and disaster assistance frequently involves the procurement and use of pesticides, A.I.D. requires that such assistance adhere to 22 CFR Part 216 in the choice, use, and handling of the pesticides.

Since prevention is the ultimate goal, A.I.D. should encourage host countries to conduct systematic pest monitoring to forecast impending pest emergencies and disasters.

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## CHAPTER I PEST MANAGEMENT POLICY OF A.I.D.

### INTRODUCTION

The Pest Management Guidelines document is based on the pest management policy developed by the Agency for International Development (A.I.D.) over the past several years. The guidelines document does not propose new A.I.D. policies pertaining to pest management methods, and it shall not be used to replace, revise, or clarify the detail and scope of A.I.D.'s 1988 Policy Paper on Environment and Natural Resources, its 1978 Policy on Pesticide Support, its 1980 Environmental Regulations in Title 22 of the U.S. Code of Federal Regulations, Part 216 (22 CFR 216), or the decisions of the Bureau and Agency Environmental Coordinators. This chapter summarizes A.I.D. policy relating to pest management to provide perspective and context to subsequent chapters.

The term "pesticide" as used in this document includes any artificial or natural substance used to kill or incapacitate any pest. It is a general term that includes herbicides, insecticides, nematocides, fungicides, antibiotics, rodenticides, plant growth regulators, etc.

The nucleus of A.I.D.'s environmental and natural resources policy resides in the concept of attaining sustained economic and social progress by environmental and natural resources conservation, protection, and management. The primary goal of this policy is to "help developing countries to conserve and protect their environment and natural resources, and to promote long-term economic growth by managing exploited resources for sustainable yields" (A.I.D., 1988).

Population increases in developing countries, a shortage of arable land, and greater food production needs have resulted in the intensification of agriculture and the use of modern technology to increase yields and improve crop quality. Some practices, including continuous cropping, monoculture, and reliance on fertilizers, irrigation, and high-yielding varieties, may aggravate pest problems. The Food and Agriculture Organization (FAO) of the United Nations estimates that about one-third of the world's food crops are lost to pests during production, harvest, and storage. Unless food commodities are protected from pests (e.g., weeds, insects, nematodes, pathogens, and vertebrates), potential gains sought through high-input farming can be offset.

Reliance on pesticides to reduce pest-related crop injury, as well as improper pesticide application procedures, can result in undesirable conditions. These include soil and water contamination, human health risks, pest resistance, destruction of non-target organisms, secondary pest problems, unacceptable toxic residues on agricultural products, and unnecessary financial burdens. A systematic approach to pest control is fundamental in striving to "support activities specifically designed to achieve sustained natural resource productivity and management while protecting or enhancing the environment" (A.I.D., 1988). Integrated pest management--a strategy that aims at maintaining pest populations below economically damaging levels and reducing the use of toxic chemicals--offers ways to achieve effective long-term pest control while mitigating hazards to humans and the environment.

Since the early 1950's, A.I.D. and its predecessor agencies have provided pest management assistance to developing countries for three basic purposes:

1. To protect human health, mainly by controlling vectors of diseases;
2. To protect food crops at both the pre-harvest and post-harvest stages; and
3. To protect livestock from direct pest injury and from transmission of disease agents (A.I.D., 1978).

In 1971, the Agency began to direct pest management activities toward integrated pest management (IPM). In 1976, A.I.D. adopted its first environmental procedures, 22 CFR Part 216 (also known as Regulation 16). This regulation, which was revised in 1980, requires a careful integration of environmental consequences into one decision-making process for A.I.D. projects, programs, and activities. This allows mitigative measures, such as IPM, to be incorporated into project design prior to authorization and implementation. Still, it is important to recognize that:

- o Developing countries do not have adequate infrastructure to regulate, store, handle, distribute, monitor, apply, and dispose of pesticides;
- o Many developing countries directly or indirectly subsidize chemical pesticide use, which often leads to overuse and discourages the application of alternative pest management techniques. Similarly, government controls on the price of other agricultural inputs, such as fertilizers and water, and on agricultural products may discourage the use of alternate pest control methods;
- o Developing countries will continue to use pesticides, and strictly controlled A.I.D.-financed pesticides represent only a small fraction of the total;
- o It will be necessary to continue pesticide use in malaria and other vector-borne disease control programs; and
- o Greater donor coordination is needed to provide adequate pest management materials and training to developing countries.

## **POLICY**

Because environmentally sound and sustainable agriculture requires the proper selection, application, storage, and disposal of agricultural chemicals, A.I.D. policy is to implement IPM tactics wherever appropriate. This policy includes:

- o Minimal pesticide use;
- o Judicious pesticide selection;
- o Discouraging general requests for pesticides;
- o Emphasis on non-chemical pest management tactics;
- o Infrastructure development for proper pest and pesticide management, including regulation of pesticide manufacturing, labeling, distribution, worker and public exposure levels, application, storage, and disposal;
- o Communication of U.S. policy and experiences to other nations and international organizations;
- o Promotion of supplements or alternatives to vector control that do not involve toxic chemical use; and
- o Encouraging host country efforts to research improved pest management methods (A.I.D., 1988).

A.I.D. has discontinued procurement of pesticides on a non-project basis under the commodity import program, except in emergencies and cases of compelling circumstances. Pesticides have been eliminated from the list of

commodities automatically eligible for A.I.D. financing. As discussed in Chapter III, requests for the use of pesticides as part of projects are reviewed on a case-by-case basis (A.I.D., 1978).

### **Specific IPM Strategies**

Because each IPM system should be specifically designed for particular geographic locations, crops, pest complexes, and resource availabilities, it would be unrealistic for A.I.D. to create policies on which specific IPM tactics must be incorporated into every site-specific IPM strategy. In this context, appropriate research is a fundamental component of IPM and is encouraged, and funded where appropriate, by A.I.D.

### **Host Country Legislation**

It is A.I.D. policy to support the creation and implementation of laws and regulations, consistent with U.S. laws and regulations, that will maximize the benefits derived from pesticide use while minimizing potential adverse environmental impacts in developing countries (A.I.D., 1978). Host country legislation should cover all aspects of pesticide involvement, such as control of imports, registration, sale, distribution, use, marketing, training, licensing, certification, storage, transport, disposal, tolerance levels on agricultural commodities, and enforcement. A.I.D. complements pest management programs with appropriate efforts to strengthen institutional capabilities and scientific expertise. According to 22 CFR 216, A.I.D. requires that U.S. technical assistance and donated equipment be used only in conjunction with the application of pesticides approved by A.I.D. For example, in recent locust and grasshopper plagues, A.I.D. prevented the use of pesticides such as dieldrin and benzene hexachloride (BHC) because of their environmental persistence and acute toxicity.

### **Training**

It is A.I.D. policy to assist developing countries in the establishment and implementation of regulations, consistent with U.S. regulations, that will reduce pesticide-related risks to the environment and humans (A.I.D., 1978). Attaining the goals of this policy involves training to increase a host country's capabilities in pesticide procurement, formulation, labeling, storage, application, and disposal. This includes training assistance to host country governments to enhance their institutional capacity to maintain control over pesticide availability, production, and use. Training should be aimed at all levels of pest and pesticide management, from government decision makers to pesticide applicators and farmers.

### **Pesticide Selection**

A.I.D. pesticide purchases are effectively limited to chemicals registered in the United States by the Environmental Protection Agency. Assistance for the procurement or use of pesticides may be approved by a Bureau Environmental Coordinator only after a thorough examination as stipulated in 22 CFR Part 216 (see Chapter III and Appendix A for further information). In general, it is preferable to select the pesticide least hazardous to humans and the environment that is effective against the target pest and that has U.S. Environmental Protection Agency (USEPA) registration for same or similar use without restrictions. Some pesticides (e.g., those used against tropical pests not found in the United States) are not registered in the United States because there is little or no use for them there; they may or may not be hazardous to the environment and human health (Chapter III). These pesticides would only be considered for use if it can be proven that no USEPA registered pesticides can work, that sufficient toxicological data exists and is comparable to that required by USEPA for registration and, in the case of agricultural production programs, that no alternative crops can be grown, even if they are not as economically profitable. At the same time, although 22 CFR Part 216 does not explicitly forbid the use of USEPA-restricted pesticides, application of such chemicals in the United States can be accomplished only by state certified technicians. Comparable certification programs are generally nonexistent in developing countries, which is a viable reason for discouraging their use in pest control operations, unless the project develops such certification programs and monitors their effectiveness. A.I.D. will not approve any pesticide that has been cancelled or banned by USEPA.

### **Local Currency for Pesticide Procurement**

Since the mid-1950's, PL-480 and related food-aid programs have supported natural resources conservation in developing countries. It is A.I.D. policy to use PL-480 resources for inter alia reforestation, agroforestry, watershed management, soil conservation, and habitat protection. A.I.D. is committed to ensuring that projects funded by local currency are environmentally sound. Because IPM strategies are aimed at mitigating environmental injury, IPM would be a viable alternative to sole reliance on chemical control of pests. IPM, however, does not preclude the use of pesticides, which are in many cases an integral component of IPM systems. A.I.D. may approve a country's use of PL-480-generated local currency to finance procurement or use of pesticides applied as part of an IPM program or not, but such use must be reviewed in the same manner as A.I.D. financed pesticides (as discussed in Chapter III).

### **Donor Coordination**

It is a critical element of A.I.D.'s pesticide and pest management policy that pest management activities be coordinated with other donors, international organizations, and U.S. agencies (A.I.D., 1978). A.I.D. works with other bilateral donor agencies through the Development Assistance Committee of the Organization for Economic Cooperation and Development (OECD), multilateral development banks, and international organizations such as FAO. Donor coordination is especially important at local levels to avoid shortages of materials as well as to reduce overstocking of pesticides, duplicative efforts, and providing a multiplicity of products.

### **Pesticide Storage, Handling, Application, Labeling, Transport, and Disposal and Monitoring Human Health**

It is A.I.D. policy to promote safe and effective pesticide operations to protect human life and the environment (A.I.D., 1988). A.I.D. policy, however, does not specify particular protocols for pesticide storage, handling, application, labeling, transport, and disposal, and monitoring human health (see Chapter V). Although A.I.D. is studying improved methods for application and disposal, specific "best" techniques to accomplish these tasks have not been identified or incorporated into formal policy. At this time, recommendations to refine pesticide storage, handling, application, labeling, transport, disposal, and safety practices (including any recommendations on residue tolerance levels for agricultural commodities) are included in the Environmental Assessments (EAs) conducted by A.I.D. These recommendations, as part of these environmental impact documents, must be approved by the appropriate Bureau Environmental Coordinator.

5

## CHAPTER II STRATEGIES FOR PEST MANAGEMENT

Humans have long competed with a wide variety of organisms over limited food, fiber, and other resources. With the advent of synthetic organic pesticides in the 1940's, many experts thought that a panacea to pest problems had finally been found. In the decades since, it has become increasingly apparent that total reliance on chemical pesticides is at best only a temporary solution and at worst greatly exacerbates pest problems and contributes to increased environmental contamination. Pests, particularly insects and disease, have demonstrated a remarkable ability to rapidly adapt to new environmental pressures, including pesticides. Efforts have now been redirected toward devising and implementing schemes to maintain pest populations at economically acceptable levels while causing minimal negative effects to the environment.

Pest control activities can be divided into three main approaches: exclusion, eradication, and management of established pests. Exclusion methods are used to decrease the possibility of pests entering areas where they did not formerly exist. Eradication is aimed at completely eliminating pest species from defined geographic areas. Pest management seeks to maintain pest damage at levels below economic injury levels; the current paradigm for managing established pests is integrated pest management, which employs all appropriate pest management tactics to reduce damage with minimal chemical inputs. The relative utility of one approach over another depends on the situation and the resources available. A.I.D. encourages integrated pest management and exclusion and quarantine as its methods of choice in pest management.

### EXCLUSION/QUARANTINE

There are many examples of pests entering geographic areas where they did not formerly exist. Two recent cases are the cassava mealybug, which was introduced from South America into sub-Saharan Africa in the early 1970's, and the New World screwworm, which moved from South America to North Africa in 1988. Introduced pests often cause much greater damage in their new habitats than in their places of origin because they are relatively free from regulation by natural enemies. This is certainly the case with the cassava mealybug, an insect so innocuous in South America that it was an undescribed species before being introduced to Africa. On the other hand, there are cases where an introduced species cannot survive the new environment. A recent example is the desert locust that was carried by an unusual weather front to the Caribbean. Within a matter of weeks, the panic of a potential disaster was dispelled by a combination of the insects' inability to breed in the Caribbean environment and natural predators that consumed them.

The goal of exclusion is to keep pest species from entering new geographic areas by restricting the human-assisted movement of plants and animals. For example, soybean rust, a fungal disease, has to date been excluded from entry into the United States from South America. Successful exclusion depends on a well-organized system for detection and quarantine so that pests can be eliminated before becoming established over a wide geographic area. The Plant Protection and Quarantine division of the U.S. Department of Agriculture's Animal and Plant Health Inspection Service--USDA/APHIS/PPQ--has the mandate for regulating the movement of plants and animals both into and within the United States. The interception of more than 15,000 infested items annually at U.S. ports of entry is testimony to the success of the APHIS detection and quarantine system. Many developing countries lack well-developed systems for detecting and eliminating introduced pests and should be encouraged to institute systematic quarantine procedures.

### ERADICATION

The aim of eradication is to completely eliminate pest species from defined geographic areas. If successful, eradication eliminates any future need for control of the target pest. Sometimes referred to as "total pest management", eradication is most often initiated against introduced pest species before they become established over large geographic areas and when the economic consequences are potentially great. A high-quality detection and survey network is needed to geographically focus the eradication effort. Eradication is only appropriate in limited

situations and has been successfully employed in only a few cases, most notably with the New World screwworm in North America.

Eradication of the screwworm relies primarily on three types of control strategies: release of sterile insects (autocidal control), chemical control, and the destruction of hosts. These are briefly discussed below.

#### **Sterile Insect Releases**

A control strategy developed by the USDA, sterile insect release refers to the mass rearing and release of sexually sterile insects of the target pest species. The sterilization is most commonly achieved through radiation. Once released, sterile males mix with the wild population and mate with fertile females. These matings produce non-viable eggs. If sufficient numbers of sterile males are released, the target pest population will gradually decline and become extinct. The sterile insect approach has been used with variable success against the New World screwworm in North America, the tsetse fly in Africa, and fruit flies in several locations. The likelihood of success for this approach is higher for pest species in which the female mates only once in its lifetime. The likelihood of success is also increased if the released sterile males are competitive with the wild males in the natural population. If the released insects do not compete well with wild insects, much higher numbers of sterile males must be released.

#### **Chemical Control**

Pesticides, either alone or in combination with the sterile insect technique, are often used in eradication and control programs. In some cases pesticides in bait formulations are used to attract and kill the pest species. This "bait and kill" strategy has been used in the United States in eradication programs against the Mediterranean fruit fly.

#### **Host Destruction**

In cases where pests have limited host preferences, it may be possible to eradicate a newly introduced pest by temporarily destroying all of the hosts in the infested area. This technique was effectively used in 1915 to eradicate citrus canker disease from Florida by destroying more than three million citrus trees. Host destruction is an extreme approach that is not generally encouraged by A.I.D.

#### **MANAGEMENT OF ESTABLISHED PESTS (IPM)**

Pests that are indigenous to an area (or introduced pests that have become widely established) can be managed by a variety of methods, including biological control, host resistance, cultural control, and the use of pesticides. The current practice is to use combinations of these techniques to manage pest populations so that their numbers remain below economically damaging levels with minimal disruption to the ecosystem. This approach is called integrated pest management (IPM)--sometimes referred to as integrated pest control (IPC) in European countries.

The concept of IPM has frequently been misunderstood by politicians, administrators, and the general public. IPM is an approach rather than a specific solution. Yet IPM is sometimes considered to be a specific solution that can be easily adapted and applied to any pest problem in any geographic area. This misconception has, in some IPM programs, led to confusion, overly great expectations, and disappointment.



One of the earliest and most widely quoted definitions of IPM (IPC) was developed by FAO (1967):

[IPM is a] pest management system that in the context of the associated environment and the population dynamics of the pest species, utilizes all suitable techniques and methods, in as compatible a manner as possible and maintains pest populations at levels below those causing economic injury.

Successful IPM programs depend on a thorough understanding of pest populations, the associated ecosystem, and the available management tactics. Only with this understanding can strategies be developed that maintain the pest density below economically important levels with minimal perturbation to the ecosystem. To a large extent, IPM is area specific. Therefore IPM strategies must be tailor-made for specific crop/pest complexes in particular locations. This demands a long-term commitment to applied research.

Bottrell (1979) has proposed four guidelines for the development of IPM strategies:

1. Analyze the "pest status" of each of the reputedly injurious organisms and establish economic thresholds for the "real" pests. The organisms we perceive to be pests do not always merit this status. Likewise, pests that are economically important are not always obvious. Research is needed to determine which organisms, at what densities, and at what crop growth stages cause economic damage. Only then can we begin to develop strategies to manage the "real" pests.

2. Devise schemes for lowering the equilibrium positions of key pests. Population densities of organisms tend to fluctuate around a general equilibrium position. This equilibrium level is determined by the resources available (food, water, shelter), the weather, and the impact of natural enemies attacking the population. Often, the equilibrium level is influenced by human activities. When a pest is accidentally introduced to a new area, it often encounters an environment free from natural enemies. If the environment is favorable, the pest can reach higher levels than were possible in its native home. This new level could theoretically be reduced by introducing natural enemies, modifying cultural practices, use of resistant host varieties, the judicious use of pesticides, or combinations of these methods.

3. During emergency situations, seek remedial measures that cause minimum ecological disruption. When pest populations fluctuate above the levels determined to be economically important, interventions, often in the form of pesticides, are needed to avoid unacceptable losses. Care must be taken to ensure that these interventions have the least possible negative environmental impact. This can be accomplished through the choice of pesticide (see Chapter III), method of application, timing of treatment, and use of alternative non-chemical practices.

4. Devise monitoring techniques. Pests, especially insects and diseases, often have enormous reproductive capacity and can rapidly increase to damaging levels. Monitoring pest populations is essential in order to intervene before damage becomes economically unacceptable. Survey programs must be standardized and systematic to ensure accuracy.

## TACTICS OF PEST MANAGEMENT

Following is a brief summary of the major tactics currently available for IPM strategies. Genetic engineering, which is certain to play a role in future pest management programs, is also briefly discussed.

## Biological Control

All living organisms have natural enemies that attack and feed on them. The deliberate use of natural enemies (parasites, predators, and pathogens) to control pest species is termed biological control, also known as biocontrol. Biocontrol can be a component of IPM but has frequently been used as the sole control tactic. There are three main approaches to biocontrol; classical, augmentation, and conservation. These are briefly discussed below.

### Classical Biocontrol

The classical approach to biocontrol refers to the introduction and establishment of natural enemies in areas where they did not previously exist. Classical biocontrol is often the tactic of choice against introduced pest species, particularly when the pest is not considered to be damaging in its native home.

Classical biocontrol attempts to reestablish the natural regulation that occurs in the pest's area of origin. To do this requires an extensive study of the proposed biocontrol agent in its native environment, including information on host range and other factors. Even then it is important to proceed with caution; otherwise, the biocontrol agent could itself become a pest in the new environment.

If it is successful, biocontrol is a highly sustainable pest management tactic and should be used whenever possible. It has not always been successful, however, particularly against indigenous pest species or against pests in row crop ecosystems.

### Augmentation Biocontrol

Augmentation biocontrol refers to the mass production and release of natural enemies of pest species. Releases are either inundative or inoculative. Inundative releases are mass releases of natural enemies to control pests that are about to surpass economic injury levels. Inoculative releases are usually made early in the season to allow natural enemies to increase and control pests in the future. Much of the work in augmentative approaches has focused on the use of insect pathogens such as *Bacillus popilliae*, a milky spore disease of the Japanese beetle. *Bacillus thuringiensis*, on the other hand, is used more like a pesticide because the bacteria are killed within days by direct sunlight.

### Conservation Biocontrol

The conservation approach to biocontrol refers to enhancing the environment so that it is more favorable for natural enemies. Timing a pesticide application so that it has the least effect on natural enemies is one example of conservation biological control. Other examples include strip harvesting to conserve hosts and natural enemies, planting alternative hosts for pests so that natural enemy populations can be maintained, and leaving crop stubble in selected areas so that hosts are available throughout the year. Mixed-cropping systems have also been shown in many cases to maintain higher populations of natural enemies than monocultures. Many "traditional" farmer practices inherently support conservation tactics.

## Host Resistance

Host resistance refers to the selection of plants or animals that express some degree of resistance or tolerance toward particular pests. Host resistance has been effectively used against numerous pests in many crops. Its application against parasites of animals has been more limited.

The advantages of host resistance are obvious. Once a resistant plant is selected, it can be readily multiplied, disseminated to farmers, and incorporated into the farming system, often with little change to the farmer's cultural practices. This control tactic has not always proved durable over time, however. The wide-scale

planting of resistant varieties places tremendous selection pressure on the pest population, which has often resulted in the selection of pest strains that are able to attack the crop (breakdown of resistance). Biotechnology is likely to have a major impact in the future development of pest-resistant crops.

### Cultural Control

Cultural control refers to a wide variety of tactics that are used to make the environment less favorable for the pest species. Examples of cultural controls include the timing of planting or harvest to escape pest damage, flooding of fields, plowing to disrupt the life cycle of insects in the soil, intercropping, and fallowing periods. Cultural controls are often an integral part of the farmer's normal practices and can be disrupted when modern agricultural techniques are adopted. For example, a change from a rotation system to continuous cultivation of peanuts can result in a buildup of root-attacking nematodes. Many "traditional" farmer pest control methods already involve cultural control tactics. Such "traditional" methods should be explored and incorporated appropriately into IPM strategies.

### Physical/Mechanical Control

Physical/mechanical control is most widely used for the control of weeds (hand or mechanical cultivation) but is sometimes used against insects, diseases, and other pests. Common examples of mechanical control include fly swatters, window screens, and sticky traps. An agricultural example is the culling of diseased plants from a field to prevent disease transmission to healthy plants. The use of physical or mechanical control tactics in agriculture is often limited because of the high labor requirements. Yet "traditional" pest control practices by farmers often use physical/mechanical control techniques and should be incorporated into IPM strategies where appropriate.

### Chemical Control

Chemical control, although under increasing scrutiny because of its inherent disadvantages, is the only method currently available for controlling certain pests. The use of pesticides will undoubtedly continue, and probably increase, in the coming decade. Nevertheless, pesticides should be used only in cases where less ecologically disruptive methods are unavailable. When pesticides are used, it should be with minimal perturbation to the ecosystem. That can be accomplished through the development and use of economic thresholds, careful choice of pesticide (see Chapter III), and the manner and timing of application.

The disadvantages associated with sole reliance on synthetic organic pesticides have been well documented. These include direct hazards to the user, pesticide residues in food, environmental pollution, pest resistance, resurgence of pests after pesticide use, and the change in status of pests from secondary to primary after pesticide use (i.e., insecticides used against key pests decrease the abundance of natural enemies of other pests, which then increase in importance).

The problem of direct hazards to users is particularly critical in developing countries. It is estimated that developing countries account for only 20% of all pesticide use but for 50% of all pesticide poisonings and 73% to 90% of all pesticide-related deaths. This indicates that the risks associated with pesticide use are much higher in developing countries and that any proposed pesticide use should be accompanied by an intensive training effort to mitigate these risks.

Another problem of chemical control, pest resistance to pesticides, is becoming increasingly common as pesticide usage increases. In 1984, it was estimated that 638 pest species worldwide had resistance to certain pesticides. These include some 428 arthropods, 50 weeds, 150 plant pathogens, and 10 small mammals and plant parasitic nematodes. Strategies to manage resistance are being developed and include rotation of pesticides and pesticide mixtures as well as the extensive use of non-chemical alternatives.

Pesticide residue tolerance levels on agricultural commodities in developing countries generally have not been delineated or else are not systematically monitored or enforced. Because human safety is a primary goal of IPM, the observance of pesticide residue tolerance levels should be encouraged and, if possible, facilitated.

### **Insect Behavior Modification**

Semiochemicals are used on occasion, where and when available, to modify insect behavior. Generally, these chemicals consist of pheromones (hormones produced by insects and released into the environment as behavioral cues to other insects) and kairomones (chemicals not produced by insects but having an effect on their behavior—for example, molasses as a feeding attractant or neem extract as a feeding deterrent). Such chemicals may be useful in disrupting insect mating and development, attracting pests to traps, or repelling pests away from crops, among other responses. Because these compounds are generally quite selective regarding the target organism and are usually used in small amounts, semiochemicals are an innovative and effective tactic for incorporation into IPM strategies.

### **Genetic Engineering**

Although not yet widely applied in developing countries, biotechnology will provide many new pest management options in the future. For example, plants can now be genetically engineered to produce insecticides that normally are produced only by bacteria. Conversely, bacteria can be engineered to mass-produce insecticides that normally are produced only in plants. Regulations governing the testing, release, and general use of engineered biopesticides are being developed in many countries. Guidance on proposed uses of such pesticides should be sought from AID/W.

- 11 -

## CHAPTER III REGULATIONS FOR ENVIRONMENTAL REVIEW FOR A.I.D.-FINANCED PROCUREMENT OR USE OF PESTICIDES

### INTRODUCTION

A.I.D.'s regulations require that the potential environmental consequences of A.I.D.-financed activities are identified and considered by A.I.D. and the host country prior to the final decision to proceed with an activity. The procedures that guide this regulation are set forth in 22 CFR Part 216. Section 117(c) of the Foreign Assistance Act and Section 533(g) of the 1991 Appropriation Act require that A.I.D. review its projects, programs, and activities in accordance with the requirements of 22 CFR Part 216. A.I.D.'s policy is to approve for procurement or use only those pesticides that are critically needed and proven safe.

22 CFR Part 216 includes specific instructions for examining A.I.D. projects that include funding for the use or procurement of pesticides. ("Use" includes the procurement or use of equipment and technical assistance in connection with pesticide use, storage, transport, and disposal even if the host country or another donor is funding the actual procurement.) For such projects, Project Identification Documents (PIDs) and Project Papers (PPs) include a review of the proposed action for pest control as it relates to the environment. The first step in this review is called the Initial Environmental Examination (IEE). The IEE provides the basis for a "threshold decision" as to whether an Environmental Assessment (EA) is required prior to project implementation or whether no further environmental review is necessary. (For certain actions that affect the environment of the United States, the global commons, or areas outside the jurisdiction of any nation, an Environmental Impact Statement (EIS) may be required in accordance with the National Environmental Policy Referendum; virtually no A.I.D. actions are in this category, however, and it will not be discussed further.) Depending on the USEPA registration status of the proposed pesticide(s), an EA or EIS may be mandatory. In cases where an EA or EIS is mandatory, the IEE may be omitted from the review process. Precise definitions for the IEE, the EA, and the EIS are provided in 22 CFR Part 216.

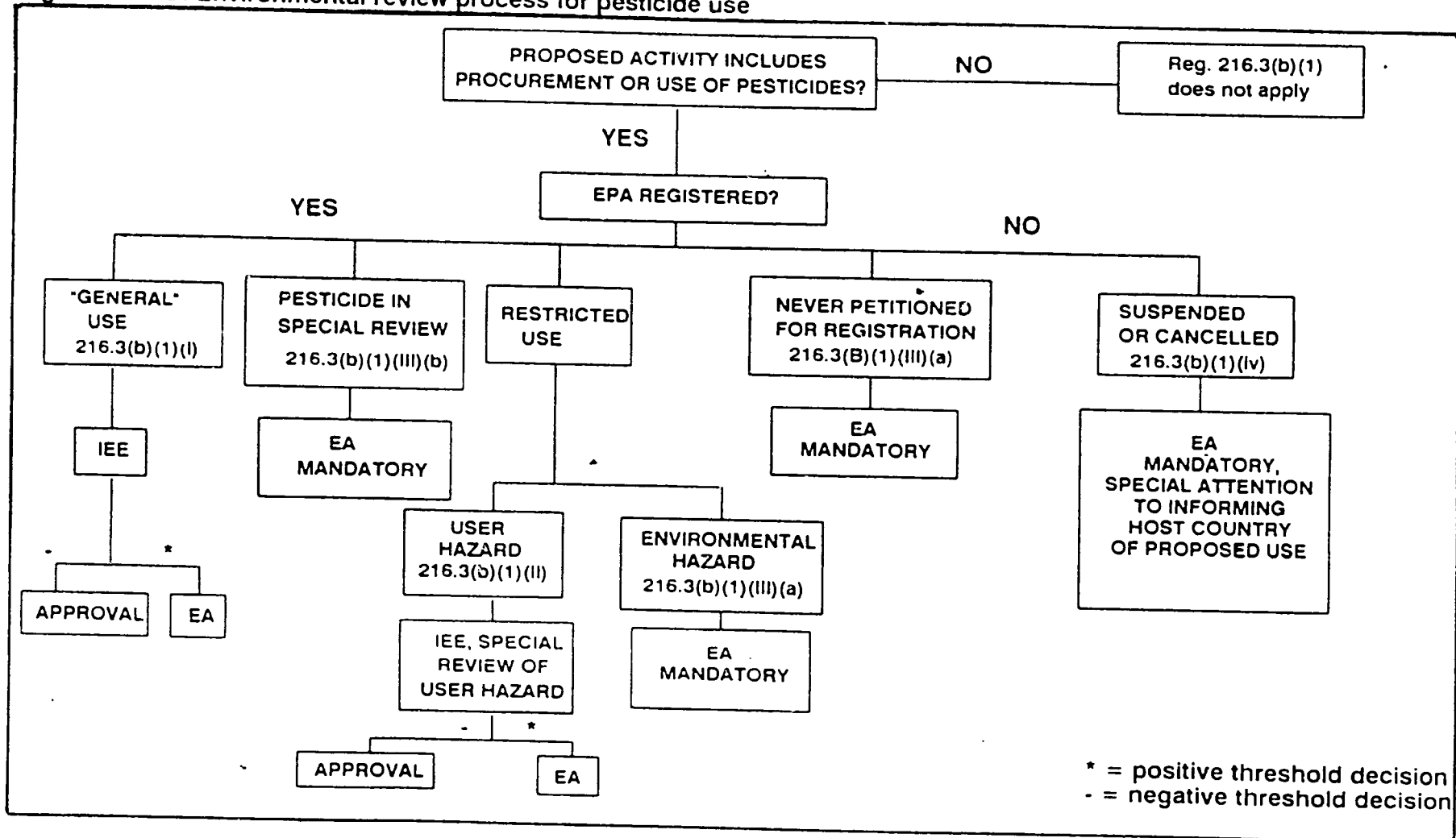
Project Officers are held responsible for complying with the requirements of 22 CFR Part 216 during the design and implementation of activities involving the use or procurement of pesticides. The information in this chapter should be viewed as a brief introduction to A.I.D.'s pesticide regulations but not in any way as interpretation of, or a replacement for, 22 CFR Part 216. The complete text of 22 CFR Part 216 is included in Appendix A.

### RELATION OF USEPA REGISTRATION STATUS TO ENVIRONMENTAL PROCEDURES

The procedures for evaluating the environmental consequences of an action in which A.I.D. finances procurement or use of pesticides depend on the USEPA status of the proposed pesticide (see Figure 1). USEPA-registered pesticides are treated differently from those that do not have USEPA registration because the registered chemicals have undergone a thorough multi-million dollar, multi-year, risk evaluation and have been found to be acceptable in the United States.

USEPA-registered pesticides are evaluated first in an IEE to determine whether they will cause significant harm to the environment where they will be used. If not, no further review is required. If the proposed use of USEPA-registered pesticides will have a significant adverse effect on the environment, an EA must be completed. The only exception to this rule is for pesticides that are registered for same or similar use, but are restricted for environmental reasons by the USEPA. Pesticides in this category must automatically be examined in an EA. Pesticides that are not registered for same or similar use by the USEPA also must automatically be examined in an EA.

Figure 1. A.I.D. Environmental review process for pesticide use



## ISSUES TO BE ADDRESSED IN AN IEE

Several specific factors that must be considered in preparing an IEE for the review of USEPA-registered pesticides. Other factors may also be examined in the IEE as appropriate.

Factors that must be considered in preparing an IEE include the following:

**1. USEPA registration status of the proposed pesticide:** As mentioned earlier, the USEPA status of the proposed pesticide dictates the procedures to be followed in the environmental review process. The USEPA document "Suspended, Cancelled, and Restricted Pesticides" is useful for identifying pesticides against which the USEPA has taken specific regulatory action. This document is published periodically, but may not include very recent USEPA regulatory actions. (See Appendix B for information about this and other sources of assistance on the USEPA status of pesticides.)

**2. Basis for selection of the pesticide:** This section of the IEE includes the economic and the environmental rationale for choosing a particular pesticide. In general, the least toxic pesticide that is effective (and that has USEPA registration for same or similar use) is selected.

**3. Extent to which the proposed pesticide use is, or could be, part of an IPM program:** A.I.D. policy promotes the development and use of integrated approaches to pest management whenever possible. This section of the IEE discusses the extent to which the proposed pesticide use is incorporated into an overall IPM strategy.

**4. Proposed method or methods of application, including the availability of application and safety equipment:** This section examines in detail how the pesticide is to be applied and the measures to be taken to ensure its safe use. Some situations, for example, may favor ground application over aerial application because of the problems of spray drift beyond the target area.

**5. Any acute and long-term toxicological hazards, either human or environmental, associated with the proposed use, and measures available to minimize such hazards:** This section of the IEE examines the acute and chronic toxicological data associated with the proposed pesticide. The proposed use of acutely and highly toxic pesticides (e.g., parathion) must be thoroughly justified, as must the use of any pesticide known or suspected to have chronic effects on humans or other non-target organisms.

In general, A.I.D. discourages the use of pesticides classified by USEPA as "restricted use pesticides." Such pesticides can be used in the United States only by or under the direct supervision of certified applicators; this is because USEPA has determined that these pesticides may cause unreasonable adverse effects on the environment and the applicator when they are used in accordance with widespread and commonly recognized practices in the United States.

Developing countries generally do not have comparable certification programs for pesticide applicators. Assistance components to develop some form of training and/or certification should be considered if restricted-use pesticides are needed. In addition to hazards, this section of the IEE also discusses measures designed to mitigate any identified toxicological hazards, such as training of applicators, use of protective clothing, and proper storage.

**6. Effectiveness of the requested pesticide for the proposed use:** This section of the IEE requires information similar to that provided in item 2, but more specific to the actual conditions of application. This section also considers the potential for the development of pest resistance to the proposed insecticide.

**7. Compatibility of the proposed pesticide use with target and non-target ecosystems:** This section examines the potential effect of the pesticide on organisms other than the target pest (for example, the effect on bee colonies kept in the area). Non-target species of concern also include birds and fish. The potential for negative

impact on non-target species should be assessed and appropriate steps should be identified to mitigate adverse impacts. Note: The IEE examines facts that indicate whether there will be harm. The EA considers mitigating measures.

**8. Conditions under which the pesticide is to be used, including climate, flora, fauna, geography, hydrology, and soils:** This section examines issues such as the potential for contamination of surface and groundwater sources.

**9. Availability of other pesticides or non-chemical control methods:** This section identifies other options for control of pests and their relative advantages and disadvantages.

**10. Host country's ability to regulate or control the distribution, storage, use, and disposal of the requested pesticide:** This section examines the host country's existing infrastructure and human resources for managing the use of the proposed pesticide. If the host country's ability to regulate pesticides is deemed inadequate, the proposed action might result in significant harm to the environment, which must be considered in the EA.

**11. Provision for training of users and applicators:** A.I.D. recognizes that safety training is an essential component in programs involving the use of pesticides. The need for thorough training is particularly acute in developing countries, where the level of sophistication of applicators may typically be lower than in developed countries.

**12. Provision made for monitoring the use and effectiveness of the pesticide:** Evaluating the risks and benefits of pesticide use should be an ongoing dynamic process.

Depending on the responses provided in the IEE to the above issues, the originator of the project (generally a Mission) will recommend a positive or negative determination of whether further assessment of the potential environmental consequences is necessary. The appropriate Bureau Environmental Coordinator (BEC) will either concur with the determination, or request that the originator reconsider the Decision. A negative determination indicates that the Agency is satisfied that the proposed action will not cause significant harm to the environment. A positive determination indicates that significant harm is foreseeable and the environmental consequences of the program need to be examined in greater detail in an EA.

## THE SCOPING EXERCISE

The issues to be addressed in an EA are outlined during a scoping process, described in 22 CFR 216.3(a)(4). Scoping is initiated by the Mission proposing the activity. Scoping attempts to identify issues of significant environmental importance and to eliminate issues that are unlikely to have a significant environmental impact. The scoping exercise also addresses programmatic considerations such as the time frame and resources necessary for conducting the EA. A scoping team typically includes the project officer, an environmental expert, a host country government representative, and representatives of relevant host country non-governmental organizations. A typical scoping exercise takes one to five days and results in a specific statement of work for the EA.

Once it is completed, the scoping exercise can be circulated to other federal agencies for comments if the Bureau Environmental Coordinator believes such comments would be useful. One possible, albeit rare, outcome of the scoping exercise is a change in the Threshold Decision from positive to negative; this could occur if it becomes evident during the scoping process that the proposed actions will have no significant impact on the environment.



## **ISSUES TO BE ADDRESSED IN AN ENVIRONMENTAL ASSESSMENT (EA)**

The EA is an in-depth examination of the environmental issues associated with a proposed A.I.D.-funded activity. In general, the EA examines in detail the issues to be discussed in IEEs (216.3(b)1(1)(i)), but it also addresses other significant issues identified during the scoping process, such as the impact of the proposed action on endangered or threatened species. An important component of the EA is an examination of the potential environmental consequences of alternatives to the proposed action, including any non-chemical possibilities; one of the alternatives considered should be the "no-action" approach. The EA must also include specific recommendations on how project implementation can be improved to mitigate adverse impact on the environment or human health and how the project evaluations will formally include compliance with the EA. The EA follows a prescribed format, which is described in 216.6(c)(1-7). Summarized examples of EAs conducted by A.I.D. are provided in Appendix C.

## **EAs AND PROJECT AMENDMENTS**

In the event of amendments to projects, EA assumptions and recommendations may be rendered obsolete depending upon the substantive nature of the amendment(s). If the amendment is substantive (e.g., use of an additional pesticide, expansion of pest management activities into a new area or crop, use of a different pesticide application method), there may be a need to revise or amend the EA to appropriately address changes in the project. Similarly, if new information is discovered which affects the pest management aspects of the project (e.g., the pesticide(s) used in the project are banned or placed in the restricted use category by EPA, or susceptible non-target organisms are identified in or near the site of operations), the EA must be revised or amended accordingly. Also, if an EA has not been conducted prior to project authorization (or if the pesticides to be used in the project are not identified until the project implementation phase), an EA is still required and must be completed retroactively. In each of these cases, the project officer must consult with the appropriate Bureau Environmental Coordinator to determine the best course of action.

## **EXEMPTIONS FROM 22 CFR PART 216**

A.I.D. is exempted from fulfilling the requirements of 22 CFR Part 216 in certain limited situations. These include emergencies, as determined in writing by the A.I.D. Administrator, multi-donor projects where A.I.D. is a minor donor and where the Agency Environmental Coordinator had determined that the controlling donors' pesticide procedures are adequate, projects using small quantities of pesticides for research purposes, and, under very restricted conditions, non-project assistance. Exemptions are rarely granted, however, and efforts to fulfill the spirit of 22 CFR Part 216 should be undertaken even under emergency conditions. Consult 216.3(b)(2-3) and with the relevant Bureau Environmental Coordinator for specific information on the conditions that must be met before exemptions to 22 CFR Part 216 can be considered.

## **ROLE OF AGENCY ENVIRONMENTAL STAFF**

### **Mission and Regional Office Environmental Officers**

Many Missions and Regional A.I.D. Offices (REDSO/EA, REDSO/WCA, ROCAP) have designated Environmental Officers and/or contract environmental advisors. These people are the first source of information in the Mission or sub-region on A.I.D. Environmental Procedures. The Mission Environmental Officer or Advisor (MEO or REA) and/or Regional Environmental Officer (REO) review proposed project activities for their potential environmental impact and provide advice on the application of 22 CFR Part 216 regulations. MEOs/REOs play an important role in recommending when categorical exclusions to 22 CFR Part 216 are applicable, when exceptions to pesticide procedures apply, and, when IEEs are prepared, whether Threshold Decisions are positive or negative. (See 216.2(c)(2)(i-xv) for a list of activities that may be excluded from environmental examination.) MEOs/REOs also coordinate and provide guidance on the scoping exercise and the preparation of EAs. MEOs/REOs are not authorized to approve IEEs or EAs. This function is reserved for the Bureau Environmental Coordinators.

**Bureau Environmental Coordinator**

Bureau Environmental Coordinators (BECs) have an extremely important role in assuring that A.I.D. activities are implemented and conducted in an environmentally sound manner. Specifically, the BECs must review the appropriateness of all categorical exclusions to 22 CFR Part 216, review and approve IEE Threshold Decisions originating from Missions in their respective Regions, review the written description of the scoping process, and approve all Environmental Assessments. If a BEC does not approve a specific Mission Threshold Decision, he or she can request that the originating Mission reconsider the Decision. When differences of opinion cannot be resolved at this level, the Assistant Administrator for the concerned Regional Bureau reviews the Threshold Decision and makes the final determination.

**Agency Environmental Coordinator**

The Agency Environmental Coordinator is responsible for monitoring overall Agency compliance with 22 CFR Part 216 regulations and for developing Agency strategies and policies that will ensure that all A.I.D.-funded activities are conducted in an environmentally sound manner. 22 CFR Part 216 specifies a few situations in which the Agency Environmental Coordinator must be involved: determining whether the requirements for a "minor donor" exception to 22 CFR Part 216 are met (216.1(12)(ii)); circulating EAs that are not country-specific to concerned Missions and host countries for comments (216.6(e)(2)); coordinating external communications required for the review of EISs (216.7-8); and serving as a conduit for responding to requests for information on EAs and EISs under the Freedom of Information Act (216.10).

## CHAPTER IV PEST MANAGEMENT IN PROJECT DESIGN

Both in goal and by mandate, Agency programs are designed to consistently promote sustainable productivity and to maintain or enhance the natural resource base in recipient countries. Actions that address these issues are to be built into all A.I.D. projects.

Most experts and A.I.D. view the pesticides-only approach to pest management as an unsustainable, counterproductive and environmentally detrimental practice. A multifaceted approach brings several non-pesticidal, sometimes traditional, methods to bear either in place of or in addition to pesticides. A.I.D. is examining new projects for ways of adopting this integrated approach.

An integrated approach to pest management often involves research, training, and evaluation—activities that happen only when planned and budgeted. The purpose of this chapter is to provide guidance on how pest management awareness and activities can be incorporated into projects during the design process and, more specifically, how pest management issues can be integrated into various stages of project documentation (see Figure 2). Documents submitted outside of the design process, umbrella projects, and non-project assistance efforts are briefly discussed at the end of this chapter.

### KEY CONSIDERATIONS

For background, several general points should be made:

1. All A.I.D. officers who design, implement, evaluate and approve projects must be aware of the requirements in A.I.D.'s Environmental Procedures (Chapter III) so that they are included as part of project design in project documents and acted on during the project.
2. As with all other aspects of the project, the recipient country should be actively involved in planning, implementing and evaluating the pest management component of the project.
3. Will the project involve the sale, brokerage, trade, packaging, bottling, storage, use, transport, or disposal of pesticides? The earlier in project design this question is addressed, the easier it will be to plan acceptable mitigative measures. It may not be clear that pest management is a part of the project. For example, projects that support intermediate credit institutions provide funds to farmers who may or may not use those funds to purchase pesticides. In such cases, the nature of follow-on project activities should be identified and, to the extent possible, A.I.D.'s Environmental Procedures should be observed or the intermediate credit institutions should be strengthened to be able to apply their own environmental assessment procedures.
4. Project budgets should include line items for pest management assessments, training or research.
5. Outside advice on technical aspects of project pest management strategies can be acquired if needed at any stage in project design. See Appendix B for a list of resources.
6. Different offices have different names for project planning documents. The need for pest management in the project should be considered and discussed at all stages and in all pertinent documents, regardless of what the documents are called.

## THE PROJECT IDENTIFICATION PROCESS

### ANALYSIS

CDSS

Country Development Strategy Statement

What A.I.D. can do  
(Sectoral level)

ACTION PLAN

NPD

CONCEPT PAPER

NPN

New Project Description (ANE & LAC)

Concept Paper (S & T)

New Project Narrative (AFR)

Initial preliminary proposal of "bright idea" for a specific project

### DESIGN

PID

Project Identification Document

Purpose, Outputs & Inputs; Preliminary Analysis & resources required to design project in detail

PP

Project Paper

The detailed description, feasibility analyses, and project proposal

### IMPLEMENTATION

PROAG

Project agreement

The commitments of both the U.S. and the host government to implement the project. Agreement on objectives, findings, responsibilities, conditions and covenants based on approved project paper

## DOCUMENTS

### Country Development Strategy Statement (CDSS)

Country Development Strategy Statements are multi-year strategy documents that summarize a country's social and economic development status, its development plans and resources, and A.I.D.'s assistance strategy within the country. The CDSS provides the rationale and setting for current projects and often prompts ideas for new projects.

Central Bureaus in Washington develop a somewhat comparable document, the Central Program Strategy Statement (CPSS). This document outlines long-term Bureau goals in the context of A.I.D.'s policy.

These documents usually do not describe specific actions but instead discuss in broad terms the strategies used in A.I.D.'s health, agriculture, environment, and other development programs in countries or Bureaus. Pest management, although not usually discussed in detail, is often mentioned. For example, many CDSSs discuss A.I.D.'s role in efforts to enhance agricultural productivity, which often means that the Agency supplies inputs such as fertilizers and pesticides to the project. Sections of the CDSS devoted to description of health programs often mention vector-borne disease control efforts--efforts that involve pest management.

The CDSS should include, either in the sectoral sections of the document or in a separate "Pest Management" section, the Agency's and Mission's commitment to safe and sustainable pest management through an integrated approach. For instance, efforts to bolster the agricultural capabilities of the country should include training and research in the safe use of pesticides and in the development and use of alternatives, such as resistant plants or biological control. These points can be made briefly, but strategically, in the CDSS or CPSS. Any reference to pest management in these documents will set the stage for all projects that follow.

### Action Plan (AP)

With a CDSS in place, Missions prepare Action Plans every year to focus specifically on how current programs and projects contribute to objectives outlined in the CDSS and on how new initiatives will help address issues raised in the CDSS. The AP links the long-range objectives in the CDSS to more detailed plans for activities. Central Bureaus may also develop an AP (usually every 3-5 years) as a means to assess progress on current projects and to identify new projects. APs often include a section titled Forward Plans, which discusses short-range objectives and benchmarks for current projects. Plans for research, training, and evaluation may appear in the body or annexes of the AP.

Project officers involved in overseeing pest management activities should contribute brief descriptions of activities and objectives to the AP. If pesticide procurement, use, storage, transport, and/or disposal is contemplated, then accompanying safety training should be briefly described. Descriptions of pesticide monitoring efforts are appropriate in discussions of evaluation or research plans. Likewise, efforts to identify, develop, or use alternative management strategies should be discussed in sections on research and/or environmental efforts.

Useful alternatives to pesticides often exist, and it is incumbent on the project officer to try to bring them to bear on the project. By considering pest management at this stage in project design, designers will have the luxury of time needed to incorporate alternatives into projects.

### New Project Document

This document is called a New Project Description (ANE and LAC) or a New Project Narrative (AFR) or a Concept Paper (RD). A New Project document briefly describes the problem that the new project will address

and the proposed solution offered by the project. Requirements for temporary duties (TDYs), consultants, baseline data, and monitoring and evaluation are provided.

As project officers foresee the need, specific pest management components in the project should be described. More than providing the details of what will be done, it is important to discuss the strategy that will be followed on the project. If only pesticides are used for control, then some justification should be provided. If alternatives will be used, then their availability and integration into the project should be described.

Budget line items for design specialists in pest management training and for pesticide monitoring should be included. If alternative pest management methods are to be used, then the political/social acceptability of those methods may need to be evaluated. If so, plans for this (or other assessments) should be mentioned and figured into the budget.

### **Project Identification Document (PID) And Initial Environmental Examination (IEE)**

By this stage in project design, the responsible staff officer in most cases should have a clear idea about the pest management strategies that will be used as well as how those strategies will be implemented.

At the PID stage in project design, all budget line item requirements for pest management in the project should be described. These include, for example, the costs of conducting an EA, other assessments, training, research, or social studies, the costs of equipment, and the costs of contractors. An abbreviated Logical Framework is sometimes included in the PID.

The PID includes the IEE, which is the first formal review of the project's pest management implementation plans. As a matter of simplification, all projects involving pesticides require a brief IEE with a positive determination.

### **Project Paper (PP) And Environmental Assessment (EA)**

The Project Paper includes all the information needed to justify, explain, and implement the project. The Logical Framework, which is included in the PP, provides the goals and objectives against which project progress will be measured.

If pest management is to be a part of the project, then all related plans should be described in the PP. Pest management objectives (e.g., sustainable control of pests, training of pest managers, or start-up of pest management research programs) should be included in the Logical Framework, with objectively verifiable indicators (e.g., crop damage level assessments, numbers trained) clearly indicated so that progress can be measured. The budget should identify by line items those funds that are earmarked for pest management.

The PP also includes the EA which is done simultaneously with and as part of PP design (see Chapter III). As part of project design, specific pest management recommendations from the EA must be incorporated in the PP. Ideally, if pest management has been considered throughout project design, recommendations will be few and will be easily incorporated into the project.

All projects involving pesticides will formally assess compliance with the EA in all project evaluations.

### **Project Agreement (PROAG)**

Based upon the approved PP, the Project Agreement (PROAG) describes how A.I.D. and the host country government will collaborate on the project. Generally a brief description of the project is followed by discussion of financial arrangements.

A.I.D. makes every effort to ensure that the recipient country's government is made aware of and consents to the proposed pesticides and their use. The PROAG is the appropriate document for describing any proposed use and describing how, based upon the EA, mitigations and alternatives will be used. Involving recipient country representatives on pest management issues early in the project will minimize difficulties at this late stage. Once the PROAG is signed by all parties, the project is ready for implementation.

#### **Annual Budget Submissions (ABS)**

The Annual Budget Submission is prepared by Missions and by Bureaus or Offices in Washington. The bulk of the ABS is made up of tables that summarize the status of accounts and list funding projections. Trends are reflected in the tables, and usually are briefly summarized in comments at the front of the ABS. Depending on the importance of pest management projects in the management unit, it may be appropriate to comment on the level of effort being devoted to such projects—either by identifying funds by line items (e.g., "Pest Management Research," "Safe Use of Pesticides Research") and/or by briefly describing pest management allocations in the preface. The ABS generally provides much of the information that goes into the Congressional Presentation.

#### **Congressional Presentations (CP)**

The Congressional Presentation (CP) is the Agency's annual submission to the Congress that describes funding requirements for the upcoming budget year. The CP contains new project descriptions and is in large part made up of tables. Also, the CP describes directions and priorities in the Agency. Congress is interested in pest management policy in A.I.D.-funded programs. The CP is the crucial document that describes and justifies Agency plans to the Hill. Along with descriptions of sectoral efforts, Missions, Bureaus, and Offices should comment on pest management strategies in Agency programs. For example, discussions of agricultural productivity should clearly describe the approaches to pest management that will be used. Similarly, levels of effort for pest management programs should be easily identified in budget tables.

#### **UMBRELLA PROJECTS**

Many A.I.D. projects are structured so that subprojects such as grants or cooperative agreements will be supported under the project. Frequently the nature of the subprojects is not completely clear when the large umbrella project is being designed. As each subproject is proposed it should be reviewed per Regulation 216 for pest management components, and plans for such a review should be described in the umbrella project's EA. The previous discussion also relates to project amendments and extensions.

#### **NON-PROJECT ASSISTANCE**

When A.I.D. provides funds, credit, or commodities outside of the context of projects, the responsible A.I.D. staff officer should assure that, to the extent possible, assistance for pest management activities is used responsibly and in keeping with A.I.D.'s Environmental Regulations.

A.I.D. has discontinued procurement of pesticides on a non-project basis under the commodity import program, except when the approval of the Administrator is obtained in the cases of emergencies and other extraordinary and compelling circumstances. Pesticides have been eliminated from the list of commodities automatically eligible for A.I.D. financing. Requests for the use of pesticides as part of projects are reviewed on a case-by-case basis (Chapter III) (A.I.D., 1978). Exceptions to this requirement may be granted for research projects, emergencies, and projects in which A.I.D. is considered to be a minor donor (Chapter III).

- 22 -

## CHAPTER V PESTICIDE MANAGEMENT

Much has been written about the classification, toxicity, environmental hazards, and safe handling of pesticides. This chapter does not attempt to provide a complete source of information on any of these topics. It does, however, include some general considerations on safe pesticide management as they relate to A.I.D. policy.

### PESTICIDE CLASSIFICATION

Pesticides include a wide variety of compounds designed to destroy a broad range of pest organisms. Pesticides are classified into different groups using various criteria. The most common ways of classifying pesticides are by target organism, chemistry, formulation, and toxicity.

#### Target Organism

Pesticides can be classified according to the kinds of organisms that they are designed to kill. Using this scheme, pesticides are separated into insecticides, acaricides, herbicides, fungicides, rodenticides, nematocides, molluscicides, and others. Some pesticides belong to more than one group; for example, carbofuran has both insecticidal and nematocidal properties. Methyl bromide is often characterized as a general biocide because it can be used to kill a wide variety of organisms (plants, insects, and microorganisms). Worldwide estimates indicate that the most commonly used pesticides, in descending order, are herbicides, insecticides, and fungicides. Together these groups account for more than 93% of the pesticide market.

#### Chemical Group

Despite the large numbers of products available, most pesticides can be placed in one of a few common chemical groups. For example, the vast majority of insecticides in use today are organophosphates, carbamates, or synthetic pyrethroids. Brief descriptions of the major chemical groups of pesticides, including some of their important characteristics, are presented in Appendix E.

#### Formulation

For the end user, classification based on formulation is possibly more important than chemical classification. Formulation refers to the form in which the pesticide is sold to the user. A formulation is a mixture of an active ingredient (i. e., the component that kills the pest) and several other compounds added to facilitate application. These other ingredients include solvents, carriers, emulsifiers, stickers, and others. Some formulations are sold as solids, such as dusts, granules, and wettable powders, others as liquids, such as emulsifiable concentrates, flowables, and ULV (ultra low volume), and some as gases for fumigation. Brief descriptions of common formulations are provided in Appendix E.

#### Toxicity

An important and useful way in which pesticides are classified is by toxicity to mammals. Mammalian toxicity provides an indication of the relative danger of different products to humans. Toxicity can refer to a pesticide's short-term effects (acute) or long-term effects (chronic). Acute toxicity is typically measured within 24-48 hours after a single dose, whereas chronic toxicity (e. g., carcinogenicity or mutagenicity) is measured over a much longer period and often after repeated daily dosages.

Acute toxicity is further divided into three categories, depending on how the pesticide enters the body: oral, dermal, or inhalation. The dermal route of entry is the most common way persons are occupationally exposed to pesticides.



Toxicity is measured in terms of the average dose needed to kill 50% of a test population of animals (usually mice, rats, or rabbits). This is referred to as LD<sub>50</sub> (lethal dose for 50% of the test population) and is generally expressed in milligrams of pesticide per kilogram of body weight. The lower the LD<sub>50</sub>, the more toxic the pesticide.

The USEPA has divided pesticides into four categories according to their acute oral and dermal toxicities (see Table 1). Category I pesticides are the most toxic and category IV the least toxic. WHO has developed a similar scheme (see Table 2). Note: The USEPA and WHO toxicity classification systems are different, e.g., USEPA category III is not the same as WHO category III.

An important concept is that the mammalian toxicity of a pesticide depends to a great extent on how it is formulated. A pesticide formulation that contains a low percentage of a very toxic active ingredient could be less toxic than a formulation that contains a less toxic active ingredient but at a higher percentage. For example, the acute oral LD<sub>50</sub> for malathion is 1375 mg/kg and for fenitrothion is 800 mg/kg, but a 96% ULV formulation of malathion would be more toxic than a 50% formulation of fenitrothion. The toxicity of a pesticide formulation can be calculated using the following:

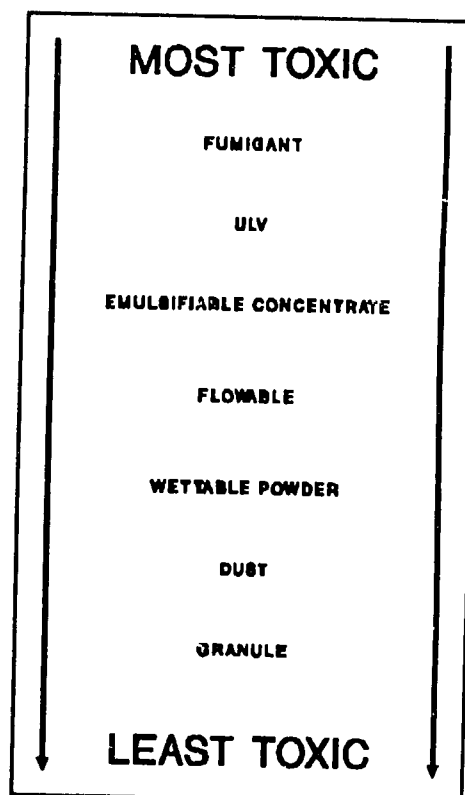
$$LD_{50} \text{ of formulation} = \frac{LD_{50} \text{ of active ingredient} \times 100}{\% \text{ active ingredient in formulation}}$$

Since most accidental pesticide exposure is dermal, the hazards to the user also vary with how well the pesticide is absorbed through the skin. Liquid formulations tend to be absorbed much more rapidly than dry formulations. As a general rule, the hazards to the user decrease according to the scheme presented on the right:

Note: "Inert" ingredients can be hazards as well; thus, the formula above is only an approximation, as it assumes no toxicity associated with the inert ingredients.

#### MONITORING HUMAN EXPOSURE TO PESTICIDES

People who are occupationally exposed to organophosphate pesticides should be tested periodically to determine the extent to which they are being exposed to the pesticide(s). This is done by monitoring the level of an enzyme, acetylcholinesterase (often referred to as cholinesterase), in the blood. Cholinesterase is essential for nerve transmission, which is adversely affected by organophosphate pesticides.



**Table 1. USEPA Labeling Toxicity Categories by Hazard Indicator\***

Hazard Indicators	Toxicity Categories			
	I	II	III	IV
Oral LD <sub>50</sub>	Up to and including 50 mg/kg	From 50 thru 500 mg/kg	From 500 thru 5000 mg/kg	Greater than 5000
Inhalation LD <sub>50</sub>	Up to and including 0.2 mg/liter	From 0.2 thru 2 mg/liter	From 2 thru 20 mg/liter	Greater than 20 mg/liter
Dermal LD <sub>50</sub>	Up to and including 200 mg/kg	From 200 thru 2000	From 2000 thru 20,000	Greater than 20,000
Eye effects	Corrosive; corneal opacity not reversible within 7 days	Corneal opacity reversible within 7 days; persisting for 7 days	No corneal opacity; irritation reversible within 7 days	No irritation
Skin effects	Corrosive	Severe irritation at 72 hours	Moderate irritation at 72 hours	Mild or slight irritation at 72 hours

\* The USEPA has developed additional refinements in its testing requirements and has adjusted these categories in practice to reflect this. For example, the inhalation values in this table are based on a 1-hour exposure, and have been divided by four to reflect 4-hour inhalation exposure (so that category I becomes 0.05 mg/liter for 4-hour exposure, category II becomes from 0.05 to 0.5 mg/liter, etc.). In addition, the duration of the eye observation period now routinely extends to 21 days.

**Table 2. WHO Classification System According to Acute Toxicity**

Class	Hazard Level	Oral Toxicity*		Dermal Toxicity*	
		Solids**	Liquids**	Solids**	Liquids**
Ia	Extremely hazardous	5 or less	20 or less	10 or less	40 or less
Ib	Highly hazardous	5-50	20-200	10-100	40-400
II	Moderately hazardous	50-500	200-2000	100-1000	400-4000
III	Slightly hazardous	over 500	over 2000	over 1000	over 4000

\* Based on LD<sub>50</sub> for the rat (mg/kg body weight)

\*\* The terms "solids" and "liquids" refer to the physical state of the product or formulation being classified.

If properly conducted at periodic intervals, cholinesterase testing can be used to identify persons who are in danger of becoming ill before they show symptoms. Unfortunately, because of differences in the mode of action of various pesticide groups, cholinesterase monitoring is only effective for identifying organophosphate and carbamate poisoning. There are no simple techniques for detecting exposure to other major pesticide groups.

Several methods are available for determining cholinesterase inhibition. A simple pin-prick method, developed for use in the field, provides results within a few minutes. More accurate laboratory testing procedures are also available.

How often to test depends on two factors: 1) the toxicity of the pesticide(s) to which a person is exposed, and 2) the amount of time of exposure. Persons involved in formulation, mixing, and applying pesticides are probably at the highest risk. Truck drivers who transport pesticides but seldom come in direct contact with pesticides are at a somewhat lower risk. The general population is at a very low risk and therefore should not be tested unless an accident occurs that greatly increases their exposure. In general, persons occupationally exposed should be monitored every 1-2 weeks depending on the toxicity of the product they are using. If working with pesticides is seasonal in nature, monitoring should be conducted only during the season of exposure.

Appendix B lists several resource contacts and publications on pesticide intoxication. In particular, it is suggested that Publication No.5, An Agromedical Approach to Pesticide Management: Some Health and Environmental Considerations (available through A.I.D./S&T/AGR) be consulted.

#### USEPA LEGAL CLASSIFICATION

In addition to toxicity categories, the USEPA also separates pesticide formulations into categories based on a risk/benefit analysis. The risks include those to both humans and the environment. The broad categories used by the USEPA are: cancelled, suspended, restricted use, and unclassified.

Cancelled formulations (i.e., banned) are those for which the USEPA has determined that the risks outweigh the benefits under conditions of use in the United States. In some cases all uses of an active ingredient have been cancelled (e.g., BHC or benzene hexachloride), while in other cases certain uses are still permitted.

A pesticide formulation or active ingredient is suspended if it is determined that it may pose an imminent hazard. Use of the pesticide is halted until the USEPA completes a review to determine whether the pesticide should be cancelled.

Restricted use pesticides can be purchased and used only by, or under the supervision of, a state certified pesticide applicator. Certification in the United States is attained by passing a state examination or completing training that complies with minimum federal requirements. The following guidelines have been established to identify pesticides that pose hazards to the user:

##### Restricted for residential and institutional uses if the pesticide:

- as diluted for use, has an acute oral LD<sub>50</sub> of 1500 mg/kg or less;
- as formulated, has an acute dermal LD<sub>50</sub> of 2000 mg/kg or less;
- as formulated, has an acute inhalation LC<sub>50</sub> of 0.5 mg/l or less based on a 4-hour exposure;
- as formulated, is corrosive to the eye or results in corneal involvement or irritation persisting for more than 7 days;
- as formulated, is corrosive to the skin or causes severe irritation at 72 hours;

- when used in accordance with label directions or widespread commonly recognized practices, may cause significant subchronic, chronic, or delayed toxic effects in humans as a result of single or multiple exposures to the product's ingredients or residues.

**Restricted for all other uses (agricultural, vector control, etc.) if the pesticide**

- as formulated, has an acute oral LD<sub>50</sub> of 50 mg/kg or less;
- as formulated, has an acute dermal LD<sub>50</sub> of 200 mg/kg or less;
- as diluted for use, has an acute dermal LD<sub>50</sub> of 16,000 mg/kg or less;
- as formulated, has an acute inhalation LC<sub>50</sub> of 0.05 mg/l, based on a 4-hour exposure;
- as formulated, is corrosive to the eye or causes corneal involvement or irritation persisting for more than 21 days;
- as formulated, is corrosive to the skin;
- when used in accordance with label direction or widespread commonly recognized practices, may cause significant subchronic toxicity, chronic toxicity, or delayed toxic effects in humans as a result of single or multiple exposures to the product's ingredients or residues.

Unclassified pesticides are often referred to as those permitted for "general use." These pesticides are typically less dangerous for the user than restricted use pesticides and can be purchased and used by all segments of society. The use of unclassified pesticides is always "restricted" in a sense, however, by the label instructions; for example, a pesticide may include a statement such as "Do not use this pesticide within 25 feet of any body of water." In the United States, the directions on a pesticide label are considered legally binding, and users who violate them could be subject to civil and/or criminal penalties.

#### **A.I.D. REGULATIONS**

A.I.D.'s policy on pesticide use, established by Regulation 216 (described in Chapter III), does not specifically prohibit the application of restricted use pesticides in A.I.D. projects. The appropriate chemical is determined by following the EA procedures. In general, however, restricted use pesticides will not be approved, particularly if there is evidence that a safer alternative is available or if a reasonable alternative crop exists that does not require a restricted use pesticide. Additionally, A.I.D. guidelines endorse the FAO pesticide guidelines (Appendix F), which, as stated above, do not approve the use of highly toxic pesticides by small farmers or in countries that have a poorly developed regulatory infrastructure.

#### **PESTICIDE REGULATION IN DEVELOPING COUNTRIES**

Pesticide use is almost always associated with some risk to the user and potentially harmful effects on non-target organisms in the environment. Consequently, effective control over pesticide availability and use is required.

The principle method for controlling the types of pesticides available in a country is by: 1) controlling their importation, manufacture, and sale through a mandatory registration process; and 2) enacting legislation regarding in-country manufacturing and formulation. The purpose of registration is to ensure that pesticides, when used according to label directions, will be effective against the target pest yet not pose unacceptable risk to the user, the general public, or the environment. The determination of acceptable risk is subjective, but should be based on an

objective evaluation of the risks and benefits associated with use of the proposed pesticide. The risk/benefit assessment may differ from one country to another. The FAO has developed a set of guidelines for developing appropriate pesticide regulations (see Appendix B, Publication No.2).

A typical mechanism for registering pesticides is to establish a national panel of experts that reviews petitions to import and market specific pesticide products. The panel establishes, either at the outset or gradually, a list of acceptable and unacceptable (banned) pesticides. Developing countries may choose to use or modify lists established by another country. All pesticides should be subject to a review process regardless of whether they are imported or manufactured domestically by the private sector, government agencies, donor organizations, or non-governmental organizations (NGOs). The panel may have the additional task of establishing regulations concerning pesticide labeling, quality control, packaging, storage, transport, disposal, and distribution, and may develop mechanisms for enforcing those regulations.

## **HUMAN SAFETY AND AWARENESS**

One effective method of mitigating human exposure to pesticides is through public awareness. All pesticide-related programs should consider the need for public awareness programs about pest management activities. Such programs can be carried out through the local extension service or the ministry of agriculture (or its equivalent). Large-scale pesticide operations (e.g., locust plague control) may require media coverage to better disseminate information on the control effort. In addition, systematic monitoring for pesticide exposure (e.g., acetylcholinesterase kits for organophosphate and carbamate pesticides) should be strongly encouraged even though safety measures to protect pesticide applicators and handlers are carried out. Systematic monitoring of the exposure levels of handlers and applicators allows project administrators to determine whether to refine the pesticide application procedures and equipment. Also, pesticide exposure monitoring can indicate in a timely manner which workers are at risk of pesticide intoxication.

## **RECOMMENDATIONS FOR HANDLING PESTICIDES SAFELY**

### **Pesticide Application**

- Always read the pesticide label and follow its instructions completely. The label instructs the user about the type of protective clothing to wear and other precautions that will minimize the possibility of negative effects on the user and the environment. Labels should be in the local language(s).
- Wear clean protective clothing and a respirator whenever recommended.
- Never leave pesticides unattended in an unsecured place.
- Never transfer pesticides to containers other than those designed to hold that pesticide.
- Never work alone with pesticides.
- Inspect containers for leaks before manipulating them.
- Keep food, drink, tobacco, and eating utensils away from the work area.
- Never eat, drink, smoke, or rub your eyes when handling pesticides.
- Always have soap and plenty of water available at the work site.
- Thoroughly wash protective clothing after handling pesticides. Wash pesticide-contaminated clothes separately from other clothing. Dispose of any heavily contaminated clothing.

- Workers should immediately stop work and wash if pesticide spills on them.
- Keep unauthorized persons, especially children, away from pesticides.

### **Pesticide Storage**

Following proper procedures in storing pesticides protects the product from deterioration and protects the general public and environment from harmful exposure. Pesticide storage procedures should be posted in storage areas in the local language(s).

Nearly all pesticides have a limited shelf life. Even pesticides properly stored in sealed containers will deteriorate over time. The active ingredient can break down into other products that may or may not have pesticidal activity, or the pesticide formulation can break down, making it impossible to use the product. Deterioration is accelerated by both external climatic elements (high temperature, sunlight, and humidity) and internal corrosion of the container by the pesticide.

Liquid formulations in sealed containers typically have a longer shelf life than dry formulations, but their shelf life may decline rapidly once the container has been opened.

Some general recommendations on selecting a site for a pesticide storage warehouse, characteristics of a good storage facility, and pesticide warehouse management are provided below.

#### The pesticide storage site should

- be far removed from any population centers, both present and future. Site planners should consider urban expansion. Too often, pesticide storage facilities built on the outskirts of a city have been enveloped as the city expands.
- be located in an area not prone to flooding.
- be inaccessible to any nearby surface water source or located in an area that has a high water table.
- afford good access, preferably from more than one side, for delivery trucks and fire-fighting vehicles.
- be shaded by trees, if possible, to help lower the temperature in the warehouse.
- be fenced and posted with warning signs to keep out unauthorized individuals, domestic animals, and wildlife.

#### The pesticide warehouse or storage shed should

- be built of non-flammable materials such as cement blocks or corrugated metal sheeting.
- have floors made of smooth concrete or other impervious material so that pesticide spills will not be adsorbed.
- be well-ventilated, preferably by natural wind flow, to minimize temperature increases and keep fumes from accumulating.
- be surrounded by a ditch to keep any liquid spills from draining away from the warehouse.

- be constructed to allow tight security (locking doors, barred windows).
- be well-lit either by sunlight or electric lights.
- have a water supply for spill decontamination.
- display instructions on managing spills in the local language(s).
- be equipped with spill containment and safety supplies (e.g., shovels, sand, brooms, hoses, fire extinguishers).

**The warehouse should be managed so that**

- A "first in-first out" procedure is followed for all pesticides, to minimize the chance for deterioration of the product and containers.
- Individual products are stored separately, and aisles are located so that all products can be accessed.
- All pesticides are kept on pallets. This allows easier manipulation and keeps containers from contact with moisture on the floor, which leads to more rapid deterioration of containers.
- No food, tobacco, or drinking water is stored in the warehouse.
- No eating, drinking, or smoking is allowed in the warehouse.
- A supply of soap and water for washing is maintained in the warehouse.
- If possible, herbicides are stored separately from insecticides and fungicides, to avoid cross-contamination if herbicides leak or are spilled.

**Pesticide Transport**

Because of their hazardous nature, pesticides must be transported with special care. This may be especially important in developing countries where roads are often in poor condition. Listed below are some guidelines for the transport of pesticides:

- Use well-maintained vehicles to avoid accidents and delays.
- Use open vehicles covered with tarpaulins to decrease any possible build-up of heat or toxic vapors and to protect the pesticide from rain.
- Make sure that drivers are aware of the dangers associated with the materials they are transporting and have the training necessary to handle spills.
- Vehicles transporting pesticides should never be left unattended.
- Containers should be well secured in the bed of the vehicle with ropes, chocks, etc.
- Never transport leaking or badly deteriorated containers; transfer the pesticide to structurally sound containers or place damaged containers in "overpack" drums.



- Make sure that all containers are labeled with appropriate warnings.
- Do not transport food, beverages, animal feed, or clothes with pesticides.
- Load and unload pesticides very carefully to minimize the chance of dropping containers. If no loading ramp or hoist is available, pesticides can be off-loaded by rolling containers onto used tires.
- Thoroughly wash the vehicle after unloading. Any spilled pesticide should be absorbed with sand, sawdust, ash, or dirt and decontaminated with a neutralizing compound such as bleach.

### **Pesticide Spills**

- The type of chemical spilled should be identified as soon as possible, and the source of the spill should be stemmed. All personnel dealing with spills should wear protective clothing, including respirators.
- The dimensions (area and depth) of the chemical spill should be determined. This may require laboratory analyses of soil samples obtained with a soil core sampler.
- Risks of contaminating water, food, fuel, other chemicals, humans, and other organisms should be assessed, and items at risk should be removed, if possible.
- Superficial spills involving organophosphate pesticides can be neutralized using lime. All spills should be isolated as soon as possible. Heavily contaminated materials, including soil, can be disposed of using methods prescribed in the following sections.

### **DISPOSAL OF PESTICIDES AND EMPTY CONTAINERS**

One of the most difficult problems associated with pesticide use is the management of unwanted pesticide and empty containers. "Unwanted pesticide" can refer to the product left over in a spray tank after application, to rinsate from the "triple rinse" procedure (described below), or to obsolete pesticide that can no longer be used because of deterioration or legal restrictions (e.g., the pesticide was banned after it was procured). In addition, all programs that use pesticides must manage the disposal of empty pesticide containers.

In general, the manufacturer of the unwanted pesticide(s) should be contacted for information on the compound prior to planning for specific disposal options. In some cases, the manufacturer may be willing to participate in the disposal or containment of the unwanted stocks.

#### **Empty Containers**

Pesticide containers can never be completely cleansed of pesticide residues. Therefore they should never be used for storing food or water. Avoiding reuse is a particularly acute problem in developing countries where any kind of container, especially high-quality steel drums, is in high demand for storage and construction. Only two procedures can ensure that empty pesticide containers are not used for food or drinking water: 1) render the containers unusable or 2) return them to a formulation facility for reuse.

Following are some general procedures for dealing with empty containers.

**Draining**--Drain the container for at least 30 seconds into the spray tank or other container (for liquids).

**Cleaning--Clean the container by one of two methods:**

- o Triple rinsing with an appropriate solvent. This procedure involves adding a solvent equal to approximately 10% of the container's volume. The solvent should be water for water soluble formulations (e.g., emulsifiable concentrates and flowables) or an organic solvent, such as diesel fuel, for ULV and other petroleum-based formulations. After the solvent is added, the container is agitated and the rinsate drained into an appropriate recipient (spray tank or other). This procedure is repeated three times. The triple rinse has the disadvantage of resulting in large quantities of dilute pesticide, which must be considered a hazardous waste and handled appropriately.
- o Treating the empty container with a combination of chemicals to neutralize the pesticide residues. For most organophosphate and carbamate insecticides, an alkaline substance such as lye or bleach helps break down most of the remaining pesticide. Specific recommendations are available from pesticide manufacturers.

**Disposal--Dispose of the container by one of three methods:**

- o Burial. Containers (metal, glass, or paper) should be buried in a shallow pit (2 feet deep) at a site that meets the criteria for a pesticide storage site, listed above. Burial in soil that contains a high proportion of clay and organic matter is best because it decreases leaching and accelerates microbial breakdown. The site should be fenced, with warning signs posted. Geologic and hydrologic evaluation of potential burial sites should be conducted before the construction of burial pits to ensure that conditions are appropriate for this method of disposal. Accurate records should be kept of the number and kinds of containers buried at a particular site.
- o Return the container to a pesticide formulation facility. This option should be selected only after a careful evaluation has shown that the facility will properly recondition containers before reuse. Reconditioning includes thorough cleaning, relining, painting, and relabeling. Normally this option will be available only for large steel drums.
- o Sell the containers for recycling. This option may be available for steel containers in certain countries. Smelting temperatures, which normally reach 2000° F, will consume any remaining pesticide. Containers should be pierced and crushed prior to recycling.

**Destroying the container--**Containers can be destroyed by piercing, crushing, or (if glass) breaking. Options for the ultimate disposal of containers are still being explored by A.I.D., other donors and international organizations.

**Unwanted Pesticide**

Unwanted pesticide comes in two general forms: (1) quantities left over after application or container rinsing and (2) obsolete pesticides that are no longer of use. Pesticides left over in the spray tank after application and rinsates can be dealt with fairly easily. The pesticide can be sprayed out in the same area that received the application or in an area similar to it, or, if undiluted, it can be returned to the original container for storage until later use. Note: Rinsates that are based on organic solvents may be phytotoxic (i.e., toxic to plants).

Disposal of large quantities of obsolete pesticide is a more difficult and potentially dangerous problem. To minimize the possibility of such disposal problems, never plan to purchase or store more pesticide than will be needed during one control season.

Disposal of obsolete pesticides can be adequately addressed only on a case-by-case basis. Nevertheless, following are some general issues for consideration:

- Why is the pesticide unwanted? This could be due to either deterioration or regulatory measures (banning its use in a country). If the pesticide is unwanted because of deterioration, how has this been ascertained? Has an analysis been conducted to determine whether the product can still be used.? If not, this may be a useful first step.
- If the pesticide is still usable, is there an alternate use for it? For example, can a pesticide imported for locust control be appropriately used against some other pest after the locust threat has abated?
- What is the condition of the containers? The situation is more urgent if the containers are showing signs of losing structural integrity than if they are still intact. An interim measure to prevent leakage from deteriorating containers is to repackage the pesticide in new containers or place the old containers in "overpack" barrels.
- How much and what kind(s) of pesticide(s) are unwanted? A detailed inventory is needed before appropriate disposal plans can be developed.

The disposal of obsolete or unwanted pesticides is a complex and potentially hazardous undertaking that can also be expensive if quantities are large. Again, each disposal problem is unique, and the capabilities and facilities for disposal vary among countries. Always seek expert advice whenever A.I.D. is considering involvement in a pesticide disposal operation. The USEPA has provided technical assistance to A.I.D. on pesticide disposal on several occasions. An EA will be required before A.I.D. involvement can be initiated. Following are brief descriptions of some of the options that may be available for pesticide disposal (the ordering of the options is not an indication of preference).

#### Dedicated Incinerator

High temperature incineration at a facility specially built for burning hazardous waste is one method for disposing of large quantities of unwanted pesticides. Few developing countries have dedicated hazardous waste incinerators, however, and such facilities are very expensive to build. It may be possible to transport unwanted pesticides to an incinerator in another country, although there may be legal constraints on the movement of hazardous waste across borders.

#### Return to a Formulation Facility for Reformulation

Reformulating a pesticide may be a valid, though untried, alternative in certain limited situations, particularly if the country where the pesticide is located has a pesticide formulation facility. In principle, the formulation facility could transform the product into a more useful form; for example, a ULV formulation procured for locust control could be reformulated into an emulsifiable concentrate for use in vegetable gardening. It may also be possible to transport the pesticide to another country for reformulation. This may be difficult, however, especially for landlocked countries, due to legal constraints on transport, cited above.

#### Incineration in a Cement Kiln

Experiments have shown that pesticides can be decomposed by burning (as fuel) in a modified cement kiln. The advantage of this method is that many countries already have cement kilns. The cement factory must be a modern facility in good working order, however, before this option can be considered. In late 1989, A.I.D. modified a cement kiln in northern Pakistan and burned unwanted pesticides, including dieldrin, with emissions rates

that approached those set by the USEPA. Further testing of this method may result in an environmentally acceptable method for pesticide disposal. A technical report on this experiment is available from the Office of U.S. Foreign Disaster Assistance (OFDA) in AID/W.

#### Land Farming

Land farming refers to applying the pesticide to unused land. This option can be used only for pesticides that are rapidly broken down by the combined action of sunlight (photodecomposition) and soil microbes. In most cases, land farming should be considered a last-resort option. The procedure requires that safety precautions be built into the operation and identified in a comprehensive EA.

#### Biodegradation

Biodegradation refers to the use of microorganisms to break down a pesticide into non-toxic compounds. At present, biodegradation is primarily used for on-farm disposal of excess diluted pesticide and rinsates. Microbial action is favored by a high organic content at the disposal site. Nitrogen fertilizers, animal manure, and compost can be added to increase microbial activity. Future work is likely to focus on artificially selecting or genetically engineering organisms to more effectively decompose pesticides.

#### Chemical Decomposition

Experimental work has been conducted on chemical detoxification of pesticides. This technique is still in a research phase.

## CHAPTER VI EMERGENCY OPERATIONS AND DISASTER DECLARATIONS

Many pest species go through periodic changes in abundance. Typically, these oscillations in density are in response to changes in the climate or other external factors. When rainfall is sufficient in certain critical geographic areas, populations increase in response to favorable ecological conditions. Major plagues occur when favorable conditions coincide temporally and spatially with traditional breeding areas for two or three consecutive years. In periods of high density, the threat of damage to crops, livestock, wildlife, or humans can reach emergency proportions; desert locusts in Africa and Asia are a good example of this phenomenon.

Introduction of a pest to an area of the world it did not formerly inhabit can also pose a serious threat to the welfare of the area's inhabitants. If the potential for negative impact is determined to be high, an effort to eradicate the pest before it becomes widely distributed may be the most sensible action. This could also be considered an emergency operation.

The objective of this chapter is to provide guidance to A.I.D. Missions and Bureaus in emergency situations such as those described above. The majority of A.I.D. acute emergency pest management activities have involved grasshoppers and locusts in Africa and Asia. The experiences gained from these control activities and the policies governing A.I.D. operations in emergency situations have application to other pest emergencies. This chapter summarizes some of the information contained in A.I.D. Locust/Grasshopper Management Operations Guidebook (Appendix B, Publication No.17), and that document should be referred to for greater detail.

### DEFINITIONS

#### Pest Emergency

A pest infestation is determined to be an emergency when the threat of damage is great and when the ability of the host country to deal effectively with the problem is surpassed or is likely to be surpassed in the near future. The decision of whether any given infestation is an emergency is technical in nature and depends on the biology of the pest, the potential for injury to crops, livestock, humans, or wildlife, and the ability of the affected country or countries to handle the problem effectively.

#### Pest Disaster

The term disaster is restricted to situations where the U.S. ambassador of a country, in response to the host country's request and in consultation with A.I.D. officials and other sources of information, has determined that the urgency of a pest situation merits declaration of a disaster. A disaster determination is made in response to the following:

1. a violent act of nature, such as flood, hurricane, fire, earthquake, volcanic eruption, or landslide;
2. an act of man, such as civil strife, border conflict, riot, or displacement of large numbers of people;
3. an accident of serious proportions, such as an explosion or fire;
4. a slowly developing catastrophe caused by nature or human neglect, or both, such as drought, famine, or epidemic; or
5. a potential calamity, including ecological threats, menacing lives and property and requiring prevention or monitoring measures.

Pest disasters could be included under criteria 4 and 5. (Chapter 3, A.I.D. Handbook 8).

## FORECASTING DISASTERS/EMERGENCIES

Today's surveillance systems (e.g., greenness/biomass indicators, computer modeling of pest populations, crop-yield forecasting, and information acquired from satellite imagery), in conjunction with traditional survey methods, can help us predict emergencies that could develop into catastrophes. In the future it should become increasingly possible to respond to an emerging pest problem before it becomes a disaster, thereby avoiding undue harm to the environment and waste of resources. A.I.D. should encourage host countries to conduct timely and systematic pest surveys, supplemented by appropriate modern technology, to forecast and prevent impending pest emergencies and disasters.

## PEST CONTROL OPERATIONS

The primary responsibility for managing pest infestations rests with the government within the affected country. In many countries a national crop protection service operates under the ministry of agriculture (or its equivalent) to address pest infestations affecting agricultural crops. Pests of livestock are generally handled by animal health personnel (also generally within the ministry of agriculture), while human health vectors are the responsibility of units within the ministry of health. These services are sometimes supported by regional organizations that provide services to member countries.

When the host country government is no longer able to respond effectively to a pest problem and requests assistance from the donor community, the U.S. government (USG) may support preparedness or control operations on an emergency or non-emergency basis. Under the authority of A.I.D. Handbook 8, the Office of U.S. Foreign Disaster Assistance (OFDA) will provide funds to countries suffering serious pest infestation when a disaster determination is made by the U.S. ambassador. A.I.D. Bureaus or Missions may provide support for bilateral or regional pest management programs on a non-emergency basis.

### Foreign Disaster Relief

In the event of a declared disaster, as defined in A.I.D. Handbook 8, the United States may provide emergency relief assistance as a humanitarian service consistent with U.S. foreign policy goals. Assistance shall, to the greatest extent possible, reach those most in need of relief and rehabilitation. U.S. assistance supports and encourages host country participation in disaster preparedness activities and supplements rather than replaces host country disaster relief resources.

Normally, disaster relief can be made available during the initial 60-day period following the sudden onset of a disaster. During this period, the Chief of Mission may commit up to \$25,000. Commitments in excess of the initial \$25,000 and/or extension of the disaster phase beyond 60 days require prior approval of OFDA. Missions should submit detailed budgets and Action Plans for OFDA review. OFDA assistance to pest control programs may consist of technical assistance, contracting of aircraft, and the purchase of pesticides and equipment.

### Response Coordination

A.I.D. gives a high priority to joint donor participation and international coordination of all aspects of pest control programs. A.I.D. will participate in host country planning committees with other donor and international organizations and host country officials, as well as in donor meetings sponsored by FAO or other international organizations coordinating pest control efforts. A.I.D. will provide resources in response to country action plans approved by Country Coordinating Committees. The U.S. government may also make contributions to international organizations handling pest control programs. Contributions to an international organization do not preclude the USG from providing relief for the same disaster on a bilateral basis.

### **Continuing Crop Protection Responsibility**

A.I.D. believes that, over the long term, national and regional crop protection groups must ultimately address the pest control problems in developing countries.

A.I.D. will provide medium to long-term bilateral resources from geographic Bureaus or Mission funds, if available, for host country institutional development when A.I.D. operational plans demonstrate that marginal contributions to specifically identified activities will increase the host country's or regional organization's ability to handle pest control. A.I.D.'s support for this type of institution building follows the normal process for project development.

### **USG Environmental Regulations**

Disaster and emergency assistance programs for pest control often involve the procurement and use of pesticides. A.I.D. requires that these programs adhere to Regulation 216 in the choice, use, and handling of pesticides. In emergency or disaster situations, a waiver to Regulation 216's requirement for an EA may be granted; however, it is A.I.D.'s policy that an EA will be started immediately and its recommendations incorporated into the relief operation as soon as they are identified. In the case of grasshopper/locust outbreaks in Africa and Asia, a Programmatic Environmental Assessment (PEA) was prepared and approved within A.I.D. to guide A.I.D. assistance, including the selection of appropriate pesticides.

In general, only pesticides registered for use by the USEPA are recommended. Also, to the extent possible, pesticides should be purchased from U.S. sources. Any Mission planning to provide future assistance for locust and grasshopper control must prepare a country-specific EA or supplemental (to the PEA) EA prior to approval of any control programs. EAs exist for locust and grasshopper control in Morocco, Pakistan, and Tunisia, and for screwworm prevention in Egypt. Supplemental grasshopper/locust EAs are expected to be completed for Chad, Mali, Niger, Mauritania, Senegal, Cameroon, Burkina Faso, and Sudan.

Missions that become involved in programs that require the purchase or use of pesticides should become familiar with the USG regulations on pesticides as soon as possible after a potential disaster has been identified (see Chapters I and III). Pesticide use, storage, disposal, training of applicators, and the provision of protective clothing must be considered at the outset of the decision to provide emergency assistance (see Chapter V for additional information on pesticide management).

### **Environmental Impact**

A.I.D. policy on the use of pesticides, as discussed in Chapter I, is to: 1) strengthen the host country's capacity to appreciate and evaluate the potential environmental effects of the pesticides; 2) select and implement measures to manage the environmental effects effectively; and 3) promote IPM to the maximum extent possible.

A.I.D. will support pesticide residue testing and analysis to evaluate the environmental effects of pesticides used in pest control operations. Environmental safeguards must be integrated into all pest control operations, especially emergency pest control operations, from inception to the end.

### **Avoiding Excess Pesticide Stocks**

During emergency situations, it is often difficult to determine the exact quantities of resources needed to meet the emergency. This is particularly true for pest infestations, which can rapidly increase or decrease in importance. A.I.D. policy discourages the stockpiling of pesticides for emergency operations. Instead, A.I.D. encourages the setting up of "pesticide banks" through prior arrangements with manufacturers. Pesticide banks are a means of guaranteeing the availability of specific pesticides for delivery on short notice. The principle is to avoid--to the extent possible--speculative pre-positioning of large quantities of pesticides in the outbreak region. This

approach is amply supported by a past history of large quantities of obsolete pesticides remaining from earlier campaigns, which also raises the problem of disposal.

A.I.D. policy also encourages host country governments to avoid storing more pesticide than can be used in one season's control campaign. Missions should explore the willingness of the host country government to donate unused pesticides to neighboring countries in need or to consider alternate applications within the country, according to label directions.

## **GUIDELINES FOR ACTION IN PEST DISASTERS**

1. **Prepare a disaster determination.** The disaster determination must be prepared before any OFDA funds can be made available to the country. A disaster determination should contain the specific information required by OFDA (available in A.I.D. Handbook 8).

2. **Assign an action/project manager.** Initiate emergency operations procedures such as reassignment of additional staff, establishment of a filing system, and request for a shorter cable approval process. Organize a mission disaster committee following the Mission disaster plan. Members may be representatives from the director's office, a technical office, a management office, the controller's office, and the program office.

The committee should address the following questions:

- Are the Mission's resources adequate?
- What external assistance is needed to manage the program effectively (entomologist, logistician, coordinator)?

3. **Develop a budget and Plan of Action for submission to OFDA.** If dollar values are unknown, indicate the kinds of services and commodities required. The possibility of using local currency for disaster programs can be considered.

4. **Establish procedures for Mission management of finances and funds disbursement.**

5. **Discuss the type and formulation of pesticides currently in the country and propose the choice of pesticide for procurement based on the PEA or other A.I.D. guidance.** To achieve the most effective mobilization and allocation of resources within the donor community, note the cable 88 STATE 339983 (18 Oct 88) on "Further guidance on participation in locust control campaigns that may utilize non-approval pesticides" (Appendix B, Publication No.22)

6. **Decide who will procure the needed commodities--the Mission, OFDA, the host country, or another mechanism.** In disaster situations, OFDA can procure and ship commodities very rapidly.

7. **Initiate numbered situation reports to be submitted regularly to AID/W.** OFDA should be designated as the action addressee, with information copies to other interested offices (Geographic Bureau Technical Resources Divisions). Cooperating European capitals (e.g., Rome for FODAG, Paris for Club du Sahel, Brussels for USEC, Abidjan for REDSO and APHIS), neighboring countries and other potentially affected Missions should also be included in the distribution. The reports should contain the following information:

- Recent information concerning movements and control operations
- Logistic operations



- Finances
- Donor coordination/pledges

8. **Maintain records.** Maintain records of the arrivals/ departures of technical assistance teams, the dates and contents of significant decisions, the general chronology of events, and the contributions of all donors. These records will be useful in preparing a final report for OFDA, which should include a section on success, failures, and lessons learned.

9. **Make Mission resources available as appropriate, especially for short-term technical assistance.** Mission resources include vehicles, camping equipment, international and internal travel arrangements and clearances, interpreting/ translating services, maps, and secretarial services.

10. **Obtain briefing materials on the pest situation to facilitate Mission orientation to the problem.**

11. **Use the telephone as necessary to ensure prompt disaster response.** All information communications should be confirmed by cable, however.

12. **Plan for the following activities:** survey, procurement, personnel, transport, equipment, field communications, control activities, customs clearance, training, funding, and environmental impact assessment and evaluation. Environmental impact assessments should be in place prior to assistance implementation, or the process could be delayed.

13. **Develop an organizational chart.** Delineate lines of responsibility within the Mission.

14. **Establish a logistics plan, a field support plan, and communications systems.**

15. **Plan for communications media coverage to educate the public about the program.** Communities near the area(s) of operations should be particularly aware of needed safety precautions.

## References Cited

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**Appendix A**  
**Regulation 216**

## PART 216—ENVIRONMENTAL PROCEDURES

### Sec.

- 216.1 Introduction.
- 216.2 Applicability of procedures.
- 216.3 Procedures.
- 216.4 Private applicants.
- 216.5 Endangered species.
- 216.6 Environmental assessments.
- 216.7 Environmental impact statements.
- 216.8 Public hearings.
- 216.9 Bilateral and multi-lateral studies and concise reviews of environmental issues.
- 216.10 Records and reports.

**AUTHORITY:** 42 U.S.C.4332; 22 U.S.C. 2381.

**SOURCE:** 41 FR 26913, June 30, 1976, unless otherwise noted.

### § 216.1 Introduction.

(a) *Purpose.* In accordance with sections 118(b) and 621 of the Foreign Assistance Act of 1961, as amended, (the FAA) the following general procedures shall be used by A.I.D. to ensure that environmental factors and values are integrated into the A.I.D. decision making process. These procedures also assign responsibility within the Agency for assessing the environmental effects of A.I.D.'s actions. These procedures are consistent with Executive Order 12114, issued January 4, 1979, entitled Environmental Effects Abroad of Major Federal Actions, and the purposes of the National Environ-

mental Policy Act of 1970, as amended (42 U.S.C. 4371 et seq.) (NEPA). They are intended to implement the requirements of NEPA as they effect the A.I.D. program.

(b) *Environmental Policy.* In the conduct of its mandate to help upgrade the quality of life of the poor in developing countries, A.I.D. conducts a broad range of activities. These activities address such basic problems as hunger, malnutrition, overpopulation, disease, disaster, deterioration of the environment and the natural resource base, illiteracy as well as the lack of adequate housing and transportation. Pursuant to the FAA, A.I.D. provides development assistance in the form of technical advisory services, research, training, construction and commodity support. In addition, A.I.D. conducts programs under the Agricultural Trade Development and Assistance Act of 1954 (Pub. L. 480) that are designed to combat hunger, malnutrition and to facilitate economic development. Assistance programs are carried out under the foreign policy guidance of the Secretary of State and in cooperation with the governments of sovereign states. Within this framework, it is A.I.D. policy to:

(1) Ensure that the environmental consequences of A.I.D.-financed activities are identified and considered by A.I.D. and the host country prior to a

final decision to proceed and that appropriate environmental safeguards are adopted;

(2) Assist developing countries to strengthen their capabilities to appreciate and effectively evaluate the potential environmental effects of proposed development strategies and projects, and to select, implement and manage effective environmental programs;

(3) Identify impacts resulting from A.I.D.'s actions upon the environment, including those aspects of the biosphere which are the common and cultural heritage of all mankind; and

(4) Define environmental limiting factors that constrain development and identify and carry out activities that assist in restoring the renewable resource base on which sustained development depends.

(c) *Definitions*—(1) *CEQ Regulations*. Regulations promulgated by the President's Council on Environmental Quality (CEQ) (FEDERAL REGISTER, Volume 43, Number 230, November 29, 1978) under the authority of NEPA and Executive Order 11514, entitled Protection and Enhancement of Environmental Quality (March 5, 1970) as amended by Executive Order 11991 (May 24, 1977).

(2) *Initial Environmental Examination*. An Initial Environmental Examination is the first review of the reasonably foreseeable effects of a proposed action on the environment. Its function is to provide a brief statement of the factual basis for a Threshold Decision as to whether an Environmental Assessment or an Environmental Impact Statement will be required.

(3) *Threshold Decision*. A formal Agency decision which determines, based on an Initial Environmental Examination, whether a proposed Agency action is a major action significantly affecting the environment.

(4) *Environmental Assessment*. A detailed study of the reasonably foreseeable significant effects, both beneficial and adverse, of a proposed action on the environment of a foreign country or countries.

(5) *Environmental Impact Statement*. A detailed study of the reasonably foreseeable environmental impacts, both positive and negative, of a

proposed A.I.D. action and its reasonable alternatives on the United States, the global environment or areas outside the jurisdiction of any nation as described in § 216.7 of these procedures. It is a specific document having a definite format and content, as provided in NEPA and the CEQ Regulations. The required form and content of an Environmental Impact Statement is further described in § 216.7 *infra*.

(6) *Project Identification Document (PID)*. An internal A.I.D. document which initially identifies and describes a proposed project.

(7) *Program Assistance Initial Proposal (PAIP)*. An internal A.I.D. document used to initiate and identify proposed non-project assistance, including commodity import programs. It is analogous to the PID.

(8) *Project Paper (PP)*. An internal A.I.D. document which provides a definitive description and appraisal of the project and particularly the plan or implementation.

(9) *Program Assistance Approval Document (PAAD)*. An internal A.I.D. document approving non-project assistance. It is analogous to the PP.

(10) *Environment*. The term environment, as used in these procedures with respect to effects occurring outside the United States, means the natural and physical environment. With respect to effects occurring within the United States see § 216.7(b).

(11) *Significant Effect*. With respect to effects on the environment outside the United States, a proposed action has a significant effect on the environment if it does significant harm to the environment.

(12) *Minor Donor*. For purposes of these procedures, A.I.D. is a minor donor to a multidonor project when A.I.D. does not control the planning or design of the multidonor project and either (i) A.I.D.'s total contribution to the project is both less than \$1,000,000 and less than 25 percent of the estimated project cost, or (ii) A.I.D.'s total contribution is more than \$1,000,000 but less than 25 percent of the estimated project cost and the environmental procedures of the donor in control of the planning or design of the project are followed, but only if the

A.I.D. Environmental Coordinator determines that such procedures are adequate.

[45 FR 70244, Oct. 23, 1980]

**§ 216.2 Applicability of procedures.**

(a) *Scope.* Except as provided in § 216.2(b), these procedures apply to all new projects, programs or activities authorized or approved by A.I.D. and to substantive amendments or extensions of ongoing projects, programs, or activities.

(b) *Exemptions.* (1) Projects, programs or activities involving the following are exempt from these procedures:

- (i) International disaster assistance;
- (ii) Other emergency circumstances; and
- (iii) Circumstances involving exceptional foreign policy sensitivities.

(2) A formal written determination, including a statement of the justification therefore, is required for each project, program or activity for which an exemption is made under paragraphs (b)(1)(ii) and (iii) of this section, but is not required for projects, programs or activities under paragraph (b)(1)(i) of this section. The determination shall be made either by the Assistant Administrator having responsibility for the program, project or activity, or by the Administrator, where authority to approve financing has been reserved by the Administrator. The determination shall be made after consultation with CEQ regarding the environmental consequences of the proposed program, project or activity.

(c) *Categorical Exclusions.* (1) The following criteria have been applied in determining the classes of actions including in § 216.2(c)(2) for which an Initial Environmental Examination, Environmental Assessment and Environmental Impact Statement generally are not required:

(i) The action does not have an effect on the natural or physical environment;

(ii) A.I.D. does not have knowledge of or control over, and the objective of A.I.D. in furnishing assistance does not require, either prior to approval of financing or prior to implementation of specific activities, knowledge of or

control over, the details of the specific activities that have an effect on the physical and natural environment for which financing is provided by A.I.D.;

(iii) Research activities which may have an affect on the physical and natural environment but will not have a significant effect as a result of limited scope, carefully controlled nature and effective monitoring.

(2) The following classes of actions are not subject to the procedures set forth in § 216.3, except to the extent provided herein:

(i) Education, technical assistance, or training programs except to the extent such programs include activities directly affecting the environment (such as construction of facilities, etc.);

(ii) Controlled experimentation exclusively for the purpose of research and field evaluation which are confined to small areas and carefully monitored;

(iii) Analyses, studies, academic or research workshops and meetings;

(iv) Projects in which A.I.D. is a minor donor to a multidonor project and there is no potential significant effects upon the environment of the United States, areas outside any nation's jurisdiction or endangered or threatened species or their critical habitat;

(v) Document and information transfers;

(vi) Contributions to international, regional or national organizations by the United States which are not for the purpose of carrying out a specifically identifiable project or projects;

(vii) Institution building grants to research and educational institutions in the United States such as those provided for under section 122(d) and Title XII of Chapter 2 of Part I of the FAA (22 USCA 2151 p. (b) 2220a. (1979));

(viii) Programs involving nutrition, health care or population and family planning services except to the extent designed to include activities directly affecting the environment (such as construction of facilities, water supply systems, waste water treatment, etc.)

(ix) Assistance provided under a Commodity Import Program when, prior to approval, A.I.D. does not have

knowledge of the specific commodities to be financed and when the objective in furnishing such assistance requires neither knowledge, at the time the assistance is authorized, nor control, during implementation, of the commodities or their use in the host country.

(x) Support for intermediate credit institutions when the objective is to assist in the capitalization of the institution or part thereof and when such support does not involve reservation of the right to review and approve individual loans made by the institution;

(xi) Programs of maternal or child feeding conducted under Title II of Pub. L. 480;

(xii) Food for development programs conducted by food recipient countries under Title III of Pub. L. 480, when achieving A.I.D.'s objectives in such programs does not require knowledge of or control over the details of the specific activities conducted by the foreign country under such program;

(xiii) Matching, general support and institutional support grants provided to private voluntary organizations (PVOs) to assist in financing programs where A.I.D.'s objective in providing such financing does not require knowledge of or control over the details of the specific activities conducted by the PVO;

(xiv) Studies, projects or programs intended to develop the capability of recipient countries to engage in development planning, except to the extent designed to result in activities directly affecting the environment (such as construction of facilities, etc.); and

(xv) Activities which involve the application of design criteria or standards developed and approved by A.I.D.

(3) The originator of a project, program or activity shall determine the extent to which it is within the classes of actions described in paragraph (c)(2) of this section. This determination shall be made in writing and be submitted with the PID, PAIP or comparable document. This determination, which must include a brief statement supporting application of the exclusion shall be reviewed by the Bureau Environmental Officer in the same manner as a Threshold Decision under § 216.3(a)(2) of these proce-

dures. Notwithstanding paragraph (c)(2) of this section, the procedures set forth in § 216.3 shall apply to any project, program or activity included in the classes of actions listed in paragraph (c)(2) of this section, or any aspect or component thereof, if at any time in the design, review or approval of the activity it is determined that the project, program or activity, or aspect or component thereof, is subject to the control of A.I.D. and may have a significant effect on the environment.

(d) *Classes of Actions Normally Having a Significant Effect on the Environment.* (1) The following classes of actions have been determined generally to have a significant effect on the environment and an Environmental Assessment or Environmental Impact Statement, as appropriate, will be required:

(i) Programs of river basin development;

(ii) Irrigation or water management projects, including dams and impoundments;

(iii) Agricultural land leveling;

(iv) Drainage projects;

(v) Large scale agricultural mechanization;

(vi) New lands development;

(vii) Resettlement projects;

(viii) Penetration road building or road improvement projects;

(ix) Powerplants;

(x) Industrial plants;

(xi) Potable water and sewerage projects other than those that are small-scale.

(2) An Initial Environmental Examination normally will not be necessary for activities within the classes described in § 216.2(d), except when the originator of the project believes that the project will not have a significant effect on the environment. In such cases, the activity may be subjected to the procedures set forth in § 216.3.

(e) *Pesticides.* The exemptions of paragraph (b)(1) of this section and the categorical exclusions of paragraph (c)(2) of this section are not applicable to assistance for the procurement or use of pesticides.

(45 FR 70244, Oct. 23, 1980)

## § 216.3 Procedures.

(a) *General procedures*—(1) *Preparation of the Initial Environmental Examination.* Except as otherwise provided, an Initial Environmental Examination is not required for activities identified in § 216.2(b)(1), (c) (2), and (d). For all other A.I.D. activities described in § 216.2(a) an Initial Environmental Examination will be prepared by the originator of an action. Except as indicated in this section, it should be prepared with the PID or PAIP. For projects including the procurement or use of pesticides, the procedures set forth in paragraph (b) of this section will be followed, in addition to the procedures in this paragraph. Activities which cannot be identified in sufficient detail to permit the completion of an Initial Environmental Examination with the PID or PAIP, shall be described by including with the PID or PAIP: (i) An explanation indicating why the Initial Environmental Examination cannot be completed; (ii) an estimate of the amount of time required to complete the Initial Environmental Examination; and (iii) a recommendation that a Threshold Decision be deferred until the Initial Environmental Examination is completed. The responsible Assistant Administrator will act on the request for deferral concurrently with action on the PID or PAIP and will designate a time for completion of the Initial Environmental Examination. In all instances, except as provided in paragraph (a)(7) of this section, this completion date will be in sufficient time to allow for the completion of an Environmental Assessment or Environmental Impact Statement, if required, before a final decision is made to provide A.I.D. funding for the action.

(2) *Threshold decision.* (i) The Initial Environmental Examination will include a Threshold Decision made by the officer in the originating office who signs the PID or PAIP. If the Initial Environmental Examination is completed prior to or at the same time as the PID or PAIP, the Threshold Decision will be reviewed by the Bureau Environmental Officer concurrently with approval of the PID or PAIP. The Bureau Environmental Of-

ficer will either concur in the Threshold Decision or request reconsideration by the officer who made the Threshold Decision, stating the reasons for the request. Differences of opinion between these officers shall be submitted for resolution to the Assistant Administrator at the same time that the PID is submitted for approval.

(ii) An Initial Environmental Examination, completed subsequent to approval of the PID or PAIP, will be forwarded immediately together with the Threshold Determination to the Bureau Environmental Officer for action as described in this section.

(iii) A Positive Threshold Decision shall result from a finding that the proposed action will have a significant effect on the environment. An Environmental Impact Statement shall be prepared if required pursuant to § 216.7. If an impact statement is not required, an Environmental Assessment will be prepared in accordance with § 216.6. The cognizant Bureau or Office will record a Negative Determination if the proposed action will not have a significant effect on the environment.

(3) *Negative Declaration.* The Assistant Administrator, or the Administrator in actions for which the approval of the Administrator is required for the authorization of financing, may make a Negative Declaration, in writing, that the Agency will not develop an Environmental Assessment or an Environmental Impact Statement regarding an action found to have a significant effect on the environment when (i) a substantial number of Environmental Assessments or Environmental Impact Statements relating to similar activities have been prepared in the past, if relevant to the proposed action, (ii) the Agency has previously prepared a programmatic Statement or Assessment covering the activity in question which has been considered in the development of such activity, or (iii) the Agency has developed design criteria for such an action which, if applied in the design of the action, will avoid a significant effect on the environment.

(4) *Scope of Environmental Assessment or Impact Statement*—(i) *Proce-*



*ture and Content.* After a Positive Threshold Decision has been made, or a determination is made under the pesticide procedures set forth in paragraph (b) of this section that an Environmental Assessment or Environmental Impact Statement is required, the originator of the action shall commence the process of identifying the significant issues relating to the proposed action and of determining the scope of the issues to be addressed in the Environmental Assessment or Environmental Impact Statement. The originator of an action within the classes of actions described in § 216.2(d) shall commence this scoping process as soon as practicable. Persons having expertise relevant to the environmental aspects of the proposed action shall also participate in this scoping process. (Participants may include but are not limited to representatives of host governments, public and private institutions, the A.I.D. Mission staff and contractors.) This process shall result in a written statement which shall include the following matters:

(a) A determination of the scope and significance of issues to be analyzed in the Environmental Assessment or Impact Statement, including direct and indirect effects of the project on the environment.

(b) Identification and elimination from detailed study of the issues that are not significant or have been covered by earlier environmental review, or approved design considerations, narrowing the discussion of these issues to a brief presentation of why they will not have a significant effect on the environment.

(c) A description of (1) the timing of the preparation of environmental analyses, including phasing if appropriate, (2) variations required in the format of the Environmental Assessment, and (3) the tentative planning and decision making schedule; and

(d) A description of how the analysis will be conducted and the disciplines that will participate in the analysis.

(ii) These written statements shall be reviewed and approved by the Bureau Environmental Officer.

(iii) *Circulation of Scoping Statement.* To assist in the preparation of

an Environmental Assessment, the Bureau Environmental Office may circulate copies of the written statement, together with a request for written comments, within thirty days, to selected federal agencies if that Officer believes comments by such federal agencies will be useful in the preparation of an Environmental Assessment. Comments received from reviewing federal agencies will be considered in the preparation of the Environmental Assessment and in the formulation of the design and implementation of the project, and will, together with the scoping statement, will be included in the project file.

(iv) *Change in Threshold Decision.* If it becomes evident that the action will not have a significant effect on the environment (i.e., will not cause significant harm to the environment), the Positive Threshold Decision may be withdrawn with the concurrence of the Bureau Environmental Officer. In the case of an action included in § 216.2(d)(2), the request for withdrawal shall be made to the Bureau Environmental Officer.

(5) *Preparation of Environmental Assessments and Environmental Impact Statement.* If the PID or PAIP is approved, and the Threshold Decision is positive, or the action is included in § 216.2(d), the originator of the action will be responsible for the preparation of an Environmental Assessment or Environmental Impact Statement as required. Draft Environmental Impact Statements will be circulated for review and comment as part of the review of Project Papers and as outlined further in § 216.7 of those procedures. Except as provided in paragraph (a)(7) of this section, final approval of the PP or PAAD and the method of implementation will include consideration of the Environmental Assessment of final Environmental Impact Statement.

(6) *Processing and Review Within A.I.D.* (i) Initial Environmental Examinations, Environmental Assessments and final Environmental Impact Statements will be processed pursuant to standard A.I.D. procedures for project approval documents. Except as provided in paragraph (a)(7) of this section, Environmental Assessments and final

Environmental Impact Statements will be reviewed as an integral part of the Project Paper or equivalent document. In addition to these procedures, Environmental Assessments will be reviewed and cleared by the Bureau Environmental Officer. They may also be reviewed by the Agency's Environmental Coordinator who will monitor the Environmental Assessment process.

(ii) When project approval authority is delegated to field posts, Environmental Assessments shall be reviewed and cleared by the Bureau Environmental Officer prior to the approval of such actions.

(iii) Draft and final Environmental Impact Statements will be reviewed and cleared by the Environmental Coordinator and the Office of the General Counsel.

(7) *Environmental Review After Authorization of Financing.* (i) Environmental review may be performed after authorization of a project, program or activity only with respect to subprojects or significant aspects of the project, program or activity that are unidentified at the time of authorization. Environmental review shall be completed prior to authorization for all subprojects and aspects of a project, program or activity that are identified.

(ii) Environmental review should occur at the earliest time in design or implementation at which a meaningful review can be undertaken, but in no event later than when previously unidentified subprojects or aspects of projects, programs or activities are identified and planned. To the extent possible, adequate information to undertake deferred environmental review should be obtained before funds are obligated for unidentified subprojects or aspects of projects, programs or activities. (Funds may be obligated for the other aspects for which environmental review has been completed.) To avoid an irreversible commitment of resources prior to the conclusion of environmental review, the obligation of funds can be made incrementally as subprojects or aspects of projects, programs or activities are identified; or if necessary while planning continues, including environmental review, the agreement or other document obligat-

ing funds may contain appropriate covenants or conditions precedent to disbursement for unidentified subprojects or aspects of projects, programs or activities.

(iii) When environmental review must be deferred beyond the time some of the funds are to be disbursed (e.g. long lead times for the delivery of goods or services), the project agreement or other document obligating funds shall contain a covenant or covenants requiring environmental review, including an Environmental Assessment or Environmental Impact Statement, when appropriate, to be completed and taken into account prior to implementation of those subprojects or aspects of the project, program or activity for which environmental review is deferred. Such covenants shall ensure that implementation plans will be modified in accordance with environmental review if the parties decide that modifications are necessary.

(iv) When environmental review will not be completed for an entire project, program or activity prior to authorization, the Initial Environmental Examination and Threshold Decision required under paragraphs (a)(1) and (2) of this section shall identify those aspects of the project, program or activity for which environmental review will be completed prior to the time financing is authorized. It shall also include those subprojects or aspects for which environmental review will be deferred, stating the reasons for deferral and the time when environmental review will be completed. Further, it shall state how an irreversible commitment of funds will be avoided until environmental review is completed. The A.I.D. officer responsible for making environmental decisions for such projects, programs or activities shall also be identified (the same officer who has decision making authority for the other aspects of implementation). This deferral shall be reviewed and approved by the officer making the Threshold Decision and the officer who authorizes the project, program or activity. Such approval may be made only after consultation with the Office of General Counsel for the purpose of establishing the manner in which conditions precedent to dis-

bursement or covenants in project and other agreements will avoid an irreversible commitment of resources before environmental review is completed.

(8) *Monitoring.* To the extent feasible and relevant, projects and programs for which Environmental Impact Statements or Environmental Assessments have been prepared should be designed to include measurement of any changes in environmental quality, positive or negative, during their implementation. This will require recording of baseline data at the start. To the extent that available data permit, originating offices of A.I.D. will formulate systems in collaboration with recipient nations, to monitor such impacts during the life of A.I.D.'s involvement. Monitoring implementation of projects, programs and activities shall take into account environmental impacts to the same extent as other aspects of such projects, programs and activities. If during implementation of any project, program or activity, whether or not an Environmental Assessment or Environmental Impact Statement was originally required, it appears to the Mission Director, or officer responsible for the project, program or activity, that it is having or will have a significant effect on the environment that was not previously studied in an Environmental Assessment or Environmental Impact Statement, the procedures contained in this part shall be followed including, as appropriate, a Threshold Decision, Scoping and an Environmental Assessment or Environmental Impact Statement.

(9) *Revisions.* If, after a Threshold Decision is made resulting in a Negative Determination, a project is revised or new information becomes available which indicates that a proposed action might be "major" and its effects "significant", the Negative Determination will be reviewed and revised by the cognizant Bureau and an Environmental Assessment or Environmental Impact Statement will be prepared, if appropriate. Environmental Assessments and Environmental Impact Statements will be amended and processed appropriately if there are major changes in the project or program, or

if significant new information becomes available which relates to the impact of the project, program or activity on the environment that was not considered at the time the Environmental Assessment or Environmental Impact Statement was approved. When ongoing programs are revised to incorporate a change in scope or nature, a determination will be made as to whether such change may have an environmental impact not previously assessed. If so, the procedures outlined in this part will be followed.

(10) *Other Approval Documents.* These procedures refer to certain A.I.D. documents such as PIDs, PAIPs, PPs and PAADs as the A.I.D. internal instruments for approval of projects, programs or activities. From time to time, certain special procedures, such as those in § 216.4, may not require the use of the aforementioned documents. In these situations, these environmental procedures shall apply to those special approval procedures, unless otherwise exempt, at approval times and levels comparable to projects, programs and activities in which the aforementioned documents are used.

(b) *Pesticide Procedures*—(1) *Project Assistance.* Except as provided in paragraph (b)(2) of this section, all proposed projects involving assistance for the procurement or use, or both, of pesticides shall be subject to the procedures prescribed in paragraphs (b)(1) (i) through (v) of this section. These procedures shall also apply, to the extent permitted by agreements entered into by A.I.D. before the effective date of these pesticide procedures, to such projects that have been authorized but for which pesticides have not been procured as of the effective date of these pesticide procedures.

(i) When a project includes assistance for procurement or use, or both, of pesticides registered for the same or similar uses by USEPA without restriction, the Initial Environmental Examination for the project shall include a separate section evaluating the economic, social and environmental risks and benefits of the planned pesticide use to determine whether the use may result in significant environmental impact. Factors to be considered in

such an evaluation shall include, but not be limited to the following:

- (a) The USEPA registration status of the requested pesticide;
- (b) The basis for selection of the requested pesticide;
- (c) The extent to which the proposed pesticide use is part of an integrated pest management program;
- (d) The proposed method or methods of application, including availability of appropriate application and safety equipment;
- (e) Any acute and long-term toxicological hazards, either human or environmental, associated with the proposed use and measures available to minimize such hazards;
- (f) The effectiveness of the requested pesticide for the proposed use;
- (g) Compatibility of the proposed pesticide with target and nontarget ecosystems;
- (h) The conditions under which the pesticide is to be used, including climate, flora, fauna, geography, hydrology, and soils;
- (i) The availability and effectiveness of other pesticides or nonchemical control methods;
- (j) The requesting country's ability to regulate or control the distribution, storage, use and disposal of the requested pesticide;
- (k) The provisions made for training of users and applicators; and
- (l) The provisions made for monitoring the use and effectiveness of the pesticide.

In those cases where the evaluation of the proposed pesticide use in the Initial Environmental Examination indicates that the use will significantly effect the human environment, the Threshold Decision will include a recommendation for the preparation of an Environmental Assessment or Environmental Impact Statement, as appropriate. In the event a decision is made to approve the planned pesticide use, the Project Paper shall include to the extent practicable, provisions designed to mitigate potential adverse effects of the pesticide. When the pesticide evaluation section of the Initial Environmental Examination does not indicate a potentially unreasonable risk arising from the pesticide use, an Environmental Assessment or Environmental Impact Statement shall nevertheless be prepared if the environmental effects of the project otherwise require further assessment.

(ii) When a project includes assistance for the procurement or use, or both, of any pesticide registered for the same or similar uses in the United States but the proposed use is restrict-

ed by the USEPA on the basis of user hazard, the procedures set forth in paragraph (b)(1)(i) of this section will be followed. In addition, the Initial Environmental Examination will include an evaluation of the user hazards associated with the proposed USEPA restricted uses to ensure that the implementation plan which is contained in the Project Paper incorporates provisions for making the recipient government aware of these risks and providing, if necessary, such technical assistance as may be required to mitigate these risks. If the proposed pesticide use is also restricted on a basis other than user hazard, the procedures in paragraph (b)(1)(iii) of this section shall be followed in lieu of the procedures in this section.

(iii) If the project includes assistance for the procurement or use, or both of:

(a) Any pesticide other than one registered for the same or similar uses by USEPA without restriction or for restricted use on the basis of user hazard; or

(b) Any pesticide for which a notice of rebuttable presumption against reregistration, notice of intent to cancel, or notice of intent to suspend has been issued by USEPA.

The Threshold Decision will provide for the preparation of an Environmental Assessment or Environmental Impact Statement, as appropriate (§ 216.6(a)). The EA or EIS shall include, but not be limited to, an analysis of the factors identified in paragraph (b)(1)(i) of this section.

(iv) Notwithstanding the provisions of paragraphs (b)(1)(i) through (iii) of this section, if the project includes assistance for the procurement or use, or both, of a pesticide against which USEPA has initiated a regulatory action for cause, or for which it has issued a notice of rebuttable presumption against reregistration, the nature of the action or notice, including the relevant technical and scientific factors will be discussed with the requesting government and considered in the IEE and, if prepared, in the EA or EIS. If USEPA initiates any of the regulatory actions above against a pesticide subsequent to its evaluation in an IEE, EA or EIS, the nature of the

action will be discussed with the recipient government and considered in an amended IEE or amended EA or EIS, as appropriate.

(v) If the project includes assistance for the procurement or use, or both of pesticides but the specific pesticides to be procured or used cannot be identified at the time the IEE is prepared, the procedures outlined in paragraphs (b) (1) through (iv) of this section will be followed when the specific pesticides are identified and before procurement or use is authorized. Where identification of the pesticides to be procured or used does not occur until after Project Paper approval, neither the procurement nor the use of the pesticides shall be undertaken unless approved, in writing, by the Assistant Administrator (or in the case of projects authorized at the Mission level, the Mission Director) who approved the Project Paper.

(2) *Exceptions to Pesticide Procedures.* The procedures set forth in paragraph (b)(1) of this section shall not apply to the following projects including assistance for the procurement or use, or both, of pesticides.

(i) Projects under emergency conditions.

Emergency conditions shall be deemed to exist when it is determined by the Administrator, A.I.D., in writing that:

(a) A pest outbreak has occurred or is imminent; and

(b) Significant health problems (either human or animal) or significant economic problems will occur without the prompt use of the proposed pesticide; and

(c) Insufficient time is available before the pesticide must be used to evaluate the proposed use in accordance with the provisions of this regulation.

(ii) Projects where A.I.D. is a minor donor, as defined in § 216.1(c)(12) of this part, to a multi-donor project.

(iii) Projects including assistance for procurement or use, or both, of pesticides for research or limited field evaluation purposes by or under the supervision of project personnel. In such instances, however, A.I.D. will ensure that the manufacturers of the pesticides provide toxicological and environmental data necessary to safeguard

the health or research personnel and the quality of the local environment in which the pesticides will be used. Furthermore, treated crops will not be used for human or animal consumption unless appropriate tolerances have been established by EPA or recommended by FAO/WHO, and the rates and frequency of application, together with the prescribed preharvest intervals, do not result in residues exceeding such tolerances. This prohibition does not apply to the feeding of such crops to animals for research purposes.

(3) *Non-Project Assistance.* In a very few limited number of circumstances A.I.D. may provide non-project assistance for the procurement and use of pesticides. Assistance in such cases shall be provided if the A.I.D. Administrator determines in writing that (i) emergency conditions, as defined in paragraph (b)(2)(i) of this section exists; or (ii) that compelling circumstances exist such that failure to provide the proposed assistance would seriously impede the attainment of U.S. foreign policy objectives or the objectives of the foreign assistance program. In the latter case, a decision to provide the assistance will be based to the maximum extent practicable, upon a consideration of the factors set forth in paragraph (b)(1)(i) of this section and, to the extent available, the history of efficacy and safety covering the past use of the pesticide in the recipient country.

(43 FR 20491, May 12, 1978, as amended at 45 FR 70245, Oct. 23, 1980)

#### § 216.4 Private applicants.

Programs, projects or activities for which financing from A.I.D. is sought by private applicants, such as PVOs and educational and research institutions, are subject to these procedures. Except as provided in § 216.2 (b), (c) or (d), preliminary proposals for financing submitted by private applicants shall be accompanied by an Initial Environmental Examination or adequate information to permit preparation of an Initial Environmental Examination. The Threshold Decision shall be made by the Mission Director for the country to which the proposal relates,

if the preliminary proposal is submitted to the A.I.D. Mission, or shall be made by the officer in A.I.D. who approves the preliminary proposal. In either case, the concurrence of the Bureau Environmental Officer is required in the same manner as in § 216.3(a)(2), except for PVO projects approved in A.I.D. Missions with total life of project costs less than \$500,000. Thereafter, the same procedures set forth in § 216.3 including as appropriate scoping and Environmental Assessments or Environmental Impact Statements, shall be applicable to programs, projects or activities submitted by private applicants. The final proposal submitted for financing shall be treated, for purposes of these procedures, as a Project Paper. The Bureau Environmental Officer shall advise private applicants of studies or other information foreseeably required for action by A.I.D.

[45 FR 70247, Oct. 23, 1980]

#### § 216.5 Endangered species.

It is A.I.D. policy to conduct its assistance programs in a manner that is sensitive to the protection of endangered or threatened species and their critical habitats. The Initial Environmental Examination for each project, program or activity having an effect on the environment shall specifically determine whether the project, program or activity will have an effect on an endangered or threatened species, or critical habitat. If the proposed project, program or activity will have the effect of jeopardizing an endangered or threatened species or of adversely modifying its critical habitat, the Threshold Decision shall be a Positive Determination and an Environmental Assessment or Environmental Impact Statement completed as appropriate, which shall discuss alternatives or modifications to avoid or mitigate such impact on the species or its habitat.

[45 FR 70247, Oct. 23, 1980]

#### § 216.6 Environmental assessments.

(a) *General purpose.* The purpose of the Environmental Assessment is to provide Agency and host country decision makers with a full discussion of

significant environmental effects of a proposed action. It includes alternatives which would avoid or minimize adverse effects or enhance the quality of the environment so that the expected benefits of development objectives can be weighed against any adverse impacts upon the human environment or any irreversible or irretrievable commitment of resources.

(b) *Collaboration with Affected Nation on Preparation.* Collaboration in obtaining data, conducting analyses and considering alternatives will help build an awareness of development associated environmental problems in less developed countries as well as assist in building an indigenous institutional capability to deal nationally with such problems. Missions, Bureaus and Offices will collaborate with affected countries to the maximum extent possible, in the development of any Environmental Assessments and consideration of environmental consequences as set forth therein.

(c) *Content and Form.* The Environmental Assessment shall be based upon the scoping statement and shall address the following elements, as appropriate:

(1) *Summary.* The summary shall stress the major conclusions, areas of controversy, if any, and the issues to be resolved.

(2) *Purpose.* The Environmental Assessment shall briefly specify the underlying purpose and need to which the Agency is responding in proposing the alternatives including the proposed action.

(3) *Alternatives Including the proposed action.* This section should present the environmental impacts of the proposal and its alternatives in comparative form, thereby sharpening the issues and providing a clear basis for choice among options by the decision maker. This section should explore and evaluate reasonable alternatives and briefly discuss the reasons for eliminating those alternatives which were not included in the detailed study; devote substantial treatment to each alternative considered in detail including the proposed action so that reviewers may evaluate their comparative merits; include the alternative of no action; identify the Agen-

cy's preferred alternative or alternatives, if one or more exists; include appropriate mitigation measures not already included in the proposed action or alternatives.

(4) *Affected environment.* The Environmental Assessment shall succinctly describe the environment of the area(s) to be affected or created by the alternatives under consideration. The descriptions shall be no longer than is necessary to understand the effects of the alternatives. Data and analyses in the Environmental Assessment shall be commensurate with the significance of the impact with less important material summarized, consolidated or simply referenced.

(5) *Environmental consequences.* This section forms the analytic basis for the comparisons under paragraph (c)(3) of this section. It will include the environmental impacts of the alternatives including the proposed action; any adverse effects that cannot be avoided should the proposed action be implemented; the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity; and any irreversible or irretrievable commitments of resources which would be involved in the proposal should it be implemented. It should not duplicate discussions in paragraph (c)(3) of this section. This section of the Environmental Assessment should include discussions of direct effects and their significance; indirect effects and their significance; possible conflicts between the proposed action and land use plans, policies and controls for the areas concerned; energy requirements and conservation potential of various alternatives and mitigation measures; natural or depletable resource requirements and conservation potential of various requirements and mitigation measures; urban quality; historic and cultural resources and the design of the built environment, including the reuse and conservation potential of various alternatives and mitigation measures; and means to mitigate adverse environmental impacts.

(6) *List of preparers.* The Environmental Assessment shall list the names and qualifications (expertise,

experience, professional discipline) of the persons primarily responsible for preparing the Environmental Assessment or significant background papers.

(7) *Appendix.* An appendix may be prepared.

(d) *Program assessment.* Program Assessments may be appropriate in order to assess the environmental effects of a number of individual actions and their cumulative environmental impact in a given country or geographic area, or the environmental impacts that are generic or common to a class of agency actions, or other activities which are not country-specific. In these cases, a single, programmatic assessment will be prepared in A.I.D./ Washington and circulated to appropriate overseas Missions, host governments, and to interested parties within the United States. To the extent practicable, the form and content of the programmatic Environmental Assessment will be the same as for project Assessments. Subsequent Environmental Assessments on major individual actions will only be necessary where such follow-on or subsequent activities may have significant environmental impacts on specific countries where such impacts have not been adequately evaluated in the programmatic Environmental Assessment. Other programmatic evaluations of classes of actions may be conducted in an effort to establish additional categorical exclusions or design standards or criteria for such classes that will eliminate or minimize adverse effects of such actions, enhance the environmental effect of such action or reduce the amount of paperwork or time involved in these procedures. Programmatic evaluations conducted for the purpose of establishing additional categorical exclusions under § 216.2(c) or design considerations that will eliminate significant effects for classes of actions shall be made available for public comment before the categorical exclusions or design standards or criteria are adopted by A.I.D. Notice of the availability of such document shall be published in the FEDERAL REGISTER. Additional categorical exclusions shall be adopted by A.I.D. upon the approval of the Administrator, and design con-

sideration in accordance with usual agency procedures.

(e) *Consultation and review.* (1) When Environmental Assessments are prepared on activities carried out within or focused on specific developing countries, consultation will be held between A.I.D. staff and the host government both in the early stages of preparation and on the results and significance of the completed Assessment before the project is authorized.

(2) Missions will encourage the host government to make the Environmental Assessment available to the general public of the recipient country. If Environmental Assessments are prepared on activities which are not country-specific, the Assessment will be circulated by the Environmental Coordinator to A.I.D.'s Overseas Missions and interested governments for information, guidance and comment and will be made available in the U.S. to interested parties.

(f) *Effect in other countries.* In a situation where an analysis indicates that potential effects may extend beyond the national boundaries of a recipient country and adjacent foreign nations may be affected, A.I.D. will urge the recipient country to consult with such countries in advance of project approval and to negotiate mutually acceptable accommodations.

(g) *Classified material.* Environmental Assessments will not normally include classified or administratively controlled material. However, there may be situations where environmental aspects cannot be adequately discussed without the inclusion of such material. The handling and disclosure of classified or administratively controlled material shall be governed by 22 CFR Part 9. Those portions of an Environmental Assessment which are not classified or administratively controlled will be made available to persons outside the Agency as provided for in 22 CFR Part 212.

[45 FR 70247, Oct. 23, 1980]

#### § 216.7 Environmental impact statements.

(a) *Applicability.* An Environmental Impact Statement shall be prepared when agency actions significantly affect:

(1) The global environment or areas outside the jurisdiction of any nation (e.g., the oceans);

(2) The environment of the United States; or

(3) Other aspects of the environment at the discretion of the Administrator.

(b) *Effects on the United States: Content and Form.* An Environmental Impact Statement relating to paragraph (a)(2) of this section shall comply with the CEQ Regulations. With respect to effects on the United States, the terms environment and significant effect wherever used in these procedures have the same meaning as in the CEQ Regulations rather than as defined in § 216.1(c) (12) and (13) of these procedures.

(c) *Other effects: Content and form.* An Environmental Impact Statement relating to paragraphs (a)(1) and (a)(3) of this section will generally follow the CEQ Regulations, but will take into account the special considerations and concerns of A.I.D. Circulation of such Environmental Impact Statements in draft form will precede approval of a Project Paper or equivalent and comments from such circulation will be considered before final project authorization as outlined in § 216.3 of these procedures. The draft Environmental Impact Statement will also be circulated by the Missions to affected foreign governments for information and comment. Draft Environmental Impact Statements generally will be made available for comment to Federal agencies with jurisdiction by law or special expertise with respect to any environmental impact involved, and to public and private organizations and individuals for not less than forty-five (45) days. Notice of availability of the draft Environmental Impact Statements will be published in the FEDERAL REGISTER. Cognizant Bureaus and Offices will submit these drafts for circulation through the Environmental Coordinator who will have the responsibility for coordinating all such communications with persons outside A.I.D. Any comments received by the Environmental Coordinator will be forwarded to the originating Bureau or Office for consideration in final policy decisions and the



preparation of a final Environmental Impact Statement. All such comments will be attached to the final Statement, and those relevant comments not adequately discussed in the draft Environmental Impact Statement will be appropriately dealt with in the final Environmental Impact Statement. Copies of the final Environmental Impact Statement, with comments attached, will be sent by the Environmental Coordinator to CEQ and to all other Federal, state, and local agencies and private organizations that made substantive comments on the draft, including affected foreign governments. Where emergency circumstances or considerations of foreign policy make it necessary to take an action without observing the provisions of § 1506.10 of the CEQ Regulations, or when there are overriding considerations of expense to the United States or foreign governments, the originating Office will advise the Environmental Coordinator who will consult with Department of State and CEQ concerning appropriate modification of review procedures.

[45 FR 70249, Oct. 23, 1980]

**§ 216.8 Public hearings.**

(a) In most instances AID will be able to gain the benefit of public participation in the impact statement process through circulation of draft statements and notice of public availability in CEQ publications. However, in some cases the Administrator may wish to hold public hearings on draft Environmental Impact Statements. In deciding whether or not a public hearing is appropriate, Bureaus in conjunction with the Environmental Coordinator should consider:

(1) The magnitude of the proposal in terms of economic costs, the geographic area involved, and the uniqueness or size of commitment of the resources involved;

(2) The degree of interest in the proposal as evidenced by requests from the public and from Federal, state and local authorities, and private organizations and individuals, that a hearing be held;

(3) The complexity of the issue and likelihood that information will be

presented at the hearing which will be of assistance to the Agency; and

(4) The extent to which public involvement already has been achieved through other means, such as earlier public hearings, meetings with citizen representatives, and/or written comments on the proposed action.

(b) If public hearings are held, draft Environmental Impact Statements to be discussed should be made available to the public at least fifteen (15) days prior to the time of the public hearings, and a notice will be placed in the FEDERAL REGISTER giving the subject, time and place of the proposed hearings.

[41 FR 26913, June 30, 1976. Redesignated at 45 FR 70249, Oct. 23, 1980]

**§ 216.9 Bilateral and multilateral studies and concise reviews of environmental issues.**

Notwithstanding anything to the contrary in these procedures, the Administrator may approve the use of either of the following documents as a substitute for an Environmental Assessment (but not a substitute for an Environmental Impact Statement) required under these procedures:

(a) Bilateral or multilateral environmental studies, relevant or related to the proposed action, prepared by the United States and one or more foreign countries or by an international body or organization in which the United States is a member or participant; or

(b) Concise reviews of the environmental issues involved including summary environmental analyses or other appropriate documents.

[45 FR 70249, Oct. 23, 1980]

**§ 216.10 Records and reports.**

Each Agency Bureau will maintain a current list of activities for which Environmental Assessments and Environmental Impact Statements are being prepared and for which Negative Determinations and Declarations have been made. Copies of final Initial Environmental Examinations, scoping statements, Assessments and Impact Statements will be available to interested Federal agencies upon request. The cognizant Bureau will maintain a permanent file (which may be part of

65

its normal project files) of Environmental Impact Statements, Environmental Assessments, final Initial Environmental Examinations, scoping statements, Determinations and Declarations which will be available to the public under the Freedom of Information Act. Interested persons can obtain information or status reports regarding Environmental Assessments and Environmental Impact Statements through the A.I.D. Environmental Coordinator.

[45 FR 70249, Oct. 23, 1980]

## Appendix B

### REFERENCES AND SOURCES OF INFORMATION

#### Selected Publications:

1. Food and Agriculture Organization of the United Nations (FAO). FAO Plant Production and Protection Paper series of guidelines for the integrated control of crop pests (rice, corn, etc.). When ordering, indicate the crop of interest.

Publications Division  
FAO, Via delle Terme di Caracalla  
00100 Rome, Italy.

2. Food and Agriculture Organization of the United Nations (FAO). Guidelines on:
  - a. The Registration and Control of Pesticides.
  - b. Good Labeling Practices for Pesticides.
  - c. The Packaging and Storage of Pesticides.
  - d. Pesticide Residue Trials to Provide Data for the Registration of Pesticides and the Establishment of Maximum Residue Limits.
  - e. Environmental Criteria for the Registration of Pesticides.
  - f. Efficacy Data for the Registration of Pesticides for Plant Protection.
  - g. The Registration of Biological Pest Control Agents.
  - h. Retail Distribution of Pesticides with Particular Reference to Storage and Handling at the Point of Supply to Users in Developing Countries.
  - i. Post-Registration Surveillance and Other Activities in the Field of Pesticides.
  - j. The Disposal of Waste Pesticides and Pesticide Containers on the Farm.
  - k. Good Practices for Ground and Aerial Application of Pesticides.
  - l. Government Responsibilities in Implementing the Pesticide Code of Conduct (draft, to be published in 1991).
  - m. Personal Protection When Using Pesticides in Hot Climates.
  - n. Legislation on the Control of Pesticides.
  - o. Disposal of Bulk Quantities of Unwanted Pesticides (to be published in 1991).
  - p. Pictograms for Use on Agrochemical Labels.

The above publications may be ordered individually or as a set. See the address above.

3. Formulation of Pesticides in Developing Countries. United Nations Industrial Development Organization. Vienna, 1983.
4. Recognition and Management of Pesticide Poisonings. United States Environmental Protection Agency (USEPA). 4th edition, 1989. Available in English and Spanish.

S&T/AGR  
Agency for International Development  
Washington, D.C. 20523

5. An Agromedical Approach to Pesticide Management: Some Health and Environmental Considerations. Davies, J.E., Freed, V.H., and Whittemore, F.W., A.I.D./CICP/University of Miami, 1983.  
  
S&T/AGR  
Agency for International Development  
Washington, D.C. 20523
6. Guidelines for the Safe and Effective Use of Pesticides.  
(Published in several languages)  
  
International Group of National Associations of Manufacturers of Agrochemical Products (GIFAP)  
Avenue Hamoir 12  
1180 Bruxelles, Belgium
7. Work Smart, Work Safely, with Farm Chemicals. (Published as a pictorial guide for farm workers in English and Spanish)  
  
National Agricultural Chemicals Association (NACA)  
1155 Fifteenth Street, N.W.  
Washington, D.C. 20005
8. Field Surveys of Exposure to Pesticides - Standard Protocol. World Health Organization, 1981.  
  
Pesticide Development and Safe Use Unit Division of Vector Biology and Control  
WHO Headquarters  
1211 Geneva 27, Switzerland
9. Agro-pesticides: Their Management and Application. Oudejans, J.H., United Nations Economic and Social Commission for Asia and the Pacific, 1982.
10. Handbook on the Use of Pesticides in the Asia-Pacific Region. Asian Development Bank, 1987.  
  
Information Office  
Asian Development Bank  
P.O. Box 789  
Manila, Philippines
11. Integrated Pest Management. Council on Environmental Quality, 1979.  
  
Superintendent of Documents  
U.S. Government Printing Office  
Washington, D.C. 20402
12. Integrated Pest Management, 1982 (\$7.50); Resistance of Agricultural Pests to Control Measures, 1983 (\$2.50). Council for Agricultural Science and Technology (CAST).  
  
CAST  
137 Lynn Avenue  
Ames, Iowa 50010

13. Manual for Preparation of Initial Environmental Evaluations (IEE) and Environmental Assessments of USAID Projects for the Control of Vector-borne Diseases. 1990.

S&T/HP/P  
Agency for International Development  
Washington, D.C. 20523

14. Pesticide Users Guide. A Handbook for African Extension Workers. Overholt, W. and Castleton, C., 1989.

AFR/TR  
Agency for International Development  
Washington, D.C. 20523

15. Farm Chemicals Handbook  
(issued annually)

Meister Publishing Company  
37733 Euclid Ave.  
Willoughby, Ohio 44094

16. Suspended, Cancelled, and Restricted (SCR) Pesticides. USEPA Registration Support Branch, Office of Pesticide Programs. February 1990. [ADDRESS?]

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888/88 Ploenchitr Road  
Bangkok 10500, Thailand

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1101 Pennsylvania Avenue, S.E.  
Washington, D.C. 20003

21. Pesticide and Toxic Chemical News. (Journal subscription).

1101 Pennsylvania Avenue, S.E.  
Washington, D.C. 20003

22. **Further guidance on participation in locust control campaigns that may utilize non-approval pesticides, Cable 88 State 339983 (18 Oct. 88)**

**Resource Contacts:**

1. **AID/Washington Operations Bureaus:**  
Africa, Asia, Europe, Latin America and Caribbean, Near East, Office of Foreign Disaster Assistance,  
Research and Development (S&T)--Environmental Coordinator and Pest Management Advisors
2. **National Pesticide Information Retrieval System (NPIRS)**  
Purdue University  
Entomology Hall, Room 220  
West Lafayette, IN 47907  
Tel: (317)-494-6614  
Fax: (317)-494-6535

NPIRS, the "clearinghouse" for USEPA information on pesticides, maintains both an on-line information retrieval service and data bases on CDROMs. These (PEST-BANK and CHEMBANK) are updated quarterly and accessible free of charge to A.I.D. Missions and Bureaus through CICP (see above). On-line service is updated weekly and coverage is somewhat more extensive. NPIRS should be contacted for current subscription costs.

3. **Food and Agriculture Organization of the United Nations (FAO)**  
Plant Protection Service  
Plant Production and Protection Division  
Via delle Terme di Caracalla  
00100 Rome, Italy  
Tel: 57975757  
Telex: 61081 FAO 1  
Fax: 5646172
4. **U.S. Environmental Protection Agency (USEPA)**  
Office of International Activities (A-106)  
401 M. Street, S.W.  
Washington, D.C.  
Tel: (202)-382-4878  
Fax: (202)-382-7883  
Tlx: 89 58USEPA WSH
5. **National Pesticides Telecommunications Network (NPTN)**  
Texas Tech University  
Health Science Center  
Department of Preventative Medicine  
Lubbock, TX 79409  
Tel: 1-800-858-7378

Supplies information on pesticide safety and human poisoning. Funded by USEPA.

6. **Denver Wildlife Research Center (DWRC)**  
International Programs Research Section  
Building 16, Denver Federal Center  
P.O. Box 25266  
Denver, CO 80225-0266  
Tel: (303) 236-7850  
Fax: (303) 236-7863

**Supplies information on control of vertebrate pests, e.g., birds and rodents. An activity of USDA; special project funding by A.I.D.**

- 7. International Group of National Association of  
Manufacturers of Agrochemical Products (GIFAP)  
Avenue Hamoir 12  
1180 Bruxelles, Belgium**

**Supplies information on pesticide manufacturers, safe handling, application equipment and farmer training.**

- 8. World Health Organization (WHO)  
1211 Geneva 27  
Switzerland**

**Supplies information on pesticide issues related to human health.**

- 9. Pan American Health Organization  
525 23rd St., N.W.  
Washington, D.C. 20036  
(202) 861-3200**



**Appendix C**

**Summaries and Tables of Contents of Selected Environmental Reviews**



## Consortium for International Crop Protection

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**ENVIRONMENTAL ASSESSMENT**  
**OF THE USE OF BAYTICOL (FLUMETHRIN) 1% POUR-ON**  
**ACARICIDE IN THE PILOT ERADICATION PROJECT PROPOSED**  
**FOR THE TROPICAL BONT TICK (AMBLIYONMA VARIEGATUM)**  
**ON ANTIGUA, WEST INDIES**

Prepared for  
U.S. Agency for International Development

September 30, 1989

**A.I.D. Project No. P10/T 598-0000-3-9651000**  
**A.I.D./LAC Buy-in to Contract No. DAN-4142-C-00-5122-00**

64-

## TABLE OF CONTENTS

	<u>Page</u>
I. EXECUTIVE SUMMARY AND RECOMMENDATIONS	1
II. INTRODUCTION	4
A. <u>Background and Purpose</u>	4
B. <u>Data examined</u>	5
C. <u>Relation to the 1987 project EA</u>	6
III. PESTICIDE PROCEDURES	6
A. <u>The EPA registration status of the requested pesticide</u>	6
B. <u>The basis for selection of the requested pesticide.... relative to acaricides previously approved for the control of the tropical bont tick (and other tick species) present in Antigua</u>	11
C. <u>The extent to which Bayticol would be part of an integrated approach to eradication of the tropical bont tick.</u>	14
D. <u>The proposed method or methods of pesticide application, including availability of appropriate application and safety equipment</u>	16
E. <u>Any acute and long-term toxicological hazards, either human or environmental, associated with the proposed pesticide use and measures available to minimize such hazards</u>	18
F. <u>The effectiveness of the requested pesticide(s) for the proposed use</u>	22
G. <u>Compatibility of the proposed pesticide(s) with target and nontarget ecosystems</u>	24
H. <u>The conditions under which the pesticide is to be used, including climate, flora, fauna, geography, hydrology, and soils</u>	24
I. <u>The availability and effectiveness of other pesticides or nonchemical control methods</u>	24
J. <u>The Requesting country's ability to regulate or control the distribution, storage, use and disposal of the requested pesticide</u>	28
K. <u>Provisions for training of users and applicators</u>	29
L. <u>Provisions for monitoring the use and effectiveness of the pesticide</u>	30

65

IV.	SUMMARY OF MITIGATIVE MEASURES AND REQUIREMENTS	30
A.	<u>Mitigative measures</u>	30
B.	<u>Requirements</u>	32
V.	SUGGESTIONS FOR PROGRAM IMPLEMENTATION	32
A.	<u>Incentives for livestock owners</u>	32
B.	<u>Incentives for the treatment teams</u>	33
C.	<u>Epidemiological studies</u>	33
D.	<u>Antiguan government commitment</u>	33
VI.	REFERENCES	35
VII.	ANNEXES	43
VIII.	LIST OF PREPARERS	52
IX.	PERSONS CONTACTED	53
X.	RECOMMENDED DISTRIBUTION	56

## I. EXECUTIVE SUMMARY AND RECOMMENDATIONS

**MAIN FINDING: Bayticol 1% pour-on should not be approved for use in the Antigua pilot horn tick eradication project at this time.**

p. 7

USDA/APHIS has requested that U.S.A.I.D. approve the use of the acaricide Bayticol (flumethrin) 1% pour-on for use in a pilot tropical horn tick eradication project on Antigua. Because Bayticol is not registered in the U.S., U.S.A.I.D. commissioned this update of the 1987 Environmental Assessment (EA) that was done for the previously proposed acaricides amitraz (Taktic) and permethrin (Atraban). The main objective of this EA is to determine to what extent Bayticol data is available to satisfy U.S. EPA registration requirements, and whether any data gaps found are critical with regard to the proposed use of Bayticol on Antigua.

APHIS was responsible for providing foreign registration data on Bayticol (flumethrin) for review by the EA team. One set of data, submitted in support of Bayticol registration in the Federal Republic of Germany, was procured from Bayer/Mobay Chemical by APHIS for the EA team's inspection on condition that none of the data be divulged.

The team conducted a literature search and contacted world-class specialists in pesticide toxicology in order to locate additional information on Bayticol. None of the information thus located satisfied data gaps found in the German registration submission with regard to U.S. registration requirements as stated in EPA regulation 40 CFR Part 158.

The EA team also made site visits on Antigua and St. Lucia in June 1989 and conferred extensively with people who are involved in tick control and/or have experience using Bayticol under local conditions. This input from the field was central to the team's conclusions and recommendations.

The EA concludes that Bayticol pour-on is very effective and that it offers important logistical, cost and safety advantages including portability, relative rainfastness, long residual action, and reduction of exposure of applicators and the environment. However, a review of the available data shows critical gaps in information that is required by EPA for U.S. registration and which is also pertinent to the proposed use of Bayticol on Antigua:

- a. no chronic studies on reproduction effects on multiple generations;
- b. no oncogenicity data;
- c. a missing teratogenicity study;

- d. no data on movement and metabolism in soil;
  - e. no studies on toxicity to fish and other aquatic animals; and
  - f. insufficient information on inert ingredients.
2. USDA should ask Bayer/Mobay to reconsider registering Bayticol 1% pour-on in the U.S. and collaborate with them to develop the data required in support of registration. p. 11
  3. As mandated in the 1987 EA, USDA should evaluate other acaricides that are EPA-registered or under development and which might be superior to amitraz and permethrin sprays for use in the project. This includes both acaricides formulated as pour-ons and those having other novel delivery systems. p. 24

The bont tick eradication project on Antigua has the necessary research component and is a pilot program with potential for developing technology to be applied throughout the Caribbean. The use of Bayticol or some other effective pour-on acaricide would greatly improve the chances for successful eradication of the bont tick.

4. More USDA staff should be assigned to the project to insure successful implementation, including the proper use of acaricides. p. 30

An experienced officer is needed in the field full-time to do nothing but supervise treatment evaluation teams and be vigilant about data collection and the safety and effectiveness of field operations.

5. Treatment teams should be given veterinary training so that the teams can also provide veterinary assistance and livestock management advice to animal owners. p. 32

This training would have several important benefits:

- a. increased motivation of farmers and treatment team staff to carry out their roles in the eradication program effectively;
- b. the tick eradication program could contribute to an improved veterinary care program for the island that would be capable of assisting livestock owners and monitoring for reintroduction of ticks and tick-borne diseases after termination of the project;
- c. motivated, interested individuals likely to do good work will be more attracted to, and more likely to stay with, treatment team jobs;

- d. a cadre of quality animal handlers/veterinary assistants would be produced for Antigua and other Caribbean islands; and
  - e. the quality (and perhaps quantity) of animals on Antigua would improve.
6. The project staff epidemiologist and veterinarian should study the epidemiological status of ticks and tick-borne diseases on Antigua.
7. Before field activities begin, the project should secure a commitment from the Antiguan government for effective enactment and enforcement of supportive legislation and post-project continuation of the tick/disease monitoring and treatment program.

p. 33

p. 33

**Summary of:**

**Environmental Assessment of the Egypt Screwworm Control Program**

**by**

**Richard Peterson, AID/ANE/TR  
Allan T. Showler, AID/OFDA  
F. Kenneth Lyvers, USAID/Cairo  
Lenneth P. LuePhang, USAID/Cairo  
Nasr M. Rohaiem, USAID/Cairo**

**June 1990**



TABLE OF CONTENTS

	<u>PAGE</u>
i. Preface.....	2
ii. Table of Contents.....	3
iii. List of Acronyms and Abbreviations.....	6
iv. List of Tables.....	7
v. List of Figures.....	7
1.0 Executive Summary.....	8
2.0 Scoping Procedure.....	9
2.1 Document Preparation.....	10
3.0 Purpose of Assessment.....	10
4.0 AID Environmental Procedures.....	16
5.0 Government of Egypt Environmental Legislation.....	16
6.0 The Screworm and the Problem in Libya.....	18
7.0 Conditions in Egypt.....	19
7.1 Geography.....	19
7.2 Climate.....	22
7.3 Population.....	25
8.0 The Screworm Threat to Egypt.....	28
8.1 Routes of Screworm Entry into Egypt.....	28
8.2 Livestock.....	29
8.3 Humans.....	29
8.4 Wildlife.....	31
9.0 Infrastructure in Egypt.....	32
9.1 Survey.....	32
9.2 Control Practice, Pesticide Use, and Quarantine.....	34
9.3 Human Safety During Pesticide Application.....	37

9.4 Storage.....39

9.5 Disposal of Pesticides and Empty Containers.....41

10.0 Integrated Pest Management (IPM).....42

10.1 Wind Oriented Trap (WOT).....43

10.2 Sentinel Sheep Pens.....44

10.3 Screwworm Adult Suppression System (SWASS).....45

10.4 Ivermectin.....46

11.0 International Mobilization.....47

11.1 Libya.....47

11.2 Egypt.....49

11.3 Eradication Plan.....49

12.0 Training.....50

13.0 Recommendations.....51

14.0 Other Recommendations.....54

15.0 References.....59

16.0 Appendices.....63

A. Persons Contacted

B. Ministry of Agriculture Request for Screwworm Assistance from USAID

C. Cable from AID/Cairo - Request for Assistance

D. Initial Environmental Examination (IEE) and Environmental Assessment (EA) as Submitted by USAID/Cairo

E. EPA Pesticide Fact Sheet - Coumaphos

F. Screwworm Myiasis in Humans, A. T. Showler

G. General Organization for Veterinary Services (GOE)

H. Informational Pamphlet on Screwworm Control prepared by GOE

I. Poster on Screwworm Threat prepared by GOE

J. Screwworm Training Manual prepared by Food and Agriculture Organization, Rome

- K. Insecticide Packet Labelling and Instructions for Wound Sampling (Arabic/French)
- L. Dip Vat Management, Mobay Corporation, Animal Health
- M. Outline of Screwworm Training Course. Natural History Museum, London

The accidental arrival of the New World screwworm (NWS) in Libya poses a serious threat to livestock, wildlife, and humans in all of Africa, southern Europe, and the Middle East. FAO has provided assistance to Libya and neighboring countries to contain the infestation until a two year FAO/IAEA/IFAD NWS eradication program using the sterile male insect technique is successfully completed. The insecticide provided by FAO was coumaphos, which is applied in prescribed amounts to animals wounds. The Government of Egypt (GOE) stated an urgent need for ca. \$1.5 million worth of equipment, including trucks, sprayers, livestock dipping vats, pesticides, and training for veterinary technicians, but the UNDP/FAP budget of \$250,000 and Ministry of Agriculture (MOA) resources were inadequate to field the type of control program needed. USAID was officially requested by the MOA to provide survey, transportation and pesticide application equipment, and training at a cost of about \$638,000 to augment funds contributed by other donors. As required by S216.3 (a)(4)(u)(a-d) of A.I.D.'s Environmental Procedures, USAID/Cairo completed an IEE which contained references to previous work that determined the need for an EA following the procedures set forth in S216.3 (b). From these documents, the Project Officer and the Mission Environmental Officer determined that UNDP/FAO identified the significant issues relating to the proposed application of coumaphos to control NWS, based on work begun in May 1989. It was decided that there is evidence of substantial NWS presence in Libya and of its imminent movement into Egypt. Delay in implementation of the program could jeopardize livestock production in Egypt.

The subsequent EA, drafted initially by USAID/Cairo, and completed by Drs. Showler and Peterson of AID/OFDA and AID/ANE/TR, respectively, was conducted by interviewing MOA and USAID/Cairo officials concerned with livestock production in Egypt. Various livestock inspection stations were evaluated in Egypt, where the screwworm threat is greatest (e. g., at Matruh, Sidi Barani, Salum, and Libya/Egypt border).

The EA's table of contents (attached) depicts the breadth of issues that were examined by Drs. Showler and Peterson while in Egypt (May 6-21, 1990). Salient features are noted in the following paragraphs.

Environmental legislation in Egypt is less comprehensive than in the U.S., but the law does prohibit the use of pesticides in the country's protected areas (shown on a map in EA) and restricts dumping of unused pesticide and rinsate into waterways.

The EA describes the NWS threat to Egypt as being "enormous;" Egypt contains about 13 million head of livestock, much of which is herded by nomads. About 13% of Egypt's economy is supported by animal production. The human population would be as vulnerable to NWS attack as that of Libya due to the low standard of living of most Egyptians, and a strained Ministry of Public Health. Wildlife is already threatened by human intervention in oases and riverine habitats, and some endangered species would likely be exterminated by NWS. It was determined that animal movement across the Libya/Egypt border is monitored at a border station near Salum, and that the large expanse of desert between Tripoli and Egypt acts as

74

a natural barrier of sorts to NWS spread. Nevertheless, there are unmarked tracks that provide access to and from Libya, and nomads and wildlife traverse the border frequently without being detected.

While a GOE survey and quarantine program exists in Egypt, it was determined that additional resources and training were needed. In light of the fact that livestock are treated by technicians equipped with limited safety clothing, and that the pesticides are adequately labeled and stored, the EA approved, with some modification, the USAID/Cairo intention of providing additional sprayers, trucks, dipping vats, other equipment for survey and control, and training. IPM options were identified in the EA, particularly regarding cultural practices (e. g., timing of shearing, dehorning, castration, and branding operations), and survey (e. g., wind-oriented traps, sentinel animals, and use of screwworm adult suppression system). Twenty-seven EA recommendations were provided, and they include the use of AChE tests kits, use of military helicopters for survey in remote areas, continued MOA interaction with nomads, proper pesticide rinsate and empty container disposal practices, safe pesticide storage practices, appropriate training, and improved reporting procedures.



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 **VECTOR BIOLOGY & CONTROL**

## **Environmental Assessment**

**Insecticide Use in the Malaria Control Component  
of the Health Systems Support Project  
(APSISA 519-0308)**

**El Salvador, October 1989**

**by**

**Andrew A. Arata, Ph. D.**

**and**

**Samuel G. Breeland, Ph.D**

**AR-066-4**

## Table of Contents

	<b>Page</b>
1. Executive Summary (Spanish and English)	1
2. Purpose, Scoping Process, Scope of Work, Project Description, Need for an Environmental Assessment	4
3. Alternatives -- Including the Proposed Action	7
4. Affected Environment	8
5. Environmental Consequences: Issues Analysis and Mitigation Measures	9
6. Recommendations	17
7. List of Persons and Places Visited	18
8. References	20

### Appendices

Appendix 1	Scope of Work
Appendix 2	Technical Information on Bendiocarb
Appendix 3	Ficam 80 W Label
Appendix 4	Cronograma de Actividades 1989 Departamento de Malaria
Appendix 5	Areas Epidemiologicas en el Pais
Appendix 6	Graficas de Estadisticas sobre Malaria en el Pais (5 graficas)
Appendix 7	Bendiocarb: Specifications, Methods of Determining Chemical and Physical Properties
Appendix 8	Instructions for Safe Use of Bendiocarb for Residual Indoor Application in Vector Control Programs

## 1. Executive Summary

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The Health Systems Support Project (APSISA 519-0308) provides, among other components, support for the Government of El Salvador (GOES) to reduce the incidence of malaria through a "responsive, efficient and effective nationwide malaria control program." Support elements include technical assistance, training and commodity support for insecticides and equipment.

The integrated GOES program resulted in a steady reduction of malaria morbidity from 2,000 cases per 100,000 in 1980 to about 600 cases in 1986, when the current A.I.D. support was implemented. The decline continued to a level below 200 cases per 100,000 (9,215 cases) in 1988. From 1980 through 1988, the annual parasitic index (API = number of positive slides/1,000 examined) fell from 20.0 to 1.8. The number of cases of *P. falciparum*, the most severe form of malaria, was reduced from 15,782 to 120 during the same period.

This reduction was achieved through the development of a well-organized control program that includes indoor house spraying in areas of highest transmission, larviciding of proximal anopheline breeding areas, timely peridomestic ULV spraying with pyrethroid insecticides, physical larval control through source reduction activities and prophylactic and therapeutic distribution of medication. The various approaches in the integrated scheme are guided by appropriate entomological, parasitological and medical surveillance data. Both surveillance and control efforts are strongly supported by community participation efforts.

To date, the carbamate insecticide propoxur has been employed in the indoor house spraying activities. Its use was approved in the initial IEE (1986) and it has been used effectively and safely. However, the cost of propoxur will permit protective spraying of only one-half of the 30,000 houses targeted for the coming year. Therefore, the GOES has requested replacement of propoxur with bendiocarb (also a carbamate compound), which is priced at a level that will allow full coverage of the targeted areas (30,000 houses with approximately 150,000 inhabitants, or less than 2.5 percent of the national population).

Bendiocarb is a moderately toxic insecticide of the same class and toxicological level as propoxur. It was identified in the initial IEE as a potential back-up insecticide, and has been tested for efficacy and efficiency by the GOES since 1986. Results of these trials and similar trials in neighboring countries have demonstrated that bendiocarb is as efficacious as propoxur. In addition, there have been problems with inconsistent supplies and quality of propoxur that would not be expected with the proposed bendiocarb product (Ficam<sup>®</sup> 80 W) because of its formulation in pre-packaged, pre-measured units of 100 g sachets. Propoxur is available in



pre-packaged, pre-measured units of 100 g sachets. Propoxur is available in bulk (800 g) formulations, which provide considerably more potential for error in mixing, dosage determination and suspensibility.

Bendiocarb is registered by the U.S. Environmental Protection Agency (USEPA) for mosquito control (EPA Reg. No. 45639). Although not previously purchased by A.I.D. for use in malaria control programs, it is recommended by WHO and is currently being used successfully in a number of countries in the Americas, Asia, and Africa. The safety procedures required for use of bendiocarb are the same as those that the GOES has used for propoxur. Technical details for bendiocarb, specifications for formulations, and safety and first-aid procedures are included in appendixes to this report.

The proposed use of bendiocarb poses no environmental hazard. The 300,000 targeted houses are scattered along the coastal area in approximately 100 communities, largely in the western and eastern departments. The area is of a rural agriculture nature. Spraying will be done only in houses by trained malaria program sprayers. Disposal of the containers is facilitated by the sachet packaging, which can be burned and buried easily.

There is no endangered species list in El Salvador. The only nature reserve, Monte Cristo, is not in the malarious zone and no spraying will occur in that area.

Replacement of propoxur by bendiocarb is the most reasonable of the alternative actions. Retention of propoxur as the insecticide of choice would result in inadequate coverage of high risk areas and endanger the program. Abandonment of intradomestic spraying would even more seriously threaten the whole integrated control program, which has been very successful to date. Neither of these alternatives is viable.

It appears that the substitution of bendiocarb in the project would mean the very survival of an exceptionally successful integrated anti-malaria activity for the remainder of the project, as opposed to a serious interruption of a downward trend in malaria transmission if it were not incorporated. Bendiocarb would be expected to be as biologically efficacious as propoxur for the project. It also would be likely to preserve the progress already made within budget and without the sacrifice of propoxur as a viable alternative should it be needed in the future.

A summary of the Evaluation Team's recommendations are as follows:

- 1) Endorse the use of bendiocarb to replace propoxur, the latter to be retained as an alternative.

19

- 2) Urge the continued training and monitoring of personnel in safe use.
- 3) Recommend that labels, instructions for safe use and disposal be made in Spanish.
- 4) Support continued susceptibility testing of vectors to bendiocarb.
- 5) Strongly recommend continued USAID and MOH/GOES support for the integrated control program as it is currently being conducted.

**ENVIRONMENTAL ASSESSMENT  
OF THE AGRICULTURAL EXPORT  
SERVICES PROJECT, JAMAICA**

May 1990

A.I.D. Project Number 532-0165

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## TABLE OF CONTENTS

<b>LIST OF ACRONYMS</b>		<b>6</b>
<b>1.0 EXECUTIVE SUMMARY</b>		<b>1</b>
1.1	<b>Introduction</b>	1
1.2	<b>Affected Environment</b>	1
1.2.1	<b>Watersheds, Climate, and Soils</b>	1
1.2.2	<b>Vegetation and Biodiversity</b>	2
1.2.3	<b>Socio-Economic Conditions</b>	2
1.3	<b>Alternatives Considered</b>	3
1.4	<b>Assessment of Alternatives</b>	5
1.5	<b>Recommendations and Mitigative Measures</b>	6
1.6	<b>Estimated Budget for Environmental Management</b>	8
<b>2.0 PURPOSE AND CONTENT OF THE ENVIRONMENTAL ASSESSMENT</b>		<b>9</b>
2.1	<b>The Jamaica Agricultural Export Services Project</b>	9
2.2	<b>Government of Jamaica Strategy for Increasing Agricultural Exports</b>	10
2.3	<b>Recent Experiences with Efforts to Increase Agricultural Exports in Jamaica</b>	10
2.4	<b>Related Donor Activities</b>	10
2.5	<b>State of the Environment in Jamaica</b>	11
2.6	<b>Constraints to Environmental Management Activities Within the Agricultural Sector in Jamaica</b>	12
2.7	<b>Principal Environmental Issues Affecting Agricultural Export Production in Jamaica</b>	13
2.8	<b>Contents of the Environmental Assessment</b>	13
<b>3.0 AFFECTED ENVIRONMENT</b>		<b>15</b>
3.1	<b>Geography, Ecology and Social Conditions in Jamaica</b>	15
3.2	<b>Biophysical Resources</b>	16
3.2.1	<b>Watersheds, Hydrology and Geology</b>	16
3.2.2	<b>Climate</b>	17
3.2.3	<b>Soils</b>	18
3.2.4	<b>Vegetation Types</b>	19
3.2.5	<b>Biodiversity</b>	20
3.3	<b>Land Use and Socio-Economic Conditions</b>	22
3.3.1	<b>Farming Systems</b>	22
3.3.2	<b>Roads and Infrastructure</b>	23
3.3.3	<b>Population</b>	24
3.3.4	<b>Socio-Economic Characteristics</b>	24
3.4	<b>Pesticide Use and Management in Jamaica</b>	24
3.4.1	<b>Conditions Under Which Pesticides Are to Be Used in Jamaica</b>	25

*92*

3.4.2	Present Availability of Pesticides in Jamaica	25
3.4.3	Present Problems with Pest Resistance to AESP Crops	26
3.4.4	Availability and Effectiveness of Other Pesticides or Non-Chemical Control Methods	26
3.4.5	Jamaica's Ability to Regulate Pesticide Use	27
3.4.6	Present Provisions for Training of Pesticide Users	28
3.4.7	Present Provisions for Monitoring Pesticide Use	28
3.5	The Relationship Between Agriculture and Ecosystem Management	28
3.6	Ecological Limits to Agricultural Growth	30
<b>4.0</b>	<b>ALTERNATIVE STRATEGIES FOR SUSTAINABLE ENVIRONMENTAL MANAGEMENT</b>	<b>32</b>
4.1	Introduction	32
4.2	Alternative I: Existing Project Paper	32
4.2.1	Pesticide Use and Management	34
4.3	Alternative II: Existing Project Paper plus Environmental Management Sub-Components	34
4.3.1	Criteria for Sub-Project Approval	35
4.3.1.1	Pesticide Use and Management	36
4.3.1.1.1	Basis for Selection of Proposed Pesticides	36
4.3.1.1.2	Effectiveness of Proposed Pesticides	37
4.3.1.1.3	Integrated Pest Management Programs	38
4.3.1.1.4	Methods of Pesticide Application	41
4.3.1.2	Soil and Water Conservation	43
4.3.1.3	Conservation of Biological Diversity	47
4.3.1.4	Conservation of Tropical Forests	51
4.3.2	Improvements in Extension Services*	52
4.3.2.1	Technical Training for Rural Residents	54
4.3.2.2	Technical Assistance Programs That Support Environmental Conservation	55
4.3.2.2.1	Training in Safe Use of Pesticides	57
4.3.3	Monitoring of Environmental Conditions and Applied Research	57
4.3.4	Protection of Critical Habitats Presently Threatened By Agricultural Production	59
4.3.4.1	Monitoring of Proposed Pesticide Uses	60
4.3.5	Development of Model Farms and Demonstration Areas	62
4.3.6	Environmental Education	63
4.4	Alternative III: No Action	65
4.5	Criteria for Assessment of Alternatives	66
4.6	Identification of Preferred Alternative	66
<b>5.0</b>	<b>ENVIRONMENTAL CONSEQUENCES OF EACH ALTERNATIVE</b>	<b>68</b>
5.1	Introduction	68
5.2	Environmental Consequences Under Alternative I	68

5.2.1	Pesticide Management .....	68
5.2.2	Soil and Water Management .....	69
5.2.3	Conservation of Biodiversity .....	70
5.2.4	Conservation of Tropical Forests .....	71
5.2.5	Summary of Consequences of Alternative I .....	71
5.3	Environmental Consequences Under Alternative II .....	72
5.3.1	Pesticide Management .....	72
5.3.2	Soil and Water Management .....	73
5.3.3	Conservation of Biodiversity .....	74
5.3.4	Conservation of Tropical Forests .....	75
5.3.5	Summary of Consequences of Alternative II .....	75
5.4	Environmental Consequences of Alternative III .....	75
5.4.1	Summary of Consequences of Alternative III .....	75
5.4.1.1	Pesticide Management .....	76
6.0	<b>MITIGATIVE MEASURES FOR THE PREFERRED ALTERNATIVE ..</b>	<b>77</b>
6.1	Summary of Recommendations for the Preferred Alternative .....	77
6.2	Mitigative Measures .....	78
6.2.1	Pesticide Use and Management .....	80
6.3	Estimated Budget for Environmental Management .....	81
6.3.1	Staff .....	81
6.3.2	Training .....	82
6.3.3	Equipment, Materials, and Infrastructure .....	82
7.0	<b>ANNOTATED BIBLIOGRAPHY .....</b>	<b>83</b>

**APPENDIX A: Tables and Figures**

**APPENDIX B: The EPA Registration Status of Proposed Pesticides**

**APPENDIX C: Toxicity and EPA Characterizations of Selected Pesticides**

**APPENDIX D: Agricultural Export Services Project**

**APPENDIX E: Initial Environmental Examination Form for Sub-Project Approval**

**APPENDIX F: Water Quality Parameters for Conservation of Biodiversity**

**APPENDIX G: Recommended Course Topics for Extension Training**

**APPENDIX H: Names and Qualifications of Preparers**

**APPENDIX I: Institutions and Person Contacted**

94

## 1.0 EXECUTIVE SUMMARY

### 1.1 Introduction

The U.S. Agency for International Development requested an Environmental Assessment (EA) of the Agricultural Export Services Project (AESP) in Jamaica. An environmental assessment field review was carried out by a Tropical Research and Development, Inc. team of three U.S. specialists from April 2 through April 21, 1990. Team members were: James Tolisan, M.S., Team Leader, Biodiversity/Tropical Forestry/Watershed Management Specialist; Max McFadden, Ph.D., Institutional Analysis Specialist; and Herbert Fisher, M.S., Crop Protection Specialist. The team determined that the principal environmental issues facing the AESP in Jamaica include the following:

- Pesticide use and management
- Conservation of on and off-farm soil and water resources
- Conservation of biological diversity
- Conservation of tropical forests

These criteria formed the basis for evaluation of alternatives considered for the AESP.

### 1.2 Affected Environment

Jamaica is the third largest island in the Caribbean with a total land area of 4,411 square miles. The island is mountainous, with more than 50 percent of the land area above 1,000 feet in elevation and the majority of land having slopes greater than 30 percent. Ecologically, Jamaica has a wide variety of microclimates and vegetation communities. This diversity of habitat supports an enormous variety of plant and animal life—many of which are endemic to the island or the region and may face serious threats from habitat destruction.

#### 1.2.1 Watersheds, Climate, and Soils

Geologically, approximately two-thirds of Jamaica is limestone, concentrated in the central and western parts of the island. Much of this region is karstic, with extensive underground caverns and minimal dilution of ground water flows. The other third of the island is dominated by igneous and metamorphic rocks, shales, and alluvium—which characterize the Blue and John Crow Mountains and surrounding coastal areas.

Groundwater, especially that originating from karstic white limestone, tends to show high turbidity (an indicator of high suspended solids, heavy metals, or agro-chemicals) due to the highly transmissive nature and low filtration action of the geologic materials.

Surface waters, particularly those in rivers originating from prewhite limestones, frequently have high sediment loads due to significant soil loss from poorly or unforested steep lands in high rainfall uplands.

Jamaica's climate is tropical humid to sub-humid. Rainfall is heavy throughout the region, ranging from 70 inches per annum along parts of the south coast to more than 200 inches per annum in the John Crow Mountains. Small rain shadow areas exist in parts of the country, particularly the capital of Kingston, where annual precipitation can be less than 40 inches.

Approximately 64 percent of the island's soils originate from limestone, are more resistant to erosion, and are slightly alkaline. These soils, however, can be shallow and stony and have low moisture content and high iron and aluminum levels. The remainder of the soils consist of alluviums, generally deeper and more fertile, and highland limestone and shale mixes, frequently porous, highly leached, low in nutrient content, and highly acidic.

### 1.2.2 Vegetation and Biodiversity

Jamaica was once entirely covered in humid and sub-humid tropical forests. Currently, however, less than 25 percent of the island is in forest or woodland cover. Two-thirds of this forested area is in degraded condition, having been cut one or more times, and has not yet returned to a mature secondary forest.

Small, isolated wetland communities can be found throughout the country, and mangrove forests dot coastal areas, particularly along the south coast. The remainder of the land comprises some form of agricultural or urban use, including government-planted tree farms.

Biological diversity is high in Jamaica. More than 2,800 species of flowering plants have been recorded, along with 550 ferns, 300 mosses, 200 orchids, and 256 birds. Again, with the degree of endemism and limited ecological and taxonomic data recorded for many of these species, significant habitat disruption could result in major ecological and scientific losses.

### 1.2.3 Socio-Economic Conditions

In recent decades bauxite mining, manufacturing, and tourism have become important sectors in the economy. Agriculture, however, is still a primary source of employment and economic revenue. Approximately 32 percent of the total work force is directly involved in agriculture, with many other workers involved in related industries.



The younger generation is not maintaining this agricultural tradition. Fifty percent of the agricultural workforce is over 50 years of age, and 30 percent are over 60.

Unemployment is high in Jamaica, and recent figures indicate that more than one-fourth of the population may be unemployed. A high percentage of the population is presently under the age of 20, making continued population growth inevitable, despite a low fertility rate.

### **1.3 Alternatives Considered**

Three project alternatives were considered for the AESP:

**Alternative I:** The AESP as described in the existing Project Paper.

**Alternative II:** The AESP as described in Alternative I, plus environmental management components proposed by the EA team in April, 1990.

**Alternative III:** A "No Action" policy, assuming an end of USAID assistance in this area.

The AESP, as described in the existing Project Paper, is designed to foster economic growth and equity in Jamaica. This will be achieved by increasing the production and productivity of selected non-traditional and traditional agricultural export crops, particularly those produced by small and medium-scale farmers.

The primary activities of the AESP included in Alternative I include (a) developing sub-projects with producer groups and association to expand the production and marketing of export crops, (b) support for key public sector agencies in improving and expanding essential services to the producers and exporters, and (c) working with selected Jamaican financial institutions to support innovation and problem-solving among agricultural export borrowers.

Alternative II continues all of these activities and incorporates a more comprehensive environmental management program. Alternative II addresses the fact that expanded crop production will require sustained soil structure, fertility, and water holding characteristics to support repetitive crop growth and development. Alternative II also requires pest control measures that do not threaten the health of consumers, processors, or farm workers and the ecosystems upon which their farms are dependent. Additionally, expanded crop production activities must identify and avoid or mitigate factors which could adversely affect surrounding and downstream ecosystems.

The environmental management components included in Alternative II are summarized below. Component headings which include an asterisk (\*) must be implemented in order for the project to be in compliance with Sections 117, 118, and 119 of the FAA. Component

headings without this asterisk are strongly recommended for inclusion in the project to insure that project activities are environmentally sustainable.

**Review Criteria to be Used in Evaluating Approval of Sub-Project Proposals\***: specific criteria and measures which must be included in all approved sub-projects to assure safe and correct use of pesticides and agro-chemicals and conservation of soil and water resources, biological diversity, and tropical forests. This component will include funding to establish sub-projects as demonstration areas for farmers.

**Improvements in Extension and Technical Assistance Services\***: training workshops for GOJ (Government of Jamaica) personnel, extension staff from grower's associations and other private entities, and selected local project "promoters" to improve extension capabilities and services, especially related to agro-chemical use and pest control, soil and water conservation practices, and wildland buffer zone management--will also include the development of a technical library and resource center.

**Monitoring of Environmental Conditions\***: technical and financial support to private entities, non-government organizations (NGOs), and related projects for the collection, analysis, and maintenance of data on environmental conditions affecting or affected by export agricultural production.

**Protection of Critical Habitats Presently Threatened by Agricultural Production\***: collaborative work with other projects to identify critical habitats and ecologically sensitive areas within Jamaica presently or potentially threatened by export agriculture field activities, as well as and to develop practical strategies for implementing and maintaining protection zones within these areas.

**Development of Model Farms and Demonstration Areas**: financial and technical support for the establishment of areas which demonstrate examples of safe and correct pest control and agro-chemical use, soil and water conservation practices, and wildland buffer zone management, including mechanisms to assure that local farmers will visit and benefit from the demonstrations.

**Environmental Education**: technical and financial assistance to local and national NGOs and private entities for the development and implementation of environmental education programs directed at school youth, youth and adult farm organizations, farmers, and producer associations.

#### 1.4 Assessment of Alternatives

Alternatives I, II, and III were evaluated by comparing present and future socio-economic and environmental trends which can be anticipated. The findings were as follows:

- A.** Alternative I does not adequately address the critical mandates for pesticide management, and conservation of biodiversity and tropical forests as set forth in Sections 117, 118, 119 of the FAA. While providing mechanisms to improve conservation and management of soil, water, plant, and wildlife systems through funded sub-projects, improved extension services and technical assistance, Alternative I does not specify activities that would accomplish these goals.

Alternative I does not include specific criteria for funding and implementing approved sub-projects, distinct programs to improve extension and technical assistance efforts, and direct measures to address potential adverse environmental impacts from field agricultural activities. Without these components, Alternative I will result in detrimental effects to upland watersheds, farm soils, tropical forests, biological diversity, and human health.

Expansion of upland agricultural areas will increase soil loss, sediment loads in rivers, downstream flooding, and changes in river channel patterns. Poorly managed agro-chemical use will result in human health hazards, eutrophication of downstream rivers and wetlands, and disruption of aquatic communities.

Poor management of remaining mature primary and secondary tropical forests will result in soil, species, and economic losses. Wildlife habitat will be degraded or lost, plant and animal species population levels may decline, and agricultural pests could proliferate.

- B.** Alternative II will continue the important economic and agricultural programs of Alternative I with several essential additions to improve environmental management.

Approved sub-projects will become models to demonstrate ecologically sound agricultural production for small and medium-scale farmers in Jamaica. Improved extension services and environmental education programs will provide farmers with the information necessary to make sound decisions regarding health and safety practices in the use of agro-chemicals, sustainable management of soil and water resources, and conservation of important forest and biological communities.

Monitoring programs will provide national and local decision-makers with a clearer framework for planning and evaluation. Collected data will also aid on-going efforts to identify and conserve important ecologically sensitive areas which could be threatened by expanded agricultural production.

Alternative II will be in compliance with Sections 117, 118, and 119 of the FAA. The PMU of the AESP will actively work to conserve and improve conditions in the export agriculture sector for biological diversity, tropical forest management, and the use of agro-chemicals.

- C. The environmental consequences of No Action--Alternative III--towards agricultural export crop production in Jamaica will be very similar to those outlined in Alternative I, with one major exception. Alternative I includes financial and technical opportunities to mitigate or avoid adverse environmental impacts, though it fails to specify how or when it would accomplish these objectives.

In a No Action scenario, there will be no mechanism available for mitigating any potential adverse impacts to soil and water resources, tropical forest communities, or wildlife populations and habitat from export agricultural production actions.

Alternative III will require other funding agencies, the GOJ and innate farmer initiative to avoid or correct adverse impacts from agricultural production on surrounding ecosystems. However, currently no other mechanism besides the AESP which has sufficient technical and financial capabilities to address these issues on a national basis.

## **1.5 Recommendations and Mitigative Measures**

Alternative II is recommended as the preferred course of action. This alternative will strengthen agricultural development activities, economic development, and national environmental management efforts.

Certain actions will be required to assure that the AESP is implemented in an environmentally-sound manner. These mitigative measures must be done in order for the project to be in compliance with Sections 117, 118, and 119 of the FAA. Specific mitigative measures to be implemented as immediate actions can be summarized as follows:

- The project will contract the long-term services of an Environmental Management Specialist and a Pesticide Use/Integrated Pest Management Specialist for a minimum of a four-year period.
- Short-term technical assistance will be contracted during the first two years of the project to include specialists in a) wildlife/biodiversity, b) soil and water conservation, c) on-farm forestry and tropical forest/buffer zone management, d) aquatic biology, e) water quality, and f) social ecology.

- **Project Management Unit (PMU) staff must identify appropriate local farmers to include in training workshops and act as local "promoters" for AESP activities.**
- **PMU staff must initiate an environmental education outreach strategy and action plan and begin the organization of a technical data and resource center.**
- **PMU staff will assure that project activities do not result in any net loss of existing natural wetlands.**
- **PMU staff will assure that no mature native forest communities are felled or cleared as a result of project activities.**
- **Funded aquaculture sub-projects will have no adverse impacts on surrounding wetlands through drainage, construction, water diversions, waste discharge, escape of exotic species, or killing of predators (especially crocodiles).**
- **Funded sub-projects will include a completed Initial Environmental Examination to be completed by the PMU staff.**
- **Funded sub-projects will not cultivate slopes steeper than 40 percent grade. All funded sub-projects to include field agriculture activities must incorporate soil and water conservation measures into project plans.**
- **The project will not fund any field activities which may result in the clearing of mature secondary or primary tropical forests.**
- **PMU staff will work with staff from private and public entities to design and purchase necessary materials for wide-spread environmental monitoring.**
- **PMU staff will establish a working group with private and public entities to identify ecologically sensitive critical habitats presently or potentially threatened by agricultural production. Initial studies will include wildlands and habitats within the Black River watershed, the Cockpit Country, and the John Crow Mountains.**



**Appendix D**

**Manual for Preparation of Initial Environmental Examination (IEE)  
and Environmental Assessment (EA) of U.S.A.I.D. Projects for the  
Control of Vector-Borne Diseases**



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**Manual for Preparation of Initial Environmental  
Evaluations (IEE) and Environmental  
Assessments (EA) of U.S.A.I.D. Projects for  
The Control of Vector-Borne Diseases**

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**AR-045**

93

## TABLE OF CONTENTS

- 1.0 Introduction - Background and Purpose of this Document
- 2.0 Current Regulations Governing Environmental Considerations
  - 2.1 Scope of Coverage and Definitions
  - 2.2 Compliance with A.I.D. environmental Procedures With Reference to Vector Control
    - (a) Responsibility
    - (b) Guide to Compliance
    - (c) Environmental Examination (IEE)
    - (d) Environmental Assessment (EA)
    - (e) Environmental Impact Statement (EIS)
    - (f) Pesticide Procedures
    - (g) Endangered Species
    - (h) Monitoring and Evaluation Requirements
    - (i) Checks on Compliance
    - (j) Timing of Environmental Reviews
    - (k) Cost Considerations
- 3.0 Vector-borne Diseases Requiring Vector Control Interventions
- 4.0 Vector Control Activities Subject to USAID Environmental Review
  - 4.1 Chemical Control
    - (a) Background
    - (b) Pesticides
      - (1) Policy and Rationale
      - (2) Selection of Pesticides
      - (3) Pesticide Applications in Vector Control Projects
      - (4) Insect Resistance to Pesticides
      - (5) Hazards Involved in the Use of Pesticides
  - 4.2 Alternatives to Chemical Pesticides in Vector Control
    - (a) Biological Control
      - (1) Predators
      - (2) Parasites and Pathogens
      - (3) Fungi
      - (4) Protozoa
      - (5) Viruses
  - 4.3 Physical Control



- (a) Filling
- (b) Deepening
- (c) Drainage
- (d) Water and Land Management
- (e) Impoundments
- (f) Construction Projects
- (g) Environmentally Sensitive Habitats
- (h) Man-Made vs. Natural Habitats

**5.0 Training of Vector Control Personnel**

**6.0 Operational Examples of USAID Environmental Assessment Strategy**

**APPENDIX I - AID Environmental Procedures, 22 CFR Part 216.**

**APPENDIX II - Excerpts from: Environmental Assessment, Vector Control and Water and Sanitation Activities of Health Sector II Project, Honduras, 1988.**

**APPENDIX III - Excerpts from: Environmental Assessment of the Pakistan Malaria Control II Project Extension, 1988.**

**TABLE 1. Insecticides available for use in A.I.D.-supported vector control (V.C.) projects and registered for mosquito control by EPA (See Annex 2)**

**TABLE 2. Insecticides Used in Mosquito Control (WHO)**

**TABLE 3. Relative Costs of Pesticides Used for Indoor House Spraying**

**TABLE 4. Occurrence of Resistance in Selected Anophelines to Adulticides**

**TABLE 5. Status of Vector Resistance (Year of First Detection) to Pesticides in C. American Countries**

**FIGURE 1. Pesticide Intoxication Risk by Occupation on Type of Exposure.**

**FIGURE 2. Hazard Variables (toxicity, contamination, time) of Pesticides.**

**ANNEX 1. Pesticide Law and Labeling; including sample insecticide label (Malathion)**

**ANNEX 2. Insecticides labeled for the Control of Adult and Larval Mosquitoes by Ground and Aerial Application Methods (Rathburn)**

95

- ANNEX 3. Discussion Topics:**
  - 3A. Integrated Vector Control**
  - 3B. Selection of Pesticides**
  - 3C. Vector Resistance and Agriculture**
  - 3D. Availability of Alternative Insecticides**
- ANNEX 4. World Bank Guidelines for the Selection and Use of Pesticides**
- ANNEX 5. Hazards Involved in the Use of Pesticides**
- ANNEX 6. Field Methods for Measuring Blood Cholinesterase Activity**

- 96

## 1.0 Introduction - Background and Purpose of this Document

This document was prepared in response to a request from the Office of Health of the Bureau of Science and Technology of A.I.D. as a guide for those concerned with environmental aspects of vector-borne disease control projects supported by USAID. Particular emphasis is placed on Guidelines for Compliance with regulations covering projects designed as interventions against such diseases as malaria, dengue, schistosomiasis, etc., involving the use of pesticides or environmental modifications directed against or affecting disease vector populations. Existing relevant documents<sup>1,2,3</sup> offer little detail on environmental implications or procedural direction for activities at the Mission level. Collectively, however, the referenced documents do provide pertinent information on legislation and Agency policies governing various environmental analyses, and have been incorporated and acknowledged in this document where appropriate. Also similarly included and referenced are published and unpublished (but released) documentation from the World Health Organization (WHO), U.S. Environmental Protection Agency (EPA), the Centers for Disease Control (CDC) and other sources.

This document attempts to anticipate and meet the needs of responsible officials for dealing with A.I.D.'s environmental policies, regulations and procedures as related to vector control projects. An effort is made to address the component activities of vector control operations e.g. pesticide applications, drainage projects, etc. to assure compliance with the regulations over the life of the project.

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<sup>1</sup> Environmental Assessment Guidelines Manual. A.I.D. Sept. 1974 (prepared by SER/ENGR) pp. 107 +61 pp. annexes.

<sup>2</sup> Programmatic Environmental Assessment (PEA) of Malaria Control Programs. 1980. 5 volumes:I-II (A-D): Scudder, H.I. and F.C. Roberts, Insect Control & Research, Inc. (Baltimore) for U.S.A.I.D. [reportedly 50 sets were distributed]

<sup>3</sup> A.I.D. Evaluation Assessments of Development Projects. June 1988. Occ. Paper No. 17. pp. 15.

**HOW TO PREPARE ENVIRONMENTAL ASSESSMENTS  
OF PESTICIDE USE IN A.I.D. PROJECTS**

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- 98

## CONTENTS

	<u>Page</u>
FOREWORD AND ACKNOWLEDGEMENTS	ii
CONTENTS	111
ACRONYMS AND ABBREVIATIONS	v
INTRODUCTION	1
WHAT IS AN ENVIRONMENTAL ASSESSMENT?	1
<u>Steps Leading to an Environmental Assessment</u>	2
WHAT IS MEANT BY "PESTICIDE"?	2
WHAT IS NEEDED TO CONDUCT AN ASSESSMENT?	4
<u>A.I.D. Documents</u>	4
<u>Technical References</u>	5
<u>Documents on Local Laws and Regulations</u>	6
<u>Other Sources</u>	7
<u>Always Consult the Pesticide Label</u>	7
GENERAL PROCEDURES	8
<u>Briefing in Washington, DC</u>	8
<u>Upon Arrival in Host Country</u>	8
<u>The Environmental Assessment's Content and Form</u>	8
<u>Before Departing Host Country</u>	10
<u>Debriefing in Washington, DC</u>	10
STEP-BY-STEP PROCEDURES	10
<u>Writing Style</u>	10
<u>Pesticide Procedures</u>	11
a. <u>The EPA Registration Status of the Requested Pesticide(s)</u>	11
<u>EPA Registration Status</u>	11
<u>Tolerance Requirements</u>	12
<u>EPA Special Review Program</u>	13
<u>Format</u>	14
b. <u>The Basis for Selection of the Requested Pesticide(s)</u>	14
c. <u>The Extent to Which the Proposed Pesticide Use Is Part</u> <u>of an Integrated Pest Management Program</u>	14
<u>Guidelines for IPM Programs</u>	16
d. <u>The Proposed Method or Methods of Pesticide Application,</u> <u>Including Availability of Appropriate Application and</u> <u>Safety Equipment</u>	16

e.	<u>Any Acute and Long-Term Toxicological Hazards, Either Human or Environmental, Associated With the Proposed Pesticide Use and Measures Available to Minimize Such Hazards</u>	17
	<u>Acute Toxicological Hazards</u>	17
	<u>Long-Term Toxicological Hazards</u>	19
f.	<u>The Effectiveness of the Requested Pesticide(s) for the Proposed Use</u>	20
	<u>What to Report on Effectiveness</u>	20
g.	<u>Compatibility of the Proposed Pesticide(s) With Target and Nontarget Ecosystems</u>	21
	<u>Special Requirements to Preserve Endangered Species and Biodiversity</u>	24
h.	<u>The Conditions Under Which the Pesticide Is to Be Used, Including Climate, Flora, Fauna, Geography, Hydrology, and Soils</u>	24
i.	<u>The Availability and Effectiveness of Other Pesticides or Nonchemical Control Methods</u>	24
j.	<u>The Requesting Country's Ability to Regulate or Control the Distribution, Storage, Use, and Disposal of the Required Pesticide(s)</u>	24
k.	<u>The Provisions Made for Training of Users and Applicators</u>	25
l.	<u>The Provisions Made for Monitoring the Use and Effectiveness of the Pesticide(s)</u>	25
	<b>HOW TO SUMMARIZE THE MITIGATIVE MEASURES AND REQUIREMENTS</b>	26
	<b>GLOSSARY OF TERMS COMMONLY ENCOUNTERED IN ENVIRONMENTAL ASSESSMENTS</b>	28
	<b>ANNEX 1: 22 CFR PART 216, ENVIRONMENTAL PROCEDURES</b>	39

## INTRODUCTION

The introduction after World War II of synthetic organic pesticides such as the insecticide DDT and the herbicide 2,4-D began a new era in pest control. Hundreds of synthetic organic insecticides, herbicides, fungicides, nematocides, rodenticides, and other chemical pesticides entered commercial markets.

The availability of modern pesticides led to widespread acceptance and reliance upon them. Chemical control soon became the predominant method of pest control in many countries. Current trends indicate that the use of pesticides in developing countries is increasing more rapidly than in developed countries. Pesticide use in Africa, Asia, and Latin America could double over the next ten years if trends continue.

Most pesticides being used in developing countries originate in industrialized nations. About 30% of total U.S. pesticide production is exported. The exports include pesticides not registered for any use, or considered too dangerous for unrestricted use, in the U.S.

Chemical pesticides have spread much faster in developing countries than the capability to ensure their effective and proper use. Many of these countries do not have laws to govern importation, use, and disposal of toxic chemicals. Even if they have laws, governments frequently lack the means to enforce them.

The U.S. Agency for International Development (A.I.D.) now requires a risk-benefit evaluation of pesticides and pest control practices used in the Agency's overseas assistance projects. A.I.D. policy is to encourage use of nonchemical pest control methods and practices that reduce reliance on chemical control. When pesticides are used, it is A.I.D. general policy to avoid using pesticide chemicals that the U.S. Environmental Protection Agency (EPA) has not registered or has registered with restriction because their toxicity warrants special handling. A.I.D. approves use of pesticides only if a review indicates a favorable benefit-risk ratio.

The purpose of this guide is to assist consultants of the Consortium for International Crop Protection (CICP), A.I.D. staff, and A.I.D. contractors when developing Environmental Assessments of pesticides in A.I.D. projects. The guide tells what is needed and how to proceed when conducting the Assessments. It will help to minimize time spent on the Assessments and avoid errors and omissions that can delay A.I.D. decision making.

## Appendix E

### MAJOR CHEMICAL GROUPS AND FORMULATIONS OF PESTICIDES

#### Chemical Groups

##### Insecticides

**Chlorinated hydrocarbons:** Most insecticides in this group are very persistent in the environment, are not readily metabolized by most living organisms, and are fat soluble. Because of these properties, the chlorinated hydrocarbons are able to accumulate in animals, and they bio-magnify, i. e., they move through the food chain with each level having a higher concentration. The acute toxicity of chlorinated hydrocarbons ranges from highly toxic to moderately toxic. Many countries have banned or severely restricted the use of chlorinated hydrocarbons because of their long-term environmental impacts. Common insecticides found in this group are DDT, BHC, lindane, and dieldrin.

**Organophosphates (OPs):** These insecticides vary from highly toxic to relatively nontoxic. They do not persist in the environment, generally lasting less than one month before breaking down into nontoxic substances. However, the affects of organophosphate pesticides on animals (including humans) can accumulate. Organophosphates inhibit an enzyme, acetyl-cholinesterase, necessary for nerve transmission. This affect is non-reversible, and therefore the body must produce more of the enzyme to replace that which has been affected by the pesticide. If a person is repeatedly exposed to organophosphate pesticides, the body cannot replace the enzyme as fast as it is being destroyed and the person can suddenly become ill after an exposure that taken alone would not be sufficient to cause intoxication. Examples of commonly used organophosphates are malathion, fenethion, and chlorpyrifos.

**Carbamates:** This group of insecticides has properties similar to the organophosphates. Carbamate insecticides break down readily in the environment and have a wide range of acute mammalian toxicity. The carbamates differ from the organophosphates in that the affects on the nervous system are rapidly reversible, and therefore not cumulative.

**Synthetic pyrethroids (SPs):** This is a relatively new group of insecticides and their use is increasing. The synthetic pyrethroids are chemicals synthesized by man to resemble a naturally occurring insecticide found in the flowers of certain plants in the genus Chrysanthemum. In general, synthetic pyrethroids are very toxic to insects but much less toxic to mammals. Some of the synthetic pyrethroids are highly toxic to fish and should be used with great care near bodies of water. Because of their high toxicity to insects, they are typically applied at much lower rates than any of the above-mentioned groups. Examples of synthetic pyrethroids in common usage are Karate (lambda-cyhalodrin) and Decis (deltamethrin).

**Insect Growth Regulators (IGRs):** These are chemical substances that disrupt the normal development of insects (and other arthropods), rather than acting on the nervous system as do the chemical groups listed above. IGRs are generally nontoxic to vertebrates, mollusks, and plants. The IGRs presently in use include chitin synthesis inhibitors (e.g., diflufenzuron) which interfere with the production of the insect cuticle, and juvenile hormone analogues (e.g., methoprene) which disrupt metamorphosis.

**Biological Insecticides:** These are usually microbial agents formulated for application by conventional methods. They are generally quite selective against the target pest (little or not effects on non-target organisms). The microbial agents include viruses (e.g., nuclear polyhidrosis viruses for control of certain moths, especially in forested lands), bacteria (e.g., Bacillus thuringiensis and B. popilliae against a wide variety of pests insects), fungi (some are known to be effective against plant-parasitic nematodes in orchard situations), protozoa (e.g., Nosema locustae against various locusts and grasshoppers), fungi, and nematodes (certain species have been shown to be effective against mosquitoes). Many potentially effective biological insecticides are known, but relatively few are being marketed at the present time. Nevertheless, research on them continues.



Other biological pesticides would include microbial toxins, or antibiotics, such as streptomycin and related compounds which are used to some extent to combat pathogens that infect trees. The trees are usually inoculated with the antibiotics using a gravity injection system.

### Herbicides

Phenoxy compounds: Most of the herbicides in this group are used to control broad-leaf weeds. The phenoxy herbicides are analogues of natural plant growth hormones and thereby disrupt normal growth. Although phenoxy herbicides generally have low toxicity to mammals, they can be irritating to the eyes, skin, respiratory, and gastrointestinal linings. Examples of common herbicides in this group are 2,4-D and 2,4,5-T.

Ureas: This group includes herbicides that generally have low selectivity (i. e., affect most plants) which inhibit the metabolic processes of plants. Mammalian toxicity is generally low. Diuron, linuron, and neburon are examples of urea herbicides.

Triazines: These are selective herbicides that are used to control both broad-leaf and grass weeds. The triazines are powerful inhibitors of photosynthesis, but some plants, such as corn, are able to tolerate the triazines more than others. They have low toxicity to mammals. Simazine and atrazine are examples of commonly used triazines.

Dipyridyliums: This group consists of herbicides that are typically non-selective. The dipyridylium compounds are used for complete weed control of as pre-harvest aids to desiccate the crop plants. Dipyridylium, unlike many of the other herbicides, are very toxic to mammals when ingested; thus great care should be exercised in the handling and storage of herbicides in this group. Examples of herbicides in this group are paraquat and diquat.

### Fungicides

Inorganic compounds: Some of the earliest pesticides were compounds containing sulfur or copper or mixtures of sulfur and copper, and many of these inorganics are still used as fungicides and acaricides. Generally, the inorganic compounds based on copper and sulfur compounds are relatively nontoxic but may irritate the skin and eyes. Bordeaux mixture (a mixture of copper sulfate and lime) is an example of an inorganic compound used to control several plant fungal diseases.

Dithiocarbamates: Zinc, manganese, and iron salts of dithiocarbamates are widely used as agricultural fungicides. The group has low acute toxicity to mammals but their chronic effects as carcinogens is being questioned. Examples of dithiocarbamates are thiram, maneb, and zineb.

Miscellaneous organics: The chemistry of fungicides does not allow separation of products into a few chemical groups. Other than the dithiocarbamates, two of the most widely used fungicides are captan and daconil. Both are wide-spectrum products that are only slightly toxic to mammals, but can cause skin and eye irritation.

### Rodenticides

Anticoagulants: Many of the commonly used rodenticides kill by inhibiting blood clotting. Exposed animals generally die of internal bleeding. Concentrated formulations are highly toxic but low concentrate ready-to-use products generally available on the market are much less hazardous. Vitamin K is an antidote for poisoning by anticoagulants. Warfarin and diphacinone are examples of commonly used anticoagulant poisons.

Acute poisons: A few products are available that are designed to rapidly kill rodents soon after ingestion. Zinc phosphide and arsenic trioxide are inorganics that are both highly toxic to mammals and should be used with great care. A plant extract, red squill, is also used as an acute poison against rodents. It is less hazardous to man and other mammals than the inorganic rodenticides because it rapidly induces vomiting (rats cannot vomit).

## Formulations

**Dusts:** Pesticide dusts are an active ingredient combined with an inert powder such as talc or clay. The percentage of active ingredient is generally quite low. Dusts are ready to use as purchased and usually safer than liquid formulations for the applicator. Because of their low concentration of active ingredient, dusts tend to be more expensive than more highly concentrated formulations.

**Granules (G):** Granular formulations are similar to dusts except that the particle size is much larger. Granular pesticides are produced by coating or impregnating sand or clay with the active ingredient. They require no additional mixing and can be applied with simple equipment. Granules are relatively safe for the user and do not drift from the target site. Some granular pesticides are systemic, i. e., they are transported through the plant's vascular system. As with dusts, the concentration of active ingredient is low, and therefore the cost of granular formulations is higher than the cost of more concentrated formulations.

**Baits:** A pesticide bait is a mixture of pesticide and a food substance that will attract and be eaten by the target pest. In general, baits have less impact on non-target organisms than other types of formulations.

**Wettable powders (WP):** Superficially, wettable powders appear to be similar to dusts. However, the concentration of active ingredient is much higher because wettable powders are designed to be diluted in water before application. Agitation is necessary to keep wettable powders from settling out after being mixed with water.

**Emulsifiable concentrates (EC):** This formulation consists of an active ingredient in a liquid organic solvent. An emulsifier is added to allow the concentrate to be mixed with water. Spreaders and stickers are often included to facilitate better plant coverage. Emulsifiable concentrates are easy to transport and store, but care should be exercised when working with the concentrated product. A variety of spraying equipment is available for applying ECs and other liquid formulations.

**Flowables (F):** This formulation consists of solid pesticide particles suspended in a liquid. Their use and application is similar to emulsifiable concentrates.

**Ultra low volume (ULV):** ULV formulations consist of the pesticide active ingredient dissolved in an organic solvent. They are the most concentrated liquid formulations (generally >90% active ingredient). ULV formulations are designed to be used as purchased. Special sprayers that apply a very small amount per unit area are needed for application. ULV formulations are generally quite hazardous because of their high concentration of active ingredient.

**Fumigants:** Fumigants are pesticides in the gaseous state that are generally used in an enclosed environment (warehouse, grain bins, etc.). Some fumigants are sold as gases (e. g., methyl bromide), while others are sold as solids that become gas when exposed to the atmosphere (aluminum phosphide). Fumigants tend to be highly toxic and only well-trained persons should be authorized to use them.

**Appendix F**

**FAO International Code of Conduct  
on the Distribution and Use of Pesticide**

105-

# Contents

## International Code of Conduct on the Distribution and Use of Pesticides

Introduction .....	1
Text of the Code .....	5
Article 1. Objectives of the Code .....	5
Article 2. Definitions .....	6
Article 3. Pesticide management .....	10
Article 4. Testing of pesticides .....	12
Article 5. Reducing health hazards .....	13
Article 6. Regulatory and technical requirements .....	15
Article 7. Availability and use .....	17
Article 8. Distribution and trade .....	17
Article 9. Information exchange .....	19
Article 10. Labelling, packaging, storage and disposal .....	21
Article 11. Advertising .....	22
Article 12. Monitoring the observance of the Code .....	24
Annex: FAO Conference Resolution 10/RS .....	26
References .....	28



FOOD AND AGRICULTURE ORGANIZATION  
OF THE UNITED NATIONS  
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105

# Introduction

**T**he action by FAO to develop, in consultation with appropriate United Nations agencies and other organizations, an International Code of Conduct on the Distribution and Use of Pesticides follows and accompanies many other events, some going back 25 years. All these events were designed to benefit the international community and to serve to increase international confidence in the availability, regulation, marketing and use of pesticides for the improvement of agriculture, public health and personal comfort.

One of the basic functions of the Code, which is voluntary in nature, is to serve as a point of reference, particularly until such time as countries have established adequate regulatory infrastructures for pesticides.

The Director-General of FAO in 1981 suggested that such a Code could help to overcome a number of difficulties associated with pesticides. The FAO Panel of Experts on Pesticide Specifications, Registration Requirements and Application Standards, at its meeting in 1982, agreed that activities involving the export and import of pesticides, and thereby their safe use, might be best dealt with through the adoption of a Code of Conduct. To that end a working paper was prepared for the FAO Second Government Consultation on International Harmonization of Pesticide Registration Requirements, Rome, 11-15 October 1982. The formal decision to develop the Code was taken at that Consultation, which recommended that FAO, in consultation with the appropriate United Nations organizations and bodies and international organizations outside the United Nations system, should draft a Code (1). The Code itself was adopted by the FAO Conference at its Twenty-third Session in 1985 by way of Resolution 10/85, which appears as an Annex to the present publication.

A number of governments and organizations have expressed

10/17

concern about the propriety of supplying pesticides to countries which do not have infrastructures to register pesticides and thereby to ensure their safe and effective use. It should be noted that the development of national regulatory programmes is the first priority of FAO activities in this field. There has also been concern over the possibility that residues of certain pesticides, not needed or not permitted in particular countries, are present in imported agricultural commodities produced in other countries where the use of such pesticides is not restricted. While recognizing that it is impossible to eliminate all such occurrences, because of diverging pest control needs, it is none the less essential that every effort be made to apply pesticides only in accordance with good and recognized practices. It is at the same time important for industrially developed countries to recognize, in their regulatory activities concerning residues, the pest control needs of developing countries, particularly the needs of countries in tropical regions.

In the absence of an effective pesticide registration process and of a governmental infrastructure for controlling the availability of pesticides, some countries importing pesticides must heavily rely on the pesticide industry to promote the safe and proper distribution and use of pesticides. In these circumstances foreign manufacturers, exporters and importers, as well as local formulators, distributors, repackers, advisers and users, must accept a share of the responsibility for safety and efficiency in distribution and use.

The role of the exporting country needs to be considered. Much emphasis has been given recently to the desirability of regulating the export of pesticides from producing countries. It is generally accepted that no country should trade in pesticides without a proper and thorough evaluation of the pesticide, including any risks. However, the fact that a product is not used or registered in a particular exporting country is not necessarily a valid reason for prohibiting the export of that pesticide. Developing countries are mostly situated in tropical and semi-tropical regions. Their climatic, ecological, agronomic, social, economic and environmental conditions and therefore their pest problems are usually quite different from those prevailing in countries in which pesticides are manufactured and exported. The government of the exporting country, therefore, is in no position to judge the suitability, efficacy, safety or fate of the pesticide under the conditions in the country

where it may ultimately be used. Such a judgement must, therefore, be made by the responsible authority in the importing country in consultation with industry and other government authorities in the light of the scientific evaluation that has been made and a detailed knowledge of the conditions prevailing in the country of proposed use.

The export to developing countries of pesticides which have been banned in one or more other countries or whose use has been severely restricted in some industrialized countries has been a subject of public concern which has led to intensive discussions on whether the exporting country should assume responsibility for the marketing and use of such products in the importing country. In this respect it is essential to note that when pesticides are banned, the reasons are toxicological, environmental or social. Valid and adequate toxicological reasons justifying banning a product are of concern, though not necessarily of equal importance, to most countries. Consequently, such products should not be exported or imported without careful consideration of the toxicological implications for those likely to be exposed.

While a Code of Conduct may not solve all problems, nevertheless it should go a long way toward defining and clarifying the responsibilities of the various parties involved in the development, distribution and use of pesticides, and it should be of particular value in countries which do not yet have control procedures. Where there is a pesticide regulatory process in a country, the need for a Code of Conduct will obviously be less than where there is no such scheme in operation.

The Code of Conduct is not a short or simple document, mainly because the nature, properties, uses and effects of pesticides are diverse and therefore require comprehensive consideration. Furthermore, the strong public pressure for banning or restricting the use of some effective and much-needed pesticides often stems from a lack of understanding of the many important issues involved. This document is designed, therefore, also to provide the general public with some basic guidance on these issues.

# Text of the Code

## *Article 1. Objectives of the Code*

1.1 The objectives of this Code are to set forth responsibilities and establish voluntary standards of conduct for all public and private entities engaged in or affecting the distribution and use of pesticides, particularly where there is no or an inadequate national law to regulate pesticides.

1.2 The Code describes the shared responsibility of many segments of society, including governments, individually or in regional groupings, industry, trade and international institutions, to work together so that the benefits to be derived from the necessary and acceptable use of pesticides are achieved without significant adverse effects on people or the environment. To this end, all references in this Code to a government or governments shall be deemed to apply equally to regional groupings of governments for matters falling within their areas of competence.

1.3 The Code addresses the need for a cooperative effort between governments of exporting and importing countries to promote practices which ensure efficient and safe use while minimizing health and environmental concerns due to improper handling or use.

1.4 The entities which are addressed by this Code include international organizations; governments of exporting and importing countries; industry, including manufacturers, trade associations, formulators and distributors; users; and public-sector organizations such as environmental groups, consumer groups and trade unions.

1.5 The standards of conduct set forth by this Code:

1.5.1 encourage responsible and generally accepted trade practices;

101

1.5.2 assist countries which have not yet established controls designed to regulate the quality and suitability of pesticide products needed in that country and to address the safe handling and use of such products;

1.5.3 promote practices which encourage the safe and efficient use of pesticides, including minimizing adverse effects on humans and the environment and preventing accidental poisoning from improper handling;

1.5.4 ensure that pesticides are used effectively for the improvement of agricultural production and of human, animal and plant health.

1.6 The Code is designed to be used, within the context of national law, as a basis whereby government authorities, pesticide manufacturers, those engaged in trade and any citizens concerned may judge whether their proposed actions and the actions of others constitute acceptable practices.

## Article 2. Definitions

For the purpose of this Code:

*Active ingredient* means the biologically active part of the pesticide present in a formulation.

*Advertising* means the promotion of the sale and use of pesticides by print and electronic media, signs, displays, gift, demonstration or word of mouth.

*Banned* means a pesticide for which all registered uses have been prohibited by final government regulatory action, or for which all requests for registration or equivalent action for all uses have, for health or environmental reasons, not been granted.

*Common name* means the name assigned to a pesticide active ingredient by the International Standards Organization or adopted by national standards authorities to be used as a generic or non-proprietary name for that particular active ingredient only.

*Distinguishing name* means the name under which the pesticide is

labelled, registered and promoted by the manufacturer and which, if protected under national legislation, can be used exclusively by the manufacturer to distinguish the product from other pesticides containing the same active ingredient.

*Distribution* means the process by which pesticides are supplied through trade channels on local or international markets.

*Environment* means surroundings, including water, air, soil and their interrelationship as well as all relationships between them and any living organisms.

*Extension service* means those entities in the country concerned responsible for the transfer of information and advice to farmers regarding the improvement of agricultural practices, including production, handling, storage and marketing.

*Formulation* means the combination of various ingredients designed to render the product useful and effective for the purpose claimed; the form of the pesticide as purchased by users.

*Hazard* means the likelihood that a pesticide will cause an adverse effect (injury) under the conditions in which it is used.

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

*Label* means the written, printed or graphic matter on, or attached to, the pesticide; or the immediate container thereof and the outside container or wrapper of the retail package of the pesticide.

*Manufacturer* means a corporation or other entity in the public or private sector or any individual engaged in the business or function (whether directly or through an agent or through an entity controlled by or under contract with it) of manufacturing a pesticide active ingredient or preparing its formulation or product.

110



**Marketing** means the overall process of product promotion, including advertising, product public relations and information services as well as distribution and selling on local or international markets.

**Maximum residue limit (MRL)** means the maximum concentration of a residue that is legally permitted or recognized as acceptable in or on a food, agricultural commodity or animal feedstuff.

**Packaging** means the container together with the protective wrapping used to carry pesticide products via wholesale or retail distribution to users.

**Pesticide** means 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 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.

**Pesticide industry** means all those organizations and individuals engaged in manufacturing, formulating or marketing pesticides and pesticide products.

**Pesticide legislation** means any laws or regulations introduced to regulate the manufacture, marketing, storage, labelling, packaging and use of pesticides in their qualitative, quantitative and environmental aspects.

**Poison** means a substance that can cause disturbance of structure or function, leading to injury or death when absorbed in relatively small amounts by human beings, plants or animals.

**Poisoning** means occurrence of damage or disturbance caused by a poison, and includes intoxication.

**Product** means the pesticide in the form in which it is packaged and sold; it usually contains an active ingredient plus adjuvants and may require dilution prior to use.

**Protective clothing** means any clothes, materials or devices that are designed to provide protection from pesticides when they are handled or applied.

**Public-sector groups** means (but is not limited to) scientific associations; farmer groups; citizens' organizations; environmental, consumer and health organizations; and labour unions.

**Registration** means the process whereby the responsible national government authority approves the sale and use of a pesticide following the evaluation of comprehensive scientific data demonstrating that the product is effective for the purposes intended and not unduly hazardous to human or animal health or the environment.

**Repackaging** means the transfer of pesticide from any commercial package into any other, usually smaller, container for subsequent sale.

**Residue** means any specified substances in food, agricultural commodities, or animal feed resulting from the use of a pesticide. The term includes any derivatives of a pesticide, such as conversion products, metabolites, reaction products, and impurities considered to be of toxicological significance. The term "pesticide residue" includes residues from unknown or unavoidable sources (e.g. environmental) as well as known uses of the chemical.

**Responsible authority** means the government agency or agencies responsible for regulating the manufacture, distribution or use of pesticides and more generally for implementing pesticide legislation.

**Risk** means the expected frequency of undesirable effects of exposure to the pesticide.

**Severely restricted** — a limited ban — means a pesticide for which virtually all registered uses have been prohibited by final government regulatory action but certain specific registered use or uses remain authorized.

**Toxicity** means a physiological or biological property which determines the capacity of a chemical to do harm or produce injury to a living organism by other than mechanical means.

**Trader** means anyone engaged in trade, including export, import, formulation and domestic distribution.

**Use pattern** embodies the combination of all factors involved in the use of a pesticide, including the concentration of active ingredient in the preparation being applied, rate of application, time of treatment, number of treatments, use of adjuvants and methods and sites of application which determine the quantity applied, timing of treatment and interval before harvest, etc.

### *Article 3. Pesticide management*

3.1 Governments have the overall responsibility and should take the specific powers to regulate the distribution and use of pesticides in their countries.

3.2 The pesticide industry should adhere to the provisions of this Code as a standard for the manufacture, distribution and advertising of pesticides, particularly in countries lacking appropriate legislation and advisory services.

3.3 Governments of exporting countries should help to the extent possible, directly or through their pesticide industries, to:

3.3.1 provide technical assistance to other countries, especially those with shortages of technical expertise, in the assessment of the relevant data on pesticides, including those provided by industry (see also Article 4);

3.3.2 ensure that good trading practices are followed in the export of pesticides, especially to those countries with no or limited regulatory schemes (see also Articles 8 and 9).

3.4 Manufacturers and traders should observe the following practices in pesticide management, especially in countries without legislation or means of implementing regulations:

3.4.1 supply only pesticides of adequate quality, packaged and labelled as appropriate for each specific market;

3.4.2 pay special attention to formulations, presentation, packaging and labelling in order to reduce hazard to users, to the maximum extent possible consistent with the effective functioning of the pesticide in the particular circumstances in which it is to be used;

3.4.3 provide, with each package of pesticide, information and instructions in a form and language adequate to ensure safe and effective use;

3.4.4 retain an active interest in following their products to the ultimate consumer, keeping track of major uses and the occurrence of any problems arising in the actual use of their products as a basis for determining the need for changes in labelling, directions for use, packaging, formulation or product availability.

3.5 Pesticides whose handling and application require the use of uncomfortable and expensive protective clothing and equipment should be avoided, especially in the case of small-scale users in tropical climates.

3.6 National and international organizations, governments, and pesticide industries should take action in coordinated efforts to disseminate educational materials of all types to pesticide users, farmers, farmers' organizations, agricultural workers, unions and other interested parties. Similarly, affected parties should seek and understand educational materials before using pesticides and should follow proper procedures.

3.7 Governments should allocate high priority and adequate resources to the task of effectively managing the availability, distribution and use of pesticides in their countries.

3.8 Concerted efforts should be made by governments and pesticide industries to develop and promote integrated pest management systems and the use of safe, efficient, cost-effective application methods. Public-sector groups and international organizations should actively support such activities.

112

3.9 International organizations should provide information on specific pesticides and give guidance on methods of analysis through the provision of criteria documents, fact sheets, training sessions, etc.

3.10 It is recognized that the development of resistance of pests to pesticides can be a major problem. Therefore, governments, industry, national institutions, international organizations and public-sector groups should collaborate in developing strategies which will prolong the useful life of valuable pesticides and reduce the adverse effects of the development of resistant species.

#### *Article 4. Testing of pesticides*

4.1 Pesticide manufacturers are expected to:

4.1.1 ensure that each pesticide and pesticide product is adequately and effectively tested by well-recognized procedures and test methods so as to fully evaluate its safety, efficacy (2) and fate (3) with regard to the various anticipated conditions in regions or countries of use;

4.1.2. ensure that such tests are conducted in accordance with sound scientific procedures and good laboratory practice (4) the data produced by such tests, when evaluated by competent experts, must be capable of showing whether the product can be handled and used safely without unacceptable hazard to human health, plants, animals, wildlife and the environment (3);

4.1.3 make available copies or summaries of the original reports of such tests for assessment by responsible government authorities in all countries where the pesticide is to be offered for sale. Evaluation of the data should be referred to qualified experts;

4.1.4 take care to see that the proposed use pattern, label claims and directions, packages, technical literature and advertising truly reflect the outcome of these scientific tests and assessments;

4.1.5 provide, at the request of a country, advice on methods for the analysis of any active ingredient of formulation that they manufacture, and provide the necessary analytical standards;

4.1.6 provide advice and assistance for training technical staff in relevant analytical work. Formulators should actively support this effort.

4.1.7 conduct residue trials prior to marketing in accordance with FAO guidelines on good analytical practice (5) and on crop residue data (6, 7) in order to provide a basis for establishing appropriate maximum residue limits (MRLs).

4.2 Each country should possess or have access to facilities to verify and exercise control over the quality of pesticides offered for sale, to establish the quantity of the active ingredient or ingredients and the suitability of their formulation (8).

4.3 International organizations and other interested bodies should, within available resources, consider assisting in the establishment of analytical laboratories in pesticide-importing countries, either on a country or on a multilateral regional basis; these laboratories should be capable of carrying out product and residue analysis and should have adequate supplies of analytical standards, solvents and reagents.

4.4 Exporting governments and international organizations must play an active role in assisting developing countries in training personnel in the interpretation and evaluation of test data.

4.5 Industry and governments should collaborate in conducting post-registration surveillance or monitoring studies to determine the fate and environmental effect of pesticides under field conditions (3).

#### *Article 5. Reducing health hazards*

5.1 Governments which have not already done so should:

5.1.1 implement a pesticide registration and control scheme along the lines set out in Article 6;

5.1.2 decide, and from time to time review, the pesticides to be marketed in their country, their acceptable uses and their availability to each segment of the public;

11/2

5.1.3 provide guidance and instructions for the treatment of suspected pesticide poisoning for their basic health workers, physicians and hospital staff;

5.1.4 establish national or regional poisoning information and control centres at strategic locations to provide immediate guidance on first aid and medical treatment, accessible at all times by telephone or radio. Governments should collect reliable information about the health aspects of pesticides. Suitably trained people with adequate resources must be made available to ensure that accurate information is collected;

5.1.5 keep extension and advisory services, as well as farmers' organizations, adequately informed about the range of pesticide products available for use in each area;

5.1.6 ensure, with the cooperation of industry, that where pesticides are available through outlets which also deal in food, medicines, other products for internal consumption or topical application, or clothing, they are physically segregated from other merchandise, so as to avoid any possibility of contamination or of mistaken identity. Where appropriate, they should be clearly marked as hazardous materials. Every effort should be made to publicize the dangers of storing foodstuffs and pesticides together.

5.2 Even where a control scheme is in operation, industry should:

5.2.1 cooperate in the periodic reassessment of the pesticides which are marketed and in providing the poison control centres and other medical practitioners with information about hazards;

5.2.2 make every reasonable effort to reduce hazard by:

5.2.2.1 making less toxic formulations available;

5.2.2.2 introducing products in ready-to-use packages and otherwise developing safer and more efficient methods of application;

5.2.2.3 using containers that are not attractive for subsequent reuse and promoting programmes to discourage their reuse;

5.2.2.4 using containers that are safe (e.g. not attractive to or easily opened by children), particularly for the more toxic home-use products;

5.2.2.5 using clear and concise labelling;

5.2.3 halt sale, and recall products, when safe use does not seem possible under any use directions or restrictions.

5.3 Government and industry should further reduce hazards by making provision for safe storage and disposal of pesticides and containers at both warehouse and farm level, and through proper siting and control of wastes from formulating plants.

5.4 To avoid unjustified confusion and alarm among the public, public-sector groups should consider all available facts and try to distinguish between major differences in levels of risk among pesticides and uses.

5.5 In establishing production facilities in developing countries, manufacturers and governments should cooperate to:

5.5.1 adopt engineering standards and safe operating practices appropriate to the nature of the manufacturing operations and the hazards involved;

5.5.2 take all necessary precautions to protect the health and safety of operatives, bystanders and the environment;

5.5.3 maintain quality-assurance procedures to ensure that the products manufactured comply to the relevant standards of purity, performance, stability and safety.

#### *Article 6. Regulatory and technical requirements*

6.1 Governments should:

6.1.1 take action to introduce the necessary legislation for the regulation, including registration, of pesticides and make provisions for its effective enforcement, including the establishment of appro-

private educational, advisory, extension and health-care services: the FAO guidelines for the registration and control of pesticides (9) should be followed, as far as possible, taking full account of local needs, social and economic conditions, levels of literacy, climatic conditions and availability of pesticide application equipment;

6.1.2 strive to establish pesticide registration schemes and infrastructures under which products can be registered prior to domestic use and, accordingly, ensure that each pesticide product is registered under the laws or regulations of the country of use before it can be made available there;

6.1.3 protect the proprietary rights to use of data;

6.1.4 collect and record data on the actual import, formulation and use of pesticides in each country in order to assess the extent of any possible effects on human health or the environment, and to follow trends in use levels for economic and other purposes.

6.2 The pesticides industry should:

6.2.1 provide an objective appraisal together with the necessary supporting data on each product;

6.2.2 ensure that the active ingredient and other ingredients of pesticide preparations marketed correspond in identity, quality, purity and composition to the substances tested, evaluated and cleared for toxicological and environmental acceptability;

6.2.3 ensure that active ingredients and formulated products for pesticides for which international specifications have been developed conform with the specifications of FAO (8), where intended for use in agriculture; and with WHO pesticide specifications (10), where intended for use in public health;

6.2.4 verify the quality and purity of the pesticides offered for sale;

6.2.5 when problems occur, voluntarily take corrective action, and when requested by governments, help find solutions to difficulties.

#### *Article 7. Availability and use*

7.1 Responsible authorities should give special attention to drafting rules and regulations on the availability of pesticides. These should be compatible with existing levels of training and expertise in handling pesticides on the part of the intended users. The parameters on which such decisions are based vary widely and must be left to the discretion of each government, bearing in mind the situation prevailing in the country.

7.2 In addition, governments should take note of and, where appropriate, follow the WHO classifications of pesticides by hazard (11) and associate the hazard class with well-recognized hazard symbols as the basis for their own regulatory measures. In any event, the type of formulation and method of application should be taken into account in determining the risk and degree of restriction appropriate to the product.

7.3 Two methods of restricting availability can be exercised by the responsible authority: not registering a product; or, as a condition of registration, restricting the availability to certain groups of users in accordance with national assessments of hazards involved in the use of the product in the particular country.

7.4 All pesticides made available to the general public should be packaged and labelled in a manner which is consistent with the FAO guidelines on packaging (12) and labelling (13) and with appropriate national regulations.

7.5 Prohibition of the importation, sale and purchase of an extremely toxic product may be desirable if control measures or good marketing practices are insufficient to ensure that the product can be used safely. However, this is a matter for decision in the light of national circumstances.

#### *Article 8. Distribution and trade*

8.1 Industry should:

8.1.1 test all pesticide products to evaluate safety with regard to

human health and the environment prior to marketing, as provided for in Article 4, and ensure that all pesticide products are likewise adequately tested for efficacy and stability and crop tolerance, under procedures that will predict performance under the conditions prevailing in the region where the product is to be used, before they are offered there for sale;

8.1.2 submit the results of all such tests to the local responsible authority for independent evaluation and approval before the products enter trade channels in that country;

8.1.3 take all necessary steps to ensure that pesticides entering international trade conform to relevant FAO, (8), WHO (10) or equivalent specifications for composition and quality (where such specifications have been developed) and to the principles embodied in pertinent FAO guidelines, and in rules and regulations on classification and packaging, marketing, labelling and documentation laid down by international organizations concerned with modes of transport (ICAO, IMO, RID and IATA in particular);<sup>1</sup>

8.1.4 undertake to see that pesticides which are manufactured for export are subject to the same quality requirements and standards as those applied by the manufacturer to comparable domestic products;

8.1.5 ensure that pesticides manufactured or formulated by a subsidiary company meet appropriate quality requirements and standards which should be consistent with the requirements of the host country and of the parent company;

8.1.6 encourage importing agencies, national or regional formulators, and their respective trade organizations to cooperate in order to achieve fair practices and safe marketing and distribution

practices and to collaborate with authorities in stamping out any malpractices within the industry;

8.1.7 recognize that the recall of a pesticide by a manufacturer and distributor may be desirable when faced with a pesticide which represents an unacceptable hazard to human and animal health and the environment when used as recommended, and cooperate accordingly;

8.1.8 endeavour to ensure that pesticides are traded by and purchased from reputable traders, who should preferably be members of a recognized trade organization;

8.1.9 see that persons involved in the sale of any pesticide are trained adequately to ensure that they are capable of providing the buyer with advice on safe and efficient use;

8.1.10 provide a range of pack sizes and types which are appropriate for the needs of small-scale farmers and other local users to avoid handling hazards and the risk that resellers will repackage products into unlabelled or inappropriate containers.

8.2 Governments and responsible authorities should take the necessary regulatory measures to prohibit the repackaging, decanting or dispensing of any pesticide in food or beverage containers and should rigidly enforce punitive measures that effectively deter such practices.

8.3 Governments of countries importing food and agricultural commodities should recognize good agricultural practices in countries with which they trade and, in accordance with recommendations of the Codex Alimentarius Commission, should establish a legal basis for the acceptance of pesticide residues resulting from such good agricultural practices (7, 14).

#### *Article 9. Information exchange*

9.1 The government of a pesticide-exporting country which takes action to ban or severely restrict the use or handling of a pesticide in order to protect health or the environment domestically should

<sup>1</sup> ICAO: International Civil Aviation Organization  
IMO: International Maritime Organization  
RID: International regulations concerning the carriage of dangerous goods by rail  
IATA: International Air Transport Association.

notify, directly or indirectly, the designated national authorities in other countries of the action it has taken (15).

9.2 The purpose of the notification regarding control action is to give competent authorities in other countries the opportunity to assess the risks associated with the pesticide, and to make timely and informed decisions as to the importation and use of the pesticides concerned, after taking into account local, public-health, economic, environmental and administrative conditions. The minimum information to be provided for this purpose should be:

9.2.1 the identity (common name, distinguishing name and chemical name);

9.2.2 a summary of the control action taken and of the reasons for it — if the control action bans or restricts certain uses but allows other uses, such information should be included;

9.2.3 the fact that additional information is available, and the name and address of the contact point in the country of export to which a request for further information should be addressed.

9.3 If export of a banned or severely restricted pesticide occurs, the country of export should ensure that necessary steps are taken to provide the designated national authority of the country of import with relevant information.

9.4 The purpose of information regarding exports is to remind the country of import of the original notification regarding control action and to alert it to the fact that an export is expected or is about to occur. The minimum information to be provided for this purpose should be:

9.4.1 a copy of, or reference to, the information provided at the time of the notification of control action;

9.4.2 indication that an export of the chemical concerned is expected or is about to occur.

9.5 Notification of control action should be provided as soon as practicable after the control action is taken. For pesticides banned

or severely restricted before the implementation of the Code, an inventory of prior control action should be provided to the International Register of Potentially Toxic Chemicals (IRPTC), unless such information has already been provided.

9.6 Provision of information regarding exports should take place at the time of the first export following the control action, and should recur in the case of any significant development of new information or condition surrounding the control action. It is the intention that the information should be provided prior to export.

9.7 The provision of such information by the exporting country must take into account protection of the confidentiality of data in the importing country.

9.8 Governments of importing countries should:

9.8.1 establish internal procedures for the receipt and handling of such information from the exporting country;

9.8.2 ensure that such information received is not used in any manner which would be inconsistent with the provisions of the General Agreement on Tariffs and Trade (GATT).

#### *Article 10. Labelling, packaging, storage and disposal*

10.1 All pesticide containers should be clearly labelled in accordance with applicable international guidelines, such as the FAO guidelines on good labelling practice (13).

10.2 Industry should use labels that:

10.2.1 include recommendations consistent with those of the recognized research and advisory agencies in the country of sale;

10.2.2 include appropriate symbols and pictograms whenever possible, in addition to written instructions, warnings and precautions;

10.2.3 in international trade, clearly show appropriate WHO hazard classification of the contents (11) or, if this is inappropriate

or inconsistent with national regulations, use the relevant classification;

10.2.4 include, in the appropriate language or languages, a warning against the reuse of containers, and instructions for the safe disposal or decontamination of empty containers;

10.2.5 identify each lot or batch of the product in numbers or letters that can be read, transcribed and communicated by anyone without the need for codes or other means of deciphering;

10.2.6 are marked with the date (month and year) of formulation of the lot or batch and with relevant information on the storage stability of the product.

10.3 Industry should ensure that:

10.3.1 packaging, storage and disposal of pesticides conform in principle to the FAO guidelines for packaging and storage (12), the FAO guideline for the disposal of waste pesticides and containers (16), and WHO specifications for pesticides used in public health (19);

10.3.2 in cooperation with governments, packaging or repackaging is carried out only on licensed premises where the responsible authority is convinced that staff are adequately protected against toxic hazards, that the resulting product will be properly packaged and labelled, and that the content will conform to the relevant quality standards.

10.4 Governments should take the necessary regulatory measures to prohibit the repacking, decanting or dispensing of any pesticide into food or beverage containers in trade channels and rigidly enforce punitive measures that effectively deter such practices.

#### *Article 11. Advertising*

11.1 Industry should ensure that:

11.1.1 all statements used in advertising are capable of technical substantiation;

11.1.2 advertisements do not contain any statement or visual presentation which, directly or by implication, omission, ambiguity or exaggerated claim, is likely to mislead the buyer, in particular with regard to the safety of the product, its nature, composition, or suitability for use, or official recognition or approval;

11.1.3 pesticides which are legally restricted to use by trained or registered operators are not publicly advertised through journals other than those catering for such operations, unless the restricted availability is clearly and prominently shown;

11.1.4 no firm or individual in any one country simultaneously markets different pesticide active ingredients or combinations of ingredients under a single distinguishing name;

11.1.5 advertising does not encourage uses other than those specified on the approval label;

11.1.6 promotional material does not include use recommendations at variance with those of the recognized research and advisory agencies;

11.1.7 advertisements do not misuse research results or quotations from technical and scientific literature and scientific jargon and irrelevances are not used to make claims appear to have a scientific basis they do not possess;

11.1.8 claims as to safety, including statements such as "safe", "non-poisonous", "harmless", "non-toxic", are not made, with or without a qualifying phrase such as "when used as directed";

11.1.9 statements comparing the safety of different products are not made;

11.1.10 misleading statements are not made concerning the effectiveness of the product;

11.1.11 no guarantees or implied guarantees -- e.g. "more profits



with...", "guarantees high yields" — are given unless definite evidence to substantiate such claims is available;

11.1.12 advertisements do not contain any visual representation of potentially dangerous practices, such as mixing or application without sufficient protective clothing, use near food, or use by or near children;

11.1.13 advertising or promotional material draws attention to the appropriate warning phrases and symbols as laid down in the labelling guidelines (13);

11.1.14 technical literature provides adequate information on correct practices, including the observance of recommended rates, frequency of applications, and safe pre-harvest intervals;

11.1.15 false or misleading comparisons with other pesticides are not made;

11.1.16 all staff involved in sales promotion are adequately trained and possess sufficient technical knowledge to present complete, accurate and valid information on the products sold;

11.1.17 advertisements encourage purchasers and users to read the label carefully, or have the label read to them if they cannot read.

11.2 International organizations and public-sector groups should call attention to departures from this Article.

11.3 Governments are encouraged to work with manufacturers to take advantage of their marketing skills and infrastructure, in order to provide public-service advertising regarding the safe and effective use of pesticides. This advertising could focus on such factors as proper maintenance and use of equipment, special precautions for children and pregnant women, the danger of reusing containers, and the importance of following label directions.

#### *Article 12. Monitoring the observance of the Code*

12.1 The Code should be published and should be observed

through collaborative action on the part of governments, individually or in regional groupings, appropriate organizations and bodies of the United Nations system, international governmental organizations and the pesticide industry.

12.2 The Code should be brought to the attention of all concerned in the manufacture, marketing and use of pesticides and in the control of such activities, so that governments, individually or in regional groupings, industry and international institutions understand their shared responsibilities in working together to ensure that the objectives of the Code are achieved.

12.3 All parties addressed by this Code should observe this Code and should promote the principles and ethics expressed by the Code, irrespective of other parties' ability to observe the Code. The pesticide industry should cooperate fully in the observance of the Code and promote the principles and ethics expressed by the Code, irrespective of a government's ability to observe the Code.

12.4 Independently of any measures taken with respect to the observance of this Code, all relevant legal rules, whether legislative, administrative, judicial or customary, dealing with liability, consumer protection, conservation, pollution control and other related subjects should be strictly applied.

12.5 FAO and other competent international organizations should give full support to the observance of the Code, as adopted.

12.6 Governments should monitor the observance of the Code and report on progress made to the Director-General of FAO.

12.7 Governing Bodies should periodically review the relevance and effectiveness of the Code. The Code should be considered a dynamic text which must be brought up to date as required, taking into account technical, economic and social progress.

# Annex

**FAO Conference Resolution 10185:  
International Code of Conduct**

**on the Distribution and Use of Pesticides**

## THE CONFERENCE.

*Recognizing* that increased food production is a high priority need in many parts of the world and that this need cannot be met without the use of indispensable agricultural inputs such as pesticides.

*Noting* that FAO's study entitled *Agriculture: toward 2000* foresees a steady increase in the worldwide use of pesticides.

*Convinced* that such growth in pesticide use is likely to take place in spite of necessary intensive parallel efforts to introduce biological and integrated pest control systems.

*Acknowledging* that pesticides can be hazardous to humans and the environment and that immediate action must be taken by all concerned, including governments, manufacturers, traders and users, to eliminate, as far as possible and within the scope of their responsibility, unreasonable risks, not only in the country of origin but also in the countries to which pesticides may be exported.

*Being* aware that the requirements for the safe and proper use of pesticides in some developed countries have led to the adoption of complex systems of regulations and of enforcement mechanisms, but that many other countries have neither such mechanisms nor the necessary legislation, regulations or infrastructures to control the import, availability, sale or use of pesticides.

*Convinced* that additional efforts are needed to enable such countries to control pesticides more effectively and to assess the hazards which could result from their use or misuse,

*Recognizing* that a voluntary International Code of Conduct, based on internationally agreed technical guidelines, would provide a practical framework for the control of pesticides, especially in countries that do not have adequate pesticide registration and control schemes,

*Noting* that such a draft Code was reviewed by the Committee on Agriculture at its Eighth Session, and endorsed by the Council at its Eighty-eighth Session,

*Having further noted* the conclusions and recommendations of these bodies.

1. *Hereby adopts* a voluntary International Code of Conduct on the Distribution and Use of Pesticides as given in the annex to this Resolution;
2. *Recommends* that all FAO Member Nations promote the use of this Code in the interests of safer and more efficient use of pesticides and of increased food production;
3. *Requests* governments to monitor the observance of the Code, in collaboration with the Director-General who will report periodically to the Committee on Agriculture;
4. *Invites* other United Nations agencies and other international organizations to collaborate in this endeavour within their respective spheres of competence.

*(Adopted 28 November 1985)*

1/20

The Conference agreed that it was essential to maintain a consensus on the proposals made for the inclusion of PIC in the Code. The Conference, therefore, decided that additional changes and amendments should not be included in the Code and Guidelines at this stage but should first be considered by the appropriate Panel of Experts and subsequently submitted through COAG and Council to Conference for its review and decision, together with a progress report on the implementation of the Code and PIC.

In order to provide for immediate implementation of the PIC procedure, the Conference adopted the following Resolution:

Resolution 6/89

INCLUSION OF PRIOR INFORMED CONSENT IN THE  
INTERNATIONAL CODE OF CONDUCT ON THE  
DISTRIBUTION AND USE OF PESTICIDES

THE CONFERENCE,

Considering Resolution 3/87 of the Twenty-fourth Session of the Conference in which it was decided that "in the Code of Conduct on the Distribution and Use of Pesticides" the principle of "prior informed consent" should be incorporated within the next biennium,

Taking note of the action taken by the Director-General to implement the Conference decision which included an Expert Consultation and a Government Consultation, which had reached general agreement on the operation of the Prior Informed Consent procedure and of the amendments required for the inclusion of Prior Informed Consent in the Code,

Noting the decisions of the Governing Council of UNEP to amend the "London Guidelines for the Exchange of Information on Chemicals in International Trade" to include Prior Informed Consent, and the emphasis placed by the Governing Council on the necessity of cooperation between UNEP and FAO on the implementation of Prior Informed Consent,

Considering the recommendations of COAG to Council and the recommendations of the Council to the Conference,

1. Decides to amend Articles 2 and 9 of the Code as indicated in Section A of Appendix E;
2. Authorizes the Director-General to establish a programme to implement Prior Informed Consent procedures, as outlined in Section A of Appendix E;
3. Requests the Director-General to seek to establish such a programme jointly with UNEP.

(Adopted 29 November 1989)

121

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