PN-AAZ-653
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The Conservation Foundation

OPPORTUNITIES TO ASSIST DEVELOPING COUNTRIES IN THE PROPER USE OF AGRICULTURAL AND INDUSTRIAL CHEMICALS

Report of the
Committee on Health and Environment

Volume 1

Prepared by

The Committee on Health and Environment
and
The Conservation Foundation

on behalf of the

U.S. Agency for International Development

FINAL REPORT
FEBRUARY 18, 1988

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TABLE OF CONTENTS

VOLUME 1

Preface
Acknowledgments
Executive Summary

Chapter 1: Chemicals and Pesticides in Developing Countries
- A. Use Patterns
- B. Effects
- C. Underlying Conditions that Exacerbate Problems

Chapter 2: A.I.D.'s Role in the Pesticide/Chemical Problem
- A. Complexity of Chemical and Pesticide Problems
- B. Constraints on A.I.D.
- C. A.I.D.'s Environmental Regulations and Pesticide Policy
- D. A.I.D. and Integrated Pest Management
- E. A.I.D.'s Role in Pollution from Chemical Industries

Chapter 3: Recommendations
1. Strengthening Constituencies for Chemical and Pesticide Issues
2. Environmental and Pesticides Policies and Procedures
3. Integrated Pest Management
4. Chemical Industries: Planning for Assistance
5. Annual Reporting to Congress
6. U.S. Government Policy and Coordination

Annex A: List of Verifiable Indicators
Annex B: Pesticides in Central America
References
Glossary of Terms and Acronyms

VOLUME 2

Appendix 1: A.I.D.'s Organization and Structure

Appendix 2: A.I.D.'s Environmental Regulations and Pesticide Policy

Appendix 3: A.I.D.'s Policies and Programs Regarding Agricultural and Industrial Chemicals in Developing Countries

Appendix 4: Opportunities for Coordination Among U.S. Agencies

Appendix 5: Other Donors' Policies

Appendix 6: Integrated Pest Management Programs in Developing Countries: Lessons from Case Studies

Appendix 7: Bibliography

PREFACE

This report examines opportunities for the U.S. Agency for International Development (A.I.D.) to assist developing countries in properly using agricultural and industrial chemicals,* and developing safer alternatives. Other international development agencies are encouraged to consider the contents of this report and incorporate applicable recommendations into their policies and procedures.

The recommendations in this report were developed by The Committee on Health and Environment, which includes representatives of environment, industry, labor, and universities. Participants were selected for their experience in developing countries and for their expertise in both natural and social sciences relevant to pesticide and chemical use. The Committee was formed by A.I.D., assisted by The Conservation Foundation, pursuant to section 539(i) of the Foreign Assistance Appropriation Act of 1987 (P.L. 99-591). This section was introduced as an amendment to the Act by the House Appropriations Subcommittee on Foreign Operations, Export Financing, and Trade, chaired by Representative David Obey (D.-Wisconsin). The amendment established the objectives of the Committee on Health and Environment, which are as follows:

> To examine opportunities for assisting countries in the proper use of agricultural and industrial chemicals and processes and alternatives such as integrated pest management.

To develop the conclusions presented in this report, the Committee analyzed a broad array of issues pertaining to the use of pesticides and industrial chemicals in developing countries. Though it acknowledges the benefits of chemicals and pesticides when they are properly used, the report focuses on opportunities for A.I.D. to assist developing countries to prevent or reduce harmful economic, human health, and environmental effects of these substances. It also concentrates on opportunities that are clearly within A.I.D.'s mandate, although steps that could be taken by other organizations are also mentioned.

A.I.D. was established in 1961 and currently has programs in over 70 countries. The Agency has requested a budget of $5.8 billion for fiscal year 1988.** A.I.D.'s international influence, particularly in agricultural development ($616 million in 1987), places it in a key position to help developing

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* See the glossary at the conclusion of this volume for definitions of these terms.

** A.I.D. Congressional Presentation, 1987.

countries use agricultural and industrial chemicals more safely.*** The six recommendations described in this report, if acted upon, would significantly increase A.I.D.'s role in promoting that goal.

While many issues are beyond A.I.D.'s control, very few are beyond its ability to influence. The recommendations in this report are based on the premise that the Agency should strive to the fullest extent possible to set a positive example by encouraging safe and effective use of industrial chemicals and pesticides for the benefit of people in developing countries.

In developing these recommendations, Committee members drew on their own expertise, supplemented by information provided to them by The Conservation Foundation, a nonprofit policy research institution based in Washington, D.C. The background information included results of interviews with A.I.D. staff, a survey of literature on pesticide and chemical uses and effects in developing countries, information on current A.I.D. policies and programs, and reviews of the policies of other U.S. government agencies and of multilateral and bilateral development assistance institutions.

This report is divided into two volumes. The first, brief volume reviews the economic, health, and environmental costs that developing countries incur from improper use of pesticides and chemicals (chapter 1); explains the Committee's findings and major conclusions (chapter 2); and, in greater detail, outlines the Committee's recommendations regarding actions that A.I.D. should take to improve the safe use of pesticides and chemicals in developing countries (chapter 3).

The supplementary volume to this report describes more fully the information that the Committee considered in developing its recommendations.

*** For purposes of this report, "safe use" includes safe manufacture, formulation, transport, use, storage, and disposal, as well as the development and use of safer alternatives.

ACKNOWLEDGMENTS

This report is a product of the contributions of many people who gave their time and effort to provide information and thoughtful insights to the Committee on Health and Environment and to Conservation Foundation staff.

While it is not possible in this space to name all contributors to this effort, The Conservation Foundation and the Committee on Health and Environment particularly acknowledge the contributions of A.I.D.'s numerous staff people who worked hard to ensure that this report was both useful and accurate. Particular thanks are due to **Mary Lou Higgins**, the A.I.D. project officer for this effort, and to **Norman Cohen**, the Agency's Environment Coordinator. Others whose contributions have been helpful include **Bessie Boyd, Carol Collier, Jim Hester, Gudren Huden, Pat Koshel, Molly Kux, Steven Lintner, Jeff Schweitzer,** and **Jack Vanderryn.** The high quality of the assistance provided by these and other A.I.D. employees has made this report possible.

The Committee on Health and the Environment and The Conservation Foundation, however, bear full responsibility for the contents of this report, including any errors or omissions.

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EXECUTIVE SUMMARY

This report examines opportunities to assist developing countries in the proper use of agricultural and industrial chemicals, and in the development and use of safer alternatives. The conclusions and recommendations primarily are based on the Committee on Health and Environment's review of the U.S. Agency for International Development's (A.I.D.'s) role. Many of the conclusions and recommendations are useful for other international development assistance agencies as well.

The Committee concluded that problems in developing countries related to chemicals and pesticides are growing; that A.I.D. has exemplary environmental regulations regarding pesticide and chemical provision and use; and that the Agency needs to take stronger actions to help developing countries ameliorate the adverse side effects of pesticide and chemical use.

CONCLUSIONS

Conclusion #1: Misuse and excessive use of pesticides and chemicals are significant and widespread problems in developing countries.

The use of pesticides and industrial chemicals in developing countries has increased rapidly in recent decades (1). Properly used, these products contribute to economic development, increase productivity in the agricultural and industrial sectors, and improve health and welfare. Improperly used, however, these benefits are reversed and societies incur losses through human illness, environmental damage, and economic costs.

People in developing countries use only 25% of the world's pesticides, yet they suffer half of the acute poisonings reported worldwide and between 73% and 99% of the deaths (2). Pesticide resistance among insect pests is a major problem in developing

countries. It subverts efforts to increase agricultural production and to reduce the incidence of vector-borne diseases. There is convincing evidence that pesticides and chemicals cause substantial damage to forests, fisheries, and other economically important natural resources (3). Finally, rapid industrialization in some parts of the developing world increases risks to humans and the environment from leaks, accidents, and routine emissions during formulation, transport, storage, and disposal of chemicals. Although expensive to correct, effective planning and implementation of laws can reduce these risks.

Conclusion #2: A variety of interlocking political, economic, health, and environmental factors contribute to and result from the misuse of pesticides and other chemicals.

In developing countries, a number of factors tend to heighten the risks to health and environment as pesticides and chemicals are produced, used, stored, and disposed. Some of these factors are related to economic conditions and government policies. For example, subsidies of pesticides by developing countries, intended to promote agricultural development, often encourage excessive use of pesticides. Other contributing factors include lack of education among workers, many of whom are women and children; lack of information on hazards and alternatives; increased susceptibility of workers to toxins because of generally poor health; and inadequate regulatory policies and enforcement structures.

Conclusion #3: A.I.D. is constrained by a number of factors in its ability to address the problems of chemical and pesticide misuse. One significant impediment is the inconsistent implementation of environmental policies among U.S. Government agencies operating overseas.

Some of the factors that constrain A.I.D. include the differing needs and levels of development of the countries it assists, the difficulty of implementing programs in accordance with multiple U.S. and international policy objectives, administrative difficulties imposed by the Agency's size and global nature, and budget constraints.

Coordination of environmental policies can be particularly difficult with other U.S. agencies that have different mandates. For example, A.I.D. and the Department of Agriculture have recently been involved in a debate over the environmental procedures that should be followed in a Mediterranean fruit fly eradication program in Central America. This and other international programs of the U.S. Government that have environmental implications are guided only by Executive Order 12114, which leaves a variety of key issues unresolved and is vulnerable to being rescinded by a future Administration.

Conclusion #4: A.I.D.'s environmental and pesticide regulations and policies are exemplary, but the Agency needs to implement them more effectively.

Twelve years ago, A.I.D. instituted its environmental procedures (22 CFR 216). The procedures' purpose was to "ensure that environmental factors and values are integrated into the A.I.D. decision-making process" (4). Since then the Agency has steadily increased its efforts with respect to pesticide and chemical problems in developing countries. For example, it conducts environmental evaluations of proposed projects; avoids providing highly toxic pesticides, especially to small farmers; conducts training programs on safe pesticide use; and funds research on alternative practices. It has also reduced the quantity of pesticides and industrial chemicals it provides through its overseas projects. In the industrial sector, A.I.D. has funded a project to bring U.S. industrial safety experts to visit their counterparts in developing countries. A.I.D.'s policies have set a precedent for other donors, some of which

have recently taken steps to develop guidelines on pesticide use in their own programs.

While A.I.D.'s policies are exemplary, they have not yet been implemented fully. In part this is due to the fact that pesticides and chemicals are readily available from other sources if A.I.D. refuses to provide them or places strict limitations on their use. In part it is also due to the fact that the Agency needs to reconsider various aspects of its regulations and improve its field capability to implement environmentally sound projects. The intensification of agriculture and the rapid pace of industrialization in many developing countries are increasing the risks of chemical misuse and accidents. The Committee on Health and Environment believes that A.I.D. and other international donors will be called on to take stronger actions in the future to help developing countries ameliorate the adverse side effects of pesticide and chemical use.

<u>Conclusion #5</u>: Promotion of Integrated Pest Management is an A.I.D. policy, and the Agency has initiated some IPM programs. However, IPM is not yet the mainstream strategy of its agricultural and vector control programs, and more empirically grounded research on IPM is needed.

IPM involves the use of a variety of pest control methods, including physical, biological, genetic and other controls, as well as pesticides. In agricultural settings, IPM relies on the concept of an economic threshold of crop damage, below which the cost to control a pest is greater than the benefits of doing so. Integrated disease control is a similar concept that applies to the use of various control methods for insect disease vectors.

While A.I.D.'s policies support IPM as a concept, the Agency tends to use IPM in special projects, rather than integrating it into its general agricultural development and vector control programs.

Conclusion #6: The importance of pollution problems caused by chemical industries is increasing rapidly in many developing countries. A.I.D. is well positioned to help developing countries address these problems because of its long-standing presence in developing countries and its access to U.S. expertise in pollution control technology.

A.I.D. is only one of many U.S. and international organizations with the responsibility to address problems related to the use, production, and disposal of chemicals. Further, the Agency's size and budget require that its role be limited. Nonetheless, the Agency's long-standing relationships with institutions and individuals in developing countries, its position as an influential international donor, and its policy commitment to environmentally sound development allow it to have an important influence. A.I.D.'s ability to assist developing countries by drawing on the United States' private and public sector capabilities in pollution control are another asset.

RECOMMENDATIONS

The six recommendations in this report anticipate the demands of the future, while drawing on lessons learned in the twelve years of A.I.D.'s experience with its environmental regulations and policies. Combined, the picture that emerges is one of multiple opportunities for both A.I.D. and the rest of the international development assistance community to make a decisive contribution to the mitigation of damages from pesticide and chemical misuse. The recommendations suggest that the Agency expand its influence by working with other groups, and enhance the effectiveness of its own development assistance programs. However, A.I.D., and particularly the Missions located in host countries, should continue to take the lead in choosing, from among the many identified problems, those that most need to be addressed in their specific countries.

The Committee expects that modifications in A.I.D.'s programming and administration of its resources, rather than budget increases, are necessary to implement most of these recommendations. The interested reader should consult chapter 3 of this report for more details regarding specific examples and implementation suggestions.

Recommendation #1: A.I.D. and other donors should work to strengthen and increase the number of constituencies in multiple sectors and levels of society which actively support safe and environmentally sound use of pesticides and industrial chemicals in developing countries.

As noted earlier, pesticide and chemical problems are complex and interlocking; they have economic, environmental, and political dimensions that cut across agricultural, health, and other sectors. Therefore, any viable strategy for addressing them must enlist the support of groups in all these sectors. Influential groups ("constituencies") for safe and sustainable uses of chemicals and pesticides include host-country governments, industries, nongovernment organizations, the research community, U.S. agencies, and international agencies. Such groups can conduct and support a wide range of constructive activities, and working with them is consistent with the Agency's overall commitment to build institutions and human resources in developing countries. Examples of activities that A.I.D. can help constituents to undertake include educating the public, training workers, modifying national or state policies that may encourage overuse, studying ecological effects of farming practices, providing technical assistance, and implementing or monitoring international guidelines.

Recommendation #2: A.I.D. should enhance the effectiveness of its agricultural and health programs that affect or involve pesticide or chemical use.

Actions to enhance the effectiveness of A.I.D.'s own assistance programs that relate to the problems of chemicals and pesticides should be a priority because A.I.D.'s greatest opportunity to effect change is through the activities it controls directly. Furthermore, A.I.D.'s credibility -- and thus its influence with other constituencies -- is enhanced by demonstrated examples of success at achieving development objectives while minimizing adverse ecological and health impacts.

Particular actions the Agency should take include the following:

- Improve the capability of its professional staff to address environmental issues.

- Expand efforts to obtain the perspectives of project beneficiaries, and evaluate projects for environmental consequences.

- Reduce the administrative burden (though not the thoroughness) of its environmental and pesticide procedures.

- Consider increasing the share of its budget allocated to projects designed specifically to address pesticide or chemical problems in the agricultural and health sectors.

- Strive to apply its environmental regulations and pesticide policy in Agency-supported projects in which pesticides and chemicals are provided by non-Agency sources, e.g. where A.I.D. is a minor donor to a multi-donor effort.

- With the assistance of an advisory group, reconsider whether or under what conditions providing safe

pesticides through nonproject assistance might increase the Agency's ability to promote proper use of pesticides. (This might be the case because there is substantial evidence that other countries readily provide pesticides when the U.S. will not.)

<u>Recommendation #3</u>: A.I.D. should increase its use of Integrated Pest Management (IPM) significantly, with the goal of making IPM its primary pest management approach. Achieving this goal will require improved implementation and more support for research and training, and would have a catalytic effect on other donors.

The Committee and other experts agree that IPM and integrated disease control, if properly managed, are more sound from an economic, agricultural, public health, and environmental perspective than approaches that use chemicals as the primary means of control. Moving IPM from the demonstration phase to the general approach used by A.I.D. and other donors is now critical.

Bringing IPM into the mainstream of the Agency's activities, and indeed, making it a higher priority for all international donors, will require A.I.D. and other donors to support more training and research. Training might be targeted at other trainers, for example, agricultural extension workers in host countries. Research must be supported at a higher level; one good way to do this is to conduct agricultural development projects such that scientifically useful information on IPM will be obtained. Attention should be paid to designing projects with longer timeframes, collecting data from control plots that use chemical-intensive methods, developing economic thresholds for more crops, and evaluating all projects from both a technical and a sociological standpoint.

Recommendation #4: In cooperation with other U.S. agencies and the private sector, A.I.D. should prepare a long-term plan for its role in preventing and mitigating problems associated with activities involving industrial chemicals in developing countries.

A.I.D. and other international donors are increasingly being called on to assist developing countries to ameliorate problems resulting from their rapidly expanding use and production of industrial chemicals. For example, the Agency can help develop accident contingency plans, assist in identifying and cleaning up hazardous wastes, and train industrial workers in occupational health and safety. Because the situation is complicated by the social and economic differences between the three main geographic areas of the developing world, and because A.I.D.'s resources for such activities are likely to continue to be limited, a long-term plan will help target the Agency's resources and maximize their impact.

Recommendation #5: A.I.D. should report to Congress every two years, beginning in 1989, on its progress toward implementing the recommendations in this report and on future opportunities to address pesticide and chemical issues in developing countries.

The Committee believes that the issues raised in this report are sufficiently important to merit discussion in broader U.S. Government policy-making circles.

Recommendation #6: Congress should provide clear policy guidance to U.S. Government agencies regarding the provision to, and use of, agricultural and industrial chemicals in developing countries. The Executive Branch should then implement that policy in a consistent fashion.

The efforts of all U.S. agencies internationally would be more successful and cost-effective if they were governed by consistent policies regarding the provision and use of chemicals to developing countries. A number of examples of inconsistencies have arisen over time, some of which cannot be satisfactorily resolved by agencies that have different mandates. Therefore, the Committee recommends that Congress direct the Office of Technology Assessment (OTA) to study the problem, and then draw on OTA's findings to provide clear policy guidance. The Executive Branch should then coordinate activities and approaches so that the policy is implemented in a consistent fashion.

REFERENCES FOR EXECUTIVE SUMMARY

1. D. Halliday and L. Donegan, "Quality Control and Analysis of Pesticides in Developing Countries," paper published by Tropical Development and Research Institute, undated.

2. Jeyarajah Jeyaratnam, "1984 and Occupational Health in Developing Countries," Scandinavian Journal of Work, Environment, and Health, 11:229-234, 1985. See also David Bull, A Growing Problem: Pesticides and the Third World Poor. (Oxford: Oxfam, 1982), p. 38; and L.W. Goodman and B. Portilla, "Foreign Toxins: Multinational Corporations and Pesticides in Mexican Agriculture." paper prepared for World Resources Institute conference, 1985.

3. Instituto Centro America de Investigacion y Technologia-Guatemala (ICAITI). "An Environmental Study of the Consequences of Pesticide Use in Central American Cotton Production," 1976. See also R.J. Hall, "Impact of Pesticides on Bird Populations," Silent Spring Revisited, 1987; K.A. King and A.J. Krynitsky, "Population Trends, Reproductive Success, and Organochlorine Chemical Contaminants in Waterbirds Nesting in Galveston Bay, Texas," Archives of Environmental Contamination and Toxicology 15(4):367-76, 1986; and S.N. Weimeyer, et al., "DDE, DDT and Dieldrin: Residues in American Kestrels and Relation to Reproduction," U.S. Fish and Wildlife Service, Fish and Wildlife Technical Report 6, 1986.

4. Agency for International Development, Environmental Procedures, 22 CFR Part 216, October 9, 1980.

CHAPTER 1:
CHEMICALS AND PESTICIDES IN DEVELOPING COUNTRIES

Several factors impel the need for the U.S. Agency for International Development (A.I.D.) to examine its policies and procedures concerning the use of pesticides and industrial chemicals in developing countries. Among these factors are trends in developing countries' use and production of pesticides and industrial chemicals; the economic, environmental, and human health effects of these trends; and underlying conditions in developing countries that exacerbate the negative effects of chemicals and pesticides. Analysis of the evidence concerning these factors indicates that developing countries need assistance to reduce overall use of chemicals and pesticides and to use and produce them more safely. A survey view of the problems also highlights the importance of addressing them in an interdisciplinary and intersectoral fashion. Both causes and effects cut across the agricultural, health, and environmental sectors of society, and have economic, political, and environmental dimensions.

A. USE PATTERNS

Use of both pesticides and industrial chemicals in developing countries has increased rapidly in recent decades (1). Pesticides are used to protect agricultural products for both domestic and international markets, and are critical for disease prevention. Despite their use, about one-third of crops are still lost to pests each year and malaria alone affects over 100 million people annually (2). Finally, a wide variety of industrial and commercial activities and products are dependent on the use and production of chemicals.

1. PESTICIDE USE

Pesticides have been used extensively in developing countries since the 1950s, when they gained importance as key components for both Green Revolution agricultural technologies and public health programs to control vector-borne diseases. In developing countries, pesticide use is now thought to account for between 10% and 25% of the world supply (3,4). In some regions, pesticide expenditures are projected to at least double and possibly triple by 1995, assuming current use rates (5). Most of this increase is expected to occur in agriculture; vector control uses of pesticides, on the other hand, remained fairly constant in the Americas from 1983 through 1986 (6). Developing countries are expected to continue increasing both the absolute quantities of pesticides they use and their proportion of the increasing global consumption (7) (see annex B for information on pesticide use in Central America).

A number of factors contribute to excessive use and misuse of pesticides by many farm and health workers in developing countries, in turn increasing their exposure and risk.

Some of these factors are related to economic conditions and related government policies. Governmental pricing and input subsidies, which are intended to stimulate agricultural production, lower the costs to farmers of pesticides and other agricultural inputs, thus providing incentives to use more. In the health sector, subsidies are used because of the importance of lowering the incidence of illness caused by vector-borne diseases; again such subsidies create incentives to use pesticides. Other governmental factors contribute to excessive use of pesticides, too. For example, political pressures driven by economic concerns often cause governments to give more funding and political support to agricultural and commerce ministries than to environmental ministries. As another example, cosmetic standards for produce demanded by the international market encourage heavy pesticide use (8), although tests for residue

levels by importing countries offset this factor to a certain extent.

Farmer and consumer attitudes influence pesticide use as well. Many farmers in developing countries use substantial quantities of pesticides because they believe that pesticides are effective and because they lack information on alternatives and hazards. Governmental extension services and research agencies usually promote the use and development of more pesticides because they are simpler to develop and transfer than alternatives such as Integrated Pest Management.

Geography is a third factor. Tropical climates permit more crop cycles per year than temperate zones, so that over the course of a year greater quantities of pesticides are commonly used. Workers frequently reject protective clothing as too uncomfortable to use in tropical climates.

Lack of information on hazards and alternatives is a further contributing factor to pesticide misuse. Distributors often repackage and sell pesticides without the label information that accompanied the original shipment. User illiteracy and warning labels in languages other than the users' further impede the communication of appropriate information (9). Additionally, farmers in developing countries frequently lack access to technical assistance, and what little information they do receive about proper application rates can be undercut by distributors and advertising that promote pesticides.

Poor education contributes to misuse and overuse as well. In many agricultural areas in developing countries, the prevailing division of labor means that children in their preteens or early teens and women are the principal pesticide applicators and laborers in treated fields. Not only are these groups often poorly educated, but they also are among the most vulnerable to the health effects that can result from high exposure (10). Agriculture and health workers in developing countries often use particularly dangerous pesticides that are not regulated as they are in developed countries (11). Laborers

are often unaware of the importance of observing practices that could reduce their exposure, such as waiting to reenter treated fields.

2. INDUSTRIAL CHEMICAL USE

The variety of chemicals in industrial use worldwide is generally estimated at around 100,000. More than 1,500 new chemicals are introduced into commerce each year (12). Total worldwide volume of chemicals sold in 1981 was nearly 5 billion tons (13). Many developing countries still import most of the chemicals they use, but productive capability and use are quickly expanding in the rapidly industrializing countries. In 1986 and 1987, preliminary projections indicate that the output of industrial chemicals increased by 7% in developing countries, as contrasted with 3.5% to 5% in developed countries (14). Associated with increasing chemical manufacturing and use is a growing need in most developing countries to safely dispose of unused chemicals and chemical by-products. As in many developed countries, the capacity to handle these wastes safely is limited.

B. EFFECTS OF PESTICIDES AND INDUSTRIAL CHEMICALS

Although pesticides and chemicals can be beneficial when used properly, they can result in high costs when used in excessive amounts or without proper safeguards. These costs must be absorbed by developing countries' economies, human populations, and natural environments.

1. ECONOMIC EFFECTS

The economic costs of pesticide overuse and misuse are significant but very difficult to calculate with precision. Costs of industrial chemical use are even more difficult to estimate accurately. In both cases, costs are both direct and indirect.

Costs to developing country economies vary and can be affected by government policies. Subsidies of pesticides by developing countries use large quantities of scarce economic resources and encourage inefficiencies in the agricultural sector (15). Export revenues are lost when crops or livestock are rejected by importing countries because of high pesticide residues (16). Recently, many countries have begun to promote alternatives to high pesticide use in response to these economic pressures.

Excessive use of pesticides extracts costs from the natural environment, and many of these costs are eventually passed on to humans as economic costs. Excessive use can decrease soil productivity (17). Overuse or improper disposal of pesticides and fertilizers can damage commercially important wildlife-based industries such as shrimp mariculture, harm soil quality which in turn results in decreased yields, and contaminate water supplies.

Pesticide resistance resulting from excessive or inappropriate use has been reported for one or more pesticides in nearly 450 insect crop pests and disease vectors (18). The economic costs of resistance are varied and substantial. Governments and individuals incur increased costs to control and treat vector-borne diseases. Farmers experience costs through decreased yields and the cost of purchasing more, increasingly expensive pesticides. Secondary pests often emerge and cause serious agricultural damage (19). As pesticide effectiveness declines, pressures increase for the government to subsidize their use. When governments yield to this pressure, the spiraling cycle of overuse continues. In many crops, pesticides account for 10% to 15% of farm production costs, and there is evidence that pesticides account for 50% of production costs in some crops (20). In fact, many documented cases of insect resistance in the health sector appear to have resulted from overuse in agriculture (21).

Economic costs also result when human health declines because of exposure to hazardous substances. Costs occur in the

form of decreased labor productivity, increased health care consumption, and the need to provide new sources of safe drinking water and food, among others. (Human health effects of chemicals and pesticides are described in a later section.)

2. ENVIRONMENTAL EFFECTS

Only in recent years has the extent of environmental contamination from agricultural chemicals in temperate climates become clear. Under tropical conditions even less is known about the transport and fate of pesticides, though there have been reports of leaching and contamination in some regions (22). Fish and other wildlife can be poisoned at the site of application or disposal, either directly or by consuming plants, insects, or drinking water that have been contaminated. They can also be affected by off-site effects such as runoff into coastal fisheries or habitats such as reefs. Some types of pesticides accumulate in the food chain, so that even small amounts can lead to significant effects in higher animals. Chronic or one-time exposures of certain chemicals can damage the reproductive success of wildlife populations, reduce their resistance to disease, and cause deaths (23). In addition, pesticide exposures can disrupt metabolic processes and alter certain behavior patterns such as migration (24).

Within the soil, pesticides often cause harm to nontarget and beneficial species such as earthworms and pollinating insects. Soil microorganisms, which break down wastes and recycle chemical elements essential to plants, can also be harmed by pesticide residues. This causes reduced rates of soil decomposition and generally lower soil fertility. Pesticides have been shown to retard the development of plant roots and seedlings (25).

Another environmental problem is that natural predators of the target pest can be reduced or eliminated through exposure to pesticides. Certain fungicides reduce levels of fungi that are

natural insect pathogens (26). As a result, farmers can face new outbreaks of pests that were previously not a problem.

2. HUMAN HEALTH EFFECTS

The impacts of pesticides on human health depend on the toxicity of the chemical or pesticide and the duration and type of exposure, as well as the health status of the exposed populations. Most cases of acute pesticide and chemical poisonings occur in occupational settings. The general public can be exposed to pesticides or chemicals in a variety of ways as well. Their exposure is often indirect, such as contact with contaminated commodities, water, or air.

Either direct or indirect exposure can lead to chronic (building up over a long time) or acute (with toxic levels immediately exceeded) intoxication. There are few data from human populations on the rates of chronic illnesses caused by regular and routine exposure over long periods of time, but studies have correlated long-term pesticide exposure with a number of life-threatening illnesses. Acute exposures are better documented and understood because they usually result in immediate illness that often can be directly linked to a particular incident and a specific chemical or pesticide.

Estimates of unintentional pesticide poisonings around the world range from 834,000 to 1.5 million annually; 3,000 to 20,000 of those poisoned die (27). In developing countries, it is estimated that 400,000 pesticide poisonings occur each year (28). It is generally accepted that these figures understate the actual numbers, because record-keeping is poor, and because victims may be discouraged from reporting poisonings or may not even realize the correlation between their illness and their exposure to pesticides. Regardless of the total count, it is clear that rates of pesticide poisonings in developing countries far exceed those that prevail in most developed countries. A.I.D. has reported that about 1,800 pesticide poisonings per

600,000 population occur in Central America each year, compared with 1 per 600,000 per year in the United States (29).

a. OCCUPATIONAL EXPOSURE

In developing countries, pesticide applicators have suffered the majority of reported poisonings. They account for half of the acute poisonings, and from 73% to 99% of the deaths associated with pesticides worldwide (30) -- though developing countries use only 25% of the world's pesticides (31). When poisonings occur, few pesticide applicators have access to medical care, and most physicians are not trained to recognize and treat the pesticide poisoning cases they see. Even if poisonings are recognized, antidotes are often unavailable, especially in rural areas where agrochemical poisonings are most common.

Although the majority of pesticide poisonings in agriculturally based economies will continue to occur among pesticide applicators, occupational exposures will increasingly be associated with manufacture, handling, and disposal in the rapidly industrializing countries. The overall magnitude of chemically induced health problems among developing country workers is difficult to assess, as illustrated by the United Nations' estimate that fewer than 5% of industrial accidents worldwide are reported in the press (32). However, studies of specific industries, sectors, and countries have documented very high rates of occupational illnesses in plants of all sizes and ownership structures and in many countries (33).

Occupational illnesses tend to be particularly common in small businesses and plants, which comprise the majority of workplaces in developing countries. Technology is often outdated and inadequately maintained, and managers and operators are poorly trained. The limited information that does exist correlating exposures with health effects tends not to be disseminated (34). Small companies do not account for all

occupational illness in developing countries, however; many large companies and multinational corporations have also failed to implement adequate protective measures.

b. GENERAL PUBLIC EXPOSURE

All phases in the life cycles of pesticides and chemicals pose hazards to the general public. These phases include manufacture, formulation, transport, use, storage, and disposal.

The general public's most common, direct exposure to pesticides results from aerial spraying in agriculture. People are also directly exposed when pesticides are applied aerially or in households to treat disease vectors. Indirect exposure is more common, however. Acute or chronic illness can result from washing, bathing, or drinking water from contaminated rivers and irrigation ditches, or from collecting water in used pesticide containers. In addition, residues remaining on produce and in the meat of livestock and wildlife often exceed levels considered acceptable by many developed nations.

The general public's most acute, although least frequent, exposures to industrial chemicals result from toxic vapors and liquids that escape during manufacturing accidents. Transportation and delivery vehicles involved in traffic accidents often spill their contents, exposing nearby communities. Many types of chemicals and pesticides are volatile, and storage facilties have been known to catch fire or leak large amounts of chemicals onto surrounding property or into water supplies. Over half of the 28 most serious accidents of this century have occurred in the last decade (35).

Continual releases, such as leaching of hazardous wastes from an insecure landfill or normal emissions and effluents from chemical plants, can cause both acute and chronic health problems. They can also contaminate food sources. Finally, the problem of how to dispose of obsolete pesticide stocks and toxic industrial chemicals in containers is becoming increasingly

urgent as the supplies age (sometimes into more toxic byproducts), as their storage containers degrade, and particularly as population growth causes residential neighborhoods to impinge upon storage sites (36).

C. UNDERLYING CONDITIONS IN DEVELOPING COUNTRIES THAT EXACERBATE PROBLEMS ASSOCIATED WITH CHEMICALS AND PESTICIDES

While the environmental, economic, and human health effects of pesticide and chemical manufacture and use are the same in developed and developing countries, the magnitude and the underlying causes of problems differ. Underdevelopment is characterized by poverty; unplanned and unmanageable growth; and a lack of policies, regulatory systems, enforcement, and information. All these forces exacerbate the adverse effects of pesticide and chemical manufacture and use.

The first underlying problem is that few countries have strong health, safety, and environmental protection statutes. Other economic priorities not only divert resources away from environmental programs; they actually lead to policies that encourage excessive and improper use of chemicals and pesticides. In particular, many developing country governments stimulate excessive use of pesticides with a variety of economic subsidies including artificially lowering pesticide prices, tax exemptions for pesticides, and tying agricultural crop insurance to usage of certain quantitites of pesticides (37). Notwithstanding this common pattern, many analyses show that the goals of agricultural and industrial development not only are compatible with environmental protection, but are, in fact, mutually dependent (38).

Second, even where policies and laws exist, regulatory infrastructures are usually insufficient to enforce them. A common problem results from disagreements about jurisdiction of government agencies, due in part to frequent changes in

administrations and personnel. Further, graft and corruption are common in many levels of developing country governments. These and other impediments to effective implementation mean that industries have fewer incentives to run safe operations than do their counterparts in industrialized countries.

Third, the underlying economic situation in many developing countries seriously impedes improved pesticide and chemical use. Resources for both public and private investment are scarce. As a result, many of the impediments to improved pesticide and chemical use -- especially for small, locally based companies -- result from a lack of capital with which to invest in safer technologies, lack of technical training on how to use them, and lack of dependable infrastructure and equipment (e.g., water, electricity, and transportation) that would allow firms to improve the technologies that they use (39).

Fourth, rapid urbanization has led to unplanned growth in many countries, depleting resources (e.g., water) and interspersing industries with high density residential populations. Without an infrastructure that can address the resulting problems, such living conditions compound the likelihood of exposure. For example, drinking and bathing water are often obtained from the same source, so people who wash off chemicals from their hands or clothes may drink from the same water later in the day. The high density of people residing near the plant at Bhopal, India, increased the human exposure to a deadly manufacturing accident there in 1984 (40).

Fifth, lack of data, barriers to the flow of data, and lack of trained personnel to generate and interpret data are pervasive problems for developing countries that are trying to monitor hazardous substances coming into their countries. Even when standards are available from other countries and monitoring is successful, geographic, climatic, and cultural variations often make the results inapplicable.

Finally, individuals in developing countries are especially vulnerable to the effects of environmental contaminants. Poor

general health status, malnourishment, and inadequate medical care make them physically more vulnerable to toxic substances (41). Lack of education and illiteracy contribute to overuse and misuse, while poor living conditions increase the likelihood of exposure.

REFERENCES FOR CHAPTER 1

1. D. Halliday and L. Donegan, "Quality Control and Analysis of Pesticides in Developing Countries," paper published by Tropical Development and Research Institute, undated.

2. United Nations Environment Program, "Profile," 1987.

3. Dale Bottrell, "Social Problems in Pest Management in the Tropics," Insect Science Applications (1983) 4(1-2): 179-84.

4. L.W. Goodman and B. Portilla, "Foreign Toxins: Multinational Corporations and Pesticides in Mexican Agriculture," paper prepared for World Resources Institute Conference, 1985.

5. For Latin America, see: David K. Burton and Bernard J.R. Philogene, An Overview of Pesticide Usage in Latin America, Department of Biology, University of Ottawa, 1985.

6. Pan American Health Organization, Report XXXV: Status of Malaria Programs in the Americas, working document CD32/INF/2, September, 1987.

7. Op cit., Halliday and Donegan.

8. David Weir and Mark Schapiro, Circle of Poison, (San Francisco: Institute for Food and Development Policy, 1981).

9. David Bull, A Growing Problem: Pesticides and the Third World Poor. (Oxford: Oxfam, 1982), p. 192.

10. David Michaels et al., "Economic Development and Occupational Health in Latin America: New Directions for Public Health in Less Developed Countries," American Journal of Public Health, May 1985.

11. Sandra Postel, "Defusing the Toxics Threat: Controlling Pesticides and Industrial Waste," Worldwatch Paper 79, Worldwatch Institute, 1987.

12. The Conservation Foundation, "State of the Environment: A View Toward the Nineties" (Washington, D.C.: The Conservation Foundation), 1987.

13. Organization of American States, "Background on the Problem of Trade in Toxic Products Banned or Restricted in the Producing Countries," August 3, 1987.

14. United Nations Industrial Development Organization, Industry and Development Global Report, 1986, p. 59.

15. Robert Repetto, Paying the Price: Pesticide Subsidies in Developing Countries, World Resources Institute, 1985.

16. Op cit., Goodman and Portilla; see also David Bull, op cit., p. 59.

17. Instituto Centro America de Investigacion y Technolgia (ICAITI), "An Environmental Study of the Consequences of Pesticide Use in Central American Cotton Production," 1976.

18. G.P. Georghiou, "The Magnitude of the Resistance Problem," in Pesticide Resistance: Strategies and Tactics for Management (Washington, D.C.: National Academy Press, 1986).

19. Michael Hansen, "Escape from the Pesticide Treadmill: Alternatives to Pesticides in Developing Countries." Institute for Consumer Policy Research, Consumers Union of the United States, 1987.

20. Jeffrey Leonard, Natural Resources and Economic Development in Central America, International Institute for Environment and Development, 1987, p. 145.

21. Op cit., Dale Bottrell

22. Op cit., David Bull

23. Op cit., ICAITI; see also Michael Hansen, op cit.; Dale Bottrell, "Social Problems in Pest Management in the Tropics," Insect Science Applications (1983) 4(1-2): 179-84.

24. David Pimentel, et al., "Environmental and Social Costs of Pesticides: A Preliminary Assessment," OIKOS, 34:126-140, 1980.

25. Committee of International Development Institutions on the Environment, "Pesticides and their Use," UNEP/CIDIE, Fifth Meeting, Luxembourg, 13-15 June, 1984.

26. Op cit., David Pimentel.

27. R. S. Levine, Assessment of Mortality and Morbidity Due to Unintentional Pesticide Poisoning, World Health Organization, 1985, p.4.

28. J.E. Davies, "Health Effects of the Global Use of Pesticides," report prepared for the World Resources Institute, 1985; and W.F. Alneida, "Agrochemicals: Human Exposures and Associated Health Effects," WHO Expert Committee on Environmental Pollution Control in Relation to Development, Geneva, Nov. 14-21, 1983.

29. Op cit., Jeffrey Leonard, p. 148.

30. Jeyarajah Jeyaratnam, "1984 and Occupational Health in Developing Countries," Scandinavian Journal of Work, Environment, and Health, 11:229-234, 1985; see also op cit., David Bull, p.38

31. Op cit., Goodman and Portilla

32. United Nations Center on Transnational Corporations, "Overview Paper for Informal Seminar to Further International Cooperation for Environmental Management of Industrial Process Safety and Hazards," December, 1985.

33. B.K. Lee, "Occupational Lead Exposure of Storage Battery Workers in Korea." British Journal of Industrial Medicine, 39: 283-289, 1982. See also John R. Goldsmith, "Occupational Health in Chinese Metallurgical Industries: Report Based on a Visit." American Journal of Industrial Medicine, 7:353-57, 1985.

34. International Labour Office, "The Application of International Labour Standards and Guidelines on Occupational Safety and Health and the Transfer of Technology," 1981.

35. Paul Shrivastava, Bhopal: Anatomy of a Crisis (Cambridge, Massachusetts: Ballinger, 1987).

36. Jeffrey Leonard, "Confronting Industrial Pollution in Rapidly Industrializing Countries: Myths, Pitfalls and Trade," Ecology Law Quarterly, 1985.

37. Op cit., Robert Repetto; see also Polly Hoppin, "Sistema de Control de Plaguicidas en el Ecuador: Sistema en Peligro," unpublished paper, Dec. 15, 1986.

38. Op cit., Jeffrey Leonard, 1985

39. Op cit., Jeffrey Leonard

40. Op cit., Paul Shrivastava

41. Op cit., David Bull, p. 38

CHAPTER 2:
A.I.D.'s ROLE IN ADDRESSING THE PESTICIDE/CHEMICAL PROBLEM

In considering opportunities for the U.S. Agency for International Development (A.I.D.) to better assist developing countries with chemical and pesticide problems, the Committee on Health and Environment sought to understand not only the use and effects of chemicals and pesticides in developing countries (as summarized in chapter 1), but also A.I.D.'s particular role and opportunities. Details from that inquiry are available in a separate volume containing appendices to this report.

The Committee began by reviewing A.I.D.'s overall organization, structure, and mandate (see appendix 1), and its current policies and programs that relate specifically to agricultural and industrial chemicals in developing countries (appendices 2 and 3). To put its findings in perspective, the Committee also examined the environmental programs and policies of other U.S. government agencies that have international responsibilities (appendix 4) and the environmental policies of other international donor agencies (appendix 5).

This chapter extrapolates from the analysis of the aforementioned materials to draw conclusions about A.I.D.'s role and opportunities to assist developing countries to use pesticides and chemicals properly.

A. COMPLEXITY OF PESTICIDE AND CHEMICAL PROBLEMS IN DEVELOPING COUNTRIES

Chapter 1 summarized the myriad economic, environmental, and health factors that both contribute to, and arise from, the improper use of pesticides and chemicals in developing countries. It also explained the fundamental relationship between underlying conditions such as poverty and low education levels and the negative effects that can accompany production and use of chemicals when they are not managed carefully.

While A.I.D. has initiated activities designed to address many of these problems and underlying conditions, it often has concentrated on indirect forms of assistance, channeled through other institutions that are in a better position to address particular problems. These institutions range from other international agencies, to host country governments, to private sector organizations within developing countries (1).

Strengthening and increasing the number of constituencies who can work for the proper use of chemicals and pesticides within their own countries and sectors is often the most cost effective means to achieve long-term, fundamental change. Consistent with this fact, institution building and private-sector development are two of the four goals that A.I.D. has defined as appropriate to help guide U.S. economic development assistance (2).

B. CONSTRAINTS

Some significant constraints limit A.I.D.'s ability to implement policies and projects in developing countries. The international scope of the Agency's operations imposes a variety of special considerations that are absent from many other U.S. government agencies.

Some of the policies and activities of other international development organizations constrain the Agency's activities. Consensus often must be reached with other organizations to coordinate development assistance (3). A.I.D.'s policies and project activities can be subverted if they are not coordinated with the rest of the international community, or if similar environmental policies are not observed by other organizations (4).

Intragovernmental considerations are important as well. A.I.D. must develop its programs in accordance with U.S. policy objectives (5). General humanitarian and development goals tend to remain consistent over time, but foreign policy objectives are

subject to rapid change. Moreover, environmental policies of U.S. agencies operating overseas sometimes are inconsistent with one another. For example, A.I.D. has come into conflict with the U.S Department of Agriculture regarding the environmental procedures to follow in a jointly funded program to control Mediterranean fruit flies in Central America (see appendix 4). Executive Order 12114 requires U.S. agencies operating overseas to establish procedures for conducting environmental impact analyses of projects that "significantly affect foreign environments" (6). Both USDA and A.I.D. have established such procedures, but they are not consistent (A.I.D.'s are more stringent than the Executive Order requires). Such conflicts over environmental procedures to be observed in overseas activities not only undermine the efforts of both agencies but also compromise the overall effectiveness and credibility of the U.S. Government in the countries where it operates.

Differing levels of development and varying needs among countries also pose challenges for A.I.D. (7). Individual A.I.D. Missions are, in an important sense, "guests" operating in the context of foreign countries' political systems and objectives. As such, their authority to propose environmental procedures, reforms, and restrictions is limited. Additionally, the Agency's priorities do not always coincide with the priorities of developing countries, especially given the prevailing notion among many of the latter that environmental management is a luxury (8). Nevertheless, A.I.D. can be and often is involved in stimulating policy reforms and new programs in a number of host countries. For example, the Agency often uses food aid (P.L. 480, Title I; see appendix 1) as a lever to promote host country government reforms.

Administrative factors also constrain A.I.D. The size and decentralized nature of the Agency, while necessary and appropriate given its international responsibilities, makes it logistically difficult to coordinate activities between A.I.D./Washington and the Missions (9).

In addition, budget constraints pose a significant problem for the Agency. Over the past few years, A.I.D.'s development assistance funds have declined steadily, while Congressional earmarks have further reduced the amount of discretionary funds available. These trends limit the opportunities to implement new and innovative projects, particularly long-term initiatives which are so critical in environmental management.

C. A.I.D.'S ENVIRONMENTAL PROCEDURES AND PESTICIDE POLICY

A.I.D.'s environmental procedures (22 CFR 216) and pesticide policy have set a constructive example for many other international organizations. The Agency's environmental procedures state that it should "integrate environmental factors and values into its decision making process" and assess and monitor the environmental effects of its activities (10). A.I.D.'s pesticide policy requires it to assess the impact of pesticides on public health and the environment before approving funding for the provision or use of pesticides (11).

Several constructive changes have occurred as a result of these policies. A.I.D. appears to have significantly reduced the quantity of pesticides provided through its development projects (12). Further, when it does provide pesticides, A.I.D. places more restrictions to protect health and the environment than it did previously (13). It has also influenced some bilateral and multilateral development assistance organizations to reconsider and, in some cases, revise their activities regarding pesticides (14). Additionally, the Agency has initiated some projects that address environmental health concerns as their principal objectives. For example, it has provided technical assistance and training in Integrated Pest Management in a variety of countries.

While these trends indicate movement in the right direction, the Agency still needs to more effectively use its environmental and pesticide policies to promote sound pest management

practices. At least four internal factors are inhibiting progress in this area.

First, A.I.D. has an insufficient number of overseas personnel with the technical training necessary to design and evaluate projects that fulfill the objectives of the Agency's environmental policies. For example, even though A.I.D. policies require that alternatives to chemicals be assessed in designing crop protection strategies, the Agency has too few adequately trained specialists in pest management and environmental protection to implement such a policy. This contributes to the problem that environmental requirements are often viewed as unimportant, and it also makes it difficult for Missions to use environmental analysis to constructively influence project design early in the process (15).

Second, when A.I.D. projects undergo midterm and final evaluations, environmental issues are frequently overlooked (16). To anticipate and avoid possible adverse effects, the Agency's environmental procedures and its pesticide policy require assessments of projects before they are initiated, and the environmental procedures also suggest monitoring projects "to the extent feasible and relevant ... to measure changes in environmental quality ... during their implementation [216.3(a)(8)]." However, once projects are underway, they are rarely monitored for compliance with environmental safety provisions (e.g., whether safe pesticide application procedures are being observed), nor are they generally assessed at their completion for environmental consequences (e.g., whether the pesticides have been adequately stored or disposed). Evaluations during and after projects are very important, because they provide opportunities to document aspects that should be handled similarly or differently in future projects and to create incentives for project implementors to comply with environmental conditions that may have been placed on the project at the outset.

A third shortcoming is that many A.I.D. Missions do not routinely analyze and address the underlying perspectives of project beneficiaries when they plan projects that involve pest management (17). Many farmers in developing countries prefer to rely on pesticides and chemicals as their primary means of pest control. To deemphasize intensive use of chemicals and to train farmers in proper use, it is necessary not only to understand that farmers prefer pesticides but also to understand the specific underlying reasons for that preference. If the reasons can be properly identified, alternatives can be constructed that meet those preferences. For example, local culture and customs affect views of pesticides. So do lack of understanding of the hazards, and farmer's desires for stable yields, for technologies that are easy to use, and for labor schedules that do not conflict with other community priorities. The more accurately these and other perspectives are understood, the more successful can be projects that introduce alternative approaches (18).

Fourth, procedural requirements intended to address potential damage to public health and the environment are often seen by field staff as a burden to circumvent, rather than as a vital step towards securing effective, sustainable, and environmentally sound projects. This problem arises in part from the need for more training (mentioned above), but also from the administrative burden often associated with complying with the environmental regulations, particularly when pesticides are involved (19).

D. A.I.D.'S PEST MANAGEMENT STRATEGIES

Although A.I.D.'s policy is to "de-emphasize the sole use of pesticides in pest management programs" and to "concentrate its effort in an integrated approach using all available pest management tools" (20), many of its agriculture projects still rely on chemicals rather than Integrated Pest Management (IPM - see glossary for definition) as the primary crop protection method (21).

A.I.D. has developed some special IPM demonstration projects, but has not yet implemented IPM throughout its agricultural and vector control programs. Its IPM projects have met with variable success. Administrative problems and a failure to collect data plagued a major effort in the Sahel (22). By contrast, an IPM project in Central America has been more successful, apparently due to its training orientation and the rapport local staff have developed with local farmers and officials (23).

A.I.D.'s experiences suggest that problems with IPM often can be social, adminstrative, and political. Technical improvements are needed in some cases, too. For example, A.I.D. does not routinely design and implement agricultural or health projects so that alternative pest management approaches can be compared empirically to chemical-intensive approaches (24). Such comparisons are important to build knowledge about the success or failure of various strategies and to let farmers and government agencies directly observe the benefits of alternatives.

E. A.I.D.'S ROLE IN ADDRESSING INDUSTRIAL CHEMICAL POLLUTION PROBLEMS

Currently, A.I.D.'s role in industrial and urban activities is very small in comparison with its agricultural and rural sector projects (25) (see appendix 3). Still, increasing urbanization and industrialization in certain developing countries -- and the associated potential for major environmental and human health problems relating to hazardous wastes and chemical accidents -- are confronting the Agency with pressures to allocate resources and to address social and economic concerns raised by these trends.

As Chapter 1 notes, development often results in occupational injuries and illnesses in chemical manufacturing industries. The lack of infrastructure in many rapidly developing countries to support proper manufacture, handling,

transportation, storage, and disposal of chemicals virtually guarantees that rapid industrialization will result in more routine as well as accidental releases of chemicals that threaten environmental quality and public health (26).

A.I.D. is well positioned to help developing countries deal with environmental problems associated with industrial activities. It has years of experience assisting a number of host countries, combined with direct access to U.S. industrial expertise and the experience of other U.S. government agencies, such as the U.S. Environmental Protection Agency and the National Institute for Occupational Safety and Health. Indeed, A.I.D. receives numerous requests for assistance in mitigating these types of problems, and is increasingly asked to help design strategies to prevent them. The Agency has responded to some of these requests. Yet it needs to further develop its environmental policies and strategies for meeting the increasing problems associated with industrial activities.*

E. CONCLUSIONS

From the preceeding overview of A.I.D.'s role in assisting developing countries to address the misuse and overuse of pesticides and chemicals, the Committee on Health and Environment has reached the following conclusions, which lead directly to the recommendations found in the next chapter.

1. **Misuse and excessive use of pesticides and chemicals are significant and widespread problems in developing countries.**

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* As of January, 1988, A.I.D. was drafting a policy paper to address explicitly, among other natural resource issues, the question of how the Agency can help developing countries appropriately handle hazardous substances, including pesticides.

2. A variety of interlocking political, economic, health, and environmental factors contribute to and result from the misuse of pesticides and other chemicals.

3. A.I.D. is constrained by a number of factors in its ability to address the problems of chemical and pesticide misuse. One significant impediment is the inconsistent implementation of environmental policies among U.S. Government agencies operating overseas.

4. A.I.D.'s environmental and pesticide regulations and policies are exemplary, but the Agency needs to implement them more effectively.

5. Promotion of Integrated Pest Management is an A.I.D. policy, and the Agency has initiated some IPM programs. However, IPM is not yet the mainstream strategy of its agricultural and vector control programs, and more empirically grounded research on IPM is needed.

6. The importance of pollution problems caused by chemical industries is increasing rapidly in many developing countries. A.I.D. is well positioned to help developing countries address these problems because of its long-standing presence in developing countries and its access to U.S. expertise in pollution control technology.

FOOTNOTES AND REFERENCES FOR CHAPTER 2

1. U.S. Agency for International Development, "Blueprint for Development. The Strategic Plan of the Agency for International Development," (1985).

2. Ibid.

3. Ibid., pp. vii, and 60-65.

4. See J.K. Jensen, "Pesticide Donations: the Need for Better International Collaboration," paper presented at the International Conference on Tropical Agriculture, 23-25 September, 1987, Kuala Lampur, Malaysia.

   Also, A.I.D. unclassified cable # 10007, from Khartoum, July 30, 1986.

5. Op cit., "Blueprint for Development".

6. Executive Order 12114, "Environmental Effects Abroad of Major Federal Actions," 3 Code of Federal Regulations 356, 1980.

7. Op cit. "Blueprint for Development".

8. Conservation Foundation (CF) staff interviews with A.I.D. staff, July-August, 1987.

9. CF staff interviews with A.I.D. staff, July-August, 1987.

10. 22 C.F.R. 216, 1978.

11. Agency for International Development, Bureau for Program and Policy Coordination, "Policy on Pesticide Support," May, 1978. (Supplements the procedure for evaluating pesticides requested by other governments as proposed in the Federal Register on Dec. 26, 1977.)

12. Ibid. Also, regarding Africa, unclassified cables: #10200, from Dakar, Oct. 6, 1987, and #13068, from Khartoum, Oct. 26, 1987; and memorandum from Bessie Boyd to Anne Hollander, October 15, 1987, "Pesticides and Use in A.I.D.".

13. Many recent Environmental Assessments and Initial Enironmental Examinations include extensive discussions of precautions to be used when applying pesticides. E.g., see Environmental Threshold Decision papers for: Agriculture, Research, Extension and Education project in Ecuador; Health Sector II project in Honduras; Multifoods Revolving Credit Facility in Latin America; Grenada Agricultural Sector Revitalization Projects; and Honduras Mosquitia Relief and Development Project.

14. For example, in order to address disagreements and confusion among international donors over key issues in the Africa campaign to control locust/grasshopper infestation, the FAO convened a meeting in December 1986 of international donors and affected African countries. The U.S. positions were adopted by the FAO and other donors into FAO policy for dealing with the crisis. Among the most important of these was the decision to discontinue the use of BHC and dieldrin, pesticides considered by the U.S. to be environmentally dangerous and unacceptable for use in the locust control program. See Project Paper, African Emergency Locust/Grasshopper Assistance, Project No. 698-0517/625-0517/AFR/OED, U.S. A.I.D., March 17, 1987. See also Organization for Economic Cooperation and Development (OECD), Environment Monograph No.4, "Environmental Assessment and Development Assistance," 1986.

15. CF staff interviews with A.I.D. staff, with members of Committee on Health and Environment, and with other experts, July-August, 1987

16. Interviews with A.I.D. staff and other experts, July-August, 1987. A number of summaries of mid-term or final evaluations of projects using insecticides to control malaria carrying vectors, however, do identify and address potential health problems for workers involved in the spraying.

17. CF staff interviews with members of the Committee on Health and Environment, fall 1987. See also, Agency for International Development, "Report of a Preparatory Evaluation Workshop on the Management of Agricultural Projects in Africa," Special Evaluation Study #33, January, 1986.

18. Bottrell, Dale, "Social Problems in Pest Management in the Tropics," Insect Science Applications 4(1-2) 1983.

19. CF staff interviews with A.I.D. staff, July-August, 1987; and with members of the Committe on Health and Environment.

20. Op cit., "Policy on Pesticide Support."

21. CF staff interviews with A.I.D. staff and non-Agency experts, July-Sept, 1987.

22. "Tripartite Evaluation of Sahel Regional IPM Project 625-0928, by CLISS-FAO-A.I.D., March 19-April 24, 1986.

23. "Project Evaluation: Regional Integrated Pest Management for Central America and Panama," Final Report, Checchi and Co. Consulting Inc., December 1, 1986, A.I.D./ROCAP Project Number 596-0110.

24. Interviews with A.I.D. Staff, July-August, 1987.

25. Interviews with A.I.D. Staff, July-August, 1987.

    Also, Agency for International Development, Congressional Presentation, Fiscal Year 1988, U.S. Department of Commerce, National Technical Information Service.

26. United Nations Centre on Transnational Corporations, "Overview Paper for Informal Seminar to Further International Cooperation for the Environmental Management of Industrial Process Safety and Hazards," December, 1985.

CHAPTER 3:
RECOMMENDATIONS OF THE COMMITTEE ON HEALTH AND ENVIRONMENT

A wide variety of choices and opportunities face the U.S. Agency for International Development (A.I.D.) if it is to help developing countries meet their needs regarding pesticides and chemicals (as chapter 1 explains). The Committee on Health and Environment has endeavored to help the Agency better understand these choices by preparing detailed recommendations for new procedures and their implementation. In preparing these recommendations, the Committee has considered not only developing countries' needs, but also the Agency's particular mixture of strengths and constraints (see chapter 2). The Committee believes that A.I.D. itself, and particularly the Missions, should continue to have the responsibility to identify, among the many options that exist, those which will be the most helpful in their specific host countries.

Among the many options it considered, the Committee believes six recommendations in particular to be the most important, feasible, and cost-effective. Recommendation #1 addresses opportunities for A.I.D. to strengthen and build more constituencies who will work on behalf of pesticide and chemical safety in developing countries. These potential constituencies can be found throughout the various sectors and levels of society, including government, industry, nongovernment organizations (NGOs), and the research community, among others. Recommendations #2-4 speak to opportunities for A.I.D. to improve the sustainability, success, and environmental soundness of its projects that affect the use of chemicals and pesticides. These represent opportunities for A.I.D. to enhance the effects of its own programs; these recommendations likely could also enhance A.I.D.'s ability to set a positive example for other groups working on improving the pesticide and chemical situation. Recommendation #5 urges A.I.D. to monitor its progress on these recommendations, to identify future opportunities for action, and to report this information to Congress every two years, beginning

in 1979. The last recommendation would require action by the U.S. Congress. It calls for Congress to review -- with an eye towards better coordination in the future -- U.S. government policies and procedures regarding the provision of chemicals and pesticides overseas.

RECOMMENDATION #1:

A.I.D. should strengthen and increase the number of constituencies in multiple sectors and levels of society which actively support safe and environmentally sound use of pesticides and chemicals in developing countries.

Any viable strategy for addressing the complex problems associated with chemicals and pesticides must include efforts to strengthen and increase the number of constituencies who can help raise the level of awareness of these problems, and conduct activities to alleviate them. Such activities can include training, communication, research, grass-roots organizing, technical assistance, policy-making, development of safe alternative products, and environmental monitoring -- to name just a few.

Groups from all levels and sectors of society can be effective constituents. U.S. government agencies and international organizations and donors are potential constituents because their activities in host countries can either support or undermine safe and sustainable uses of hazardous substances. Constituencies can also be cultivated at many levels within host countries, including national and local government agencies, NGOs such as rural cooperatives and environmental groups, private industries, and the research community. It is important to involve groups from the agricultural, health, and environmental sectors jointly to address problems, because of their cross-cutting nature (see chapter 1).

The specific sectors that can be most effective at supporting proper use of pesticides and chemicals vary from one country to the next. Thus, in deciding which groups to assist in their host countries, Missions should analyze each country's specific problems and policies, their political contexts, and the existing roles and interests of the various sectors and groups. Among the important issues to consider are the reasons for the country's economic policies towards chemicals and pesticides, the relative power of different government ministries, the roles of various NGOs, and the strengths and weaknesses of the research community. Regardless of the groups involved, efforts must be responsive to perceived needs for change within the host countries if they are to be fruitful. Where no perceived need for change exists, public education and awareness efforts might be an appropriate initial effort.

a. OTHER U.S. GOVERNMENT AGENCIES

Many U.S. Government agencies in addition to A.I.D. have programs that do or could influence the use of pesticides and chemicals in developing countries. Through cooperation and exchanges of information and expertise, U.S. agencies could increase their effectiveness in addressing economic, environmental, and human health effects of chemicals and pesticides. In addition, cooperation could help to ensure that agencies promote similar objectives in their overseas activities.

As the U.S. government's primary overseas development agency, A.I.D. has extensive experience implementing programs in developing countries. The Agency has personnel and an extensive network of consultants who are experts in agricultural development, food and nutrition, and many other areas. At the same time, other U.S. agencies have substantial expertise in issues related to chemicals and pesticides. For example, the U.S. Department of Agriculture has a growing domestic Integrated Pest Management (IPM) research capability; the U.S. Environmental Protection Agency (EPA) has detailed knowledge of environmental

laws, regulations, emergency planning procedures, and health and environmental effects of chemicals and pesticides; and the National Institute for Occupational Safety and Health (NIOSH) is expert in issues relating to worker health and safety. (See appendix 4.)

Of all the agencies that conduct overseas activities, however, opportunities for cooperation are most apparent between A.I.D. and the Peace Corps. Peace Corps Volunteers (PCVs) work at the local level to recognize and implement approaches that meet the needs of individual communities. Several of the opportunities identified in subsequent recommendations in this report could be more quickly and effectively realized by working with Peace Corps Volunteers. For example, A.I.D. could train more Volunteers -- who in turn could train local farmers -- in IPM and in safe handling of pesticides. Because PCVs work at the local level for 2 to 3 years at a time, their involvement could contribute directly to several A.I.D. needs -- for example, by providing better data for improved evaluations of projects and better accommodation of project beneficiaries' perspectives (see recommendation #2).

In addition to cooperating with other agencies that conduct overseas projects, A.I.D. can and does draw on the expertise of agencies that are willing to provide technical assistance on an as-needed basis. It also works with agencies that determine U.S. positions in international forums (see section b, below).

In conclusion, the Committee on Health and Environment recommends that A.I.D.:

- **Explore opportunities for more extensive cooperation with the Peace Corps on overseas agricultural objectives, especially more extensive reliance on PCVs to promote IPM and pesticide safety.**

- As appropriate, arrange for more technical assistance from and to U.S. agencies such as the Food and Drug Administration, NIOSH, EPA, and the Overseas Private Investment Corporation.

b. OTHER DONORS AND INTERNATIONAL ORGANIZATIONS

Because of the resources they control, international organizations operating in developing countries can be very effective at addressing problems with the use of pesticides and chemicals. On the other hand, to the extent that such organizations do not have common approaches to addressing problems, they can undermine one another's efforts. For example, when a country refuses to provide certain pesticides to a developing country because of concerns about toxicity and potential misuse, its intentions are subverted if other countries supply the pesticides instead.

Recognizing the need to coordinate, several international organizations provide forums for international dialogues on issues relevant to chemicals and pesticides in developing countries. International dialogues leading to binding and non-binding actions have concerned worker health and safety standards (ILO, WHO); transboundary movement of hazardous wastes (OECD, UNEP); exports of chemicals, pesticides, and technologies involving them (OECD, UNEP, ILO, FAO, OAS); industrial accidents (OECD, ILO); and other topics (see glossary for acronyms).

Except in the Development Advisory Committee (DAC) of the Organization for Economic Cooperation and Development (OECD), A.I.D. has no direct voice in these international organizations, except when it is tapped to provide experts to participate in special efforts. Other U.S. Government agencies, in particular the Departments of State and Treasury, have the lead responsibility for coordinating and determining U.S. policy towards most international organizations. The State Department

is in charge of U.S. Government positions regarding the United Nations system*, OECD, and other international policy forums. Treasury establishes U.S. contributions and their conditions of approval to multilateral development banks (MDBs), and is responsible for debt rescheduling. The recent spate of "debt for nature" swaps, in which private U.S. organizations purchase and then cancel a developing country's debt in return for a commitment of funds to environmental preserves, provide an example of environmental protection measures that can be accomplished through debt rescheduling.

In summary, A.I.D.'s influence in international agreements and in the programs of international organizations is usually indirect. It can, and often does, try to influence international organizations by encouraging the lead U.S. agencies and by setting constructive examples (for example, conducting environmental assessments in multidonor projects in which it participates); and identifying environmental needs which other donors can then address. There are, however, significant opportunities for A.I.D. to enhance the safe use of pesticides and chemicals in developing countries by encouraging international organizations in the following directions:

- Influence the policies of other international organizations by working through the OECD DAC, with the Departments of State and Treasury, with the U.S. Executive Directors of the MDBs, and with co-donors on multidonor projects.

- Press for other bilateral and multilateral donors to adopt policies and guidelines on the provision of pesticides and the use of IPM that conform with those adopted by A.I.D. and FAO.

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* The United Nations system includes FAO, IFAD, ILO, UNEP, UNIDO, WFP, and WHO, among others (see glossary for acronyms).

- Promote agreement on the need for environmental evaluations, the circumstances under which they should be conducted, and appropriate methods to be used.

- Promote MDB lending policies that take environmental considerations into account, and call attention to environmental problems arising in existing MDB-sponsored projects.

- When A.I.D. is a co-donor on projects that involve the use of pesticides, apply the A.I.D. pesticide regulations, or withdraw or reduce its support for those projects. Further, promote the use of Integrated Pest Management, provide funding for applicator training sessions, and arrange for the project to be evaluated at its conclusion for environmental and public health consequences.

- Promote consultation of project officials with host country government officials on pest control strategies.

- Create incentives (e.g., awards, public recognition, performance standards) for A.I.D. personnel to resolve problems that arise in multidonor projects at the field level, to provide suggestions for improvement, and to enhance the environmental awareness and policies of other international donors.

- Initiate investigations of specific environmental and health problems (e.g. inadequately disposed pesticides, contaminated food or water supplies, lack of protective clothing for workers, educational needs) and suggest remedial programs which can then be funded by other (perhaps multiple) donors.

c. HOST COUNTRY GOVERNMENTS

Host country governments strongly influence the use of chemicals and pesticides through their regulatory and economic policies. Many of these policies encourage misuse and overuse or fail to discourage it (see chapter 1). Where the political will to reform economically or environmentally detrimental practices does not exist, A.I.D. can work to educate key decision-makers or can make reform a condition of further assistance. In fact, policy dialogue and reform is one of the four priority areas that A.I.D. has identified to guide its assistance programs (see appendix 1).

Where host country governments do have the political will and resources to benefit from major environmental policy assistance, A.I.D. can and often does take a variety of steps. In pursuing this approach, A.I.D. may want to consider or expand activities of the following nature:

- Find mechanisms to improve coordination of policies and collaborative programs between agricultural, health, environmental, and commerce ministries (see chapter 1 regarding the cross-sectoral nature of most problems related to hazardous substances, e.g., the effect of pricing policies on pesticide use).

- Help host countries improve economic, legislative, or management problems that contribute to misuse or overuse of chemicals and pesticides.

  - Arrange for regulatory experts and economists to help diagnose and suggest options for solving problems.

- When problems have been clearly identified, assist and encourage drafting of new legislation, management plans, or other appropriate strategies.

- Help fund regulatory functions such as monitoring and enforcement.

o Ensure that policy reform efforts provide tailored solutions rather than the approaches that U.S. and other industrial nations have adopted, as the latter systems are often inappropriate for cultural, climatic, legal, resource, and other reasons.

o Facilitate the participation of NGOs such as labor unions, consumer organizations, and trade associations when policy changes are being made to help ensure that the results enjoy broad-based and long-term political support.

o Support educational programs to help developing countries develop a cadre of people who can implement safer, more sustainable agricultural and health programs. For example, support training of extension agents who can implement and extend the use of IPM programs; toxicologists and ecologists who can interpret data on chemicals and pesticides within the context of exposure scenarios and climatic conditions in their own countries; epidemiologists and physicians who can monitor for public health effects from chemicals; etc.

o Send influential governmental officials from host countries on observational tours to other countries to let them see successful examples of farms that use IPM, industries that have adopted innovative safety measures, and other examples of constructive agricultural and environmental programs.

- Encourage developing country representatives who study in the United States on A.I.D. scholarships in disciplines relating to agriculture, industry, and public health to take some environmental courses and training.

- Help governments access environmental data that exist elsewhere, particularly if the data are readily available within the United States.

- Provide opportunities for communication among government officials in developing countries that share similar problems and sociopolitical contexts.

d. NONGOVERNMENT ORGANIZATIONS

Rural cooperatives, national growers associations, chambers of commerce, commodity groups, other community organizations, labor and trade unions, and environmental groups are often excellent sources of information and human resources. They tend to be effective because they have strong commitments to issues, good communication networks, and detailed knowledge of the internal political system of their own country along with access to mechanisms for affecting it. Many have training and educational capabilities as well.

A.I.D. should fund a mix of activities by NGOs, including both general support to help organizations become or remain established and direct project support once they have a solid foundation. Providing funds for NGOs to conduct specific projects can significantly enhance their ability to influence the outcome of policy debates, to undertake effective public education projects regarding safe handling of chemicals and alternatives such as IPM, or to conduct relevant research projects, among other examples.

When A.I.D. is considering whether to give specific NGOs financial or other support, A.I.D. should bear in mind that problems can result when a U.S. agency supports a group that may be considered a political agent as well as an environmental advocate. In many countries, universities and rural cooperatives are perceived as less sensitive targets than are groups that may have more overtly political missions, as may be the case with growers associations, environmental groups, or labor organizations. In other countries, the opposite may be true. In any case, the more politically neutral organizations are often better equipped to implement certain types of activities such as teaching and technical assistance, while the more political groups tend to be more effective at achieving environmental awareness and political change.

A.I.D. could devote a larger share of its overall budget to supporting NGOs and specifically could expand its programs to:

- Support programs to teach members of crop protection societies about IPM and pesticide safety, so they can teach other members and farmers with whom they work.

- Fund exchanges, conferences, or colloquia between NGOs from developing countries to work out strategies on specific policy issues and to share general goals and ideas.

- Where political sensitivities suggest that direct financial assistance would be unwise but the work of an organization is considered important to support, provide nonfinancial assistance such as meeting places, educational or technical support, and protective clothing for workers. Alternatively, channel funds through U.S. or internationally based NGOs that have extensive experience working with their counterparts in developing countries.

- Assist organizations that monitor, within host countries, the implementation of internationally approved guidelines that pertain to safer use of chemicals and pesticides.

- Support education programs to teach children and workers about environmental issues and about pesticide and chemical safety.

e. INDUSTRY

Local industries and multinational corporations (MNCs) based within developing countries have an important role to play in achieving health and safety objectives. The importance of industry's role is clear from its front-line responsibility for workplace and community safety. Further, the largest users of chemicals are chemical companies themselves.

Domestic industrial plants in several advanced developing countries in the Near East and Asia have benefited from a program that arranges visits by U.S. industrial engineers to their counterparts in developing country industries. The program, whose purpose is to address pollution control problems at individual sites, is jointly funded by A.I.D. and the U.S. private sector (see appendix 3). This type of exchange program has been well received, probably because industrial counterparts are more familiar with the range of issues faced by the private sector.

Because profit-making drives many of the decisions made by chemical companies, they are more likely to support measures designed to improve hazardous substance use and management if they see economic or political advantages to doing so. Thus, A.I.D. may be able to effect more change in the practices of particular plants or industries in developing countries if it helps them understand that many changes, such as management

improvements, energy recovery, and waste recycling, can be economically advantageous. Assistance to host-country governments and to NGOs (see above) can help to make safety improvements either mandatory or more politically desirable to industry.

MNCs often are more concerned about their public image and their legal liability than are local companies, because of pressures and legal requirements MNCs face in their home countries. They may be willing to support statutes and enforcement structures because they reduce the incidence of accidents that associate them with significant environmental damage, human illness, or death.

When working with the industrial sector, A.I.D. should:

- Continue and expand efforts to link industrial pollution control experts with their counterparts in rapidly industrializing countries.

- Foster individual constituents within the industrial sector. For example, send industrial managers from host countries on observational tours to see examples of economically advantageous control methods, and provide safety training assistance for industrial workers.

- Enlist the assistance and support of multinational corporations in efforts to influence host country governmental changes.

f. THE RESEARCH COMMUNITY

By developing safer alternatives to pesticides, research centers at the international, regional, and host-country level make a critical contribution to resolving the problems associated

with pesticide use. Political and economic pressures from governments, NGOs, and other groups to avoid reliance on pesticides as a primary pest management strategy need to be backed with concrete alternatives. Research is the key to discovering such alternatives, including pest-resistant crop varieties, cultural controls, biological controls, and other components of IPM.

A.I.D. is already a major contributor to international agricultural research. It began supporting the Consultative Group on International Agriculture Research (CGIAR) in 1972 and has consistently provided 25% of the estimated contributions to the 13 CGIAR-supported centers.* The majority of A.I.D. funding goes to support the core programs of the various centers, while the remainder is used for restricted, collaborative, and special projects (1).

A.I.D.'s Program in Science and Technology Cooperation (PSTC), initiated in 1981, is another way in which A.I.D supports agricultural research. The PSTC "seeks to stimulate new and innovative research on problems that confront developing countries." It is implemented through a system of competitive research grants, with highest priority given to scientists from developing countries. Several of the current grant areas are related to IPM, including research into genetic engineering of tropical crops (15 grants awarded as of 1985), exploration of alternatives to chemicals for world food needs (18 projects as of 1985), and identification of biological control methods for human and plant disease vectors (16 projects as of 1985) (2).

Finally, most of the agricultural and vector control projects conducted by A.I.D. Missions are research projects in their own right. Many of these projects have pest management objectives. As noted in later sections of this report, the value of these efforts to the research community would be enhanced if

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* For fiscal year 1987, however, A.I.D. funding is less than the traditional proportion due to budgetary pressures.

A.I.D. would ensure better documentation of results, and use of scientific methods such as control plots and baseline data collection.

In addition to funding and conducting research, A.I.D. encourages international and host-country research organizations to investigate IPM methods.

The Committee on Health and Environment recommends that A.I.D.:

- Continue to fund the CGIAR centers, and emphatically urge that some of the United States' substantial contribution be used to support investigation of nonchemical alternatives and IPM systems. Encourage other donors to promote such research as well.

- Continue to award grants to scientists in developing countries for work on pest- and disease-resistant plants, biological controls, and nonchemical alternatives for crop protection and vector control.

- Fund research in social and economic issues related to safe pesticide and chemical use, e.g., research on effective training mechanisms, the effects of different pesticide labeling schemes, the interrelations of politics and IPM, etc.

- Promote research into nonchemical alternatives and IPM systems by national agencies that are closely tied to outreach and extension services of host countries. Help establish closer ties between national extension services and other research groups such as the CGIAR centers.

- Award research grants to develop IPM systems as well as individual IPM components. For example, fund more work to establish economic thresholds for important tropical pests in a variety of countries, and to conduct pilot projects to field-test combinations of nonchemical controls on important tropical crops.

- Develop guidelines for environmental safeguards that researchers should observe while promoting the development of biological alternatives to chemicals, such as genetically engineered microbial pesticides. Notify host countries before planned releases to the environment of biological alternatives.

- Advise Missions to ensure that all field projects having pest management components -- whether they be agricultural production projects, IPM demonstrations, education, or other activities -- are conducted under scientifically controlled conditions to provide useful research data.

RECOMMENDATION #2:

A.I.D. should enhance the effectiveness of its agricultural and health programs that affect or involve pesticide or chemical use.

A.I.D. has clear, constructive policies regarding the need to avoid detrimental environmental impacts in all its programs. It has especially stringent policies to assure safe use of pesticides (see appendix 2). However, the Agency needs to improve its strategy for implementing these policies so they will better fulfill their potential to have a positive impact on all Agency activities.

Until the mid-1970s, A.I.D. routinely provided pesticides, with little or no analysis of their potential hazards, through

both project and nonproject assistance. The Agency abandoned this practice after the Environmental Defense Fund and several other environmental organizations filed a lawsuit against it in 1975 (3). As a result of that lawsuit, most A.I.D. projects, including but not limited to those providing pesticides, must now be accompanied by an Initial Environmental Evaluation. If the evaluation identifies potentially negative environmental effects, a full environmental assessment is required. Exceptions are permitted for emergencies (such as those that threaten massive pest outbreaks), research, or projects in which A.I.D. is a minor donor.

Over the past decade, A.I.D. has become one of the most environmentally conscious members of the international development assistance community. In spite of this, the Agency's procedures are falling short of their potential. To understand the reasons for these shortcomings, and steps that should be taken to address them, it is helpful to consider four different categories of activities that involve or address problems with hazardous substances:

(1) Projects designed specifically to address pesticide or chemical risks,

(2) Projects in which pesticides or chemicals are provided by non-A.I.D. sources,

(3) Projects that directly use chemicals or pesticides, and

(4) Non-project assistance that funds pesticides.

a. PROJECTS DESIGNED SPECIFICALLY TO ADDRESS PESTICIDE OR CHEMICAL RISKS

Some projects are targeted to address an existing or threatening problem from chemicals or pesticides. Examples

include consulting with host country governments to identify and plan for disposal of unused stocks of pesticides, conducting regional workshops on pesticide safety, assisting industrial plants to improve pollution control activities, training national crop protection personnel in proper handling of pesticides, and testing integrated approaches to vector control (see appendix 3). Such projects help to address the increasing number of host countries' requests for A.I.D. assistance and help promote sustainable development, agricultural productivity, and more effective disease control.

Projects specifically designed to address pesticide or chemical issues comprise a very small percentage of A.I.D.'s budget. While many of them have been well-designed and executed as far as they have gone, funds and staff resources rarely permit adequate follow-up or evaluation. Furthermore, because they are specific, isolated activities, projects with explicit environmental objectives do not often make substantial contributions to host country efforts to manage chemicals. Yet they are perceived as the Agency's principal contribution to improving environmental health.

The Committee on Health and Environment recommends that A.I.D.:

- **Consider allocating an increased share of its budget for projects designed specifically to address pesticide or chemical problems.**
  - **In particular, consider allocating a larger share of the health sector budget to study and address chemically induced health problems, especially for women and children who are applying pesticides.**
- **Evaluate these activities to make them more useful, and compile results so they can be used to help design future efforts.**

b. PROJECTS IN WHICH PESTICIDES AND CHEMICALS ARE PROVIDED BY NON-A.I.D. SOURCES

Two types of A.I.D. projects lead indirectly to pesticide or chemical use.

First, pesticides can be provided indirectly when A.I.D. is a minor donor to a project* and pesticides are provided by the other donors (A.I.D. field personnel report that this occurs commonly). In this case, A.I.D.'s normal requirement for an Initial Environmental Evaluation is waived, unless the Environmental Coordinator decides there is reason to require it. The Agency's pesticide policies do not apply either. Despite the loophole in the regulations, the Agency is more frequently striving to apply its environmental policies when it is a minor donor. For example, A.I.D. has worked to reduce the use of EPA-restricted pesticides in a locust control project in Africa (see appendix 3).

Second, some projects lead to or require the use of pesticides or chemicals in the future, even though these substances are not required for the specific project activity. The most common examples are projects to develop river basins, to provide irrigation or water management facilities, and to build industrial plants. For example, a proposal to build a dam or irrigation system likely will not require the immediate use of pesticides, but the standing waters produced by the completed project may eventually lead to pesticides being used to kill insect vectors that breed there.

The general effect of these situations is that projects that involve hazardous substances provided by other donors, or that

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* A.I.D. considers itself a minor donor when it contributes less than 25% of the project's budget or less than $1 million.

will involve future use of hazardous substances may or may not be assessed for their environmental or secondary human health impacts.

Therefore, the Committee recommends that A.I.D.:

- o Continue and expand its efforts to apply its environmental and pesticide policy even when it is a minor donor -- particularly the requirement to complete an Initial Environmental Evaluation. The policy should hold particularly when A.I.D.'s financial or in-kind contribution is substantial in absolute terms. When other donors object, A.I.D. should:

  - Consider reducing or withdrawing support from the project or insist that the A.I.D. portion of the contribution be used to assess or mitigate environmental or human health impacts.

  - Work at the international level to change the policies of other donors (see previous section on international organizations).

- o Apply its pesticide policy even when the use of pesticides may be a consequence rather than a direct component of a project.

- o Place greater emphasis on preparing environmental assessments that anticipate secondary adverse impacts on human health.

c. PROJECTS THAT DIRECTLY USE CHEMICALS OR PESTICIDES

A.I.D.'s primary opportunity to influence pesticide and chemical use is through the projects it conducts that directly use pesticides and, occasionally, other chemicals. Most are

agricultural development projects; some are projects to combat vector-borne diseases. A variety of problems now exists in implementing A.I.D.'s policies within the context of specific projects. The following sections identify these problems and make specific recommendations for addressing them.

i. TRAINING AND STAFFING NEEDS

One of the most serious problems with the implementation of A.I.D.'s environmental regulations is that many A.I.D. Missions have minimal staff capability to influence the designs of projects to improve their environmental components or to evaluate environmental impacts. Initial Environmental Evaluations and Environmental Assessments are usually prepared by an Environmental Officer, who is otherwise not part of the project design team, or by nonstaff consultants. The problem can be particularly serious when pest emergencies, such as the cyclical locust outbreaks in the Sahel, necessitate that Missions safely manage large quantities of pesticides provides on an emergency basis (see appendix 3).

Agricultural and health officers at the Mission level need more information on how to design and assess the adequacy of pesticide applicator training courses, storage and disposal practices, and other health and environmental measures (4). They also need to be able to analyze trade-offs between limited uses of highly toxic pesticides versus more extensive uses of less toxic ones. Few Mission personnel believe that yield and production of crops can be increased with reduced chemical inputs, nor are they aware that use of pesticides for agricultural purposes is leading to pesticide resistance among insect disease vectors. If more Mission personnel had training in these areas, or more ready access to qualified professionals, they would be more likely to design agricultural and health projects that incorporate environmentally sound goals. For example, they might coordinate better between the health and agricultural sectors to reduce the resistance problem. Further,

they would be less likely to regard environmental factors as problems beyond their competence to address. Such training or additional professional help is also necessary for the delegation of Environmental Assessment approvals to be effective, as recommended further below.

Therefore, A.I.D. should:

- Ensure that its agricultural and health professionals at the Mission level are thoroughly trained, or have ready access to contractors* who are experts in: (a) environmental health issues, (b) nonchemical pest control methods, and (c) social sciences relevant to understanding beneficiaries' perspectives (see item iii, below).

- Ensure that the level of training or professional assistance available to Mission personnel is sufficient for all agricultural, forestry, and health sector projects to be initially designed with pest management options and environmental provisions in mind, rather than having them added on later.

- Prepare and disseminate guidelines for field staff (not just Environmental Officers) that would assist them in properly planning and evaluating pest management and vector control components of projects. For example, such guidelines should include information in the following areas (as well as many others mentioned throughout this report):

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* Many A.I.D. Missions hire professionals under so-called "personal services" contracts. If such professionals are readily available, it may not be necessary to have experts in these issues as members of Mission staffs. An advantage of personal services contractors is that they provide continuity because they generally stay in a given geographical region longer than permanent A.I.D. staff, most of whom are rotated to other countries every 2 years.

- How and why to evaluate the impact of a change in pest management practices either at the beginning or mid-stream in a project;

- How and why coordination of agricultural and health projects could reduce pesticide resistance;

- How and why to evaluate national policies for their impact on the long-term success of a project to demonstrate pest management alternatives;

- How and why to conduct training courses in pesticide use.

ii. EVALUATIONS

Once a project is underway and after its completion, it is important to monitor the implementation of environmental safeguards and to evaluate environmental consequences. The frequent lack of follow-up on these issues during and after many agricultural development and health sector projects significantly increases the likelihood that the importance of health and safety considerations will dwindle as the project continues.

Another problem that frequently contributes to difficulties in evaluating projects is that baseline data are rarely collected on the practices of pesticide applicators and other field workers prior to a project. Consequently, it is impossible to evaluate whether, how much, and in what ways these field workers' pest management approaches have changed as a result of a particular project.

Evaluations that address health and environmental concerns are crucial, not only because they create an incentive to comply with environmental requirements but also because they provide documentation of unrealistic assumptions that should be changed

in future projects. In addition, comparisons of health and environmental consequences of projects that are funded through different program areas can highlight opportunities to reduce overall risks. For example, evaluations of agricultural and health projects would probably show opportunities to collaborate -- e.g., by avoiding using the same pesticides, thus reducing the risk of pest resistance. Therefore, for projects that involve the use of chemicals or pesticides, A.I.D. should:

- Require that midterm and final evaluations determine whether appropriate environmental safeguards were actually observed, and assess the environmental and human health consequences.

- Ensure that project budgets include adequate funding to evaluate health and environmental consequences.

- Ensure that lessons learned from evaluations are incorporated in the design of subsequent projects -- through wider general dissemination of evaluation reports (to other donors and interested parties, as well as A.I.D.) and through use of evaluation reports as study materials in training courses.

- Distill lessons about environmental and health impacts, and effective techniques for overcoming problems, from a cross-section of many projects. (A.I.D.'s Center for Development Information and Evaluation [CDIE] may be best equipped to undertake this task.)

- Institute incentives for personnel to adhere more conscientiously to environmental components of projects. For example, make project funding contingent on unannounced visits that verify compliance with occupational and environmental safety requirements, and change personnel performance standards to give more

credit for environmentally and economically sustainable projects than for the number of projects initiated and/or completed.

- Ensure that baseline data are collected prior to implementing environmental projects, so that evaluations can be meaningfully conducted at the end. This can be done in tandem with the efforts to assess user preferences at the beginning of a project (see below).

iii. BENEFICIARIES' PERSPECTIVES

Budgets and time demands rarely permit staff to conduct adequate consultations with local people who will be involved with or affected by A.I.D. projects (project beneficiaries). A.I.D. personnel and consultants are encouraged to consult with beneficiaries, but in the absence of time and explicit requirements, such efforts are often conducted superficially or not at all.

Understanding the perspectives and practices of local people who will be affected is critical for projects to be successful, particularly when projects are intended to change existing practices such as pest management strategies. Underlying preferences must be considered, understood, and factored into project designs. For example, farmers often prefer to use pesticides over cultural or biological pest controls. The reasons vary but often include lack of understanding of health hazards, lack of knowledge or belief that sole reliance on pesticides results in less stable yields over the long term, and preferences for less labor-intensive approaches. If these underlying reasons are understood and actively addressed in project design and implementation, resistance to alternatives is more likely to be overcome. For example, alternatives can be introduced in ways that let farmers see the advantages for

themselves (e.g., by using comparison plots) and that avoid labor-intensive strategies at times that conflict with other labor demands on the community. In addition, A.I.D. staff should bear in mind that people are apt to respond much more favorably to a project if they have been consulted in advance and can see how the design accommodates their perspectives.

The involvement of project beneficiaries can be facilitated in various ways: (1) by actively soliciting viewpoints at community meetings prior to and during projects, (2) by using local people to gather information through questionnaires and oral interviews, (3) through analysis of local farm systems economics such as budgets and time management issues, and (4) by soliciting feedback during training sessions associated with projects, particularly regarding aspects of a program that may be difficult for users to implement.

Clearly, the cost of obtaining information about user preferences is not trivial. However, because failure to obtain it often is associated with subsequent project failure, it should not be compromised. Instead, A.I.D. should:

- Make consultation with local people a requirement in its environmental regulations and in specific project work plans.

- Provide guidance to field staff on how to incorporate the views of intended users of pesticides and IPM systems, as well as other groups substantially affected, into project designs.

- Ensure that all projects intended to change the practices of project beneficiaries include adequate budgets for user consultation. Conduct fewer or smaller agricultural development projects, if necessary, to provide adequate budgets for user consultation on the projects the Agency does fund.

- **Evaluate projects at their completion (and for an appropriate period thereafter) to determine success in addressing participant perspectives. For example, evaluate the level and type of participation, attitude change, level of adoption of new approaches, and success of training efforts.**

iv. ADMINISTRATIVE BURDENS

The administrative burden of completing Environmental Assessments (EAs) for most projects involving pesticides (the procedures do not apply to research, emergencies, and projects where A.I.D. is a minor donor) impede the agency's attempt to have a positive impact on environmentally sound development. While the environmental regulations should not be weakened, steps to make them less time-consuming are desirable.

Receiving administrative approval for an EA can take many months. As a result, some Agency personnel find ways around the regulations, or simply avoid projects that require EAs (in particular, projects that involve pesticides). For example, A.I.D. personnel sometimes turn to other donors for the needed pesticides. While this technically still requires an EA, the requirement is difficult to enforce when no request for pesticides comes through Agency channels. EAs are therefore not completed, and projects may fail to anticipate and minimize detrimental environmental and human health impacts caused by pesticides.

In those cases where the effect of the requirements is that Mission personnel avoid projects involving pesticides altogether, or turn to other sources to supply them, the Agency's opportunity to have an effective presence in promoting the proper use of pesticides (e.g., within the context of IPM projects) is reduced. To the extent that this occurs, A.I.D. may be following

the letter of its procedures yet failing to use its leverage to achieve the desired development objective -- namely, more efficient and safe means of pest control.

To reduce the occurrence of these problems, A.I.D. should:

- Streamline its administrative procedures for review and approval of Initial Environmental Evaluations (IEEs) and EAs. This requires environmentally trained personnel at the mission level.* Where sufficient expertise is available, the approval of IEEs and EAs should be delegated to the Mission or Regional Environmental Officers, with oversight or spot-checking by Headquarters (Bureau) Environmental Officers.

- Ensure that this streamlining in no way reduces the level of thoroughness of the IEEs or EAs.

d. NONPROJECT ASSISTANCE THAT FUNDS PESTICIDES

One of the more difficult issues with which A.I.D. has had to grapple is the question of whether, or under what circumstances, to provide pesticides to developing countries through nonproject assistance. Nonproject assistance generally takes the form of money loaned or granted directly to developing countries. It is direct financial assistance not earmarked for specific development projects per se, although it may be used by host countries to execute a project type of activity. A.I.D.'s nonproject budget is far greater than its budget for project assistance (see appendix 1, table A-1). For this reason, policies regarding pesticide provision through nonproject assistance assume particular importance.

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* The common inability to find trained personnel to whom responsibilty can be delegated underlines the need for increased training and staffing, as recommended above.

The primary nonproject assistance program under which the issue of providing pesticides falls is A.I.D.'s Commodity Import Program (CIP). Under CIP, A.I.D. provides loans or grants to developing countries. The countries then use those loans or grants to purchase basic U.S. goods such as agricultural machinery, construction equipment, fertilizers, raw materials, and foodstuffs. To a lesser extent, the issue of pesticide provisions also arises under the Food for Peace program (PL-480) and through cash transfers provided through Economic Support Funds. Each of these types of assistance is described in more detail in appendix 1.

The Agency's pesticide policy severely limits the use of nonproject funds to purchase pesticides. Nonproject assistance can only be used to purchase pesticides in "emergencies or compelling circumstances." Prior written approval of the A.I.D. Administrator is required. Also required are an assessment of the indigenous capability of the receiving country to handle the pesticides safely, a determination that the assistance is necessary to meet U.S. foreign policy objectives, and a determination that the assistance is consistent with A.I.D.'s policy to promote economically and environmentally sound pest management practices. (For further information on the pesticide policy, see appendix 2. For discussion of A.I.D. disaster assistance, see appendix 3.)

The net effect of this policy is that A.I.D. has virtually discontinued the financing of pesticides on a nonproject basis under CIP, except in emergencies. According to the Agency, between 1975 and 1985 only one request, based on "compelling circumstances," was made and approved (5).

It is widely suspected that the burdensomeness of the procedures is the major factor in discouraging use of CIP for pesticide procurement. In 1985, an A.I.D. task force proposed a change in the guidelines that would have made it somewhat easier to obtain pesticides through CIP. The basis of the plan was that pesticides could be more easily purchased but only if part of the

CIP funds were specifically allocated "to support activities that will assist in improving the management and use of pesticides in the requesting country." Environmental organizations and others opposed the plan, however, and the Agency withdrew the idea.

The Committee on Health and Environment believes that the impetus for the proposed changes may be valid, though it does not have adequate time and resources to analyze the detailed policy issues involved. In particular, it sees merit to the point of view that safe pesticides should perhaps be available through nonproject assistance, especially in the face of substantial evidence that other countries provide pesticides readily if the U.S. does not. In addition, the provision of safe pesticides through CIP might increase A.I.D.'s ability to promote proper use of pesticides. At the same time, the Committee is very sympathetic with the apparent concerns of the environmental organizations and others, who believe that the 1985 proposed change lacked an adequate definition of a "safe" pesticide, provided no assurance that significant funds would be used to support pesticide safety or IPM programs, and was unclear regarding safeguards the Agency would require governments to undertake and enforce before it allowed CIP funds to be used to purchase pesticides.

Therefore, the Committee on Health and Environment recommends that A.I.D. should:

- After initiating action on other recommendations in this report, reconsider whether or under what circumstances to provide pesticides through nonproject assistance. A.I.D. should seek assistance from an advisory group composed of members of the environmental community, industry, and labor, as well as experts on pesticide use in developing countries.

- Demonstrate that it has the technical and managerial capability to carry out reasonable safeguards before it goes forward with any proposal that emerges from this reconsideration. For example, future assessments of how well A.I.D. implements other recommendations included in this report, which would be reported to Congress biennially (per Recommendation #5), would give a strong indication of this capability.

RECOMMENDATION #3:

A.I.D. should increase its use of Integrated Pest Management (IPM) significantly, with the goal of making IPM its primary pest management approach. Achieving this goal will require improved implementation and more support for research and training.

Broadly conceived, IPM is any system that relies on a variety of approaches for controlling pests, including physical, biological, genetic, and cultural* controls, as well as pesticides. IPM tries to maximize the natural mortality factors of major pests, while minimizing the need for pesticides. It relies on the concept of an economic threshold of pest population density or crop damage, below which the cost to control a pest is greater than the benefit of doing so. In agriculture, the components of IPM include efforts to breed crops resistant to diseases and pests, the use of cover crops for weed control, plantings timed to avoid pest damage, crop rotations, and introduction of insect predators and parasites (6). Integrated control of human and animal disease vectors includes methods such

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* Cultural control is defined as modification of crop management practices to make the environment less favorable to pests (Flint, M.L. and R. van den Bosch, Introduction to Integrated Pest Management, Plenum Press, 1981.)

as reduction of breeding sites, interruption of host-vector contact, more judicious and effective means of pesticide application, breeding of resistant livestock, and immunization.

The Guidelines in A.I.D.'s Policy on Pesticide Support firmly support IPM. They state that it is Agency policy to:

> "... assist developing countries to design IPM systems and procedures that are economically and environmentally sound ... help developing countries to develop infrastructures for pest and pesticides management ... exert a greater degree of international leadership on pest management alternatives ... discourage requests for pesticides unless they are to be used in (IPM) systems, ... and promote the use of available supplementary methods of vector control." (7)

Clearly, A.I.D. believes that IPM has the potential to assist in making agricultural development sustainable, and to reduce some of the economic, health, and environmental problems associated with exclusive use of chemicals for pest and vector control. The Committee on Health and Environment agrees.

a. INCREASE USE OF INTEGRATED PEST MANAGEMENT

Three trends emphasize the importance of developing and using IPM systems in both developed and developing countries. One is that the world population is expected to reach 6 to 7 billion by the year 2000. Clearly, the need for intensified agriculture is growing and along with it the need to control pests effectively and safely. Second, stabilizing agricultural yields and decreasing the incidence of vector-borne diseases are among the most important needs to reduce the incidence of famine, economic hardship, and suffering in many developing countries. Third, detrimental impacts of pesticides -- including pollution of natural resources, human health problems, economic costs, resistance to pesticices, and emergence of secondary pests in agricultural and health projects -- are fueling a desire and a need to use fewer chemicals.

IPM usually requires financial and human resources and political support, yet experience extending over the last 25 years shows that IPM can be implemented on a wide scale, in a variety of crops, and in countries with varied political structures, cultures, and climates. IPM has been demonstrated to be more effective than chemical-intensive methods at reducing profit fluctuations in agriculture (8). It has been repeatedly demonstrated to reduce input costs, secondary pest outbreaks, and threats to public health and the environment. IPM can also overcome problems related to poor infrastructure (e.g., lack of roads) because biological controls distribute themselves, and can result in better practices with pesticides because farmers are trained to understand how to use them judiciously (9).

Examples of successful IPM are most common in cash crops, but can also be found in subsistence agriculture. IPM for rice in Southeast Asia has cut insecticide use in half, increased profits, reduced risks, and bolstered yields (10). IPM efforts have shown similar successes on cassava in Africa, soybeans in Brazil, bananas in Costa Rica, cotton in Nicaragua, and coconuts in the South Pacific (11). President Corazon Aquino recently declared IPM as the national crop protection strategy for the Philippines. The ministers of agriculture in India, Indonesia, and Malaysia have taken similar actions in their countries (12). (See appendix 6 for more information and examples of successful IPM programs in developing countries.)

In spite of these compelling circumstances and A.I.D.'s policies, IPM is not yet the Agency's primary crop protection strategy. To change this, A.I.D. should:

- Increase its use of IPM (as broadly defined in this report) with the near-term goal of making it the primary approach in all its projects having pest management components, including agriculture, forestry, water management, livestock, and disease vector control projects. This does not preclude the use of pesticides but requires reliance on cultural, biological, and physical approaches as the primary defense against pests and vectors.

- Require that a specialist in alternative pest control strategies be a member of the design and evaluation teams of every project that includes an agricultural development or disease vector control component, whether or not chemical use is anticipated. Ensure that such people are also part of the implementing team and as such, are available for regular, on-site decision making for the duration of each project.

- Fund IPM consultants as one of the A.I.D. contributions to projects that have pest and vector management components and to which the Agency is a codonor.

- Prepare guidelines for field staff on how and why to use IPM in agricultural development and vector control projects.

b. IMPROVE IPM RESEARCH, TRAINING, AND IMPLEMENTATION

IPM research has been seriously hampered by a lack of public funding comparable to that spent on research for chemical-based pest control. This has resulted in an insufficient number of trained scientists and technicians, and an insufficiency of basic information on pests and their natural control factors in a variety of agricultural settings (13). It has also hampered

efforts to adapt and extend existing successes with IPM systems to more crops and ecosystems.

The sociological, economic, and political aspects of IPM implementation also need more attention. For example, IPM and integrated disease control projects may seem unsuccessful in comparison with pesticide-intensive projects if they are only compared to one another for a few years. Therefore, the time frame for a project can be critical to its perceived success or failure. A political problem is the common tendency of governments to abandon IPM when major pest outbreaks threaten; more studies are needed of this phenomenon and ways to overcome it. Chemical technology is easier to develop and transfer than IPM, and is often cheaper due to government subsidies of chemicals; therefore, farmers, extension agents, and public health workers have strong incentives to prefer chemical technology. This issue too deserves more attention. (These and other implementation issues are discussed in more detail in appendix 6.)

Drawing on this experience, A.I.D. should:

- Promote more research in technical, sociological, economic, and political aspects of IPM. Expand support for host country researchers, coordinate with U.S. institutions such as the Alternative Agriculture Institute, and strongly encourage international institutions such as the Consultative Group on International Agricultural Research (CGIAR) to do more work on IPM systems.

- Conduct its own projects that have pest management components (agricultural, forestry, disease vector control) so that scientifically useful information is obtained. For example, in agricultural projects, run control plots that use standard chemical-intensive methods side-by-side with alternative methods in order to gather empirical data about the technical and economic impact of alternative strategies and to allow farmers to compare for themselves the results of alternative approaches.*

- Research, establish, and publish information on economic thresholds for all crops on which A.I.D. projects are implemented.

- Widely disemminate descriptions and evaluations of IPM projects.

- Train and provide technical assistance to extension agents and field scouts in how to adapt known IPM methods to the ecology and culture in their country.

- Directly consult local farmers, farmers organizations, and pesticide applicators -- including women and children -- throughout the lifecycle of IPM projects (design, implementation, and evaluation). Modify the designs as necessary to ensure they are based on realistic assumptions about work habits, household economics, etc.

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* Side-by-side plots might not produce scientifically valid results if pesticides that are heavily used or aerially sprayed on the chemical-intensive plot drift into the IPM plot. However, visual comparison of results by farmers is an important educational tool, so project designers should work to minimize this problem (e.g., by using ground application methods for pesticides).

- Evaluate projects at the end for technical, sociological, and economic impacts and lessons. (See annex A for possible measures of progress.)

- Draw on comprehensive evaluations of each project in designing subsequent efforts.

- Design projects on a smaller scale than the regional programs described above, to ascertain whether higher quality would result from less complicated efforts.

- Require that on-site project implementors receive training in IPM and are responsible for its implementation within the project.

- Conduct IPM projects on a longer time scale (6-10 years rather than 3-6) -- so that potentially successful, sustainable approaches are not deemed failures simply for lack of adequate time to demonstrate long-term benefits such as increases in predatory species, more stable yields, and reduced costs.

- Initiate training programs and orient hiring (both direct hire and private service contractors) to substantially increase the level of experience and expertise of project staff at all levels in alternative pest control strategies and IPM.

RECOMMENDATION #4:

In cooperation with other U.S. agencies and the private sector, A.I.D. should prepare a long-term plan for its role in preventing and mitigating problems associated with activities involving industrial chemicals in developing countries.

As noted earlier in this report, economic and environmental losses associated with industrial activities are increasing in many developing countries. The precise rate of increase of these problems is difficult to predict. However, the rapid pace of industrialization, the increasing rate of industrial accidents, and the poor regulatory and physical infrastructure typical of most developing countries are ominous harbingers of potential problems.

A sizeable percentage of urban and rural populations in many countries stands to be adversely affected by industrial pollution, chemical spills, hazardous wastes, and industrial disasters. Serious industrial accidents in 1984 in heavily populated areas of Bhopal, India; Mexico City, Mexico; and Cubatao, Brazil provided graphic evidence of the fatalities and grave health effects that can occur from poorly planned growth of chemical industries. Evidence is accumulating that rural economic activities in many developing countries, notably farming and fisheries, are being undermined by industrial pollution (14).

Not all of the effects are direct. Indirect losses and opportunity costs are abundant as well, such as when industries fail to capture economic benefits from recycling wastes.

The U.S. has a preeminent capability to help rapidly industrializing countries cope with the side effects of chemical production and use, based on its domestic experience in addressing these issues. In addition, it can be argued that such assistance is in the United States' self interest. Clearly, poorly planned industrial development affects the global environment and the safety of foodstuffs and products imported by the United States.

Helping to prevent and mitigate environmental health problems associated with industrial activities is consistent with A.I.D.'s mandate to execute U.S. economic assistance programs throughout the developing world and to include environmental and natural resource objectives in development planning. On the other hand, A.I.D.'s experience and focus has traditionally been on agricultural development issues, and its budget is likely to continue to be limited. Further, as noted elsewhere in this report, it is not the only agency with a capability or responsibility to help. Others that fall in this category along with A.I.D. include the Overseas Private Investment Corporation (OPIC), the National Institute for Occupational Safety and Health (NIOSH), and the Environmental Protection Agency (EPA);* parts of the private sector such as multinational chemical companies; and other international organizations.**

At present, a very small percentage of A.I.D.'s resources is devoted to addressing problems associated with industrial activities. Most of these efforts are concentrated in the rapidly industrializing countries of Asia and the Near East and in the form of special projects undertaken on an ad hoc basis. For example, A.I.D. supports trips by U.S. industrial experts to provide technical pollution control assistance to industrial

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* Neither NIOSH nor EPA has a budget or mandate to address problems of developing countries, except (in EPA's case) where such assistance will alleviate a U.S. environmental problem. Therefore, outside funding is usually required to access NIOSH or EPA expertise.

** Several international organizations are already tackling aspects of this problem. For example, the United Nations Environment Program is promoting information exchange on hazardous substances (15); the International Labor Organization has proposed procedures for setting workplace health and safety standards (16); the World Health Organization has studied and published information on the special problems with small industries (17); and the World Bank has developed "Guidelines for Identifying, Analyzing, and Controlling Major Hazard Installations in Developing Countries" (18).

technicians in developing countries. Another example is that A.I.D. has recently undertaken an effort to identify stocks of outdated pesticides that may threaten public health because they are improperly stored or disposed.

These ad hoc efforts are often creative, well designed, and helpful. At the same time, they represent a small effort in relation to the rising tide of industrialization problems. A.I.D. therefore should develop a long-term strategic plan for addressing these problems in a more comprehensive fashion.

The Committee on Health and Environment is reluctant, for several reasons, to prescribe the nature of this effort in too much detail or to make specific recommendations about the priority A.I.D. should give to industrial pollution control efforts. Among these reasons are the regional variability in the problem, the currently inadequate data on the extent of the problem, the level of resources that could be required, and the degree to which these decisions are inexorably intertwined with Agency-wide decisions about priorities and orientation.

Therefore, the Committee thinks it is most appropriate for A.I.D. to address this question itself. In doing so, it should consider a number of issues, among which the Committee suggests the following:

- Which regions of the developing world are most likely to need industrial pollution control assistance? What kinds, how much, and how soon? These issues might be addressed through Country Environmental Profiles, which are in various stages of preparation (some are completed) with the assistance of many international donors, including A.I.D. Addressing the issues through this mechanism would provide a sense of priority vis-a-vis other environmental issues.

- What specific options for assistance are available? For example, the Agency should consider the following: institution building, accident contingency planning, policy dialogues, technical assistance to build safe disposal sites, occupational safety and health training.

- How would a new initiative on industrial pollution affect the Agency's other priorities and orientation, particularly its orientation towards the agricultural sector?

- What lessons have been learned from industrial pollution projects A.I.D. has conducted to date?

- Whether and how can A.I.D. find the necessary expertise to conduct such programs, given its current orientation and staff capabilities?

  - What role might the private sector play in assisting with a new industrial pollution initiative?

  - What are the potential roles of other U.S. agencies, including the Environmental Protection Agency, the Overseas Private Investment Corporation, the Trade and Development Program, the Commerce Department, and the National Institutes for Occupational Safety and Health? (Appendix 4 discusses opportunities for coordination with these and other agencies.)

- What are the potential roles of international institutions, such as multilateral development banks, bilateral assistance agencies, the United Nations system (including the International Labor Organization), and international trade union federations? Will their assistance be sufficient? Should A.I.D. confine its role to influencing the policies of other international organizations?

o Based on the results of the above, should a new initiative be global or oriented mainly towards the advanced developing countries? If the latter, what are the funding implications of the fact that advanced developing countries receive relatively fewer A.I.D. resources, and that they receive more Economic Support Funds than Development Assistance Funds? (See appendix 1 for descriptions of A.I.D.'s various funding mechanisms.)

In conclusion, A.I.D. should:

o Develop a 10-year plan describing its potential roles and levels of involvement in promoting environmentally sound industrial development and addressing problems associated with industrial chemicals activities in particular. The plan should consider the issues and sources of information described above.

o In developing the plan, consider the substantial economic and social differences that exist between the three main geographic areas of the developing world.

RECOMMENDATION #5:

A.I.D. should report to Congress every two years, beginning in 1989, on its progress toward implementing the recommendations in this report and on future opportunities to address pesticide and chemical issues in developing countries.

A.I.D. should report to Congress next year, and thereafter on a biennial basis, regarding its progress on the recommendations in this report and on related health and environmental issues. Such a requirement will encourage A.I.D. to be vigilant in evaluating its progress in implementing these recommendations and to be creative in identifying additional opportunities beyond those identified in this report. It will also provide an opportunity for these issues to be discussed in broader U.S. policy-making circles.

Effective self-monitoring and reporting will require verifiable indicators, and the reporting of these should be separate for each Bureau. Some possible indicators are provided as an annex to this volume. The indicators were developed to illustrate the specific kinds of information that would be useful and the issues on which evidence of progress is important. However, the Committee wishes A.I.D. to develop its own appropriate and manageable indicators, using these as a starting point.

In conclusion, A.I.D. should:

- Prepare a biennial report to Congress, with the first report provided in 1989. The reports should contain evaluations of A.I.D.'s progress in implementing the recommendations discussed in this report and in identifying future opportunities.

- Base the reports on verifiable measures of progress, along the lines of those described in annex A.

- In identifying future opportunities, seek advice and opinions from host-country governments and scientists, and Agency technical and social science experts. Use Country Profiles and State of the Environment reports now being written in many developing countries. Provide estimates of the costs and benefits of assisting developing countries to address these issues.

RECOMMENDATION #6:

Congress should provide clear policy guidance to U.S. Government agencies regarding the provision to, and use of, agricultural and industrial chemicals in developing countries. The Executive Branch should then implement that policy in a consistent fashion.

After considering all the things that A.I.D. can do to improve the safe handling and use of pesticides and chemicals in developing countries, it must be recognized that its efforts can be undermined if other U.S. agencies operating in those countries do not follow consistent policies.

Since 1979, U.S. agencies operating overseas have had to comply with Executive Order 12114, which requires them to establish procedures for conducting environmental impact analyses of projects that "significantly affect foreign environments." A specific conflict under this Order recently arose because A.I.D. and the U.S. Department of Agriculture jointly funded the MOSCAMED and CAPMED programs -- the goals of which are to eradicate the Mediterranean fruit fly from Mexico and Central America. Each agency has its own environmental procedures under the Executive Order, and, as noted elsewhere in this report, their procedures conflict (A.I.D.'s are more stringent than the Order requires). Each agency thinks that its policies apply,

because the United States does not have a consistent, overarching policy on the issue of environmental assessment in general or on the provision of pesticides overseas by U.S. agencies. Furthermore, because the policy exists only in the form of an Executive Order, it could be rescinded by a new Administration, thus leaving the Executive Branch with no policy at all.

Another example of the need for overarching policies arose between the State Department and the Environmental Protection Agency. During 1984-85, the U.S. Government was developing its position on proposed United Nations Environment Program guidelines regarding the exchange of information on hazardous exports. For many months, the State Department opposed the guidelines, while the EPA supported them on the grounds that U.S. law (the Federal Insecticide, Fungicide, and Rodenticide Act and the Toxic Substances Control Act) required them. Ultimately the U.S. delegation agreed with the provisional notification scheme proposed by UNEP.

Such conflicts over the conduct of environmental matters in overseas projects and the U.S. position on international questions cost time and money for the U.S. Government, undermine the projects of specific agencies, compromise the overall effectiveness and credibility of the U.S. Government in the countries where it operates, and weaken the United States' ability to encourage other donors to adopt environmental policies.

At a minimum, the Committee believes that U.S. Government agencies need a clear, consistent policy to guide them in their activities that involve or influence other countries and that involve chemicals and pesticides (including U.S. delegations to international organizations). The benefits of such a policy would include both enhanced effectiveness overseas and, potentially, very large resource savings because conflicting actions would be reduced.

Therefore, the Committee on Health and Environment recommends that:

- The U.S. Congress charge the Office of Technology Assessment (OTA) with reviewing Executive Order 12114 to determine how it is being implemented by the various U.S. agencies. OTA should then provide Congress with an analysis and policy options for improving implementation of the Order.

- Related to this effort, OTA should also review the question of whether the U.S. government needs an overarching policy on provision of pesticides and chemicals overseas.

- Once guidance is provided from Congress, in the form of legislation if necessary, the Executive branch should be responsible for ensuring that Agencies promulgate their own guidelines for observing the policy and establish structures to monitor their compliance.

REFERENCES FOR CHAPTER 3

1. Interview with Dana Dalrymple, Office of Agriculture, Bureau of Science and Technology, A.I.D., February, 1988.

2. U.S. A.I.D., Office of the Science Advisor, "Development Through Innovative Research: The First Three Years of the A.I.D. Program in Science and Technology Cooperation," January, 1985.

3. Environmental Law Reporter, volume 6, p. 20121, 1976.

4. A.I.D. plans to meet some of these training needs are discussed in a draft A.I.D. memo, subject: "Pesticides and Pest Management -- Short-Term Training," from Peter Freeman, November, 1987.

5. Agency for International Development/Washington, Memo from Task Force on the Procurement of Pesticides under Non-project Assistance to AIDWIDE. Subject: Guidance for implementing A.I.D. policy in relation to pesticide procurement. October 15, 1985.

6. See Michael Dover and Brian Croft, "Getting Tough: Public Policy and the Management of Pesticide Resistance" Study 1, World Resources Institute, Nov. 1984; Michael Hansen, "Escape from the Pesticide Treadmill: Alternatives to Pesticides in Developing Countries," Institute for Consumer Policy Research, Consumers Union of the United States, 1987; Dale Bottrell, "Social Problems in Pest Management in the Tropics," Insect Science Applications (1983) 4(1-2): 179-84.

7. U.S. Agency for International Development, "Policy on Pesticide Support," Bureau for Program and Policy Coordination, May, 1978.

8. Dale Bottrell, "Limitations to Low-Input Pest Management in Developing Countries," unpublished paper, 1987.

9. Op cit., Hansen

10. Peter Kenmore, "IPM Means the Best Mix," Rice IPM Newsletter 1, no. 1 (1987). International Rice Research Institute, Manila, Philippines.

11. Op cit., Hansen

12. Op cit., Kenmore

13. Op cit., Hansen

14. Jeffrey Leonard with David Morell, "The Emergence of Environmental Concern in Developing Countries: A Political Perspective," Stanford Journal of International Law 17, no.2 (1981).

15. United Nations General Assembly Resolution 37/137, December 17, 1982.

16. International Labour Office, "Interregional Tripartite Symposium on Occupational Safety, Health, and Working Conditions: Specifications in Relation to Transfer of Technology," 1981.

17. World Health Organization, "Review of the Results of Studies on the Conditions of Health in Small Industries," in "Meeting on Organization of Health Care for Small Industries," Geneva, July 22-27, 1975.

18. World Bank, "Guidelines for Identifying, Analyzing and Controlling Major Hazard Installations in Developing Countries," 1984.

ANNEX A:

POSSIBLE INDICATORS OF PROGRESS IN MEETING THE HEALTH AND ENVIRONMENTAL GOALS OF THIS REPORT AS NEEDED FOR REPORTING TO CONGRESS (Recommendation #5)

The following indicators are provided only as suggestions of data elements that A.I.D. might collect in evaluating its progress on the issues described in this report and in reporting to Congress. The Committee on Health and Environment understands that A.I.D. will need to establish monitoring and reporting requirements to prepare such information and wants to give the Agency sufficient flexibility to do so in the least burdensome way that it can develop. At the same time, the following list indicates the specific kinds of information that are relevant and the issues on which evidence of progress is important.

Possible Indicators for Recommendation #1:

1. List the Missions that have addressed constituency building on pesticides and chemicals issues in their Country Development Sector Strategies.

2. In 1993, submit a report on the constituency-building efforts of each Bureau and the Agency as a whole between 1988 and 1993.

Possible Indicators for Recommendations #2 and #3:

1. Among agricultural and vector control projects initiated during the previous year (where A.I.D. is the primary funder):

   a. What percent included plans for environmental and occupational safety and health?

   b. What percent included collection of baseline environmental and occupational safety and health data as one of the initial steps in the plan?

   c. What is the average percent of these projects' budgets allocated for evaluations? What is the range?

   d. Among those with pest management components:

      i. What percent are using IPM (or integrated disease control) as the primary pest (or vector) control strategy?

ii. What percent include an item in the budget for a pest management expert to be on site for greater than 25% of the time? 50%? 75%?

iii. How many have an expected duration of 1-3 years? 3-5 years? 5-7 years? greater than 7 years?

2. Among agricultural and vector control projects already under way or completed during the previous year (where A.I.D. is the primary funder):

a. How many and what percent of the total had MIDTERM EVALUATION completed during the previous year?

b. Among those that had a midterm evaluation:

i. What percent included an assessment of environmental and occupational consequences and of adherence to environmental and occupational safeguards?

ii. What percent included an evaluation of how beneficiaries' perspectives were affecting the project's success? (e.g., level of participation, change of attitudes, change in practices, level of adoption of new approaches)?

c. How many and what percent of the total had a FINAL EVALUATION completed during the previous year?

d. Among those that had a final evaluation:

i. What percent included an assessment of environmental and occupational consequences and of adherence to environmental and occupational safeguards?

ii. What percent included an assessment of how beneficiaries' perspectives had affected the project's success (e.g., see b.ii., above)?

e. Among those having a pest management component:

i. What percent are using IPM or integrated disease control as the primary pest control strategy? (Appropriate measures of IPM and integrated disease control are needed. Options include: What percent of projects are regularly monitoring pest populations and using that information to make treatment decisions? What percent are using cultural

controls? What percent are using pesticides as the means of last resort? What percent are making pest management decisions using an economic threshold?)

ii. What percent had a crop protection specialist at the project site for at least 25% of the time? 50%? 75%?

iii. What percent had pesticides provided by non-A.I.D. sources?

3. What percent of agricultural and vector control personnel in the Missions:

   a. Had performance standards reflecting environmental sustainability and occupational safety of projects as one of the criteria for which they were evaluated each year?

   b. Had at least one day of training during the year in some aspect of proper pest management and chemical handling techniques?

4. List brief (1 paragraph) descriptions of IPM research projects supported by AID during the previous year. [Include agricultural development projects where IPM is used only if chemical-intensive control plots are included and if empirical data are being gathered on comparative results; similarly, include vector control projects only if scientifically valid data collection on alternatives as well as conventional controls is part of the project.]

5. In 1989 (and subsequent years if the assessment goes on longer), report on the outcome of the A.I.D. Task Force on NonProject Provision of Pesticides. Identify the advantages and disadvantages to changing the current policy (which prohibits nonproject provision of pesticides).

<u>Possible Indicators for Recommendation #4:</u>

1. In 1989, report to Congress on the substance of the long-term plan for A.I.D.'s role in preventing and mitigating problems associated with chemical/industrial activities in rapidly developing countries. Include suggestions for information that could be reported to Congress on this issue for subsequent years.

2. In 1990 and subsequent years, report on the indicators developed per (1).

Possible Indicators for Recommendation #5: Not Applicable.

Possible Indicators for Recommendation #6:

1. Report on progress with interagency coordination on environmental issues.

ANNEX B:
PESTICIDES IN CENTRAL AMERICA

I. BACKGROUND

Central America is made up of seven small countries -- Guatemala, Belize, El Salvador, Honduras, Nicaragua, Costa Rica, and Panama. Because their economies rely principally on the export of six major crops (bananas, cotton, rice, sugar, coffee, and corn) Central American countries are vulnerable to fluctuations in demand and prices in international agricultural markets. African palm, citrus and other crops may become more important over time, as governments attempt to diversify their agricultural base. (1)

II. PESTICIDE USE IN CENTRAL AMERICA

Since the mid 1940s, Central American countries have relied increasingly on chemical inputs to grow crops such as insecticides, fungicides and nitrogen-rich fertilizers. As is typical in developing countries, the majority of imported pesticides is used on export crops(2)*.

In 1978, the total quantity of pesticides used in Central American countries was projected to remain roughly constant over the next ten years, in part because of a decrease in cotton production. Nonetheless, overall use of pesticides in Honduras, El Salvador, and Guatemala has increased in recent years (4). Belize, which uses less pesticides than other countries in the region, has increased its use of paraquat to control weeds in banana and sugarcane crops and to eradicate marijuana. Malaria is experiencing a resurgence in rural areas of Belize, Honduras, Nicaragua and Guatemala, and an intensified program to control the disease-carrying mosquitos is increasing the use of DDT substantially. (5)

Studies conducted in a number of Central American countries document applications of pesticides well in excess of the numbers and doses recommended on pesticide labels or used in developed countries. In Guatemala, the average annual number of applications of insecticides on cotton has increased from eight to forty, and the quantity used is among the highest in the world. In some areas, pesticides comprise 50% of the costs of agricultural production (6).

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* For example, until recently, over 80% of the insecticides used in Central America were applied to cotton. Of the total quantity of herbicides, 32% was used on sugarcane, 25% on rice, 18% on cotton, 14% on bananas, and 10% on coffee. Over 62% of the fungicides were used on bananas. (3)

Most of the pesticides used in Central America are imported from industrialized countries. Some are active ingredients that are mixed with inert and other ingredients at one of the many formulating plants in the region. Others are finished pesticides. Only Guatemala actually produces active ingredients; exports finished pesticides to all the other countries in the region. Guatemalan exports of pesticides were valued at U.S. $45 million in 1983 (7), and may increase in quantity and value, according to industry personnel who predict that an increasing percentage of pesticide production will take place in developing countries (8).

III. ADVERSE EFFECTS OF PESTICIDES IN CENTRAL AMERICA

A. HEALTH EFFECTS

Acute and chronic pesticide poisonings in Central America are one of the region's "most pervasive health problems" (9). Though record keeping is poor and reported cases of poisoning probably underestimate the total, illnesses and deaths resulting from exposure to pesticides have been documented in all Central American countries.

- In Costa Rica, El Salvador, Guatemala, Honduras, and Nicaragua, over 19,000 cases of pesticide poisoning were recorded between 1971 and 1976 (10). During each of the principal cultivating months, 88 poisonings were reported in Guatemala (11). A.I.D. estimated in 1979 that Central Americans are roughly two thousand times as likely to be poisoned by pesticides as are residents of the United States (12).

- 500 Costa Rican banana plantation workers applying DBCP during the 1970s have become sterile; researchers expect the numbers affected to reach 2,000. DBCP is also widely used in Honduras and Panama. (13)

- High levels of DDT and organophosphate pesticides have been found in shrimp, milk and meat of livestock, and in mother's milk, in El Salvador (14), Guatemala, and Nicaragua (15). Residues of chlorinated hydrocarbon in tissues of Guatemalans living in the cotton growing region are seven times those of urban dwellers (16). A Guatemalan suckling child daily consumes between seven and 244 the maximum daily intake legally permitted in the United States and advocated by W.H.O. and F.A.O. (17)

Dangerous levels of residues on produce and meat exported from Central America to the United States and other countries threaten to expose people in importing countries as well. Of pesticides used in Latin America in the late 1970s, including Guatemala and Costa Rica, forty five were registered for use in the United States. EPA considered unsafe food that contained any

residue at all of twenty five of the pesticides. Residues from another thirty seven were not detectable with Food and Drug Adminstration techniques. (18) Nonetheless, increasing quanities of food have been rejected for export from Central America and import to the U.S. in recent years because of excessive residues.

- Over a four-month period in 1980 in Honduras, high levels of residues of DDT, dieldrin and heptachlor were discovered in beef and shipment to the U.S. was prohibited. (19) Shipments of beef from five Central American countries were refused entry into the United States in 1981.

- According to the U.S. F.D.A., half of all imports of green coffee beans in the 1970s contained detectable amounts of pesticides that had been banned in the U.S. The F.D.A. study, which examined samples from all countries in Central America except Belize, found residues in beans from Honduras, Guatemala and El Salvador. (20)

B. ECONOMIC EFFECTS

A number incidents of pest resistance caused by excessive use of pesticides are well documented in Central America. In Nicaragua, years of exclusive reliance on chemicals for protecting cotton from the boll weevil ultimately reduced yields by 30% by the late 1960s. Equally intensive spraying of a variety of pesticides failed to control two insect pests in the Costa Rican banana crop. (21) Resurging malaria in Guatemala, El Salvador, and Nicaragua has been correlated with mosquito resistance to DDT (22).

Significant outbreaks of new, secondary pests in several Central American countries have repeatedly resulted from improper use of pesticides that kill the natural enemies of insects whose populations are normally below the economic threshold level. The use of DDT, DMC, toxaphene and other compounds has been correlated with the resurgence of pests that had been unimportant, in turn encouraging greater doses of insecticides. (23)

Even in cases in which resistance has not rendered a pesticide entirely ineffective, many Central American farmers spend a much higher percentage of their farm budget on chemicals than do their U.S. counterparts (24). In the Pacific coast agricultural areas, some farmers have spent up to 50% of their crop budgets on pesticides (25). Commercial growers in Costa Rica, El Salvador, and Nicaragua spent between 45 and 55% of their budgets on pesticides; small producers spent 15-30% (26).

Little information exists about the economic costs associated with damage to public health and the environment from

improper use of pesticides in Central America -- costs which may include reduced labor productivity and lost wildlife resources that are important to local economies, among other things. Perhaps the most complete effort to quantify costs was included in an extensive study of Central American cotton production. The study estimated that environmental and social damages in the cotton sector in Nicaragua totaled $200 million annually during the 1970s, until an extensive Integrated Pest Management program was implemented. (27)

C. ENVIRONMENTAL EFFECTS

Relatively little is known about the environmental effects of pesticide use in Central America. Because agrochemicals are less persistent in tropical conditions than in temperate climates, pesticide contamination of soils and water are likely to be less of a threat to Central America than to northern countries. Widespread pollution of coastal waters, rivers, and groundwater has not been documented, although incidents have been recorded in several countries (28). In the Pacific agricultural areas of Guatemala, for example, DDT has contaminated groundwater (29). On the other hand, short-term pollution of streams from cleaning pesticide application equipment is frequent (30), and streams and groundwater have been contaminated by leaching fertilizers (30). In at least one case, excessive applications of copper fungicides sterilized 50,000 hectares of agricultural land in Costa Rica, forcing the United Fruit Company to move its banana plantations (32).

Since pesticide residues can accumulate and concentrate in tissues of fish, birds and animals, the excessive use of pesticides in Central America may acutely poison wildlife or lead to chronic health problems, such as impairing reproductive capacity, or thinning the shells of young birds. A preliminary finding of a recent study suggests that the use of pesticides in the highland/Pacific areas of Central America may adversely affect not only local species but North American birds that have migrated there for the winter as well (32).

IV. CONSTRAINTS TO ADDRESSING PESTICIDE PROBLEMS IN CENTRAL AMERICA

A number of factors make proper use of pesticides more difficult in developing countries, such as those in Central America than in industrialized countries. If they are to succeed, programs to address problems with pesticides in any of the Central American countries must take these factors into account.

A. FACTORS RELATED TO POVERTY

A recent, multi-sector effort to harmonize registration and labelling requirements for pesticides in Latin America has helped Central American countries to focus on improving the legal structures for controlling the import, formulation, use, and disposal of pesticides (34). Today, most Central American countries have a number of statutes or decrees which attempt to prevent problems associated with pesticides. Some are more comprehensive than others but none of the countries is equipped to adequately enforce its pesticide laws. For example, in Costa Rica in 1984, the two workers responsible for inspecting formulating facilities were able to visit only 17% of the plants. 92% of the rural extension officers had not had any training in the proper use of pesticides. (35) To varying degrees, Central American countries lack finances, infrastructure, or political will to prevent and control the misuse of pesticides without outside assistance.

The poor health of workers and others exposed to pesticides may exacerbate their susceptibility to pesticide-related illnesses. Moreover, lack of education and literacy can render useless efforts to carefully label substances. One study found that three-fourths of the Central American workers employed in cotton growing could not read usage instructions or warnings. Living conditions heighten the threat: the majority of the workers in the study lived within 100 meters of the fields, many in temporary houses without walls to protect them from pesticide drift. (36)

B. GOVERNMENT ECONOMIC POLICIES

Perhaps the most significant barrier to addressing problems with pesticides in Central America are government economic policies that encourage excessive use of pesticides. Artificially low pesticide prices can defeat efforts to implement Integrated Pest Management, widely viewed as an economically and environmentally sound alternative to primary reliance on pesticides. Comprehensive information about subsidies exists for only one country in Central America. The per capita subsidies in Honduras -- resulting from policies such as giving pesticide importers a favorable rate of exchange and exempting pesticides from sales taxation -- are among the highest in a group of nine countries studied. (37) Although IPM has been used successfully in a number of contexts in Central America, widespread implementation of alternative approaches will be impossible while such economic policies remain in place.

V. A.I.D.'s PROGRAMS RELATING TO PESTICIDES IN CENTRAL AMERICA

A.I.D. has four broad development objectives in the Latin American/Caribbean region: (1) short-term economic stability, (2) basic structural reforms that permit rapid and sustained economic

growth, (3) a broader sharing of the benefits of growth, and (4) the strengthening of democratic insitutions and respect for human rights.

The Bureau for Latin America and the Caribbean, which encompasses Central America, also supports a variety of environmental objectives in the region. For example, a current regional project is designed to raise host countries' awareness of biodiversity issues. Other environmental projects include the improvement of national parks management and establishment of wildlife preserves in Panama, an inventory and evaluation of natural resources in Ecuador, and a number of projects for protection and management of tropical forests.

Two programs in Central America involving the procurement and/or use of pesticides have drawn considerable attention from Congress and the environmental community: the MOSCAMED and CAPMED programs. These programs are jointly funded by A.I.D. and the U.S. Department of Agriculture, using P.L. 480 Title I funds. MOSCAMED began in 1975 with the establishment of the MOSCAMED Joint Commission between Mexico, Guatemala, and the United States, through the U.S. Department of Agriculture (USDA). Meeting the current goal of the MOSCAMED program, which is to earadicate the Mediterranean fruit fly (Medfly) from Guatemala (and ultimately from all of Central America through the CAPMED program) has involved widespread aerial spraying of malathion bait spray and, until recently, the use of ethylene dibromide (EDB) (a pesticide banned for most uses in the U.S.) in quarantine facilities. USDA completed an assessment of the environmental impacts of MOSCAMED and CAPMED in 1987, but A.I.D. began its own Environmental Assessment in early 1988 because of disagreements between the two agencies over the necessary scope of such assessments. These issues are described more thoroughly in the main text of this report, under Recommendation #6.

A.I.D. is currently funding a regional Integrated Pest Management (IPM) project in Central America. The project has made remarkable progress in a relatively brief time period. At the time of the mid-term evaluation, officials were highly supportive of the project and it had led to increased crop yields. Better knowledge of the importance of administrative considerations in IPM projects (a lesson learned from an earlier A.I.D. project in the Sahel) contributed to the project's success. According the the mid-term evaluation, such administrative factors included incorporating country-specific programs in the design phase, the training orientation of the project, the rapport that staff were able to develop with local farmers and government officials, and the involvement of Mission staff in designing and implementing the region-wide project.

Another IPM project in Central America (for cotton in El Salvador) is intended to promote and expand IPM in a pilot zone of 11,000 hectares. Between 1982 and 1985, from 20 to 100% of the farms in the pilot zone were reported to implement some IPM

practices, with positive economic results. Obstacles encountered by farmers included lack of access to credit, unenforced pesticide laws, little neighborhood cooperation, unwillingness to grow off-season crops, and difficulties adopting innovations. (38) These problems are typical of many developing countries in Central America and in other regions.

A.I.D. has implemented several programs in Central America to control disease vectors, as well. These programs include efforts to focus on biological, social, and environmental factors in order to reduce the use of pesticides.

VI. CONCLUSIONS

While few comprehensive studies of pesticide use and problems in Central America exist, incidents in each of the seven countries in the region illustrate the potential impact of misuse. Particularly if more and more manufacturing takes place in plants based in developing countries that have minimal standards for quality control, the severity of the health, economic, and environmental effects of primary reliance on pesticides is likely to increase. Given its long-standing presence in Central America, the United States is uniquely equipped to assist governments, non-governmental organizations, and others to address pesticide problems within their countries. By implementing a number of the recommendations contained in the Committee on Health and the Environment's final report, A.I.D. could make a substantial contribution to such efforts in Central America.

REFERENCES FOR ANNEX B

1. H. Jeffrey Leonard, Natural Resources and Economic Development in Central America, (International Institute for Environment and Development, Washington, D.C.: 1987).

2. Ibid, p.181.

3. Burton, David K. and Bernard J.R. Philogene, An Overview of Pesticide Usage in Latin America, (University of Ottawa, Ottawa, KIN 6N5: 1985). It is important, to note, however, that figures on the quantities used by large users are more likely to be reported than those by small users, because the distribution and record keeping systems in large operations are more sophisticated.

4. Ibid.

5. PAHO/A.I.D., Belize Health Sector Assessment, PAHO/A.I.D.,

Washington, D.C.; Belize I, as cited in H.J. Leonard, Natural Resources and Economic Development in Central America, (International Institute for Environment and Development, Washington, D.C.: 1987), p. 165.

6. Op cit., Leonard, p. 145, ref. 84.

7. Op cit., Burton and Philogene.

8. Staff conversation with William Hollis, National Agrochemicals Association (NACA), July, 1987.

9. H. Jeffrey Leonard, Natural Resources and Economic Development in Central America, (International Institute for Environment and Development, Washington, D.C.: 1987), p.144.

10. Mendes, R., "Informe sobre Salud Ocupacional de Trabajadores Agricolas en Centro America y Panama", PAHO, 1977.

11. A. Incer Arias, "Principales Danos Producidos por Agentes Quimicos en Costa Rica." Documento de Trabajo preparadc para el Simposio sobre Emergencias Producidas por Agentes Quimicos organizado por el Centro Panamericano de Ecologia Humana y Salud (ECO), Metepec, Mexico, May, 1984, p. 150, ref. 107.

12. A.I.D. Brief, as cited in H. Jeffrey Leonard, Natural Resources and Economic Development in Central America, (International Institute for Environment and Development, Washington, D.C.: 1987), p. 158, ref. 100.

13. Hansen, Michael, Escape from the Pesticide Treadmill: Alternatives to Pesticides in Developing Countries, (Institute for Consumer Policy Research Consumers Union: 1987).

14. "El Salvador I.", Environmental Profile of El Salvador, compiled for A.I.D. by G. Hartshorn et al., (Tuscon: Arid Lands Information Center, University of Arizona, 1982), as cited in H. Jeffrey Leonard, Natural Resources and Economic Development in Central America, (International Institute for Environment and Development, Washington, D.C.: 1987), ref. 99.

15. Postel, Sandra, Defusing the Toxics Threat: Controlling Pesticides and Industrial Waste, Worldwatch Paper 79, (Worldwatch Institute: 1987), p.16.

16. "Guatemala Ib," An Environmental Profile of Guatemala. Assessment of Environmental Problems and Short- and Long-Term Strategies for Problem Solution. Prepared for A.I.D. by Institute of Ecology, University of Georgia (Athens, Georgia: 1981), as cited in H. Jeffrey Leonard, Natural Resources and Economic Development in Central America, (International Institute for Environment and Development, Washington, D.C.: 1987), p. 148, ref. 96.

17. Michaels, David and Clara Barrera, "Economic Development and Occupational Health in Latin America: New Directions for Public Health in Less Developed Countries," American Journal of Public Health, 1985.

18. Weir, David and Mark Schapiro, Circle of Poison, (Institute for Food Development Policy: 1981).

19. "Honduras II", Country Environmental Program: A Field Study. Prepared for A.I.D. by Paul Campanella et al. (Mclean, Virginia: JRB Associates, 1982), as cited in H. Jeffrey Leonard, Natural Resources and Economic Development in Central America, (International Institute for Environment and Development, Washington, D.C.: 1987), p. 61.

20. Op cit., Weir and Shapiro.

21. Ibid, Postel and Hansen.

22. Chapin, G. and R. Wasserstrom, "Agricultural Poduction and Malaria Resurgence in Central America and India," Nature, 293(5829), 1983, as cited in H. Jeffrey Leonard, Natural Resources and Economic Development in Central America, (International Institute for Environment and Development, Washington, D.C.: 1987), ref. 90.

23. ICAITI, "An Environmental and Economic Study of the Consequences of Pesticide Use in Central America--Cotton Production," as cited in H. Jeffrey Leonard, Natural Resources and Economic Development in Central America, (International Institute for Environment and Development, Washington, D.C.: 1987), ref. 94.

24. H. Jeffrey Leonard, Natural Resources and Economic Development in Central America, (International Institute for Environment and Development, Washington, D.C.: 1987), p. 181.

25. Guatemala Ib; Nicaragua I., Environmental Profile of Nicaragua, compiled for A.I.D. by S. Hilty, (Tucson: Arid Lands Information Center, University of Arizona, 1982), as cited in H. Jeffrey Leonard, Natural Resources and Economic Development in Central America, (International Institute for Environment and Development, Washington, D.C.: 1987), ref. 17, p.84.

26. Thrupp, Lori Ann, Pesticides and Policies, 1982, refs. 8,9, and 10.

27. Op cit, ICAITI.

28. "Guatemala II," Perfil Ambiental de la Republica de Guatemala, prepared for A.I.D./ROCAP by Universidad Rafael Landivar (Guatemala City, Universidad Rafael Landivar, 1984), "Panama II," Panama: State of the Environment and Natural Resources (Washington, D.C.: Agency for International Development, 1980), "Costa Rica II," Costa Rica: A Field Study, prepared for A.I.D. by G. Hartshorn et al.(San Jose, Costa Rica: Tropical Science Center, 1984) and "Honduras II," as cited in H. Jeffrey Leonard, Natural Resources and Economic Development in Central America, (International Institute for Environment and Development, Washington, D.C.: 1987), p. 160, ref. 142.

29. Cunningham, as cited in H. Jeffrey Leonard, Natural Resources and Economic Development in Central America, (International Institute for Environment and Development, Washington, D.C.: 1987) p. 160, ref. 143.

30. Op cit, Leonard, p. 160, ref. 143.

31. Ibid, p. 147, refs. 93 and 94.

32. Op cit, Thrupp, refs. 10 and 12.

33. Op cit, Leonard, p. 158.

34. Delp, C.J., "Trends in Tropical Pesticide Use," (ISCPP: 1986).

35. Op cit, Thrupp.

36. Op cit, Michaels.

37. Repetto, Robert, Paying the Price: Pesticide Subsidies in Developing Countries, Research Report #2, (World Resources Institute: 1985).

38. Thrupp, Ann, Preliminary Study of Technology Transfer and Socioeconomic Impacts, A.I.D. consultant report, 1985.

GLOSSARY OF TERMS and ACRONYMS

A.I.D. -- United States Agency for International Development. A.I.D.'s mandate is to execute U.S. economic assistance programs throughout the developing world.

Agricultural Chemicals -- For purposes of this report, includes pesticides but also other chemicals, such as fertilizers, that are used for agricultural purposes and can cause adverse effects. Note that some types of pesticides are not covered, (e.g., microorganisms used as pesticides). This report only considers problems associated with chemical forms of pesticides.

CDC -- Centers for Disease Control. An operating agency under the U.S. Department of Health and Human Services. Responds to public health emergencies and administers national programs for the prevention and control of communicable and vector-borne diseases.

CIP -- Commodity Import Program. A particular type of nonproject assistance that A.I.D. provides to developing countries.

Chemicals or Industrial Chemicals -- For this report, refers to chemicals other than pesticides that are used in industrial processes or are used commercially.

EA -- Environmental Assessment. A.I.D.'s environmental regulations require that an EA be completed if an Initial Environmental Evaluation demonstrates that a project has potential to cause environmental impacts. EAs are also required for all projects involving pesticides, except in the cases of emergencies, research, or when A.I.D. is a minor donor.

EPA -- Environmental Protection Agency. The primary environmental protection arm of the U.S. Government. The EPA administers a variety of statutes to prevent or mitigate adverse effects of pollutants in air, water, and on land.

FAO -- Food and Agriculture Organization. A specialized agency of the United Nations. Oversees UN policy with respect to agriculture, fisheries, and forestry.

FDA -- Food and Drug Administration. Part of the U.S. Department of Health and Human Services. Aims to protect citizens against impure or unsafe foods, drugs, cosmetics and other potential hazards.

Hazardous Substances -- A general term meant to include either pesticides or industrial chemicals that are hazardous to humans or the environment.

IEE -- Initial Environmental Evaluation. IEEs must be completed for all A.I.D. projects. An IEE is essentially a checklist of items to be considered in determining whether a project may have an environmental impact. If so, an Environmental Assessment is required.

ILO -- International Labor Organization. A specialized agency associated with the United Nations. Promotes voluntary cooperation among members to improve labor conditions and raise living standards.

IPM -- Integrated Pest Management. Any system that relies on a variety of approaches for controlling pests, including physical, biological, genetic, and cultural controls as well as pesticides. IPM tries to maximize the natural mortality factors of major pests in an agricultural system, while minimizing the need for pesticides. It relies on the concept of an economic threshold of pest population density or crop damage, below which the cost to control a pest is greater than the benefit of doing so. Efforts to breed crops resistant to diseases and pests, the use of cover crops for weed control, plantings timed to avoid pest damage, and introduction of insect predators are just a few examples of the components of IPM.

MNC -- Multinational corporation

NGO -- Nongovernmental organization

NIOSH -- National Institute of Occupational Safety and Health. A part of the Centers for Disease Control, NIOSH carries out research and develops national occupational safety and health standards.

OAS -- Organization of American States. Regional intergovernmental organization to promote development and cooperation among member states and to preserve peace and security in the Americas.

OECD -- Organization for Economic Cooperation and Development. Its members are the governments of Western Europe, Australia, Canada, Japan, New Zealand and the United States. Stimulates economic cooperation between member countries to promote growth, expand world trade, and coordinate aid to less developed countries.

OPIC -- Overseas Private Investment Corporation. Assists U.S. investors in over 100 developing countries. Provides loans, insurance, and information on investment opportunities.

PAHO -- Pan American Health Organization. This is the World Health Organization's regional office for the Americas.

Pesticides -- Any chemical intended to reverse or mitigate the harmful effects of pests. Includes insecticides, herbicides, fungicides, rodenticides, and certain plant growth regulators.

UNEP -- United Nations Environment Program. Monitors changes in the environment and promotes natural resource conservation.

UNIDO -- United Nations Industrial Development Organization. A specialized agency of the United Nations. Promotes and accelerates industrialization of developing countries by providing technical assistance, planning, and marketing information. Also helps countries to formulate industrial policies.

USDA -- United States Department of Agriculture.. Responsible for U.S. food and agriculture programs including resource conservation, nutrition, improvement of farm income, and development and expansion of overseas markets. Also provides credit, extension and rural development services.

World Bank -- The largest development institution in the world; a multi-lateral lending institution.

WHO -- World Health Organization. A specialized agency of the United Nations which directs and coordinates international health efforts including health education, nutrition, sanitation, and immunizations. Promotes research, technical cooperation, and the transfer of information, and establishes standards for food and pharmaceuticals.

The Conservation Foundation

OPPORTUNITIES TO ASSIST DEVELOPING COUNTRIES IN THE PROPER USE OF AGRICULTURAL AND INDUSTRIAL CHEMICALS

Report of the
Committee on Health and Environment

Volume 2: Appendixes

Prepared by The Conservation Foundation

for the

Report of the Committee on Health and Environment

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102

VOLUME 2:

TABLE OF CONTENTS

Appendix 1:	A.I.D.'s Organization and Structure
Appendix 2:	A.I.D.'s Environmental Regulations and Pesticide Policy
Appendix 3:	A.I.D.'s Policies and Programs Regarding Agricultural and Industrial Chemicals in Developing Countries
Appendix 4:	Opportunities for Coordination Among U.S. Agencies
Appendix 5:	Other Donors' Policies
Appendix 6:	Integrated Pest Management Programs in Developing Countries: Lessons from Case Studies
Appendix 7:	Bibliography

APPENDIX 1:

A.I.D.'s ORGANIZATION AND STRUCTURE

This appendix describes the various offices and bureaus of A.I.D., and explains the mandate and typical spheres of activity for each.

Information in this section was derived from a variety of A.I.D. publications and project documents.

Prepared by The Conservation Foundation
for the Report of the Committee on Health and Environment

OVERVIEW OF A.I.D.

I. ORGANIZATION OF THE AGENCY

A. Purpose of the Agency

The mandate of the U.S. Agency for International Development (A.I.D.) is to execute U.S. economic assistance programs throughout the developing world. A.I.D. was established in 1961 to provide development assistance which promotes self-sustaining economic growth and improved social well-being in developing countries. The Agency currently has programs in over 70 countries and has requested $5.8 billion for fiscal year 1988 to execute its programs.

Development assistance priorities for A.I.D. focus on five key areas: 1) generating income growth; 2) alleviating hunger; 3) improving health, especially child survival; 4) increasing educational opportunities, and 5) slowing population growth. Four principles have been mandated as appropriate to guide U.S. economic development assistance: 1) policy dialogue and reform; 2) research and technology transfer; 3) institution building; and 4) private sector development.

B. Administrative Linkages

The International Development Cooperation Agency (IDCA), is an inter-Agency body which develops and coordinates U.S. development assistance, including A.I.D. activities. Representation from a variety of agencies assures that foreign aid objectives support U.S. national interests, including political, economic, security, commercial, developmental, and humanitarian. A.I.D. maintains linkages with other organizations, both domestic and international, public and private, in order to carry out specific programs and policies. The Agency's "Blueprint for Development" specifically calls for increased coordination with other organizations to enhance the impact of A.I.D.'s programs.

C. The A.I.D. Missions (USAIDs)

The core unit of the Agency is the Mission, the A.I.D. office within each host country. All Agency activities in host countries are channeled through the Mission in each country, even if they have been initiated by a particular Office or Bureau in Washington (see below). Although Mission programs are coordinated by the corresponding regional Bureau, the decentralized nature of the Agency gives Missions considerable autonomy to develop and execute programs in their country. In addition, the majority of A.I.D. funds are dispersed directly by the Missions.

105

The size of each Mission depends on the amount of funds allocated to each country and the complexity of projects underway. Therefore, the staff may be composed of limited numbers of people, each of whom serves in a variety of functions, or it may number in the hundreds, with specialized program areas and a range of technical capabilities. Each Mission has an environmental officer, whose responsibility is to assure that all programs are consistent with the Agency's environmental policies and regulations. Depending on size of the Mission, the environmental officer may or may not have other duties as well. In addition to each Mission environmental officer, regional environmental management specialists are based in Central and South America, the eastern Caribbean , West and Central Africa, and East Africa.

D. Summary of A.I.D./Washington Offices and Bureaus

The Washington, D.C. headquarters of A.I.D. is divided into Offices and Bureaus, each with a generally defined area of expertise, function, or geographical responsibility. These Offices provide technical support, oversight and funding for programs carried out by the Missions.

A.I.D. organizes assistance two ways - centrally and regionally. Centrally funded programs focus on global problems that transcend national and continental boundaries. These programs support policies, adaptation of technologies, and scientific innovations which have potential application to developing countries. Centrally funded programs include population, private enterprise, and foreign disaster assistance. In general, centrally funded programs concentrate on specific issues rather than places. They develop and evaluate policy and methodology, and coordinate services and multi-donor aid. Regional Bureaus coordinate programs in regions and in specific host countries. Annex A-1 shows the organizational diagram for the Agency.

The Agency's Environmental Affairs Coordinator is located in A.I.D. Washington, in the Office of the Administrator. Among the Washingtong Bureaus, the Bureau for Science and Technology has an Environmental Coordinator, and the Bureau for Program and Policy Coordination has an Environmental Policy Advisor. In addition, Regional Environmental Coordinators for each of the three regional Bureaus (Africa, Asia, and Latin America) provide oversight for the activities initiated or implemented by the Missions and are responsible for oversight of the environmental regulations. The Regional Environmental Management Specialists based in the field, provide field-based support to the Mission environmental officers and report to the Washington-based regional Bureau environmental officers. As mentioned previously, each Mission also designates an Environmental Officer.

106

1. The Regional Bureaus

A.I.D. has three geographic bureaus: Africa (AFR), Asia/Near East (ANE), and Latin America and the Caribbean (LAC). Regional Bureaus oversee programs derived mainly from regional socio-economic and environmental circumstances. Funds for country programs are allocated through the regional Bureau, and centrally funded programs require Mission consent to conduct work in any particular country. Country and regional programs are tailored to specific host-country needs.

In addition to Missions, there are three regional Offices which address issues relating to groups of countries. Two Regional Economic Development Services Offices (REDSOs) in Africa and the Regional Office for Central America and Panama (ROCAP) execute these regional activities in coordination with the Missions.

2. Bureau for Program and Policy Coordination (PPC)

This Bureau has principal responsibility for overall A.I.D. policy development and program review. PPC coordinates and plans budgets for A.I.D. geographical programs, formulates A.I.D. policy, reviews project proposals to assure they are consistent with policy, and oversees funding from outside donors. Some PPC funds are used for policy research and evaluation activities. In addition, PPC development assistance monies fund two significant programs which are global in scope: the Consultative Group on International Agricultural Research (CGIAR), and the United Nations Fund for Population Activities (UNFPA).

3. Bureau for Science and Technology (S&T)

S&T is the largest centrally funded A.I.D. entity, and is the technical branch of the Agency. It has a large staff of specialists who provide technical support to the Missions and other Offices and Bureaus within A.I.D. Additionally, it discovers and implements appropriate ways to develop, transfer, and apply scientific innovations in the third world context. S&T is organized into five directorates, each with a distinct area of programmatic responsibility. The directorates are: Food and Agriculture; Energy and Natural Resources; Human Resources; Health; and Population. These directorates fund projects that a) evaluate new technologies through pilot projects or research, or b) support outside institutional (private and public) innovation in science and technology relevant and applicable to developing countries.

4. Office of the Science Advisor (SCI)

SCI was started in 1981 to encourage cooperation with scientists in developing countries, and to foster basic research capabilities and efforts that may contribute to development in developing countries. Currently scientists from more that 60

countries receive SCI competitive research grants for scientific work in areas relevant to developing countries and for "Research Networking" with the National Academy of Sciences.

5. Bureau for Food for Peace and Voluntary Assistance (FVA)

This Bureau administers three programs: Food for Peace (P.L. 480); Private and Voluntary Cooperation; and American Schools and Hospitals Abroad (ASHA). Funds channeled through these programs primarily support outside institutions engaging in relief efforts, community assistance, health care and child survival in developing countries. The Office of Private and Voluntary Cooperation (PVC) is the principal centrally funded A.I.D. entity administering matching and cost-sharing grants to private and voluntary organizations (PVOs) engaged in international development. A.I.D. Missions and regional Bureaus also provide field support for PVO work in specific countries or regions. (The Food for Peace program is described in more detail in a later section).

6. Bureau for Private Enterprise (PRE)

PRE was initiated in 1981 to encourage private sector growth, which is one of A.I.D.'s four policy principles. Three Offices in PRE oversee separate aspects of "privatization", or the promotion and expansion of private sector growth: Housing and Urban Development, Investment, and Project Development. PRE cooperates with U.S. and developing countries businesses, to initiate pilot programs encouraging private enterprise, and works with A.I.D. Missions to use private enterprise as a delivery mechanism for aid. PRE tries to remove obstacles to private business growth through market development, commercialization of technology, and divestiture.

A Revolving fund, established in 1983, has provided loans to financial institutions to strengthen capital markets in developing countries and to small businesses and private health care initiatives. Almost a quarter of the 1987 appropriations to PRE helped fund private and/or cooperative enterprises which support agricultural development.

7. Office of U.S. Foreign Disaster Assistance (OFDA)

OFDA is designed to respond quickly to overseas disasters. Its goals are to provide emergency relief and assist in contingency planning to address disasters resulting from natural or technological disasters, such as earthquakes, pest infestations, epidemics, and chemical spills. OFDA's three regional divisions plan relief strategy and develop mitigation activities for their part of the globe. These geographically based divisions also foster and maintain links with A.I.D.'s geographic Bureaus and with Missions. Regular appropriations to OFDA for international disaster assistance (IDA) are frequently

108

supplemented in large amounts when a disaster occurs through special appropriations and individual Mission budgets.

8. Board for International Food and Agricultural Development (BIFAD)

BIFAD was formed in 1975 when Congress passed the Title XII amendment to the Foreign Assistance Act of 1961. Title XII addresses the need to establish a link between A.I.D. and academic institutions to enhance research and development in agriculture around the world. The Board's membership is made up of U.S. university professionals and private business people. They advise A.I.D. regarding Title XII programs, and provide an important link between the Agency and academic institutions engaged in research relevant to agricultural development both here and abroad.

II. TYPES OF ASSISTANCE

A.I.D. budgets are channeled through three major types of funds: project assistance funds, non-project assistance funds, and Economic Support Funds (ESF). In general, project assistance is defined as aid which supports human development needs in broadly defined categories such as agriculture, health, family planning, and education. It generally takes the form of specific development projects.

Non-project assistance usually takes the form of money loaned or granted directly, for example, to help balance payment shortfalls of debtor countries. It is direct financial assistance not earmarked for specific development projects *per se*, although it may be used by host countries to execute a "project" type of activity. The Agency believes that economic growth can best be promoted through the development of the private sector. It has given increased support to a variety of balance of payments support in the context of multi-donor structural adjustment programs. Therefore, the proportion of non-project forms of assistance and ESF funds relative to project assistance has been increasing. These three funding mechanisms are described below.

A. Development (Project) Assistance

Broadly defined, development assistance (DA) strives to improve the quality of life of the poor by enhancing their economic opportunities. DA projects are sometimes locally derived and usually locally adapted, and focus on improving and protecting human and natural resources. The primary executing forces for development assistance programs are the A.I.D. Missions. Centrally funded development assistance projects require Mission consent to operate in any given locale. The six categories of DA, which are the Functional Development Assistance Accounts contained in the Foreign Assistance Act, are described below. Annex A-1 provides a breakdown of development assistance

by region and for specific Offices and Bureaus.

1. Agriculture, Rural Development and Nutrition

As with all DA programs, the goal here is to increase the income of the poor. Specifically, projects are designed to expand the availability and consumption of food, often by stimulating rural economic growth according to the following strategy: (a) finding and/or creating employment for low-income households to enable them to purchase available food; (b) promotion of private agricultural markets; (c) support for sustainable family farms through credit; (d) targeted food assistance when/where none available; (e) advice on nutrition. The program also incorporates current scientific innovations as these become available. Some examples are the introduction of new cropping systems, and utilization of new seed varieties that respond well in restrictive climates. This account is the largest funding source for environmental and natural resource activities.

2. Population Planning

Family planning services constitute 80% of this program's budget. The funds are used to train health professionals; supply contraceptives to both the private and the public sector; and fund local, community-based family planning associations. Research, primarily involving fertility regulation methods, accounts for the remaining expenditure. Half of the program's funds are channeled through the regional Bureaus to private and public groups in 30 developing countries. Through centrally funded programs, the other half goes to US firms, PVO's and academic institutions which provide services in 80 countries.

3. Health

More than half of A.I.D.'s health account focuses on infant and child mortality. Funding is broadly based both inside the Agency and bilaterally. Centrally funded programs concentrate on technical support for child survival, and field support for control of vector-borne diseas, water and sanitation projects, and research (e.g. testing of new vaccines and service delivery systems).

4. Child Survival Fund (CS)

This account is a heavily funded offshoot of the health program. The separate account was established to emphasize the infant/child mortality problem in order to develop separate systems, and later incorporate them into traditional programs. This is happening to some extent. Fully half of the DA health account supports Child Survival programs. Funds also come from the Africa Bureau's Sahel program and the Food for Peace program.

Two technologies are stressed: Oral Rehydration Therapy (ORT), and immunization. Other issues are birth spacing and nutrition. There are also some area-specific programs, such as malaria treatment programs in parts of Africa.

5. Education and Human Resources Development (EHR)

This program's goal is to help developing country institutions achieve a permanent capacity for research, teacher training, and production of educational materials. A.I.D. programs in this area provide and help maintain both local and external training programs for technicians. In fiscal year 1986, 15,000 A.I.D.-funded people received training in the U.S. In both education for children and adult training for private and public sector leadership, EHR programs concentrate on developing analytical and planning skills in scientific and technical areas.

Central Bureau EHR programs provide field support to Missions, administrative support for training and labor development, and funds for research; regional programs provide technical support and administer training.

6. Private Sector, Energy, and Private and Voluntary Organizations

As A.I.D. increasingly stresses privatization, this account (familiarly called "the 106 account") has become more important in providing support in the above three areas. Generally, this program concentrates on cross-sectoral problems and mobilizing external (particularly non-governmental) assistance resources. It includes some support for environmental issues, particularly issues affecting urban environments and industrialization. Private enterprise DA provides credit to small enterprises, provides management training, and encourages the private sector to participate in the delivery of aid and to develop local trade associations. The objective of the PVOs and cooperative development organizations is to establish community skill centers and promote the export of native crafts. A.I.D. "106 account" activities also support research and technology transfer.

B. Economic Support Fund

The Economic Support Fund (ESF) is designed to strengthen economic stability in countries of particular security interest to the U.S. ESF is administered by A.I.D. in conjunction with the Department of State, and under the general oversight of the Secretary of State. This flexible support is usually used for discrete projects identified by the host country, but can also be in the form of direct cash transfers or commodity import programs. Provision of ESF may be tied to economic reforms or other conditions negotiated directly with recipient governments. It also is used to support allies and developing nations "heavily burdened by high costs of their own defense... either in recognition of provision of military base or access

rights, or as non-project assistance...within the context of major multi-donor structural adjustment programs."

The Commodity Import Program (CIP) is a mechanism to provide loans or grants to countries for purchasing basic goods from the U.S., including agricultural machinery, construction equipment, fertilizers, chemicals, raw materials, and foodstuffs. CIP is not a separately funded account; instead it is a program supported by other accounts (usually ESF but also development assistance accounts). Military equipment and luxury items are specifically excluded from the program, as are items of questionable safety or efficacy (e.g. certain chemicals). Although A.I.D. may delimit the range of commodities available through CIP, it "does not determine the specific items to be purchased, nor does it select the suppliers. Transactions are handled directly between U.S. suppliers and foreign importers."

C. Food for Peace (P.L.480)

Public Law 480 established the Food for Peace program in 1954. As the largest U.S. food assistance program, P.L. 480 provides agricultural exports of $1.3 billion -- roughly 5 percent of the total value of all U.S. agricultural exports. More than 100 countries received P.L. 480 assistance in fiscal year 1985. Different types of assistance are provided under three distinct titles. Title I agreements permit foreign governments to purchase U.S. agricultural commodities on a concessionary basis (U.S. Government financed). Title II authorizes food donations to countries requiring urgent relief, while Title III (Food for Development) allows foreign governments to purchase U.S. agricultural commodities on concessionary terms, then resell them in their own countries for local currency. Proceeds from Title III sales are used for self-help projects; as the local currencies are spent, the dollar equivalent is subtracted from the Title I debt.

The use of PL-480 as a funding mechanism requires joint participation by the U.S. Department of Agriculture (USDA) and A.I.D. in negotiating agreements with host country governments over the programming of the funds. Other U.S. government agencies with an interest may be involved at this stage as well. There is disagreement between USDA and A.I.D. over which of the two agencies has responsibility for the continued monitoring and administration of P.L. 480 monies once the negotiating stage is concluded.

III. REGIONAL PRIORITIES AND A.I.D. OBJECTIVES

This section provides a brief profile of each of the A.I.D. regions, summarizing the key development issues. It also provides an overview of A.I.D.'s priorities, strategies, and general environmental objectives to promote development in each region as described in A.I.D.'s fiscal year 1988 Congressional Presentation. (Specific programs which deal with pesticides and chemicals are described in Section C and Appendix 3).

A. Bureau for Africa

1. Regional Profile

There is considerable diversity among the nations on the African continent. However, most face a formidable range of development obstacles. The most serious endemic problems include:

- Population growth, migration and human development (rapid urbanization, health, literacy, malnutrition);
- Environmental degradation (deforestation, erosion, desertification);
- Political constraints (institutions and political infrastructure are inadequate; internal strife and border hostilities);
- Economic constraints (limited funds, debt burden, extensive govenment control of economies, unfavorable terms of trade);
- Inadequate support resources (limited energy resources, social infrastructure (education) and physical infrastructure (roads).

In addition to these underlying problems, the African countries are highly susceptible to abrupt economic, political and environmental changes that have disastrous consequences for steady development progress. These disruptions, prevalent in the past, can be expected to hamper progress at various times and places in the future. They include drought; invasions of pests such as locusts; economic jolts such as those caused by a jump in oil prices or a drop in prices for African export commodities; and internal and external warfare, which can destroy resources, interrupt transportation, and cause forced migrations, among other things.

2. Strategy and Goals

A.I.D.'s program for the region includes a number of components, with the major emphases on (1) economic restructuring and reform, (2) increased agricultural production, and (3) human

resources development. To these ends, the Agency expects to continue its activities in agriculture, health, population, child survival, education, and environmental protection. In all African programs, A.I.D. stresses two general objectives: to increase the self-reliance of African nations and African people, and to increase the involvement of the private sector in the development process. The latter objective is particularly relevant to chemical issues because of A.I.D.'s emphasis on reducing parastatals and passing responsibility to the private sector, e.g. for distribution of agricultural inputs such as pesticides and fertilizers.

To most effectively promote these activities, A.I.D. has proposed creating a "Development Fund" for Africa which would replace the traditional functional accounts and allow greater flexibility in programming. Appropriations to the Fund would be consolidated and maintained until needed, rather than expended in the fiscal year in which they were allocated. The Agency expects this to increase its ability to insist that certain conditions be met by recipient countries prior to providing aid.

3. General Environmental Objectives

A.I.D. states that the depletion of soils, deforestation, and poor land management "are having a major long-term negative impact on Africa's agricultural future." Thus, better management of the region's natural resources must be an "integral part" of agricultural assistance activities. The Natural Resource and Energy Management Project will "provide technical assistance and training to strengthen the capacity of African organizations" to undertake a range of activities. The Agency's programs concentrate on four general problem areas: agroforestry (Senegal), soil and water conservation (Rwanda), fuelwood management (Sudan), and energy. It also supports a number of activities related to maintaining biological diversity.

[Appendix 3 provides descriptions of specific projects related to pesticides and chemicals.]

B. Bureau for Latin America and the Caribbean

1. Regional Profile

Political and security problems are prevalent throughout the region. Some are associated with civil warfare, others with narcotics trafficking (especially in the Andean region). Still, conditions in Latin America depend greatly on external factors--the international economy, protectionism in industrial nations, and prices for commodities other than oil. Prices for non-oil commodities dropped by 12% between 1984 and 1985 and then by another 4% in 1986, thus depressing the region's traditional export earnings. These declines are significant, since A.I.D. feels that prolonged economic difficulties pose a serious threat to the expansion and consolidation of gains in democratization.

Despite these trends, there is discernible progress in achieving social development goals, as evidenced by increased primary school enrollment ratios, lowered infant mortality rates, and a larger percentage of women who use contraceptives. Of course, this overall appraisal masks considerable differences among countries -- including both setbacks and gains in social, political and economic performance.

2. Strategy and Goals

A.I.D.'s principal strategic goal in the region is to support governments that are stable, friendly, and democratic, and that provide a climate of political and economic freedom conducive to the protection of security interests within the Hemisphere. A.I.D. has four broad development objectives in the Latin American/Caribbean region: (1) short-term economic stability, (2) basic structural reforms that permit rapid and sustained economic growth, (3) a broader sharing of the benefits of growth, and (4) the strengthening of democratic institutions and respect for human rights.

The Agency seeks to target the needs of lower-income groups, emphasize employment opportunities, build institutions, and apply advances in science and technology. Its strategy emphasizes the role of the private sector as the main engine of development, but also seeks to improve the role of the public sector by encouraging reforms which increase political and economic freedoms and by encouraging management improvements to reduce the cost of public services. In the Development Assistance category, programs in agriculture, rural development, and nutrition have the twin goals of increasing production and generating the income needed by the rural poor to meet their basic needs.

3. General Environmental Objectives

A.I.D. feels that long-term growth in the region's agricultural enterprises and related economic activities will depend to a considerable extent on the management of natural resources, including the maintenance of biological diversity. A major regional project is designed to raise host countries' awareness of biodiversity issues. Other environmental projects include the improvement of national parks management and establishment of wildlife reserves in Panama, an inventory and evaluation of natural resources in Ecuador, and a number of projects for the protection and management of tropical forests.

[Appendix 3 contains descriptions of projects related specifically to chemicals and pesticides in the Latin American and other regions.]

C. Bureau for Asia and the Near East

1. Regional Profile

The geographical and economic differences of countries in the ANE Bureau are extreme, ranging from very poor countries to those which are middle income nations. The region includes Asia, the Middle East, and parts of Europe. If one excludes Europe, the region encompasses 1.4 billion people with an average per capita income of less than $380 per year, one-third of whom are unable to meet FAO standards for minimum caloric requirements necessary to sustain an active working life. Despite impressive increases in food production, income inequality and population growth result in the persistence of malnutrition. This problem is compounded by a variety of political problems, such as the difficulty of achieving a Middle East peace; the war in Afghanistan and resulting refugee settlements in Pakistan; the vulnerability of democracy in the Philippines; and the persistence of narcotic traffic and terrorism.

2. Strategy and Goals

U.S. objectives in the region fall into three main categories: humanitarian, political, and economic. In addition, the U.S. seeks to control the flow of illegal drugs into the United States. Humanitarian considerations are obvious and to some extent are integrated with political and economic interests. Political objectives include the maintenance of peace, stability, and the security interests of the U.S. Economic objectives include policy reform, expansion of private sector activities, and expansion of new markets in the region for both U.S. manufacturing and agricultural exports.

3. General Environmental Objectives

A.I.D. has a variety of programs in the region that acknowledge that sustainable development and an acceptable quality of life depend to a great extent on effective management of natural resources and protection of the environment. Among the general problems addressed are water resources management, tropical deforestation, biological diversity, and institutional development and training.

A Biological Diversity Small Grants Program is assisting with parks and wildlife reserves, providing biological surveys, and implementing biodiversity training programs. The Agency also has projects to improve water supply and wastewater treatment (Egypt, Jordan, and Oman), to promote reforestation for watershed preservation and erosion control (India, Pakistan, and Nepal), to survey unused pesticide stores (Yemen and East Africa) and to provide technical assistance to industrial managers on occupational safety and accident prevention. Specific projects are described in Appendix 3.

TABLE A-1
GENERAL DISTRIBUTION OF FUNDS

U.S. A.I.D. APPROPRIATIONS BY REGION AND PROGRAM
FISCAL YEAR 1987[1]
($millions)

Program	Region: Africa	Asia, Near East, Europe	Latin America, Caribbean	Centrally Funded Programs	TOTAL
DEVELOPMENT ASSISTANCE					
Agriculture	140	191	161	124	616
Population	18	52	22	127	219
Health	27	43	38	52	160
Child Survival	15	13	24	24	76
Education, HR	34	23	85	9	151
Prvt.Ent,Ener,PVOs	5	16	71	44	136
Other Programs	89[2]	—	151[3]	77	317
TOTAL D.A.	328	338	552	457	1675
ECONOMIC SUPPORT FUND	213	2961	769	1	3944
PL480 TITLE I[4]	135	377	220	196	928
PL480 TITLE II	103	158	53	220	534
GRAND TOTAL	779	3834	1594	874	7081

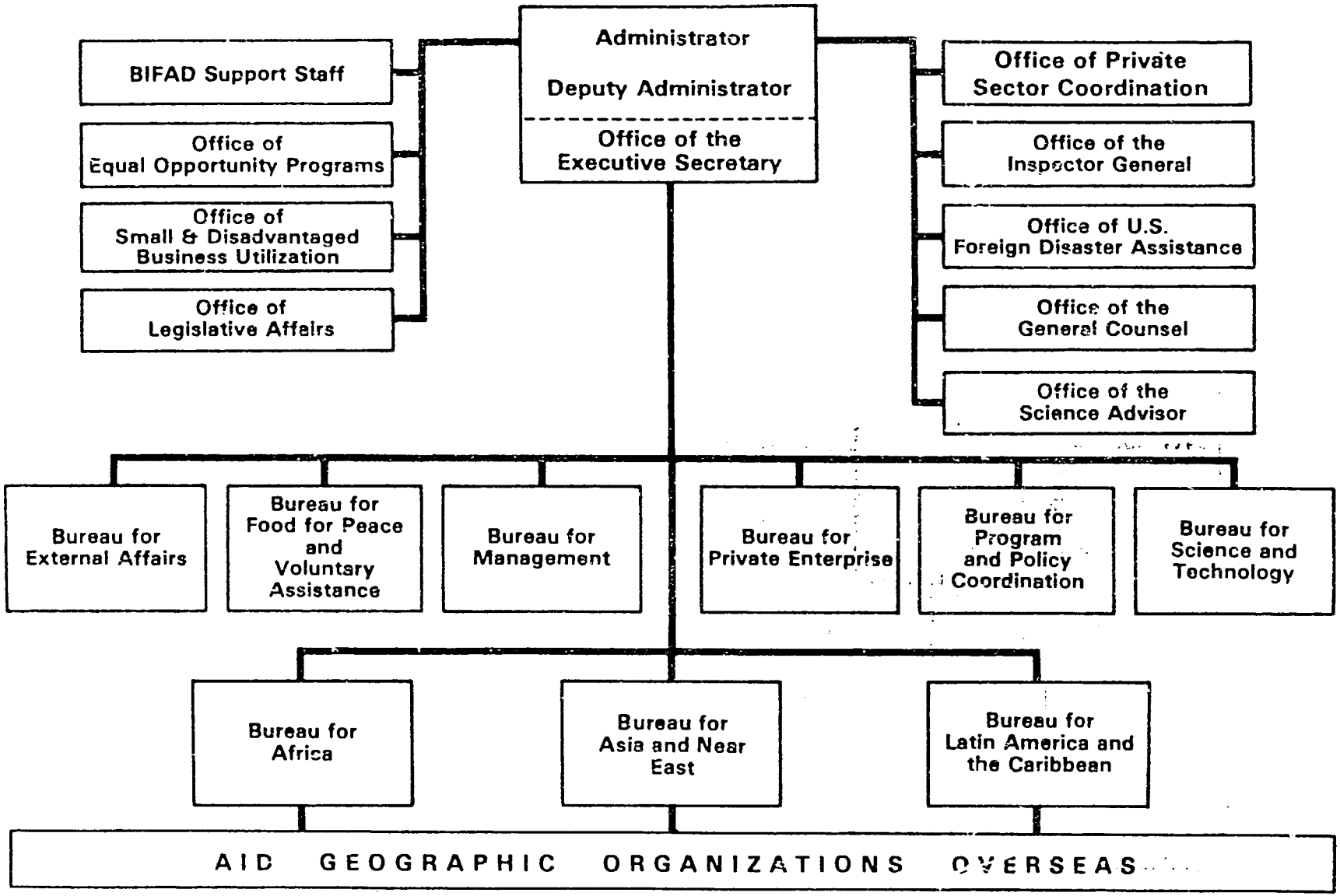
1) AID, Congressional Presentation, FY 1988, Annex I, II, III and IV, pp. 7, 5, 4 and 10 respectively.

2) $73 million to the Sahel program.

3) For International Disaster Assistance.

4) Figures for the PL480 programs are from a separate summary of obligations: IDCA, Congressional Presentation, FY 1988, p. 46

Agency for International Development



July, 1986

ANNEX A-1

1-14

APPENDIX 2:

A.I.D.'s ENVIRONMENTAL PROCEDURES AND PESTICIDE POLICIES

INTERNATIONAL DEVELOPMENT COOPERATION AGENCY
Agency for International Development

22 CFR Part 216

Environmental Procedures

§ 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 Environmental 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 of design of the project are followed, but only if the A.I.D. Environmental Coordinator determines that such procedures are adequate.

§ 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 included 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 physicial 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 physicial and natural environment for which financing is provided by A.I.D.;

(iii) Research activities which may have an affect on the physicial 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 procedures. 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 § 216.2(b)(1) and the categorical exclusions of § 216.2(c)(2) are not applicable to assistance for the procurement or use of pesticides.

§ 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 § 216.3(b) 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 § 216.3(a)(7), 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 Officer 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 above.

(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) *Procedure and Content.* After a Positive Threshold Decision has been made, or a determination is made under the pesticide procedures set forth in § 216.3(b) 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 three 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 § 216.3(a)(7), 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 § 216.3(a)(7), 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 obligating funds may contain appropriate convenants 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 convenants 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 § 216.3(a)(1) and (2) 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 each 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 disbursement 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 on-going 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 § 216.3(b)(2), all proposed projects involving assistance for the procurement or use, or both, of pesticides shall be subject to the procedures prescribed in

§ 216.3(b)(1) (i) through (v) below. 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 restricted by the USEPA on the basis of user hazard, the procedures set forth in § 216.3(b)(1)(i) above 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 § 216.3(b)(1)(iii) 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 § 216.3(b)(1)(i) above.

(iv) Notwithstanding the provisions of §§ 216.3(b)(1) (i) through (iii) above, 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 techni-

cal 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 §§ 216.3(b)(i) through (iv) 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 § 216.3(b)(1) above 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) above, 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 § 216.3(b)(2)(i) above 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 § 216.3(b)(1)(i) and, to the extent available, the history of efficacy and safety covering the past use of the pesticide the in recipient country.

§ 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.

§ 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.

§ 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 Agency'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 consideration 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.

§ 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.

§ 216.8 Public hearings.

(a) In most instances AID will be able to gain the benefit of public par-

ticipation 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.

§ 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.

§ 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 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.

(22 U.S.C. 2381; 42 U.S.C. 4332)

Dated October 9, 1980.

Joseph C. Wheeler,

Acting Administrator.

The attached Policy on Pesticide Support has been in effect since 1978 and is still fully supported by AID as an effective policy directive on pesticide use. The policy states that AID will concentrate its pest management activities on efforts which minimize the use of pesticides, by developing effective integrated pest management (IPM) programs using alternative techniques, including biological, cultural, and mechanical methods. The policy encourages AID missions and central offices to increase the availability of technical assistance to support IPM programs, to improve pesticide safety and to monitor the effects on human health and the environment of pesticide use.

POLICY ON PESTICIDE SUPPORT

Bureau for Program and Policy Coordination
Agency for International Development

May 1978

13

INTRODUCTION

This policy determination provides guidance concerning AID's new pest management policy and the promotion of an effective long-term pesticide management program. The Agency recognizes that the proper selection and use of pesticides can contribute to increased agricultural productivity and improved public health. The proper management of pesticide use is also a prerequisite to the development and implementation of integrated pest management programs which avoid the sole reliance upon pesticides by employing a wide range of biological, cultural, mechanical, and chemical techniques to hold pests below damaging economic levels while offering maximum protection to the environment.

BACKGROUND

Since the early 1950s, AID and its predecessor agencies have provided assistance to less developed countries which has included the supply of pesticides and technical assistance in their use. Such assistance has been provided for three basic purposes:

(1) The protection of human health, primarily the control of insect vectors of malaria and other vector-transmitted diseases.

(2) The protection of food crops through the management or control of pests which reduce crop yields or cause post-harvest food losses.

(3) The protection of livestock through the control of harmful insects and related pests either directly or through transmission of an etiologic agent.

PREFACE

This paper was first drafted in June of 1977 and is based on the findings and recommendations of the Agency's Programmatic Environmental Impact Statement of AID's Pest Management Programs. The current version has taken into account comments received from AID bureaus on drafts of August 2, 1977, October 7, 1977, and April 5, 1978. The basic structure and content have remained consistent with positions taken in earlier drafts.

These policy guidelines supplement the formal procedure for evaluating pesticides requested by other governments as proposed in the Federal Register on December 26, 1977 and promulgated on May 12, 1978.

In working towards these purposes, AID has been governed by several important concerns: the protection of public health and safety; the preservation of environmental quality; and the avoidance of adverse impacts on the host country and neighboring nations.

Since 1971 AID has provided training and direct technical assistance for the planning and implementing of ecologically and environmentally sound integrated pest management systems for the control of agricultural pests and diseases. Such training has been accomplished by bringing individuals from less developed countries to the United States, and/or by using U.S. experts within the recipient country.

AID's experience with pest management programs has demonstrated: (1) that pesticides frequently provide only immediate short-term solutions to problems of crop protection and human health, and that a heavy reliance on chemical pesticides often results in unintended adverse effects; (2) that many less developed nations currently do not have an adequate pest management infrastructure (in particular--qualified personnel and facilities) for the effective regulation, control, handling, and distribution of pesticides; (3) that AID could not invariably expect less developed countries to accept U.S. environmental concepts or pesticide policies when the latter conflict with their own national policies and priorities; (4) that a large increase in the demand for pesticides in developing countries is likely in the near future, and that many of these countries have the capability to acquire pesticides directly from U.S. manufacturers and other countries without AID financial assistance and the type of control which accompanies AID-financed pesticides; and (5) that it will be

necessary to continue use of pesticides in malaria and other vector-borne disease control programs until supplementary and alternative methods are developed.

These findings suggest that the best strategy for AID to follow is to de-emphasize the sole use of pesticides in pest management programs and to concentrate the Agency's effort in an integrated approach utilizing all available pest management tools. In this regard, AID will seek to reduce dependence on pesticides by encouraging the use of currently available supplementary methods and will continue to take the initiative in the development of new alternatives through support of research and field tests. In bilateral support programs for malaria control, AID will urge the use of an integrated approach. AID also realizes the importance of a continued commitment to the developing countries on pest control programs in order to be an influential factor in increasing their ability to manage pests in an environmentally sound manner.

POLICY GUIDELINES

In full consideration of the above factors, it is AID policy:

(1) To establish wherever possible, programs aimed at assisting developing countries in designing and operating economically and environmentally sound integrated pest management systems and procedures in which pesticides will be used only when necessary.

(2) To help develop infrastructures of developing countries for pest and pesticides management.

(3) To exert a greater degree of international leadership by communicating U.S. policies and experience on pest control and pesticide problems to other nations and international organizations.

(4) To discourage requests for pesticides unless they are to be used in economically and environmentally sound integrated pest management systems.

(5) To promote the use of available supplementary methods of vector control as well as development of new and improved supplementary or alternative methods which do not depend on the use of persistent pesticides, including such methods as source reduction, water management, larviciding, and biological control.

To implement this policy, AID:

(a) Has discontinued the financing 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 AID financing. Requests for the use of pesticides as part of projects will be reviewed on a project-by-project basis and a separate section included in the initial environmental examination of the project evaluating the risks and benefits of the proposed pesticide use. Exceptions to this requirement may be granted for research projects, projects undertaken under emergency conditions, and projects to which AID is minor contributor to a multidonor effort.

(b) Will increase the availability of U.S. technical staff and funding of technical and training assistance, within the limitations of available resources. Examples of such assistance include:

- o Establishment, operation, evaluation, and improvement of developing countries' pesticide regulatory systems.

139

- o Establishment, operation, evaluation, and improvement of integrated pest management systems.
- o Development, adoption, and continuing review of pesticide quality standards and establishment or improvement of facilities and procedures to monitor and enforce them.
- o Strengthening of cooperation between the Ministries of Health and Agriculture and any other Ministries which may be concerned with the regulation and use of pesticides at the national level with particular emphasis on training, technical assistance, and problems of mutual concern.
- o Strengthening of less developed countries' capabilities to use sound environmental planning and monitoring as an integral part of their crop protection and public health programs and policies.
- o Monitoring of human health and environmental effects of pesticides, as well as management of their proper use.
- o Collection of data on use, efficacy, and safety of pesticides.

(c) Give special consideration in the Agency's research projects to the problems encountered by small farmers. Such research might include:

- o Development of integrated pest management programs for basic food crops utilizing cultural, physical and mechanical control methods to the maximum extent possible, and employing chemical pesticides only when absolutely necessary.

- o Development of non-chemical methods for pest control such as the use of sex attractants, antifeeding compounds, juvenile hormones, and microorganisms pathogenic to pests.
- o Development of environmentally acceptable chemical means of vector control.
- o Development of pesticide formulations which are not readily absorbed through the skin.
- o Development of pesticide containers and a pesticide container handling system to meet the needs of small farm pesticide users in less developed countries.
- o Development of alternative disease control methods which do not focus on vector control, such as malaria immunization and schistosomocical drugs.

(d) Continually upgrade Agency knowledge and expertise regarding pesticides and alternate methods of pest control through effective linkage with outside sources of expertise, and internal training programs.

APPENDIX 3:

A.I.D.'s POLICIES AND PROGRAMS

ON

PESTICIDES AND CHEMICALS IN DEVELOPING COUNTRIES

Prepared by The Conservation Foundation

for the Report of the Committee on Health and Environment

A.I.D.'S POLICIES AND PROGRAMS ON PESTICIDES AND INDUSTRIAL CHEMICALS IN DEVELOPING COUNTRIES

I. INTRODUCTION

Over the past decade, by implementing fairly stringent policies and procedures, A.I.D. has significantly reduced the quantity of pesticides and industrial chemicals provided through its overseas development projects. Moreover, the Agency's policies have set a precedent for other bilateral and multilateral donor organizations, some of which have recently taken steps to develop guidelines on pesticide use in their own programs. In the 10 years since the introduction of its environmental and pesticide policies, A.I.D. has established itself as an environmental leader in the international donor community.

This paper briefly describes A.I.D.'s policies on pesticide and chemical use, and highlights some of the problems associated with their implementation. It then provides information on the types of programs which A.I.D. has developed and that affect the safety of pesticides and chemicals during each stage of their life cycle. It discusses programs that address problems for those who work with chemicals, for the general public and for the environment. Finally, the paper summarizes emergency assistance programs, which are designed to provide disaster relief by using pesticides or to prevent or mitigate disasters caused by pesticides and chemicals.

(References in parentheses indicate projects identified in the footnotes.)

II. A.I.D.'s PESTICIDE AND CHEMICAL POLICIES, REGULATIONS, AND IMPLEMENTATION

A. PESTICIDE AND CHEMICAL POLICIES

Until the mid-1970's, pesticides were routinely provided by A.I.D. through both project and non-project assistance. At the time, project designers felt that the benefits from using pesticides far outweighed any adverse environmental or human health impacts. Consequently, environmental assessments were not required even for the procurement of such products as DDT and Paraquat (which were subsequently banned or restricted in the U.S.).

Routine provision of pesticides was abandoned following a 1975 lawsuit brought against A.I.D. by the Environmental Defense Fund and several other environmental organizations.[1] The case was settled with the stipulation that A.I.D. prepare

Programmatic Environmental Impact Statements (E.I.S.'s) of its overall program and its Pest Management programs, and formulate environmental procedures. Furthermore, all A.I.D. projects, including those providing pesticides, were to be accompanied by an environmental assessment or E.I.S. Exceptions were permitted for emergencies (such as those which threaten massive pest outbreaks), research, or where A.I.D. is a minor donor.

Current regulations, which were adopted in 1978, are based on the above findings and recommendations resulting from the litigation, and are summarized in A.I.D.'s Policy on Pesticide Support (Appendix 2).[2] This document articulates A.I.D.'s current policy of minimizing the use of chemical pesticides in agriculture in an effort to develop effective Integrated Pest Management (IPM) programs. Additionally, the policy encourages the "availability of technical assistance to support IPM programs, to improve pesticide safety, and to monitor the effects on human health and the environment of pesticide use."[2] The regulations mandate that projects requesting the use of pesticides be evaluated on a case-by-case basis, with the risks and benefits of the proposed use clearly documented. A.I.D. personnel consider the provision and use of industrial chemicals to be subsumed under the pesticide regulations, although this is not explicitly stated in the regulations.

Environmental issues gained more importance within the Agency when Congress, through the Foreign Assistance Act of 1977, altered A.I.D.'s mandate so as to include environmental and natural resource objectives. The effect of this mandate was to require the Agency to integrate environmental and natural resource issues into development planning. Environmental profiles of host countries were required; as of 1987, over 50 Phase I profiles and 23 Phase II profiles have been prepared.

B. PROBLEMS IMPLEMENTING POLICIES AND REGULATIONS

Despite the fact that the regulations and pesticide policy of the Agency provide an explicit framework for the Agency's activities, they are sometimes circumvented in the implementation phase.

1. PROJECT IMPLEMENTATION

A.I.D. environmental policies tend to be better implemented through Agency projects than other forms of assistance, because control over the implementation is more direct. However, even project forms of assistance have some environmental policy implementation problems. For one, funds granted to organizations such as intermediate credit institutions are sometimes used to purchase pesticides. While this is not permitted under A.I.D. regulations unless an Environmental Assessment is conducted, it is easy for intermediaries to redirect funds or to obtain pesticides from other sources, thereby circumventing the E.A. requirement. Secondly, other international donors frequently

provide pesticides for projects in which A.I.D. is involved. Depending on the magnitude of the Agency's involvement, A.I.D. regulations apply in theory, but may not in practice due to conflict with the policies of collaborating donors. Finally, some of the Agency's agricultural projects emphasize the sole use of pesticides for crop protection, rather than using them as a component of IPM.

2. IMPLEMENTATION OF NON-PROJECT ASSISTANCE

a. COMMODITY IMPORT PROGRAM

While no precise figures are available, the percentage of CIP funds used to purchase pesticides and industrial chemicals is minimal, probably less than 1 percent for each. On the other hand, fertilizers represent a major component of the CIP, with purchases of up to $20-$30 million for a single country.[3] In FY 1986, CIP agreements totalled $230.5 million for the seven participating countries.[4]

Similar to the Commodity Import Programs are Special Procurement Activities which have been initiated in a number of assisted countries. In general, these activities are of limited duration, are targeted for a specific problem, and have more precise objectives than those for CIP. Funding for Special Procurement Activities is often conditional on policy reforms. $168.5 million was allocated in FY 1986. As with CIP, it is not clear what proportion of these funds is used by the host country to purchase chemicals or pesticides (it is difficult for A.I.D. to monitor), nor is it clear whether Agency environmental regulations apply. However, the Agency does place conditions on Special Procurement Activities stating that the funds should not be used to purchase pesticides.

b. FOOD FOR PEACE (P.L. 480)

In 1977 Title III of P.L. 480 (known as Food for Development) was added to the Food for Peace program. Title III permits foreign governments to purchase U.S. agricultural commodities on concessionary terms, and to generate local currencies through reselling them. Proceeds from these sales are used for self-help projects including many to increase agricultural production. Purchases made under Title III totalled $112 million in fiscal year 1985.

Because individual projects are financed through local currencies, it is not possible to determine how much P.L. 480 assistance may ultimately be used to purchase pesticides and other chemicals. A.I.D. is not required to keep records of purchases made under Title III, although this policy is currently undergoing review.

There is an important question as to whether A.I.D. environmental regulations apply to P.L. 480-generated local

currency -- in the past it has been argued that such currency is beyond the reach of the Agency's regulations, but recently that has been called into question. Regardless, in 1987 the Agency made it a policy to deny approval of P.L.-480 generated local currency for pesticide procurement unless an environmental review is conducted which is substantively equivalent to the environmental reviews required under the Agency's environmental regulations.

Two programs involving the procurement and/or use of pesticides under P.L. 480 Title I funds have drawn considerable attention from Congress and the environmental community: the MOSCAMED and CAPMED programs. MOSCAMED began in 1975 with the establishment of the MOSCAMED Joint Commission between Mexico, Guatemala, and the United States, through the U.S. Department of Agriculture (USDA). Meeting the current goal of the MOSCAMED program to eradicate the Medfly from Guatemala (and ultimately from all of Central America through the CAPMED program) has involved widescale aerial spraying of malathion bait spray and the use of ethylene dibromide (EDB) (a pesticide banned in the U.S.) in quarantine facilities, although use of EDB was reportedly discontinued in September, 1987.

The question about the applicability of A.I.D. regulations to local currency (see above) and differences in A.I.D. and U.S.D.A. environmental procedures, have contributed to disagreements over the use of funds and the need for environmental review. A.I.D. has funded an environmental assessment of the MOSCAMED program which will be completed in June, 1988.

3. ECONOMIC SUPPORT FUND

The Economic Support Fund (ESF) provides foreign exchange to countries threatened by economic instability. Economic reform programs, including agricultural sector reforms and projects, are often financed with ESF monies. Major projects in Jordan, Egypt, Morocco, Senegal, Pakistan, Afghanistan, Haiti, and the Dominican Republic have recently been funded.

While direct pesticide provision is subject to an environmental assessment, host countries receiving ESF funds may circumvent this. For example, funds under the control of a Ministry of Agriculture may be used for in-country purchases in local currency. The Agency has no information system to indicate what percentage of ESF is directly used for pesticide or chemical purchase. Also, there is no incentive for Missions to carefully track the flow of funds to determine if program implementation has followed Agency regulations.

III. AID PROGRAMS AFFECTING CHEMICALS USED FOR AGRICULTURAL, HEALTH AND INDUSTRIAL PURPOSES

Throughout the following section, A.I.D. projects identified

in the footnotes are mentioned and indicated in parentheses, e.g. (Sudan,2). The projects are mentioned because they illustrate particular issues, not because they are primary sources from which most information in this section was obtained. On the contrary, most of it derives from literature and from interviews with A.I.D. staff and non-Agency experts.

A. PROGRAMS AFFECTING AGRICULTURAL AND HEALTH USES OF CHEMICALS

1. PESTICIDE APPLICATORS

AGENCY POLICY. Agency policy stresses avoiding the provision of highly toxic pesticides in A.I.D. projects, especially to small farmers (Bolivia,1); scrutinizing the use of highly toxic pesticides even by certified users; and requiring safe handling methods for all pesticides (a description of which must be included in environmental assessments of A.I.D.-funded projects using pesticides) (Jamaica,1). This allows experts who review environmental assessments to determine if more appropriate pesticides or improved safety measures should be incorporated into the project design (Haiti,1; Zanzibar,1; Ecuador,1; Senegal,1).

SPECIAL SAFETY PROJECTS. A.I.D. conducts a small number of training programs and conferences that address safe pesticide use. Furthermore, activities to promote alternatives such as IPM typically address pesticide-related occupational safety and health problems.

WITHIN-PROJECT EFFORTS. The majority of A.I.D.'s efforts to ensure that applicators use pesticides safely do so by promoting safety within the context of agricultural and health projects. While these efforts affect the individuals directly involved, the actual number of people reached is small in comparison to the number of people who routinely come in contact with pesticides.

FOLLOW-UP DIFFICULTIES. While safety is clearly stressed in the early phases of project design and execution, inadequate mechanisms exist to ensure follow-up during the implementation phase. Many A.I.D. Missions have minimal capability to evaluate the adequacy of training conducted or the safety of application, storage and disposal practices. Farmworker training is often related only to specific crops and pesticides rather than general safety principles. Baseline data are rarely collected on the practices of pesticide applicators prior to the project, so it is impossible to tell if they are merely following directions or have learned and accepted the importance of safe pesticide practices. Because of these and similar problems, some projects fail to meet A.I.D.'s own standards (Senegal,1; Haiti,1; Zanzibar,1). The problem seems to be particularly common when clear responsibility for crop protection and safety components is not assigned.

141

2. THE GENERAL PUBLIC AND THE ENVIRONMENT

PROJECTS AND POLICIES. As stated above, when pesticides are used in A.I.D. funded projects, safe practices such as proper storage and disposal are frequently required. Projects which stress the proper handling of pesticides do help protect the general public and the environment.

IMPLEMENTATION DIFFICULTIES. The living conditions of the rural poor population often make safety requirements difficult to implement, even within the project areas. For example, irrigation ditches with dangerous runoff may still be used for bath or drinking water for people or animals (Sudan,2). As above, A.I.D. Missions have limited follow-up capability to ensure that requirements are met; enforcement usually depends on the priorities and resources of government extension agents or others implementing the project (Senegal,1).

DEVELOPMENT OF ALTERNATIVE PRACTICES. Various innovations, many financed with A.I.D. funds, have been and are being developed as alternatives to practices which rely on highly intensive use of agro-chemicals. This is in part as a result of lessons learned in both agricultural and health projects whose effectiveness was undermined by pest resistance (Sudan,2; Pakistan,1). Crop related innovations include integrated pest management, farming systems research, breeding of resistant varieties, and the development of genetically engineered insect-resistant plants. The International Agricultural Research Centers (IARCs), many of which were instrumental in developing "green revolution" technologies, are now also concentrating on alternative agricultural technologies which reduce the need for agro-chemicals (Centrally Funded,1).

IPM AS AN ALTERNATIVE. A.I.D. policy to promote IPM projects has met with variable success (Guatemala,2; Panama,1; El Salvador,1; Indonesia,1). Two of the largest projects which are regional in scope are in the Sahel (Africa Regional,3) and in Central America (Regional,1). Evaluations of the Sahelian project showed it to be technically successful in that it demonstrated the potential of IPM; however, administrative problems among the participating organizations led to major problems with the project as a whole, and an overall feeling within A.I.D. that the project was a failure. The Central American IPM project has made remarkable progress in a relatively brief time period. This has in part resulted from increased knowledge of the importance of administrative considerations that were deficient in the Sahel project, such as the inclusion of country-specific programs in the design phase. These projects demonstrate that strong attention must be given to economic, administrative, and social considerations, in addition to technical ones, to achieve success in IPM projects.

ALTERNATIVES IN PUBLIC HEALTH PROGRAMS. Innovations addressing pesticide use for vector control include programs in

116

malaria and schistosomiasis control (Sudan,1; Ecuador,3). These programs focus on biological, social, and environmental factors to reduce the use of pesticides. Additional efforts to reduce the use of pesticides have been made through programs to develop vaccines, especially against malaria. Also, A.I.D.'s Vector Biology and Control Project assists host countries to improve the effectiveness and safety of vector control programs. In malaria control programs, for example, A.I.D. provides funds to train control personnel in integrated means of vector control, provides commodities such as residual insecticides and equipment for their proper application, supports applied field research, and supports health education and community involvement activities. A.I.D. also supports multi-lateral disease control activities, such as the World Health Organization's Tropical Disease Research Program.

ECONOMIC POLICY REFORMS. In addition to the formation of projects to safeguard general public health and the environment, A.I.D. has undertaken a number of economic policy reforms which may encourage proper use of agricultural inputs, including pesticides. For example, removal of fertilizer and pesticide subsidies has been a major component of many agricultural sector reforms, especially in Africa and Asia.

IMPROVEMENT OF RURAL LIVING CONDITIONS. A.I.D.'s efforts to improve rural living conditions and to promote I.P.M. probably have some impact on the use of agricultural chemicals in rural areas, but the influence is limited to the target populations of specific projects. This approach is contrasted with the implementation of broad educational programs (Ecuador;2), where the project emphasis is on health education for the greatest number of individuals possible, rather than more narrowly focused agricultural or rural development projects where only participants are influenced. The Agency has supported the development of educational programs (Ecuador,3) to modify behavior patterns which influence susceptability to disease, and to incorporate control efforts into support for improved public health (Pakistan,1).

B. A.I.D PROGRAMS RELATED TO INDUSTRIAL ACTIVITIES: (MANUFACTURE, FORMULATION, TRANSPORT, STORAGE, AND DISPOSAL OF CHEMICALS)

1. INDUSTRIAL WORKERS

LACK OF PROJECT-RELATED LEVERAGE. Occupational health risks presented by industrial activities involving pesticides and non-agricultural chemicals are virtually identical. Problems can arise during manufacture, formulation, transport, storage, use or disposal. However, because the Agency does not generally get involved in industrial development projects, it is difficult for it to introduce occupational safety standards on a project basis, as is done with pesticides.

USE OF PRIVATE SECTOR EXPERTISE. The World Environment Center (W.E.C.) (ANE Regional,1) program and several others seek to improve occupational health in industrial settings by emphasizing technical assistance to specific manufacturing facilities. It provides an example of bilateral private assistance which is facilitated by the Agency. The major activities being supported in Egypt have the potential to improve working conditions (Egypt,1).

REGIONAL VARIATIONS. It is important to note that the need for industrial worker safety programs also varies significantly between regions. In Africa, (with the exception of Nigeria), urban/industrial problems appear less significant than rural issues. In many Asian countries, on the other hand, high levels of urbanization and extensive industrialization indicate that host countries have both the need, and the financial resources, to improve industrial safety.

2. THE GENERAL PUBLIC AND THE ENVIRONMENT

A.I.D. is currently supporting several activities to assist industries to improve their processing capacity in ways that will reduce pollutants and hazardous waste. However, these efforts have largely been limited to projects or assistance in Asia and the Near East, and A.I.D.'s financial commitment to projects relating to industrial chemicals is relatively small.

PROJECTS TO REDUCE INDUSTRIAL DISCHARGE. Past and current A.I.D. projects that address the issue of industrial discharge include reviews of facilities, technical assistance, and training (primarily of high-level managers) at facilities in Asia and the Far East. These measures were designed to enhance the manufacturer's abilities to implement industrial pollution control and emergency prevention measures. A.I.D. encourages the participation of volunteer specialists from U.S. industry, usually coordinated by the World Environment Center, in these short-term visits. The Agency plans to work with government, industry and unions in India may have valuable lessons for the appropriate structure of its future work addressing problems associated with industrial chemicals.

PROJECTS TO IMPROVE URBAN HEALTH. In Egypt, A.I.D. has supported the government's efforts to review the regulatory structure, assess hazards, and plan to address problems. Additionally, the health of the general population and the environment will benefit through A.I.D.'s wastewater treatment program. Although large quantities of money may be required to initiate programs to minimize health risks, the Agency has set a precedent for large scale urban/industrial assistance programs by providing ESF money for the Egyptian project.

PESTICIDE DISPOSAL PROJECTS. For agricultural chemicals, A.I.D. has recently been active in identifying problems of pesticide disposal. The Agency has funded a variety of studies

130

that have identified poorly disposed and severely outdated pesticide stocks, and developed recommendations for their disposal (Africa Regional,2; Pakistan, 2; Thailand,2; Yemen,1; Samoa,1). A.I.D. has also provided assistance to West African countries to develop pesticide legislation (Africa Regional,1).

C. A.I.D.'s ENVIRONMENTAL POLICIES AND RESPONSES TO DISASTER SITUATIONS

Disasters represent a unique aspect of both environmental policy and programming in terms of the Agency's response. A.I.D. provides both relief and prevention assistance for overseas disasters, primarily through the Office of Foreign Disaster Assistance (OFDA), upon specific request by country officials. Although OFDA's primary activity is disaster relief and rehabilitation, it is also responsible for a variety of other activities, such as institution development, training, emergency planning, and development of early warning systems. However, these "non-relief" programs comprise a minor share (about 5%) of the activities administered through OFDA. Including emergency relief appropriations, the funds administered by OFDA in fiscal year 1986 totaled $91.7 million.

In fiscal year 1986, the most significant activities within OFDA were in the African Region. Relief and recovery programs in nine countries stricken by drought, and sixteen countries threatened by locusts and grasshoppers, were coordinated through the Bureau for Africa. OFDA responded to an additional twenty-eight disasters, maintained follow-up activities on fifteen prior year disasters, and assisted in six non-declared disasters using Relief and Rehabilitation funding.

Emergency assistance programs represent one of the few remaining channels for the direct provision of major quantities of pesticides and are exempt from A.I.D.'s requirement for environmental assessments. Because of this, OFDA's response to major pest control problems are described in greater detail below.

1. EMERGENCY ASSISTANCE FOR PEST CONTROL

a. THE LOCUST/GRASSHOPPER EMERGENCY

Africa, the Middle East, and South Asia have been subject to severe plagues of locusts and grasshoppers throughout recorded history. Locust infestations during the late 1940's through the 1950's were sufficiently serious that regional and national pest control institutions were established in Africa. These programs in part account for the successful control of outbreaks that occurred in the 1960's and 1970's. Control efforts restricted the spread of locust outbreaks and the crop losses due to migratory pests in the mid-1970's were limited to 400,000 tons of millet and sorghum in West Africa. As time passed without an

151

outbreak, funding sources for monitoring programs were reduced and a number of regional control organizations were dissolved.

When normal rainfall returned to the Sahel and other drought-prone areas of Africa in 1986, following a severe three-year drought, populations of five major species of locusts and grasshoppers increased dramatically, threatening much of the semi-arid region of Africa. The international donor community undertook a major surveillance and control campaign ($80 million) in at least 20 countries. Eleven countries requested that they be declared disaster areas by the U.S. ambassador in order to qualify for special relief assistance. Over 3 million hectares were aerially sprayed with pesticides.

OFDA's share of these expenditures ($6.2 million through June, 1987) has been used to support control activities including purchase and transport of pesticides, aerial spraying and ground support services, fuel and equipment, entomologists, managerial specialists, and training. Institutional support to rejuvenate the waning, regional pest control organizations does not appear to be part of the strategy. However, OFDA initiated a special program to conduct research on the efficacy and environmental effects of various pesticides that are being used in these programs, so that information about relative safety can be incorporated into future activities. In 1987, the A.I.D. Africa Bureau received funding authorization for a $15 million (subject to availability) 3.5 year project to continue emergency assistance (Africa Regional,4). Actual funds allocated were severly restricted, and the exact amount to be provided is uncertain.

In December, 1987, local papers in Africa were reporting that persons were ill and being hospitalized from eating locusts treated with pesticides. The newspapers apparently cited unconfirmed reports that the locusts had come from Chad, Sudan, and Ethiopia, via Nigeria. [State Department telecommunication dated December 14, 1987, C. Kelly to B. Boyd.]

The locust emergency illustrates a common problem in properly coordinating the environmental policies of international donors, because a variety of pesticides have been shipped over a short period of time from many different countries.

b. THE RODENT INFESTATION EMERGENCY

In both Chad and Sudan, the rainfall after the drought brought abundant harvests, but also locust, grasshopper, and rodent infestations. Rat infestation surveys early in 1987 indicated that severe crop losses, up to $20 million for Chad, (10%-20% for cereal crops and up to 25% for groundnuts) would result if pest control programs were not immediately initiated. The use of rodenticides to achieve rapid control was deemed necessary in both countries (OFDA,1).

152

A rodent control expert recommended that disasters be declared in both Chad and Sudan in order to facilitate the rapid provision of rodenticides. The use of an acute toxicant (zinc phosphide), an anti-coagulant (warfarin), and locally produced jars to be used as traps, were the suggested control methods. Differences of opinion on the risk and effectiveness of the three methods emerged between the missions, A.I.D. Washington, and control experts. The Missions initiated different control programs, but then the results of a small-scale demonstration project using warfarin (funded by A.I.D.) was reported as a success, and warfarin was adopted as the control technique by both Missions. A.I.D. staff report that future rodent control assistance will be in the form of non-emergency aid, thus the requirements to complete initial environmental evaluations will apply.

c. IMPLEMENTATION OF ENVIRONMENTAL PROCEDURES FOR EMERGENCIES INVOLVING AGRICULTURAL/HEALTH PESTS

Rapid action is necessary to control pest infestations prior to major crop damage in agricultural emergencies and prior to infection or disease transmission in health emergencies. In both situations, steps must be taken before the pests begin to reproduce in order to limit the scale of the emergency. This need for rapid action limits the time available for environmental assessments and testing of different control strategies. For this reason, waivers of A.I.D.'s pesticide policy (which normally require an environmental assessment prior to provision of pesticides) are often granted to procure pesticides, survey and control equipment, and provide other necessary resources when agricultural production and health are endangered. For example, a variety of waivers were issued for the locust and grasshopper control program.

In the case of the rodent control programs, A.I.D. refused to grant waivers and instead required that Initial Environmental Examinations (IEEs) be completed. However, while the U.S. was reviewing the environmental effects of the control agents it would use, the African governments initiated operations using more highly toxic rodenticides supplied by other international donors.

2. TECHNOLOGICAL DISASTERS

OFDA's historical focus has been relief measures for natural disasters, although it is likely that in the future the Agency will be called upon to respond to more technological disasters, such as the Bhopal accident. In anticipation of this transition, and in addition to internal changes to respond to these emergencies, OFDA is expanding its programs in preparedness management for industrial emergencies. Projects for such "non-emergency" assistance are generally carried out through regional programming. In 1986 and 1987, two programs focused specifically

on mitigating harmful effects of chemicals before they become disasters. An analysis of pesticide waste and disposal sites was undertaken in a variety of countries in Africa and Asia and the Near East; and in the Asia and Pacific Region a new emphasis on industrial accidents, "including chemical explosions, pollution, and toxic waste management," was planned.

IV. SUMMARY OF A.I.D.'S RESPONSE TO ENVIRONMENTAL CONCERNS INVOLVING CHEMICALS

The primary issue that emerges in reviewing A.I.D.'s environmental policies and institutional responses is that these considerations are still viewed as policies or projects which limit or compete with other A.I.D. concerns, rather than as a fundamental base that must be integrated into Agency-wide policies and activities. This is reflected, in part, by the lack of a separate account for Environment and Natural Resources in the Foreign Assistance Act. Environmental management affects the social and economic development of countries, as well as the success of specific projects.

Although there is an increasing awareness and sensitivity to the environment, it is not given the same attention as population or economic issues. This is in spite of the fact that sustainable economic development in most developing countries is necessarily linked to sound management and maintenance of the natural resource base. The tendency is to view pesticide and chemical hazards as discrete issues rather than as fundamental factors affecting development.

For addressing the issues related to industrial activities involving agricultural and industrial chemicals, the Agency has limited leverage. It has initiated several projects involving technical assistance to governments which request help. As with agro-chemical programs, more significant results might be obtained if programs were targeted towards specific countries or regions with particularly serious needs, and/or towards problem areas, such as disposal of wastes. Information sufficient to determine priorities would be needed.

Finally, disaster relief programs have specific and unique requirements which differ significantly from the regular programming within the Agency. In the case of natural disasters, because large quantities of pesticides may be provided without the benefit of an environmental assessment, a number of problems have ensued. Furthermore, OFDA is also responsible for designing programs to encourage disaster preparedness, but has limited funding for ths purpose. OFDA's preparedness activities might be more appropriate if supplemented by other institutional arms of A.I.D. whose primary focus is not rapid response, but long-term program development.

FOOTNOTES

All but four of the references to this appendix were derived from unpublished literature or special A.I.D. reports such as project evaluations. trip reports, and A.I.D. cables and memoranda. To facilitate reivew, they are identified by country and number in the text. Below, open literature citations are listed first, followed by country references which are listed alphabetically to assist the reader.

PUBLISHED LITERATURE

1. Environmental Law Reporter 6 , 20121

2. A.I.D., Policy on pesticide support, May 1978

3. Mike McAllister, A.I.D. Office of Procurements, personal interview

4. A.I.D., Congressional Presentation FY 1988, main volume

A.I.D. REPORTS AND UNPUBLISHED DOCUMENTS

AFRICA REGIONAL

1. West African Regional Workshop on Pesticide Legislation. 1985, Report of the Workshop; Comments by E. Weiler, moderator from EPA, on loan to A.I.D. Workshop was held in 4/85, comments made in 4/86.

2. Evaluation of Obsolete Pesticide Stores in East Africa. WEC Network News, Summer 87, and a 9/87 cable from A.I.D./W to the US Embassy in Khartoum regarding implementing a "pesticide disposal pilot program".

3. CILSS Integrated Pest Management Project Informal summary by CICP for Carroll Collier, A.I.D./S&T/ Agriculture, 1982.

4. Locust/grasshopper assistance Project Paper, project #698-0517/ 625-0517; From CF summary of multiple documents and interviews.

ASIA AND NEAR EAST REGIONAL

1. International Environment and Development Service (IEDS); a program of the World Environment Center (WEC) From a WEC brochure and 9/11/87 interview with ANE Bureau staff.

BOLIVIA

1. Disaster Recovery
EA for proposed pesticide use in A.I.D. loan no. 511-0581, by C. Collier, A.I.D., and D. Calvert, CICP, 12/83.

CENTRAL AMERICA REGIONAL

1. Integrated Pest Management for Central America and Panama. Project evaluation by Checchi and Co, 12/86. A.I.D. project timeframe is 7/84-7/89.

CENTRALLY FUNDED PROJECTS

1. Bureau of Science and Technology; Bureau for Policy, Planning and Coordination, Consultative Group on International Agricultural Research. From CF summary of multiple documents.

ECUADOR

1. Agricultural Disaster Assistance. Environmental Assessment, 9/83, by R. Altman, A.I.D..

2. Pesticide Safety Education in Ecuador: Materials Research, Development and Evaluation. Final Report, by D. Winter, Univ.of California, Davis, 1/86.

3. Malaria Control. From CF summary of multiple documents, especially Reporte de Evaluacion, Mayo, 1987, by Samuel Breeland, et. al. project #518-0049.

EGYPT

1. Industrial Pollution. From interviews with A.I.D. staff, Bureau for Asia/NE, 9/87.

EL SALVADOR

1. Cotton IPM Program. Preliminary study of Technology Transfer and Socioeconomic Impacts, Ann Thrupp, 5/85, consultant report.

GRENADA

1. Agricultural Sector Revitalization. Pest Management Unit (PMU) of the Grenada Ministry of Agriculture, 9/84. A.I.D. #543-0005.

136

GUATEMALA

1. Malaria Control. From CF summary of A.I.D. project #1-597-0136, based on "Excerpts from a Health Sector Assessment Prepared for USAID/Guatemala", December, 1986, by the Institute for Resource Development and the Vector Biology and Control Project p.8-47.

2. Small Farm Diversification Systems. EA of Pesticide use, by G. Schaefers, consultant.

HAITI

1. Targeted Watershed Management. EA by M. Cusson, Laval U., Canada, 8/86. A.I.D. #521-0191.

2. Agroforestry Outreach. From EA by M. Cusson, Laval U., Canada, 8/86. A.I.D. #521-0122, commenced 1981.

INDONESIA

1. Secondary Food Crops Development. Environmental Assessment by W. Allen, 1982.

JAMAICA

1. Agricultural Research Project. Environmental Assessment by Carl Barfield, U of Fla./CICP, 7/86. A.I.D. #532-0128, FY86-93, $7.6 million.

OFFICE OF FOREIGN DISASTER ASSISTANCE (OFDA)

1. Rodent Control Program: Chad. From CF summary of multiple documents.

2. Rodent Control Program: Sudan. From CF summary of multiple documents.

PAKISTAN

1. Malaria Control. From CF summaries of information especially 1985 Vector Biology and Control Project, External Review.

2. Pesticide Disposal. A.I.D. Executive Summary, and WEC Pakistan Pesticide Report, 4/87.

PANAMA

1. Agricultural Technology Development. Environmental Assessment by G. Schaefers, consultant.

SENEGAL

1. Casamance Regional Development Project. Analysis of Pesticide Use in the ... no. 675-0205, by G. Schaefers, Cornell, for US A.I.D./CICP, 1/83.

SUDAN

1. Surveillance System for Schistosomiasis Control. Initial Environmental Examination, prepared by D. Bottrell, CICP, 7/80.

2. The Rahad Irrigation Project. A.I.D Project Impact Evaluation Report No. 31, 3/82.

TANZANIA

1. Malaria Control in Zanzibar. A.I.D. #621-0163, External Review by Vector Biology and Control Project, March, 1986.

THAILAND

1. Northeast Rainfed Agricultural Development. Environmental Assessment by H. Reissig, Cornell, 84/85. A.I.D. Project #493-0308.

2. Pesticide Waste Sites and Disposal of Obsolete Stocks Study of...in Thailand and Western Samoa, by Jensen and Zweig, 9/86.

WESTERN SAMOA

1. Pesticide Waste Sites and Disposal of Obsolete Stocks Study of..in Thailand and W. Samoa, by Jensen and Zweig, 9/86.

YEMEN

1. Pesticide Disposal Assessment. From J.K. Jensen's trip report through CICP, for USAID/Yemen, 7/87.

158

APPENDIX 4:

OPPORTUNITIES FOR COORDINATION AMONG U.S. AGENCIES

Prepared by The Conservation Foundation

for the Report of the Committee on Health and Environment

I. PURPOSE OF THIS APPENDIX

In a number of instances in its discussions and final report, the Committee on Health and the Environment recognized the impact of other U.S. and international organizations on problems associated with chemicals and pesticides in developing countries. On the one hand, the involvement of other institutions limits the impact that unilateral action by the Agency for International Development (A.I.D.) can have on addressing problems. On the other, A.I.D.'s role as the United States' lead development assistance agency presents it with opportunities to leverage additional resources by coordinating more closely with other U.S. Government institutions.

This appendix serves as background in particular for Recommendations 1, 3, and 6, though the technical resources it identifies are relevant also to Recommendations 2 and 4.* For each of ten U.S. Government departments and agencies, this appendix describes the agency's overall function, its policies and activities regarding chemicals in developing countries, its current coordination with other U.S. agencies, and appropriate opportunities for further coordination, particularly with A.I.D.

Policies and activities of U.S. Government agencies and departments towards the use of pesticides and chemicals in developing countries can be divided into three categories: 1) agencies that directly fund and/or operate ongoing projects based in developing countries, 2) agencies that provide technical resources to developing countries upon request by a host government or international organizations, and 3) agencies that influence international institutions and international guidelines, or which loan and grant funds to governments for projects based in developing countries (includes those that have an interest in public health, environmental and international economic issues). This appendix discusses U.S. government activities in all three categories.

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* Recommendation 1 in the Committee's final report urges A.I.D. to build constituencies both within and outside developing countries who will promote the proper use of chemicals. Recommendation 3 suggests ways in which A.I.D. could more effectively promote Integrated Pest Management. Recommendation 6, which emerged from concerns that policies of other U.S. agencies could undermine one another, sites the need for a comprehensive U.S. policy regarding the activities of U.S. agencies that affect the use of chemicals and pesticides in developing countries.

II. AGENCIES THAT DIRECTLY FUND AND/OR OPERATE PROJECTS BASED IN DEVELOPING COUNTRIES

A. APPLICABLE U.S. POLICIES

Since 1979, U.S. agencies operating overseas have been obligated to comply with Executive Order 12114, which requires them to establish procedures for conducting Environmental Impact Statements (EISs) of projects which "significantly affect foreign environments," and to take into account the E.I.S. when making decisions about a given project. The Executive Order defines environment as "the natural and physical environment," and explicitly excludes social, economic and other environments. It does not list factors that are to be considered in the E.I.S. In addition to the procedures required by the Executive Order, the environmental practices of some U.S. agencies are guided by their legislative mandates.

B. U.S. AGENCIES' ACTIVITIES

1. UNITED STATES DEPARTMENT OF AGRICULTURE

USDA's overall mission is to promote U.S. agriculture. Among its principal activities are generating and gathering information relevant to agricultural production, providing extension services, and teaching. Through its Office of International Cooperation and Development, USDA conducts and promotes overseas technical assistance, training, scientific exchanges, and research.

When funding and operating a project overseas, USDA conducts its environmental impact assessment for projects likely to have a significant impact on the environment in accordance with procedures that each USDA agency has developed on the basis of Executive Order 12114. The procedures vary among USDA's different agencies.

Most overseas USDA projects that directly involve pesticides are designed to prevent the entry into the U.S. of foreign plant and animal pests that might have a detrimental effect on U.S. agriculture. This is primarily the responsibility of the Animal and Plant Health Inspection Service (APHIS). Unlike A.I.D., APHIS does not automatically require an environmental assessment or environmental impact statement when pesticides are used in its overseas projects. Requirements for the content of an E.I.S. are less strict and extensive than those included in A.I.D.'s regulations.

These and other discrepancies in USDA and A.I.D. environmental policies have been highlighted recently because of a dispute over the need for and scope of an environmental impact analysis of a project to eradicate the Mediterranean fruit fly (medfly) from Central America (MOSCAMED).*

The MOSCAMED disagreements have consumed personnel time and delayed decision making. But they have led USDA to rethink its responsibilities with regards to pesticide use overseas. For example, although APHIS initially used ethylene dibromide (EDB) in the project (2) even after the EPA banned its use, APHIS now states that its policy is not to provide or participate in projects that use pesticides banned for use in the United States.**

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In 1984, the Governments of the U.S. and Guatemala agreed to use local currency generated through the Food for Peace Program (P.L. 480) to fund a Mediterranean fruit fly eradication program. P.L. 480 is a U.S. funding mechanism that requires USDA and A.I.D. to jointly negotiate with host country governments over how the funds are to be programmed (4,5).

A.I.D.'s policy is to require that an environmental analysis be conducted before the Agency will agree to the disbursement of local currency funds generated through the PL-480 program (6). In 1986, USDA and A.I.D. reached an impasse over the level of environmental analysis necessary before funds should be obligated. USDA's position was that it had conducted an analysis that was sufficient, but A.I.D. did not consider the USDA/APHIS Draft Environmental Assessment to meet its requirements for an environmental analysis (5,7).

Negotiating instructions for the fiscal year 1987 P.L. 480 agreement was delayed as A.I.D. and USDA attempted to resolve the issue. The dispute was eventually referred to the National Security Council for resolution. As a result, A.I.D. and USDA agreed that negotiating instructions for the agreement to disburse funds would be released without specific reference to the need for an environmental analysis. However, the agreement called for a cable from A.I.D.'s Assistant Administrator for Latin America and the Caribbean, to the A.I.D. Mission Director in Guatemala, directing the latter to deny use of any local currency to support pesticide procurement until an environmental analysis which substantively met the requirements of A.I.D.'s pesticide regulations was finished (6). At the end of 1987, A.I.D. decided to conduct and fund an independent environmental assessment of the MOSCAMED project (4).

** Several officials in both agencies believe that the differences in the missions of A.I.D. and USDA make agreement on consistent policies difficult. This lends support to the Committee's proposal for a comprehensive policy for U.S. agencies regarding the use of pesticides and chemicals in developing countries.

2. PEACE CORPS

The Peace Corps is an independent agency within the Executive Branch of the U.S. Government. It was established in 1961 to "promote world peace and friendships" by assigning volunteers to countries that request assistance in helping their poorest people meet their basic needs (9). The Peace Corps currently assigns roughly 7,700 Volunteers to posts in sixty countries.

The Department of International Operations within the Peace Corps is made up of four offices, one for training and support, and one for each of the three regions where volunteers are assigned (Africa, Inter-America, and North Africa/Near East/Asia/Pacific). Volunteers focus in one of seven areas: agriculture, fisheries, health and nutrition, natural resources, education, small enterprise development, and water sanitation/energy. Approximately 1,100 Volunteers work in agriculture.

Peace Corps supplies volunteers who have areas of expertise that are congruent with the requests of host-country governments. Peace Corps Directors within a given country work with that country to define the substance of volunteers' work there.

For a number of reasons Peace Corps Volunteers, particularly those focusing in agriculture, are well positioned to help farmers become less dependent on chemicals for crop protection. Volunteers can also help farmers learn to apply, store, and dispose properly of those pesticides they continue to use. Individual volunteers remain in one village or rural area for two to three years, and are usually replaced by another volunteer. They are trained to keep meticulous records so that their experiences can be effectively passed on to their successors. Peace Corps is committed to considering the preferences and perspectives of local farmers and to working closely with individuals to help them develop new skills and approaches. For the most part, volunteers' roles in addressing problems with chemicals and pesticides have been on an ad hoc basis in a few isolated projects.*

Peace Corps Volunteers (PCVs) have returned with a myriad of anecdotes of pesticide misuse which they witnessed or heard of during their assignments, particularly in rural areas. Yet while PCVs receive basic training on how to use pesticides safely and

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* Some volunteers have been assigned to Integrated Pest Management projects or other pest management programs, many funded by A.I.D. One volunteer arranged for the funding to buy a truck which could carry unused pesticide stocks to a disposal facility.

sometimes are trained in Integrated Pest Management (22), most are not well equipped to address the increasing use and misuse of pesticides in developing countries. A survey of returned Peace Corps volunteers completed in 1984 by the Consortium for International Crop Protection concluded that "potentially significant discrepancies in training of PCVs in the areas of crop protection and pest management are revealed when comparing training received with training needed, and with work performed".* The survey further concluded that Volunteers do not use many sources of information other than fellow Volunteers, although A.I.D., international development groups, private voluntary organizations, and others could be helpful (21).

Because of the decentralized management of the Peace Corps, and its commitment to giving the host government the lead role in defining Peace Corps activities, it is somewhat difficult to establish an agency-wide policy that would shape the substance of the volunteers' work. However, some Peace Corps officials believe that lack of funding and technical expertise have been more important impediments to the agency's taking an active role in addressing problems associated with pesticides than the decentralized decision-making process.

An A.I.D.-funded effort to train many Peace Corps Volunteers in the proper use of pesticides and Integrated Pest Management, both pre-service and in-service, might greatly enhance the U.S. potential to address problems associated with pesticides in developing countries. For the reasons noted above, Peace Corps Volunteers may be better able to affect change at the field level than staff within A.I.D. missions. At the same time, A.I.D.'s technical resources could provide critical tools for volunteers, particularly those focusing in agriculture and natural resources. In addition, the relationships between Peace Corps Directors and host-country government officials could facilitate A.I.D. efforts to influence countries' regulatory structures, extension capabilities, and other policies that affect pesticide use.

There is less potential for PCVs to become involved in addressing problems associated with industrial activities, because most urban volunteers are assigned to schools where they train educators and teach. As countries become more industrialized, however, Peace Corps like A.I.D. will need to consider whether or not to expand its involvement in urban

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* Training needs included "country specific information on available products and their use as well as identification and treatment of poisoning for each... more know-how in proper pesticide application... training in Integrated Pest Management... (and) an understanding of the social, cultural, economic and environmental impacts of such chemicals in each country."

164

centers. In the process of reevaluating its future role regarding urban industrial problems, A.I.D. might consider involving Peace Corps in relevant discussions.

3. OVERSEAS PRIVATE INVESTMENT CORPORATION (OPIC)

OPIC's purpose is to "mobilize and facilitate the participation of U.S. private capital and skills in the economic and social development of less developed friendly countries and areas, thereby complementing the development assistance objectives of the United States". (10) The premiums, interest, and fees OPIC charges to its investors fund the agency. The Secretary of State guides OPIC policy.

OPIC provides private U.S. investors initiating or expanding projects overseas with both political risk insurance and financing. Since 1985, regulations have required OPIC to "undertake to refuse to insure, reinsure, gaurantee or finance any investment in connection with a project which the Corporation determines will pose an unreasonable or major environmental, health, or safety hazard". (11)

In determining whether or not to give a project an environmental clearance, OPIC staff rely upon existing information on the strength of environmental regulations and infrastructure in the particular country, documents on potentially hazardous substances from U.S. agencies and other sources, and international standards. They also draw extensively upon the technical resources of other U.S. agencies, including A.I.D., EPA, OSHA, and USDA. In some cases, they request changes in the design of a project to address concerns about environmental and public health impacts. Where they do approve insurance or financing for an environmentally sensitive project, OPIC forwards information to the host government on the hazards of the process or substance involved, including standards or other regulatory action taken by the United States and international organizations.

Legislation permits OPIC to cancel financing or insurance if an investor does not comply with environmental restrictions delineated in the contract. However, the budget for OPIC environmental analyses is very limited, and the two staff people assigned to the work are concerned that a lack of resources to monitor projects for compliance with environmental restrictions limits their effectiveness. In several cases, they have asked an A.I.D. Mission environmental officer to review a project's environmental performance, but are rarely able to pay for such visits and so cannot make many such requests. Unless the Executive Branch devotes greater financial resources to meeting OPIC's environmental responsibilities, the Agency will likely continue to have minimal ability to make its insurance or financing contingent on compliance with environmental restrictions.

4. BUREAU OF INTERNATIONAL NARCOTICS MATTERS, DEPARTMENT OF STATE

Pesticide spraying to eradicate drug crops beyond U.S. borders is coordinated and funded by the Department of State, while enforcement is the responsibility of the Drug Enforcement Administration. The Bureau of International Narcotics Matters coordinates with governments in Colombia, Mexico, Burma, Pakistan, Panama, Belize, Guatemala, and Jamaica to supply technical assistance, funding and aircraft for aerial spraying. (The potential danger of on-the-ground spraying operations mandates aerial spraying.)

As a matter of policy, the Bureau does not fund the use of pesticides which have been banned or restricted for use in this country. In compliance with Executive Order 12114, State completes an Environmental Impact statement for any work overseas. In some cases, State will encourage a host government to use an alternative pesticide. It will not withdraw all financial support for a project in which the government insists upon and funds a pesticide restricted or banned in the U.S.

USDA has a formal agreement with State to conduct research, field work and technical assistance for the Bureau. The Bureau does not coordinate directly with A.I.D.

5. TRADE AND DEVELOPMENT PROGRAM

The Trade and Development Program (TDP) is an autonomous program of 15 to 20 people whose function is to grant roughly $20 million per year to foreign governments to fund feasibility studies for projects that will strengthen the country's economic base. TDP only considers funding feasibility studies of projects that would generate $100 for U.S. companies for every $1 spent by TDP.

TDP is officially under the umbrella of the International Development Cooperation Agency (IDCA), which also houses A.I.D. and OPIC. IDCA is somewhat figurative; it was established in homage to Senator Humphrey to encompass all U.S. efforts involving economic assistance to developing countries. The A.I.D. Administrator is also the IDCA Coordinator.

Opportunities for the U.S. private sector to help achieve some of A.I.D.'s development assistance goals could be explored with TDP assistance in funding feasibility studies. For example, TDP is already investigating possible markets for U.S. companies interested in selling pollution control technology to developing countries.

III. AGENCIES THAT PROVIDE TECHNICAL RESOURCES

A. APPLICABLE U.S. POLICIES

A number of statutes include provisions that encourage or require agencies to share information and expertise other countries. The reasons vary from promoting U.S. or global environmental interests to expanding the experiences of U.S. agency staff. A long-standing policy debate has revolved around the question of whether the U.S. needs a general policy regarding types of information that should be shared with developing countries, particularly as regards hazardous substances exports. For now, however, technical assistance policies are left to each agency (see below).

B. U.S. AGENCIES' ACTIVITIES

1. ENVIRONMENTAL PROTECTION AGENCY

The Environmental Protection Agency was established in 1970 to conduct the environmental control programs of the U.S. Government. Acknowledging the "ever-closer relationships between environmental degradation in developing countries and U.S. interests" and "the emergence of new opportunities for influencing the character and content of the international community's collective response to Third World environmental problems, including health-related aspects," EPA established a Developing Countries Staff (DCS) in 1986. DCS is housed within EPA's Office of International Activities. (12)

At the time of its formation, DCS estimated that between 1983 and 1986, 225 EPA staff and $6.4 million were committed to work in developing countries on an ad hoc basis. But until 1986, no overall strategy or policy existed to guide EPA's work in developing countries, and divisions within the agency did not coordinate effectively in addressing requests for assistance.

DCS has identified a number of direct and indirect benefits that accrue from giving technical assistance to developing countries. They include development of EPA's scientific/technical expertise, acquisition of data that can be incorporated in regional and global models and analyses, protection of the health and welfare of U.S. citizens, and strengthening U.S. influence on the character and conduct of environmental programs of international environmental and development institutions.

In its work with rapidly industrializing nations, EPA plans to give direct assistance including consulting, training, and/or information sharing. In order to emphasize projects that will contribute to the country's long-term ability to address environmental problems, EPA plans to concentrate on impact assessment, abatement of air and water pollution, disposal of hazardous wastes, and the regulation of pesticides and toxic

chemicals. Cooperative agreements have been negotiated with Mexico, India, China, and Brazil, and are almost completed with Korea and Taiwan.

In contrast, EPA's assistance to "poorer nations" will be indirect. Because it perceives lack of development to contribute substantially to environmental problems in developing countries, EPA will collaborate closely with bilateral and multilateral development assistance agencies, particularly A.I.D. It has proposed a series of training courses and workshops entitled "Technical Assistance to Developing Countries on Pesticide Regulatory Process and Procedures" designed to increase the technical skills of regulatory officials and improve their ability to access information critical to regulatory decisions. (13)

DCS and A.I.D. signed a Memorandum of Understanding in February, 1988 on mutual assistance on environmental matters in developing countries. EPA hopes to "influence and assist A.I.D. to broaden its overall environmental perspective and program beyond a largely natural resources management orientation to include pollution abatement and control as well as environmental policy planning and institution-building."

DCS plans a range of cooperative activities with A.I.D., including designing and funding projects jointly. Recently, EPA and A.I.D. have worked together to provide experts to inspect and propose solutions to disposal of pesticide stocks in several countries, and to design the pest management component of an OECD seminar. A.I.D. has requested technical information relevant to problems in several of its projects, including waste disposal in Belize, the use of asbestos pipe in Jamaica, and appropriate pesticides for the African Locust Control Program.

DCS also plans to work closely with the multilateral development banks that have been spurred by pressures from U.S. nongovernmental oragnizations, and subsequently Congress and the President, to more effectively incorporate environmental concerns into planning and implementing projects. The World Bank, Asian Development Bank, Inter-American Bank, and others have sought technical advice from EPA in responding to the U.S. mandate. The DCS strategy also calls for closer coordination with the private sector, including U.S. environmental organizations and industry.

2. DEPARTMENT OF AGRICULTURE

In addition to overseeing projects in certain countries in an attempt to prevent pests from entering the U.S., USDA shares knowledge with a variety of countries. The Office of International Cooperation and Development (OICD) oversees technical assistance, training courses, work with international organizations, efforts to involve private agribusinesses in U.S. development efforts, and scientific exchanges with other countries. Assistance combatting pests is provided by technical

162

experts from the Animal and Plant Health Inspection Service (APHIS).

A number of laws and specific language in appropriation acts have helped establish USDA as the principal agency conducting and coordinating research, technology transfer, implementation, and assistance activities related to Integrated Pest Management within the U.S. (1) The Agricultural Research Service, for example, whose overall goal is to promote sustainable agriculture, seeks to develop systems to increase yields and quality with "minimum disruption to the environment" emphasizing "a systems approach" which usually requires minimal dependence on chemicals. *

According to some observers, an increasing number of USDA affiliated scientists and officials believe that the future viability of U.S. agriculture depends on the development of alternatives to chemical pest control methods. Support at the highest management levels of USDA appears to have been increasing in the last two years (since 1986). Agencies that are linked to state level activities, such as the Cooperative State Research Service (CSRS), still tend to emphasize development of alternatives somewhat more than the federal levels of USDA.

A.I.D. extensively draws upon USDA expertise. For example, A.I.D. funds approximately 70% of the training USDA conducts for agriculturalists around the world. A.I.D. often calls upon experts from various USDA agencies when planning and implementing agriculture projects. Given that A.I.D. and USDA share the institutional goal of promoting Integrated Pest Management, A.I.D. may be able to more extensively coordinate with USDA on alternative approaches to pest control.

3. FOOD AND DRUG ADMINISTRATION (FDA)

The Food and Drug Administration, one of a number of agencies in the Department of Health and Human Services, regulates misbranding, identity, and adulteration of foods and cosmetics, approves drugs for use in the United States, and regulates medical devices (14).

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* The Agricultural Research Service brings together scientists conducting basic research, research on specific control techniques, and systems research (to integrate control techniques to manage one or more species of pests). Its "high priority national programs (1986-1992) include six objectives, one of which is "integration of systems". Within several other objectives, ARS identifies needs (such as biocontrol technologies for major crop pests) that are relevant to IPM. (20)

FDA's responsibilities regarding pesticides and industrial chemicals in developing countries are restricted to mitigating the impact of dangerous chemicals on food to be consumed in the United States. FDA monitors food imported from other countries to determine whether or not pesticide residues exceed tolerances set by the EPA. An import found to contain any amount of a pesticide banned for use in the U.S. is turned away.

Repeated rejections of shipments of food containing illegal pesticide or chemical residues potentially have serious economic implications for the exporting country. Lacking the technical expertise, facilities, and regulatory structure to control residues, a number of developing country governments have requested assistance from FDA in establishing systems that will enable them to analyse the chemicals that are applied and to monitor their crops for residues before export. At the request of international organizations (such as FAO and WHO) FDA has advised countries on the establishment of laboratory facilities and regulatory structures.

In some instances, other U.S. agencies giving technical assistance in developing countries have called upon FDA experts. EPA and FDA coordinated on a session to help the Chilean government assess problems associated with its use of pesticides, and to develop options for addressing them. FDA does not have plans to formalize its technical assistance services as EPA has done.

FDA also maintains regular contact with 66 embassies and 88 other entities, including the regulatory officials who have similar responsibilties to FDA in their respective countries. FDA sends regular mailings of documents that might be of interest to those entities, such as regulatory actions or controversies.

FDA does not interact with A.I.D. on pesticide and chemical issues except during international meetings of mutual interest. Where A.I.D. decides to assist host country governments and others in establishing regulatory structures and facilities, FDA expertise may be useful. Furthermore, A.I.D. efforts to help a given country to address its pesticide problems comprehensively would benefit from information, such as that gathered by FDA, on the particular sources within countries of excessive residues discovered on shipments of food imported to the United States. Monitoring such information could help A.I.D. set priorities for some of the activities recommended in the Committee on Health and Environment's Final Report.

4. BUREAU OF INTERNATIONAL LABOR AFFAIRS, DEPARTMENT OF LABOR

The Bureau of International Labor Affairs concentrates on assessing the impact of international economic and trade policies on American workers. It is also responsible for coordinating any technical assistance provided by Department of Labor personnel to

170

foreign countries, and for helping the State Department administer the labor attache program, which assigns a foreign service officer in each embassy to labor-related activities.

The Bureau draws upon technical experts in the Occupational Safety and Health Administration (OSHA), also housed in the Department of Labor, and the National Institute for Occupational Safety and Health (NIOSH), a non-regulatory investigative agency in the Public Health Service. In several cases, individuals have visited developing countries to assist governments in establishing or restructuring their occupational safety and health systems. OSHA's Technical Data Center collects information on all the chemicals that are subjects of OSHA standards, including health effects and existing standards in other countries. The Center responds to requests from all over the world for information on particular chemicals. Other NIOSH resources include NIOSHTIC, a data base of literature, and the Registry of Toxic Effects of Chemical Substances (a compendium of toxicity data).

As A.I.D. evaluates its future activities regarding industrial hazards, it might consider drawing more extensively on NIOSH expertise, in particular.

5. CENTERS FOR DISEASE CONTROL

The Centers for Disease Control (CDC) is an agency of the Public Health Service in the Department of Health and Human Services. It was established in 1946 to conduct research relevant to efforts to control malaria in war areas. Today, it works with State health departments to track the spread of diseases so that epidemics can be prevented and controlled. CDC also responds to requests from Ministries of Health in other countries to conduct research or provide information that will assist in efforts to control diseases overseas.

CDC's nine departments house expertise and information that could help developing countries, A.I.D., and other agencies seeking technical assistance. Activities particularly relevant to pesticide issues in developing countries take place in two Divisions in the Center for Infectious Diseases.

The Division of Parasitic Diseases houses a laboratory that collaborates with the World Health Organization to establish quality standards for pesticide formulations. Purchasers often require that a formulation comply with the W.H.O. standards (e.g., for density, solubility, and toxicity) so as to ensure its performance; they then contract with laboratories to test that the particular formulation meets those standards. In addition to conducting tests which provide information for the standard-setting process, CDC's lab responds to requests to troubleshoot problems that arise once a formulation is in use. For example, in 1976, a CDC team conducted tests on a malathion formulation used in a malaria control effort in Pakistan that had caused five

deaths and 2,500 poisonings. They also provided training in proper spraying, and set up a program for testing cholinesterase levels of workers. The research led to a modification of the W.H.O. standards for malathion to include a particular test for the impurity isomalathion, which had been responsible for the poisonings.

Approximately 80% of the entomological expertise within CDC is in the Division of Vector Borne Viral Diseases. This Division conducts research and consults on how to control epidemic outbreaks of vector borne diseases, including recommendations of specific pesticides and doses. It has become involved with only one developing country in any depth: three years ago, personnel conducted trials of an ultra low volume spraying approach to control a vector in Mexico.

A.I.D. provides some funding to CDC's ongoing programs. It has several Participating Agency Service Agreements (PASAs) to conduct joint projects, some in the U.S., and some in the field. The Vector Biology and Control Project, for example, conducts research relevant to A.I.D. Office of Health efforts to control disease carrying vectors.

Both CDC and A.I.D. personnel are satisfied with the coordination between the two agencies on vector control projects. It is conceivable that some A.I.D. efforts may benefit from drawing more extensively on other Centers within CDC, such as the Center for Environmental Health.

IV. AGENCIES THAT PARTICIPATE IN INTERNATIONAL ORGANIZATIONS

A. APPLICABLE U.S. POLICY

As noted in the Committee on Health and the Environment's Final Report, a number of international organizations initiate and coordinate international dialogues on issues relevant to chemicals and pesticides in developing countries. International dialogues leading to binding and non-binding actions have concerned worker health and safety standards (ILO, WHO), assessment of chemicals (OECD), transboundary movement of hazardous waste (OECD, UNEP), exports of chemicals and pesticides (OECD, UNEP, FAO, OAS) industrial accidents (OECD, ILO) and other topics.

Except in OECD's Development Advisory Committee (DAC), A.I.D. has minimal influence in these international fora. Other U.S. Government agencies, in particular the Departments of Treasury and State, have the lead responsibility for coordinating and determining U.S. policy towards most international organizations (see following sections).

The United States' impact on international organizations' policies depends in part on the ability of the delegations attending international meetings to articulate coherent and

112

politically viable policy positions. The process of developing a comprehensive U.S. policy on pesticides and chemicals in developing countries (Recommendation 6) would, among other things, improve the United States' opportunity to contribute to the relevant activities of international organizations.

B. U.S. AGENCIES' ACTIVITIES

1. THE STATE DEPARTMENT

The State Department coordinates the U.S. delegations that attend international meetings on behalf of the United States. The Bureau(s) within State assigned to a particular meeting are responsible for clearing any given official U.S. position with all relevant agencies. The highest level appointees may become involved in a disagreement among agencies over important components of a position on an issue; if they are unable to resolve those differences, the delegation does not put forth a position.

The Bureau of International Organizations' Affairs often facilitates issues specifically involving developing countries. In some cases, IOA plays an insignificant role and other offices within State undertake to organize U.S. activity or to formulate the U.S. position on an international question. The Bureau of Oceans, International Environmental, and Scientific Affairs (OES), for example, has primary responsibility for the State Department's participation in discussions about international agreements regarding chemicals.

In 1979, State and the U.S. Committee for Man and the Biosphere organized a "U.S. Strategy Conference on Pesticide Management" designed to "provide policy and program guidance to the Department of State and other U.S. institutions in their search for ways to reduce the adverse impacts of pesticides on the global environment." The conference explored a number of policy options, including a new function for an "Ad Hoc Pesticide Advisory Committee" within State that would collect information from U.S. agencies and the scientific literature (16). For reasons that are unclear, State did not follow up on that conference.

2. ENVIRONMENTAL PROTECTION AGENCY

Within the Office of International Activities, the Developing Country Staff (DCS) is planning to "systematically upgrade the Agency's involvement and influence in international organizations". Its approach is three-pronged: to play a more active role in shaping U.S. positions and policy on these issues; to expand the technical support that EPA can give to international organizations; and to give U.S. government policy more prominence by "seeking to place more Americans on international secretariats". DCS is making an effort to be the conduit for all requests relating to developing countries. (12)

EPA program offices, such as the Office of Pesticides and Toxic Substances, also help shape U.S. participation in the work of international organizations such as OECD and WHO on issues that are relevant to devloping countries.

EPA may confront conflicts with other U.S. agencies as it takes a more active role in international dialogues. In at least one instance, officials at EPA have felt strongly that a position advocated by the State Department contradicted U.S. law.*

3. DEPARTMENT OF THE TREASURY

The U.S. Treasury is a potentially powerful vehicle for the U.S. to shape policy of both international organizations and developing countries.

Treasury appoints the United States' Executive Directors to each of the multilateral development banks, who control a percentage of a given bank's voting shares equal to the percentage of the budget that the U.S. contributes. [The U.S. controls 19.91 percent of the vote of the World Bank. Japan, the United Kingdom, Germany, and France each control from 5.57 to 6.63 percent (19)] Furthermore, Treasury negotiates the U.S. financial contributions with other member countries, although Congress must authorize and approve funding levels (19). Consequently, Treasury has substantial leverage to influence policy direction and emphasis.

As a result of lobbying by the U.S. environmental community, strong support from several Congressional committees, and the personal commitment of Treasury Secretary James Baker, the Department now has a staff assigned to monitoring the environmental impact of projects funded by loans from multilateral banks. On several occasions, banks have modified projects on environmental grounds, at the insistence of the U.S. Executive Director. In other cases, the U.S. has cast the sole vote against the funding of a project, to no avail.

Treasury also is responsible for rescheduling debt payments when countries cannot meet a previously agreed-upon schedule.

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* During several meetings in 1984 and 1985, representatives from the State Department, EPA, environmental organizations and others met to discuss the U.S. delegation position on proposed UNEP guidelines on the exchange of information about hazardous exports. According to one participant, the State Department representatives were opposed to the guidelines altogether, even though U.S. law (The Federal Insecticide, Fungicide, and Rodenticide Act; and the Toxic Substances Control Act) required notification. Ultimately, the U.S. delegation agreed with the provisional notification scheme proposed by UNEP.

174

The recent spate of "debt for nature swaps," in which private U.S. organizations concerned about conservation purchase and then cancel the debt of a developing country in return for that country committing funds to national parks or other environmental preserves, have received favorable support from Secretary Baker as an example of the creative options that contingency funding arrangements present.

4. OFFICE OF THE U.S. TRADE REPRESENTATIVE

The U.S. Trade Representative's Office within the White House seeks to reach agreements that will help American companies sell their products overseas. It is a small agency (140 staff) and its influence on Administration trade policy has depended on the relationship of the USTR and the President. (18)

USTR is involved in discussions that might have an impact on the competitive posture of U.S. companies, such as differences in labeling and notification practices. Institutionally, USTR does not consider the environmental or health implications of its support for free trade. Instead, it operates on the assumption that EPA has both the expertise and the statutory mandate to address potential environmental problems with U.S. products.

5. DEPARTMENT OF COMMERCE

Like the Office of the U.S. Trade Representative, the mandate of the Department of Commerce is to promote U.S. industry. Within the Department, the International Trade Administration is responsible for implementing that mandate overseas. Commerce also participates in interagency discussions to determine U.S. positions on issues addressed by the OECD and United Nations. Further, it now has an international commercial service with representatives in almost every U.S. embassy around the world.

The Commerce Department's top priority is to ensure that decisions reached by the U.S. Congress, U.S. agencies, and international organizations do not unnecessarily disrupt trade. For example, some Commerce staff are concerned about A.I.D.'s current guidelines that restrict A.I.D.'s use or funding of pesticides to those approved for use in the United States. They point out that developing countries will be exposed to these pesticides regardless of the U.S. position, because other sources will provide them. Meanwhile, U.S. chemical companies lose opportunities to sell their products.

Commerce Department representatives look forward to coordinating more closely with A.I.D. and other agencies to consider the trade implications of environmental policies that apply to overseas activities or affect international trade.

V. CONCLUSIONS REGARDING OPPORTUNITIES FOR COORDINATION

Coordination between A.I.D. and other U.S. agencies is not necessarily critical to A.I.D.'s successful implementation of its pesticide and environmental policies. In some cases, coordination would only add to financial and administrative burdens. In other situations, however, better coordination could greatly enhance A.I.D.'s efforts. Opportunities for better coordination are particularly important to Recommendations 1, 3, and 6. The technical expertise of various U.S. agencies could enhance A.I.D.'s ability to implement recommendations 2 and 4, as well.

A. COORDINATION RELEVANT TO RECOMMENDATION 1

Recommendation 1 suggests that A.I.D. build constituencies among U.S. government agencies, international organizations, host-country governments, nongovernment organizations, private industry, and research institutions.

Recommendation 1 assumes that A.I.D. may be able to leverage more resources than it alone controls by building constituencies. Any contact between A.I.D. and other U.S. agencies has the potential to sensitize and involve agencies in efforts to address chemicals and pesticides problems. For example, A.I.D.'s willingness to assist OPIC has probably encouraged OPIC staff to become more ambitious in their environmental analyses and in the requirements they ask investors to meet. A.I.D.'s conflict with USDA over requirements for environmental assessments in the MOSCAMED project appears to have led APHIS to strengthen its pesticides policy. A.I.D. should consider opportunities for working with U.S. agencies that have the potential to result in particularly significant changes in that agency's policy or activity.

Drawing upon the resources of other agencies also enhances A.I.D.'s ability to build other institutions and constituencies -- in the international community and the host country -- that can effect safer use of chemicals and pesticides. As one example, Peace Corps is particularly well equipped to work with people on a local level, helping them to recognize and implement approaches that meet their needs. As another example, in those host countries that have the political will to establish strong regulatory systems, FDA, EPA, and OSHA/NIOSH may be able to help design effective regulatory systems. As a final example, the Departments of Treasury and State can influence the efforts of international organizations and help make them more effective at implementing safe chemical and pesticide use programs. In these and other contexts, coordinating with other U.S. agencies can indirectly enhance A.I.D.'s efforts to build support for safe use of chemicals and pesticides in host countries.

B. COORDINATION RELEVANT TO RECOMMENDATION 3

Recommendation 3 urges A.I.D. to use IPM as its primary approach to pest management, to improve the implementation of those projects that do use IPM, and to support more IPM research and training. It suggests, among other things, that on-site project implementors receive training in IPM and that local farmers, farmers' organizations, and pest applicators be consulted throughout the lifecycle of projects that use IPM.

Among agencies working overseas, opportunities for coordinating with Peace Corps stand out as those that could best meet the objectives underlying Recommendation 3. An effort to implement IPM on a wide scale depends upon work at all levels within a country, including developing support for IPM within the host country government, to which both Peace Corps and A.I.D. can contribute. The principal obstacles to implementing IPM are local, however. Overcoming farmers' dependence on chemicals requires working with individuals and small groups over long periods of time to demonstrate that integrated approaches can be cost effective, and to train farmers in IPM techniques. With adequate support, Peace Corps Volunteers are well equipped to undertake such an effort.

Peace Corps Volunteers receive minimal training in crop protection, safe use of pesticides, and IPM, though training and resources vary country to country. Peace Corps has indicated that it would be interested to have A.I.D. fund in-service training of Peace Corps Volunteers and their in-country counterparts. A.I.D. could build upon such efforts as FAO's "train the trainers" programs for IPM techniques in rice that have received positive evaluations (19).

Utilizing expertise of agencies that provide technical assistance could also help A.I.D. meet the objectives of Recommendation 3. For example, USDA-affiliated scientists may be helpful in IPM research and training.

C. COORDINATION RELEVANT TO RECOMMENDATION 6

Recommendation 6 suggests that the U.S. Congress develop a more clear and consistent policy for U.S. agencies to address problems with chemicals and pesticides in developing countries.

In particular, the Committee on Health and Environment is concerned that alternative intepretations of Executive Order 12114, reflected in regulations that require different levels of scrutiny in the provision and use of chemicals, can result in delays and other problems for joint projects where environmental concerns are central. This has been illustrated in the lack of a consistent interpretation of this Executive Order in the MOSCAMED project, jointly funded by A.I.D. and U.S.D.A. Guidance from Congress about when Environmental Impact Assessments are required, and what they must include, would reduce those types of

177

conflicts between agencies that may have legitimately different institutional objectives.

Recommendation 6 could have a positive impact on coordination between agencies that offer technical assistance and agencies that participate in international organizations, as well. For example, agencies that currently respond to requests for technical assistance on an ad hoc basis might enhance their impact if Congress encouraged them to develop strategies for addressing certain needs of developing countries. Legislative guidance for U.S. agencies should facilitate the process of developing U.S. delegation positions on international questions involving pesticides and chemicals.

D. COORDINATION RELEVANT TO RECOMMENDATIONS 2 and 4

Although coordination with and among U.S. agencies is particularly relevant to Recommendations 1, 3, and 6, it should enhance A.I.D.'s efforts to implement recommendations 2 and 4 as well.

Recommendation 2 identifies four steps that A.I.D. should take in order to implement its environmental and pesticides policies more effectively. They include enhancing the Agency's professional capability to address environmental issues, and consulting with project beneficiaries to obtain their perspectives. EPA, in particular, could assist in training A.I.D. staff or consultants, and accessing information that would enhance A.I.D.'s professional staff capability on environmental issues. As noted earlier, Peace Corps Volunteers could play a role in consulting with farmers involved in A.I.D. projects.

Recommendation 4 suggests that A.I.D. prepare a long-term plan for its role in preventing and mitigating problems associated with chemical industry activities in developing countries. NIOSH and EPA could provide information about industrial problems, health implications, hazard evaluations and other planning techniques for A.I.D. to consider in defining its appropriate role regarding industrial activities.

FOOTNOTES

1. Council on Environmental Quality, "Report to the President: Progress Made by Federal Agencies in the Advancement of Integrated Pest Management," June 30, 1980.

2. Bentley, Hannah, and Wirth, David, "Comments of the Natural Resources Defense Council and the Sierra Club on Draft Scope of Work for an Environmental Assessment of the USDA Guatemala Medfly Eradication Program," May 22, 1987.

178

3. Perl, Matt, "Background Paper: Medfly eradication in Central America," August 20, 1987.

4. Interviews with A.I.D. staff, July-August, 1987.

5. Ibid.

6. Cable on request for an additional environmental analysis prior to poviding PL480 local currency for programs involving pest procurement and use, drafted by AID/LAC/DR/RD, Steve Wingert, May, 1987.

7. Interviews with A.I.D. staff, July, 1987.

8. Sinclair, Ward, "USDA backs use of carcinogen in U.S. battle with Medflies (Guatemala would use pesticide banned in the U.S.)", Washington Post, April 15, 1987.

9. Peace Corps Act, P.L. 87-293, 7S Stat. 612; 22 USC 2501-2523, approved Sept. 22, 1961.

10. Section 231, 22 U.S.C. 2191

11. P.L. 99-204; 99 Stat. 1669 added section n.

12. Environmental Protection Agency Developing Countries Staff, "EPA Developing Countries Strategy and Program Status Report", July, 1987.

13. Environmental Protection Agency, Office of International Programs, Office of Pesticide Programs, "Project Description: Technical Assistance to Developing Countries on Pesticide Regulatory Processes and Procedures," August, 1987.

14. Interagency Working Group on a Hazardous Substances Export Policy, "Draft Report," Federal Register Volume 45, No. 157, Tues. Aug. 12, 1980, pp. 53766-7, attachment A.

15. Wirth, David A., "Emerging Standards for Exports of Hazardous Substances," unpublished paper, April, 1985.

16. U.S. Department of State and the U.S. National Committee for Man and the Biosphere, "Proceedings of the U.S. Strategy Conference on Pesticide Management," June 7-8, 1979.

17. Dept. of State unclassified cable, A.I.D. 6725, November, 1987.

18. Auerbach, Stuart, "An Obscure Elite Agency Marks 25 Years' Survival," Washington Post, November 16, 1987.

19. Kenmore, Sierra Club, Bankrolling Disasters: International Development Banks and the Global Environment, Sierra Club, Sept. 1986.

20. Agricultural Research Service, USDA, "High-Priority National Programs (1986-1992)," also "Agricultural Research Service Program Plan," Miscellaneous Publication Number 1429.

21. Greishop, James and Winter, David, "Crop Protection Survey: Returned Peace Corps Volunteer," draft. Prepared for Consortium for International Crop Protection and Agency for International Development, February 1, 1984.

22. Peace Corps, Office of Training and Progam Support, "Agriculture Sector, Annual Report, 1986".

NOTE: Other information in this appendix was gathered through interviews with officials in the U.S. agencies discussed.

APPENDIX 5:

ENVIRONMENTAL POLICIES OF OTHER INTERNATIONAL DEVELOPMENT ORGANIZATIONS

Prepared by The Conservation Foundation

for the Report of the Committee on Health and Environment

ENVIRONMENTAL POLICIES OF OTHER INTERNATIONAL DEVELOPMENT ORGANIZATIONS

A. INTRODUCTION

To place A.I.D.'s pesticide policies in perspective, it may be useful to examine the guidelines for pesticide distribution and use established by various international organizations and other multilateral and bilateral development agencies. The complexity of international pesticide control efforts is evidenced by the fact that "in 1976, there were at least twenty-four international organizations linked in various ways to the international pesticide regulatory system (1)."

To date, however, there are no binding restrictions on the international trade of hazardous chemicals (2). Moreover, none of the major multilateral development banks (MDBs) or foreign assistance agencies has enacted enforceable regulations to control the export of pesticides to developing countries. Instead, a large number of development agencies have promulgated guidelines and/or recommendations for the distribution and use of pesticides. Although voluntary in nature, these guidelines do establish basic principles, and provide points of reference for developing countries as they seek to establish their own regulatory procedures and infrastructure. In almost every case, the emphasis is on the exchange of information related to banned or restricted chemicals. The following descriptions summarize the guidelines of a variety of international agencies; it is beyond the scope of this presentation to analyze how effectively they are implemented.

B. WORLD BANK

In April 1985, the World Bank - the largest development assistance institution in the world - issued its "Guidelines for the Selection and Use of Pesticides in Bank Financed Projects and Their Procurement When Financed by the Bank" (OPN 11.01). The guidelines, which were developed in conjunction with A.I.D., set out 22 basic principles covering the management, storage, application, and procurement of pesticides. They also provide selection criteria for pesticides to be used in Bank projects.

The guidelines emphasize integrated pest management (IPM) as a basic strategy in all bank-financed agricultural development projects, noting that the IPM approach "includes the prudent use of pesticides when damage reaches unacceptable levels." However, according to the guidelines, the decision to use pesticides should be made only after a thorough evaluation to determine that potential benefits do in fact outweigh direct and indirect costs. In particular, the guidelines state that "preference should be given to products which are registered in the country of proposed use, if such regulatory authority exists, or which

are already registered for an identical use in a country where capability exists to evaluate their efficiency, toxicity, and long-term effects."

C. REGIONAL DEVELOPMENT BANKS

The Asian Development Bank (ADB) is currently circulating a 200-page draft "Manual on the Use of Pesticides under Bank-financed Projects" (May 1987). The guidelines are designed to assist Bank staff in evaluating proposed pesticide use. With over 50 percent of ADB loans destined for agricultural or agro-industrial projects (2), the need for such a manual is clear. ABD guidelines are broadly consistent with those of the World Bank, and include a Technical Resources section and a compilation of 15 individual country profiles. The profiles outline registration requirements, pest management practices, industry statistics, environmental concerns, major crops, pests, and key pesticides for each country.

The African Development Bank (AFDB) has no formal pesticides policy to date, however, A.I.D. and the World Bank recently offered to assist the AFDB Environmental Adviser in preparing a set of pesticide guidelines. The Inter-American Development Bank (IDB) also has no written pesticides policy. In general, the IDB follows the guidelines promulgated by the World Bank. Pesticide recommendations are usually made on an individual basis for particular projects.

D. EUROPEAN COMMUNITY

As a leader in world pesticide exports, Western Europe has an important role to play in regulating the flow of hazardous pesticides to developing countries. While some European governments have enacted legislation individually to control hazardous exports, the European Community (EC) as a whole has yet to approve a resolution that would restrict such trade by each of its 12 Member States.

The EC is currently debating whether or not to require "prior informed consent" of importing country governments. The "prior consent" clause would permit the export of certain banned or restricted chemicals from the EC only upon receipt of a formal consent from the importing government (3). "If approved, the EC directive would be the first international legislation to incorporate the principle of prior consent. It would also be the first whose implementation would be mandatory (4)."

The major pesticide manufacturers argue that such legislation could delay export authorizations by six months to a year. Moreover, they insist, the measure would encourage Eastern Europe to flood the developing countries with even more hazardous pesticides (4,5).

The organization responsible for EC foreign aid programs is the European Development Fund (EDF). Recent official documents indicate that the EDF continues to finance the export of pesticides as part of its development programs. For example, 40,000 litres of endrin and 60,000 kilograms of aldrin were approved for a coffee plantation regeneration project in the Ivory Coast (6).

E. ORGANIZATION FOR ECONOMIC COOPERATION AND DEVELOPMENT (OECD)

The 24 Member countries of the OECD are among the major producers, exporters, and importers of chemicals, giving them a degree of experience and expertise often cited as lacking in non-Member importing countries. The organization has expressed concern over the export of hazardous chemicals, and on April 4, 1984, the OECD Council adopted a "Recommendation Concerning Export of Banned or Severely Restricted Chemicals." This non-binding recommendation instructs each Member country government to notify importing countries (on a one-time basis) of measures taken to ban or severely restrict the domestic use of hazardous chemicals. The recommendation is designed purely to promote the exchange of information; no attempt to regulate exports is implied, and the Appendix specifically denounces government control or regulation of exports.

With respect to chemicals more generally, the OECD has prepared draft Guidelines for Manufacturers and Traders in Chemicals. The guidelines are intended to protect end-users of hazardous chemicals, by encouraging manufacturers to provide information and assistance in the proper handling, use, and disposal of such chemicals. In addition, a 1985 OECD Council Recommendation called on Member Governments to ensure that "where dangerous substances and processes are involved, they continue to seek ways to promote the integration of the best techniques of prevention and protection... in projects in which they and their industrial enterprises are involved."

F. GENERAL AGREEMENT ON TARIFFS AND TRADE (GATT)

Currently 88 Contracting Parties adhere to the General Agreement on Tariffs and Trade (GATT). This international agreement is intended, among other things, to liberalize trade by removing unnecessary barriers due to technical standards. With respect to chemical exports, a Ministerial Declaration states the following:

> Contracting parties shall, to the maximum extent feasible, notify GATT of any goods produced and exported by them but banned by their national authorities for sale on their domestic markets on grounds of human health and safety. (7)

However, the requirement applies only to products completely banned for sale in their country of origin; it does not include

severely restricted chemicals. Furthermore, the GATT declaration apparently does not include products banned for environmental reasons -- only those banned "on grounds of human health and safety" (8).

G. UNITED NATIONS GENERAL ASSEMBLY

Between 1979 and 1983, the U.N. General Assembly adopted 4 resolutions (UNGA 34/173, 35/186, 36/166 and 37/137) pertaining to the export of hazardous chemicals. Such resolutions can be adopted with a simple majority vote, and hence do not necessarily reflect a commitment on the part of all member States. Moreover, General Assembly resolutions are not legally binding even for those countries voting in favor; they represent a moral endorsement rather than a legal commitment. The last resolution goes beyond advocating the exchange of information, and actually promotes the control of exports within the exporting country (an objective explicitly rejected by OECD).

H. U.N. FOOD AND AGRICULTURE ORGANIZATION

The Food and Agriculture Organization (FAO) of the United Nations oversees UN policy with respect to agriculture, fisheries and forestry. Most FAO projects are co-financed with the U.N. Development Program (UNDP) which supplies a significant proportion of funding. With respect to environmental protection, the organization has recently been criticized as "perhaps the least forward looking of the large multilateral agencies" (9).

At its 23rd Session in 1985, the FAO Conference adopted the "International Code of Conduct on the Distribution and Use of Pesticides." The Code consists of 12 articles outlining voluntary standards of conduct for all those connected with pesticide distribution and use. The approach is to define and clarify the responsibilities of the various parties involved. The FAO Code, which was prepared in cooperation with the agrochemicals industry and other international organizations, places no restrictions on the international pesticide trade. As one observer notes, "the FAO code takes the increased use of pesticides as inevitable and concentrates on how their use can be made safer, whereas in contrast, the World Bank Guidelines emphasise the limited use of pesticides and encourage alternatives" (10).

I. UNITED NATIONS ENVIRONMENT PROGRAM (UNEP)

UNEP was created in 1972, following discussions at the Stockholm Conference on the Human Environment. Unlike most UN specialized agencies, UNEP's primary function is catalytic -- designed to spur other organizations to take action. Over the past 15 years it has mobilized four times the resources for the environment that it has had to spend itself.

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UNEP has a number of cooperative programs with FAO, UNDP, WHO, and other international agencies to explore and promote Integrated Pest Management strategies. In addition, UNEP maintains listings of potentially or proven hazardous chemicals through its International Register of Potentially Toxic Chemicals (IRPTC).

In June, 1987, the UNEP Governing Council approved the "London Guidelines for the Exchange of Information on Chemicals in International Trade" (11). The Guidelines address procedural and institutional aspects of information exchange. The Council recalled the Governing Council's 1977 decision urging governments to ensure that potentially harmful chemicals "are not permitted to be exported without the knowledge and consent of appropriate authorities in the importing country" (8), but there is no attempt to regulate hazardous chemical exports, and the resolution is not considered legally binding for Member States.

In addition to adopting the London Guidelines, the Governing Council suggested the convening of an ad hoc group of experts to develop "modalities of prior informed consent and other approaches" to supplement the London Guidelines.

J. INTERNATIONAL LABOR ORGANIZATION

The International Labor Organization (ILO) has adopted a number of recommendations and international conventions pertaining to occupational safety and health. The ILO Committee on Work on Plantations (Eighth Session, Geneva, 7-16 December, 1982) adopted unanimously a set of conclusions concerning Occupational Safety and Health on Plantations with Special Reference to Mechanisation and the Use of Chemicals and to Labour Inspection. These conclusions contain several recommendations regarding the use of farm chemicals, including government monitoring, transfer of information and proper labelling practices.

K. WORLD HEALTH ORGANIZATION

Since the early 1950s, the World Health Organization (WHO) has taken an active role in international pesticides issues. In 1975, the 166-member organization first issued its Recommended Classification of Pesticides by Hazard, which classifies both pesticide formulations and their active ingredients according to acute oral and dermal toxicity (12). More recently, WHO cooperated with FAO, UNEP, and other organizations in preparing the "International COde of Conduct on the Distribution and Use of Pesticides" (13). WHO also frequently serves as the coordinator of vector control projects that involve multiple donors.

WHO also publishes "Specifications for Pesticides in Public Health" (now in 6th edition), which outlines the physical and chemical properties of the main compounds used in controlling insect vectors (14). The manual, which is widely distributed and

186

used in developing countries, also recommends analytical methods to test or inspect pesticides, and includes precautions for packaging, labelling, and handling.

In addition, WHO promotes the safe and effective use of pesticides through its Pesticide Development and Safe Use Unit, in the Division of Vector Biology and Control (15).

REFERENCES

1. Carolyn Greenwood, Restrictions on the Exportation of Hazardous Products to the Third World: Regulatory Imperialism or Ethical Responsibility? Boston College Third World Law Journal, v.5, 1985.

2. Asia Development Bank, Manual on the use of pesticides under Bank-financed projects (Executive Summary), August 1987, p.2.

3. Proposal for a Council Regulation (EEC) concerning export from and import into the Community of certain dangerous chemicals, COM(86)362 (submitted by the Commission to the Council on July 2, 1986).

4. Gary Yerkey, "Industry fights EC plan to slow chemical sales to Third World," The Christian Science Monitor, August 8, 1985, p. 11.

5. James Erlichman, "Sale of Banned Pesticides Likely to Escape Curbs," Manchester Guardian, February 9, 1987; see also Gary Yerkey, "Industry Fights EC Plan to Slow Chemical Sales to Third World," The Christian Science Monitor, August 8, 1985, p. 11.

6. J. Lemmers, "Dangerous Pesticides Included in the EC Aid Programme," EC-Third World Bulletin, no.1, 1985.

7. GATT, Export of domestically prohibited goods (ministerial declaration, adopted 29 November, 1982), L/5424, p.11.

8. OECD, Information exchange related to export of hazardous chemicals (ENV/CHEM/CM/83.7), April 1983.

9. Francois Nectoux and Nigel Dudley, A Hard Wood Story. London: Friends of the Earth, 1987.

10. Andrew Chetley, "Not Good Enough for Us But Fit for Them -- An Examination of the Chemical and Pharmaceutical Export Trades," Journal of Consumer Policy 9:155-180, 1986.

18

11. United Nations Environment Programme, "Proceedings of the Governing Council at its Fourteenth Session," UNEP/G.C.14/26, July 10, 1987.

12. FAO, "International Code of Conduct on the Distribution and Use of Pesticides," Rome: FAO, 1986.

13. WHO, "WHO Recommended Classification of Pesticides by Hazard." WHO Chronicle, 29, 397-401, 1975. Revised July, 1982.

14. WHO, "Specifications for Pesticides Used in Public Health," 6th edition. Geneva: WHO, 1985.

15. WHO, The Work of WHO 1984-1985: Biennial Report of the Director-General. Geneva: WHO, 1986.

188

APPENDIX 6:

INTEGRATED PEST MANAGEMENT PROGRAMS IN DEVELOPING COUNTRIES: LESSONS FROM CASE STUDIES

Prepared by The Conservation Foundation

for the Report of the Committee on Health and Environment

INTEGRATED PEST MANAGEMENT PROGRAMS IN DEVELOPING COUNTRIES: LESSONS FROM CASE STUDIES

I. PURPOSE AND BACKGROUND

Recommendation 3 of the Committee on Health and Environment's final report urges the Agency for International Development (A.I.D.) to "increase its use of Integrated Pest Management (IPM) significantly, with the goal of making IPM the Agency's primary pest management approach." The Committee believes that by integrating IPM into its agricultural production and vector control projects, and by effectively promoting and implementing IPM, A.I.D. can play an important role in addressing problems with pesticides in the developing countries in which it works.

This appendix presents five case studies of IPM programs in developing countries that demonstrate the potential economic and environmental benefits of IPM. It highlights those factors that appear critical to their success and, as well, those factors that can undermine IPM programs. The purpose is both to provide a context for the Committee's endorsement of A.I.D.'s involvement with IPM and to illustrate the importance of several of the sub-recommendations, which must become an integral part of A.I.D.'s approach if the goal of recommendation 3 is to be achieved.

Broadly conceived, IPM is any system that relies on a variety of approaches for controlling pests, including physical, biological, genetic and cultural controls, as well as pesticides. IPM tries to maximize the natural mortality factors of major pests in an agricultural system, while minimizing the need for chemical pesticides. It relies on the concept of an economic threshold of pest population density or crop damage, below which the cost to control a pest is greater than the benefit. Examples of the components of IPM systems include efforts to breed crops resistant to diseases and pests (host plant resistance); introduction of insect predators and parasites (biological controls); the use of cover crops to suppress weeds, plantings timed to avoid pest damage, and crop rotations (cultural controls); and the minimal use of chemical pesticides (emergency control measures).

II. CASE STUDIES

A. SOYBEANS IN BRAZIL (1)

The importance of soybeans as a source of protein in diets of people in developed and underdeveloped countries alike has spurred worldwide production. Today, Brazil is the third largest producer of soybeans, following the United States and China.

From 1970 to 1975, Brazil's output of soybeans increased almost seven-fold to 10 million metric tons. Crops were increasingly threatened by a number of pests, including the stink bug (three varieties), velvetbean caterpillar, soybean looper, and others. Brazil appealed to INTSOY, an international program established to "improve human nutrition around the world through the use of soybeans," to help design a crop protection program. Because Brazil's climate was similar to that of the United States, INTSOY researchers were able to transfer IPM technologies being developed at U.S. universities.

The Integrated Pest Management system developed for Brazil relied on monitoring for pest damage and using minimal amounts of insecticides. Those insecticides with the least potential to kill the pests' natural enemies or to otherwise disrupt the environment were preferred. They were used only when an economic threshold was reached. In developing the program, Brazil relied on extensive technical and financial assistance from a variety of international organizations that were motivated, apparently, by the great economic promise of healthy soybean production.

The success of the pilot IPM program, which yielded over 20% more seeds and reduced average Brazilian insecticide use by approximately 93%, led the Brazilian government to establish a National Soybean Research Center. The Brazilian state of Parana and eventually the entire country officially adopted the IPM program for soybeans. Research scientists and extension personnel trained growers; the government established a televised Alert System to communicate with farmers about steps that should be taken depending on the level of pest infestation that they observed on their own plots. 30% of all Brazilian soybean farmers practiced IPM by 1983.

B. BANANAS IN COSTA RICA (2)

The vast number of banana varieties are a staple food in the tropics, particularly for low income people. They are the second most extensively cultivated fruit in the world.

In Central America, diseases began to plague bananas when genetically uniform varieties were grown on a large scale. By the late 1960s, however, scientists had discovered varieties resistant to most diseases. Two insect pests -- the banana weevil and banana rust thrip -- continued to threaten yields.

When synthetic organic pesticides became available after World War II, the United Fruit Company began applying insecticides to its plantations in Costa Rica, in an effort to control weevils and thrips. Initially, United Fruit applied dieldrin aerially and to the base of the plants. Pest populations multiplied and developed resistance, largely because the insecticides also killed natural enemies. Secondary pests emerged. United Fruit tried other pesticides in increasing amounts, to no avail.

F11

Company entomologists concluded that current spraying practices did not reflect the fact that plants could tolerate more caterpillars before damaged fruit and reduced yields resulted. Using basic monitoring techniques, United Fruit began spraying only when the numbers of caterpillars reached a threshold level, thereby reducing insecticide use 75%. The entomologists also observed that natural enemies abounded in forests near the plantations, and predicted that they would return if insecticide spraying was reduced further. In 1973, the company stopped using insecticides altogether, and within several months insect pests were below economic thresholds.

C. COTTON IN NICARAGUA (3)

Cotton crops in a variety of countries have exhibited similar responses to extensive application of pesticides to control pests, particularly the boll weevil: chemicals effectively control pests for up to 15 years, then populations of resistant varieties and secondary pests threaten an entire region's cotton industry.

Nicaragua's first wide-scale attempt at IPM for cotton began in 1971. By then, the average number of pesticide applications had increased to 28 per season (some fields were sprayed even more often), and average yields had fallen by up to 30%. Farmers had tried greater and greater doses of the less expensive but acutely toxic organochlorines. Human breast milk contamination by DDT was higher than anywhere in the world, and malaria was resurging.

Nicaragua's IPM system relied upon technical and financial assistance from France and the United Nations, among others, and used steps similar to those taken in Brazil. As more and more farmers developed a basic understanding of the concept and procedures of IPM, researchers and trainers added more complex measures, such as trap cropping. Test IPM plots showed substantial economic benefits from the IPM approach: in one, the IPM plot used 33% less pesticides, incurred 25% less costs, and generated 16% higher yields than the conventional control plot.

By the mid 1970s, Nicaragua's IPM system for cotton had begun to deteriorate. Decline in the international cotton market reduced farmers' incomes from the crop. A large pest outbreak during one season shook farmers' confidence in minimal applications of pesticides and IPM specialists were paid so little that they took on more than they could manage. A new government policy rewarded increased output, so that the farmers' goals became maximum yield rather than maximum profits. Because of the particulars of the economic calculations for that season, farmers concluded that a two-fold increase of insecticides would maximize yield. The country's economic problems propelled the crisis into the first several years of a new government. The number of insecticide applications per season again surged to 27, but did not control the boll weevil.

In 1982, the government initiated an experimental "Boll Weevil Suppression Program," focusing on growing crops that were used to "trap" the weevil and were then sprayed, leaving nontrap crops with weevil populations below the economic threshold. The Program trained farmers in the basic elements of the IPM system used in the 1970s (cutting and plowing under cotton stalks, scouting, planting crops in high densities). Insecticide applications and costs dropped, profits increased, and yields remained roughly constant. Research focused on developing alternatives to pesticides for other cotton pests.

Today, political disagreements threaten Nicaragua's IPM program. The United States, West Germany, and other industrialized countries have recalled agricultural loans and personnel. The continuing military conflict in many rural areas has undermined the agricultural economy and put IPM technicians personally at risk. Without support from international lending institutions and a reasonably stable economy, Nicaragua's efforts to implement IPM on a wide scale are likely to be extremely difficult.

D. RICE IN SOUTHEAST ASIA (4)

Rice is among the world's most important crops, providing one quarter of the diet for 90% of the world's poor. Research to increase the yield of rice crops in Southeast Asia began in 1960 with the establishment of the International Rice Research Institute (IRRI) by the Ford and Rockefeller Foundations. IRRI developed a number of high-yielding varieties which it distributed in seed form with fertilizers, chemical pesticides, and training in irrigation and other techniques to ensure proper cultivation.

The package of inputs and training initially increased yields. However, the genetic uniformity of the high-yield rice varieties made them more susceptible to pests than the traditional varieties, and weeds could more easily compete with the high-yield plants, which had been bred to be short so that they could support a higher volume of grain on each plant.

From the early 1950s, government programs to distribute free pesticides and fertilizers (provided in part by foreign aid programs and chemical companies) encouraged farmers to rely on pesticides to control the two major rice pests affecting yields at the time: rice hispa and the rice leaf beetle. Within several years of the initiation of IRRI's activities, other pests began to multiply, including insects, diseases, and weeds. Government credit policies encouraged use of insecticides to control the upsurge. IRRI researchers worked on developing varieties resistant to the brown planthopper, in particular, but by the mid 1970s new strains of the planthopper emerged which threatened the new varieties.

Several researchers at IRRI who studied the problem concluded that pest outbreaks were resulting from destruction of natural enemies, caused by farmers' tendency to apply less insecticide than recommended -- enough to kill the pests' predators, but not the pests themselves.

Funding from the U.N. Food and Agriculture Organization enabled IRRI personnel to develop an IPM training program for rice farmers. The program components included resistant varieties, scouting, use of economic thresholds to make treatment decisions, and application of proper doses of insecticides. Experiments with a number of training methods and assistance from an anthropologist showed that participation by farmers in the design of the IPM program was critical to its success. For example, quantitative concepts, some of which intimidated farmers, were revised in favor of qualitative approaches.

The IPM program was extremely successful. Yields remained constant, insecticide costs dropped 50%, profits increased 10%, and the risk of fluctuation in profits declined. From 1983 to 1986, net returns on investment in IPM by individual farmers averaged more than four to one. Apparently in response to these results, the Presidents of the Philippines and Indonesia, and agriculture officials in India and Malaysia, declared IPM their countries' official crop protection strategy (Kenmore, 1987b).

E. CASSAVA IN AFRICA (5)

Eighty percent of Africans depend on cassava as their major food source. Cassava provides an additional 250 to 300 million people in other developing countries with a substantial percentage of their daily caloric intake.

Unlike the crops described in the other case studies, cassava is grown primarily by subsistence farmers. Consequently, pest epidemics in cassava can cause mass starvation. In the past fifteen years, the primary pests plaguing cassava have been the mealybug and green spider mite, both of which were accidentally imported to Africa in 1970.

Insecticides have never been particularly effective in controlling the mealybug and the spider mite, for two reasons. First, the pests are adept at hiding from the chemicals. Second, distribution of insecticides is virtually impossible, as many small cassava plots are inaccessible by road. Consequently, as the pests spread rapidly to countries across Africa -- causing average yield losses of from 5 to 80% -- scientists turned to IPM.

In the late 1960s and early 1970s, the newly established International Institute for Tropical Agriculture (IITA) launched research projects to develop resistant varieties of cassava. Subsequently, they joined the Commonwealth Institute of Biological Control (CIBC) in efforts to identify and test

194

biological controls. Additional financial and technical support came from international, national, and regional institutions (including development assistance agencies in Germany, Switzerland, and Austria that initially funded searches in South America for exotic predators, and subsequently a massive system to produce and distribute the mealy bug's natural enemies).

The ultimate success of the Continent-wide program, known as the Africa-wide Biological Control Project of Cassava Pests (ABCP), depended in part upon the design of the Automatic Insect Release System (AIRS), which distributes the E. lopezi wasp by air. The wasps are put into capsules which are then accelerated to the cruising speed of the airplane within an air scoop -- but accelerated in the opposite direction to that of the plane. Therefore, when they are dropped from the plane, the capsules are not damaged by their impact with the air outside the plane. Once in an area, the wasps spread from plot to plot.

A number of experiments have demonstrated that the release of E. lopezi reduces populations of mealybugs to economically acceptable levels. Yet the area in Africa infested with mealybugs is so vast that the distribution program has only covered 12 percent of it. E. lopezi may turn out to be ineffective in some environmental conditions, so scientists are continuing to search for other exotic enemies.

Efforts to control the green mite are still in the fledgling stages. As with the mealy bug, researchers focus on searching for natural enemies. Scientists are also involved in breeding varieties of cassava that are resistant to African cassava mosaic disease and cassava bacterial blight.

Scientists have only recently begun to address the need to train people at a variety of levels in the concepts of biological control of cassava, including methods to raise the mealy bug's natural enemies. The program is expensive: research and training related to releasing natural enemies in 50% of the cassava belt is projected to cost $30 million over the next five years. However, with adequate funding the program has the potential to solve cassava pest problems. Among other things it will be important to overcome obstacles particular to developing countries, including lack of infrastructure, and low literacy and education rates among rural farmers.

III. OTHER EXAMPLES

Reports of other successful IPM efforts in developing countries are numerous (6,7,8). To list a few:

- In Jiangsu Province, China, an IPM program for cotton decreased 90%, yields increased, and costs for pest control decreased 84%.

- In Guangdon Province, China, using parasitic wasps to control stemborers in sugarcane reduced crop protection costs 33%.

- In the Jilin Province of China, biological control methods resulted in 80-90% control of a major corn pest.

- In Sri Lanka, a parasite which cost $32,250 to ship to the country about fifteen years ago now prevents approximately $11.3 million in pest damage to coconut.

- The O. rhinoceros beetle which once caused extensive damage to coconut in the South Pacific is controlled by a virus and by cultural methods, implemented with help from FAO.

IV. A.I.D. IPM PROJECTS

A.I.D.'s efforts to promote IPM in particular projects have met with variable success. Two of the largest projects, both regional in scope, are in the Sahel and in Central America.

Evaluations of the Sahelian project showed it to be technically successful in demonstrating the potential of IPM; however, administrative problems among the participating organizations and a failure to collect data led to major problems with the project as a whole, and an overall feeling within A.I.D. that the project was a failure, though it provided useful lessons (9).

A.I.D.'s Central American IPM project has made remarkable progress in a relatively brief period of time, in part as a result of increased knowledge of the importance of administrative considerations that were deficient in the Sahel project. The initial evaluation of the Central America Project attributes much of its success to the training orientation and commitment of the professional staff, the rapport they were able to develop with local farmers and government officials, and the involvement of the Mission staff in designing and implementing the project (10).

V. CONCLUSIONS

Experience with IPM extending over the last 25 years shows that it can be implemented on a wide scale, in a variety of crops, and in developing countries with varied political structures, cultures, and climates. IPM can significantly reduce input costs, increase or stabilize yields, and reduce threats to public health and the environment often associated with primary reliance on pesticides.* Examples of successful IPM are most

common in cash crops but can also be found in subsistence agriculture.

At the same time, experience shows that IPM requires both financial and human resources and political support, especially in the developmental stages. In each case mentioned above, the developing country government and/or major international institution(s) invested substantial resources to develop, augment, or transfer the IPM technology for the particular crop and region, and to distribute it to farmers or across farmland. In some situations, such as in Brazil, Nicaragua, and Africa, the government promoted IPM and actively participated from the inception of the program. In the case of the Philippines, the government responded favorably to positive results demonstrated by the IRRI, and ultimately provided critical political support. As the current decline in IPM in Nicaragua suggests, without support from international institutions -- which may be determined by political considerations -- researching, developing, and even implementing IPM is much more difficult. If for any reason a government decides that it is politically more important to support the continued use of large amounts of pesticides, IPM may fail or remain untested. **

The case studies reviewed here raise the question of whether or not efforts to implement IPM will succeed without the impetus of a pending economic crisis. In most cases the crops involved were extremely important to the country's economy and to international trade. Governments and international institutions (and in the case of Costa Rica a multinational corporation) were spurred to endorse IPM by an economic crisis they could not ignore. In the case of cassava in Africa, the threat of mass starvation generated the necessary investment of funds and

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* The long-term economic impacts of IPM will remain unclear until IPM is adopted on a wide scale. One concern is that if IPM systems greatly increase yields, this may lower prices of produce, which may affect farmers' profits. (Bottrell, unpublished, 1987)

** Because IPM is based on the concept of treating for pests at an economic threshold (where the costs of pest damage exceed costs to control the pests) the prices of control measures affect the economic threshold. The lower the costs to control the damage, the lower the threshold. If pesticides are very inexpensive, for example, a farmer might decide to spray when there are only a few pests per plant. If excessive use continues, resistance, environmental damage, and threats to public health resurface. Consequently, government subsidies of pesticides can thwart efforts to minimize the use of pesticides within an IPM system, and lead to the failure of that system.

personnel. (Because of its centrally planned government and the history of the government's relationship with the pesticide industry, China may be an exception to this.)

Nonetheless, the political pressure for government support is likely to grow as more and more successful projects are conducted. The political mandate is a critical factor to implementing IPM on a wide scale in developing countries. Once political support exists, those responsible for planning and implementing a particular program can draw upon a growing body of research that presents various approaches and components which are critical to their success. It is important to note that less research has been done on IPM systems for subsistence farmers, which must be designed differently than systems conducted on large plantations and may be less easily implemented.

In sum, a review of the literature and the case studies presented here indicate that IPM holds real promise for developing countries. As the Committee on Health and the Environment suggests in its report, development assistance agencies and others responsible for planning agriculture programs should develop IPM systems for crop protection before the cycle of resistance, environmental damage, and economic costs reaches higher proportions. Increased support for research and careful evaluation of the successes and failures in each IPM project will help ensure that its potential is realized.

FOOTNOTES

1. Hansen, Michael. "Escape from the Pesticide Treadmill: Alternatives to Pesticides in Developing Countries." Institute for Consumer Policy Research, 1987.

2. Ibid.

3. Ibid.

4. Ibid.

5. Ibid.

6. Referenced in Postel, Sandra, "Defusing the Toxics Threat: Controlling Pesticides and Industrial Waste", World Watch Paper 79, 1987.)

7. Brader, L., "Integrated Pest Control in the Developing World", Annual Review of Entomology, Vol. 24, 1979.

8. Qu Geping, "Biological Control of Pests in China," Mazingira, Vol. 7, No. 2, 1983.

9. CLISS-FAO-AID, Tripartite Evaluation of Regional IPM Project (625-0928). Consortium for International Crop Protection: March 19-April 24, 1986.

10. A.I.D./ROCAP, "Regional Integrated Pest Management for Central America and Panama, Final Report." Project #596-0110, December 1, 1986.

APPENDIX 7:

BIBLIOGRAPHY

Prepared by The Conservation Foundation

for the Report of the Committee on Health and Environment

Note for February 18, 1988 edition: Some of the references in this bibliography are incomplete. The Conservation Foundation will provide a complete bibliography in the forthcoming, published edition of this report.

BIBLIOGRAPHY

NEWS REPORTS

"A Caustic Soda Plant for Bangkok," Chemical Week, 1981.

"A Continuing World Need: Protecting Endangered Species," The Christian Science Monitor, 1987.

"A Fresh Flap Over Trade Barriers," Chemical Week, 1981.

"Alabama and E.P.A. to Examine Company's Waste Disposal Plan" New York Times, December 28, 1980.

"Aquaculture: Shrimp with Rice, a Thai Speciality" Asiaweek, March 22, 1987, p.53.

"Bacteria Help Cleanse Polluted Ground Water" Chemical Ecology Chemical Manufacturers Association, 1985.

"Biological Monitoring of Agricultural Workers Exposed to Pesticides: I. Cholinesterase Activity Determination" Journal of Occupational Medicine (1986) Vol. 28.

"Biotechnology down on the farm: The coming Cornucopia" Business Week, 1986.

"Burning of Toxics Faces Rising Protests Worldwide" Chemical Week, 1985.

"Characteristics and Trends of Ecuadorean Development" Editorial Gallocapitan, 1980.

"Clinical Confirmation of Organophosphate Poisoning in Serial Choliesterase Analyses" Arch Intern Med (1987) Vol. 147.

"Clinical Management of Field Worker Organophosphate Poisoning" The Western Journal of Medicine, 1985.

"Danger at Work: In Malaysian Factories, Workers' Safety Runs Second to Paring Costs", The Wall Street Journal, 1980.

"Dieldrin Chobe National Park, Botswana" African Wildlife Vol. 36, no 6.

"Disaster Changes World of Pesticides" Toronto Globe, 1984.

"DuPont Cancels Plant" New York Times, 1987.

"Economic Development and Occupational Health in Latin America: New directions for Public Health in Less Developed Countries," American Journal of Phblic Health, Vol. 75, no. 5.

"Environmental Assessment and Development Aid" OECD Journal, 1987.

"Environmental Biotechnology Creeps out of the Laboratory" Biotechnology 3, 1987.

"Environmental Destruction Hurts India's Development," Chemical Week, 1982.

"Europes Olefins: An Economic Shake-up," Chemical Week, 1982.

"Florescent Dye Tracers and UV Lamp," Products for Science, 1984.

"Food Applications of Biotechnolgy Attract Amgen," Biotechnology News, 1985.

"From Phlogiston to Ozone," Christian Science Monitor, February 20, 1987.

"Hazardous Waste Export and Control" Chemical Week, 1983.

"Health Problems of Pesticide Usage in the Third World" British Journal of Industrial Medicine, 1985.

"How bugs and Pests Rout the Chemists" The Economist, 1987.

"Human Ecology and Health," Newsletter of the Pan American Center for Human Ecology and Health "ECO" Metepec, Estado de Mexico-MEXICO. Vol. I, nos. 1,2, 1982; Vol. II, no. 3, 1983; Vol. III, nos. 2,3,4, 1984; Vol. IV, nos. 1,2,3, 1985; Vol V, nos. 3,4, 1986.

"India's Changing Landscape," The Economist, 1983.

"Insect Resistance to Pesticides is Growing Problem," Science, 1987.

"Insecticides," Chemical Economics Handbook, (SRI International: 1979).

"Insuring The Status Quo," International Policy Report, Center for International Policy, 1977.

"International Newsletter," Chemical Week, July 21, 1982.

"Mercury Poisoning in Nigaragua: A Case Study of the Export of Environmental and Occupational Health Hazards by a Multinational Corporation," International Journal of Health Services, (1981) Vol. 11, no. 2.

"Mexican Petrochemicals: The Big Buildup," Chemical Week, 1981.

"One Third World Farmer Every Minute Poisoned by Pesticides, WHO Reports". Toronto Globe, 1985.

"Organic Farming to be Studied by Academy" Chemical and Engineering News, October 29, 1984.

"Pesticide Industry Overview," Chemical Economics Handbook, (SRI International: 1980).

"Pesticide Subsidies May be Hurting Third World More Than Helping." Chemical Engineering, January 20, 1986, pp. 11-12.

"Pesticides Don't Know when to Stop Killing," Multinational Monitor, (1985) Vol. 6, no. 13.

"Pesticides and the Consumer," EPA Journal (1987) Vol. 13, no. 4.

"Pollution Control Spending Drops Again," Chemical Week, 1983.

"Pollution Controls do not Push Petrochemical Firms Out of U.S., Study Concludes" Hazardous Waste Report, (Rockville, MD, October 29, 1984).

"Red Salud y Trabajo: Un Proyecto en Desarrollo," Salud y Trabajo, 1987.

"Research is Heating up on Coal-water Fuels," Chemical Week, July 21, 1982.

"'Safe' Pesticides Polluting Environment." The Christian Science Monitor, 1987.

"Slowdown in China," Chemical Week, 1981.

"Special Problems of Occupational Health in the Developing Countries," Occupational Health Practice (London, Butterworths: 1981).

"Synopses: Toxics," Ambio, (1982) Vol. 11, pp. 46-69.

"The Big Spenders for Pollution Control," Chemical Week, 1982.

"The Boomerang Booklet," Organic Gardening, 1980.

"The Chemicals Industry and the Environment," Industry and Environment (1979) Vol. 2, no. 4.

"The International Man," Ambio, 1984.

"The National Development Plan of Equador, 1980-1984," Editorial Gallocapitan, 1980.

"The Pesticide Health and Safety Program," Summary 1987.

"The Scope of Occupational Health in Developing Countries," American Journal of Public Health, (1985) Vol. 75, no. 5.

"The Second Green Revolution," New York Times Magazine, 1981.

"The Slave Children of Thailand," Economic Developments, 1981.

"Third World Grows Addicted to Pesticides," The Christian Science Monitor, 1987.

"Toxic Chemicals: How More than 50 Nations on Five Continents Handle their Most Deadly Pollutants," World Environment Report (1979) Vol. 5, no. 14.

"Treatment of Hazadous Wastes," Science (1986) Vol. 237, no 76.

"U.S., Mexico Sign Hazardous Waste Accord" Chemicals and Engineering News, November 17, 1986.

BOOKS, JOURNAL ARTICLES, AND GOVERNMENT DOCUMENTS

21st Annual McGraw-Hill Survey of Overseas Operations of U.S. Industrial Companies, 1979-81 (McGraw-Hill: 1979).

22nd Annual McGraw-Hill Survey of Overseas Operations of U.S. Industrial Companies, 1980-82 (McGraw-Hill: 1980).

A.I.D. "Development Through Innovation Research: The First Three Years of the A.I.D. Program in Science and Technology Cooperation.

A.I.D. "Environmental Assessment and Analysis of Pesticide Use in Agricultural Research Project," 1986.

A.I.D. "Report on Pesticides," 1975.

A.I.D. "Africa Emergency Locust/Grasshopper Assistance", (6980517)PD-AAU-750, Africa Regional Project Paper. (Washington, D.C.: 1987).

A.I.D. "Agrarian Reform Credit", (5190263) PD-AAF-945, El Salvador Project Paper.

A.I.D. "Agricultural Inputs Development", (3860367) PD-AAD-113.04 Par-A1; .05 Pars-B1, C1; .00 Final Report-D1 India.

A.I.D. "Agricultural Inputs Development", (3860367) PD-AAD-111.00 Prop-B1; .05 Prop-E1; .00 Par-G1 India.

A.I.D. "Agricultural Inputs Development", (3860367) PD-AAD-114.03 Final Report-A1; .04 Final Report-D1; .05 Evaluation Report-F1 India.

A.I.D. "Agricultural Research, Extension and Education", (5270192) PD-AAF-997, Peru Project Paper.

A.I.D. "Audit of the Sahel Regional Integrated Pest Management Project", (6250928) PD-AAT-335 Sahel Regional Audit Report. (Washington, D.C.: 1986).

A.I.D. "Commercialization of Alternative Crops: Amendment No. 1", (5050008) PD-AAS-083 Belize Project Paper (PP). (Washington, D.C.: 1985).

A.I.D. Commodity Eilgibility Listing, 1986 Edition (Washington, DC: 1986).

A.I.D. "Environment and Natural Resources Guidance." (Washington, D.C.: May 1987).

A.I.D. "Evaluation of ASEAN Agricultural Development Planning Centre", (4980258)PD-AAS-122, Asia Regional Special Evaluation Report. (Washington, D.C.: 1985).

A.I.D. "FY 88 Congressional Presentation Database: Summary of Obligations in Functional Subcategories." (Washington, D.C.: 1987).

A.I.D. "Final Technical Report: Pest Management and Related Environmental Analyses", (9310930) PD-AAU-118 AID/DSAN-C-0252, Final Report. (Washington, D.C.: 1986).

A.I.D. "Goat Production Improvement Program", (5210181) D-AAU-235, Project Evaluation Summary (PES)/Evaluation Summary (ES) Haiti. (Washington, D.C.: 1986).

A.I.D. "Integrated Pest Management", (5960110) PD-AAP-478, Reg. Office Central America and Panama-ROCAP Project Paper (PP). (Washington, D.C.: 1984).

A.I.D. "Integrated Pest Management (IPM)", (6250928) PD-AAJ-707, Central and West Africa Regional, Project Evaluation Summary, (Washington, D.C.: 1982).

A.I.D. "Irrigation and A.I.D.'s Experience: A Consideration Based on Evaluations", PN-AAL-019. Program Evaluation Report no.8. (Washington, D.C.: August 1983).

A.I.D. "Need to Reassess AID's Strategy for Food Crop Protection in West Africa", (6250928) PD-AAQ-058. Central and West Africa Regional Audit Report. (Washington, D.C.: 1984).

A.I.D. "Pesticide Management Related Environmental Project GTS", (9310930) PD-AAC-980 Technical Assistance Prop-B1, D1; Project Paper-F1; PAR-G1.

A.I.D. "Pesticide Use in the St. Lucia Agriculture Structure Adjustment Project: Analysis of the Risks and Benefits and Mangement Procedures".

A.I.D. "Project Evaluation: Regional Integrated Pest Management", (0960110)PD-AAV-510 Central Regional Office/Central American and Panama-ROCAP, Special Evaluation, PDC-0085-I-00-6097-0. (Washington, D.C.: 1986).

A.I.D. "Regional Coffee Pest Control", (5960090) PD-AAG-747 ROCAP (PP-B1).

A.I.D. "Report of the Evaluation Committee for the ASEAN Plant Quarantine Centre", (4980258) PN-AAW-346 Special Evaluation, (Washington, D.C.: 1985).

A.I.D. "Sahel Regional Report, Evaluation Integrated Pest Management", (6250928) PDBBE063 1986-04-24. (Washington, D.C.).

A.I.D. "Sudan: The Rahad Irrigation Project", PN-AAJ-610 Project Impact Evaluation Report no. 31. (Washington, D.C.: March 1982).

A.I.D. "Vector Biology and Control", (9365948) PD-AAQ-794 Project Paper (PP). (Washington, D.C.: 1985).

A.I.D. "Vector Biology and Control Project pamphlet." Vector Biology and Control Project, Medical Service Consultants.

A.I.D. "Afghanistan: Agricultural Credit", (3060165) PD-AAD-018 Project Paper-B1 Afghanistan.

A.I.D. /REDSO/ESA, Pesticide Management in East and Southern Africa, 1987.

A.I.D. "Asian Plant Quarantine Project", (4980258) PD-AAF-754 Project Paper Asia Regional.

A.I.D. "Blueprint for Development. The Strategic Plan of the Agency for International Development," (Washington, D.C.: 1985).

A.I.D. "CILSS IPM Research, Special Evaluation Report-B1", (6250928) PD-AAG-078 CWA Regional Project Paper-E1.

Abelson, A. "Plant-Fungal Symbiosis" Science, (August 16, 1985) Vol. 229, no. 4714.

Abelson, A. "Chemistry and World Food Supply," Science, no. 4570.

Abelson, A. "Improvement of Grain Crops," Science, (April 16, 1982) Vol. 216, no. 4543.

Aeppel, Timothy. "Rain Forest Misuse Prompts Ultimatum", The Christian Science Monitor, August 14, 1987.

Aeppel, Timothy. "Third World Grows Addicted to Pesticides," Christian Science Monitor, 1987.

Agricultural Chemicals Association. "Guidelines for Advertising Practices in the Promotion of Pesticide Products in Developing Areas of the World," 1981.

Agricultural Chemicals Dialogue Group. "Guidelines for Labeling Practices for Pesticide Products in Developing Areas of the World," 1985.

Agricultural Chemicals Dialogue Group. Description, 1983.

Agricultural Occupational Health as Part of Primary Health Care, World Health Organization, 1979.

"Agriculture: Against the Grain in Indonesia", Asiaweek, March 22, 1987, p. 55.

Alan R. Liss, Inc. "Clinical Confirmation of Organophosphate Poisoning in Serial Choliesterase Analyses," 1986.

American Technology Management Consultants. "Application of Biotechnology to Hazardous Waste Disposal," 1982.

"An Environmental Management Policy for the Inter-American Development Bank," 1979.

Anderson, E. "U.S. Chemical Trade Hurt by Developing Country Debt," Chemical and Engineering News, April 13, 1987.

Arata, Andrew. "El Uso de Plaguidicas en la Agricultura y la Salud Publica: El Punto de Vista de la Ecologia Humana," ECO/PAHO, 1983.

Arata, A. "Perspectivas del Uso de Plaguicidas: Historia, Situacion Actual y Necesidades Futuras", ECO/PAHO, pp. 29-36.

Ashford, Nicholas A. "Policy Issues in Technology Transfer", in The Export of Hazard. (Routledge & Kegan Paul: 1985), pp. 128-142.

Asian Development Bank Manual on the Use of Pesticides Under Bank-Financed Projects.

Asogwa, S.E. "A Survey of Working Conditions in Small-Scale Industries in Nigeria," Journal of Occupational Medicine, 1981.

Associated Scientific Publishers. "Health and Industrial Growth", Cibva Foundation Symposium 32, 1975.

"Background Information on the Consultative Group on International Agricultural Research (CGIAR) and The International Agricultural Research Centers (IARCs)." Consultative Group on International Agricultural Research, Annual Report, 1985.

Baden, J. "Oil and Ecology Do Mix", The Wall Street Journal, February 24, 1987.

Baker, E.L. "Malathion Intoxication in Spray Workers in the Pakistan Malaria Control Program," Report to A.I.D., U.S. Department of Health, Education and Welfare, Public Health Service, Center for Disease Control, Atlanta, GA. November 19, 1976.

Baloch, Umar Khan Problems Associated with the Use of Chemicals by Agricultural Workers, 1982.

Barfield, C.S. "Environmental Assessment and Analysis of Pesticide Use in Agricultural Research Projects". (A.I.D. Project no. 532-0128). U.S.A.I.D/Jamaica, October 1986.

Barrow, C., Abstract of D. Bull's book, A Growing Problem: Pesticides and the Third World Poor, Community Development Journal Vol 19, no. 3 (Oxfam, 1982), pp 195-196.

Barry Castleman. Notes for article: "Who is Bayer in Brazil?" 1984.

Barton, John H. "The Effects of the new Biotechnologies on the International Agricultural Research System," 1984.

Batra, Suzanne. "Biological Control in Agroecosystems," Science, (1982) Vol. 215.

Batstone, Roger J. "Chemical Safety Communication and Management: Community Right to Know and Emergency Preparedness." Paper, 1985.

Benbrook, C. and Moses, P. "Engineering Crops to Resist Herbicides," Technology Review (November/December 1986), pp. 55-79.

Binder, Gordon. Private Accord Reached on Labeling Guidelines for Agriculural Chemicals in Third World, The Conservation Foundation, 1985.

Blaine, R. Letter from R. Blaine (Institute for Consumer Policy Research) to Dr. T. Lovejoy (WWF). Institute for Consumer Policy Research, March 23, 1987

Blaine, R. Letter from R. Blaine (Institute for Consumer Policy Research) to Dr. Thomas Loveyjoy (WWF). Institute for Consumer Policy Research, March 23, 1987.

Bloom, Jane L. Comments on Natural Resources Defense Council, Inc on EPA's Proposal Regarding Export Notification for Shipments of Hazardous Waste. Natural Resources Defense Council, 1986.

Boardman, Robert. Pesticides in World Agriculture. (St. Martin's Press: 1986).

Bottrell, Dale. Low Resource Agriculture in Africa. OTA Technology Paper Series: Pest Control. Washington, D.C.: OTA, February 1987.

Bottrell, Dale. "Social Problems in Pest Management in the Tropics". Insect Science Applications (1986) Vol. 4, nos. 1,2, pp. 179-184.

Bottrell, Dale. "Government Influence on Pesticide Use in Developing Countries," Insect Science Applications (1984) Vol. 5, no. 3, pp. 151-155.

Bottrell, Dale. "Integrated Pest Management". Council on Environmental Quality, 1979.

Bouguerra, M.L. "Les Pescides et le Tiers Monde". La Recherche (1986) Vol. 17, no. 176, pp. 245-253.

Boyer, J.S. "Plant Productivity and Environment" Science (1982) Vol. 218.

Brader, L. "Integrated Pest Control in the Developing World," Plant Protection Series, Annual Review of Entomology 24: (1984) pp. 225-254.

Brady, Nyle. "Chemistry and World Food Supplies" Science, (1982) Vol 218.

Brattsten, L.B. "Insecticide Resistance: Challenge to Pest management and Basic Research" Science (1986) Vol. 231.

Brockington, Langdon "Safety Push Overseas," Chemical Week September 11, 1985.

Bull, David. A Growing Problem: Pesticides and the Third World Poor. (Oxford: 1982).

Bunchuck, James. "Hazardous Substances Export Policy," 1983.

Burton, D.K. and B.J.R. Philogene. "An Overview of Pesticide Use in Latin America." Ottawa: Department of Biology, University of Ottawa, 1985.

CAREC Surveillance Report, Caribbean Epidemiology Centre, (1986) Vol. 12.

CEQ. International Transport of Pesticides and Hazardous Wastes in Environmental Quality, (1985) Chapter 7, pp. 227-235.

California University at Berkeley. "International Survey on Pesticide Use," 1979.

Calvert, Donald J. "Health-Related Aspects of Integrated Pest Management" Environmental Health Perspectives (1976) Vol. 14.

Cardich, A. "Native Agriculture in the Highlands of the Peruvian Andes," National Geographic Research (1987) Vol. 3, no. 1, pp. 22-39.

Castleman, Barry. "Effective Control of Occupational Diseases", International Labour Office, 1981.

Castleman, Barry. Response to Levenstein-Eller critique, The Export of Hazard. (Routledge & Kegan Paul: 1985), p.90.

Castleman, Barry. "The Double Standard in Industrial Hazards", The Export of Hazard (Routledge & Kegan Paul: 1985), pp.60-90.

Cavin, G.E. "The Sahel of West Africa--the Grasshopper and Locust Problem-1987: An Evaluation of the Problem and Its Needs for Control," Consortium for International Crop Protection, April, 1987.

Center for Development Information and Evaluation Bureau for Program and Policy Coordination. CDID Evaluation Publications List. A.I.D./CDIE, May 1987.

Center for the Biology of Natural Systems/FAO Positions. Letter to Ray Smith and two attachments on FAO's positions on pesticides. CBNS/FAO, August 19, 1970.

Centre for Overseas Pest Research. "Implications of Pesticide Use for Tropical Freshwater and Terrestrial Ecosystems," Papers presented at an informal workshop meeting held at the Centre for Overseas Pest Research. (London, February 3-5, 1975).

Chapin, G. and R. Wasserstrom. "Bitter Harvest: Pesticide Pushers are Sowing the Seeds of Disease in the Third World," The Progressive, March 1980.

Chapin, Georganne, and Robert Wasserstrom. "Agricultural Production and Malaria Resurgence in Central America and India," Nature, (1981) Vol. 293.

Checchi and Company Consulting, Inc. "Project Evaluation: Regional Integrated Pest Management for Central America and Panama, Final Report", AID/ROCAP Project No. 596-0110. Submitted to U.S.A.I.D./ROCAP, San Jose, Costa Rica, December 1, 1986.

910

"Chemistry and Industry Pesticides and the Third World," Papers presented at a meeting organized by Oxfam, the British Agrochemicals Association, and the Society of Chemical Industry, (London, May 30-31, 1985), pp. 609-625.

Chen, A. "Unraveling Another Mayan Mystery," Discover, (June 1987), pp. 40-46.

Cheney, Donald P. Biotechnology in the Marine Sciences. (Wiley Press).

Chetley, A. "Not Good Enough for Us But Fit for Them -- An Examination of the Chemical and Pharmaceutical Export Trades," Journal of Consumer Policy 9 (1986), pp. 155-180.

Code of Federal Regulations. "Executive Order 12114, Environmental Effects Abroad of Major Federal Actions", 1980.

Collectron-Arizona, Inc. "Mexico, Building New Concepts in Profitable Production."

Collier, C. and D. Calvert. "Environmental Assessment for Proposed Pesticide Use in Bolivia Disaster Recovery Project," Consortium for International Crop Protection. U.S.A.I.D. Loan no. 511-0581, December 1983.

Committee of International Development Institutions on the Environment, "Pesticides and Their Use," 1984.

Congressional Record, May 1987.

Consortium for International Crop Protection. Integrated Pest Management and Environmental Protection Project, Annual Report, A.I.D. Contract DAN-4142-C-00-5122-00, Project No. 936-4142, October 1, 1985-September 30, 1986.

Consortium for International Crop Protection. "Pest Management and Related Environmental Protection Project", Final Technical Report A.I.D. Contract DSAN-C-0252, Project no. 931-0930, September 1, 1980-April 30, 1986.

Consortium for International Crop Protection. "Reducing Costs and Increasing Efficiency of National Crop Protection Programs in Grenada." Final Report. PIO/T No. 543-0005-3-40157, Grenada Agricultural Sector Revitalization. February 1987.

Consortium for International Crop Protection. "Tripartite Evaluation of Sahel Regional IPM Project", No. 625-0928, CLISS-FAO-AID, March 19-April 24, 1986.

Consortium for International Crop Protection. Annual Report to Agency for International Development, 1983.

Consortium for International Crop Protection. Annual Report to Agency for International Development, 1981.

Consortium for International Crop Protection,. Annual Report to Agency for International Development, 1984.

Consultation of Experts on Impact Monitoring of Residues from the use of Agricultural Pesticides in Developing Countries. 1975.

Controlling Hazardous Waste EPA Journal (1984), Vol 10, no 8.

Cooke, Stephanie. "Invasion from Ireland: Grease-eating Microbes," Chemical Week, 1986.

"Corporate Standards Applied Internationally". SAM and APPEN Conference on Global Development and Environment Crisis, 1987.

Cowley, W.E. "Chemical Development in the Developing Countries." Papers presented at a symposium organized by the Liverpool section of the SCI in Liverpool. Chemistry and Industry (1976) no. 7, pp. 284-285.

Coye, Molly. "The Health Effects of Agricultural Production: The Health of the Community". Journal of Public Health Policy, 1986.

Coye, Molly. "The Health Effects of Agricultural Production: The Health of Agricultural Workers." Journal of Public Health Policy, 1985.

Craig, I.A. Letter to Dr. Charles Alton, re Pesticide Safety NERAD/NEROAC, Khon Kaen, August 1, 1983.

Craig, I.A. Pesticide Safety, Conservation Foundation, 1983.

Crawford, Mark. "STP Ponders Plant Research Initiatives," Science, (1986) Vol. 231.

Croft, Brian. Getting Tough; Public policy and the Management of Pesticide Resistance, Study 1, (World Resources Institute: 1984).

Crop Protection in Brazil, Uruguay, Bolivia, Ecuador and Donimican Republic, 1972.

Dempsey, Kathleen. Bugs to Eat Toxic Waste Plants, Sites and Parks, 1983.

Directory of International Marketers. Farm Chemical, September 1975, pp. 54, 127.

Dunbar, Bosalie E. "Products Banned in U.S. Often Resurface Abroad," Christian Science Monitor, March 7, 1986.

216

Dwyer, Paula. "CPI Boosts Project Aftermath," Chemical Week, April 24, 1985.

EPPO Bulletin. "Progress Achieved in the Implementation of Integrated Control Projects in the USA and Tropical Countries," 1974.

East African Scientific and Technical Literature Service. "Plant Protection Problems in Southeast Asia," 1971.

Eckholm, E. and S.J. Scherr. "Double Standards and the Pesticide Trade," New Scientist, (February 16, 1978), pp. 441-443.

Eichers, T. and P.A. Andrilenas. "Evaluation of Pesticide Supplies and Demand for 1976," U.S. Department of Agriculture, Agricultural Economic Report no. 332.

Eichers, T. "Evaluation of Pesticide Supplies and Demand for 1979," U.S. Department of Agriculture, Economics, Statistics, and Cooperatives Service, Agricultural Economic Report no. 422, 1979.

Environmental Impact Statement, (1977) Vol. 2.

Environmental Impact Statement on the A.I.D. Pest Management Program, (1977) Vol. 2.

Environmental Law Reporter (1976) Vol. 6, no. 20121.

Environmental Protection Agency: Office of Water and Hazardous Materials, Office of Pesticide Programs, "Production, Distribution, Use and Environmental Impact Potential of Selected Pesticides," 1974.

Eschwege, H. "Federal Efforts to Regulate Pesticide Residues in Food." Statement before the Subcommittee on Oversight and Investigations, 1978.

Eschwege, H. "Federal Efforts to Notify Foreign Nations Regarding Pesticide Suspensions and Cancellations." Statement before Commerce, Consumer, and Monetary Affairs Subcommittee, 1978.

Eschwege, H. "Federal Efforts to Notify Foreign Nations Regarding Pesticide Suspensions and Cancellations," 1978.

Eschwege, H. Letter to The Honorable Douglas M. Costle re Need for Comprehensive Pesticide Use Data, 1980.

Eschwege, H. Letter to The Honorable Douglas M. Costle re Review of Federal Programs for Regulating Pesticide Imports and Exports, 1978.

FAO. Guidelines on Environmental Criteria for the Registration of Pesticides, 1985.

FAO. Guidelines on Good Labelling Practice for Pesticides, 1985.

FAO. "Guidelines for the Packaging and Storage of Pesticides," 1985.

FAO. Guidelines for the Registration and Control of Pesticides, 1985.

FAO. "International Code of Conduct on the Distribution and Use of Pesticides", Appendix C., (Rome: 1986).

FAO. "Pesticide Legislation and Regulations". Pesticide Legislation and Regulation for 5 Central American Countries. With cover letter to Ray Smith. (Rome: July 24, 1978).

FAO. Production Yearbook 1985, Vol. 39. (Rome: 1986).

FAO. "International Code of Conduct on the Distribution and use of Pesticides." (Rome: 1986).

FAO/UNEP. Report on an FAO/UNEP Consultation of Experts on Impact Monitoring of Residues from the Use of Agricultural Pesticides in Developing Countries. (Rome: September 29-October 3, 1975).

FAO/UNEP Panel. "Integrated Pest Control." An Introductory Statement from the FAO/UNEP Panel of Experts on Integrated Pest Control.

FAO/WHO. Guidelines for Legislation Concerning the Registration for Sale and Marketing of Pesticides. (Rome: 1969).

Farm Chemicals Handbook '87. (Meister Publishing Co.: 1987).

Farmers Asistance Board, Inc. Profits from Poison, 1982.

Federal Procurement Data Center. Product and Service Codes, Prepared for Office of Federal Procurement Policy and Office of Management and Budget, October 1982.

Feeney, A. "Breaking the Circle of Poison," Environmental Action, (April 1984), pp. 16-20.

Ferguson, W.S. "RCRA -- The Newest Challenge Federal Regulation of New Industrial Plants," pp. 20-22.

Ferrey, Steven. "As the Superfund Program Proceeds, Wastes from Contaminated Sites Threaten to Create a New Generation of Superfund Sites," The Amicus Journal, 1987.

Francis, Charles A. Multiple Cropping Systems, (Macmillan Publishing Company: 1986).

Fredrickson, C.J. et al. "Project: Joint FAO/Donor Review of the 1986 Grasshopper Campaign in the Sahel, Team Report for the Gambia." (Consortium for International Crop Protection: November 29, 1986).

Frost and Sullivan, Inc. Pesticides in South America and Mexico, 1981.

Frost and Sullivan, Inc. The Pesticides Markets in the United States, Mexico and South America, Announcement of Availability of Report, 1978.

"Fumigants and Nematicides," Chemical Economics Handbook, (SRI International: 1980).

Furguson, W. Scott. RCRA-The Newest Challenge Federal Regulations of Industrial Plants.

GAO Report to Congresional Requesters. "Nonagricultural Pesticides: Risks and Regulation". United States General Accounting Office. (Washington, D.C. April 1986).

GAO. "Pesticides; Need to Enhance FDA's Ability to Protect the Public From Illegal Residues", October, 1986

GAO. "Pesticides; FDA's Investigation of Imported Apple Juice Concentrate", August, 1986.

GAO. "Pesticides; Need to Enhance FDA's Abiliy to Protect the Public from Illegal Residues", October, 1986.

George, S. How the Other Half Dies. (Montclair, NJ: Allenfield Osmun: 1981), pp. 275-279.

Georghiou, George P. "The Surveillance of Pest Resistance to Insecticides in Agriculture," Paper presented at the International Workshop on "Resistance to Insecticides Used in Public Health and Agriculture", (Colombo, Sri Lanka, 22-26 February 1982).

Georghiou, George P. "Principal Mechanisms of Resistance to Insecticides," Paper presented at the International Workshop on "Resistance to Insecticides Used in Public Health and Agriculture", (Colombo, Sri Lanka: 22-26 February 1982).

Georghiou, George P. "The Magnitude of the Resistance Problem" Pesticide Resistance: Strategies and Tactics for Management. (National Academy Press: 1986).

215

Goldenman, Greta and Sarojini Rengam. Problem Pesticides, Pesticide Problems: A Citizens' Action Guide to the International Code of Consduct on the Distribution and Use of Pesticides. (International Organization of Consumer Unions: 1987).

Golsmith, John. Occupational Health in Chinese Metallurgical Industries: Report based on a visit. American Journal of Industrial Medicine, (Alan Liss, Inc.: 1985).

Gooding, E.G.B. Pest and Pesticide Management in the Caribbean Volume II, Invited Papers. Proceedings of Seminar and Workshop (CICP/USAID: November 3-7, 1980).

Gooding, E.G.B. Pest and Pesticide Management in the Caribbean, Volume III, Country Papers, Proceedings of Seminar and Workshop (CICP/USAID, November 7, 1980).

Goodman, L.W. and B Portilla. "Foreign Toxins: Multinational Corporations and Pesticides in Mexican Agriculture," Conference Draft prepared for WRI Conference on the Role of MNC's in Environment in Developing Countries, June 14, 1984.

Guidelines for The Disposal of Waste Pesticide and Pesticide Containers on the Farm, 1985.

Halliday, D. and L. Donegan. "Quality Control and Analysis of Pesticides in Developing Countries," Paper prepared by Tropical Development and Research Institute.

Hammerton, J. Pest and Pesticide Management in the Caribbean Volume I, Summary Papers. Proceedings of Seminar and Workshop (CICP/USAID: November 3-7, 1980).

Hansen, M. Escape from the Pesticide Treadmill: Alternatives to Pesticides in Developing Countries. (New York: Institute for Consumer Policy Research, Consumer's Union of the United States: 1986).

Hansen, Raymond. Biotechnology and scale-up: Let's establish our Priorities, (International Scientific Comunications: 1986).

Harvard School of Public Health. "Development of U.S. Policy Regarding the Export of Hazardous Substances," 1981.

Hazards to the Environment, (Hunting Technical Services Limited England: 1986).

Health and Safety Booklet UK. "A Guide to the Control of Industrial Major Accident Hazard Regulations," 1984.

Hearings on the Federal Insecticide, Fungicide, and Radenticide Act before the Committee on Agriculture, 1987.

Heftel, Cecily. Testimony before Subcommittee on Department Operations, Research,and Foreign Operations, 1985.

Henderson, J. "Report on Grasshopper in Senegal and the Mauritania", Consortium for International Crop Protection, March 7-April 9, 1987.

Henderson, Nell. "Applying Biotechnology to Clean up Pollution," Washington Post, 1986.

Herald,, R.J. AID/OFDA Team to Assist USAID Mission, Governments of Mail, Mauritania, Senegal and the Gambia and Donor Organizations to Elaborate Operational Plans for the 1987 Grasshopper Control Program, March 1987.

Higgins, M.L. "Environmental Assessment Draft for Haiti", A.I.D., September 10, 1986.

Hill, K.R., M.E. Getz, R. Sarmiento. "Pesticide Analysis in Developing Countries," Paper.

Hoppin, P. "Hazardous Exports: Policy Options and Obligations." Unpublished, 1985.

Hoppin, P. "The Occupational Health of Farmworkers: A Quest for Data," 1986.

Houck, J.P. "Foreign Agricultural Assistance: It's Mostly a Good Thing for U.S. Farmers," Choices, 1987.

Huddleston, E.W. "Entomology and Pesticide Planning for 1987: Senegal Grasshopper Control Program," Consortium for International Crop Protection, March 4-April 6, 1987.

Hughes, Edward. "Pink Death in Iraq," The Reader's Digest, (November 1973, condensed from The Sunday Times, London: 9 September 1973), pp.130-134.

Huq, S. "Production, Distribution and Pricing of Pesticides: A Survey of Five Asian Countries," (World Resources Institute: November 1984).

Hurtado, M.E. "Mother Nature's Asset-Strippers," South, (November, 1986), p. 143.

Husain, S.S. "Guidelines for the Selection and Use of Pesticides in Bank Financed Projects and their Procurement when Financed by the Bank," Appendix B. World Bank/FAO OPN 11.01, March 1985.

ICAITI. "Comparison Between Pest Control Costs and Other Costs and Profits Between Integrated Control Plots and Traditional Control Plots in Guatemala (Tiquisate Zone) in 1974-1975", An Environmental and Economic Study of the Consequences of

37

Pesticide Use in Central American Cotton Production (Final Report; Guatemala: (Central Research Institute for Industry), 1977).

ICAITI. "An Environmental and Economic Study of the Consequences of Pesticide Use in Central American cotton Production," 1976.

"IPM Seen As Only Solution to Pesticide Resistance," Pesticide & Toxic Chemical News (February 25, 1987), pp. 39-40.

"India's Changing Landscape", The Economist, Science and Technology Brief, (March 5, 1983), pp. 94-95.

Industrial Health, "A study of Cognitive Functions in DDT Sprayers," 1984.

"Interagency Working Group on a Hazardous Substances Export Policy," Federal Register, 1980.

International Labour Office, "The Role of Standards in the Safe Transfer of Technology to Developing Countries," 1981.

International Labour Office, "The Effects of Technology Transfer on Working Conditions," 1981.

International Labour Office, "The Application of International Labour Standards and Guidelines on Occupational Safety and Health and the Transfer of Technology," 1981.

International Labour Office, "Certain Ergonomic Principles in the Design of Factories in Hot Climates," 1981.

International Labour Office: "Some Aspects of Occupational Disease Control in Relation to the Transfer of Technology," 1981

International Rice Research Institute, FAO/IRRI/Intercountry Programme for Integrated Pest Control in Rice in South and Southeast Asia, 1984.

Irwin, Francis, et al. Public Policy for Chemicals, The Conservation Foundation, 1980.

Ives, J. H. "The Health Effects of the Transfer of Technology to Developing World: Report and Case Studies." (Routledge & Kegan Paul: 1985), pp. 172-193.

Ives, J.H. "Hazard export in the developing Irish Republic" The Export of Hazard, (Routledge & Kegan Paul: 1985), pp. 115-128.

Jasanoff, Sheila. "Remedies Against Hazardous Exports: Compensation, Products Liability and Criminal Sanctions," The Export of Hazard (Routledge & Kegan Paul: 1985), pp. 142-161.

218

Jasanoff, Sheila. "Pollution and Public Health Under Indian Law," Presented at APHA Annual Meeting, 1985.

Jensen, Janice. "The Pesticide Situation in Thailand," Final Report for A.I.D., November 1986.

Jensen, Janice. "Pesticide Donations: The Need for Better International Collaboration," Paper presented at the International Conference on Tropical Agriculture,, Kuala Lampur, Malaysia, 1987.

Jensen, Janice. "USAID/ANE Pesticide Disposal Mission," CICP trip report, 1987.

Jeyaratnam, Jeyarajah. "1984 and Occupational Health in Developing Countries," Environmental Health, 1985.

Jones, Maldwyn. "Accidents, Hazards of Existing Chemicals Dominate High-Level Meeting," 1987.

Katanyukul, W. et al. "NERAD Working Group for Pest Management in Cropping Systems. Report on a study tour of NERAD Tambons, (April 22-27, 1984).

Khalfan, Zulf M. Danger: Development at Work.

King, Susan. "Hazardous Exports: A Consumer Perspective." The Export of Hazard, (Routledge & Kegan Paul: 1985), pp. 1-18.

Kleindorfer, Paul. "Insuring and Managing Hazardous Risks: From Seveso to Bhopal and Beyond," (Springer-Verlag: 1986).

Kreiger, James. "Plant Biotechnology Experts Assess Hopes for Long and Short Term," Science, 1984.

Laidlaw, Ken. "Japanese Industry Threatens Fish," Development Press Services, UK, 1980.

Lappe, F.M. and J. Collins. "Food First: Beyond the Myth of Scarcity," (Ballantine: 1977), pp. 58-76.

Lautenberg F. Lautenberg Amendment, in P.L. 99-591 H.J. Res. 738, Congress of the U.S., October 30, 1986.

Layman, Paticia. "Rhine Spills Force Rethinking of Potential for Chemical Pollution," Chemicals and Environmental News, 1987.

Lee, B.K. "Occupational lead exposure of storage battery workers in Korea," British Journal of Industrial Medicine, 1982.

Lehner, Urban. "GM Explores Use of Bacteria to Cut Paint-Shop Pollution,"Wall Street Journal, 1984.

Leonard, H. Jeffrey. "Pollution Control and the Private Sector: The Relevance of the U.S. Experience for Mexico," Speech given at ECOTECH '87, 1987.

Leonard, H. Jeffrey. "Confronting Industrial Pollution in Rapidly Industrializig Countries: Myths, Pitfalls and Trade," Ecology Law Quarterly, 1985.

Leonard, H. Jeffrey. Prepared Statement before Subcommittee on International Economic Policy and Trade, 1985.

Leonard, H. Jeffrey. Natural Resources and Economic Development in Central America, (International Institute for Environment and Development: 1987).

Leonard, H. Jeffrey. "Degraded Lands Need Restoration," CF Letter. The Conservation Foundation, March-April 1984.

Leonard, H. Jeffrey. "Hazardous Wastes: The Crisis Spreads," (National Development: 1986).

Leonard, H. Jeffrey. "The Emergence of Environmental Concern in Developing Countries: A Political Perspective," with David Morrell, Stanford Journal of International Law, (1981). Vol. 17, no.2.

Leonard, H. Jeffrey. "The Environment and International Development: Policy Issues For 1986 and Beyond," 1986.

Leonard, H. Jeffrey. "Pollution, Industrial Develpment and Comparative Advantage," (University Microfilms International: 1986).

Lepkowsi, Wil. "World Bank Plan to Prevent Chemical Disasters," Technology Review, 1986.

Lepkowski, V. "Chemical Safety in Developing Countries: The Lessons of Bhopal," Chemical and Engineering News, (April 8, 1985), pp. 9-14.

Levenstein, Charles and Stanley W. Eller. "Exporting Hazardous Industries: "For example" Is Not Proof." The Export of Hazard (Routledge & Kegan Paul: 1985), pp. 51-60.

Levine, R.S. "Assessment of Mortality and Morbidity Due to Unintentional Pesticide Poisoning." (World Health Organization: 1985).

Lewin, Tarar "U.S. Judge Bars Suits on Bhopal," New York Times, May 13, 1986.

Library of Congress, Congressional Research Service. "Air Pollution Control and Waste Dumping Standards in Colombia, South America," 1980.

Lindsey, Bob "Alarm raised on Growth of Phoenix," The New York Times, March 12, 1987.

Little, C. "Agriculture III," American Land Forum, January/February 1987, pp. 44-48.

Loevinsohn, M.E. "Insecticide Use and Increased Mortality in Rural Central Luzon, Philippines," The Lancet, June 13, 1987.

Lyons, Paul. "Brazil Beefs up Petrochemicals," Chemical Week, 1986.

Maltby, Christopher. Report on the Use of Pesticides in Latin America, (UNIDO: 1980).

Man and the Biosphere Programme: "Risk Assessment of Agrochemicals in Island Ecosystems: The Development of National and Regional Policy Guidelines in the Eastern Caribbean". Draft Project Outline, May 1985.

Marcus, Steven. "Toxic Waste Weapon: Bugs," The New York Times.

Marx, Jean. "Plants Resistance to Herbicide Pinpointed," Science, (1983) Vol 220.

McCormick, J. "Diet for a Poisoned Planet," Greenpeace (1987) Vol 12, no. 3, pp. 17-20.

McDonnell, Patrick. "Mexico Will Close Plant Getting U.S. Waste Ink," Los Angeles Times, February 14, 1986.

McWain, L. "Evaluation of Pesticide Formulation Facilities: Ivory Coast, Mali, Senegal, Kenya, Sudan". Consortium for International Crop Protection, April 1987.

McWain, L. "Evaluation of Pesticide Formulation Facilities", 1987

Meir, Barry. "Poison Produce: As Food Imports Rise, Consumers Face Peril From Use of Pesticides," The Wall Street Journal, March 26, 1987.

Meir, Barry. "Carbide reports a $210.9 Million 4th period Loss," The Wall Street Journal, 1986.

Mellor, J. and S. Gavian. "Famine: Causes, Prevention, and Relief," (January 30, 1987), pp. 539-545.

Metcalf, R. and A. Kelman. "Integrated Pest Management in China Environment," (May 1981) Vol. 23, no. 4, pp. 6-13.

Metcalf, R.L. "Changing Role of Insecticides in Crop Protection," Annual Review of Entomology 25 (1980) pp. 219-256.

Michaels, David, et. al. "Occupational Health and the Economic Development of Latin America," The Export of Hazard (Routledge & Kegan Paul: 1985), pp 94-115.

Ministerio de Agricultura y Ganaderia. Decreto No. 315: "Ley sobre control de pesticidas, fertilizantes y productos para uso agropecuario," Ministerio de Agricultura y Ganaderia, (Departamento de Informacion Agropecuaria San Salvador, El Salvador: Mayo de 1973).

Monitoring the Agricultural Inputs Programme (Hunting Technical Services Limited England: 1986).

Morehouse, Ward. What happened at Bhopal, New York Council on International and Public Affairs, 1986.

Moses, Phyllis. "Strange Bedfellows: Molecular Biologists Have Harnessed a Plant Pathogen to Genetically Engineer Crops," BioScience, Vol 37.

NCIH Publications, "Chemical Hazards in the Third World," 1987.

NERAD telex. Telex to US Embassy/Bangkok re Approval of Pesticides for Use in NERAD Project, April 18, 1983.

National Academy Press. Committee on Scientific and Regulatory Issues Underlying Pesticide Use Patterns and Agricultural Innovation. "Regulating Pesticides in Food."

National Agricultural Chemicals Association. Summary of the 1986 Industry Profile Study, 1987.

National Audubon Society. 1986 Rangeland Grasshopper Cooperative Management Program. Comments on draft Environmental Impact Statement, March 3, 1986.

National Audubon Society. 1987 Rangeland Grasshopper Cooperative Management Program. Comments on Environmental Impact Statement Scoping Process, July 11, 1986.

National Council for International Health. "International Health News," (Washington, DC: February 1987), Vol. 8 no. 2.

National Research Council. "Committee Calls Agricultural Biotechnology Research Unfocused; Recommends Actions Toward a New National Strategy", 1987.

National Technical Information Service. "Assessment of Technologies for Determining Cancer Risks from the Environment," 1981.

Natural Resources Council. "NAS Report on Carcinogens in Food Estimates Hundreds of Thousands of Cancers from Pesticides".

Navarro, V. Letter to editor. The New England Journal of Medicine, 1984.

Navarro, V. "Special Report: Policies on Exportation of Hazardous Substances in Western Developed Countries," New England Journal of Medicine, (August 23, 1984), pp. 546-548.

Newsline (Natural Resources Defense Council: 1986), Vol 4, no 4.

"1987 U.S. Pesticides Market predicted to Reach 1,376 Million Pounds," Pesticide & Toxic Chemical News, (November 22, 1978), pp.17-18.

1981 Chemical R&D Spending Will Leap 17%, Chemical Week, 1981.

Norman, C. "Regulating Pesticides: The "Delaney Paradox," Science, May 29, 1987.

Norris, R. Pills, Pesticides, and Profits. (New York: North River Press, 1982).

Noweir, M. Safe Level Criteria For Air Contaminants for Developing Countries," (Alexandria University Press: 1975).

Noweir, M. Occupational Health in Developing Countries with Special Reference to Egypt, (Alan R. Liss, Inc.: 1986).

O'Brien, Helen. Resume; and descriptions of courses developed by OFDA. July 10, 1987.

O'Brien, Helen. "Preventing Pesticide Poisonings in Developing Countries," World Bank, Office of Environmental and Scientific Affairs, October 1984.

O'Connor, Raymond J. and Michael Shrubb. Farming and Birds, (Cambridge University Press: 1986).

OECD. Environmental Assessment and Development Assistance (Paris: 1986).

OECD. "International Investment and Multinational Enterprises: Recent Trends in International Direct Investment," 1987.

Office of Evaluation. "The Impact of Irrigation on Development: Issues for a Comprehensive Evaluation Study," A.I.D. Program Evaluation Discussion Paper no. 9, October 1980.

Office of Technology Assessment. List of Publications. Office of Technology Assessment, Congress of the United States, January 1987.

Office of the Special Representative for Trade Negotiations. "Labor Standards and Trade Distortions," 1978.

Oldenstadtm, Dennis. "Solutions to Environmental and Economic Problems", Science, (1982) Vol. 217.

Organization of American States. "Background on the Problem of Trade in Toxic Products Banned or Restricted in the Producing Countries," 1987.

Osman, Y. "A Model for the Development of Occupational Health Services Within the Framework of Public Health with Special Reference to Sudan".

Overholt, W. Pesticides User's Guide--For Extension Workers in West Africa, 1984.

Overseas Operations of U.S. Industrial Companies, 1974-76 (McGraw-Hill: 1974).

Overseas Operations of U.S. Industrial Companies, 1976-78 (McGraw-Hill: 1976).

Overseas Operations of U.S. Industrial Companies, 1977-79 (McGraw-Hill: 1977).

OPIC. 1985 Development Report, 1985.

OPIC. 1986 Development Report, 1986.

OPIC. 1984 Development and Audit Report, 1984.

PAHO. "Occupational Health in Latin America and the Caribbean: Consideration on some Problems, Alternatives, Trends and Challenges for its Promotion," 1981.

Pakistan Pesticide Report, 1987.

Palacio Nacional. "Acuerdo Gubernativo Numero M. de A.y M de S.P. y A.S. 27-76". Guatemala, August 9, 1976.

Palacio Nacional. "Reglamento Relativo a la Importacion, Elaboracion, Almacenamiento, Transporte, Venta y Uso de Pesticidas", April 19, 1979.

Palacio Nacional. Ministro de Agricultura, Guatemala, October 26, 1977.

Papworth, D.S. and K.D. Paharia. "Value of Pesticide Registration/Regulation to Developing Countries," FAO Plant

Protection Bulletin, 1978.

Pearson, Charles S. Down to Business: Multinational Corporations, the Environment, and Development, Study 2, World Resources Institute. January, 1985.

Perelman, Michael. The Green Revolution: American Agriculture in the Third World Radical Agriculture, 1976.

Perl, Matthew. "Medfly Eradication in Central America," Unpublished, 1987.

Perl, Matthew. "Draft Information Sheet: Rat Infestation in Chad and Sudan," Unpublished, 1987.

Perl, Matthew. "Africa Emergency Locust/Grasshopper Assistance." Draft Background Paper, 1987.

Pesticide Management. Proceedings of the U.S. Strategy Conference, U.S. Department of State, 1979.

Pfeiffer, E.W. "Nicaragua's Environmental Problems, Policies, and Programmes Environmental Conservation," 1986/1987, pp. 137-142.

Philips, F.M. "Report of Grasshopper Survey and Control Program in Senegal, Mauritania and the Gambia". A.I.D., August-September 1986.

Phoon, W. Price of Progress At The Centre, (1985) Vol. VIII, no. 2.

Phoon, W. "Occupational Health in Developing Countries: A Simple Case of Neglect," World Health Forum., (1983) Vol. 4.

Pimental, D. and L. Levitan. "Pesticides: Amounts Applied and Amounts Reaching Pests," BioScience (February 1986) Vol. 36, no.2, pp. 86-91.

Pimental, D. et al. "Environmental and Social Costs of Pesticides: A Preliminary Assessment," OIKOS (Copenhagen 1980) Vol. 34, pp. 126-140.

Plenum Publishing Corporation. "International Dynamics of Pesticide Poisoning," (no date).

Policy Sciences Center, Inc. Background Information, Consultation on Agricultural Chemicals and Research Design with cover letter to Ray Smith. The Policy Sciences Center, Inc. April 22, 1980.

Postel, Sandra. "Defusing the Toxics Threat: Controlling Pesticides and Industrial Waste." Paper published by World Resources Institute Worldwatch, 1987.

Potomac Communications Group. "Pesticide Safety Training in Developing Countries," prepared for the Agricultural Chemicals Dialogue Group, Potomac Communications Group, January 16, 1986.

Preuss, Peter W. and Alan M. Ehrlich. "The Environmental Protection Agency's Risk Assessment Guidelines", U.S. EPA, 1987.

"Primer Seminario Regional Sobre Uso y Manejo de Plaguicidas en Centro America". (Universidad de Califonia Berkeley: 1976).

Problemas de Contaminacion en Mexico, March 1986.

Purposes of and Criteria for Development of Chemical Hazard Lists from Ten Domestic and International Organizations and Comparative analyses of the EPA Acutely Toxic Chemicals list with Lists from Other Domestic and International Organizations. (ICF Incorporated: 1985).

Pustmuller, C. Comments on the biological assessment for the Morman cricket control program. (National Parks and Conservation Association and the Rocky Mountain Chapter of the Sierra Club: April 15, 1986).

Ream, Lloyd W. "Crown Gall Disease and Prospects for Genetic Manipulation of Plants," Science (1982) Vol. 218.

Reich, M.R. "International Trade and Trade-offs for Third World Consumers," Paper, 1986.

Reissig, H. "Summary of IPM Activities in the NERAD Project during 1985 and Consideration of Recommendations for 1986 Northeast Rainfed Agricultural Development Project". U.S.A.I.D. contract no. ASB-0308-C-00-2052-00, February 15-March 11, 1986.

Reissig ,H. "Environmental Assessment of Pesticide Use in the Northeast Rainfeld Agricultural Development", Project No. 493-0308. Prepared for U.S.A.I.D. with support of the Consortium for International Crop Protection, 1984.

Repetto, R. "Paying the Price: Pesticide Subsidies in Developing Countries," Research Report #2. World Resources Institute, 1985.

"Report of the West African Regional Workshop on Pesticide Legislation". Sponsored by U.S.A.I.D., CICP, GTZ, and The Republic of Togo, Plant Protection Service, April 1985.

"Report on the Tripartite Ad Hoc Meeting of Consultants on Methods of Prevention of Major Hazards in Industry". International Labour Office, 1985.

"Report to the Congress of the United States". Office of the

226

Comptroller General, 1979.

Rich, Bruce M. "The Multilateral Development Banks, Environmental Policy, and the United States," Ecology Law Quarterly, (1985, Vol. 12.

Richardson, R.H. "Autocidal Control of Screwworms in North America," Science (1982) Vol. 215.

Riding, A. "Free Use of Pesticides in Guatemala Takes a Deadly Toll," New York Times, November 9, 1977.

Riley, Dick. "Environment: Latin America," World Environment Center.

Robitaille, Steppen. "Gene-spliced Bacteria may Clean Tainted Water," San Jose Mercury News, 1986.

Rosival, Ladislav. "Pesticides," Environmental Health, 1985.

Ruttenberg, Ruth. "Hazard export: Ethical Problems Policy Proposals and Prospects for Implementation," The Export of Hazard. (Routledge & Kegan Paul: 1985), pp. 44-51.

Ryser, Jeffrey. "Cleanup for Brazil's Valley of Death," Chemical Week, August 7, 1985.

SRI International. "Herbicides", Chemical Economics Handbook, 1980.

Schaefers, G.A. "Analysis of Pesticide Use in the Senegal". U.S.A.I.D. Agricultural Production Support Project no. 685-0169 . Consortium for International Crop Protection, October 1986.

Schaefers, G.A. "A Compilation of Reports on the Grasshopper/Locust Situation in Sudan and Ethiopia", Consortium for International Crop Protection, August-September 1986.

Schneiderman, Howard. "What Entomology has in Store for Biotechnology," 1983.

Scott, Janny. "U.S. Wastes Reportedly Exported to Mexico Sites," Los Angeles Times, February 12, 1986.

Secretaria en el Despacho de Recursos Naturales. "Reglamento para el Control de Insecticidas, Productos Farmaceuticos y Biologicos de uso Veterinario por medio del Servicio de Control de Medicamentos del Programa de Produccion y Sanidad Animal Honduras".

Seethaler, K. "AID/OFDA Team in Dakar, Senegal to Assist USAID Mission, Government of Senegal and Donor Organizations to Elaborate Operational Plans for: The 1987 Grasshopper Control

Program, March 5 - April 11, 1987", Trip Report, April 20, 1987 (submitted).

"Seguridad, Higiene y Medicina del Trabajo". Division de Riesgos del Trabajo Iess. (1986) Vol. 5.

"Servicios Medicos de Empresa," Instituto Ecuatoriano de Seguridad Social, Riesgos del Trabajo del IESS, 1984.

Sewell, John and Christine Contee. "Foreign Aid and Gramm-Rudman.", Foreign Affairs. (1987), pp. 1015-1036.

Shabecoff, Philip. "Pesticides Called Manageable Evil," New York Times, May 1, 1987.

Shaikh, R. A. "The Dilemmas of Advanced Technology for the Third World," Technology Review, (1986).

Shaikh, Rashid. "Haphazard Policy on Hazardous Exports," The Lancet, 1981.

Shaikh, Rashid. "Export of Hazardous Products from the United States: A Bibliography." (Routledge & Kegan Paul: 1985).

Shrivastava, Paul. Bhopal: Anatomy of a Crisis. (Ballinger: 1987).

Sinclair, W. "USDA Backs Use of Carcinogen in U.N. Battle With Medflies," Washington Post, April 15, 1987.

Sinclair, W. "Farm Achieves Natural Balance," Washington Post, March 1, 1987.

Sinclair, W. "USDA Backs Use of Carcinogen in U.N. Battle with Medflies," The Washington Post, April 15, 1987.

Singley, Mark. "As Landfill Runs out, Composting Becomes a Better Solution," The New York Times, March 12, 1987.

Smart, T., Houston, P. and Frank, J.N. "In the Farm Belt, the Worst is Over: Exports and Farm Prices are Up -- Thanks Mostly to U.S. Taxpayers," Business Week, May 18, 1987, pp. 46-47.

Smith, Ray F. "Transfer of North American Crop Protection Technology to the Third World." Keynote address in symposium on "International Endeavours in Etymology, The Canadian Contribution", Annual Meeting Entomological Society of Canada, Ottawa, Canada., August 21, 1978.

Smith, E.H. "Integrated Pest Management (IPM)--Specific Needs of Developing Countries", Insect Science Applications (1986) Vol. 4, nos. 1,2.

Smith, Ray F. Letter regarding pesticide production/consumption

statistics from FAO. (Rome: February 1, 1973).

Smith, Ray F. Trip Report, April 22-May 1, 1974--Bellagio and Rome, Bellagio Conference. (Rome: April/May 1974).

Somers, Emanuel. "Environmental Hazards Show no Respect for National Boundaries", Environment (1987) Vol. 29, no. 5.

Statement of Joan A. Moore, Assistant Administrator for Pesticides and Toxic Substances, U.S. Environmental Protection Agency Committee on Agriculture, Nutrition, and Forestry, 1987.

"State of the Environment: A View Towards the Nineties." The Conservation Foundation, 1987.

Strigini, Paolo. "On the Political Economy of Risk: Farmworkers, Pesticides, and Dollars," International Journal of Health Services (1982) Vol. 2, no. 2.

Stromborg, K.L. et al. "Organophosphate Residues in Grasshoppers from Sprayed Rangelands," Chemistry in Ecology 2 (1984), pp. 39-45.

Suma'Mur, P. Occupational Health and National Development in Indonesia.

"Summary: The CILSS Sahel Regional IPM Project: Background, Present Status, Issues," Requested by Carroll Collier, S & T, Agriculture handwritten report, no date.

Suter, Glenn W. et al. "Treatment of Risk in Environmental Impact Assessment," Environmental Management (1985). Vol. 11, no. 3.

Swaminathan, M.S. "Biotechnology Research and Third World Agriculture," Science, (1982) Vol. 218, no. 3, pp. 967-972.

Swezey, S.L. et al. "Nicaragua's Revolution in Pesticide Policy,", Environment (January/February 1986) Vol. 28, no. 1.

Taft, Julia V. "A.I.D. Regulation 16: Emergency Determination for Chad Rat Control Program and Rodenticide Use". Action Memorandum for the Administrator. AFR/TR/PRO, July, 1987.

Talbot, Lee Helping Developing Countries Help Themselves, (World Resources Institute: 1985).

Tangley, L. "Agricultural Biotechnology: Who's Holding the Reins?". BioScience (November 1986). Vol. 36, no. 10, pp. 652-655.

Tangley, L. "Beyond the Green Revolution", BioScience (1986) Vol. 37.

Testimony of Dr. D.R. Heldman before Senate Committee in Agriculture, Nutrition and Forestry. 1986.

Testimony of Lawrie Mott on Behalf of the Natural Resources Defense Council Before the Committee on Agriculture. (Natural Resources Defense Council: 1987).

Thailand Development Research Institute. "National Strategy for Major Accident Prevention in the Chemical Industry", 1987.

Thailand Development Research Institute. "Clean Technologies for The Pulp and Paper Industry, the Textile Industry, and Metal Coating and Finishing in Thailand," 1986.

The Comptroller General of the United States. "Environmental Protection Agency Efforts to Remove Hazardous Pesticides From the Channels of Trade," Report to the Congress, 1978.

The Conservation Foundation. "A Report to the World Commission on Environment and Development: Chemical Policy in the Global Environment," 1986.

The Gas Chamber on The Chambal, Study of Job Health Hazards and Environmental Pollution at NAGDA, Madhya Pradesh. (Kalpana Printing House: 1983).

"The Overseas Private Investment Corporation," 1985 Annual Report, 1985.

The Policy Sciences Center, Inc. GIFAP, Interamerican Institute of Agricultural Sciences San Jose, Costa Rica, February 26-28, 1979.

The World Bank. "Environmental Considerations for the Industrial Development Sector," 1978.

Thrupp, L.A. "The Cotton Integrated Pest Management Program in El Salvador: Preliminary Study of Technology Transfer and Socio-Economic Impacts," CICP/ROCAP/USAID, May 1985.

"Riesgos del Trabajo: Prevencion del Riesgo de Exposicion a PLOMO en Fabricas de Baterias," 1985.

Toxic Ireland (Alliance for Safety and Health: 1982).

Turner, E. "Industrial Development Without Environmental Pollution: Role of Environmental Impact Assessment (EIA)," Asian Environment, pp. 27-36.

U.S. Department of Commerce NTIS, U.S. Economic Research Service, "Farm Pesticide Supply-Demand Trends, 1982," (PB82-193467), April 1982.

UNEP. Committee on International Development Institutions on the Environment. "Pesticides and Their Use," Discussion paper on Agenda. UNEP/CIDIE/84/1, Fifth Meeting, Luxembourg, June 13-15, 1984.

USDA. Research for Tomorrow, 1986 Yearbook of Agriculture, 1986.

United Nations Information Sources on the Pesticides Industry. UNIDO Guides to Information Sources, No. 10, revised edition UNIDO. (New York: 1982).

United Nations Cooperative Programme. "Pesticides in the Modern World". A Symposium Prepared by Members of the Cooperative Programme of Agro-Allied Industries with FAO and other United Nations Organizations, 1972.

United Nations Center on Transnational Corporations. "Overview Paper for Informal Seminar to Further International Cooperation for Environmental Management of Industrial Process Safety and Hazards," 1985.

UNEP. Proceedings of the Governing Council at its Fourteenth Session. UNEP/Governing Council 14/26. July 10, 1987.

United Nations General Assembly Resolution 37/137, December 17, 1982.

UNIDO. "Formulation of Pesticides in Developing Countries," 1983.

United Nations Publications 1988. (United Nations: 1987).

United Nations. "Consolidated List of Products whose Consumption and/or Sale Has Been Banned, Withdrawn, Severely Restricted or not Approved by Governments," Second Issue, 1986.

United Nations. "Consolidated List of Products whose Consumption and/or Sale Has been Banned, Withdrawn, Severely Restricted or not Approved by Governments," 1984.

University of California at Berkeley. "Information Systems for Alternative Methods of Pest Control," 1976.

University of California at Berkeley. "Crop Protection in Senegal, Niger, Mali, Ghana, Nigeria, Kenya, Tanzania and Ethiopia," 1972.

University of California at Berkeley. Pesticide Manual, 1976.

University of California at Berkeley. "The Crop Protection Situation in Guatemala, Honduras, Nicaragua, Costa Rica, Panama, and Guyana," 1981.

231

University of California at Berkeley. Pest Management and Pesticide Management in the Arab Republic of Egypt, 1976.

University of California at Berkeley. Pest Management and Related Environmental Protection Project Annual Report, 1977.

University of California at Berkeley. Plant Protection in Bangladesh, 1975.

University of California at Berkeley. "Plant Protection in Turkey, Iran, Afghanistan, and Pakistan," 1972.

University of California at Berkeley. Ecology Quarterly Vol. 12, no. 4.

University of California at Berkeley. Consortium for International Crop Protection, "IPM Needs of the CAP Region," 1982.

University of California at Berkeley. "Analysis of Pesticide Use in Pakistan," 1974.

"Uso de Plaguicidas en Panama y su Effecto en la Salud y el Medio Ambiente". Ministerio de Salud y Ministerio de Desarrollo Agropecuario, 1982.

Vega-Sanchez, F. "Pesticides and Food: The Need for an International Information Source for Developing Countries," U.S.A.I.D. Paper presented at the VII World Congress of the International Association of Agricultural Librarians and Documentalists. Ottawa, Canada, June 2-6, 1985.

Vilanilam, J.V. "Occupational Safety and Health in India," 1979.

Villagran, E. "An Evaluation of Integrated Pest Control Efforts in Central America and Management Guidelines to Optimize Future Programs," (A Preliminary Paper). Presented at 10th session of the FAO/UNDP Panel of Experts on Integrated Pest Control ECOTECNICA (Rome: March 25, 1981).

Voss, Dr. C. "The Gambia Grasshopper Control Campaign for 1987", Consultant Reports, Consortium for International Crop Protection, March 1987.

WCED Report. "Industry: Producing More with Less," 1987.

WCED Profile. "Chemicals and pesticides," 1987.

Wagner, A.R. "Limited Survey about Pesticide Problems and Control in the Americas". Provisional Agenda Item 12 (RICAZ5/22) (Pan American Sanitary Bureau: March 27, 1982).

Waldo, Andrew B. "A Review of U.S. and International Restrictions on Exports of Hazardous Substances." The Export of

Hazard. (Routledge & Kegan Paul: 1985), pp. 18-44.

Ware, George W. The Pesticide Book. (W.H. Freeman and Company: 1978).

Wasserstrom, Bob. Proposal on Pesticide Safety Training in Developing Countries, 1985.

Wasserstrom, Robert F. and Richard Wiles. "U.S. Farmworkers and Pesticide Safety," Field Duty, Study 3, World Resources Institute, July 1985).

Watson, M.G. "Cooperation between UNIDO and Developing Countries in the Field of Chemical Industries," Chemistry and Industry, April 3, 1976.

Weeks, James L. "Export of Hazardous Industries: The View from a Local Union in the United States". (Routledge & Kegan Paul: 1985).

Weiler, Edward. "The West African Regional Workshop on Pesticide Legislation," April, 1986.

Weir, D. and M. Schapiro. "Third World Pesticides: The Circle of Poison," The Nation, (November 15, 1980). pp. cover, 514-516.

Weisman, Steven R. "Bhopal is in Midst of Grim Recovery a Year after Leak," The New York Times, 1985.

White House Plows into Ag Research Science (1982). Vol 217.

Whittemore, F.W. "The Choice of Pesticides for Developing Countries," UNIDO Workshop on Pesticides, May, 1973.

Whorton and Obrinsky. Comments on "Persitence of Symptoms after Mild to Moderate Acute Organophosphate Poisoning Among 19 Farm Field Workers. Journal of Toxicology and Environmental Health, 1984.

Wimberly, John. "U.S. Pesticides Markets," (Predicasts: 1983).

Winter, D.M. "Pesticide Safety Education in Ecuador: Materials, Research, Development and Evaluation Final Report of Research conducted in Ecuador from August 19 to December 18, 1985". (University of California, Davis, Department of International Agricultural Development: January 29, 1986).

Wirth, D., et al. Letter of protest to C. Collier over relaxing of AID guidelines on pesticides with enclosed materials. (NRDC: January 22, 1986).

Wisner, Alan. "The Effects of Technology Transfer on Working Conditions," Paper, 1981.

World Environment Report, 1980.

World Environment Report,"In Latin America," March 24, 1980.

World Health Organization. "Prevailing Constraints in the Delivery of Health Care Services to Workers," 1975.

World Health Organization. "Some Organizational Patterns Used for the Delivery of Health Care to Small Industries," 1975.

World Health Organization. Occupational Health Care for Agricultural Workers, 1979.

World Health Organization. Review on the Results of Studies on the Conditions of Health in Small Industries, 1975.

World Health Organization "Agricultural Accidents," 1979.

World Health Organization Expert Committee Report. "Environmental Pollution Control in Relation to Development, 1985.

World Health Organization Expert Committee on Vector Biology and Control, "Integrated Pest Control," 1983.

World Health Organization Expert Committee on Vector Biology and Control, "Resistance of Vectors and Reservoirs of Disease to Pesticides," 1986.

"World Health Organization Recommended Classification of Pesticides by Hazard," WHO Chronicle 29, (1975; Revised 1982), pp. 397-401.

World Health Organization, "Occupational Health Problems in Agriculture", 1979.

World Health Organization,Guidelines to Countries for the Establishment of Health Case Programmes, 1975.

World Health Organization. "The WHO/UNDP Epidemiological Study on the Health Effects of Exposure to Organophosphorus Pesticides," (Elsevier Science Publishers: 1986).

World Health Organization. "Changing Attitudes of Agricultural Workers towards Health," 1979.

World Health Organization. Agriculture as an Occupation, 1979.

World Health Organization. "Agricultural Occupational Health Research Activities," 1979.

World Health Organization. The Work of WHO 1984-1985: Biennial Report of the Director-General, (Geneva: 1986).

World Health Organization. "Specifications for Pesticides used

in Public Health," 6th edition. (WHO: 1985).

World Resources Institute. "Improving Environmental Cooperation: The Roles of Multinational Corporations and Developing Countries," 1984.

World Resources Institute. "Guidelines for Growth," Multinational Corporations and Environment in Developing Countries. The Statement and Action Agenda of an International Conference Sponsored by World Resources Institute.

"Worldwide Directory of Institutions with Entomolotists". Bulletin of the Entomological Society of America, (1978) Vol. 24, no 2.

Woutat, Donald. "Alaska Project has Oil Experts Guessing," Los Angeles Times, 1987.

Wright, A. "Rethinking the Circle of Poison: The Politics of Pesticide Poisoning Among Mexican Farm Workers," Latin American Perspectives, Issue 51 (Fall 1986) Vol. 13, no.4, pp. 26-59.

"Zimbabwe Bans Dangerous Contraceptive, Depo-Provera: A Victory for Women's Groups." Multinational Monitor, 1981.

Zweig, Gunter. "Study of Pesticide Waste Sites and Disposal of Obsolete Pesticide Stocks". (Thailand and Western Samoa: Consortium for International Crop Protection: 1986).