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July 25, 1997

Ms. Julia Klement  
Chief - Prevention, Mitigation & Preparedness  
Office of U.S. Foreign Disaster Assistance  
Food, Disaster Assistance and Crisis Management Bureau  
U.S. Agency for International Development  
Washington, DC 20523-0008

Subject: Final Report for LAMP Program under Cooperative Agreement No. AOT-2515-A-00-2125-00 between USAID and the World Environment Center (WEC)

Dear Ms. Klement,

The purpose of this letter is to forward five (5) copies of the Final Report for a "Program for Environmental Disaster Prevention, Mitigation and Preparedness in Developing Countries", known as the Local Accident Mitigation and Prevention (LAMP) Program. This Report is being submitted to you in fulfillment of the requirements of Section 1E.2.(1) of the subject five-year Cooperative Agreement (CA) which expires on 30 September 1997 with a LOP funding of \$3.5 million. Separate Final Reports have been previously issued on the country-level LAMP Programs in Thailand (December 1995) and India, Indonesia and Mexico (February 1997). These reports discuss in detail the objectives and impacts of the LAMP Program each country, including the various events and other activities and number of participants in each event.

The main body of the Report references project goals, objectives and overall impacts or results and describes project implementation activities undertaken by WEC to facilitate those objectives and outcomes during the five (5) year duration of the Program (since October 1992). Overall, LAMP has had its greatest impact in 8 different sites in India; Vera Cruz State and 3 sites in Mexico; two industrial estates in Thailand; and West Java State and 3 sites in Indonesia. There are individual annexes that: describe in detail the objectives and agendas for nine different types of seminars and training programs that were designed and presented under the LAMP Program to train over 3500 participants; identify 54 international experts used on 159 different implementation activities and events; list the four dozen cooperating institutions that sponsored events or provided experts; and discuss important lessons learned about the sustainability of local accident mitigation and prevention groups.

In carrying out these activities, WEC has remained in close contact with the OFDA Project Officer who has provided much-appreciated guidance and direction, particularly during the phase of U.S. training for local LAMP Coordinators from different countries. WEC and OFDA expect that the individual LAMP sites in each country can serve as readiness centers for responding to any type of disaster.

Overall, the cost for implementing the LAMP Program has been approximately 200-250 thousand dollars **per country, per year** in the utilization of OFDA and WEC funds. This calculation does **not** include costs of local seminar and training facilities, fees for local experts, expenses for participants, salaries of local APELL/LAMP coordinators and equipment, materials and supplies for emergency exercises; all of these expenses were borne by local governments, industries and participants. In the spirit of the LAMP Program these expenses were seen as investments by the communities at each LAMP site to demonstrate their commitment to organizing themselves for improved safety against chemical accidents and disasters.

Attached in Appendix A is a proposal to request OFDA funding to extend the LAMP Program in the four target countries or expand the Program to new countries that are important to OFDA.

If you have any questions or comments, please contact me.

Sincerely,



Richard M. Williams  
Project Director

cc:

Antony Marcil, WEC/NY

Jeffrey D. Bell, Grant Officer, Office of Procurement, Washington DC 20523  
PPC/CDIE/DI, Washington, DC 20523-1802 (2 copies)

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**FINAL REPORT FOR THE  
LOCAL ACCIDENT MITIGATION AND PREVENTION (LAMP)**

**SUBMITTED TO:**

**UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT (USAID)**

**OFFICE OF FOREIGN DISASTER ASSISTANCE (OFDA)**

**SUBMITTED BY:**

**WORLD ENVIRONMENT CENTER (WEC)**

**JULY 25, 1997**

**COOPERATIVE AGREEMENT AOT-2515-A-00-2125-00**

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## **Implementation of the Local Accident Mitigation and Prevention (LAMP) Program in Selected Countries**

### **1. Introduction and Summary**

Under a five (5) year Cooperative Agreement (CA No. AOT-2515-A-00-2125-00) with the U.S. Office of Foreign Disaster Assistance (OFDA) that began in October 1992, the World Environment Center (WEC) has been improving community-based emergency preparedness and response capabilities in Mexico, India, Thailand and Indonesia. This has been done through the implementation of the Local Accident Mitigation and Prevention (LAMP) Program in each target country. The overall goal of the LAMP Program is to reduce the incidence and impact of major chemical, hazardous materials transport or other technological accidents and disasters in selected high-risk locations in each selected country, including the mitigation of technological side-effects of natural disasters such as earthquakes and floods. Towards this end, WEC has been organizing and implementing results-oriented accident prevention, emergency preparedness and response planning and disaster mitigation training; chemical safety education; and public awareness outreach and accident simulations (mock emergency drills) in each country.

The LAMP program evolved from a growing concern that the likelihood of major technological accidents in industrial centers posed real and potentially catastrophic threats to the people working and residing in or near these areas. Each day chemical-related accidents occur in some parts of the world thus killing and physically incapacitating many innocent lives. In 1984, a disastrous methyl isocyanate (MIC) leak at a Union Carbide plant in Bhopal, India killed over 3,000 people and seriously injured tens of thousands more. This watershed event led government and industry leaders around the world to begin improving plans to prevent and mitigate such horrific accidents.

The LAMP program is designed to bring about positive and meaningful improvements in emergency response, emergency preparedness, and emergency planning and testing through a sustained, interactive, and client driven approach. Methods of intervention vary from country to country, and within countries from site to site, according to the specific social, political, economic, and developmental conditions of each site. For that reason, LAMP must be flexible and able to respond to the planning and training needs of the groups that engage the LAMP process of improving industrial accident prevention and mitigation systems. Flexibility and responsiveness to the local clients are, therefore, defining characteristics of the LAMP program. These two traits also play an important role in the progression of activities that are scheduled. Since the program is designed to respond to the unique characteristics of each site, LAMP managers rely heavily on the local representatives at each site to help define the plan of action and goals for the project. Those groups and individuals that embrace the UNEP's Awareness and Preparedness for Emergencies at the Local Level (APELL) process and the LAMP program are often key to successful implementation of the program. Thus, one of the most important responsibilities of program management is to identify organizations and individuals who inherently support LAMP activities, engage those parties, and continually work with them to

ensure that objectives are well defined, in line with the conditions at each site, and likely to achieve the expected outcomes.

In general, under the bottom-up approach taken by WEC on the LAMP Program, prototype examples of improved community-based emergency preparedness are established at selected sites, which then are replicated in other sites while influencing and informing country-wide policies and institutions related to disaster mitigation and prevention. Overall, LAMP has had its greatest impacts in 8 different sites in India; Vera Cruz State and 3 sites in Mexico; two industrial estates in Thailand; and West Java State and 3 sites in Indonesia.

WEC has the knowledge and contacts to expand the LAMP Program to other sites in the four target countries or to certain other countries that have embraced the UNEP/APELL concept. WEC has contacts and suggested sites in each country and would be pleased to have a dialogue with OFDA as to which regions and countries fit the funding priorities of OFDA

## **2. Steps for Implementing the LAMP Program**

The overall goal, objectives and expected outcomes of the LAMP Program were defined jointly by OFDA and WEC at the outset of the Program and are listed in Annex 1.

Since program implementation must remain flexible and responsive to local conditions, there is no single approach to implementing a LAMP program. There are, however, several aspects of any LAMP program which remain constant from one country to the next. The following section outlines aspects of the LAMP program that can be seen as the characteristics common to all LAMP programs. These components are the building blocks for LAMP and can be seen as the "steps" to conducting effective LAMP programs.

A particular emphasis has been to create ongoing programs in Awareness and Preparedness for Emergencies at the Local Level (APELL) at selected local sites. APELL is well-defined process sponsored by the United Nations Environmental Program/Industry and Environment Program Activity Center (UNEP/IEO) to:

- Create and/or increase community awareness of possible hazards within the community, and
- Based on that awareness, develop an operative plan to respond to any emergencies that these hazards might present.

APELL itself uses as a model the U.S. Local Emergency Planning Committees (LEPC's), as defined and legally constituted under SARA Title 3, and the Community Awareness and Emergency Response (CAER) groups encouraged and supported by the International Association of Chemical Associations, particularly the U.S. and Canadian chemical manufacturers associations and CEFIC in Europe, which are implementing Responsible Care®. Throughout the LAMP Program, WEC and UNEP/IEO cooperated actively to jointly promote improved community-based emergency preparedness in the target countries and selected communities. In

fact, in India the Program is known as "APELL/LAMP" both at the local level and the national level.

In each country, WEC has searched out local "bonding" agents to help ensure that objectives are met on the local level, as well as national "nodal" organizations to help replicate LEPC's to other sites. The local "bonding" agents are typically local industry associations, Responsible Care® groups, community service organizations, or local worker or public safety committees with whom WEC has a shared concern about chemical safety. These "bonding" agents can then become major participants in a tri-partite local emergency preparedness committee comprising representatives of the local government, industry and an at-risk community. The national "nodal" organization(s) exhibit a similar shared concern on a national level.

An assumed sequential link between awareness and preparedness, mitigation and prevention was built into the design of various seminars and training programs that were organized and implemented at each LAMP site, in cooperation with local industry, government and community groups. That is, it was assumed that effective technological accident mitigation and prevention, the objective of the LAMP Program, can be launched only after community groups have learned to cooperate actively on awareness and preparedness for technological accidents and disasters.

In India, WEC also created a National Advisory Committee (NAC) comprised of representatives of federal ministries (labor, health, environment, interior, etc.), national industry associations (chemical manufacturers, insurance and loss prevention, etc.) and national service and professional organizations (Rotary Clubs, industrial medicine, safety professionals, etc.). The NAC has an ongoing role in replicating the LAMP program to additional sites in India, as well as in advising national and state governments on issues related to emergency preparedness and response and accident prevention.

## **2.1. Step One - Site Selection**

The LAMP program's site selection process is a critical step towards ensuring that the program will obtain meaningful results after two to three years of specially-designed interventions. LAMP relies on replication from one site to another to maximize the effectiveness of donor funding and to ensure that program initiatives continue to improve after donor funding is terminated. The need to replicate LAMP successes makes the site selection process one of the most important steps in designing a LAMP program. LAMP funding is targeted on industrial areas where the chances for meaningful and lasting impact are most likely to occur and on those communities that will most likely be in a position to share their experience with other industrial sites in need of improved accident mitigation and prevention.

The LAMP program is appropriate for those countries and/or geographic regions having a multitude of high-risk industrial sites that could benefit from the replication of LAMP activities. The criteria for selection of potential LAMP sites are:

- Flammable, explosive, or acutely toxic substances are produced or utilized on site and transported through local community areas;
- A significant number of persons reside on or near the industrial site and are, therefore, potentially at risk;
- There is an expressed local concern about industrial risk and an interest in organizing more effective prevention, mitigation and preparedness (PMP) programs to counter the current risk; and
- Disaster relief institutions exist near the industrial site or can easily be created.

## **2.2. Step Two - Recruit and Train Country Manager**

Once sites have been selected which satisfy the above criteria, WEC chooses a Country Manager to interact with the local representatives of each LAMP site and coordinate on a daily basis with industry, government and community representatives. He/she may be chosen from known alternative candidates or recruited through WEC's connections with multi-national companies having a long-term presence in the particular Country. The Country Manager plays a pivotal role embracing a number of diverse responsibilities. The Country Manager must have aptitudes and skills to both engage local leaders on technical skills of emergency responders as well as display political sensitivity regarding a community's "right to know". For this reason, the Country Manager must have experience and credibility with local industries and government groups, as well as the dynamism to reach out to other groups with whom he may not be familiar. In this way, the Country Manager can effectively direct program activities relevant to many groups and serve as a catalyst for the changes that will occur as program goals are realized.

The effectiveness of the Country Manager ultimately depends on his own understanding of the changes that can be expected at a given site and his vision for how to bring about those changes. Understanding what needs to be done at each site allows the Country Manager to take on a leadership role and thereby guide others -- plant safety managers, community group leaders, elected officials, hospital managers, and planning committee members -- towards more responsible and more effective means of preparing for crisis situations and mitigating disasters when they occur. To help LAMP Country Managers develop this "vision" of what is possible, the four Managers were brought to the U.S. to meet prototype local emergency planning and response groups in the U.S. and Canada, witness emergency response exercises and visit first-responder training facilities.

## **2.3. Step Three - Determine Baseline Indicators**

In planning a LAMP program each country and site within that country, certain baseline indicators related to accident mitigation and prevention must be assessed. Baseline indicators function as a planning tool during program implementation to determine which types of LAMP activities are appropriate. The development of a list of baseline indicators is a useful way of reviewing and documenting the conditions in LAMP countries and at selected sites. Because

baseline indicators vary from site to site, planned activities and expected outcomes at each site will also vary.

Baselines are also used as a benchmark against which program outcomes can be evaluated following the completion of program activities. The baseline indicators used by WEC for reporting program progress under OFDA funding are included Annex 2. The indicators listed are by no means the only ones which can be used to describe site conditions. Baseline indicators may also include historical events that have a particular bearing on a site or country where the LAMP program operates. For example, the 1984 Bhopal, India accident resulted in an incredible groundswell of concern for public safety and accident prevention at the grassroots level. Thus, this disaster and the subsequent emergence of grass-roots safety groups throughout India both serve as baseline indicators for India.

There is no single set of baseline conditions to which a LAMP program must refer, however, assessment of potential LAMP sites requires that baselines be determined in order to help guide LAMP activities and bring focus to long-term strategies of the project as a whole.

#### **2.4. Step Four - Develop an Action Plan**

Following site selection, choosing a Country Manager, and documenting the baseline conditions, WEC develops an action plan for each site and the country as a whole. The action plan is an important part of the LAMP process as it helps determine agendas and quantify constraints based on the local conditions. It also clearly identifies those local industrial firms that are committed to the local emergency preparedness and response program and have resources to sustain the action program.

The action plan is used to define site goals and identify the means by which these goals can be achieved. Since the replication of LAMP activities is one of the primary objectives of the program, activities which are highly replicable are always central to the action plan. Action plans should also be flexible and allow for changes in conditions at a site. Action plans also define, as priorities, activities that are most likely to succeed and result in improvements at the local level. The action plan is a guide which helps project management define and achieve realistic goals.

#### **2.5. Step Five - Select and train local LAMP Site Coordinators**

Consistent with the model promoted by initial APELL S/Ws, a local coordinating committee for improved chemical safety is formed and begins assessing chemical risks and formulating emergency response plans to mitigate that risk. Often, a natural leader will emerge as a local person motivated and committed to helping the community achieve greater safety for its citizens, through improved cooperation of the tri-partite partners (industry, government and community organizations).

At some stage, after Step Four - Planning and during Step Six - Implementation Activities, it is useful to give the individual LAMP Site Coordinators a "vision" on how different communities and organizations in North America have cooperated for improving their own safety. To further the development of self-actuating local emergency preparedness committees (LEPCs) at selected sites in the four LAMP countries, WEC brought key individuals from the different sites to the U.S. in early December 1994. The participants were mostly from local government, industry or the community, but including a few national level officials from Thailand, so as to accelerate replication of LAMP sites in that country. In the U.S., the group met with key local officials from LEPCs (as established under SARA, Title III) in the Kanawha Valley, WV and Houston, TX so as to better understand their community-based chemical emergency preparedness and accident prevention activities, including risk assessment, mapping of chemicals, emergency plan preparation and update and management of emergency exercises. The group also visited the Chemical Manufacturing Association's (CMA's) Chemical Transport Emergency Center (CHEMTREC) for coordinating responses to hazmat transport accidents throughout the U.S., and the Federal Emergency Management Agency (FEMA) and Environment Protection Agency, Chemical Emergency Preparedness and Prevention Office (EPA/CEPPO) operations centers, for coordinating U.S. Government disaster response, in Washington, DC. The participants from each country were escorted by the bi-lingual WEC LAMP Program Country Manager from that country so that individual LAMP Coordinators having different language capabilities could engage in a dialogue with officials nominated by them and help promote dialogues with officials from other countries having similar concerns.

## **2.6. Step Six - Plan and Implement Activities designed to achieve objectives**

Site selection, choosing a Country Manager, determining baseline indicators, developing an action plan and selecting and training local LAMP Coordinators are the principle steps to beginning a LAMP program. Once these steps have been accomplished, program activities are designed and implemented in relation to specific goals and objectives at each site.

The LAMP programs work with local and visiting experts from the public and private sectors to accomplish priority goals. The goals are determined by local participants, a local advisory board and WEC/LAMP staff. Building on the core of a well-established APELL Seminar/Workshop used to initiate the APELL/LAMP process, other programs of particular concern at each location are added as required. These include training of local experts and citizens on hazard and risk assessment, formulating an emergency plan to respond to that risk, plan evaluation and the organizing of mock emergency drills to test the efficacy of emergency preparedness plans. Simultaneously, local emergency first responders are trained in industrial fire safety, containment and clean-up of hazardous materials incidents and medical response to chemical accidents and disasters, including treatment of the types of medical wounds and injuries that might result in the event of particular accidental releases or spills in that community. Finally, WEC works with local industry to organize effective accident prevention programs and to reduce the threat to public health and safety from chronic and catastrophic chemical risks.

As stated before, WEC has worked closely with UNEP/IEO to organize and implement APELL Seminar/Workshops as a normal first-step to acquaint a particular community with the concepts and practice of chemical disaster preparedness. In addition, key and continuing support was provided by EPA's Chemical Emergency Preparedness and Prevention Office (CEPPO) and CDC's Center for Environmental Health, Division of Environmental Hazards and Health Effects (DEHHE). Early in the Program, WEC had an exchange of letters with CEPPO and DEHHE, under which both of these organizations would loan key personnel to WEC to implement various APELL-related seminars and training programs, chemical risk assessments and training in medical response to toxic exposure. In addition, both CEPPO and DEHHE graciously provided various technical references and chemical safety training programs to WEC at no cost.

WEC's approach to environmental disaster mitigation and prevention has several unique aspects, namely:

- A broad-based approach that mobilizes private sector resources and equipment to complement the normal public sector responsibilities for fire safety, hazmat handling and medical response;
- A proven success in communication of risk and mobilizing community participation in emergency preparedness and response exercises;
- The establishment of prototype programs at the local level that serve as operating examples to guide policy and programs at the national level in each country, and
- Involvement of the insurance industry in risk assessment and the linkage between improved accident mitigation and prevention and reduced catastrophic risk exposure on-site and off-site.

### **2.7. Step Seven - Choose More Sites and Replicate Programs**

As was stated before, LAMP relies on replication from one site to another to ensure that donor funding is maximized and that program initiatives continue to improve safety conditions once a program has been completed. This replication typically utilizes key persons from the initial LAMP sites to instill new site leaders with enthusiasm and confidence that they can effectively take charge of their own safety, even in a complex technical arena involving toxic or explosive chemicals.

### **2.8. Step Eight - Review, revise, and redirect activities as necessary**

Over the course of a multi-year LAMP program, changes inevitably occur and effect the course of program events. Elected officials change. Industry leaders will come and go as well, requiring WEC to revise and amend the action plan for each LAMP site. All of this is part of the process of implementing LAMP. In spite of external changes that may occur, LAMP remains effective by continuing to work with motivated groups, focusing on the ultimate goals of the program, and adapting these goals to conditions at the local level.

### 3. Actual Results in the Four Target Countries

Clearly-defined goals, objectives and outcomes for the LAMP programs are given in Annex 1. Individual status reports for LAMP programs in Mexico, India and Indonesia are given in Annexes 2a, 2b and 2d, respectively. The accumulated accomplishments of the Thailand program, where all OFDA funding was terminated on 30 September 1995, are given in Annex 2c.

WEC's LAMP program has worked toward these objectives and outcomes through a number of different activities designed to increase industrial and community awareness of chemical risks, develop prototype industrial emergency response plans, and improve response capabilities to technological emergencies and natural disasters. By working with the community as a whole, LAMP program fosters greater involvement of local government, industry, and community leaders in accident mitigation and prevention activities. In this way, the LAMP program derives a catalytic effect by bringing groups together in support of the goals and objectives of the program, strengthening existing ties between these groups, and developing new ties to improve emergency response and planning capabilities.

LAMP program activities include the following range of initiatives:

- Awareness & Preparedness for Emergencies and Local Level (APELL) workshop/seminar to bring industry/local government/community groups together;
- Chemical emergency preparedness and accident prevention training;
- Training in Risk Assessment in process industries;
- Workshops in communicating risk to the public and preparing the community for chemical emergencies;
- Periodic emergency response exercises involving local government, industry and community;
- Specific skill training for first responders in industrial and chemical fire safety and control of hazardous materials incidents and spills (fire, police and medical response);
- Training on safe transportation of hazardous materials;
- Computer-aided management of emergency operations (CAMEO™) - a computer software program for emergency planning and response developed by EPA and the National Oceanic and Atmospheric Administration (NOAA);
- Assistance in the establishing Local Emergency Planning Committees or crisis groups; and
- Assistance in establishing national emergency preparedness and response networking organizations to coordinate policy and replicate APELL/LAMP sites around the country.

Representative scopes of work, workshop agendas, and excerpts from activity reports are provided in Annex 3 to illustrate the many types of seminars and training programs that were organized and implemented under the LAMP Program.

A list of international experts used on the LAMP Program for different types of implementation activities and events is attached in Annex 4. Altogether, WEC utilized 54 different experts in diverse fields such as risk assessment, emergency planning, hazmat emergency response

(including medical response), CAMEO™, and community outreach and education, to participate in 159 different events and activities attended by over 3500 participants. In addition, there were dozens of local experts utilized in the different programs in each country; many or most of their names are given in the final reports issued for individual LAMP Programs in Thailand, India, Mexico and Indonesia.

More than four dozen cooperating institutions (national/international government agencies, private industries and institutions, WEC/IEF companies and individual consultants) that sponsored events or provided experts are named in Annex 5. The roles of these institutions have been well described in the individual final reports issued for the four main target countries. WEC has expressed its thanks to all the institutions for their advice and assistance in implementing the LAMP Program, but especially to UNEP/IEO, EPA/CEPPO, CDC/CEH/DEHHE, CMA and the multi-national chemical companies belonging to WEC's International Environment Forum (IEF).

Important lessons learned about the sustainability of local accident mitigation and prevention groups are presented in Annex 6. This is a composite list drawn from the country-level experiences identified in each of the individual LAMP Program Final Reports for Thailand, Mexico, Indonesia and India previously issued. In general, the lessons learned validate the bottom-up approach taken by WEC on the LAMP Program in establishing prototype examples of improved community-based emergency preparedness at selected sites that can then be replicated in other sites while influencing and informing country-wide policies and institutions.

### **3.1. Sites with Greatest Impact to date**

Good progress toward long term, effective collaboration between industry, government and local community to implement appropriate disaster prevention and mitigation measures is being indicated at several high-risk sites in the four target countries. In most cases, there is good support from a national nodal agency for replication of LAMP programs at multiple sites throughout each target country.

The sites where the most progress has been made to date are:

Mexico: Vera Cruz State (Coatzacoalcos, Vera Cruz, Orizaba & Poza Rica)

India: Madras, Mumbai, Cochin, Haldia, Kanpur and Vadodara

Thailand: Map Ta Phut and Bangpoo Industrial Estates

Indonesia: West Java State (Cilegon & Tangerang) and Gresik/Surabaya

Although the major focus of the LAMP program has been on Mexico, India, Indonesia and Thailand, some LAMP-related activities have been carried out in Chile, Costa Rica, Jamaica, and

Venezuela. Since 1992, the LAMP program has been implemented in whole or in part in over 20 different communities.

### **3.2. LAMP Program Benefits**

The LAMP program focuses on emergency prevention and preparedness at the local level in order to improve capabilities at selected high-risk sites in each target country. The major benefits and impacts of the LAMP program are therefore defined by observable changes and improvements of emergency systems at the local level. While the major measurable impacts are at the local level, the long-term replication of activities and experience to other high-risk sites in target countries is also an important aspect of the program.

Some of the local level accomplishments to date are as follows:

- Increased industry sensitivity to risk reduction and accident prevention and increased adoption of emergency preparedness and response plans;
- Increased coordinated disaster preparedness and prevention in high-risk communities;
- Increased number of trained technological accident responders using more advanced emergency response equipment as purchased by local industries and some local governments;
- Increased community involvement in disaster prevention and response for defined accident scenarios;
- Periodic and regular testing of local emergency preparedness and response plans; and
- Strengthened local, regional, and national technological disaster response networks.

National level impacts resulting from the local level intervention include the following changes:

- New legislation supporting the formation of local emergency coordination committees with representatives of the community and industry, as well as government;
- National level disaster planning and coordination committees with representation from industry associations, insurance groups, government ministries and national service organizations; and
- Resources made available for purchase of emergency response equipment and replication of program to more sites.

International level impacts are as follows:

- Other countries have adopted a community-based emergency preparedness approach to empower local communities to take charge of their own safety from the risk of toxic and hazardous chemicals; and
- Recognition of accomplishments from international agencies.

These various impacts at the local and national levels in each country are defined in more detail in the country-level LAMP Program final reports issued by WEC for Thailand (December 1995) and India, Indonesia and Mexico (February 1997).

#### **4. Activities of WEC Management**

In the context of a field-demand driven LAMP Program involving the different implementation steps described above, WEC Management was responsible for the total success of the Program in each country (Steps One through Eight above). The main ongoing responsibility of WEC Management in the U.S. was to cooperatively design implementation activities to achieve the program objectives and to recruit and arrange travel for needed experts to implement the different programs (see particularly Step Six and Annexes 3 and 4). Simultaneously, WEC management needed to select and train local WEC LAMP country managers (Step Two) and ensure that local emergency planning and response leaders develop a vision of successful community-based emergency preparedness, response, mitigation and accident prevention (Step Five). In carrying out these activities, WEC has remained in close contact with the OFDA Project Officer who has provided much-appreciated guidance and direction, particularly during the phase of U.S. training for local LAMP Coordinators from different countries. WEC and OFDA expect that the individual LAMP sites in each country can serve as readiness centers for responding to any type of disaster.

WEC Management developed a number of different management tools to simplify communications between the U.S. and field staff in each country, define and standardize the content of different seminars and training programs, coordinate the use of experts between different activities in the same and nearby countries and ensure the timely recruitment and travel of experts from different sources in the U.S. and overseas.

The key WEC Management staff members during the bulk of the LAMP Program duration were:

##### Overseas

Enrique Bravo	WEC/ Mexico Country Director
Rosie Jimenez	WEC/Mexico LAMP Assistant
Harry Wiradiputra	WEC/Indonesia Country Director
Charlat Sripicharn	WEC/Thailand Country Director
Chakthep Senivongs	WEC/Thailand LAMP Manager
K.C. Gupta	Director General, NSCI (India)
Ramesh Bhanushali	Depty. Dir. General, NSCI (India)
H.N. Gupta	Technical Advisor, NSCI (India)

##### U.S.

Richard Williams	Program Manager
V. Srinivasan	Project Manager - India
Paul Sullivan	Project Manager - Mexico (to 12/94)

Flora Hernandez                      Depty. Project Manager - Mexico  
 Brian Streiffer                      Depty. Project Manager - Indonesia and Thailand  
 Francisco de la Chesnaye              Project Manager - Mexico (after 1/95)

Most WEC U.S. and Overseas Staff worked part-time on the LAMP Program, along with other assigned responsibilities.

Overall budgets and expenditures for particular interventions and programmed activities were carefully controlled by WEC Management in the U.S. throughout the LAMP Program. Accumulated expenditures are given below:

**4.1. LAMP Program Expenditures a/o 30 June 1997**

1.	LOP OFDA Authorized Funding from FY93 through FY97	\$ 3,500,000
	WEC Matching Funds (Required)*	\$ 184,211
	Total Estimated Value of Cooperative Agreement	\$ 3,684,211
2.	OFDA Funds Obligated to Date	\$ 3,500,000
3.	Expenditures of OFDA Funds to Date (a/o 30 June 1997)	
	WEC Fiscal Year 93 (1 Oct. 92 to 30 June 93)	\$ 329,310.11
	WEC Fiscal Year 94 (1 July 93 to 30 June 94)	750,603.84
	WEC Fiscal Year 95 (1 July 94 to 30 June 95)	1,114,965.04
	WEC Fiscal Year 96 (1 July 95 to 30 June 96)	828,436.18
	WEC Fiscal Year 97 (1 July 96 to 30 June 97)	438,127.20
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	Total Expenditures	\$ 3,461,442.37
4.	OFDA Funds Remaining a/o 30 June 1997	\$ 38,557.63

Note: WEC Matching Funds (In-kind Contributions) have been approximately \$650,000, which amount far surpasses minimum WEC Contribution required under WEC's Cooperative Agreement with OFDA.

Overall, the cost for implementing the LAMP Program has been approximately 200-250 thousand dollars **per country, per year** in the utilization of OFDA and WEC funds. This calculation does not include funds for local seminar and training facilities, fees for local experts, expenses for participants, salaries of local APELL/LAMP coordinators and equipment, materials and supplies for emergency exercises; all of these expenses were borne by local governments, industries and participants. In the spirit of the LAMP Program these expenses were seen as investments by the communities at each LAMP site to demonstrate their commitment to organizing themselves for improved safety against chemical accidents and disasters.

## **Annex 1: LAMP Program Goal, Objectives and Outcomes**

The goals, objectives and outcomes for the LAMP program are listed below:

- **Goal:** Reduced loss of lives, human suffering and property damage from technological disasters.
- **Objective No. 1:** Effective prototype technological accident prevention and mitigation programs established in each country.

Result No. 1.1: Increased disaster preparedness and prevention in selected high-risk communities.

Result No. 1.2: Increased number of trained technological accident responders.

Result No. 1.3: Replication of successful technological accident prevention, mitigation and preparedness activities to other high-risk urban centers.

- **Objective No. 2:** Increased awareness of chemical risks and greater participation by government officials, industry officials and public in the preparation of emergency response plans for target communities.

Result No. 2.1: Increased community involvement in technology disaster prevention and emergency preparedness and response for defined accident scenarios.

Result No. 2.2: Increased industry adoption of emergency preparedness and response plans.

- **Objective No. 3:** Improved response to technological emergencies and natural disasters.

Result No. 3.1: Periodic and regular testing of local emergency preparedness and response plans by computer simulation, desktop exercise, and live emergency drills.

Result No. 3.2: Strengthened national and regional technological disaster response networks.

## Annex 2: Individual Country Status Report

### Annex 2a. Individual Country Status Report Cumulative to June 30, 1997

#### COUNTRY: Mexico

Performance Indicators	Baseline	Cumulative Results
<b>1. Emergency Groups Formed</b>	Some industry mutual aid groups (CLAMs)	Stronger links established between CLAMs & LEPCs
1.1 increased preparedness	No local community representatives (government & public)	Veracruz State, especially Coatzacoalcos & Orizaba
1.2 more responders	Few trained emergency responders	Medical & hazmat response training conducted in Veracruz State & Mexico City
1.3 site replication		Monterey & Guadalajara are next, 11 new towns/cities in Veracruz are potential sites (see 2., below) LAMP-Mexico final report is being translated into Spanish to facilitate its use as a resource at other potential sites in Mexico and elsewhere.
<b>2. Increased Awareness</b>	Limited local community involvement in Emergency Planning	Improved local government & community awareness in Veracruz State
2.1 by community		Coatzacoalcos, Poza Rica, Veracruz City & Xalapa
2.2 by industry	Only large firms have on-site emergency plans, none have off-site plans	Large firms have both on-site and off-site emergency response plans; most medium & small firms have on-site plans, integrating off-site plans
<b>3. Improved Response</b>	Poor off-site Emergency Response infrastructure	Improved medical & hazmat response in Veracruz State
3.1 plan testing	No community exercises conducted before	Two full emergency exercises in Coatzacoalcos; Full-scale emergency exercise conducted in Cordoba-Orizaba in March 1997; desktop exercises in Poza Rica
3.2 national network	SINAPROC in place for natural disasters	CENAPRED utilizing & managing LAMP program technology to plan for chemical disasters; also, disseminating this information

**Annex 2b. Individual Country Status Report**

Cumulative to June 30, 1997

COUNTRY: India

Performance Indicators	Baseline	Cumulative Results
<b>1. Emergency Groups Formed</b>	On-site and off-site Emergency Plans required; few on-site plans prepared	Good links established between civil & industry emergency response groups
1.1 increased preparedness	Few local community representatives (government & public)	LEPCs established in Madras, Cochin, Kanpur & Baroda. Mumbai & Haldia LEPCs being formalized
1.2 more responders	Few trained emergency responders	Hazmat control and medical response training given to fire safety and medical personnel from various Indian states and specific LAMP sites.
1.3 site replication		Ministry of Environment and Forests, GOI, has asked WEC to propose an expansion of LAMP to 45 additional sites throughout India
<b>2. Increased Awareness</b>	No Community Exercises conducted before	Full community evacuation in Madras and Mumbai off-site emergency exercises
2.1 by community		Madras, Mumbai, Cochin & Kanpur -good; Baroda & Haldia - fair
2.2 by industry	Only a few large firms have emergency response plans	Most large & medium firms in Madras, Mumbai, Cochin, Haldia & Kanpur have emergency plans
<b>3. Improved Response</b>	Poor on & off-site emergency response infra-structure	Madras & Mumbai have ordered new fire & hazmat response equipment
3.1 plan testing	No community exercises conducted before	Madras (3 tests), Mumbai (1 test)
3.2 national network	Local government heads in charge of emergency response	National emergency response advisory committee has regular meetings.

**Annex 2c. Individual Country Status Report**  
Cumulative to June 30, 1997

COUNTRY: Thailand

Performance Indicators	Baseline	Cumulative Results
<b>1. Emergency Groups Formed</b>	Industrial On-site Emerg. Plan required; few off-site plans prepared	Industry "Safety Clubs" formed and active on monthly basis at both Map ta Phut and Bangpoo Industrial Estates; IEAT involvement strong at national/estate levels (i.e. building safety center in Map Ta Phut as model for other estates); some companies expanding off-site safety and cleanup procedures and services (good signs that individual industries are taking responsibility for their products once they leave the production facility).
1.1 increased preparedness	few local community reps involved in Emerg. Plng.	CAMEO loaded and in-use at local and national levels (in hospitals and mayoral offices at local level; Ministry of Industry, NESDB at national level); Transportation Emergency Response Information (TERI) database also being developed and used in Thai; Establishment of decontamination facility at Ban Chang Hospital (Map Ta Phut) - first ever in Thailand.
1.2 more responders	few trained emergency responders	Medical, hazmat, and train-the-trainer programs effective; raised level of awareness has prompted many equipment upgrades in both private and public emergency response units; responders are now more numerous and also better equipped. Training for medical response doctors & nurses at Ban Chang Hospital relative to new decontamination room.
1.3 site replication		IEAT will use both LAMP sites as models for improving safety and preparedness at other sites throughout Thailand. IEAT Deputy Governor, Tanya Hanpol established a national safety committee (with WEC representation) as permanent planning and policy committee for industrial safety affairs.

<b>2. Increased Awareness</b>	No Joint Industry & Community Exercises conducted before	Good links established between civil & industry Emergency Resp. groups; greater awareness at local, regional, and national levels; all groups highly aware of chemical emergency risks and ramifications.
2.1 by community  2.1 (contd.)		Little progress to date to directly involve the public in safety activities, although mock drill activities do give good publicity; communities are safer due to great progress at government and industry levels; community members also benefited via residual (trickle down) effect of program. The general population is aware, generally speaking, of the inherent dangers that exist; however, more should be done to directly involve community members.
2.2 by industry	only few large firms have emergency plans	Better mutual aid among industry; positive "competitive rivalries" developing among companies to improve safety standards (i.e. safety awards given at Bangpoo, integrated response plans accepted at both sites); increase in awareness leading to increased purchases of response/safety equipment at both sites
<b>3. Improved Response</b>	No integration of on & off-site Emergency Response	Improved cooperation between industry & local mayors; integration of emergency response now common in response planning. Medical teams involved in response, too.
3.1 plan testing	no community exercises conducted before	Mock drills conducted regularly at both Map Ta Phut and Bangpoo.
3.2 national network	weak national emerg. response network	Electronic emergency database of transportation response information developed in Thai; CANUTEC hazmat guidebook also published in Thai. Ongoing efforts to continue developing national and local use of CAMEO.

**Annex 2d. Individual Country Status Report**  
Cumulative to June 30, 1997

COUNTRY: Indonesia

Performance Indicators	Baseline	Cumulative Results
<b>1. Emergency Groups Formed</b>	Industry mutual aid groups (BILIKs) in place; no community representatives.	Links between SATKORLAK PBAs and BILIKs (mutual aid groups) in Serang (Cilegon) & Gresik Counties
1.1 increased preparedness	Few local community representatives (government & public)	Municipal authorities from cities nearby to Cilegon & Gresik are involved
1.2 more responders	Few trained emergency responders	Medical response seminars held in Cilegon & Jakarta
1.3 site replication		BAPEDAL drafting a decree to authorize LEPCs at all industrial estates in Indonesia and have asked WEC to assist in this expansion.
<b>2. Increased Awareness</b>	No community exercises conducted before	Improved awareness in cities near chemical industries.
2.1 by community		Communities near to Cilegon & Gresik will be involved in future exercises.
2.2 by industry	Only few large firms have emergency plans	Cilegon and Gresik have separate Emergency Response Teams in four different zones
<b>3. Improved Response</b>	Poor integration of on & off-site emergency response planning	Improved coordination of industry & government planning in Serang and Gresik Counties
3.1 plan testing	No community exercises conducted before	Regular desk-top and on-site emergency exercises conducted in Cilegon and Gresik
3.2 national network	BAKORNAS PBA for natural disasters	GOI adding technological disaster planning to BAKORNAS PBA

### **Annex 3: Typical Agendas for Different Types of LAMP Program Activities**

This section outlines the objectives, target groups and agendas and formats for various LAMP activities. The agendas have been drawn in consultation with local/federal governments, industries associations, community groups and others to ensure they suit local conditions and requirements to be able to achieve maximum benefit out of each activity. The workshop itineraries and training schedules shown are taken from previous LAMP activities as a means of describing the standard scope and content of these initiatives. In some cases, trip report excerpts are also used to clarify expert roles and outcomes of the events. In most LAMP activities, in addition to main agenda as described below, the following events were common.

- Registration of participants
- Inauguration by Ministers/Head of the Local Government/other dignitaries and speeches etc.
- Local speakers on key note addresses on local legislation, practices etc.
- Luncheon/Dinners were mostly hosted by the industries and other hosts
- A valedictory function to sum up the events and circulate the recommendations emerging out of the activities and forward to the chief guest speaker or to the Government/Industries/ and others for appropriate action.
- Evaluation by participants
- Issuing of certificates to all the participants
- Coverage by local/regional/national newspapers, TV and Radio

#### **APELL Seminar/Workshops**

An APELL seminar/workshop is normally the first activity conducted at a particular LAMP site, in cooperation with UNEP/IEO. The APELL S/W is designed to impress government, community, and industry representatives at LAMP sites with the importance of raising the level of awareness of technological risk. APELL workshops communicate the fundamental concepts of the APELL process, familiarize participants with ten-step approach put forth by APELL, and also engage participants in emergency planning and management exercises designed to further understanding of APELL and stimulate interest in improving emergency response systems. A typical agenda includes the following items:

- Introduction to APELL Process & Partners
- Technological Accident Prevention & Emergency Response Program:
  - Role of Industry
  - Role of Government
  - Role of Community Leaders
- APELL Case Study (International Experience)
- Present Status of Emergency Preparedness at Host Sites

- Current Legislation and Regulatory Frame Work
- Formation of Coordinating Group (LEPC)
- Implementation of APELL Process
- Communicating Risk to the Community
- Off-Site Emergency Preparedness
- Developing an Emergency Response Plan
- Table-Top Exercise of the Plan
- Hazard and Risk Analysis Using EPA Methodology
- Groups Discuss Assigned Issues:
  - Starting Local Level APELL Process
  - Building Community Awareness
  - Preparing for Emergencies
  - Hazard Identification & Evaluation.
- Draft Recommendations & Discussion
- Emergency Planning Technology-Introduction to CAMEO

### **Chemical Emergency Preparedness and Prevention (CEPP) Training**

The participants in the course are senior policy makers for chemical disaster management and planning from industry, government, community and others connected with emergency planning and response. This course deliberates extensively the methodology for developing good emergency plans, chemical accident prevention systems, chemical hazard analysis and vulnerable zones, community involvement programs and chemical accidents prevention measures. It normally concludes with a table top exercises to help participants improve disaster management systems. The course was developed by EPA's Chemical Emergency Preparedness and Prevention Office and provided to WEC for use on the LAMP Program. After some free-standing applications of the Course, it was decided that elements of the CEPP should be included in APELL Seminar/Workshops (see Agenda above).

A typical CEPP training course includes:

- The Safety Continuum
- Forming the Planning Group
- Introduction to the Planning Process
- Policy, Legal Framework and Measures
- Hazards Analysis (three steps: screening, setting priorities and hazards identification)
- Vulnerability analysis
- Risk Analysis, Developing Scenarios
- Developing an Emergency Response Plan
- Present Status of Disaster Preparedness at Host Site
- Personal Protection Strategies
- Communicating Risk to the Public

- Gathering and Managing Information for Emergency Preparedness
- Introduction to Chemical Process Safety
- Measures on Accident Prevention & Emergency Response at Host Site
- Using Exercises to Test the Emergency Plan
- Panel Discussion and Recommendations
- Discussion on Recommendations
- Demonstration of use of the Computer in Planning and Response (CAMEO)

### **Community Education and Outreach (CEO) Workshop**

When chemical accidents occur, it is the public which become victims of such accidents. The industry may have good plans and trained first responders, and the local government may have all resources to handle chemical accidents, but all these will be effective and successful only when the public acts quickly and responsibly during a chemical emergency. The CEO workshop educates and trains different community groups on what actions they can take to protect themselves and their families. As a first step, participants learn of the chemical risks extent in their community. Practical methods of communicating and educating different citizen groups are then learned and practiced. This part of the workshop is the most important element of CEO, where the trainers get the experience of developing messages to suite their community. They are asked to identify different target groups in their community and to develop messages and methods for practical presentation of the message to different audience groups. In addition, the participants learn generalized communication techniques, e.g. purpose of communication, effective communication, non verbal communication techniques, things to consider while delivering the message, techniques for giving speeches, etc.

Typical agenda items are:

- Legal Provisions in USA & in Host Country
- LEPCs in USA: Roles and Functions
- Introduction to Community Awareness/Education
- Shelter in Place/Evacuation
- Community Awareness - International Experience under LAMP
- Community Awareness Programme by Industries and Local Community Groups
- Videos on explosions, fire drills, "do's and don'ts", shelter-in-place, evacuation, etc.
- Group Work on Developing Messages, Modes of Communication, Presentations etc.
- Recommendations and Discussion

### **Risk Assessment in Process Industries Workshop**

This workshop is designed for senior technical process engineers, design engineers, safety engineers who are responsible for safe operations of industrial plants with chemical process facilities. Typically, the participants will know a great deal about the topic, but welcome the opportunity to share their experiences with other professions, including the foreign expert(s).

The topics covered include:

- Overview of Process Safety Management
- Identification and Classification of Hazardous Sites and Installations
- Hazard and Operability Study & Exercises
- What If Analysis & Exercise
- Fault Tree/Event Tree Analysis and Exercises
- Overview of Recent Developments in the Process Safety Area
- Estimation of Consequences: Vulnerability Analysis
- Incident and Unified Command system for Business and Industry
- Criteria for Development of emergency Plan
- Introduction of Computer Software for Technological Accidents: CAMEO

### **Hazardous Materials Emergency Response Workshops**

Hazardous Materials Emergency Response training activities are designed to provide emergency response teams with practical skills and hands-on experience in responding to hazardous materials accidents. LAMP Hazmat training typically cover a wide range of issues and provide participants with a chance to practice what they learn so that mock drill activities and other continuing training exercises will be of benefit to them to further develop their skills. Hazmat training focuses on the following topics:

- Host Country Requirements relating to Hazardous Material Emergency Response
- US Regulations for Emergency Response
- Characteristics of Hazardous Materials
- Chemical Toxicology
- Identification of Hazardous Materials
- Incident Command System
- Levels of Protection/Chemical Protective Clothing
- Initial Site Survey & Reconnaissance
- Confinement & Containment of Hazardous Materials
- Exercise - Level B Dressout/SCBA Checkout Container Plugging & Patching
- Communications Exercise
- Exercise: Level A Dressout & SCBA Checkout

- Decontamination Exercise
- Field Instrument Exercise
- Exercise: Emergency Response Equipment Composition
- Case Studies

Practical exercises and problem solving drills are conducted to impress upon participants the practical aspects of topics presented in the classroom. A field exercise is scheduled at the end of each workshop to test student comprehension of the material covered and also give participants experience in performing under the pressure of an emergency situation. The field exercise may simulate a fire in chemical process facilities on-site in one of the plants or an off-site vehicle collision involving a truck carrying dangerous chemicals and a passenger vehicle. The scenario includes one or more unconscious victims requiring evacuation by emergency response personnel and subsequent chemical decontamination of responders and the victim(s). Responders are radio equipped and are required to initiate the 'incident command system protocol' to successfully handle all aspects of the simulated emergency. A critique of the scenario is given after completion of the exercise and student questions are answered.

### **Medical Response to Chemical Emergencies Workshop**

These workshops can be presented at several levels, depending on the level of medical expertise of the recipients (doctors, nurses and on-site first responders) and their respective roles in (1) on-site medical response and (2) treatment of medical wounds and injuries in the hospital or emergency medical treatment center off-site.

General topics for the seminars may include:

- planning for emergency medical response to chemical disasters;
- medical treatment of chemically contaminated patients; and
- chemical hazard and vulnerability assessment.

The output of this effort will be to draft an emergency preparedness plan that can be used as the basis for conducting mock emergency drills and organizing chemical accident prevention programs. It will also provide details on chemical risks at these sites and help guide discussions with local medical and emergency response officials. More technical training assumes that:

- \* there has been a prior documentation of illustrative chemical risks at industrial estates and the kinds of accidents that could occur, medical impacts on persons working on or near the facilities and recommendations of actions to prevent, mitigate and respond to the medical and public health consequences of chemical emergencies.

- \* evaluation of existing on-site and off-site plans for medical response to chemical emergencies and the availability of some specialized antidotes, patient de-tox facilities and primary treatment for burns.

Visiting experts and local officials may conduct surveys of health care facilities near selected high-risk chemical and industrial production facilities followed by workshops/seminars on industrial emergency preparedness and response at medical institutions for the relevant local medical and public health community. At the conclusion of each hospital audit, special attention is given to providing suggestions to hospital staff for improving off-site emergency plans (e.g., documentation of chemical risks for morbidity and mortality, scenarios of likely disasters and important actions to be taken to respond to each scenario) and the relationship of those plans to the local public health community and other relevant emergency response sectors (e.g., primary treatment centers, local health departments, fire services, civil defense, industrial and occupational health community).

Typical agenda items include:

- Introduction & Overview
- Concept of Industrial Hygiene
- Worst Case Models, Emergency Exposure Limits and Risk Assessment
- Incident Command Systems
- Roles of Medical Personnel
- Training Perspectives for Emergency
- Establishing & Managing Poison Control
- Toxic Lung Exposures
- Toxic Skin Exposures
- Toxic Eye Exposures
- Heat Stress
- Source of Information
- Common Systemic Toxic Exposures
- Role of Poison Control Centers
- Secondary Contamination/Decontamination Procedures, EMS & Hospital Protocols
- Demonstration of Protective Equipment

### **Safe Transport of Hazardous Materials Workshop**

LAMP's hazmat transportation workshops are conducted to give policy makers, regulatory agencies, industry and its transported, trucking associations, first responders, port authorities, civil defense group, and others an in depth look at U.S. and Canada hazmat transportation systems and their possible application in the host country. Topics covered include the U.S. legal and regulatory framework, the history of hazardous

materials transportation systems in the U.S., emergency response mechanisms for transportation incidents, and training and compliance standards.

- Host Country Legislation and Provisions Dealing with Transportation
- Guidelines for Safe Transportation of Hazardous Chemical-U.S. & Canadian Laws
- U.S. System: Major Players & Their Roles in HAZMAT Transportation
- Role, Responsibility and Liability of Transporters of Hazardous Substances
- U.S. System for Hazardous Material Transportation
- Action Programme for implementation of Statutory requirements related to Chemical Transportation Emergency Response System in US at National & Local Levels
- System for Transportation & Emergency Response
- Training arrangements in U.S. for Safe Transportation and Emergency Response
- Group Working on Recommendations

### **Oil Spill Control Training**

Presentations are designed for officials responsible controlling and/or cleaning-up oil spills on water or on land. The presentations include: inland spill case study; sorbent usage and management; dispersant usage and management; boom theory and application; associated problems with oil on water; oil in the environment; shoreline protection and case study. The participants for this training course are from oil or petrochemical companies, coast guards, port and dock safety authorities, fire brigades and other first responders.

A typical agenda includes:

- Inland Spill Case Study: Colonial Pipeline (inland waterway)
- Sorbent Usage and Management
- Dispersant Usage and Management
- Boom theory and Application
- Associated Problems with Oil on Water
- Oil in Environment
- Shoreline Protection
- Case Study: Mega Borg/Apex

### **CAMEO Workshop**

Two-day CAMEO training is organized for first responders of chemical emergencies and other persons requiring an in-depth understanding of the capabilities of CAMEO. This might include fire personnel, medical response groups, police officials, officers from regulatory agencies, local government and chief inspectorate of factories, and LEPC members. A one-day familiarization on CAMEO may also be provided for technical

participants in the risk assessment in process industries workshop. This may include introduction and use of CAMEO as important tool; chemical database; facility information module; introduction to hazard analysis process and calculation of vulnerability zones; modules including transportation, regional information, population, contacts, resources modules etc; Area Locations of Hazardous Atmosphere (ALOHA) model and mapping systems, etc.

Typical workshop agenda items are:

- History of CAMEO, Information Management Issues
- Chemical Database: Hands-on Training
- Facility Information Module: Hands-on Training
- Introduction to Hazard Analysis Process
- CAMEO Hazard Analysis Modules
- Aerial Locations of Hazardous Atmospheres (ALOHA)
- ALOHA Model: Hands-on Training
- Introduction to CAMEO Mapping Module & Interfacing Mapping Module with CAMEO Database and ALOHA Air Dispersion Plume

### **Planning and Conducting Emergency Drills**

Local LAMP Program staff or representatives engage local industry, government, and community leaders in an attempt to improve local emergency response and planning capabilities. This process requires that WEC work with local groups on an ongoing basis to bring focus to disaster planning issues and stimulate dialogue between groups that will need to cooperate in the event of a chemical disaster.

The participants include: Local Govt., Fire Brigade, Medical Services, Police, Industries, Pollution Control Board, Transport Department and Social Services;  
Topics Handled are: Accident Scenarios suggested by local LEPC-like group to reflect real chemical threats in that Community.

All needed materials and resources are donated/supplied by local industry, government and emergency response services.

#### International Observers:

(from multi-national industry, WEC, UNEP, EPA, CDC, etc.)

Local Observers: Industry Personnel, Factory Inspectorate, District Collector and local government authorities.

#### Activity Highlights:

- i) Conduct table-top exercise in advance of drill
- ii) Community evacuation during drill

Recommendations stemming from drill may include:

- Strengthen direct links between industry & community
- Notify press in advance of drills to maximize impact at local level
- Improve involvement of community groups (Rotary Club, Chamber of Commerce, railways and police, etc.)
- Identify and secure modes of communication in the event of telephone failure
- Maintain wireless equipment in good working condition
- Streamlining of traffic
- Improve approach roads
- Increase frequency of table-top exercise
- Improve capability/use of real-time air modeling by Pollution Control Board and industry during emergency
- Pollution Control Board should monitor affected area and communicate observations to safety zone
- District authorities to compile/update and disseminate information on emergency requirements
- Technical expertise available in the area to be compiled and information made available
- Assess and revise as necessary, location of safety zone
- Government employees to wear identity cards
- Improve time for evacuation of emergency zone
- Government agencies initiate action only after receiving information about emergency.

**Note:** Recommendations stemming from emergency drill evaluations are made during the post-drill evaluation meeting, which is attended by the international observers, industry representatives, local associations and media, and local government authorities. These recommendations are an essential part of providing local leaders with the ability to build on their training achievements and make successive drill activities more complex and realistic.

#### Annex 4: List of Experts Used in LAMP Activities and Events

The following experts from different organizations provided services for LAMP activities and events in different countries:

Name of Expert	Organization	Type of Activity Conducted	Country(ies)/Nos. of Activities
Tom Voltaggio	U.S. EPA, Phila., PA	APELL - Hazardous Chemical Mgmt.	India(3), Thailand
Sherry Fielding	U.S. EPA, Wash., DC	APELL - CAMEO & CEPP Training	India(3), Thailand, Mexico
Jennie (Records) Davey	Boise Fire Dept., Idaho	APELL - Role of Community and Emergency Drill Evaluation	India (6)
Robert Boldt	Dow Chemicals, Sarnia Canada	APELL - Role of Industry and Safety Audit	India(4), Thailand, Indonesia(2), Mexico
Scott Munro	Lambton Industrial Society, Sarnia, Canada	APELL - Role of Industry	Brazil
Gustave Dell	Barranquilla, Colombia	APELL - Role of Community	Brazil
Craig Matthiesson	U.S. EPA, Wash., DC	Hazardous Chemicals Mgmt. Evaluation	Thailand
Michael Callan	Consultant, New Haven, CT	Fire Protection Evaluation	Thailand
John Ferris	U.S. EPA, Wash., DC	Hazmat Risk Assessment & CAMEO Training	Thailand, Indonesia(2)
Dr. Eric Noji	U.S. CDC, Atlanta, GA	Medical Response to Chem. Accident & Audit of Response Facilities	Thailand (3), India(2), Indonesia(2)
Dr. Scott Lillibridge	U.S. CDC, Atlanta, GA	Medical Response to Chem. Accident & Audit of Response Facilities	Thailand(2), India(2), Mexico
John Gustafson	U.S. EPA, Wash. DC	Emergency Plan Evaluation	Jamaica
Henry Hudson	U.S. EPA, Atlanta, GA	Hazmat Mgmt. Evaluation	Jamaica
Robert Young	Consultant, Sarnia, Canada	APELL - Basic Concepts	India, Mexico
Paul Sullivan	WEC, Arlington, VA	Research on Hazmat Legislation and Assessment of Training Activities	Costa Rica, Mexico
William Finan	U.S. EPA, Wash.,DC	Chemical Emergency Preparedness	India(2), Thailand, Mexico, Czech

Katherine Piva	U.S. EPA, Wash., DC	& Prevention (CEPP) Training	Republic
Scott Engle	PRC, Cincinnati, OH	CEPP Training	India(2), Thailand
Charles Gazda	U.S. EPA, Dallas, TX	CEPP Training	India(2), Thailand
Lisa Raudelunas-Hiscano	WEC, New York, NY	APELL-CAMEO & Hazmat Planning	Indonesia(2)
Don Carloss	Texas A&M University Extension Services (TEEX), College Station, TX	Chemical Risk Assessment Industrial Fire Safety Seminars & Training	Indonesia(2) Mexico, India(2), Thailand(2), Indonesia (5)
Pete Benion	TEEX, College Station, TX	Chemical Spill Control & Hazmat Response Training	Mexico (2)
James Steves	U.S. EPA, Dallas, TX	Hazmat Handling	Mexico
Chakthep Senivongs	WEC, Thailand	CEPP, CAMEO Training and Emergency Exercise Planning	Indonesia (4)
Mary Evans	U.S. NOAA, Seattle, WA	Risk Assessment & Modeling	Mexico
Kim Fletcher	U.S. EPA, Wash., DC	APELL - Role of Government and Emergency Drill Evaluation	India(3)
Harry Jayasingha	ADPC, Bangkok	Natural Disaster Management	Thailand, India, Indonesia
Dr. Hank Siegalson	Emory University, Atlanta, GA	Medical Response to Hazmat Accidents	Mexico
Dr. Miguel Trevino	Consultant, Matamoros, Mexico	Medical Response to Hazmat Accidents	Mexico
Robert Richard	U.S. Dept. of Transport- ation, Washington, DC	Safe Transportation of Hazmat	Mexico
Richard Chatterton	Texas A&M University, College Station, TX	Safe Transportation of Hazmat	Mexico
Beth Romo	U.S. Dept. of Transport- ation, Washington, DC	Hazmat Transport Procedures	Mexico
Sharon MacDonald	Transport Canada, Ottawa	Hazmat Transport Procedures	Mexico
Meo Van Der Hooft	Akzo Nobel, Holland	Risk Assessment in Process Industries	India(2), Indonesia(2)
Peter Gattuso	U.S. EPA, Wash., DC	Advanced CAMEO Training	India(2)

James Rountree	TEEX, College Station, TX	Seminars and Training in Response to Hazmat Accidents & Incidents	India (4), Indonesia (4), Thailand(2)
Elizabeth Gonzalez	LEPC, Pasadena, TX	APELL-Role of Community and Community Outreach Training	India (5), Indonesia, Mexico (3)
David Thwaites	UNEP/IEO, Paris	APELL- Role of Industry and Emergency Drill Evaluation	India(2), Indonesia
V. Srinivasan	WEC, Arlington, VA	Community Outreach Training	India (4), Indonesia(2), Mexico (3)
Jerome Joyce	U.S. CDC/ATSDR, Atlanta, GA	Medical Response to Pesticide Poisoning	Mexico
Scott Wright	U.S. CDC/ATSDR, Atlanta, GA	Medical Response to Pesticide Poisoning	Mexico
Mark Horwitz	U.S. EPA, Chicago, IL	APELL - CEPP Training	India, Indonesia
Ken Borgfeldt	Exxon, Pasadena, TX	APELL - Industry Role and Community Outreach Training	India(3)
Richard Williams	WEC, Arlington, VA	Evaluation of Emergency Response Capabilities	Jordan
Kathleen Shimmin	U.S. EPA, Wash., DC	APELL - Role of Government	Mexico
Randall Patton	TEEX. College Station, TX	Hazmat Response Training	Mexico
Dr. Jonathan Borak	Consultant, New Haven, CT	Medical Response to Chemical Accidents Training	Thailand, Indonesia, India(3)
Eric Steinhouse	U.S. EPA, Denver, CO	APELL - Govt. Role & CAMEO	Mexico
Sandra Gabbert	LEPC, Pasadena, TX	Community Outreach Training	Indonesia(2), India(2)
Dr. John Read	Transport Canada, Ottawa	Hazmat Transport Training	India(3)
Michael McGrath	Dupont, Wilmington, DL	Hazmat Transport Training	India(3)
Alex Quintanilla	Loredo Fire Dept., TX	Emergency Drill Evaluation	Mexico (2)
Benjamin Galvan	Protection Civil, Loredo, Mexico	Emergency Drill Evaluation	Mexico
John Morton	UNEP/IEO, Paris	APELL Concepts	Mexico

## **Annex 5: Collaborating National and International Organizations**

### National/International Government Agencies:

- Chemical Emergency Preparedness and Prevention Office (CEPPO) of the U.S. Environmental Protection Agency
- National Center for Environmental Health - Division of Environmental Hazards and Health Effects (DEHHE) of the U.S. Centers for Disease Control and Prevention
- U.S. Agency for Toxic Substances and Disease Registry (ATSDR)
- U.S. National Oceanic and Atmospheric Administration (NOAA)
- U.S. Department of Transportation (DOT)
- Directorate General of Transport Canada
- Federal Emergency Management Agency, USA
- United Nations Environment Program - Industry & Environment Office (UNEP/IEO), Paris
- Ministry of Labor, Government of India (GOI)
- Director General of Civil Defense, Federal Ministry of Home Affairs, GOI
- Federal Ministry of Environment & Forest, GOI
- Federal Ministry of Surface Transport, GOI
- Federal Ministry of Health and Family Welfare, GOI
- State Government Ministries in India
- Institute of Occupational Safety and Health, Prague, Czech Republic
- City of Baranquilla, Columbia
- Local governments in LAMP sites in Indonesia, India, Thailand & Mexico
- Map Ta Phut and Bangpoo Industrial Estates, Thailand
- National Economic and Social Development Board, Thailand
- Asian Disaster Preparedness Center, Bangkok
- State Government of Veracruz, Mexico
- Gobencion (Ministry of Interior), Mexico
- BAPEDAL (Ministry of Environment) in Indonesia

### Private Industries and Institutions:

- National Safety Council (Bombay) and its Indian Chapters, India
- Boise Fire Department, Boise, Idaho, USA
- Texas Engineering & Extension Service, Texas A&M University System, USA
- Local Emergency Planning Committee, Pasadena, Texas, USA
- National Institute for Chemical Studies, USA
- Chemical Manufacturers Association, USA
- Lampton Industrial Society, Sarnia, Ontario, Canada
- Industries Associations in India, Indonesia, Mexico and Thailand
- Zurich Insurance Group, Mexico

IEF Companies Participating in LAMP Program:

- Dow Chemicals
- Shell
- Akzo Nobel
- Exxon
- Ciba Giegy
- Mobil Oil
- Dupont

Individual private consultants in specialized fields:

- Michael Callan, FTA Consultants, USA
- Robert C. Young, Canada
- Dr. Lester Bynum, USA
- Scott Engle, Planning Research Corporation, USA
- Hank Siegalson, Emory University, USA
- Miguel Trevino, Mexico
- Jonathan Borak, Jonathan Borak Associates, USA

Others:

WEC technical experts from India, Indonesia, Thailand, New York, Washington, D.C. & Mexico. Local experts in India, Indonesia, Thailand and Mexico from Government, Industries and NGOs

## **Annex 6: Important Lessons Learned about the Sustainability of Local Accident Mitigation and Prevention Programs**

**LAMP is most successful when working with people and groups that are highly motivated to address the problems associated with industrial accident planning, prevention, and mitigation.** In conducting any development program it is too easy to see the final outcome as a function of the project alone. It is more accurate to say, however, that any prototype project, such as LAMP, is merely a part of the overall development process taking place. Success requires that project managers identify supportive stakeholders and work closely with those groups. For any industrial or environmental initiative, where legal, regulatory, and political forces play a large role, it is mandatory that government and industry participants provide funding and resources that serve project objectives.

**Effective intervention requires the leadership of a committed LAMP Country Manager.** This person may come from a national/regional organization that shares the goals of the LAMP program. Absent such an organization, WEC should recruit/select a qualified local leader with a back-ground in environmentally-responsible industry.

A corollary to the first lesson learned, this observation relates to the critical role played by an in-country program leader. Since LAMP programs deal with myriad issues ranging from the technical aspects of first responder roles to the political sensitivity regarding the public's "right to know," the experience, credibility and dynamism of the country program manager is imperative. In choosing the right organization/person to spearhead similar programs, organizing groups should look for someone committed to the program, and not someone qualified to simply carry out the fundamental roles and responsibilities of the job.

**Local industrial "safety clubs" or LEPC-like organizations provide a platform of essential support for the LAMP program.** To achieve program goals that improve emergency response in the short-term and remain effective in the long-term, LAMP programs must be supported by organized leadership at each site. If local planning groups or safety clubs are not yet formed in a cohesive manner, an organization or donor agency should strongly consider the option *not* to initiate LAMP activities. The process of mobilizing forces is much more cost-effective and likely to succeed than any attempt to organize concerned parties, introduce safety and APELL planning concepts, only then to begin the process of developing and/or strengthening existing emergency mechanisms.

**The development of prototype systems that can be replicated throughout the country requires that LAMP, within the confines of available funding, works intensively at a few selected sites.** For strategic planning and performance monitoring, there is a need to concentrate LAMP program activities at one location to obtain maximum impact and enable full program completion for replication at other sites. Once the first site begins the LAMP process, other sites may be added on a selective basis.

**To ensure regular contact with program organizers, a full-time emergency coordinator reporting to the local authority should be appointed in each high risk local area.** When

dealing with multiple sites spread out over a large geographic area, program organizers should recognize the need for regular and ongoing contact with local level leaders. Given this need, programs such as the APELL-LAMP program should appoint a local coordinator or liaison on a full-time basis. Regular contact between local stakeholders from different LAMP sites and the exchange of information that results from these types of interaction is an effective way of motivating and mobilizing local stakeholders. As a first step in helping local coordinators to develop a vision of what is possible through community-based emergency preparedness, a visit to the U.S. is recommended so that local coordinators can meet with emergency response professionals and learn about options for improving emergency preparedness.

**Emergency response infrastructure is a primary indicator of a community's preparedness for the LAMP program.** Training and workshop programs provide basic awareness to the attendees. However, without the availability of modern response equipment and protective gear, the ultimate level of preparedness to respond effectively to hazardous materials emergencies will be limited. Training first responders without providing appropriate safety equipment can also lead to a potentially life threatening, false sense of competency on the part of responders. If suitable safety equipment is not currently available at sites where training is to be conducted, programs should be developed by taking into account the resources available and the likelihood that equipment upgrades will be made in the near future. At LAMP sites in Indonesia, Mexico and Thailand, much of the required emergency response equipment has come from industry, which purchased the equipment for its own in-plant emergency needs. In many cases this equipment has been made available through the local LEPC for use on off-site emergencies, as well.

**Given these conditions and local capabilities, particular interventions and seminars/training programs should be organized and conducted jointly with the appropriate groups.** The format and agendas for different types of LAMP activities are given separately. However, it is important that these LAMP activities build on the capabilities already existing in a local community and respond to their needs at that particular time. It is expected that "needs" will evolve over time, in relation to new learning objectives that are identified each time an emergency drill is conducted. The drills, themselves, should be progressively more complex and against different plausible accident scenarios that are likely to occur in a particular community.

**To effectively improve emergency response capabilities, mock emergency drills must be conducted frequently.** Experience under the APELL-LAMP program shows that it takes several rehearsals annually to reach a reasonable level of preparedness. Local areas should, therefore, be prepared to rehearse off-site emergency plans on an ongoing basis. Annual off-site mock emergency drills have now become required by law in India.

**Communicating basic safety messages to the general public is an important first step in building community awareness.** APELL-LAMP community awareness workshops stressed key messages, such as: "When you hear the emergency siren, go indoors, close windows and listen to the radio for further emergency instructions." The implementation of this advice in an actual emergency scenario requires two critical, yet frequently overlooked, conditions: that communities have a working emergency broadcasting system; and that local residents have

access to adequate shelter (such as schools, community centers, municipal buildings, etc.) if homes do not have proper windows and doors.

**National guidelines are needed to indicate chains of command and areas of responsibility in emergency situations.** In an off-site fire, for example, it is often unclear as to who should assume the overall command of directing emergency response activities. In cases where public fire services and the industry fire services could both intervene, appropriate planning is needed to ensure more timely and effective response. A national advisory committee (NAC) for major industrial accidents prevention may be useful in this context. This NAC should represent the three partners involved in chemical emergency planning: government, industry and community. The idea is to gather expertise and input from different perspectives of the emergency preparedness equation, and thereby build support for mutually satisfactory solutions.

## Appendix A

### **Opportunities for Expanding Community-based Emergency Preparedness to Other Sites in India, Thailand, Mexico and Indonesia or to other Countries**

The LAMP Program has proved to be an effective means for promoting and expanding community-based emergency preparedness in developing countries, just as SARA Title 3 has done in the U.S. through the validation of local emergency planning committees (LEPCs). That is, the LAMP focuses on communities that are concerned about the wide-spread presence of known and unknown chemical and toxic threats and are thus motivated to take control of their own safety through improved emergency preparedness, response and accident prevention. These LEPCs once established become a vehicle for protecting communities against any type of disaster, natural or technological.

This concept has been embraced by UNEP/IEO through its support of the APELL Program. Altogether, some 50 plus governments have signed on to the APELL concept. However, to carry this concept to reality requires that local industries and community action groups join with local governments to coordinate the energies and fears of all stakeholders into constructive actions to make the community more safe. The LAMP Program has succeeded, we believe, in doing this for the communities on which the Program has focused in India, Thailand, Mexico and Indonesia.

WEC has the knowledge and contacts to expand the LAMP Program to other sites in the four target countries or to certain other countries that have embraced the UNEP/APELL concept. WEC is seeking additional funding to extend the LAMP program in some core countries, while expanding to new countries in different Regions of the world. In particular, WEC seeks additional funds for Latin America (Mexico, Venezuela, Brazil, Jamaica, Ecuador, Peru and/or Argentina); Middle-East and North Africa (Turkey, Jordan, and/or Egypt); Asia (India, Indonesia, Malaysia, and/or Philippines); and/or Eastern Europe, Russia and Newly Independent States. WEC has contacts and suggested sites in each country and would be pleased to have a dialogue with OFDA as to which regions and countries fit the funding priorities of OFDA. In extending the LAMP Program to new countries, WEC would utilize its trained staff in the four target countries as experts in the design of community-based emergency preparedness programs in new countries in the same Region. For example, WEC/Mexico has a significant quantity of training and other reference materials available in Spanish that could be easily adapted for use in other Latin American countries. Additional details on the contacts of WEC in each country are given below.

**Regions and Countries Where WEC Could Initiate or Extend  
the APELL-LAMP Program**

**Latin America**

1. Mexico

The LAMP Program has mostly focused on selected high-risk sites in Vera Cruz State on the east coast of Mexico, especially in Coatzacoalcos, Vera Cruz, Orizaba & Poza Rica.

The impact and sustainability of the present LAMP program is illustrated by the recent emergency response exercise and evaluation conducted in March 1997 in Cordoba/Orizaba, in cooperation with the Civil Protection of Veracruz State. The firm commitments and cooperative efforts of industry, local, state and federal governments and community demonstrated a broad participation in the drill and plans to continue these efforts.

The Ministry of the Interior has asked WEC to replicate the LAMP program in other important industrial areas of the country outside of Veracruz State and catalyze the development of local emergency response capacity with the goal of reaching self-sustainability at each site.

2. Brazil

WEC has had long-standing contacts with civil protection and industry association officials in Brazil regarding chemical safety matters. Under the LAMP Program, WEC financed the participation of industrial NGO officials from Sarnia, Canada and Barranquilla, Colombia in an APELL S/W in Maceio, Brazil in 1992.

3. Venezuela

The WEC/Mexico LAMP Coordinator assisted UNEP/IEO in conducting separate APELL Seminar/Workshops in Maracaibo and Puerto la Cruz. All travel and per diem expenses were paid by UNEP, Petroquímica de Venezuela (PEQUIVEN) and the Corporativo de Venezuela (CORPOVEN).

4. Jamaica

At the request of civil protection officials in Jamaica, in early 1993 WEC financed the an assessment of catastrophic risk and evaluation of emergency response plans for the port of Kingston.

5. Ecuador

WEC has cooperated with the Fundacion Natura on presenting seminars on chemical risk assessment.

6. Peru

WEC has cooperated with a number of different NGOs on studies to treat different hazardous waste and in organizing pollution prevention centers.

7. Argentina

Over the past two years, UNEP has conducted several APELL S/Ws in Argentina and has unfulfilled requests for providing training in risk assessment, emergency planning and hazmat transport.

**Asia**

1. India

Industry, local government and community leaders continue to work together in local emergency planning and response activities at the six existing LAMP sites (Madras, Mumbai, Cochin, Kanpur, Vadodara and Haldia. In August 1996, the Ministry of Environment and Forests issued new regulations on "Rules on emergency planning, preparedness and response for chemical accidents" under the Environment (Protection) Act of 1986. These regulations authorize the setting up of local level crisis groups (similar to U.S. LEPCs), district level crisis groups, state level crisis groups and a federal level crisis group.

To help implement the new regulations, the GOI has requested funding from the World Health Organization (WHO) to extend the LAMP Program in India for four more years and replicate the LAMP in 45 industrial pockets throughout India. This expansion will build on the technical training capabilities developed in the National Safety Council of India by the existing LAMP Program, the organization skills of local coordinators at existing LAMP sites and the cooperation of WEC's network of international experts.

In a related effort, the GOI has requested World Bank funding to initiate new programs for chemical accident prevention, set up and equip emergency response centers throughout the country and improve local capability to train hazmat and medical response personnel.

2. Indonesia

The LAMP program has organized different emergency response planning, training programs and exercises in West Java (Cilegon & Tangerang) and Gresik/Surabaya in East Java. Different industry mutual response ("CERT") teams in Cilegon continue to develop local capacity for emergency planning and response during the phase-out of WEC assistance. CERT team members from the Gresik industrial area are closely monitoring the efforts in Cilegon and thus are also moving toward greater effectiveness and self-sustainability.

The environmental enforcement agency of Indonesia ("BAPEDAL") has drafted regulations that mandate the establishment of community-based emergency planning groups at high-risk

industrial sites throughout Indonesia. BAPADEL is asking different international funding agencies to finance the services of WEC to help implement the new regulations in more selected high-risk industrial zones.

3. Malaysia

The Ministry of Manpower requested WEC to initiate a chemical safety assessment and accident prevention program. In early 1996, a WEC official made a follow-up presentation of WEC capabilities.

4. Philippines

From April 1994 - March 1995, WEC provided technical assistance to the Department of Environment and Natural Resources (DENR) of the Government of the Philippines. Using funds from the Metropolitan Environmental Improvement Program (MEIP) of the World Bank (the Bank), WEC conducted a series of Pollution Management Assessments (PMAs) of industrial facilities in the Metropolitan Manila area. Specifically, the PMAs evaluated the process operations and waste management practices of twenty-five factories in six industry sectors, including the chemical industry.

### **Middle East and North Africa**

1. Egypt

In January 1995 WEC requested OFDA or USAID/Cairo financial support for a LAMP Program in Egypt, in cooperation with the Egyptian Society for Environment and Industry (ESEI). Previously, WEC and UNEP had presented an APELL S/W in Alexandria during May 1991, in cooperation with ESEI. The scope of the proposed multi-year program would need to be negotiated between WEC, the Government of Egypt (GOE) and OFDA or USAID/Cairo. It could include local and national institution building and training of first responders for a limited number of pilot sites (a minimum program); plus necessary purchase of response vehicles, equipment and medical supplies (an incremental expanded program); or include the installation of safety systems at industrial production and chemical storage sites (comprehensive program). The cost of the program would be \$2-4 million (basic program), \$8-15 million (expanded program, or \$25-50 million (comprehensive program).

2. Jordan

In June 1995, WEC submitted a \$1.5 million proposal to OFDA and USAID/Amman to establish a 5-year LAMP program in Jordan, in cooperation with the Ministry of Health, Ministry of Municipalities - Department of Environment and the Civil Defense. Specifically, WEC hopes to establish LAMP programs at Aqaba, Sahab Industrial Area (near Amman) and Irbid Industrial Area. These sites have been selected by the Ministry of Health after careful attention to the potential for environmental disaster due to catastrophic and chronic chemical risks in those

particular industrial estates and surrounding communities. The particular institutions to be established in each community will be similar to the Local Emergency Planning Committees (LEPCs) that are extant in the U.S. under SARA Title III of 1986, but modified to respond to special cultural and governmental circumstances in Jordan.

3. Turkey

In September 1991, WEC and UNEP conducted an APELL Seminar/Workshop in Izmit, Turkey. Izmit is located approximately 100 kilometers east of Istanbul at the east end of the Sea of Marmara, which links the Bosphorus and the Black Sea to the Mediterranean Sea. The city is built on steep mountain slopes and a narrow coastal plain next to the Sea and has a population of over 250 thousand. Over 25% of all the considerable industry of Turkey is located in Izmit and the surrounding areas of Kocaeli District. More threateningly, 45% of all refinery and petrochemical industry of Turkey is located in or near Izmit. In addition, there is a large chlorine plant using mercury-cell technology (double-risks from both chlorine and mercury), a pesticides/herbicides plant, a tannery, a pulp and paper complex, several textile plants and a cement plant on the Sea coast within Izmit.

A community-based accident mitigation and prevention program in Izmit has a high priority with the Government of Turkey and the Turkish Chemical Manufacturers Association, which would facilitate its replication throughout Turkey.

### **Eastern Europe and Newly Independent States**

1. Central & Eastern Europe

Using private foundation money, WEC helped organize a full Chemical Emergency Preparedness and Prevention (CEPP) course in Most, Czech Republic in late March 1995 for 25 participants from the Czech Republic and 15 from the Slovak Republic, in cooperation with the Czech Environmental Management Center (CEMC) and ASPEK in the Slovak Republic. The CEPP course was presented by two senior experts from USEPA's Chemical Emergency Preparedness and Prevention Office (CEPPO).

2. Central Asia

WEC personnel have organized industrial waste minimization projects in a large chemical plant and a large refinery in Pavlodar (Kazakhstan) and a large refinery in Fergana (Uzbekistan). Plant personnel have requested assistance in chemical safety and related disaster prevention activities.

3. Ukraine

Over the past one and one-half years, WEC has conducted industrial waste minimization projects in two large chemical plants, a tire plant, and two metallurgical plants in the Donetsk and Dnipropetrovsk Regions.