



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

**SUBMITTED TO:**

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

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

**SUBMITTED BY:**

**WORLD ENVIRONMENT CENTER (WEC)**

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## Acronyms

ADPC	Asian Disaster Preparedness Center
ALOHA	Aerial Locations of Hazardous Atmospheres
APELL	Awareness and Preparedness for Emergencies at Local Level
APOSHO	Asia Pacific Occupational Safety and Health Organizations
CAER	Community Awareness and Emergency Response
CAMEO	Computer Aided Management of Emergency Operation
CCG	Central Crisis Group
CDC/CEHHE	Centers for Disease Control and Prevention/Center for Environment Hazards and Health Effects
CEPAP	Chemical Emergency Preparedness & Accident Prevention
CMA	Chemical Manufacturers Association
CIF	Chief Inspector of Factories
CLEP	Committee on Local Emergency Planning
CMD	Chairman & Managing Director
DC	District Collector
DEA	District Emergency Authority
DISH	Directorate of Industrial Safety & Health
DLCG	District Level Crisis Group
EPA/CEPPO	Environmental Protection Agency/Chemical Emergency Preparedness and Prevention Office
FACT	Fertilizer and Chemicals Travencore Limited
FEMA	Federal Emergency Management Agency
GOI	Government of India
HAZMAT	Hazardous Material
HDA	Haldia Development Authority
ICI	Imperial Chemical Industries
ICMA	Indian Chemical Manufacturers Association
IEF	International Environment Forum
IOC	Indian Oil Corporation
IPCL	Indian Petrochemicals Corporation Limited
LAMP	Local Accident Mitigation and Prevention
LEPC	Local Emergency Planning Committee
LCG	Local Crisis Group
LPA	Loss Prevention Association
MAH	Major Accident Hazards
MARG	Mutual Aid Response Group
MD	Managing Director
MEIA	Manali-Ennore Industries Association
MEIEPC	Manali-Ennore Industries Emergency Preparedness Committee
MOEF	Ministry of Environment & Forest
MOHFW	Ministry of Health and Family Welfare
MOST	Ministry of Surface Transport
MOL	Ministry of Labor

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NAC	National Advisory Committee
NFSC	National Fire Service College
NGO	Non-government Organization
NRC	National Response Center
NSCI	National Safety Council of India
OFDA	Office of Foreign Disaster Assistance
RIDS	Response Information Data Sheets
TBIA	Thane-Belapur Industries Association
TEEX	Texas Engineering and Extension Service
UNEP	United Nations Environment Programme
USAID	United States Agency for International Development
WEC	World Environment Center

## Foreword

This final report is submitted by World Environment Center (WEC) in accordance with its Cooperative Agreement AOT-2515-A-00-2125-00 with the United States Agency for International Development's (USAID) Office of Foreign Disaster Assistance (OFDA) for a Local Accident Mitigation and Prevention (LAMP<sup>1</sup>) program in India. The APELL-LAMP program's main objective is to strengthen chemical disaster management through improved accident mitigation and prevention at the local level.

The APELL-LAMP project began in October, 1992 along with separate, parallel projects in Indonesia, Mexico and Thailand. Since the Union Carbide accident in Bhopal, India in 1984, the strengthening of emergency planning and response has become a priority for industry, government and community groups throughout India. The APELL-LAMP program was the first project initiated in India to address issues of industrial accident prevention, mitigation and preparedness. Therefore, the program filled a great need in assisting people at the local level to improve awareness and preparedness capabilities. The initial objective was to introduce a process through which industry, government and community could work together to minimize human suffering by developing effective emergency preparedness and response programs.

The program was introduced in six major hazardous industrial sites of Manali-Ennore in Madras (Southern state of Tamil Nadu), Thane-Belapur in Mumbai (Western state of Maharashtra), Vadodara (Western state of Gujarat), Kochi (Cochin — Southern state of Kerala), Haldia (Eastern state of West Bengal) and Kanpur (North-central State of Uttar Pradesh). The National Safety Council of India (NSCI), an autonomous tripartite body under the federal Ministry of Labor, was selected as national coordinator by WEC to coordinate and organize program-related activities in India.

This report contains a detailed description of the program — its activities, the implementation process, and achievements — appendices, and photographs taken during APELL-LAMP activities.

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<sup>1</sup> The LAMP program builds on the United Nations Environment Programme's (UNEP) Awareness and Preparedness for Emergencies at the Local Level (APELL) program. Because of this close relationship to the APELL program, the LAMP/India program was referred to as the APELL-LAMP program during implementation. To maintain consistency with the in-country name, therefore, the LAMP program will be referred to as the APELL-LAMP program throughout this report.

## Acknowledgments

The last four years have been a great challenge for the World Environment Center (WEC) and National Safety Council of India (NSCI) in the implementation of the APELL-LAMP program in India. What seemed like a daunting task — to bring together community, industry, and government leaders to work towards improving industrial accident prevention and preparedness — turned out to be a very fruitful and positive endeavor. The goals and objectives of the APELL-LAMP program were accomplished. This would not have been possible without the support and teamwork of several individuals and groups, whom WEC and NSCI would like to take this opportunity to thank.

WEC would like to express deep appreciation for the support it received from the Government of India's (GOI) federal level Ministry of Labour, Ministry of Environment and Forest (MOEF), Ministry of Petroleum and Chemicals, Ministry of Home Affairs, Ministry of Health and Family Welfare, and the State Governments' Factory Inspectorates.

At the local level, the program received full support from Manali-Ennore Industries Association (Madras); Thane-Belapur Industries Associations (Mumbai); industry leaders such as Indian Petrochemicals Corporation Limited (IPCL), Indian Oil Corporation (IOC), Gujarat State Fertilizer Corporation and others in Vadodara; Hindustan Lever, IOC, Calcutta Port Trust, and others in Haldia; Imperial Chemical Industries Ltd. (ICI), IOC and others in Kanpur; and Fertilizer and Chemicals Travencore Limited (FACT) in Kochi. The heads of local governments, the District Magistrate, District Collector, Mayors, and others, who are also lawfully the heads of the District Emergency Authority (DEA), took active part during the implementation as well.

The press and media covered extensively all APELL-LAMP program activities at the state, regional and local levels. Credit for successfully monitoring progress at each site is also given to the six committed APELL-LAMP coordinators identified at the beginning of the implementation of the program.

Madras:	Mr. R.R. Umakanthan, General Manager Safety, Zenico ICI Agrochemicals Ltd.
Kochi:	Mr. K.M. Amanulla, Joint Director Factories & Boilers, Government of Kerala.
Kanpur:	Mr. M.N. Siddiqi, Director of Factories, Government of Uttar Pradesh.
Haldia:	Mr. N.N. Framjee, Executive Director, Calcutta Electric Supply Co. Ltd., Calcutta.
Mumbai:	Dr. S.L. Patil, Secretary, TBIA, Mr. Dinesh Parekh and Dr. N. Sadasivan.
Vadodara:	Mr. S. Das, General Manager, Indian Petro-chemicals Limited.

Our sincere thanks as well go to the Environmental Protection Agency/Chemical

Emergency Preparedness and Prevention Office (EPA/CEPPO), Centers for Disease Control and Prevention/Center for Environment Hazards and Health Effects (CDC/CEHHE), Texas Engineering and Extension Service (TEEX), Local Emergency Planning Committees in Pasadena, Texas and Boise, Idaho, the Houston Ship Channel Industries, National Institute of Chemical Studies, Transport Canada, Chemical Manufacturers' Association (CMA), Dupont, Exxon, and other WEC International Environment Forum (IEF) member companies for their support in the implementation of program activities.

Finally, many thanks to the United States Agency for International Development (USAID) and its Office of Foreign Disaster Assistance (OFDA) for providing core funding and giving WEC the unique opportunity to implement APELL-LAMP programs in India, Indonesia, Mexico and Thailand.

## Executive Summary

In October, 1992 World Environment Center (WEC) signed a cooperative agreement with the United States Agency for International Development's (USAID) Office of Foreign Disaster Assistance (OFDA) to establish a five year Local Accident Mitigation and Prevention (LAMP<sup>2</sup>) program. The program was designed to prevent and mitigate man-made and technological disasters and emergencies in high-risk industrial areas in India, Indonesia, Mexico and Thailand. The goals of the APELL-LAMP program are founded on OFDA's prevention, mitigation, and preparedness (PMP) mandate to save lives and protect economic investments.

The APELL-LAMP program builds on the United Nations Environment Programme's (UNEP) Awareness and Preparedness for Emergencies at Local Level (APELL) program and borrows key principles of developing safety and awareness capacity from this proven process. In conducting APELL-LAMP activities, WEC used the services and experience of U.S. and international organizations such as the U.S. Environmental Protection Agency's Chemical Emergency Preparedness and Prevention Office (EPA/CEPPO), the Centers for Disease Control and Prevention (CDC), the U.S. Department of Transportation (DOT), Texas A&M University's Texas Engineering & Extension Services (TEEX), and Transport Canada. Private and public sector organizations such as the Chemical Manufacturers Association (CMA), the Pasadena, Texas Local Emergency Planning Committee (LEPC), and multinational corporations from around the world contributed in important ways to the program as well.

The APELL-LAMP program's main objective is to reduce the incidence and impact of major industrial, hazardous materials transport, or other technological accidents and disasters in selected areas of target countries. The activities under the program are designed to improve emergency response and planning within the context of local motivations to improve safety systems, infrastructure, etc. and restraints on financial resources. In this way APELL-LAMP works to achieve realistic goals that improve safety in the short-term and remain effective in the long term.

A key component of the APELL-LAMP program is that its impact can be replicated throughout the country where it is implemented, so that impacts are achieved beyond the industrial sites where activities are conducted. The program is intended to create prototypes that lay the groundwork for further preparedness and mitigation efforts. In addition, the capacity building that occurs and the emergency response plans created by the program are valuable in the event of natural disasters.

In India, the APELL-LAMP program was able to achieve its goals and objectives in spite of a massive population, complex socio-economic and political conditions, and incredibly diversified cultures and administrative structures between sites. Among the accomplishments was the enactment of new legislation by the Government of India (GOI), the establishment of triangular partnerships between industry, government, and

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<sup>2</sup> As explained above, the LAMP program will be referred to as the APELL-LAMP program in this report.

community groups, hands-on training for several first responders and community groups, the creation of local-level crisis groups, and the execution of complex mock-emergency drills including community evacuation. It is also important to note that the program was implemented utilizing the available infrastructure without any capital expenditure or investment on the part of the communities where the program operated. Financial support was available only for conducting technical training activities and awareness workshops and seminars.

The APELL-LAMP program was introduced in India at the same time that the government was debating how to strengthen its disaster management plan at the federal, state, and district levels. The discussion centered around the need for improved chemical emergency planning, the need to coordinate efforts, and the need to pool resources. As a first step the Ministry of Environment and Forest (MOEF) set up a Central Crisis Group (CCG) Alert System to help in the event of a chemical emergency. The function of the CCG is to suggest a course of action to minimize the effect of accidents and to coordinate the activities of the various response agencies. The CCG exists only on the national level and deals solely with major chemical accidents. Prior to the introduction of APELL-LAMP there was no mechanism for dealing with chemical emergencies at the local level. Recognizing the need to build capacity at the local level, the APELL-LAMP program was approved by four federal ministries prior to the program and received full support from other federal ministries during implementation. The support and involvement of industry, local authorities and community groups further enabled the program to succeed.

This report summarizes the activities and achievements of the APELL-LAMP program in India during the past four years. The report also outlines the roles of key players at the national, state and local levels. The sites selected for the implementation were the Manali-Ennore (Madras), Thane-Belapur (Mumbai), Vadodara, Kochi, Haldia and Kanpur.

APELL-LAMP activities in India were implemented with National Safety Council of India (NSCI) as the national coordinator. NSCI, with about 5,000 industrial members, is an autonomous tripartite institution under the Federal Ministry of Labor with chapters in all the industrial cities in India. NSCI has an extensive network of professional contacts with industry groups, federal, state and local governments, NGO's and community groups required for the success of such a program as the APELL-LAMP program. NSCI is a pioneer in industrial safety and health programs in India and, as such, was able to implement the program smoothly and effectively.

A main objective of the APELL-LAMP program was to assist agency's at the national level be more responsive to the needs and suggestions at the local level. To this end the National Advisory Committee (NAC) was founded during the second year of APELL-LAMP's implementation and met annually in the following four years. The NAC provides a forum for the federal ministries and other policy makers to review what is needed to strengthen emergency response programs at the APELL-LAMP sites, as well as in other industrial locations throughout the country. The main objective of the NAC is to review the activities conducted, recommendations made and problems identified by

local areas and to recommend suitable measures in line with the national agenda. The NAC has potential for developing national guidelines and, even after the close of the APELL-LAMP program, will continue to function. New members for the 1997-98 term were recently elected.

To summarize the impact of the APELL-LAMP program, the following accomplishments have been achieved by WEC and NSCI:

- Brought crucial players together from the national, state, and local levels;
- Trained 45 firemen in safe handling of hazardous chemicals;
- Trained 180 medical personnel in treatment of different chemical accident scenarios;
- Trained 167 transporters in safe transportation and handling of hazardous chemicals;
- Trained several community groups in proper response during a chemical emergency, such as evacuation and shelter planning and appropriate communication;
- Trained 107 first responders in the use of CAMEO software for planning and response;
- Conducted table-top exercises before mock drills designed to have all participants test the various tools used in emergency response;
- Conducted three mock emergency drills with community evacuations at two APELL-LAMP sites;
- Encouraged support for new legislation similar to the U.S. Emergency Planning and Community Right to Know Act (1986); and
- Created local crisis groups at APELL-LAMP sites (similar to U.S. LEPC's).

Most importantly, for the first time industry, government and community have joined hands at the local level to meet chemical emergency challenges. These achievements indicate that the APELL-LAMP program has positively influenced disaster mitigation and preparedness efforts, and that the program will continue to improve awareness, preparedness and mitigation for years to come.

Mr. V. Srinivasan, Project Manager for WEC was responsible for coordination with NSCI and managing India program activities under the overall direction of Mr. Richard Williams, Program Director. Mr. Srinivasan also conducted community awareness training programs.

This report is submitted at the conclusion of WEC's cooperative agreement with OFDA. It is also intended for audiences concerned with industrial safety in India or other rapidly industrializing nations, where WEC's experience might be relevant.

## I. INTRODUCTION

This final report is submitted to the United States Agency for International Development's (USAID) Office of Foreign Disaster Assistance (OFDA) in accordance with World Environment Center's (WEC) Cooperative Agreement for the Local Accident Mitigation and Prevention (LAMP<sup>1</sup>) program for India. The APELL-LAMP program objective in India was to reduce the incidence and impact of major industrial, hazardous materials incidents in and around the six pilots sites selected for implementation of the program.

The report summarizes and discusses the activities and accomplishments of the APELL-LAMP program in India in an attempt to give OFDA and other interested readers an indication of the overall impact achieved during the four years that the program was in operation. Following this introduction the report is divided into following sections.

- Section II. Special Features of the Indian Situation** explains the legislative background related to chemical accident preparedness and response programs in India.
- Section III. Implementation Approach - Local and National** discusses the two-pronged approach used in implementing the APELL-LAMP program in India.
- Section IV. Site Selection** describes the methods used to identify target sites for the APELL-LAMP program, and the particular attributes of the six sites selected.
- Section V. Activities** summarizes the major activities conducted.
- Section VI. Role of the National Advisory Committee (NAC)** describes the national level impact achieved through this group, which was formed through the efforts of the APELL-LAMP program.
- Section VII. Range of Participation** comments on the wide range of participation in the APELL-LAMP program.
- Section VIII. Achievements, Sustainability, and Replication** discusses the overall meaning of the APELL-LAMP program, its local and national impacts and future benefits for India.
- Section IX. Lessons Learned** comments on the process of conducting the APELL-LAMP program in India as well as WEC's perspective regarding efforts to conduct similar programs in other industrial sites.

Appendices follow the body of the report.

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<sup>1</sup> As explained above, the LAMP program will be referred to as the APELL-LAMP program in this report.

## II. SPECIAL FEATURES OF THE INDIAN SITUATION

There are three particular features of Indian law and governance which affect the implementation of the APELL-LAMP program, or any other similar program. Since World Environment Center (WEC) and National Safety Council of India (NSCI) spent a considerable amount of energy coming to terms with these conditions, they deserve mention in this report.

1. For any local level accident mitigation and prevention program operating in India, it is important to note that the District Collector (DC), who heads the administration at the district level, is also designated the District Emergency Authority (DEA) under India's 1986 Environment Protection Act. The DC is responsible for preparing and keeping up-to-date off-site emergency plans with technical input from industry and assistance from the Inspectorate of Factories of the area. Thus, because of the DC's central role, the success of APELL-LAMP, or any program depends greatly on involving the District Collector. Unfortunately, however, due to other pressing duties including the maintenance of law and order and the administration of local government, the DC is often unable to devote enough time to chemical emergency preparedness functions. This creates an important challenge for program leaders at the local level — to capture the attention and support of the DC or his nominee.

2. Under the 1948 Factories Act (amended July, 1987) and the 1989 Manufacture, Storage and Import of Hazardous Chemicals Rules, managers of hazardous chemical plants are responsible for providing certain prescribed information to the public living in the vicinity of the plant. The public, however, does not have the statutory right to seek information on its own, as is the case with the U.S. Emergency Planning Community Right to Know Act (1986). Because of this inconsistency, community participation in chemical emergency preparedness at the local level was practically non-existent prior to the introduction of the APELL-LAMP program. One of the most important areas of work, therefore, involves raising the level of awareness, understanding, and participation among community members.

3. In 1992, as the APELL-LAMP program began, there was no mechanism for establishing Local Emergency Planning Committees (LEPC) in India. The concept of creating LEPC's, however, goes hand-in-hand with the introduction of the APELL process, thus creating a special challenge for WEC and NSCI. A statute requiring local emergency crisis groups has recently become law. In August, 1996 the Chemical Accident (Emergency Planning, Preparedness and Response) Rule was enacted to mandate setting up crisis groups at four levels throughout the country. Continuous efforts are being made to strengthen this law.

4. In implementing the APELL-LAMP program, there were a number of activities which needed support from different federal government ministries and their local agencies. It was decided that approval should be obtained first from the concerned federal ministries. For example, chemical disaster management falls under the purview of the Ministry of Environment & Forest (MOEF). Hence, its approval was obtained at the national level before proceeding to the local level to implement programs. The Ministry of Labor, being the parent ministry of NSCI and responsible for industrial safety, also gave its support for activities. In addition, the Ministry of Surface Transport (MOST), the Ministry of Health and Family Welfare (MOHFW), the Ministry of Home Affairs and Ministry of Petrochemicals, all coordinated in organizing various activities and were represented in the respective activities. By seeking and receiving these approvals prior to program

implementation, the APELL-LAMP program had the blessing of several Government of India (GOI) federal ministries.

### III. IMPLEMENTATION APPROACH - LOCAL AND NATIONAL

World Environment Center's (WEC) philosophy in implementing the APELL-LAMP program hinges upon three central components which contribute to the overall direction and goals of the program. First, the APELL-LAMP program builds on the United Nations Environment Programme's (UNEP) Awareness and Preparedness for Emergencies at Local Level (APELL) process as a model for systematically increasing awareness and developing emergency management capabilities. The APELL-LAMP program was well accepted in India because it was one of the proponents of the APELL concept.

Second, the program expands the scope of the APELL process by intervening over a sustained number of years with the close cooperation of respected and experienced local leaders. In India, site coordinators kept in close contact with local developments and needs while the National Safety Council of India (NSCI) leveraged its experience and reputation to lead the program and see that activities achieved results. Mr. K.C. Gupta, Director General of NSCI acted as National Coordinator for the APELL-LAMP program. He, and his officers of NSCI were key in organizing all activities. Being a pioneer in industrial safety programs at the national level, NSCI was readily accepted by Indian audiences.

The third cornerstone of the APELL-LAMP program involves site selection. The program is designed to develop prototypes which will serve as examples so that similar programs can be implemented in other industrial areas. As discussed in greater detail below, in section IV. Site Selection, a number of criteria are used to identify sites that WEC feels will respond to program activities and achieve results.

WEC and NSCI also felt that local level impact alone would not be sufficient to stimulate wide ranging, replicable change in emergency response planning and management. The complexity found in a large country like India, where over 1000 Major Accident Hazard (MAH) units are spread out over 20 states, makes local level intervention only one aspect of achieving widespread results. It was felt that if the activities were confined only to a few areas, the national impact would be negligible and it might take a long time to replicate similar activities in other local areas. Therefore, WEC and NSCI decided to take a two-track approach and develop local capabilities while also seeking opportunities to make a difference on the national level.

Local activities were still the defining aspect of program activities, however. They were chosen and designed based on the needs identified by the local areas, and pointed to as examples of what is needed when discussing emergency response issues on the national level. WEC drew from a number of the following activities as they were needed at each site: developing emergency planning committees by involving APELL partners; carrying out community risk assessments; conducting community awareness campaigns near industrial sites; preparing off-site community emergency plans; conducting mock emergency drills and updating emergency plans; conducting training of first responders for fire, police and medical personnel; and conducting APELL workshops.

Working from WEC's Washington D.C. office, Mr. V. Srinivasan, an Indian national who served the U.S. Mission in India for more than two decades and has extensive contacts with government, industry and community groups was essential to the program's implementation and maintained close contact with NSCI. His experience in the field of industrial safety and health, as well as his wide contacts and his perception about what is needed for a country like India, enabled all of the partners to work together more constructively.

At NSCI headquarters the following technical staff members and other administrative staff were also integral to the program and supported Mr. Gupta in implementing the APELL-LAMP program: Mr. H.N. Gupta, Advisor (Technical); Mr. A.J. Rego, Joint Director; Mr. Ramesh Bhanushali, Joint Director; Mr. D. Biswas, Assistant Director; Mr. V.B. Patil, Assistant Director; Mr. V.R. Shinde, Assistant Technical Officer; Mr. A.Y. Sundkar, Technical Assistant.

#### IV. SITE SELECTION

As mentioned above, a key component of the APELL-LAMP program involves site selection. Since APELL-LAMP is designed to develop model industrial planning and response systems, site selection is critical to the overall success of the program. The basic criteria for an APELL-LAMP site requires that:

- The area has a concentration of hazardous industries, where flammable, explosive or acutely toxic substances are produced or utilized in local production processes or transported through the community with a recognized potential for major accidents.
- A significant number of people reside near the industrial site and are, therefore, at risk.
- The area has a certain degree of emergency preparedness and a record of mutual cooperation among the industrial units and local authorities.
- There is an expressed local concern and an interest in organizing an effective accident prevention, mitigation and preparedness program.
- Industry leaders are committed to collaborative actions and can leverage other local institutions. In India, local district authorities designated with coordinating off-site emergency preparedness and response should offer their time and effort for active participation in APELL-LAMP activities. They should also select and nominate representatives from the community for involvement in such activities. Active involvement of the District Emergency Authority (DEA) is of crucial importance.
- APELL-LAMP exercises are likely to promote successful, collaborative actions by industry, government and community groups;
- There is potential to replicate activities from APELL-LAMP sites to other industrial areas in the host country; and
- There is a likelihood that necessary follow-up activities based on further identification of needs will be undertaken on an ongoing basis to achieve the desired level of emergency preparedness over the long-term.

Using these criteria and in consultation with local and national agencies, WEC and NSCI ultimately chose the following six APELL-LAMP sites: **Thane-Belapur Industrial Area (Mumbai); Manali-Ennore Industrial Area (Madras); Cochin (Kochi); Kanpur; Vadodara; and Haldia.**

##### **Thane-Belapur Industrial Area:**

The Thane-Belapur Industrial Area is located about 30 km east of Mumbai, contained on 2860 hectares and about 21 km in length. Industry at the site is comprised primarily of petroleum, petrochemical, fertilizer, dyes, pesticide and insecticide, heavy organic and inorganic chemicals, and pharmaceuticals. These industries are engaged in the handling, manufacturing, storage and transportation of hazardous chemicals. A few industries are using pipelines for transportation of some of these chemicals. The facility houses about 2000 large, medium and small industries among which about 100 have been identified as Major Accident Hazard (MAH) units. The

industries employ about 100,000. The population in and around is estimated 400,000 and are potentially at risk.

Emergency preparedness in Thane-Belapur has taken great strides during the APELL-LAMP program. The industries have come together to form the Thane-Belapur Industries Association (TBIA) — the primary collaborators for implementing the APELL-LAMP program in the area. An informal Mutual-Aid Response Group (MARG) between few selected units in the area is in existence, but a large number of units are not covered by any common mutual aid scheme. However, the existing MARG, which has the active support of the Directorate of Industrial Safety & Health (DISH), Government of Maharashtra has been functioning very effectively. The TBIA has also set up an Emergency Response Station to cater to the specific needs of industries in the area.

#### **Manali-Ennore Industrial Area:**

The Manali-Ennore Industrial Area is located 15 km north of Chennai (formerly Madras) in Tamil Nadu State. This is a compact area with 20 large and medium size chemical units, of which 18 are identified as MAH units. It contains chemical, petrochemical, and pharmaceutical industries.

An off-site plan has been prepared by the District Collector in collaboration with the Manali-Industries Association (MIA) and Manali-Ennore Industries Emergency Preparedness Committee (MEIEPC). In addition, a coordination group has also been formed with industry, government and community groups as members. Two table-top exercises and two off-site mock drills have also been conducted during APELL-LAMP program with community evacuations. The MEIEPC and crisis group have produced a number of posters, booklets, and video films for educating the community. CAMEO is being used for planning and response.

#### **Cochin (Kochi):**

Cochin is situated almost exactly in the middle of the Kerala State coast line in South India. Twenty MAH units exist in Kochi District. They store large amount of hazardous materials both at units and in port areas. There is also significant inland water transportation of hazardous chemicals in the district. More than 30,000 employees work in these units and about 400,000 people live in and around the industrial areas. To improve emergency preparedness, a 45 member District Level Crisis Group (DLCG) under the office of District Collector was recently formed.

#### **Kanpur:**

Kanpur is located in northern India in the Uttar Pradesh State and is a major industrial town. It is thickly populated (population: approximately 2.5 million). There are four MAH unit which are located in the heart of the city and which have potential to cause a disaster in and around the city. On-site emergency plans have been prepared by the MAH units. An LEPC was formed during the APELL Workshop held in April, 1994. This LEPC drafted the first off-site plan for the industrial area.

**Vadodara:**

Vadodara is located on the West Coast of India in Gujarat State, where there are 250 MAH units. Vadodara alone has 56 MAH units. Vadodara has a better emergency response program than other APELL-LAMP sites. The district has established a District Contingency Planning Committee and has developed plan for the whole district. The first off-site emergency drill was conducted in 1989 and five such drills including evacuation have taken place since then. It has a central control room established and run by industries in the district on a cooperative basis. A computerized data base of hazardous chemicals and potential hazards in the area has been developed for use during emergencies.

**Haldia:**

Haldia is an industrial complex in the Midnapur District of West Bengal State. It is located 130 km from Calcutta. The complex has a total area of about 330 km<sup>2</sup> and a population of 287,000. It is managed by the Haldia Development Authority (HDA).

Haldia houses 22 industrial units out of which 6 are MAH units. The MAH units have developed on-site emergency plans. Off-site emergency plans have been prepared as well.

## V. ACTIVITIES

This section describes the major initiatives conducted in India under the APELL-LAMP program and also gives a brief description of the importance of each activity in terms of the overall objective of the program. The local parent industries in each site, the local chapter of National Safety Council of India (NSCI) and others agencies related to the activity were hosts for organizing and conducting the activities. Important recommendations emerging out of the workshops and training were forwarded to the appropriate local authorities, industry associations, state governments and to the federal government's concerned ministries. Based on the need of the local areas and in consultation with local industry groups, community groups, and federal and state government, the following activities were conducted under the APELL-LAMP program in India.

- APELL Seminar/Workshop;
- Chemical Emergency Preparedness and Accident Prevention (CEPAP) Training;
- Risk Assessment in Process Industries Seminar;
- Medical Facilities Assessments;
- Hazardous Materials Emergency Response - Instructors Training (Fire Officers);
- Hazardous Material Emergency Response - Decision Makers (Fire Department Chiefs);
- Community Awareness Educational Workshops/Training;
- Oil Spill Training;
- CAMEO Training for First Responders;
- Planning and Preparedness for Medical Response to Chemical Emergencies;
- Transportation of Hazardous Materials by Road and Emergency Response;
- International Training; and
- Table Top Exercises and Mock Emergency Drills.

These activities were designed in the form of workshops, seminars, and training courses with specific disciplines in mind and tailored to suit the needs of the respective participants. The prevention programs were designed exclusively for industry groups. Hazardous substance handling courses were designed for fire fighters, medical personnel, transporters and others directly involved in response activities. Risk communication and awareness and preparedness activities were designed for community groups. Sample agendas for each type of workshop are included in Appendix C.

For the purposes of this report, it is useful to divide the activities into four groups. Only activities falling under item A were developed using Office of Foreign Disaster Assistance (OFDA) funds. The other three categories deal with activities in keeping with the goals and ideals of the APELL-LAMP program, but which were supported by other national or international means. The four groups of activities are as follows:

- A. Activities carried out by WEC and NSCI with OFDA funding.
- B. Activities carried out by NSCI independently without OFDA funding or WEC support.
- C. Activities carried out by the local areas without OFDA and WEC support.
- D. International Activities without OFDA funding.

## **A. Activities carried out by WEC and NSCI with OFDA funding**

### **Awareness and Preparedness for Emergency at Local Level (APELL) Workshop:**

The first APELL workshop was conducted in Madras in October, 1992 for Manali-Ennore Industry Groups. Two more workshops were held later the same month, one for the federal government and industry groups in New Delhi and the other for the Thane-Belapur Industries Association (TBIA) in Mumbai.

The purpose of these workshops was to introduce the APELL concept and bring together the three partners (industry, government and community) for the first time. Subsequently, five more APELL workshops were held in the five other industrial APELL-LAMP sites. These workshops were conducted by Dr. David Thwaites from UNEP, Paris, experts from U.S. EPA, LEPC Pasadena, LEPC Boise Fire Department, and WEC.

These activities achieved an important first step in organizing the stakeholders in each APELL-LAMP site and giving them direction and focus on how to go about improving industrial accident preparedness and response.

### **Chemical Emergency Preparedness and Accident Prevention (CEPAP):**

The CEPAP program was organized for industry, government and community groups to give an overview of the methodology used for developing emergency plans, chemical accident prevention systems, chemical hazard analysis of vulnerable zones, community involvement programs and other aspects of chemical accident prevention. The U.S. EPA developed a new manual on the subject which was introduced for the first time in India through the APELL-LAMP program to those responsible for on and off-site response programs.

After the general APELL workshop, this was the first technical session conducted on planning and response. A number of important recommendations were drawn from this workshop, including a need for a coordinating committee at the local level, more training for first responders and hazard analysis, holding table top exercises and drills, and improving coordination and communication among concerned groups. These recommendations were put to use in the subsequent training programs. Mr. Bill Finan and Ms. Katherine Piva of EPA and Mr. Scott Engle, Consultant, conducted these workshops.

### **Risk Assessment in Process Industries:**

At the request of industry groups this training course was designed and organized for senior technical process engineers, design engineers, and safety engineers responsible for safety operations in plants using hazardous substances. The program evolved out a request to obtain information on international standards and procedures adopted in the hazardous chemical processes. In response, experts conducted the training course and shared international experience in process safety management.

The training focused on the identification and classification of hazardous sites, hazard and

operability studies, fault-free analysis, event-free analysis and other techniques used in different process industries. Dr. Meo Van Der Hooft, a retired Corporate Safety Officer from Azko Nobel, The Netherlands and Mr. James R. Rountree, Training Specialist from TEEEX conducted these courses in conjunction with local experts.

#### **Medical Facilities Assessment:**

Dr. Eric Noji and Dr. Scott Lillibridge from the Centers for Disease Control and Prevention (CDC) conducted two seminars in Mumbai and Madras for medical personnel and visited various hospitals to assess their response capabilities. The two experts submitted detailed reports on the need for better infrastructure and data bases for treatment of chemical accident cases.

#### **Hazardous Materials Emergency Response Seminar:**

A five day training was held on Hazardous Materials Emergency Response at the National Fire Service College in Nagpur for fire officers from industries and local government. The training, in addition to the classroom exercises, included demonstrations of protective clothing and other equipment and field training in various aspects of emergency response related to the role of fire services. Field training was conducted in the area of sealing leaks from pipelines, barrels, tankers and preventing the flow of contaminated water, medical evacuation, decontamination procedures, and communication techniques.

The training was conducted by Mr. Don Carloss and Mr. James R. Rountree of TEEEX, Texas A&M University. The Directorate General of Civil Defense of the Ministry of Home Affairs, Government of India was the Chief Coordinator for this activity. In addition, a 2-day seminar and practical demonstration was conducted for Chief Fire Officers from all the states to give them some information about hazardous materials training at the policy making level.

#### **Community Awareness Workshops:**

For the first time in India, five "Community Awareness Educational Workshops" were held in Mumbai, Kanpur, Madras, Haldia and Kochi. Community representatives consisting of social and cultural organizations, rotary clubs, trade union leaders, political representatives, industry, local government, teachers, and others who represent their community participated in these workshops. They were trained on the "do's and don't's" during an emergency, evacuation and shelter-in-place procedures. They were also trained in various ways to transfer what they had learned to their community. The techniques included, development of messages, identifying target audiences in the community, methods for delivering messages, making a presentation of the message, and communication techniques. This was the first workshop ever held in India on this subject with full community participation. The workshops were conducted by Mr. V. Srinivasan of WEC, Mrs. Elizabeth Gonzalez and Mrs. Sandra Gabbert of LEPC, Pasadena, Texas.

#### **CAMEO Training for First Responders:**

This marked the first time that Computer-Aided Management For Emergency Operation (CAMEO)

was introduced to Indian first responders. The hands-on-training was conducted by Mr. Peter Gattuso of EPA in Mumbai and Kochi.

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

A national-level workshop for policy and decision making groups on Planning and Preparedness for Medical Response to Chemical Emergencies was organized in Mumbai in collaboration with the federal Ministry of Health and Family Welfare. The participants in this workshop included officials from the federal and state Ministries, national medical research institutions, regulatory agencies, and medical personnel from the state government and major hospitals. Two local level programs were also organized for industry medical personnel, local government and medical practitioners. The purpose of the workshop was to share information on the health effects of various chemicals and their treatment. Dr. Jonathan Borak, an eminent physician and expert in medical response planning and industrial toxicology and an Associate Clinical Professor of Internal Medicine at Yale University conducted the workshops in Mumbai, Vadodara and Cochin.

#### **Transportation of Hazardous Materials and Emergency Response Workshop:**

A number of road accidents involving hazardous chemicals occurs in India, thus creating a great need for a seminar on the subject. This was the first workshop of its kind conducted in India with international expertise. Since hazardous substance transportation falls within the purview of the Ministry of Surface Transport (MOST), it collaborated in organizing three workshops on the subject in Mumbai, TBIA and Manali-Ennore. Senior officials from the transport department of the State Government, industry associations, transport agencies, regulatory agencies of the government and others who handle transportation of hazardous substances participated in the workshop.

Important recommendations such as the need for training centers for drivers, emergency response centers, better infrastructure of roads, rest and stopovers facilities, consignors responsibility, strict enforcement of the legislation, and good tanker design were taken from the workshops. The workshops were conducted by the Directorate General of Transport Canada, Dr. John Read and Mr. Michael McGrath, Dupont's U.S. Safety Health and Environment Officer.

### **International Training:**

One of the important components of the APELL-LAMP program was the training of local coordinators, heads of the local governments, industry and community groups in the U.S. A 22 member delegation from four countries, which included four local coordinators from India, visited the U.S. to investigate and review emergency response systems through visits to various industrial sites and training centers. The delegation visited LEPC's, the Federal Emergency Management Agency (FEMA), the National Response Center (NRC), the National Institute for Chemical Studies, and Kanawha Valley industries to study the coordinated effort of industry, government and community in the planning and response program. The exposure to an advanced country like the U.S. enhanced their knowledge and helped in the successful implementation of the APELL-LAMP program.

### **Table-Top Exercises and Mock Emergency Drills:**

One of the important parameters for the success of any response program involves the effectiveness with which response groups (fire, police, medical), local government authorities, community groups, and others respond during chemical emergencies. In order to test plans and improve preparedness, WEC and NSCI used table-top exercises and mock emergency drills in Madras (April, 1984) and Mumbai (October, 1995) to help prepare responders for actual emergencies. In both cases, the table-top exercises helped make for more successful and dynamic mock emergency drills. In Madras, an actual evacuation was included as part of the mock emergency drill, thus providing participants with first-hand knowledge of what must be done during disaster situations. WEC and NSCI also provided feedback and recommendations on the mock drills conducted (see Appendix B).

### **B. Activities carried out by NSCI independently without OFDA or WEC involvement**

The NSCI and its faculty members conducted a number of APELL-LAMP related activities, an indication that the program is sustainable and has achieved support and funding from other sources. NSCI sent faculty members to be trained in the U.S. in CEPAP and CAMEO programs. NSCI conducted these activities jointly with federal ministries and industry groups. NSCI continues to use its own resources for APELL-LAMP program purposes by disseminating CAMEO information on Response Information Data Sheets (RIDS) through their quarterly publication, "Industrial Safety Chronicle." In order to bring the APELL concept to a wider audience, NSCI also translated the APELL Handbook into Hindi, the national language of India, which significantly helps the non-English speaking groups.

NSCI also participated in other activities on its own initiative. A resume of the activities conducted can be found in Appendix H.

### **C. Activities carried out by the local areas without OFDA and WEC support**

Local sites have also held several training programs on APELL-LAMP related activities. A list of such activities is included in Appendix J, thus providing further evidence that the APELL-LAMP program encouraged other groups to conduct activities of their own accord.

### **D. International Activities**

Information on APELL-LAMP activities was shared at international conferences through the presentation of papers. WEC, NSCI and APELL-LAMP site Coordinators also presented papers on APELL-LAMP experiences at their local sites at the Asia Pacific Occupational Safety and Health Organizations (APOSHO) conference held in New Delhi, in November, 1995.

All papers presented included discussion of the APELL-LAMP program, Preparedness and Response-Achievements, Off-site Emergency Preparedness in Manali-Ennore Industrial Area, Community Awareness/Education in Madras, Priorities and Strategies of WEC for Environmental Protection, and the Role of Information Technology in the Reduction of Major Chemicals Accidents.

Similar presentations on APELL-LAMP action programs were made by WEC and NSCI at UNEP's APELL Advisory Committee Meetings in Paris in 1994 and 1996.

## **VI. ROLE OF THE NATIONAL ADVISORY COMMITTEE (NAC)**

Recognizing that the industrial emergency planning needs of India are great, World Environment Center (WEC) and National Safety Council of India (NSCI) decided that it would be politically expedient and financially cost effective to create a National Advisory Committee (NAC) representing the three partners involved in chemical emergency planning: government, industry and community. The idea intended to gather expertise and input from different perspectives of the emergency preparedness equation, and thereby build support for mutually satisfactory solutions.

The NAC has representatives from NSCI, WEC, four federal Ministries, state regulatory agencies, local district and municipal authorities, public emergency services, hospitals, national and local industry associations, NGO's, institutions, community, and APELL-LAMP coordinators from six sites.

The NAC met annually during the APELL-LAMP program and achieved positive results. Its main objective is to review APELL-LAMP program activities, identify problems, and make recommendations to the appropriate authorities. A number of NAC recommendations emerged out of APELL-LAMP program activities and were forwarded to appropriate authorities for review. For example, recommendations coming out of an APELL workshop led to the establishment of crisis planning groups at the local level. Ultimately, NAC provides a potential for developing national guidelines. Even after the phase-out of APELL-LAMP, NAC will continue to function with NSCI Director General as Chairman.

## **VII. RANGE OF PARTICIPANTS**

There has been wide ranging participation in all of the activities conducted under the APELL-LAMP program. Participants were drawn from federal, state and local governments, regulatory agencies, industries and industries associations, professional institutions, NGO's, trade unions, community groups, and local hospitals. A complete analysis of participants who attended different activities is given in Appendix C. A list of international speakers is given in Appendix D and a list of national and locals speakers is given in Appendices E and F, respectively.

In total, the APELL-LAMP program reached over 1100 industry professionals, community leaders, response personnel, and government representatives through the form of workshops, seminars, and technical training. In addition, the structure of the APELL-LAMP program also allowed for the development of emergency response planning and mitigation leaders to emerge. In each of the six APELL-LAMP sites, local coordinators have gained invaluable experience. And at the national level as well, NSCI and dedicated GOI representatives are now established as knowledgeable leaders in the effort to improve response capabilities, strengthen laws, and reduce risks associated with industrial development.

## VIII. ACHIEVEMENTS, SUSTAINABILITY AND REPLICATION

Achievements: The APELL-LAMP program conducted activities in several specialized areas to strengthen disaster management both at local and national levels. The overall impact of the program has resulted in important achievements, which are given below:

- **The APELL process has been enthusiastically welcomed and accepted in the local areas covered under the program.** Local Crisis Groups (LCG) were formed or strengthened in the absence of legislative requirements during the APELL-LAMP program. On August 2, 1996 the government enacted a new rule, called Chemical Accident (Emergency, Planning Preparedness and Response) Rules, which mandates the formation of emergency crisis groups at four levels (local, district, state, and central levels). This important resolution indicates that national legislative trends are following the example set by World Environment Center (WEC) and National Safety Council of India (NSCI) during the APELL-LAMP program. Appendix J contains a list of the typical LEPC structure that WEC and NSCI advocated at the six APELL-LAMP sites.
- **Greater involvement of the community in emergency preparedness has been developed.** In contrast to the lack of involvement seen prior to the APELL-LAMP program, community awareness activities are now being undertaken in the local areas as community members come to play a greater and greater role in emergency response planning. Community awareness and involvement, at first seen as a sensitive subject by government and industry leaders, has become central to local planning at all six APELL-LAMP sites.
- **Systematic methodology for rehearsing emergency plans has been developed.** Three emergency exercises and mock drills have been conducted to strengthen emergency preparedness. In two of the three cases, community evacuation was featured as an important part of these activities. The table-top exercise concept introduced through APELL-LAMP became very popular for testing various tools for emergencies. WEC and NSCI expect mock emergency planning to continue following the APELL-LAMP program and the scope of these activities to increase.
- **Technical capabilities at the national and local levels have been strengthened, thus contributing to the sustainability of program efforts.** Firefighters, police, medical personnel, and first responder instructors have benefited greatly by participating in the APELL-LAMP program. In total, over 330 people have participated in APELL-LAMP technical training activities<sup>2</sup>.
- **The APELL-LAMP program stimulated discussion at the national level to create national guidelines for chemical emergency prevention, preparedness and response.** As mentioned above, new legislation requiring the creation of local emergency crisis groups has now been enacted. Further strengthening of laws by the Government of India (GOI) is anticipated. The

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<sup>2</sup> The breakdown of participants at each APELL-LAMP activity is provided in Appendix C. APELL Workshops and Community Awareness Seminars are not included in this total number of people receiving technical training.

National Advisory Committee (NAC) will remain active and voice opinions on industrial action prevention issues requiring attention.

- **Information concerning APELL-LAMP activities has been effectively disseminated.** NSCI's monthly "Industrial Safety News" and quarterly "Industrial Safety Chronicle" have proved to be an excellent means of publicizing information on APELL-LAMP activities. Over 5000 NSCI members in India and abroad receive these publications.

Sustainability: Since the program's inception, great attention has been given to the sustainability of the program. Some measures taken in this regard are as follows:

- **NSCI has its own infrastructure, manpower and expertise and enjoys close cooperation with industry, trade unions and government.** The institutional capability and infrastructure of NSCI was further strengthened through training of its technical personnel, strengthening its library of books and videos and addition computerized databases. NSCI is committed to continue its training in various aspects of the emergency prevention, preparedness and mitigation programs. A number of APELL-LAMP activities have become part of NSCI's regular training curriculum. NSCI has become a source of information for chemical data sheets as provided in CAMEO software.
- **Local capabilities have been strengthened by providing books, manuals, videos, and computerized databases to APELL-LAMP partners.** Although the distribution of information resources is a relatively straightforward proposition, it is an important contribution for international organizations to make, as they have far greater access to information than local program participants. WEC and NSCI distributed over 200 such documents during the program, thus increasing the pool of emergency response information at APELL-LAMP sites.
- **NAC, which was formed during the APELL-LAMP program, continues to function even after the phase out period.** NAC will continue to review local and national level developments and appropriately recommend to the government ways to strengthen disaster management in India.

Replication: Replication of the APELL-LAMP program can be seen in two important ways:

- **WEC and NSCI are currently negotiating with GOI for the extension of APELL-LAMP activities to more industrial sites.**
- **The replication of the APELL-LAMP program can also be seen in the numerous activities conducted in India and internationally by NSCI and local groups without the support of Office of Foreign Disaster (OFDA) funding.** Appendices G, H, and I chronicle these important events.

## IX. LESSONS LEARNED

The experience gained through implementing the APELL-LAMP program has revealed the following important issues. To further strengthen emergency preparedness in India, these lessons learned will have relevance to the Government of India (GOI), the Office of Foreign Disaster Assistance (OFDA), and other international agencies working to improve industrial accident prevention and mitigation standards in India.

- **APELL-LAMP program funding and line items did not include a component for infrastructure investment.** Program emphasis was given to strengthening training for first responders, government and the community. In the absence of adequate attention to infrastructure development, success cannot be fully achieved. Effective response is possible only when the necessary equipment is available to meet the emergency needs. Although purchasing equipment was beyond the scope of funding for the APELL-LAMP program, it should be noted that the following items are needed in many places in India: fully equipped vans for fire and medical responders; facilities and proper antidotes to treat the patients affected by chemical accidents; separate decontamination units in hospitals; effective communication equipment; better roads for the transportation of hazardous chemicals; and evacuation routes for people living industrial areas. Until these facets of infrastructure are in place, emergency response systems will fail to adequately mitigate human suffering and the loss of life.
- **Emergency planning and preparedness efforts should focus on the local area.** A district level plan may not be the answer for quick and effective response at the local level. It is better to work on the smaller scale problems associated with local level planning.
- **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.
- **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 India.** In an off-site fire, for example, it is presently unclear as to who should assume the overall command of directing fire response activities. In cases where public fire services and the industry fire services could both intervene, appropriate planning will ensure more timely and effective response.
- **The responder training needs in India are beyond the scope of international development assistance programs such as this one.** Training for first responders (fire, medical and police) needs to be institutionalized throughout the country in order to achieve large-scale improvements.
- **Preparedness for emergencies involving hazardous materials transportation is currently inadequate.** Considering the high volumes of hazardous chemicals being transported over long distances and the past experience of transport accidents involving hazardous chemicals in India, improving transportation emergency response capabilities should be considered a priority by the GOI.
- **The District Collector (DC) should appoint a delegate to take responsibility for emergency response planning.** The DC, who is constantly on the road and has numerous responsibilities, is often too busy to tend to the needs of emergency coordination. Passing on this responsibility to a specialist in the area of emergency response would be an effective means of guaranteeing due attention to these matters.
- **The need to develop infrastructure relating to emergency response underlies all other attempts to improve capabilities at APELL-LAMP sites and throughout India.** Recommendations from workshops and trainings repeatedly pointed out that unless the government takes initiative to strengthen basic infrastructure, other efforts for prevention, mitigation and preparedness will not be effective.

## Appendix A

### Activities Carried Out Under APELL-LAMP Program

ACTIVITY	DATES	NO. OF PARTICIPANTS
<b>MANALI-ENNORE INDUSTRIAL AREA NEAR MADRAS</b>		
1. APELL Workshop	Oct.'92	76
2. A set of CAMEO software diskettes (7 Nos.) provided to GOI agencies for review	Oct.'92	-
3. Seminar on 'Chemical Disaster Emergency Medical Response'	Mar.'93	31
4. Training course on 'Chemical Emergency Preparedness' (CEP) based on the course developed by EPA, USA	Oct.'93	62
5. Table top exercise in ICI Ltd., for off-site emergency to rehearse communication aspect	Apr.'94	40
6. Mock off-site emergency drill in ICI Ltd. with community evacuation	Apr. '94	35
7. CAMEO Seminar for decision-makers	Apr.'94	25
8. Workshop on 'Community Awareness'	Mar.'96	59
9. Workshop on 'System of Transportation of Hazardous Materials by Road & Emergency Response'	Apr.'96	60

	<b>ACTIVITY</b>	<b>DATES</b>	<b>NO. OF PARTI- CIPANTS</b>
<b>THANE-BELAPUR INDUSTRIAL AREA NEAR MUMBAI</b>			
1.	Assessment of government hospital facilities	Mar.'93	-
2.	Seminar on 'Chemical Disaster Emergency Medical Response'	Mar.'93	15
3.	Assessment of industrial medical hospitals facilities	Mar.'93	-
4.	Training course on "Chemical Emergency Preparedness" (CEP) based on the course developed by EPA, USA	Oct.'93	51
5.	CAMEO software training	Aug. '94	-
6.	Table-top exercise at Herdillia Chemicals	Oct.'94	16
7.	Mock emergency drill with MARG at Herdillia Chemicals	Oct.'94	24
8.	Hands-on training course on CAMEO for First Responders	Oct.'94	24
9.	Workshop on 'Community Awareness'	May '95	63
10.	Seminar on 'System of Transportation of Hazardous Material by Road & Emergency Response'	May '96	53
<b>KANPUR</b>			
1.	APELL/CEP Seminar/Workshop (The combined one)	Apr.'94	87
2.	CAMEO software Installed	Aug.'94	-
3.	Community Awareness Workshop	May '96	39

	<b>ACTIVITY</b>	<b>DATES</b>	<b>NO. OF PARTI- CIPANTS</b>
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4.	Hands-on training course on CAMEO software at Rampur	May '95	36
5.	Hands-on training Course on CAMEO at Phulpur	Nov. '95	20

#### **COCHIN**

1.	APELL/CEP Workshop	Apr. '94	81
2.	CAMEO software installed	Aug. '94	-
3.	Hands-on training course on CAMEO for First Responders	Oct. '94	27
4.	Advanced training course on 'Risk Assessment for Process Industries & CAMEO'	Oct. '94	41
5.	Training course on 'Oil Spill Control'	Oct. '94	29
6.	Workshop on 'Community Awareness'	May'95	53
7.	Workshop on 'Planning & Preparedness for Medical Response to Chemical Emergencies'	Nov. '96	53

#### **HALDIA**

1.	APELL/CEP Workshop	Jan. '95	66
2.	Workshop on 'Community Awareness'	Mar. '96	52

	ACTIVITY	DATES	NO. OF PARTICIPANTS
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**VADODARA**

1.	APELL/CEP Workshop	Apr.'95	103
2.	Workshop on 'Planning & Preparedness for Medical Response to Chemical Emergencies'	Nov.'96	51

**AT NATIONAL LEVEL**

1.	APELL Seminar	Oct.'92 Mumbai	50
2.	APELL Seminar	Oct.'92, Delhi	55
3.	Seminar on "Management of Technological & Natural Disasters" at Madras in collaboration with the Asian Disaster Preparedness Centre, Bangkok.	May'93, Madras	45
4.	Signing of MoU between the NSC and WEC	Nov.'93	-
5.	Constitution of the National Advisory Committee under the APELL-LAMP MoU	Mar.-Apr.'94	-
6.	First Meeting of the NAC	Apr.'94 Mumba	20
7.	Seeking Expert Comments on CAMEO from CSIR Institutes (CLRI, Madras, IICT, & other Governemnt agencies)	Aug./ Sept.'94 Hyderabad	-
8.	1 <sup>st</sup> USAID Evaluation of the action program	Aug. '94	-

	ACTIVITY	DATES	NO. OF PARTICIPANTS
9.	Advanced Training Course on 'Risk Assessment for Process Industries' & CAMEO training	Oct.'94 Mumbai	62
10.	Training course on 'Oil Spill Control'	Oct.'94 Mumbai	29
11.	Second meeting of NAC	May '95	21
12.	Workshop on 'Hazardous Material Emergency Response - Instructions Training'	Jun. '95 Nagpur	29
13.	Seminar on 'Hazardous Material Emergency Response for Decision Makers'	Jun. '95 Nagpur	30
14.	Workshop on 'System of Transportation of Hazardous Materials by Road and Emergency Response'	Mar.'96 Mumbai	54
15.	Third Meeting of NAC	Aug. '96	17
16.	Workshop on 'Planning & Preparedness for Medical Response to Chemical Emergencies'	Nov. '96	44

Note: The above listing only shows activities conducted in each site. In addition, participants from all other sites also attended the national level programs held at different locations, such as firemen training at Nagpur, transporters training in Mumbai, first responders training in Mumbai, etc. which are not listed in each site.

## Appendix B

### Summaries of Typical APELL-LAMP Program Workshop Agendas

#### **APELL Workshop Adenda 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 Workshop Agenda Items:**

- 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 Computer in Planning and Response (CAMEO)

**Risk Assessment in Process Industries Agenda Items:**

- 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

**Oil Spill Control Training Agenda Items:**

- 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

**Community Awareness Workshop Agenda Items:**

- 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’t’s”, shelter-in-place, evacuation, etc.
- Group Work on Developing Messages, Mode of Communication, Presentations etc.
- Recommendations and Discussion

### **Hazardous Materials Emergency Response Workshop Agenda Items:**

- Indian 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

### **Transportation Emergency Response Workshop Agenda Items:**

- Indian 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 USA for Safe Transportation and Emergency Response
- Group Working on Recommendations

### **CAMEO Workshop Agenda Items:**

- 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
- Areal 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

### **Medical Response to Chemical Emergencies Workshop Agenda Items:**

- 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 in MRCE in India
- Secondary Contamination/Decontamination Procedures, EMS & Hospital Protocols
- Demonstration of Protective Equipment

### **Sample of an Emergency Drill Evaluation Report**

Participants: State Govt.- Revenue Deptt., Fire Brigade, Medical Services, MEIEPC and Industries, Pollution Control Board, State Transport Department, (Total 40)  
 Topic Handled: Communication starting from the industry's initial information to Police Station and others.

#### Observers:

Mr. David Thwaites (UNEP),  
 Ms. Kim Fletcher (EPA),  
 Mr. V.Srinivasan (WEC),  
 Mr. A.J.Rego (NSCI),

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

#### Activity Highlights:

- i) Conducting table-top exercise
- ii) Community evacuation
- iii) Recommendations:
  - 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 modelling 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 APELL/LAMP 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.

## Appendix C

### Sequence of Activities and Analysis of Participants at APPELL-LAMP Activities

EVENT	CENTRAL GOVT.	STATE GOVT.	LOCAL AUTHORITIES	PROFESSIONAL INSTITUTIONS	INDUSTRY	TRADE UNIONS	COMMUNITY	HOSPITALS	OTHER	TOT.
APPELL Workshop at Madras (7-10 Oct. '92)	1	6	10	8	29	4	8	-	10	76
APPELL Seminar at Mumbai (12 Oct. '92)	-	8	8	5	20	2	3	-	4	50
APPELL Seminar at Delhi (14 Oct. '92)	5	9	5	10	14	5	2	-	5	55
Chemical Disaster Emergency Medical Response at Madras (10 Mar. '93)	-	3	5	-	15	-	-	8	-	31
Chemical Disaster Emergency Medical Response at Mumbai (13 Mar. '93)	-	1	1	-	6	-	-	4	3	15
Training Course on CEP at Madras (11-14 Oct. '93)	-	8	8	4	29	2	4	-	7	62
Training Course on CEP at Mumbai (18-21 Oct. '93)	-	6	14	2	21	-	3	-	5	51
APPELL-CEP Workshop at Kanpur (12-15 Apr. '94)	-	18	2	2	39	6	17	1	2	87
	CENTRAL	STATE	LOCAL	PROFESSIONAL	INDUSTRY	TRADE UNIONS	COMMUNITY	HOSPITALS	OTHER	TOT.

EVENT	GOVT.	GOVT.	AUTHOR ITIES	ONAL INSTITU- TIONS	STRY	UNIONS	NITY	TALS	OTHER	TOT.
	CENTRAL GOVT.	STATE GOVT.	LOCAL AUTHOR	PROFESSI- ONAL	INDU- STRY	TRADE UNIONS	COMMU- NITY	HOSPI- TALS		
APPELL/CEP Workshop at Cochin (18-21 Apr. '94)	-	11	9	13	32	5	9	-	-	81
Advanced Training Course on Risk Assessment for Process Industries and CAMEO at Mumbai (18-21 Oct. '94)	-	3	1	1	57	-	-	-	-	62
CAMEO for First Responders at Mumbai (18-19 Oct. 194)	-	5	9	3	2	-	-	2	3	24
Oil Spill Control at Mumbai (21 Oct. '94)	4	--	-	-	25	-	-	-	-	29
Risk Assessment for Process Industries and CAMEO at Cochin (24-27 Oct. '94)	-	2	-	3	36	-	-	-	-	41
CAMEO for First Responders at Cochin (24-25 Oct. '94)	4	3	12	3	1	-	-	3	1	27
Oil Spill Control at Cochin (27 Oct. '94)	4	1	-	-	24	-	-	-	-	29
APPELL/CEP Workshop at Haldia (10-13 Apr. '95)	3	9	4	-	42	3	4	-	-	65
APPELL/CEP Workshop at Vadodara (25-28 Apr. '95)	1	34	4	2	56	1	1	4	-	103
Community Awareness at TBIA (2-4 May '95)	-	9	2	-	27	-	25	-	-	63

EVENT	INSTITUTIONS										TOT.
	CENTRAL GOVT.	STATE GOVT.	LOCAL AUTHORITIES	PROFESSIONAL INSTITUTIONS	INDUSTRY	TRADE UNIONS	COMMUNITY	HOSPITALS	OTHER		
Community Awareness at Cochin (8-10 May '95)	3	8	2	-	10	3	27	-	-	53	
Community Awareness at Kanpur (15-17 May '95)	3	6	-	-	20	5	5	-	-	39	
Hazardous Material Emergency Response at NFSC, Nagpur (19-24 June '95)	1	3	3	7	15	-	-	-	-	29	
Hazardous Material Emergency Response for Decision Makers at NFSC, Nagpur (26-27 June '95)	4	7	6	10	3	-	-	-	-	30	
CAMEO at Modi Xerox (26-27 Mar '95)	-	7	-	-	28	-	-	1	-	36	
CAMEO at IFFCO, Phulpur (21-22 Nov '95)	-	-	2	-	18	-	-	-	-	20	
Community Awareness at Madras (15-16 Mar '96)	5	16	-	-	26	2	9	1	-	59	
Community Awareness at Haldia (19-20 Mar. 196)	4	9	4	-	20	4	9	-	2	52	
Transportation of Hazardous Material and Emergency Response at Mumbai (25-27 Mar '96)	7	6	5	4	22	-	-	-	10	54	
Hazmat Transportation and Emerg. Resp. at TBIA (Mar. '96)	-	7	1	-	39	-	5	1	-	53	

TIONS

Workshop on System of Transportation of Hazardous Material and Emergency Response at Madras (2-4 Apr. '96)	2	7	2	5	42	-	-	-	2	60
Workshop on Planning & Preparedness for Medical Response to Chemical Emergencies at Mumbai (18-19 Nov '96)	2	3	14	7	15	-	-	3	-	44
Workshop on Planning & Preparedness for Medical Response to Chemical Emergencies at Vadodara (21-22 Nov '96)	-	15	5	9	17	-	-	5	-	51
Workshop on Planning & Preparedness for Medical Response to Chemical Emergencies at Cochin (26-28 Nov '96)	-	21	3	4	13	-	-	12	-	53

## Appendix D

### List of International Experts Who Conducted Workshops/Training

Dr. Robert Boldt Sr. Vice President Dow Chemicals, Canada	Environmental Specialist CEPPO, U.S. EPA, Washington, D.C.
Dr. Jonathan Borak Specialist in Occupational & Environmental Health Jonathan Borak & Co. Inc., New Heaven, CT. U.S.A.	Ms. Elizabeth Gonzalez Co-ordinator, LEPC Pasadena, TX, U.S.A.
Mr. Kenneth A. Borgfeld Co-Chairman LEPC Baytown, TX	Mr. Mark J. Horwitz Chief, CEPPO U.S. EPA Detroit, MI. U.S.A.
Mr. Don Carlross International Fire Programmes Co-ordinator Fire Protection Division TEEX, Texas A&M University System, Texas, U.S.A.	Mr. Harry Jaysingha Programme Co-ordinator ADPC Bangkok, Thailand
Mr. Scott W. Engle Risk Assessment Specialist PRC Environmental Management, Inc., Cincinnati, U.S.A.	Dr. Scott R. Lillibridge Centers for Disease Control & Prevention Atlanta, GA, U.S.A.
Ms. Sherry Fielding Chemical Emergency Preparedness & Prevention Office (CEPPO), U.S. Environmental Protection Agency, Washington, D.C.	Mr. Michael McGrath Manager - Safety Health & Environment DuPont Wilmington, DE, U.S.A.
Dr. William J. Finan CEPPO U.S. EPA, Washington, D.C.	Dr. Eric K. Noji, CDC/P Atlanta, GA, U.S.A.
Mrs. Sandra S. Gabbert LEPC, Pasadena, TX Mr. Peter Gattuso Systems Analyst, Programme &	Ms. Katherine Piva Programme Analyst CEPPO, U.S. EPA
	Dr. John A. Read Director General Dangerous Goods Transport Directorate Transport Canada, Canada Mr. James Robert Rountree International Program Coordinator Occupational & Environmental Safety

Training Div.  
TEEX, Texas A&M University  
College Station, Tx. U.S.A.

Mr. V.Srinivasan  
World Environment Center  
Arlington, VA, U.S.A.

Dr. J.David Thwaites  
United Nations Environment Programme  
Paris, France

Mr. Thomas Valtaggio  
Director

Hazardous Waste Management Division  
U.S. EPA  
Philadelphia, U.S.A.

Ir. Meo I. Van der Hooft  
Retd. Corporate Safety Officer  
Azko Nobel & Consultant  
The Netherlands

## Appendix E

### List of Indian Speakers by Organization

#### **CENTRAL GOVERNMENT**

##### **Ministry of Environment & Forests**

Mr. J.C. Kala  
Joint Secretary

Dr. Indrani Chandrasekharan  
Additional Director

Dr. Y.P. Kakkar  
Director, Hazardous Substances Managent.  
Div.

##### **Ministry of Industry, Dept. of Explosives**

Mr. R.C.Kaul  
Controller of Explosives  
Mumbai

Mr. C.R. Surendranathan  
Controller of Explosive  
Madras

##### **Ministry of Labour**

Mr. W.A. Balakumaran  
Director Incharge  
Regional Labour Institute, Madras

#### **STATE GOVERNMENT**

Mr. I.P. Gautam, IAS  
Collector, Vadodara District

Mr. K. Gnanadesikan, IAS Collector,  
Chengalpatu  
MGR District  
Tamilnadu

Dr.V.Varaprasada Rao, IAS

Collector, Chengalpattu  
MGR District  
Tamilnadu

Mr. Kapil Dev, IAS  
District Magistrate  
Kanpur, Uttar Pradesh

Mr. Thomas Mathew  
Collector  
Ernakulam District  
Kerala

Mr. V.P. Joy, IAS  
Collector  
Ernakulam District  
Kerala

##### **Chief Inspectorate of Factories & Boilers:**

Mr. I.K.Patel  
Khanpur, Ahmedabad

Mr. A..K. Chattopadhyay  
Inspector of Factories  
Calcutta

Mr. E. Eswaraamurthy  
Addl. Chief Inspector of Factories  
Tamilnadu Factories Inspectorate  
Chepauk, Madras

Mr. H.N. Mirashi  
Director  
Directorate of Industrial Safety & Health  
Mumbai

Mr. S.V.Tambake  
Joint Director

Directorate of Industrial Safety & Health

Mr. A.T.Joshi  
Joint Director  
Directorate of Industrial Safety & Health  
Mumbai

Mr. M.N.Siddiqi  
Director of Factories  
Kanpur

Mr. K.A. Sreedharan  
Director of Factories & Boilers,  
Kerala

Mr. K.K. Sengupta  
Chief Inspector of Factories & Boilers  
Calcutta

**Transport Commissioner's Office**

Mr. H.R.Gulati  
Asstt. Transport Commissioner  
Mumbai

Mr. S.B.Sahasrabudhe  
Asstt. Transport Commissioner  
Mumbai

Mr. M. Sethuraman  
Deputy Transport Commissioner  
Madras

**Haldia Development Authority**

Mr. Manoj Pant  
Sub-Divisional Officer

Mr. M.V.Rao  
CEO, Haldia Development Authority

**Municipal Fire Service**

Mr. D.J. Kulkarni

Chief Fire Officer  
Bombay Fire Brigade

**NATIONAL SAFETY COUNCIL**

Mr. K.C. Gupta  
Director General

Mr. A.J. Rego  
Joint Director

Mr. R.P.Bhanushali  
Joint Director

Mr. V.B. Patil  
Asstt. Director

**INSTITUTIONS**

Mr. Saravanabavan  
Jr. Manager  
Loss Prevention Association of India

Mr. L.V. Krishnan  
Director  
Safety Research & Health Physics Group

Dr. (Mrs.) S.B.Lall  
Addl. Director  
All India Institute of Medical Sciences

Dr. S.K. Dave  
Deputy Director & Head, Occupational  
Medicine & Epidemiology Division,  
National Institute of Industrial Health

**INDUSTRY ASSOCIATIONS**

Dr. N.Sadasivan  
Chairman  
Thane Belapur Industries Association  
Dr. S.L.Patil  
Secretary  
Thane Belapur Industries Association

Mr. B.Vijay Raghavan, IAS  
Chairman & Managing Director  
State Industries Promotion Corpn. of  
Tamilnadu

Mr. O.P. Malhotra  
President, Indian Chemical Manufacturers  
Association &  
President, Philips Caarbon Black Ltd.

Mr. Visubhai B. Patel  
President, Federation of Gujarat Mills &  
Industries

### **INDUSTRY**

Mr. J.Huber  
General Works Manager  
Hindustan Ciba-Geigy

Mr. Vinod Bahree  
Executive Director  
ICI India Ltd.

Mr. R.H. Parekh  
Member Board of Governors, NSC &  
Group Medical Adviser (Retd.)

Mr. S.S. Dalal  
Addl. General Manager  
Gujarat State Fertilisers Corpn. Ltd.

Mr. B.S. Chadha  
Chief Officer  
Indian Petrochemicals Corpn. Ltd.

Mr. Daljit Singh  
General Manager  
ICI India Ltd.

Mr. A.A. Raichur  
Chief Fire & Safety Officer  
Hindustan Petroleum Corpn. Ltd.

Mr. C. Anatanarayanan

General Manager  
National Organic Chemical Industries Ltd

Mr. S. Doraiswamy  
Adviser (Safety)  
SPIC Petrochemicals Ltd.

Mr. R. Sethuraman  
Managing Director  
U.B.Petroproducts Ltd.

Mr. R.R.Umakanthan  
Manager (SHE)  
Zeneca ICI Agrochemicals Ltd.

Mr. P.K. Bhargava  
Sr.Plant Manager  
Indian Oil Corpn. Ltd.

Mr. M.C.Garg  
Vice President  
CCFCL, Panki

Mr. V.J. Joseph  
Dy.Chief Engineer  
FACT Limited

Mr. J. Gopal  
Chief Safety & Project Manager  
Hindustan Organic Chemicals Ltd.

Mr. A. Mazumdar  
General Manager  
Hindustan Lever Ltd.

Mr. M. Bhagia  
Safety Manager  
Hindustan Lever Ltd.

Mr. B.B.Munshi  
General Manager  
Indian Oil Corpn.Ltd.

Mr. S.Y.Khedkar  
Executive Division

Indian Oil Corpn. Ltd.

Dr. P.S.Rao  
General Manager  
Indian Oil Corpn. Ltd.

Mr. M.S.Mani  
Deputy Manager  
Cochin Refineries Ltd.

Mr. E.J.Joseph  
Dy.Chief Manager (Fire & Safety)  
The Fertilisers & Chemicals Travancore  
Ltd.

Mr. A.K. Gulati  
Safety & Environment Manager  
Duncans Industries Ltd.

Dr..Rajgopal  
Chief Medical Officer  
Hindustan Lever Ltd.

Dr. Shivaramakrishnan  
Occupational Physician  
Hindustan Lever Ltd.

Dr. S.R.Kamath  
Occupational Physician  
Hindustan Lever Ltd.

Mr. S.S.Dalal  
Addl.General Manager  
Gujarat State Fertilisers Corp. Ltd.

Mr. P.R.Mande  
Manager (SHE)  
Herdillia Chemicals Ltd.

### **CONSULTANTS**

Mr. A. Alagar  
Consultant & Dy. DG (Retd.)  
Central Labour Institute  
Tamilnadu Chapter of NSC

Mr. N. Rengaswamy  
Manager  
Engineers India Ltd.

### **COMMUNITY REPRESENTATIVES**

Mrs. Suman Sutawani  
Activist  
Thane

Mr. A.K.Puranik  
Sr. Asstt.  
Standard Alkali Ltd.

Mrs. Sandhya Dinkar Kousadikar  
Corporator  
Navi Mumbai Municipal Corpn.

Mrs. Sushma Dande  
Corporator  
Navi Mumbai Municipal Corporation

Mrs. Jaya Sadashivan  
Social Worker & Coordinator  
CIDCO's Project of Solid Waste  
Management

## Appendix F

### Indian Honorary and Vaedictory Speakers

Name	Program
Mr. Raghupathy Hon`ble Minister for Labour Govt. of Tamil Nadu	APELL Workshop at Madras from 7-10 Oct.`92
Mr. E.M.Gaikwad Hon`ble State Minister for Labour, Housing & Social ,Govt. of Maharashtra	Training Course on Chemical Emergency Preparedness at Mumbai from 18-21 Oct.`93
Dr.Suryakant Mishra Hon`ble Minister for Community Development, Govt.of West Bengal	APELL-CEP Workshop at Haldia from 10-13 Jan.`95
Mr. S.R.Ghatak Hon`ble Minister for Labour Govt. of West Bengal	APELL-CEP Workshop at Haldia from 10-13 Jan.`95
Mr. Melur A.M. Paramasivan Hon`ble Minister for Labour Govt. of Tamil Nadu	Training Course on Chemical Emergency Preparedness at Madras from 11-14 Oct.`93
Mr. M. Chinnasamy Hon`ble Minister for Industries Govt. of Tamil Nadu	Training Course on Chemical Emergency Preparedness at Madras from 11-14 Oct.`93 at Madras.
Mr. N. Ramakrishnan Hon`ble Minister for Labour Govt. of Kerala	Advance Training Course on Risk Assessment for Process Industries and CAMEO at Cochin from 24-26 Oct.`94
Mr. Prabhakar More Hon`ble Minister of State for Home & Industry, Govt. of Maharashtra	Seminar on Hazardous Material Emergency Response at NFSC, Nagpur from 26-27 June,1995
Mr. Lakhan Seth M.L.A. & Vice Chairman Haldia Notified Area Authority	APELL-CEP Workshop at Haldia from 10-13 Jan.`95

Name	Program
Mr. S Gopalan, IAS Secretary, Ministry of Labour	APELL Seminar at Delhi on 14 <sup>th</sup> Oct.'92
Mr. M.N.Buch, IAS, Additional Secretary Ministry of Labour, Govt. of India	Advance Training Course on Risk Assessment for Process Industries and CAMEO at Mumbai from 18-21 Oct.'94.
Mr. S.Ramamurthy Chief Secretary, Govt. of Maharashtra	APELL Seminar at Mumbai on 12 Oct.'92
Mr. V.Krishnamoorthy Commissioner & Secretary Labour Department, Govt. of Keala	APELL- CEP Workshop at Cochin from 18-21 Apr.'94
Mr. P.S.Chowdhury, IAS Labour Secretary, West Bengal	APELL-CEP Workshop at Haldia from 10-13 Jan.1995
Mr. K. Biswas, IAS Environment Secretary, West. Bengal	APELL-CEP Workshop from 10-13 Jan.'95
Mr. Kalyan Biswas Secretary, Dept. of Environment Govt. of West Bengal	APELL-CEP Workshop at Haldia from 10-13 Jan.'95
Mr. K. Gnanadesikan, IAS Collector, Tamilnadu	APELL Workshop at Madras from 7-10 Oct.'92
Mr. Thomas Mathew Collector, Ernakulam District, Kerala	APELL-CEP Workshop at Cochin from 18-21 Apr.'94
Mr. I.P.Gautam, IAS District Collector, Vadodara	APELL-CEP Workshop at Vadodara from 25-28 Apr.'95
Mr. Rajiv Gupta Collector & District Magistrate Vadodara	Workshop on 'Planning and Preparedness for Medical Response to Chemical Emergencies' 21-22 Nov.'96.
Mr. Chandrakant B. Garware Chairman National Safety Council	Training course on Chemical Emergency Preparedness at Mumbai from 18-21 Oct.'93

Name	Program
Mr. Kalyan Chakravarti Vice Chairman, NSC & President Cable Corporation of India Ltd.	Workshop on 'Planning and Preparedness for Medical Response to Chemical Emergencies' held at Mumbai from 18-19 Nov. '96.
Mr. H. Krishnamurthy, Chairman & Managing Director Madras Refineries Ltd., & Pres., Manali Industries Association	APELL Workshop at Madras from 9-10 Oct. '92
Mr. Vijay Raghavan, IAS Chairman & Managing Director State Industries Promotion Corpn. of Tamilnadu	APELL Workshop at Madras from 7-10 Oct. '92
Mr. B.H. Kothari Managing Director Kothari Sugar & Chemicals Ltd. & V-P, Manali Industries Association	APELL Workshop at Madras from 7-10 Oct. '92
Mr. C.N. Venkatakrishnan, IAS Chairman Madras Metropolitan Water Supply & Sewerage Board	APELL Workshop at Madras from 7-10 Oct. '92
Mr. Abraham Thomas Chairman & Managing Director The FACT Ltd., Udyogmandal, Cochin	APELL-CEP Workshop at Cochin from 18-21 Apr. '94 Community Awareness Workshop at Cochin from 8-10 May '95
Mr. C. Babu Rajeev, IAS Chairman, Cochin Port Trust	APELL-CEP Workshop at Cochin from 18-21 Apr. '94
Mr. Atul Shroff Chairman & Managing Director Transpek Industries Ltd., Vadodara	APELL-CEP Workshop at Vadodara from 25-28 Apr. '95
Mr. K.G. Ramanathan Chairman & Managing Director IPCL, Vadodara	APELL-CEP Workshop at Vadodara from 25-28 Apr. '95

## Appendix G

### Local-Level Sponsors of APELL-LAMP Activities

1. Thane-Belapur Industries Association  
Navi Mumbai
2. Terene Fibres India Ltd.  
Koparkhairne, Navi Mumbai
3. Tamilnadu Petroproducts Ltd.  
Madras
4. Indian Petrochemical Corpn.Ltd.  
Vadodara
5. State Committee on Science, Technology &  
Environment,  
Govt. of Kerala
6. Calcutta Port Trust Officers` Club Auditorium,  
Haldia
7. Indian Oil Corporation Ltd.  
Haldia
8. FACT Limited, Cochin
9. Industries in Haldia
10. Gujarat State Fertilisers Co.Ltd.
11. Central Control Room, Vadodara

## Appendix H

### APELL-LAMP Activities Initiated by National Safety Council of India (NSCI) Independent of Office of Foreign Disaster Assistance (OFDA) Funding

Activity	Date	Highlights
1. Translation and Publication of the APELL Handbook in Hindi	Oct.'92	Released at Mumbai at the hands of Hon'ble Dy. Minister for Labour
3. Presentation of Paper on 'Hazards Associated with Storage, Handling & Transportation of Hazardous Chemicals' for top executives	Apr.'94	Presented by Mr. R.P. Bhanushali, Jt. Director, NSCI
4. Dissemination of information on Response Information Data Sheets (RIDS) from CAMEO software on hazardous chemicals	-	Published in 'Industrial Safety Chronicle' of the NSC & Provided RIDS to 75 industry organisations
5. Training Course on 'Chemical Emergency Preparedness & Response - An Approach that Works'	Aug.'94	Inaugurated by Mr. K.C.Gupta, DG, NSCI; Conducted entirely by the national faculty
6. Presentation of paper on 'Guidelines for Handling, Storage and Transportation of Hazardous Waste'	Dec.'95	Presented by Mr. A.J.Rego, Jt.Director, NSCI at World Bank Seminar on 'Industrial Pollution Control'
7. Presentation of two papers on 'An Overview of Chemical Accident in Industries and their Causes' and 'Introductions of APELL Programme for Responding to Chemical Accidents'	Feb.'96	Presented by Mr. K.C. Gupta, DG, NSCI at training course organised by Disaster Management Institute under the World Bank Project
8. Participation in first and second meetings of the Committee on 'Road Accidents & Fire' for the preparation of the Disaster Management Plan constituted by the Govt. of Maharashtra	Aug.'96	Mr. K.C. Gupta, DG, NSCI

- |     |   |              |   |
|-----|---|--------------|---|
| 9.  | Participation in the first meeting of the Committee on 'Industrial & Chemical Hazards' constituted by the Govt. of Maharashtra  | Aug.<br>'96  | Mr. K.C. Gupta, DG,NSCI   |
| 10. | Specialised Training Course on 'Chemical Emergency Preparedness & Response - An Approach that Works'                            | Sept.<br>'96 | Inaugurated by District Collector, Ernakulam<br>Conducted jointly with Kerala Chapter of NSCI |
| 11. | Participation in the second meeting of the Committee on 'Industrial & Chemical Hazards' constituted by the Govt. of Maharashtra | Sept.<br>'96 | Mr. R.P.Bhanushali, Jt. Director, NSCI  |
| 12. | Cooperation & briefing to Mr. Josh Moga, Asian Urban Disaster Mitigation Project  |              | Three participants of his organisation participated in the Vadodara Medical Workshop          |

## Appendix I

### Local Activities Initiated Independent of Office of Foreign Disaster Assistance (OFDA) Funding

Activity	Date	Highlights
<b>MANALI-ENNORE INDUSTRIAL AREA</b>		
Video Film produced on Community Awareness in Tamil language	Feb. '93	
Fourth Off-site Emergency Drill	Oct. '95	
Dubbing of Video Film on Community Awareness in English	Mar. '95	
Participation in the Feasibility Study for Establishing Emergency Response Centre being conducted at the instance of the MOEF	Jun. '96	A National Consultant has also been hired
Emergency Evacuation Map Developed	Jun. '96	Input provided by Revenue Dept. of the Tamil Nadu State which includes locations of public places
<b>THANE-BELAPUR INDUSTRIAL</b>		
Published 'Hand Book of Medical Management of Industrial Emergencies: First Aid & Treatment'	1992	Compiled and Edited by Dr.M.A.Chitnis & Dr.S.L.Patil of TBIA
Formation of Mutual Aid & Response Group (MARG)	Aug. '94	Manual on MARG published by TBIA & modified every year
Organised Exhibition on Community Awareness at village Koparkhairane	Jan. '95	Jointly with Rotary Club of Thane-Belapur Industrial Area

Workshop on 'Handling, Storage & Transportation of Hazardous Chemicals'	Jul. '95	-
Mock Off-site Emergency Drill	May '96	-
Setting up Emergency Response Station	Jun. '96	Jointly by TBIA & MIDC

#### KANPUR AREA

Formation of Committee on Local Emergency Planning	Oct. '94	Three meetings held under the Chairmanship of Kanpur
Hands on Training Course on CAMEO Software at Rampur, U.P.	May 95	Conducted by NSC Head Office faculty
Participation by Representatives of the Kanpur area in the National Level Workshop on 'Hazardous Material Emergency Response - Instructors Training ' at NFSC, Nagpur	Jun. '95	Two Fire Officers from Industrial Fire Services participated.
Hands on Training Course on CAMEO Software at Phulpur, U.P.	Nov. '95	Conducted by NSC Head Office faculty

#### COCHIN AREA

During Road Safety Week labels on Hazardous Materials developed	Jan. '95	Road Safety Week . NSC faculty took classes of Transportation of Hazardous Chemicals, class labels and emergency information panel
Community Awareness and Home Safety Workers Education Centre	Aug. '95	Same Programme organised on 15 <sup>th</sup> Sept & 21 <sup>st</sup> Nov. '95
Formation of the District Level Crisis Group	Mar. '96	Issued Officer Order by the Collector, Ernakulam District

Training Programme on Emergency, Planning Preparedness & Response for Chemical Accidents for First Responders	Jun. '96	Conducted by DLCG with Kerala Chapter of NSC & FACT
Disaster Management Training for revenue official by Institute for Management in Govt.	Nov. '96	Chemical emergency component dealt by NSC Kerala Chapter and Factories & Boilers Dept.
Management of Chemical Accidents	Dec. '96	Organised by NSC, Factories & Boilers, Govt. of Kerala and MOEF

#### HALDIA

Formation of local Emergency Planning Committee		Representatives from Govt., Local Authority, Industry & Community has been involved
Community Safety Awareness Programme	Oct. '95	96 persons including members of the families of contractors worker attended
Participation in the Meeting of the Local Co-ordinators of all Six Areas	Aug. '96	Organised at Mumbai by the NSCI. The WEC also participated. One Representative participated.
Participation in the 3 <sup>rd</sup> Meeting of the NAC at Mumbai	Aug. '96	One Representative participated

#### VADODARA

Formation of District Contingency Plan Committee	1986	
Off-site emergency drills	1989	Five such drills has been conducted
3. Established Central Control Room (CCR)	1990	Established by IPCL and being run by industries in Vadodara

4. Two video films on  
Community Awareness  
developed in Hindi

Video films are i) Dhumketu &  
ii) Surksha ki Raha Par

## Appendix J

### Typical Composition of Local Emergency Planning Committees (LEPC) as Developed through APELL-LAMP Program

Before the Chemical Accident (Emergency Planning, Preparedness and Response) Rules were enacted in August, 1996, local crisis groups with different names were established in Kanpur, Cochin, Madras and Vadodara as part of the APELL-LAMP program. The composition of these "LEPC" groups was common in most cases, and included participation from the following groups:

#### Government:

The District Collector (or another designated Chairman)  
Director or Inspectorate of Factories  
Chief Civil Defence/Police/Central Industrial Security Forces  
Head of the Local Police Department  
District Medical Officer  
Municipal Authorities (Water, Electricity etc.)  
Chief Fire Officer  
Transport Commissioner  
General Manager of Telephone Department  
Officer Regional Pollution Control Board  
Regional Labor Institute  
Director of Information  
Railway Authorities

#### Industries:

Major Hazardous Industries & Industries Associations at the local level

#### Community:

Principal of College/Father of the Church  
Trade Union Leaders  
Elected Member of the Assembly  
Head of the Community Group (Village Heads)  
Rotary/Lions Club  
Coast Guard  
Red Cross  
Social/Cultural Organisations  
NGOs  
Media/Press Groups

## Appendix K

### National Advisory Committee Members

1. NATIONAL SAFETY COUNCIL, INDIA
    - i) Mr. Chandrakant B. Garware  
Chairman
    - ii) Mr. K.C. Gupta  
Director General
  
  2. WORLD ENVIRONMENT CENTER
    - i Mr. Antony G, Marcil  
President & CEO
    - ii Mr. Richard Williams  
Senior Fellow
    - iii Mr. V. Srinivasan  
Project Manager
  
  3. CENTRAL GOVERNMENT
    - i) Ministry of Labour  
Mr. R.K. Saini  
Joint Secretary
    - ii) Ministry of Environment & Forests  
Dr. Indrani Chandrasekharan  
Addl. Director
    - iii) Ministry of Chemicals & Fertilisers  
Mr. A.K. Das  
Industrial Adviser
    - iv) Ministry of Health & Family Welfare  
Dr. B.K. Verma  
Director (Emergency Medical Relief)  
Directorate General of Health Services
  
  4. SATE GOVERNMENT
    - i) Directorate of Industrial Safety and Health  
Mr. H.N. Mirashi  
Director,  
Directorate of Industrial Safety & Health  
Govt. of Maharashtra
  
  5. UNIVERSITY
-

- i) University of Bombay  
Dr. S.S. Deshmukh  
Vice Chancellor

6. DISTRICT/LOCAL ADMINISTRATION

- i) Collector, Thane District  
Mr. Ujjwal Uke
- ii) Municipal Corporation of Greater Bombay  
Mr. P.G. Vedhpathak  
Security Officer  
Municipal Corporation of Greater Bombay  
Mumbai

7. EMERGENCY RESPONSE SERVICES

- i) Bombay Fire Brigade  
Mr. D.J. Kulkarni  
Chief Fire Officer  
Bombay Fire Brigade
- ii) Lokmanya Tilak Municipal General Hospital  
Dr. R.G. Shirhatti  
Dean  
Lokmanya Tilak Municipal General Hospital

8. INDUSTRY ASSOCIATIONS

- i) Indian Chemical Manufacturers Association  
Dr. M. Sriram  
Executive Director  
Hindustan Organic Chemicals Ltd.
- ii) Confederation of Indian Industry  
Mr. K.P. Nyati  
Head, Environment Management Division  
Confederation of Indian Industry
- iii) Tata Risk Management Services  
Dr. R.E. Abrahams  
General Manager

- iv) Manali-Ennore Industries Association, Madras  
Mr. K.Sadasiva Chetty  
Dy. General Manager (Tech. Services)  
Madras Refineries Ltd.
  - v) Thane-Belapur Industries Association, Navi Mumbai  
Mr. Dinesh T. Parekh  
President  
Thane-Belapur Industries Association (TBIA)
9. EMERGENCY PLAN ACTION COMMITTEE - GREATER BOMBAY
- i) Emergency Plan Action Committee - Greater Bombay  
Mr. S.J. Sharma  
Convenor
10. TRADE UNION
- i) Indian National Chemical Workers' Federation  
Mr. Raja Kulkarni  
President
11. LOSS PREVENTION ASSOCIATION OF INDIA
- i) Mr. Sudesh Kapoor  
Secretary  
Loss Prevention Association of India Ltd.
12. COMMUNITY ORGANISATION
- i) Rotary Club  
Dr. M.A. Chitnis  
President  
Rotary Club of India Bombay

## Appendix L

### List of APELL-LAMP Papers Presented at International Forums

1. Participation in the 3<sup>rd</sup> Meeting of Sr. Level Expert Advisory Group on APELL organised by UNEP-IE & Presentation of Country Report on APELL/LAMP Activities Dec.'96 (Paris) Presented by Mr. K.C. Gupta, DG, NSCI
2. Presentation of APELL/LAMP Paper on Indian experience at the APELL regional Seminar organised by UNEP and National Environment Protection Agency Dec.'93 (Shanghai, China) Presented by Mr. K.C. Gupta, DG, NSCI & Mr. R.P. Bhanushali, Jt. Director, NSCI
3. Presentation of paper on 'Sharing OSH Experiences with APOSHO Experts' at 10<sup>th</sup> APOSHO Conference Sept.'94 (Kuala Lumpur ) Presented by Mr. K.C. Gupta, DG, NSCI
4. Participation in the 4<sup>th</sup> meeting of Sr. Level Expert Advisory Group on APELL organised by UNEP-IE and presentation of Country Report on APELL/LAMP Activities Dec.'94 (Paris) Presented by Mr. K.C. Gupta, DG, NSCI
5. Two lectures in the Disaster Management Course, Asian Institute of Technology, Bangkok. June'95 (Bangkok) Presented by Mr. K.C. Gupta, DG, NSCI
6. Technological Hazards in India-Lecture case discussion in Disaster Management Course, Asian Institute of Technology, Bangkok Nov.'95 (Bangkok) Presented by Mr. K.C. Gupta, DG, NSCI
7. Participation in meeting on APELL organised by UNEP-IE; presentations on 'Contribution of Indian Experience; International Version of Emergency Responders Hand Book' and Technical implementation report on 'Safety & Health Management Systems' Oct.'96 (Paris) Presented by Mr. K.C. Gupta, DG, NSCI

## Appendix M

### Local Language Songs and Poems Used to Raise Awareness at the Local Level

A majority of community members living in and around industrial complexes in India are uneducated and have little information about the hazardous substances used near their community. To address this lack of awareness, WEC encouraged Community Awareness workshop participants to compose songs and poems in the respective regional languages in order to communicate basic messages. The following examples are songs that describe the “Do’s and Don’t’s” of emergency situations. As shown in Figures 3 and 4, street plays, and dance acts are other examples of how the program used popular media to reach a broad audience.

