The last step is very vital (though unfortunately least attended to at present) for creating an effective data base on the national and the international levels for all further planning.

It is needless to stress again the high value of the training programme in imparting the all-round quality of the services rendered on the lines of the activities mentioned above. In fact, all of these are to be treated as highly skilled activities and, therefore, prior training of the requisite calibre is bound to serve the efficiency of work and also to avoid confusion and working at cross purposes of the personnel involved in a situation like a disaster, where time factor is extremely important.

4. Personnel to be trained :

The key personnel to be trained and their classified levels can be identified as follows :

Level - I State level personnel :

- Relief Commissioner of the respective States;
- Secretaries, Health, Civil Supplies, etc.;
- Directors of Medical and Health Services;
- Other State level officers of different departments;
- State level NGOs

Level - II District level functionaries :

- District Magistrate;
- District Chief Medical Officer and other
- District health officials;
- District level NGOs

Level - III Block level officials :

- Block Development Officer;
- Medical officers and other staff members of Primary Health Centres;
- Block level NGOs

Level - IV Community and village level workers

It was felt that JIPMER should first take up Level-I key personnel for training. Later, if deemed desirable and feasible, Level - II may be taken up for training.

The training programmes should :

1) cover general principles of the disaster cycle and its management;

2) focus on disasters common in South India such as floods, cyclone, etc.;

3) focus on man-made disasters as applicable to India.

The duration of the training for Level-I should be of three days. There can be two workshops per year. It was decided that for Level-II, the content and duration should be decided in consultation with Level-I functionaries.

The instructional methods to be adopted for training should include :

1) introductory lectures:

2) case studies and simulated problems using written cases and computer models;

The aim is to successfully motivate the personnel and sensitize them on emotional/ religious/social issues involved in a disaster

The core content for Level-I training must consist of :

1) disaster management information systems (DMIS) ;

2) disaster epidemiology;

3) rapid assessment and response;

4) relief measures;

5) intersectoral coordination

There is also a need for continuous evaluation of the training programme. This must include a short-term evaluation based on feedback and performance in simulation exercises and a long-term evaluation based on feedback from the key personnel on how they perform in training other levels of workers and their own activity during actual disasters.

5. Training contents :

The principal contents of Disaster Training Plan would be: the details of identification of the governmental and voluntary agencies (NGOs) concerned in the region and their existing disaster management plans at all levels. The trainers should be properly instructed regarding both of them first. The former would involve imparting knowledge of the commanding and coordinating levels of the officials concerned, for planning (overall as well as sectoral, plus medical, transport, communication services and the like), for carrying out emergency requirements, calling measures for external assistance from outside the plan area and setting up procedures for information needs, and also, for the administrative needs and the financial procedures entailed therein. Such information given according to the levels of the trainees concerned would defintely enhance the efficiency of the training imparted at every operative plane.

SUMMARY AND RECOMMENDATION :

Summing up the present report, it may be noted that though quite an appreciable amount of both governmental and non-governmental measures are already being undertaken in the three States covered, a common need that is keenly felt is training programme.

Steps may therefore be undertaken to develop such a programme which will serve all the three States.

In the light of its several assets JIPMER has already been identified as a Centre for training. As such, further measures, administrative and financial, may be taken up immediately to initiate the activities for disaster management specially.

In addition, it is very essential to note that :

(i) A vast amount of literature already exists in the three States as regards the several aspects of disaster preparedness and management ;

(ii) In fact, there is an urgent need to compile, index and summarise them adequately so as to aid effective and rapid use;

(iii) This is of particular value since the literature is constantly growing;

(iv) Investigations of short term and long term effect of disasters on physical and mental health on the one hand and the overall development activities of the States on the other constitute another important need.

List of Reports and the material collected during the site visits to Andhra Pradesh, Tamil Nadu and Karaikal respectively,-

Andhra Pradesh :

1) Cyclone and contingency plan of action. Revenue Department, Government of A.P.

2) Cyclone contingency plan of action. Vishakhapatnam District.

3) Memorandum on cyclone damages, May 1990. Presented by the Government of A.P. to the Centre.

4) N. G. O.

Tamil Nadu :

5) Our report of the visit and interview with Government and non-government agencies in Madras.

6) Anti Disaster Plan. Government of Tamil Nadu 1978.

7) Contingency plans to mitigate floods and cyclone in Madras City 1991.

U. T. of Pondicherry

8) Cyclone and Floods Restoration and Relief Measures Proposals 1991.

9) Cyclones and Floods. Restoration and Relief Measures Proposals - Supplementary details

10) Cyclone/Flood. Relief Manual, 1990

11) Report on Core Faculty Training ...Sponsored JIPMER 1991.

ADMINISTRATIVE STAFF COLLEGE OF INDIA

The Administrative Staff College of India(ASCI), with financial support from WHO, has been working on Disaster Preparedness studies and training activities since April,1992. As per the list of activities included under the contractual Service Agreement (CSA), the ASCI has taken up case studies on cyclone and floods, designing a computerised simulation game, developing audio-visual material and organising a one -week training course on disaster management.

A brief summary of the activities in progress is presented below:

Case Studies on Cyclone and Floods

The ASCI study team initiated the case studies on preparedness plans for cyclone disaster in the coastal districts of Andhra Pradesh in may 1992. The team visited Nellore, Guntur, Krishna, East Godavari, West Godavari, and Vizag. During the preliminary visit, the team held discussions with the District Administrators, District Medical and Health Officers and Heads of Departments of Animal Husbandry, Irrigation, Agriculture and Public Works. Reports and documents from the Districts on the emergency preparedness plans were collected and collated.

During the first visit by the team, the relevant secondary data were collected from the Departments besides information through discussions with the district - level officers. Their impressions, views and perceptions on the preparedness plans for cyclone disasters were recorded. A draft of the case has been prepared, and this will be further enlarged to cover the phase of cyclonic storms that cross the districts, which are highly probable during October-November. This will highlight the strength/weakness of the Department of Health in meeting the challenges.

Some of the observations recorded during the discussions are presented below:

(i) During the days / hours the cyclonic storms cross the coastal areas, the district Medical and Health officers have the responsibility of deploying teams with drugs and vaccines to the areas affected . The teams are expected to undertake mass vaccination and distribution of vitamin tablets. Shortage of drugs, injection needles and other supply items pose problems.

(ii) Removal of dead bodies and carcasses is the responsibility of the Police Department. The presence of a doctor is required to issue the death certificates prior to performing the funeral In the absences of a doctor to complete the formalities decomposition of the bodies takes place faster.

(iii) In the areas flooded, during the cyclonic storms, wells used as drinking water sources . get polluted and therefore need chlorination . With inadequate transport facilities, Health Department personnel find it difficult to take up this activity.

(iv) The District Medical and Health Officer is expected to prepare a roaster of doctors, both Government and private, who could be called upon to attend to any emergency. As mentioned by a District Medical and Health Officer, the response from the private doctors has not been encouraging.

(v) Some of the cyclone shelters available in the coastal areas are not usable during the rescue operations. Due to poor maintenance of the buildings, the shelters are not safe places.

(vi) During the days immediately after the cyclone, VIPs tend to rush to the affected areas. The presence of the senior officers is essential to brief VIPs on the various aspects, including the relief and rescue operations carried out, extent of damages, etc. This, according to some of the officers the ASCI Team met, takes them away from the operation and thus they are not able to attend to the emergency.

The ASCI Team has been advised by the DMHO of East Godavari district to study an island inhabited by a small group of fishermen and the problems faced by them during cyclone. It has been decided to take up this human settlement for the case study.

SIMULATION GAME

Management games have been extensively in use to train managers by simulating a situation in which they are to take managerial decisions. A Simulated Cyclone Management Game known as " SIMCLONE" designed by Prof. S. Ramani, Director National Institute for Training in Industrial Engineering, Bombay, has been used effectively in the training courses on Disaster Management. Similar to this, it is planned to develop a game on Drought Management.

A droughtprone district has been selected in Tamil Nadu. Data on the past drought years covering the extent of area, population, crops affected, financial outlays and expenditure and other related aspects are to be collected. A mathematical model linking up the decision taken on resource allocation, schemes executed to mitigate drought and consequences such as damage to crops, loss of human and cattle population, unemployment, etc., will be developed.

The secondary data on the population, number of women and children affected, crops damaged, etc., would be distributed to the course participants and they would work in groups to take decisions on resource allocation and other related aspects. The decisions taken by them would be fed into the computer and reports on the damages/ losses will be obtained using the game package. This will provide an opportunity to learn the mistakes one might commit in decision making. The proposed game will be used in the training course on Disaster Management at ASCI, sponsored by WHO, in March 1993.

AUDIO VISUAL MATERIAL

The ASCI will develop audio-visual material on cyclone in coastal Andhra Pradesh. Video recording of the pre and post cyclone warning periods will be made. This will highlight the role of the District Medical and Health Department in the various operations. Recording of interviews with affected persons will also be done. This will be accompanied by a commentary based on a script to be drafted. The Audio Visual Research Centre of Osmania University, Hyderabad, has been approached to cooperate with ASCI in video recording, editing, etc. This activity will be used in the training course scheduled in March 1993.

TRAINING COURSE IN DISASTER MANAGEMENT

The ASCI has been offering a one-week training course on Disaster Management since 1981. It is designed to train Government officers and Executives from Voluntary Organisations in the different aspects of managment of disasters which include, among others, emergency preparedness planning , team building and coordination, besides dealing with some special issues related to management of natural disaster.

The course on Disaster Management for the current academic year (1992-93) is scheduled from March 15 to 20, 1993 sponsored by WHO. The participants will be from the departments of Health, Irrigation, Agriculture, Public Works, Revenue, Finance, Planning and Animal Husbandry from the Central and State Governments, besides district level and voluntary organisations engaged in managing natural disasters.

PUBLICITY AND REPROGRAPHIC FACILITIES

The ASCI had planned to bring out a Newsletter on natural disasters covering the Indian subcontinent by compiling information on the various natural disasters from different sources. However, due to shortage of professional manpower it has been decided to postpone this activity to the next academic year.

DISASTER MITIGATION - PRIORITIES FOR RESEARCH

A Note by National Environmental Engineering Research Institute, Nagpur

Concern over heavy loss of life and property, triggered by natural disasters and industrial accidents and the severity of global as well as localized environmental deterioration, has generated widespread consensus on the need to deal with the causes as well as the effects of environmental disasters. The UN Charter for International Decade for Natural Disaster Reduction (IDNDR) aims at alleviating human, social and material losses resulting from natural disasters through concerted local, national, regional and international action.

It will be appropriate to address the task of devising preventive, mitigative and control strategies not only for causes of natural and manmade disasters but also for the complementary environmental emergencies which may trigger such events in order to realise the charter of IDNDR.

Disasters have become a growing concern of the local, national and international community, due to their devastating effects and the frequency with which they are occurring. Bhopal, Chernobyl, Armenia and Mexico are only a few among the most serious and well publicised events of the previous decade.

Broadly defined, disasters may be characterised by either a sudden or slow onset, and caused by natural phenomenon, human activities or a combination of both. The effects of a disaster, even when triggered by natural forces, are seen as a consequence of development susceptible to damage. Whatever triggers an event, other factors are often at work to produce disastrous results. Ecological mismanagement, inappropriate landuse, poverty and rapid population growth are all known to increase vulnerability to natural disasters, particularly in developing nations like our country.

Many of the disasters of the last decade can be directly attributed to hazardous development choices. Accidents such as oil spills, chemical explosions, releases of toxic chemicals into the air or water and radiation emergencies are the most serious examples which cannot be overlooked. Such disasters occur within the context of industrial and technological development. Triggered by a human error or a technological breakdown , they illustrate where safeguards have failed or are inadequate to the level and form of development pursued by a society.

Gradual, but severe, ecological degradation represents another form of disaster. The term "ecological disaster" is increasingly used to describe situations where environmental mismangement has produced widespread and severe deterioration. Such creeping disasters are associated with industrialisation in the absence of appropriate environmental controls and protection. But the term also applies to non-industrialised

regions where ecological mismanagement has resulted in large scale soil erosion, desertification, loss of forests or other forms of serious deterioration. An ecological disaster suggests increased vulnerability, with short term as well as long term consequences. While the primary effects are environmental, the ecological damage cannot be separated from the human and social costs of such disasters.

The transboundary effects of sudden and creeping disasters raise additional concerns requiring international attention. Among other issues, questions of liability arise in the pollution of shared resources such as rivers, seas and lakes, and in the release of toxic emissions into the atmosphere, whether accidental or deliberate.

Global warming , climate change and damage to ozone layer are also perceived as disasters. Such threats and potential for disasters highlight, more than any issue, the need for cooperation and concerted effort on national, regional and international levels.

Operational Definition of Environmental Emergency

An emergency is a sudden, urgent , usually unforseen occurrence or occasion requiring immediate action with judgement. Environmental emergencies could be accentuated by natural factors or abnormal functioning of technological facilities and have the potential to cause serious injury or loss of life to a large section of the population or to result in extensive damage to property and serious disruption of life.

An ecological or environmental emergency implies a situation in which serious damage to the environment has occurred or imminent and in which immediate remedial action is required. Such emergencies are most often associated with sudden accidental incidents, but may also be used to describe situations where a gradual deterioration has reached crisis proportions, demanding emergency measures. As with slow developing crises, the implications nearly always extend beyond the direct and immediate environmental damage, often with long term health and economic costs.

Current Activities of the Institute

The following specific areas of research relevant to disaster mitigation are currently pursued at this Institute (NEERI) under various projects :

* Development of Disaster Management and Emergency Preparedness Plans for chemical industrial projects based on probabilistic risk assessment;

* Environmental Risk Assessment for Industrial, Water Resource and Mining projects besides hazardous waste sites;

* Development of Off-site Emergency Preparedness Plan at the district level based on area risk assessment and vulnerability analysis;

* Environmental-health interface modelling, calibration and validation.

Priorities for Research

1. Preparation of state-of-art reports based on review of the existing status of predisaster prevention and postdisaster remedial strategies for all natural and manmade disasters and environmental emergencies;

2. Establishment of a centralised database/clearing house for collection and dissemination of information pertaining to past case histories; identified hotspots; nature of emergencies; vulnerable population characteristics; appropriate warning, disaster prevention and mitigation measures; protective systems; skilled and technical personnel; relief supplies and other infrastructure facilities;

3. Development of training material and training of personnel for warning, prevention and preparedness activities;

4. Genotoxicity assays for chemical toxicants;

5. Environment-health interface medelling with respect to chemical pollutants and biological contaminants.

TRAINING PROGRAM FOR DISASTER PREPAREDNESS

Presented by
Mr. R.K. Thankappan. Principal. Health & Family Welfare Training Centre. Trivandrum

There can be a national level training team attached to one of the national institutes like All India Institute of Hygiene and Public Health. The members of this team may be trained at some of the international institutes where such training programmes are being conducted. The national institute could organize training programmes for the State level trainers. The State level trainers may include the trainers of the regional health and family welfare training centres and the faculty of the medical colleges. They can also impart training to some of the NGOs.

There are 47 regional health and family welfare training centres in the country to impart various in-service training programmes for the health personnel working in the country. These training centres are situated in various States, each training centre catering to 5 to 8 districts. It would be ideal to integrate all the training programmes into the existing training system. While imparting training to these trainers this point may be kept in mind so that appropriate methodology could be selected considering the time availabe for the particular topic, i.e., disaster preparedness.

Apart from the training given through the regional training centres there are certain vertical training programs going on in the country like training in immunization program, ORT program and some other national programs. This creates some duplication and so, the current thinking at the national level is to intergrate these vertical training programmes also into the in-service training given through the training centres. The regional training centres may give training to the faculty of the 471 ANM training centres in the country, 33 MPW male schools and 46 promotional schools or LHV schools. They would be able to include the subject of disaster preparedness in their teaching.

The medical colleges in the respective States may give training to the medical students and the house surgeons as a routine. Some of the medical college faculities could be called as guest faculty when training programs are organized for the health service staff.

District Training Team

One of the health officers at the district level may be given the charge of the training programme at the district level. He/She will be in charge of the training programmes as well as the information regarding the training system in the district. He/She would prepare a list of the persons to be trained and assess the training load in the district. The basic health workers i.e., the multipurpose workers, male and female, would be

trained at the district level. In addition, they could train some of the personnel from the other departments also.

Block level training team

This is a concept recently developed and implemented in some of the States like Maharashtra. Here, the grassroot level functionaries like community health guides, dais and, if necessary, the multipurpose workers also could be given training.

The Government training institutions generally impart training to the Government functionaries only. In an area like disaster preparedness it is very important to train the private sector personnel also. This may be possible through professional organizations like the Indian Medical Association.

When a disaster occurs, the NGOs will be the first to act at the local level. So, it becomes a priority to train the NGOs. Training of NGOs can be undertaken at all levels, the national, the State, the district, and the block level. Their training can be arranged separately or some of the people can be called along with the Government functionaries.

Training the personnel of other sectors is as important or sometimes more important than training the health personnel. This training may be taken up by the respective departments. But there needs to be a coordinated effort even in training.

COPING WITH NATURAL DISASTERS - INPUTS FROM NGOs

Presented by Sri N.K. Jain, Convenor, Joint Assistance Centre, New Delhi

"Disaster is any disruption of the human ecology that exceeds the capacity of the community to function normally" , according to UNDRO. The WHO has further enlarged the concept and says "Disaster is any occurrence that causes damage, ecological disruption, loss of human life, deterioration of health and health services on a scale sufficient to warrant an extra-ordiniary response from outside the affected community."

The basic premise of the UN declaring the 1990's as the International Decade for Natural Disaster Reduction is, "Much that is known is not universally applied". It is hoped that by the end of the decade mankind will have gone far towards learning to live with natural hazards and not simply suffer from their violence.

Globally, 17 individual disasters had killed more than 10,000 each since 1949. The losses in India per year go beyond Rs. 1000/- crores which is nearly the Annual Plan of Andhra Pradesh. This figure represents the quantum of Central assistance. It is here that one has to view the decision of the Union Government to provide Rs. 15 crores for setting up a Disaster Management Institute in the Sixth Five Year Plan. Knowledgeable sources point out that no provision is being made even in the Eighth Plan.

The IDNDR objectives provide a key to the riddle. It says, "Prevention, protection and preparedness against natural disasters require action on the spot that is to say in the countries and at places where disaster may occur. Such action can only be planned and organised on the national or local scale "

The NGOs, or the independent sector as they are lately being called, by their very nature tend to be small even though facing up to the challenge of disaster, which again by their nature are large. But Schumachar had said, "Small is Beautiful". Schumachar further said in a later work,." use science to understand nature and not use it to exploit the same". Disaster prevention is just not science. It is a complex process of technological and sociological factors Thus, there is a great need to provide integrated approach to science studies. It may seem that I sound a bit pessimistic but no. Here are some positive trends in International and National areas. Most of these are NGO initiatives, though quite often there are major Government inputs simultaneously. Needless to say, that both sectors have to complement and supplement each other's efforts.

HOPEFUL TRENDS - INTERNATIONAL

1972	Advent of UNDRO
1982	World's first disaster management diploma launched.
1986	Birmingham Polytechnic launch disaster mitigation course.
1986	Pan Caribbean Disaster Preparedness Project started.
1987	Our Common Future report released.
1987	UN Decides on the decade (IDNDR).
1988	UNDRO launched. (Now UNINET)
1989	Disaster Management Diploma initiated in Australia.
1990	WHO designate 1991 World Health Day April 7, theme "Health for all when the Disaster Strikes".

HOPEFUL TRENDS - NATIONAL

1978	Joint Assistance Centre established
1983	PREPARE is established at Madras
1984	MMM Engineering College introduces Disaster Management subject in their post graduate course at Gorakhpur
1986	Institute for Youth & Disaster Preparedness set-up in Orissa
1987	Disaster Management Institute set-up in Bhopal
1988	3rd Indian Engineering Congress in Madras addresses itself to the IDNDR and resolve to observe October 9 as Disaster Mitigation Day.
1990	Er. Rangachari delivers the First (1990) Disaster Mitigation Day.
1991	78th Indian Science Congress focusses on the theme "Coping with Disasters."

It is with such hopeful trends that I recount here the role that the J.A.C. has played during the past decade, in the context of its capability to provide inputs for coping with disasters.

The Joint Assistance Centre (J.A.C.) was established in the aftermath of the 1977 Andhra Pradesh cyclone and as a result of concern expressed in conference after conference.

The aim of JAC is to campaign for generating awareness of the need for every one at all times to be in a state of preparedness to face natural as well as man-made disasters, with composure and confidence. This can only be done through training and education about disasters and that remains (JAC's) main activity since inception.

The JAC started with no past experience or documentation. It organised its first course in December 1978 with just five participants. Form here, we have grown in strength and today have developed capability to render consultancy and assistance to anyone anywhere in India on a no-profit basis. It would be most ungrateful of us not to acknowledge the help and the support of a large number of friends and several Government departments.

GROWTH OF JAC

The first national workshop on "Disaster Relief Operations" was organised by the JAC, jointly with Vishva Yuvak Kendra, at New Delhi from August 8-10, 1980. A total of 59

participants took part and their recommendations are 'Gita' for us. Rightly, the accent was placed on Training Education, Information Coordination both prior to and during disasters. Thereafter, the JAC organised a one week training course for leadership in Disaster Mitigation every year from October 9-16 — October 9 being Disaster Mitigation Day and October 16 being World Food Day Due to disturbed conditions in 1990 this programme was not organised. In 1980, we brought out our first publication "NATURAL DISASTERS - A GUIDE FOR RELIEF WORKERS. In 1981, we brought out the first issue of the quarterly journal "Disaster Management".

In 1981, three 10 day courses on disaster preparedness were organised. Ever since then, programmes have been organised in Tamil Nadu, Orissa, UP, AP, Gujarat, HP and Delhi.

JAC ACTIVITIES

1 Publication Programme

a) Disaster Management - a quarterly - already discussed above.

b) A monthly "Disaster Index" that will present the "media and disasters" as monitored from print media initially.

c) A reference book "Disaster Resource Directory" is expected in a few month's time.

d) A number of books on disasters are in the pipeline. JAC have already been authorised to assign ISBN numbers to its publications.

e) Two Hindi publications are a story book 'KARTAVYA' for children and translation of Earthscan book "Natural Disasters - Acts of God or Acts of Man".

f) We published the book "Environmental Education in the context of Disasters" on behalf of Indian Institute for Youth & Development, Orissa.

2. Disaster Information Service

a) Disaster Reference Library has over 3000 books; over 60 disaster related journals; over 4000 slides on disaster education, about a dozen overhead projector transparency packages and about a dozen video cassettes on disasters. The library has been built on gifts, reciprocal exchange and includes flip charts, audio cassettes for children, a video for deaf & dumb. Recently, we have installed a PC-XT IMB Compatible Computer to streamline our "informations"

b) We not only publish material but have also made agreements with several non-profit groups to distribute the material from·

(i) Disaster Research Centre, University of Delaware (of USA).

(ii) Datum International (of UK)

(iii) Centre for Disaster Management Studies

(iv) Voluntary Health Association of India (New Delhi)

(v) Third World Book Store (Goa).

c) We monitor national newspapers in Delhi and regional newspapers in Bihar, Gujarat, Orissa, UP and have an indexing service. Electronic media is being selectively monitored.

3. Training and Educational Programmes.

a) Annual Leadership Training Course Oct. 9-16 every year as discussed earlier.

b) We conducted a one week workshop for health administrators for VHAI sponsored candidates and are capable of organising specific target oriented courses in any field of man-made and natural disaster except technical courses. For later courses, there are several specialised agencies.

c) We organise regular seminars, workshop, symposiums and exhibition as also participate in them.

CHEMICAL HAZARDS : DISTRICT DISASTER MANAGEMENT PLAN

(Proper circulated by Tata Risk Management Services)

This pertains to Off-site Emergency Plan (District Disaster Management Plan) of the State Administration of Vadodara District and On-site Emergency Plans of Individual Industries in this area. Only the specific conclusions are summarised and issues highlighted. It would be relevant to elaborate certain basic concerns (A division of Tata Sons Ltd.) were retained owing to their pioneering effort of over a decade in impact assessment of hazards and risks and mitigation of industrial hazards in developing countries. The Ministry of Environment, Government of India realised the serious consequences of environmental impact resulting from chemical disasters and directed this study. It was felt that in a developing economy the priority on sustainable development should be given to the reduction of consequences of such disasters.

BACKGROUND

It is acknowledged that regardless of the disaster, whatever the cause, the environmental impact is immense whether it is on a short-term or a long -term basis. Industries and Environment Office of UNEP developed the guidelines for responding to technological accidents, the acronym being APELL — Awareness and Preparedness for Emergencies at Local Level. The experts connected with developing this handbook in their wisdom, mentioned the consequences of a disaster regardless of the cause as these could be natural or man-made. Our knowledge has not progressed to the stage where all causes of naturally occurring events are understood, predicted or effectively prevented. However , the need to prepare ourselves to respond to accidental emergencies when and where it occurs, cannot be underestimated. Therefore, the response Plans should be effective enough to mitigate the losses to the extent possible in case of such accidents.

A proper On-site Emergency Plan can contain a large number of potentially disastrous situations confined to the boundaries of the industrial unit. However, accidents can and will happen and if an incident goes out of hand it can lead to a major catastrophe having Off-site implications. The APELL handbook has clearly identified that to mitigate such disasters the FIRST RESPONSE TO THE EMERGENCY, THE SPEED WITH WHICH THE RESPONSE OCCURS AND THE PLANNING ITSELF THAT HAS GONE INTO SUCH RESPONSE are factors that reduce the losses to the community and the industry itself. Thus, not only a correlation was established between On-site and Off-site Emergency Plans, but the qualitative guidelines were provided . The Tata Risk Management Services used these in the context of Indian environment to develop the study.

THE PROJECT

The Government of India, Ministry of Environment, felt that this matter needed closer scrutiny and a select area which had a high concentration of chemical and petrochemical units was identified for an indepth study by Tata Risk Management Services. The broad objectives, as identified by the Government for this study, were :

1. Identified major hazardous units in the area would submit their On-site Emergency Plans, Safety Audit Reports and Risk Evaluation studies for examination.

2. These plans and reports would be analysed in detail for identifying hazards that may be overlooked and the effectiveness of protection measures already incorporated.

3. Analysis of process hazards and controls subject to sufficient data being available in the On-site Plans or provided by the Units themselves.

4. Correlation of these On-site Plans with the existing Off-site Plan with the District Collector.

5. Identifying further needs in terms of studies, reports or information necessary to make the Off-site Plan more effective and develop a model District Disaster Management Plan. The premise on which the model District or Area Disaster Management Plan was to be developed was consideration of existing major hazards in the area from chemical industries. Generally they were considered as:

    a. Toxic releases
    b. Fires
    c. Explosions
    d. Combinations of all three or any two of the hazards.

The Most Hazardous Category units were to be considered in this instance, as per E.P. Rules 1989 of the Ministry of Environment.

METHODOLOGY

To evaluate the exposure i.e., Off-site implications of any or all the hazards it was imperative to examine the On-site Plans of most hazardous units, examine the details contained therein and develop the MAXIMUM-CREDIBLE LOSS SCENARIOS.

It would be interesting to mention that till such time that this case was considered afresh i.e., in 1990 July/August, the basis of developing an Off-site Plan had not been defined. Using Maximum Credible Loss (MCL) Scenarios as the base got defined in the interaction with Government Officials, Tata Risk Management Services and visiting expert, Dr. Robert Cumberland of National Chemical Emergency Centre. Environmental Informatics, Oxfordshire, U.K. This is a major lacuna and it would probably apply equally to all developing countries.

The concept of MCL was a parallel drawn from the underwriting profession's assessment of maximum possible losses in case of explosions, with the difference that

it would examine certain factors like available on-site protections, design of structures, location and siting of hazardous installations and their proximity with one another and the indiivdual management's awareness of the potential hazards. Though it would be a subjective analysis, outside consultants (SAFETY AUDITORS) conducting it would lead to impartial assessments. In addition, it was felt that the necessary data for such assessment in totality may not be available from all the units at that juncture. Hence, only the most serious hazards are to be considered for off-site implications. If the Administration could gear itself to handle the most serious consequences, accidents of smaller magnitude could be handled effectively.

Having finally come to the conclusion that the basis of the District Disaster Managment Plan i.e. an effective Plan, needed detailed analysis of On-site Emergency Plans and Maximum Credible Loss Scenarios of individual units, the question to be addressed, therefore, were:

a. Analysing and evaluating MCL and therefore what data was necessary from the individual units;

b. As per Government's guidelines, all most hazardous units had to have their On-site Emergency Plans and do these plans carry enough information to evaluate MCL;

c. The existing Off-site Plan of the area had to be examined *denovo*. In all over 50 chemical units were examined in the identified area.

LIMITS OF DATA AVAILABLE

- Of over fifty most hazardous units, only 12 On-site plans or only a semblance of On-site plans, as a document, were available.

- Some of the most hazardous units were not appearing in the District authorities list at all.

- The method of categorising the Most Hazardous Units left out potentially most hazardous units from the available list only because the units or installations themselves refused to acceept their potential hazards

- Some installations which may not per se be hazardous but would act as catalysts or trigger for a major catastrophe had not been considered at all either by District Authorities or the Organisations themselves, like the Railway Yard or Electric Generation Units/Substations.

- Large number of hazardous chemicals, though present in substantial quantities, had not been declared to the District Authorites.

- Even the On-site Plans of 12 units did not have data for Maximum Credible Loss Scenarios. Whenever any study was carried out, it was more micro study providing hardly any data for Off-site implications.

- Major Hazards had not been considered and a few dispersion studies that were available , were limited in scope and nature.

- No safety audit reports, Hazop analysis, Risk evaluation studies has been carried out.

- The On-site Plans also provided negligible or no data regarding major issues, e.g.:-

  1. Fire protection/Detection measures.
  2. First Aid details including antidotes, etc.
  3. Location and alternative Central Control Rooms in case of emergencies.
  4. Procedures and systems for activating CCR.
  5. Provision of emergency lighting, etc.
  6. Storage layout and details of storage.
  7. Meteorological data was insignificant or wrong.
  8. Line of command, responsibilities and accountability of emergency personnel was not detailed.
  9. No On-site Plan had considered a cascading effect on neighbouring units and vice versa in spite of close proximity.
  10. Terrorist, riot, strike and natural calamities did not appear to have been adequately considered.
  11. An informal mutual - aid programme appeared to be available however,

- Level & type of support was not deifined.

- No list of capabilities and facilities was available. Condition under which assistance was warranted was not laid down.

CONCLUSIONS

Regardless of the hazard involved, the District Disaster Management Plan, which, in essence, is a safety delivery system, has to define either explicitly or implicitly what is an acceptable level of risk. In the absence of crucial data from On-site Plans, this Credible Loss Scenarios would also provide the parameters for the administration, of what in effect would be the acceptable level of risk. It has to be accepted that this acceptable risk level will also be dependent on other factors like availability of financial resources, trained manpower and other priorities.

RECOMENDATIONS

The Tata Risk management Services provided long-term and short-term recommendations in detail. While it is not possible to submit these in this symposis, major headings only are indicated here.

1. The basis of planning and organisation of an Off-site Emergency Plan (On-site recommendations)
2. Viable communications;
3. Effective warning system;
4. Activation procedures;
5. System for direction and coordination
6. System for recovering and processing information;

In considering the major disaster effects in the area it was observed that the severity of some disasters foreseen precluded or severely restricted an orderly and well modulated approach to disaster response.

In spite of limits of data, based on experience and information gathered through various agencies, a Chlorine leak of the magnitude of only 20 Tonnes potentially appeared to be one such scenario.

SHORT TERM MEASURES - MOST HAZARDOUS UNITS

a. Detailed On-site Emergency Plans for all units/installation needed to be developed including development of Maximum Credible Loss Scenarios.

b. Since shifting of existing installations was not feasible, each installation should be critically examined about its adequacy in terms of equipment/personnel and resources to handle On-site Emergencies.

c. The details provided in a & b are to be correlated to the District Disaster Management Plan.

d. The District Disaster Management Plan, to be effective thereafter, requires :

   i. A formally manned Central Control Room to be manned 24 hours with all facilities of communication etc.

   ii. Under the control of CCR (Central Control Room) a first Response team of personnel & equipment along with a formal mutual aid scheme to be developed.

   iii. HAZMAT (Hazardous Materials) Response team and a van fully equipped to handle emergency should be at the disposal of CCR.

   iv. Regular and frequent Safety Auditing of the Most Hazardous Units/Installations should be made mandatory. Safety Auditors to be external Auditors, duly licensed/approved by the Government.

   v. Sanctions and permissions for expansions/new Units in area should be allowed only after a close scrutiny of the risk evaluation studies and On-site Emergency Control measures.

   vi. The operative area of Civil Defence organisations as well as the authority of Municipal fire Brigade to be extended to include these Industrial Estates.

   vii. Telecom links between the Industries/District Administration and CCR to be made more efficient.

   viii. Existing hospitals to be geared to handle specific effects of the potential hazards and regular drills to be conducted to ensure proper response at the time of any emergency.

LONG TERM

1. The Town Planning activity to keep in mind the identified hazards and the danger zones.

2. Link roads, bypasses, overbridges, railway crossings, railway trunk lines, shunting yards to be the realigned/developed/repaired to ensure smooth Emergency operations.

3. Toxicological Research should be carried out with regard to all hazardous chemcials and a proper Data base prepared.

4. A project on the basis of Chemsafe (U.K) should be taken up to advise the Central Control Room & the Civil authorities including Industries on chemical spills, accidents - transport or industrial.

5. The Central Control Room should be provided with a Data Processing Net Work linked to all the industries and heads of civic bodies not only for data acquisition and retrieval but to serve as instantaneous communication facility also.

As a consequence of the aforesaid exercise guidelines for developing a model Off-site plan/District Disaster Management Plan is being considered.