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UNITED NATIONS ENVIRONMENT PROGRAMME

INDUSTRY AND ENVIRONMENT

APELL WORLDWIDE

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ENESS AND PREPAREDNESS FOR EMERGENCIES AT LOCAL LEVEL

APELL WORLDWIDE

APELL

Awareness and preparedness
for emergencies at local level

UNEP

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INDUSTRY AND ENVIRONMENT

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UNEP IE's publications aim to meet the needs of a wide range of government officials, industry managers, and environmental protection associations, by providing information on the issues and methods of environmental management relevant to various industrial sectors.

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FOREWORD

Following various technological accidents in both highly industrialised and industrialising countries which resulted in adverse impacts on the environment, the United Nations Environment Programme Industry and Environment office (UNEP IE) launched the Awareness and Preparedness for Emergencies at Local Level (APELL) programme.

APELL's main goals are to prevent technological accidents and, failing this, to minimise their impacts. This is achieved by assisting decision-makers and technical personnel to increase community awareness of hazardous installations and to prepare co-ordinated response plans involving industry, government and the local community, in case unexpected events at these installations should endanger life, property or the environment.

APELL was started, in co-operation with industry and governments, in late 1988, when the APELL Handbook was launched. The Handbook describes a ten-step process to guide local communities in strengthening their accident prevention and emergency response capability. The APELL programme has received the support of UNEP's Governing Council and is mentioned in the UN Conference on Environment and Development's action plan, « Agenda 21 », as a tool for environmentally sound management of toxic chemicals. The APELL Handbook is available in nineteen languages at the time of writing.

The APELL Senior Level Expert Advisory Group at its meeting in December 1992 recommended that a publication describing the more successful country experiences be prepared from the Country Reports submitted to that meeting and given a wide circulation by UNEP IE. A first draft was submitted to the meeting of the Advisory Group held in December 1994. The opportunity has been taken to update these accounts, in the light of comments received, and to add extra material. « APELL Worldwide », as here presented, reflects action taken to implement the APELL programme in a dozen countries round the world up to the beginning of 1995. Extra information will be welcomed by UNEP IE as a contribution to a future edition.

UNEP IE intends to supplement « APELL Worldwide » with a further publication containing detailed case studies of APELL implementation at local level.

The UNEP IE team contributing to this project was Dawn Benson, Franca Brilliant and Janet Stevens. The work was directed by Jacqueline Aloisi de Larderel.

This report was prepared with the support of the French Ministry of the Environment.

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INTRODUCTION

« APELL Worldwide » contains twelve national overviews of APELL or APELL-like activities undertaken to prevent and prepare for technological accidents.

The selection of material has been made partly on the basis of availability of information; much of the text has been adapted from reports prepared for the 1992 and 1994 APELL Senior Level Expert Advisory Group meetings or for other meetings. However consideration was also given to the interest of the material for potential APELL users elsewhere. It is hoped that such users will all be able to find something relevant to their own countries and situations in these pages.

It is evident that the approach to implementing APELL or APELL-like processes has varied considerably in different countries. This lends support to the view that APELL can be adapted as well as adopted. In some cases, the lead has been taken by industry; in others, by government. There are histories in which APELL has provided a process to help industry and local government abide by national legislation and regulation; there are also histories in which APELL has been used to make a start on chemical accident prevention and preparedness in the absence of any such legislation or regulation. Some countries have emphasized the need for national planning and co-ordination; others again have concentrated their efforts on one or more local pilot projects. The Central and East European economies in transition have special problems, in particular the need for decentralisation, and have started to use APELL to build local awareness and capacity to deal with disasters in communities with little experience of local government.

APELL users are requesting a publication containing detailed case studies of local APELL application. UNEP IE intends to follow « APELL Worldwide » with « APELL Case Studies » as soon as possible.

APELL IN BRAZIL
AN INDUSTRY OVERVIEW

THE COUNTRY :

Total area : 8,511,965 km sq
Population : 150,750,232 (July 1989), growth rate 2.0% (1989)
Language : Portuguese
Industries : textiles and other consumer goods, shoes, pulp and paper, chemicals, cement, lumber, iron ore, steel, motor vehicles and auto parts, metalworking, capital goods, tin.

APELL FOCAL POINT

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OTHER CONTACT POINTS

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APELL MATERIALS IN LOCAL LANGUAGE

The APELL Handbook has been translated into Portuguese and distributed by ABIQUIM. A video in Portuguese, prefaced by an outline on setting up APELL, was made of the full-scale emergency drill which formed part of the Cubatao Workshop held on 14 February 1990.

The CAMEO APELL software has also been partially translated into Portuguese as a tool to help emergency management in companies.

APELL SEMINAR/WORKSHOPS

State - 14 February 1990 - Cubatao (Sao Paolo State)
Local - 3-6 November 1992 - Maceio (Alagoas State).

BILATERAL CONTACTS AND FOLLOW-UP

Visit on 21-24 September 1993 by representatives from Maceio to study APELL-type programme in Sarnia (Ontario, Canada).

HISTORY

APELL was introduced in Brazil at the end of 1988, as a direct result of the meeting held by UNEP on 14 December 1988 in Paris for the purpose of introducing APELL to the world. At that time ABIQUIM and CETESB, the Sao Paolo State environmental agency, joined forces to implement the programme and decided to start with a seminar in Cubatao, a city with many industries. As a result of this seminar, held on 14 February 1990, several other cities with chemical industry facilities decided to create their own emergency networks based on APELL. Although the Brazilian government has not yet given formal support to the dissemination of the APELL process in its country, the Civil Defence Agencies at federal and state level have in some cases played an important part in APELL activities.

To date APELL has been introduced as follows :

- Cubatao — An emergency preparedness system has been created. It is not called APELL but APELL was used as a model for part of the programme.
- Suzano — An APELL programme has been functioning since 1989 and has developed good participation by all three APELL partners, i.e. industry, local authorities and the community.
- Duque de Caxias — An industry APELL group was created in 1990, based on the petroleum/chemical complex in the town. Efforts since then have been devoted to organising an industry network and obtaining support from the local authorities.
- Camaçari — An attempt was made to introduce APELL in the petrochemical complex here. However this failed because the state government was at the time concentrating on introducing a civil defence system.
- Guaratingueta — A first meeting was arranged by the BASF Group, the main industry in the town. However little progress was made due to changes in local government.

- Sao Jose dos Campos — An APELL-like programme has been in place since 1989, involving a chemical facility, local emergency services and the nearby community. ABIQUIM regards this programme as having produced very good results.

- Maceio — At the 1st International Congress on Civil Defence held in November 1991 in Sao Paolo, contacts took place between representatives from Maceio and one of UNEP IE's Senior Industry Consultants. As a result, UNEP IE was invited to organise an APELL Seminar/Workshop in the city, which took place in November 1992. An APELL Co-ordinating Group was formed to implement the programme. The Governor of the State of Alagoas has since made a decree that the APELL process shall be implemented throughout the State; an event which attracted media attention, including an item on the TV news.

REVIEW

The progress of APELL in Brazil was reviewed by ABIQUIM for the benefit of participants in the APELL Senior Level Advisory Group Meeting held in December 1992 in Paris. At that time, ABIQUIM identified three main obstacles to successful APELL implementation in Brazil :

- low level of commitment from industry, due to the novelty of the approach and the work ;
- non-existence of « right-to-know » legislation ;
- lack of public awareness.

ABIQUIM has decided to tackle the problem of industry lack of commitment by implementing « Atuaçao Responsavel », the chemical industry's Responsible Care programme, in Brazil. Responsible Care aims for a continuous improvement in safety, health and environmental protection; based on a set of guiding principles and good management practices, which are defined in specific codes or related materials. One of these codes is « CAER », Community Awareness and Emergency Response, a process very similar to APELL. As part of the initiative, companies are expected to work together in Responsible Care groups and to create and promote means to respond to public concerns about their operations and products.

Responsible Care demands that the company's top executive formally commits his organisation to the programme. Between April and December 1992, 110 ABIQUIM member companies (65 % of the total) had joined the initiative and 10 Responsible Care groups had been created around the country in the most important industrial areas.

APELL is part of ABIQUM's strategy to implement Responsible Care, not only as a tool to create or reinforce industry's capability to improve awareness and

preparedness for emergencies but also as a means to make both local authorities and the public co-owners of the process. APELL groups will accordingly be started by each Responsible Care group as soon as possible, as part of the CAER code of management practice.

ABIQUIM hopes that this process, which is already receiving encouraging signs of interest from government authorities at various levels and from environmental organisations, will encourage a movement towards the preparation of a comprehensive set of laws and regulations on emergency preparedness, which in turn will reinforce support for the APELL process throughout the country.

CONCLUSIONS

Much can be achieved by enthusiastic « movers and shakers » at local level.

Industry's long-term commitment is vital if anything long-lasting is to be achieved.

Government's commitment is vital if anything widespread is to be achieved, particularly in so large a country.

APELL IN CHINA
A GOVERNMENT PROGRAMME

THE COUNTRY:

Total area	:	9,596,960 km sq
Population	:	1,112,298,677 (July 1989); growth rate 1.6% (July 1989)
Language	:	Standard Chinese (Putonghua or Mandarin), also Cantonese, Shanghainese, Fuzhou, Hokkien, other minority languages and dialects
Industries	:	iron, steel, coal, machine-building, armaments, textiles, petroleum.

APELL FOCAL POINT

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OTHER CONTACT POINTS

Henan Provincial Environmental Protection Bureau, 1 Shun He Road, Zheng Zhou (for Henan Province).

APELL MATERIALS IN LOCAL LANGUAGE

The APELL Handbook is available in Chinese. UNEP IE Technical Reports Nº 3, « Storage of Hazardous Materials », and 12, « Hazard Identification and Evaluation in a Local Community », have also been translated and distributed in Chinese. The APELL Newsletter has been translated into Chinese and distributed widely within the country with effect from Issue Nº. 4. The Shanghai Civil Defence Office has made an APELL video and teaching materials and television films in Chinese have also been produced. The People's Air Defence Association in Shanghai is publishing a journal called « Life and Disasters », which carries information from other countries on disaster prevention, preparedness and response.

APELL SEMINAR/WORKSHOPS

Regional (for Asia and the Pacific) - 6-10 December 1993, Shanghai.

BILATERAL CONTACTS AND FOLLOW-UP

At the request of the Chinese government and UNEP IE, the Swedish National Rescue Services Board arranged for an expert to visit China on 25 February - 3 March 1995, to advise on possible national follow-up of the recommendations of the Shanghai Seminar/Workshop. The feasibility of creating an APELL Training and Information Centre in Shanghai is being examined.

HISTORY

In 1987 NEPA set up a system for reporting environmentally polluting accidents, by promulgating « Provisional Rules for Reporting Accidents Causing Environmental Pollution and Damage ». Since that time, NEPA has regularly presented a « Case Report of Severe Environmental Pollution Accidents in China » to the State Council General Office, the Director of the Environmental Protection Committee and other state bodies.

In March 1987 NEPA also issued a circular entitled « Investigation into the Danger of Great Environmental Pollution Accidents », requiring each province in China to investigate the potential for seriously polluting accidents in its territory. As a result of these enquiries, NEPA issued the « Report on Investigations into Severe Environmental Pollution Accidents » in February 1989, together with a « List of Enterprises with Potential for Major Environmental Pollution Accidents ». It was pointed out that China had already suffered about 70 seriously environmentally polluting industrial accidents, resulting in the poisoning of about 1,000 people of whom several dozen died. Local government was then placed under a requirement to take effective measures to eliminate the hazards so identified.

There was thus considerable concern at national government level concerning the potential consequences of technological accidents, just at the time that UNEP IE was first developing its APELL programme. China actually launched APELL in May 1988, before its formal launch by UNEP IE in December of that year. APELL was started in three provinces - Henan, Shanxi and Hubei - and in two cities - Shenyang and Harbin. During that year Beijing hosted a symposium on « Emergency Response Treatment of Environmental Pollution Accidents », at which all provinces and cities in the process of implementing APELL were represented. A Chinese delegation attended UNEP IE's December 1988 meeting to report on the national initiative. Many large and medium-sized factories have now taken part in the APELL process and most of them have identified previously unrecognised hazards.

In Henan Province, APELL programmes were begun in Kaifeng, Luohe and Xinxiang Cities, under the supervision of the Vice-Governor and with the co-operation of: industry; police, fire and public health services; the environmental protection services; and the army. Four groups were established at the local and industry level in each city, i.e: a command system; a monitoring system; a communication/alarm system; and a rescue system. Simulated emergency

exercises were held in each city and filmed for relay nationwide. The programme's slogan was « Economic construction needs APELL ».

In June 1989, Kaifeng City carried out its emergency exercise at the Kaifeng Chemical Fertiliser Plant and the Kaifeng Household Chemical Plant. An Emergency Relief Plan Against Chemical Accidents was formulated. The two plants' Chemical Accident Prevention Teams were assembled for training and an emergency relief headquarters for chemical accidents was set up. In 1991 the Kaifeng Chemical Fertiliser Plant found that this training was put to the test when there was a leakage of concentrated sulphuric acid. The plant mobilised its emergency team, which was able to contain the accident in its initial stage. Local managers considered this an example of APELL's efficacy, since it was felt that the accident would have been much worse if the APELL process had not been in place.

In Shanghai, the municipal government issued on 5 July 1991 a local regulation, the « Shanghai City Chemical Accident Rescue Method ». Later in 1991 the city established a chemical emergency relief team, consisting of experts from municipal, district and county level chemical accident committees. A risk evalution of the factories in Shanghai, particularly those in the chemicals and pesticides industries, has been completed. A co-ordinated rescue organisation was also set up, drawn from chemical industry fire brigades, environmental protection agencies and epidemic prevention organisations. This is a round-the-clock operation with special communication stations containing computers and mobile communications equipment. At the end of 1992 Shanghai began to train rescue specialists and also to provide special training for chemical facilities and health services personnel. A night emergency simulation has been carried out.

Meanwhile at national level, a joint investigating group including NEPA, the Ministry for the Chemical Industry, the Anti-Chemical section of the People's Liberation Army General Staff Office and the General Company of the Petroleum and Chemical Industry have completed an investigation into the process, funding and regulations required for for the establishment of an emergency response system for chemical accidents in five cities. One of these is Shanghai, whose efforts have already been described above. Nanjing, Guangzou, Jilin and Shenyang have also been covered. The group will now carry out similar investigations for Chongqing, Lanzhou, Zheng Zhou and Beijing Cities.

More recently NEPA has set up a special unit, the Leading Group for Emergency Response to Severe Environmental Pollution and Ecological Hazard. Its responsibilities are to :

- act as a clearing-house for information on environmental pollution and accidents ;
- monitor the environmental effects of accidents and assess their impacts at field level ;
- assist local government to work out plans to prevent accidents and/or limit their consequences ;
- help local government to deal with the consequences of accidents.

Local government is encouraged to :

- raise awareness of the importance of APELL regularly and compile training materials, including posters and videos ;
- set up response teams at factories and organise regular training and drills ;
- conduct regular local hazard surveys ;
- work out emergency response plans.

The government has given grants to help industry implement preventive measures. After a chlorine leak in August 1989 at the Chongqing Tianyuan chemical plant, detection equipment was installed. In June 1990 a leak was avoided thanks to a timely alarm signal.

Nonetheless serious industrial accidents continue to occur, e.g. the two explosions on 3 August 1993 in Shenzen Special Economic Zone, which reportedly killed at least 70 people and injured 200.

REVIEW

The Chinese delegation to the APELL Senior Level Advisory Group Meeting held in December 1992 in Paris expressed the following views:

« On the whole we have made progress in carrying out the APELL programme in China and we are dedicated to continuing efforts to improve our work. However, because of language barriers, we have not had sufficient information exchange with other countries....China is a country with a fairly large land area. The implementation of the APELL programme has had uneven results in different regions of China ».

The report from Shanghai expressed the view that the unification of planning provided by the APELL process had helped create a system which was recognised and respected by all those concerned in the city - factories, local authorities and local people.

The following suggestions for national action and improvement were made:

- strengthen exchange and co-operation with other countries, through bilateral visits, and encourage other governments to join in the world-wide struggle against industrial accidents and their effects;
- develop public awareness and preparedness as an essential part of the fight against industrial accidents;
- gradually extend the scope of APELL in China to include not only large and medium-sized cities but also small ones;
- establish APELL local agencies to implement the APELL process;
- strengthen connections with UNEP and help to organise APELL events in China, so as to spread further the knowledge and understanding of APELL (the invitation to UNEP IE to hold a Regional APELL Seminar/Workshop in China was a result of this recommendation).

The Chinese delegation to the December 1994 APELL Senior Level Expert Advisory Group Meeting reported the following plans :

- carry out a new hazard identification and evaluation exercise and ensure that emergency response plans are worked out which cover all potential risks;
- revise the «Guide to the Implementation of APELL in China»
- establish an APELL training centre
- expand the number of APELL pilot projects.

CONCLUSIONS

APELL can be adapted to meet the perceived needs of national governments to protect their populations and environments against major industrial accidents.

APELL can be implemented without outside help, e.g. from UNEP IE, although the need is felt in China to learn from and profit from the experiences of other countries as well.

APELL IN INDIA
FILLING IN THE FRAMEWORK

THE COUNTRY:

Total area	:	2,973,190 km sq
Population	:	833,421,982 (July 1989), growth rate 2 % (1989)
Language	:	Hindi, English and 14 other official languages ; 24 languages spoken by a million or more people ; numerous other languages and dialects.
Industries	:	textiles, food processing, steel, machinery, transportation equipment, cement, jute manufacturing, mining, petroleum, chemicals.

APELL FOCAL POINT

Ms Indrani Chandrasekharan, Scientist, Ministry of Environment and Forests, Paryavaran Bhawan, CGO Complex, Lodi Road, New Delhi 110003.

IMPLEMENTATION AGENCY

National Safety Council (NSC), PO Box 26754, CLI Building, N.S. Mankiker Marg., Sion, Bombay 400 022.

OTHER CONTACT POINT

Directorate-General Factory Advice Service, Ministry of Labour, at CLI Building in Bombay as above.

APELL MATERIALS IN LOCAL LANGUAGE

The APELL Handbook has been translated into Hindi, published and distributed by the NSC, with financial support from UNEP.

A video on « Community Education » in the local language (Tamil) and a bilingual (English and Tamil) poster and booklet on actions to be taken by the community during an emergency have been produced and distributed by the Manali Ennore Emergency Preparedness Committee.

Bilingual (English and Malayalam) booklets on « Community Education » have been produced and distributed by the fertiliser and petrochemical industries in Cochin.

APELL SEMINAR/WORKSHOPS

Local - 7-10 October 1992 - Mannali-Ennore Industrial Area (Madras - Emergency Plan trial held 22-23 April 1994)

National (Seminar only) - 12 and 14 October 1992 - Bombay and Delhi.

Local - 12-15 April 1994 - Kanpur (Uttar Pradesh)
Local - 18-21 April 1994 - Cochin (Kerala)
Local - 10-13 January 1995 - Haldia (West Bengal)
Local - 25-28 April 1995 - Baroda (Gujarat)

NOTE : the series of local APELL Seminar/Workshops in different parts of India has been co-sponsored by the World Environment Centre (WEC)

BILATERAL CONTACTS AND FOLLOW-UP

23-25 February 1993 - follow-up visit by UNEP IE Senior Industry Consultant, together with representative of WEC, to Madras and Bombay. As a result of the meetings in Madras, the Manali-Ennore Emergency Committee (Madras) agreed to organise a practical exercise to test local emergency plans.

4-8 April 1993 - visit by Senior Industry Consultant representing both UNEP IE and WEC to Kanpur (Uttar Pradesh), with a view to organising an APELL Seminar/Workshop there.

HISTORY

The gas leak at the Union Carbide pesticides plant in Bhopal in 1984 killed more than 1,750 people outright. In April 1993 it was reported that the total death toll until that date had been officially estimated at 3,828. Eight Union Carbide officials are under indictment for culpable homicide in connection with the accident.

Article 48a of India's constitution states that : « the State shall endeavour to protect and improve the environment and to safeguard the forests and wildlife of the country ». In this context the Indian government has carried out since 1984 extensive amendments to the 1948 Factories Act and to the Dock Workers' Safety Health and Welfare Act and the Rules and Regulations made thereunder. Additional sections have also been added to the Motor Vehicles Act, regulating transport of hazardous chemicals, covering :

- definition of the responsibilities of the consigner, owner, transporter and driver ;
- display of labels, using the UN classification of hazardous chemicals, and emergency information panels and carrying of TREM (Transportation Emergency) cards on vehicles ;
- training and certification of drivrs ;
- provision of safety equipment on vehicles.

In addition, the following new legislation has been enacted :

- Environment Protection Act and Rules, 1986 ;
- Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 ;
- Public Liability Insurance Act, 1991, amended 1992.

Some of the salient features of the 1987 Factories (Amendment) Act relating to the APELL process are :

- obligation of the occupier of a hazardous installation to draw up an emergency plan and a disaster control plan and management plan ;
- compulsory disclosure of information by the occupier to the workers, the Chief Inspector of Factories, the local authority and the general public in the vicinity, regarding hazards and the measures taken to overcome them ;
- preparation of off-site emergency plans by the local emergency authority, in consultation with the industry. This is intended to lead to the integration of on-site and off-site plans ;
- constitution of a Site Appraisal Committee to examine applications for initial location or expansion of factories carrying our hazardous processes.

In addition to this legislative and regulatory activity, the Ministry of Labour, with financial support from the German government, has been collaborating with the International Labour Organisation (ILO) on a project for the establishment and initial operation of a Major Accidents Hazard Control System. This is being carried out in conjunction with factory inspectors in 12 States across India. The programme has accomplished the following :

- compilation of a hazard inventory covering 87 hazardous chemicals and 773 MAH (Major Accident Hazard) factories throughout the country ;
- development of a list of hazardous materials specialists available in India ;
- preparation of a series of guidelines on inspection of facilities, preparation of emergency plans, provision of medical care in chemical emergencies and other aspects of emergency prevention and preparedness ;
- carrying out of safety audits and frequent inspections of participating factories ;
- development and implementation of training courses and seminars for factory inspectors, safety officers, workers' representatives, etc. ;
- creation of a Management Information Service Centre.

As part of the project, a Major Accident Hazards Control Advisory Division has been set up within the Central Labour Institute in Bombay.

At the December 1994 APELL Senior Level Expert Advisory Group meeting, the representative of the Ministry of Environment and Forests reported that the MOEF had undertaken the following further activities to strengthen off-site emergency management :

- hazard analysis in fifteen industrial pockets - three studies are nearing completion ;
- preparation of model off-site emergency plans ;

- creation of three chemical Emergency Response Centres ;
- funding of three levels of accident prevention and preparedness training in seven institutes.

At local level, the National Safety Council (NSC), an autonomous body of the Ministry of Labour, has done much to encourage the spread of APELL to different parts of the country, by implementing a national level Action Programme (AP) on Chemical Emergency Prevention, Preparedness and Response, focusing on six high-risk industrial areas and national level activities. The AP aims to lay a foundation through the initial APELL/CEPP Workshops and to build a firm superstructure through progressive, in-depth follow-up activities.

In view of the considerable activity in the Manali Ennore Industrial Area near Madras, this area was selected by the NSC, UNEP IE and the WEC for an APELL pilot project. An APELL Seminar/Workshop was held there in October 1992. The Manali Ennore Emergency Preparedness Committee, set up in September 1990, is a very active body involving about twenty local industries. It has prepared and distributed 10,000 copies of a booklet on public awareness and a video in Tamil and English has been made for use at village level. The Committee has also published a condensed version of the area off-site emergency plan to introduce the topic to concerned government agencies. The area off-site emergency plan was tested in June 1989, August 1992 and April 1994. The off-site drills proved extremely worthwhile, as the plan was found to need a number of improvements.

On the basis of this pioneering work, APELL has since been introduced to five other high-risk local industrial areas, i.e. Thane-Belapur near Bombay, Kanpur in Uttar Pradesh, Cochin in Kerala, Haldia in West Bengal and Baroda in Gujarat. A major achievement in these six areas has been the orienting of the work of the Local Emergency Preparedness Committees, using the APELL concept of partnership between government, industry and community.

The introduction and use of the APELL version of Computer Aided Management of Emergency Operations (CAMEO), a computer program developed by U.S. EPA and NOAA, has been an integral part of the spread of APELL in India.

The in-depth follow-up activities in the six local areas have included training courses on « Chemical Emergency Preparedness » based on the course developed by the U.S. EPA ; a seminar on « Emergency Medical Response to Chemical Disasters » and audits of public hospitals; hands-on training courses on « CAMEO for First Responders » and distribution of CAMEO software ; table-top exercises; and mock emergency drills.

Activities at national level have included training courses on « Risk Assessment for Process Industries », « Oil Spill Control » and « Chemical Emergency Preparedness - an Approach that Works » ; a workshop on « Hazardous Material Emergency Response -Instructor Training » for fire officers; and a seminar for Chief Fire Officers.

On 26 April 1994 the first meeting was held in Bombay of an APELL National Advisory Committee (NAC), with representation from NSC, WEC, concerned ministries of the central government, state regulatory agencies, local district and municipal authorities, public emergency services, hospitals, national and local level industry associations, NGOs and communities. The meeting reviewed the recommendations made by the APELL partners during the Seminar/ Workshops held in the four local areas already covered at that time.

An international evaluation of the AP carried out in August 1994 praised the contribution and role of the NSC and recommended greater focus on the critical area of community awareness and participation. A three-day workshop on « Community Awareness » was accordingly developed and conducted in May 1995 in three local areas, with the support of the WEC and of US-based LEPCs.

The second meeting of the NAC held on 25 May 1995 reviewed the activities under the AP and praised the level of progress achieved in the application of the APELL/CEPP process in local areas in India. The NAC deliberated on the various issues to be addressed, including the sustainability of the local emergency preparedness committees and the on-going training requirements of first responders from police, fire and health services. The NAC also discussed the need to develop an approach to replicating the experience of the six pilot areas elsewhere in the country.

WEC, through its Local Awareness and Mitigation Programme (LAMP), has actively supported local APELL-related activities in India and has signed a five-year Memorandum of Understanding (MoU) with the NSC to undertake follow-up activities in accordance with the needs identified by the local areas and the NSC. This programme is funded by the US Office of Foreign Disaster Assistance (OFDA). All the follow-up activities at local and national level have been supported under the MoU.

At national level, the WEC has also offered to help the Indian Chemical Manufacturers' Association to implement the Responsible Care programme.

The Asian Disaster Preparedness Centre (ADPC), Bangkok, has also been involved in local APELL activities, with a view to focusing attention on the relationship between planning for industrial emergencies and for natural disasters.

REVIEW

The representative of the Ministry of Labour at the APELL Senior Level Expert Advisory Group meeting held in December 1992 in Paris reported that it had become clear to the government after the Bhopal disaster that a wholly prescriptive approach was not enough. Compliance with specific statutory requirements, while important, could not be considered as a full discharge of the manufacturers' responsibilities. There had also to be full and informed co-operation between the manufacturers, the workers, the local authorities and the public living in the vicinity of the installation. This is also the objective of the National Safety Council.

The participants in the Madras APELL Seminar/Workshop held in October 1992 concluded that India had an effective response system, run by government agencies, to combat natural disasters; a point confirmed during 1993 by the response to a major earthquake. Many elements of the APELL process are already addressed in local plans and systems. The major omission was seen as the involvement of the public. It was felt that APELL's objectives could be fulfilled if the APELL programme could be integrated into the existing Natural Disaster and Civil Defence System. The participants made some detailed recommendations about how to build community involvement. The following should be included in the APELL Co-ordinating Group: the local community leader (selected for his standing in the community and not for his political affiliation); the teacher; the Gram Sevak (village level social worker); and the primary health care worker. The industry representative, the Village Administrative Officer and the teacher would form a small core group to steer the process.

The NSC representative at the December 1994 Senior Level Expert Advisory Group Meeting made the following comments :

- the APELL approach is successful and should be promoted locally throughout the country ;
- experience suggests that table-top exercises and mock drills can play a useful role in preparing people to take part in actual drills ;
- experience of testing and improving the off-site emergency plan in the Manali-Ennore Industrial Area indicates that it takes a long time to achieve a satisfactory level of emergency preparedness - particular attention is needed to removal of bottlenecks in key road routes and to telecommunications facilities ;
- the District Collector (designated District Emergency Authority under statute) has a very heavy workload and it is accordingly desirable to designate one of his senior officials to deal with emergency preparedness;
- first responders require specialised training and programmes developed in Canada and the U.S. can be helpful ;
- safety and technical personnel in chemical plant also require specialised training in risk assessment ;
- more attention needs to be given to prevention of and preparation for transport accidents involving hazardous substances (NB « APELL for Transport », currently being prepared by UNEP IE in co-operation with the Swedish National Rescue Services Agency, should help with this) ;
- the effectiveness of emergency planning, training and response systems can be increased by using a software package such as CAMEO ;
- to ensure sustainability of the local emergency preparedness committees, there is a need for legal backing concerning their composition, role and function ;
- the experience of the six pilot areas needs to be replicated in other parts of the country ;
- more attention needs to be given to enhancing community awareness and participation.

CONCLUSIONS

A comprehensive legislative and regulatory framework, while important, is not enough to protect people, environment and property against the catastrophic consequences of a major industrial accident. Local awareness and preparedness and integrated local on-site and off-site emergency planning are also essential. The APELL process can therefore provide a vital addition to national legislative and regulatory activity.

The APELL process is flexible and easily adapted to local conditions and requirements, e.g. the membership of the APELL Co-ordinating Group is easily varied to suit perceived needs to involve particular groups or functions in the local community.

A two-track approach, i.e. at national and local level, is essential to spreading and sustaining the APELL process and programme in the long term.

APELL IN MEXICO AN ADAPTATION

THE COUNTRY:

Total area : 1,923,040 km sq
Population : 86,366,019 (July 1989), growth rate 2.2 % (1989)
Language : Spanish
Industries : food and beverages, tobacco, chemicals, iron and steel, petroleum, mining, textiles, clothing, transportation equipment, tourism.

APELL FOCAL POINTS

Director General, Normatividad y Regulacion Ecologica, SEDESOL, Av. Constituyentes 947, Edif. A. PB., Col. Belen de las Flores, 01110 Mexico DF.

Subdirector de Riesgos Ambientales, Direccion General de Normatividad y Reulaciion Ecologica, SEDESOL, Rio Elba 20, Piso 12, Col. Cuahtemoc, 06500 Mexico DF.

OTHER CONTACT POINTS

Associacion Nacional de la Industria Quimica (ANIQ), Providencia 1118, Col. del Valle, Mexico 03100 DF.

APELL MATERIALS IN LOCAL LANGUAGE

The APELL Handbook is published in Spanish by UNEP IE. The APELL Newsletter has been published by UNEP IE in Spanish with effect from Issue No. 5. The OECD « Users' Guides » to Hazardous Substance Databanks and to Information Systems Useful to Emergency Planners and Responders, which are available in OECD Member countries, are also available to APELL users in Spanish. « The Day the Sky Caught Fire », a video on the San Juanico LPG BLEVE of 1984, is available in Spanish.

APELL SEMINAR/WORKSHOPS

Regional (for Latin America and the Caribbean) - 23-27 July 1990 - Metepec (Toluca).

Local (with WEC) - 29 March-1 April 1993 - Monterrey
Local (with WEC) - November 1993 - Quatzacoalcos

BILATERAL CONTACTS AND FOLLOW-UP

World Environment Centre (WEC) Mexico has presented APELL at meetings and initiated and organised local Workshops. Some of these activities are undertaken in the framework of a bilateral programme between WEC and Environment Canada, in co-operation with SEDESOL, which is aimed at preventing industrial accidents in Mexico.

HISTORY

In 1984 an LPG Boiling Liquid Evaporating Vapour Explosion (BLEVE) in San Juanico, Mexico, killed 600 people and injured 7,000 others.

Since 1969 industry Mutual Aid Groups (MAGS) have been working to achieve greater standards of safety in chemical facilities. In July 1989 UNEP IE undertook a study mission to Mexico to discuss the adoption or adaptation of APELL there. Also in 1989 the Associacion Nacional de la Industria Quimica (ANIQ) instituted a programme called PREP, which is an adaptation of the CAER component of « Responsible Care » and of APELL to the Mexican socioeconomic, technical and cultural environment. One of the main objectives of PREP, as of APELL, is to create and sustain good relations between industry, government and the community. It draws on the experience and structures of the MAGs. There are now 16 of these, in all industrial areas where there are chemical facilities, and all have formal Emergency Response Plans. They are encouraged by ANIQ to co-ordinate their emergency response planning with the national civil protection system (see below) and are developing co-operation with civil protection and rescue services in carrying out emergency drills. A PREP pilot project has been launched in Cosoleacaque.

In October 1991 ANIQ officially adopted the Responsible Care programme. Adherence to it is now a condition of membership. The state oil company, PEMEX, has also agreed to adopt Responsible Care. Codes are under development on « Safety Process » and « Community Protection », and these will incorporate APELL and the experience gained from the PREP programme; the « Community Protection » code was reported in December 1994 to be at the final review stage. Answers received from industry to UNEP IE's February 1993 letter, enquiring about action taken as a result of participation in the July 1990 Regional APELL Seminar/Workshop, confirmed that PEMEX, Du Pont and Industrias OXY are all promoting APELL-type activities.

In 1991 ANIQ set up the Sistema de Emergencias en Transporte para la Industria Quimica (SETIQ), a 24-hour a day 7-day a week system for dealing with emergencies during the transportation of chemicals. Up to December 1992 SETIQ had handled more than 2,700 enquiries and dealt with 21 emergency calls. In December 1994 it was reported that SETIQ was taking an average of 450 information calls and 6 emergency calls per month.

The Mexican government created in 1988 a National System for Civil Defence, covering physical, biological and chemical hazards. Since then it has been concentrating on working to create regional and local committees, in collaboration with industry and local communities, in order to implement the system.

Along the US-Mexico border, 14 Mexican cities have paired with 14 US cities to develop chemical emergency contingency plans for the whole area. Through the process of creating and testing plans, these « sister cities » are identifying issues and lessons to be learnt regarding cross-border contingency planning and emergency response. The two governments are co-operating to ensure more effective and efficient joint planning and response.

The government has also strengthened its own institutional and regulatory arrangements for dealing with environmental matters in general. The Environmental Attorney-General's Office is now responsible for enforcing observance of standards and regulations. It will also hear public complaints regarding inadequate compliance. With regard to its role in chemical accident prevention, it conducted more than 1,000 inspections along the Mexico-US border during 1991-92, as a result of which it closed ten plants and ordered other violators to be heavily fined.

The National Institute for the Environment is working on Hazardous Activities regulations. ANIQ is collaborating with the government on this project.

ANIQ has also signed an agreement with the national civil protection authorities on the training of public service workers involved in emergency response.

The urgency of all these efforts was reinforced by the series of violent explosions which occurred on 22 April 1992 in Guadalajara, apparently due to the leakage of gasoline to the sewage system. A few days after the accident official figures put the number of dead at around 200, with another 500 people listed as missing. 800 people were injured and 3,000 people lost their homes. 350,000 people had to be evacuated.

REVIEW

The representative of ANIQ who attended the APELL Senior Level Advisory Group meeting held in December 1992 in Paris emphasized that the government, through SEDESOL, recognised that government action alone was insufficient to achieve high standards of chemical accident prevention and preparedness. A wide basis of social participation is needed if effective solutions to problems are to be identified and implemented. The Mexican chemical industry is playing an important role in this activity by incorporating its knowledge and experience into the participatory process.

CONCLUSIONS

Efforts by government and industry to achieve better chemical accident prevention and preparedness need to be integrated and to incorporate the «social» or «community» dimension if they are to be effective.

APELL can be used to reinforce these efforts at national and local level and can be adapted and incorporated into other similar programmes.

APELL IN COLOMBIA
A PIONEER PROJECT

THE COUNTRY:

Total area : 1,038,700 km sq
Population : 31,945,165 (July 1989); growth rate 2 % (1989)
Language : Spanish
Industries : textiles, food processing, oil, clothing and footwear, beverages, chemicals, metal products, cement ; mining - gold, coal, emeralds, iron, nickel, silver, salt.

APELL FOCAL POINT

The Colombian government has not so far responded to requests from UNEP to nominate an APELL Focal Point to co-ordinate APELL activities at national level.

OTHER CONTACT POINTS

Consejo Colombiano de Seguridad, Carrera 20 N° 39-62, Apartado Aereo 6839, Bogota, DE Colombia.

APELL MATERIALS IN LOCAL LANGUAGE

The APELL Handbook is published in Spanish by UNEP IE. The APELL Newsletter has been published by IE/PAC in Spanish with effect from Issue Nº. 5. The OECD « Users' Guides » to Hazardous Substance Databanks and to Information Systems Useful to Emergency Planners and Responders, which are available in OECD Member countries, are also available to APELL users in Spanish. « The Day the Sky Caught Fire », a video on the San Juanico (Mexico) LPG BLEVE of 1984, is available in Spanish.

APELL SEMINAR/WORKSHOPS

National - 6-9 November 1990 - Bogota (in co-operation with UNDRO, now the UN Department of Humanitarian Affairs).

BILATERAL CONTACTS AND FOLLOW-UP

A UNEP IE consultant visited Baranquilla and Cartagena from 24 September to 12 November 1992, to review the implementation of the APELL process and to make recommendations to assist the local APELL Co-ordinating Groups.

HISTORY

Representatives from Colombia attended the Regional APELL Seminar/Workshop for Latin America and the Caribbean held in July 1990 in Mexico. APELL was formally adopted by the Technical Risks Sub-Group of the National Emergency Response System (NERS). The NERS and the Consejo Colombiano de Seguridad (CCS), in conjunction with UNEP IE and UNDRO (now DHA), organised a national APELL Seminar/Workshop in November 1990 in Bogota. A local APELL Seminar/Workshop was subsequently conducted in Baranquilla, with minimal support from UNEP.

APELL has now been introduced in five cities :

Baranquilla

Baranquilla's Industry Mutual Aid Group (MAG) has adopted APELL as a tool to build community awareness. The UNEP consultant who visited the project in autumn 1990 reported that 17 out of the 30 industrial plants in the Baranquilla industrial zone participate in the APELL process. He also reported that 70 % of the plants surveyed have good prevention measures in place and have developed elaborate emergency plans; while 20 % have inadequate prevention programmes and response plans but are working to improve their capabilities. The remaining 10% have poor programmes and plans and are not at present doing anything to improve this situation.

The APELL Co-Ordinating Group, started early in 1990, includes representatives of seven companies and the local office of the National Industry Association, police, fire, civil defence and the Red Cross. There are five sub-committees, dealing with communications, technical assistance, emergency planning, trial drills and transport problems. The Communications Committee has so far surveyed two districts on concerns relating to industry, to help determine community needs and expectations. A further survey will be undertaken with university help. The Technical Assistance Committee (GATAPELL) has produced a guide summarising the roles to be played by differenct rescue agencies in the event of an emergency and has installed an emergency radio-telephone in the Fire Department's HQ.

It was reported to the APELL Senior Level Advisory Group meeting held in December 1992 in Paris that the following had been achieved:

- hazards have been identified and now need to be assessed ;
- an inventory of response capabilities has been made and will be fully examined in relation to the hazard assessment ;
- emergency plans have been formulated and need to be tested and evaluated ;
- relations have been established with the media and work is just starting on the creation of public awareness ;
- emergency services are being trained in response to chemical emergencies ;
- since 1991 a special 24-hour 7-day APELL communications network has been developed ;
- the APELL project has two full-time staff and a steering committee of senior managers.

The APELL Co-Ordinating Group has obtained agreement from the Mayor of Baranquilla to send an offical observer to its meetings and to have an APELL Group representative present at meetings of the Government Emergency Commission. The Local Emergencies Committee, chaired by the Mayor, has established links with the national system for emergency preparedness and response.

A self-assessment system for industry has been developed. This includes a safety inventory and an evaluation by the city's safety association. The aim is to help each company strengthen its own emergency planning and preparedness and to contribute to the plans of the Mutual Aid Group.

The UNEP consultant concluded that, in summary, the Baranquilla APELL Co-Ordinating Group had completed APELL Step 1 and initiated Steps 2,3,5,6,7 and 8. It had not yet begun implementing Steps 4,9 and 10.

The Baranquilla APELL Co-Ordinating Group has participated in meetings organised by the CCS elsewhere in the country to introduce other communities to the APELL process.

Bogota

Bogota's Puente Aranda MAG has developed an advanced mutual aid plan for the petroleum industry, which has been extended throughout the country by a top-level agreement. This agreement involves industry, government and local emergency response groups. The community has not been engaged in this process because the petroleum industry believes that accidents in petroleum plants will not affect the community outside the plant.

Cartagena

Cartagena is located on a bay, on whose eastern shore are located more than 50 plants in an industrial area which covers more than 10 km sq. As in Baranquilla, some plants in the industrial area have formed a Mutual Aid Group, which is called GAMMA. This now includes more than 20 of the most important plants in the zone.

In mid-1991 the major chemical companies in Cartagena agreed to support an APELL programme there. In March 1992, with support from a company-funded foundation, the CCS and the Baranquilla APELL Group, Cartagena held its own APELL Seminar/Workshop. Seven companies, about 10% of the total in the city, agreed to participate in the APELL process. These companies are currently developing emergency plans and resource inventories. They have drawn up a hazard map of the industrial area. They are also working with the local authorities and the local Emergency Response Committee. The process has been well received by local groups in general.

Cali and **Medellin**

Cali and Medellin have both set up APELL Co-Ordinating Groups and are starting to plan their work programmes.

REVIEW

The report to the APELL Senior Level Expert Advisory Group meeting in December 1992 identified the following benefits derived from the APELL programme in Colombia :

- improvements in risk assessment - many companies had weak assessments and untested emergency plans ;
- strengthening of mutual aid plans ;
- exchange of technology between large companies and small and medium-sized companies ;
- joint review and re-evaluation of emergency plans by both industry and government, leading to better integration of plans between industry, government and emergency bodies ;
- improvement of emergency response capabilitites ;
- better relations between industry and local communities, leading to a better image for industry.

The report also identified the following obstacles to APELL implementation :

- absence of a local emergency organisation co-ordinating government and emergency response agency activities ;

- lack of support for the APELL process from some local officials and organisations, e.g. hospitals ;
- lack of climatological and other information necessary to develop risk assessments (NB Colombia is subject to earthquakes) and lack of experience in performing risk assessments. The latter problem is exacerbated in some cases by the emphasis some companies put on protecting confidentiality ;
- the attitude of some company personnel. Some managers consider APELL a marginal activity which they can manage in their spare time. Also, different industries have different levels of interest in and commitment to the programme. Senior industry managers have no concept of risk management as a means of reducing potential damage to their plants and the surrounding community and are therefore reluctant to support the APELL process ;
- continual turnover of personnel in all sectors involved in the APELL programme. This slows down the implementation of the programme and and prevents the development of « institutional memory » concerning APELL ;
- many companies and individuals are still afraid to share information about hazards posed by their own activities, because they fear that dissemination of this information could tarnish their reputations.

Some lessons from the APELL experience in Colombia which have been drawn by the Consejo Colombiano de Seguridad are as follows :

- the agency promoting APELL must be one that is trusted by industry; an industrial association or foundation is well placed to take on this role. It is best to work through existing organisations and not to set up new ones ;
- community leaders chosen to take part must be well respected by industry as well as by their own communities ;
- representation of multinational corporations is particularly important, because they have access to resources and because they are viewed as leaders ;
- companies should include APELL responsibilities in job descriptions of company personnel, in order to increase their commitment to the programme ;
- the APELL promoter should have resources and people devoted exclusively to APELL implementation ;
- the promoter should arrange an independent audit of progress, to encourage objective evaluation of the implementaion of the programme ;
- the concept and importance of accident prevention as part of the APELL process should be made explicit ;
- UN institutional support is necessary to start and secure the development of an APELL programme ;
- a simple training programme supported by audiovisual materials would help to ensure continuity, especially given the turnover of personnel in

participating organisations. Step 1 of the APELL process should be reiterated each time one of the participants in the process changes ;

- in order to convince others to participate in APELL, supporters have to be able to demonstrate that it works, is profitable and is not difficult to implement. Publicising positive results from the programme builds support for maintaining and expanding it.

CONCLUSIONS

Although institutional support from UNEP clearly has an important role to play, much can be achieved in disseminating APELL within a country by committed individuals and organisations who are prepared to share their own experiences in order to help other communities start their own APELL programmes.

UNEP needs to develop more methodological tools and training materials to help APELL users disseminate APELL to others.

APELL IN THE PHILIPPINES THE INTEGRATED RISK MANAGEMENT APPROACH

THE COUNTRY

Total area : 298,170 km sq
Population : 64,906,990 (July 1989), growth rate 2.7 % (1989)
Language : Filipino (based on Tagalog) and English
Industries : textiles, pharmaceuticals, chemicals, wood products, food processing, electronics assembly, petroleum refining, fishing.

APELL FOCAL POINT

Amelia Dulce D. Supetran, Chief, Environmental Education and Information Division, Environmental Management Bureau (EMB), Department of Environment and Natural Resources (DENR), 99-101 Topaz Building, Kamias Road, Quezon City.

OTHER CONTACT POINTS

Genandrialine L. Peralta, Assistant Professor, National Engineering Centre, Room 317 NEC Building, U.P.Campus, Diliman, Quezon City 1101.

APELL MATERIALS IN LOCAL LANGUAGE

Materials in English used to date.

APELL SEMINAR/WORKSHOPS

National - 28-31 May 1990 - Tagaytay City

BILATERAL CONTACTS AND FOLLOW-UP

A UNEP Senior Industry Consultant re-visited Manila, Baguio, the Visayas and Mindanao during the period 24 February - 10 March 1992.

HISTORY

In response to the perceived need for integrated, area-wide planning for industrial emergencies, plans were drawn up to introduce UNEP's Awareness

and Preparedness for Emergencies at Local Level (APELL) process in the Philippines as early as the first quarter of 1989. APELL was to be implemented within the context of the Integrated Risk Assessment and Management Project for the Laguna de Bay area, which was being undertaken as one of the Case Studies in the Interagency Risk Management Programme of IAEA, UNEP, UNIDO and WHO. The Interagency Programme is aimed at improving all aspects of the management of risk in large and complex industrial areas - a particular problem in countries such as the Philippines and in areas with many small and medium-sized enterprises. UNEP has contributed the APELL process and the results of the APELL programme to the Interagency Programme and all country-level contacts made under its auspices. To pilot APELL, Pasig City was chosen because it has one of the largest concentrations of industries and people most likely to be affected in the event of an industrial emergency.

Pasig City had a population of 441,393 in 1993; this is expected to rise to 713,629 by the year 2000. It has a total land area of 3,100 hectares and lies along the southeastern end of the Pasig River. It is bounded on the northeast by Marikina, on the northwest by Quezon City, on the west by Mandaluyong and on the southeast by the town of Taytay. Pasig is considered urbanised, with 56% of its area residential, 18% industrial, 10% commercial and 15% open space; in 1994 it was the fourth highest earner among the thirteen towns comprising Metro Manila, due to its industrial development. It is composed of thirty barangays. The APELL project is concentrating on two of the most industrialised barangays, Bo. Kalawaan and Bo. Ugong.

On 28-31 May 1990 the APELL process was introduced in The Philippines through a national Seminar/Workshop, organised by the Environmental Management Bureau (EMB) of the Department of Environment and Natural Resources (DENR) at the Development Academy of The Philippines in Tagaytay City. The Workshop established the mechanisms for APELL adoption and application in The Philippines.

As lead agency both for the Interagency Programme and for the APELL programme, EMB then initiated in June 1990 a series of meetings with possible APELL partners in Pasig. The APELL Co-Ordinating Group was formed on the basis of the Municipal Disaster Co-Ordinating Council (MDCC), composed of nineteen government agencies, to which representatives of industry and non-governmental organisations (NGOs) were added. At the end of 1993 the APELL Co-Ordinating Group had fifteen members. These included: a representative of the Pasig Municipal Council and the Chairman of its Ecology and Environment Protection Committee; the Director of the Provincial Disaster Co-Ordinating Centre from the Office of Civil Defence; the Director of Special Operations from the Metro Manila Authority; The Chief of the Environmental Unit of the Laguna Lake Development Authority; representatives from industry (Chemphil, Polyphosphates Inc., Nalco); representatives from NGOs; and a representative from the Labor Federation.

As a result of the APELL initiative, local industries have got together and are meeting monthly. Those involved include firms making chemicals, petrochemicals, steel, polymer, paint and cement.

The local council members, police, fire department, local health officials and community leaders have also been contacted and have made inputs to the APELL process.

It was immediately seen that there was a need for training of all those concerned in hazard analysis and emergency planning. So far EMB has conducted three training events. A Workshop on « Environmental Risk Assessment and Control Technology » was held on 23-27 August 1993, with assistance from the Western Pacific Regional Environmental Health Centre of the World Health Organsiation (WHO).

A Workshop on « Hazard Operability Studies » was held on 22 September 1993. (HazOp is a detailed analytical method used to identify risk factors and potential operational problems in production.) This last was preceded by preparatory activities undertaken by a UNDP consultant, who helped industries to conduct preliminary hazard analyses. On 5-9 September 1994 a one-week training course on « Hazard Operability Analysis » was held for government, industries, NGOs and community representatives participating in the APELL process.

Hazard identification and evaluation have been undertaken by participating industries. Several forms have been developed and utilised for this purpose; these are designed to supply data for use with the Computer Assisted Management of Emergency Operations (CAMEO) system, which has proved both useful and credible as an information management system. The toxic and hazardous substances concerned include : sulphuric acid, hydrochloric acid, phosphoric acid, caustic soda, anhydrous ammonia, chlorine gas, calcium hypochlorite, liquid CO_2, glycerine, phosphorous, phenol, formaldehyde, styrene, LPG, gasoline, diesel/bunker fuel and solvents.

A rapid risk assessment for ranking and prioritisation purposes was also undertaken. The results showed that there are ten facilities which will have significant consequences on the surrounding populated areas in the event of a chemical emergency. These are: two LPG bottling plants; the resins/sulphuric acid plant; the pesticides formulation plant ; a glass manufacturing plant; and five chemical warehouses.

Of the ten facilities, the LPG depots yielded the highest risk value. Since the training outlined in the previous paragraph, industries are now making a more detailed identification and evaluation of risks and the corresponding risk reduction measures. They are also in the process of upgrading their individual emergency plans based on the risk assessment made.

A two-tier risk analysis and emergency planning scheme for the country is now envisaged. On the results of the preliminary hazard analysis procedure, only

plants with the highest level of risk will be required to complete a full analysis, while others will be required to carry out a more limited exercise. The full analysis will be required if it is considered possible for large numbers to be killed on-site or if there is any possibility of fatalities or permanent injuries occurring off-site. The more limited analysis will be required if it is possible for large numbers of people on-site to become ill or for people off-site to become ill.

Participating industries are now taking account of the possibility of toxic releases into the environment in their emergency planning, which previously had been concerned mainly with the possibility of fire. An inventory of the emergency response resources of industry has been undertaken. This is exposing a lack of specialist resources to combat toxic releases.

The Pasig pilot project is not the only APELL initiative in The Philippines. The national Engineering Centre of the University of The Philippines has undertaken a Chemical Hazard Control and Emergency Response Project in Kalookan, Metro Manila, with financial and logistical support from the city government. This project focussed on the assessment of risk from a high concentration of small-scale industries in a densely-populated area. It involved the identification of potential chemical hazards and of resources for responding to accidents within the communities at risk and the formulation of recommendations to be compiled in a Chemical Emergency Response Plan.

A risk assessment project was launched in February 1991. This analysed risks posed by more than 1,000 small-scale industries, with the aim of identifying particularly vulnerable areas and proposing appropriate control and emergency response measures. A Chemical Emergency Response Plan has now been drafted. The project also proposes safety guidelines on the handling and storage of chemicals which will help prevent discharges of potentially toxic chemicals.

The Philippines National Oil Corporation (PNOC) has started to use the APELL process; particularly in the areas around its power projects, such as the Mt. Apo Geothermal project in Mindanao.

Other activities which support the spread of APELL in The Philippines include :

- a five-year programme designed to build up the country's capacity to manage industrial risk, instituted in September 1993 with support from the United Nations Development Programme (UNDP). This project will be aimed specifically at establishing an Integrated Risk Assessment System, with the following outputs :
    - about 150 professionals from government, industry and academe with practical experience of the management of industrial risk gained from a three-year training programme ;
    - guidelines for risk assessment and management, including emergency planning ;
    - uniform approaches and techniques for assessing and managing risks from industrial installations ;

    - individual industry and community emergency response plans;
    - an Industrial Emergency Response and Information Centre ;
- incorporation of APELL in training activities such as those conducted by the Pollution Control Association of The Philippines (PCAPI) and the UNDP-EMB training programme on environmental planning and management for local government units, other government agencies, NGOs and selected tertiary education institutions ;
- implementation of the 1990 Toxic Substances and Hazardous Waste Act, 1990. This requires industry to submit inventories of its toxic substances and hazardous wastes and also emergency plans for accidents. It also provides that « the public shall have access to records, reports or information concerning chemical substances and mixtures, including safety data submitted, data on emissions or discharges into the environment ».

REVIEW

The representative of EMB who reported to the Regional APELL Seminar/Workshop for Asia and the Pacific held on 6-10 December 1993 in Shanghai, China, felt that a series of industrial accidents and incidents had highlighted the virtual absence of emergency planning for major industrial accidents. APELL had been introduced to fill this gap. The concept was now spreading rapidly and the process was starting to take root. This was indicated by the way in which APELL was being taken up by groups other than those involved in the original Pasig municipality pilot project in Laguna de Bay. Further activities will therefore be undertaken to test APELL's applicability to other local situations and local conditions will determine the processes and procedures finally adopted in any given situation. These activities will continue to be undertaken within the framework of the Interagency Risk Management Programme, so that risk can continue to be assessed and managed in an integrated fashion for all areas. There is a particular problem of risk prioritisation in areas with many small and medium-sized enterprises.

CONCLUSIONS

APELL has proved its worth as the awareness and preparedness component for the Interagency Risk Management Programme.

Initial APELL activities may well result in the identification of detailed training needs of participants. These may be met with help from other international organisations in addition to UNEP, e.g. UNDP and the international banks.

APELL IN THAILAND
A PLANNED APPROACH

THE COUNTRY:

Total area	:	511,770 km sq
Population	:	59,095,419 (1994), growth rate 1.3 %
Language	:	Thai
Industries	:	petrochemicals, auto assembly, electronics, tin (world's third-largest producer); tourism; textiles and garment manufacture, agricultural processing, beverages, tobacco, cement, light manufacturing (electrical appliances and components, jewellery; furniture, plastics).

APELL FOCAL POINT

Director General, Department of Industrial Works, Ministry of Industry, 75-6 Rama VI Road, Rajthevee Phrayathai, Bangkok 10400.

OTHER CONTACT POINTS

Asian Disaster Preparedness Centre (ADPC), Asian Institute of Technology, PO Box 2754, Bangkok 10501.

World Environment Centre (WEC), Thailand Office, Silom Plaza, 491/43-4 Silom Road, Bangrak, Bangkok 10500.

APELL MATERIALS IN LOCAL LANGUAGE

The APELL Handbook, « Storage of Hazardous Materials » (UNEP IE Technical Report 3) and « Hazard Identification and Evaluation in a Local Community » (UNEP IE Technical Report 12) have all been translated into Thai.

APELL SEMINAR/WORKSHOPS

Regional (for Asia and the Pacific) - 6-10 December 1993 -Shanghai, China.

Local seminar - 13 February 1992 - Mapthaput Industrial Estate, Rayong Province (south-east of Bangkok). A full-scale emergency drill for Mapthaput was held on 15 July 1994.

BILATERAL CONTACTS AND FOLLOW-UP

A UNEP Senior Industry Consultant visited Mapthaput on 11-15 February 1992 and a second visit was made on 31 May-6 June 1992. On 24 April 1992 a high-level delegation of Thai officials paid a visit to the UNEP IE office in Paris as part of a three-week study tour. On 7-10 October 1992 three observers from the Thai National Economic and Social Development Board attended the local APELL Seminar/Workshop in Madras, India.

Following an explosion in the Port of Bangkok in March 1991, the Swedish National Rescue Services Agency was invited by the Port Authority of Thailand to advise on the development of safe procedures for the handling of hazardous substances. The project began in September 1991 and is ongoing. It includes the development of local emergency preparedness in accordance with the APELL process.

HISTORY

Thailand has experienced a number of serious technological accidents. 123 people were reported killed in February 1991 in the village of Thung Maproa, Phnang-nga Province, when a truck loaded with dynamite and detonators exploded after overturning while trying to negotiate a sharp corner. In March 1991 an explosion, caused by unidentified chemical substances, occurred in Chemical Warehouse No 3 in the Port of Bangkok. The initial event was followed by further explosions and fires. Five lives were lost and there was heavy loss of property. As well as damage within the port area, adjacent squatter dwellings caught fire and burnt down, leaving some 2,500 people homeless.

So far as the Port of Bangkok is concerned, the Port Authority of Thailand sought help from the Swedish National Rescue Services Agency to develop procedures for the safe handling of hazardous substances within the port area, in accordance with international regulations (particularly those of IMO). The project, which started in September 1991, is divided into three main sub-projects :

- the development of daily routines for safe handling of hazardous substances ;
- an accident prevention programme ;
- an emergency preparedness programme, including co-operation with adjacent local government authorities and rescue services and with neighbouring communities.

Swedish experts have been seconded to the port and 20 people from the Bangkok Port and Metropolitan Fire Brigades have received ten weeks of emergency training in Sweden. This project is funded by the Swedish Agency for International Economic and Technical Co-operation (BITS).

Meanwhile the Royal Thai Government decided that it would be desirable to develop a common framework for dealing with all disasters which could have an

impact on economic and social development. The Asian Disaster Preparedness Centre (ADPC) has undertaken a consultancy to advise the government and has prepared a report for the National Economic and Social Development Board (NESDB). This document, published by UNDP, contains detailed discussion of all the issues - technological hazards, risk assessment, legislative measures, organisational structures, awareness and preparedness, emergency planning, emergency response, post-disaster evaluation, etc. It makes detailed recommendations and identifies five basic pre-requisites: sustained awareness, political will, finance, human resource development and the strengthening of institutional capabilities.

Three representatives from Thailand had attended the meeting in December 1988 in Paris, at which APELL was launched. In 1989 the Department of Industrial Works (DIW) established the Industrial Health and Safety Division, which has been developing major hazards control systems. In February 1991 DIW established a working group on « Industrial Major Hazards Control Management » as part of a monitoring programme for the Mapthaput petrochemical complex, a designated industrial zone of 2,400 acres 200 km southeast of Bangkok. The group's main responsibilities are the identification and registration of major hazard installations and the establishment of safety standards, which must be met before the installation can receive a licence to operate. APELL was identified as potentially useful for the Mapthaput complex and plans were made for the establishment of a control centre.

In February 1992 a UNEP Senior Industry Consultant visited Mapthaput. On 13 February a seminar was held « to co-ordinate the direction of APELL » for Mapthaput. This was attended by 36 participants from 13 Thai agencies, as well as by observers from eight other organisations, including UNDP, USAID and the WEC. After this seminar it was decided to proceed with a radiocommunications system for the complex and also with a public communications exercise and live emergency drills. A second UNEP IE Senior Industry Consultant visit took place on 31 May-6 June 1992. WEC financed some expert consultant input on hazardous risk assessment in September 1992 to support these initiatives. With effect from January 1993, WEC's Local Awareness and Mitigation Programme (LAMP) was implemented at Mapthaput and has successfully brought together a number of chemical firms and local government agencies which are committed to improving their emergency preparedness and response to in-plant and off-site fires and spills involving hazardous chemicals. LAMP is an APELL-like programme funded under a co-operative agreement with USAID's Office of Foreign Disaster Assistance (OFDA). WEC then organised a training workshop on « Emergency Preparedness and Accident Prevention » for Mapthaput, which was conducted in October 1993 by experts from the U.S. EPA.

During 1993 the DIW and the Industrial Estate Authority of Thailand (IEAT) developed plans to establish a Co-ordinating Centre within Mapthaput for major hazard prevention and control. However, due to the call for an extension of emergency response planning throughout the country, the Centre for Co-ordination and Co-operation to prevent and mitigate industrial hazards was

established in 1995 in the DIW office in Bangkok. The responsibilities of the Centre are to :

- collect health and safety data for chemical industries ;
- provide information on chemical hazards ;
- develop a co-operative approach to the prevention and control of industrial accidents ;
- provide training courses on prevention of chemical hazards ;
- develop location planning for chemical plants and make Material Safety Data Sheet (MSDS) information available to industries and the public by use of the CAMEO program ;
- promote the use of the APELL process.

Early in 1994 a report of the Regional APELL Seminar/Workshop held in December 1993 in Shanghai was presented to the DIW's Safety Committee and also published in « Factory Journal » Vol 12 No 2 (Thai language), thus disseminating the APELL message further throughout Thailand.

On 15 July 1994 an Emergency Response Drill was carried out at Mapthaput. The drill began at 9.30 am and lasted nearly 90 minutes. Nearly 1,000 people took part, including representatives of authorities and services throughout Rayong Province. CAMEO was used to model the event and also to retrieve chemical information. The « emergency » originated in a fire which resulted from a gas leak at the base of one of the chemical tanks in the industrial complex. The Estate Fire Brigade was on the scene within minutes hosing down the tank and pipes. Simultaneously valves of feedstock pipes were shut off. Medical assistance arrived within ten minutes. Meanwhile the police directed traffic as it converged on the site. Several different evacuation operations were organised concurrently, including part of the population of the neighbouring village of Mapthaput. The evacuation convoy even met a road accident and helped some of the victims. The drill was the culmination of two years' work to develop an integrated industrial emergency programme using APELL as a model. It is considered to have been a great success, not least because some problems were identified which can be tackled to improve future emergency response.

On 20 January 1995 the NESDB held a meeting with the DIW and other concerned government agencies to discuss how to develop and integrate the National Emergency Response Plan as part of the 8th National Economic and Social Development Plan (1997-2001). A Workshop to collect the necessary information and plan implementation of this project will be held in 1995-96.

The Centre for Co-ordination and Co-operation to prevent and mitigate industrial hazards plans to organise an APELL Seminar/Workshop early in 1996.

The APELL process has also now been introduced and integrated into the curriculum of both the BSc (Occupational Health and Safety) and MSc (Industrial Hygiene and Safety) at the Faculty of Public Health, Mahidol University.

REVIEW

Thailand's experience in using the APELL process at Mapthaput has encouraged the government to start extending APELL to the rest of the country and to use it to integrate local emergency plans into a National Emergency Plan. « APELL is considered to be a very fruitful programme to minimise the consequences of hazards for workers, people in the community and the environment and to create local awareness and preparedness for emergency response ».

CONCLUSIONS

In Thailand as elsewhere it has been found useful to pilot APELL in one location before looking at how best to extend it to other parts of the country.

The Thai experience also demonstrates that the APELL process can be used at national level to integrate emergency planning, between various agencies and organisations and across the country.

APELL IN TUNISIA
A PHASED APPROACH

THE COUNTRY :

Total area : 162,154 km sq
Population : estimated at 8 million in 1990, growth rate 2.6 % also in 1990
Language : Arabic (official) ; also French
Industries : extractive industries, natural phosphate processing, petroleum, steel, textiles, agriculture.

APELL FOCAL POINT

Président Directeur Général, Agence Nationale de Protection de l'Environnement, Centre Urbain Nord - Cité Essalama- 2080 Tunis-Ariana.

OTHER CONTACT POINTS

Institut de Santé et Sécurité au Travail (ISST), Ministère des Affaires Sociales, Boulevard Mustapha Khaznadar - 1006 Ettaoufik - Tunis.

Prévention Plus, 3 rue El Menzah - El Menzah 1 - 1004 Tunis.

APELL MATERIALS IN LOCAL LANGUAGES

The APELL Handbook is available in French and Arabic. UNEP Technical Reports 3 and 12 are available in French. The APELL Newsletter has appeared in French since Issue Nº. 5.

APELL SEMINAR/WORKSHOPS

Local - October 1990 - Gabès
National - October 1991 - Tunis

BILATERAL CONTACTS AND FOLLOW-UP

In October 1989 two French experts made a preliminary safety assessment of the industrial zone of Gabès.

HISTORY

In 1956 occupational medical services were introduced and a safety association was created. However developments in this area slowed down during the 1960s and 1970s. In the 1980s there was a revival of interest, as technological accident prevention came increasingly to be seen as an important adjunct to economic development plans, including the development of tourism. A National Commission was set up in 1987. As a result, the Institute of Occupational Health and Safety (now, as the ISST, part of the Ministry for Social Affairs) was set up in August 1990 and the High Council for the Prevention of Technological Accidents in November 1991.

At the same time the Tunisian government was also setting up programmes designed to tackle environmental problems. An Environmental Protection Agency was created in 1988 and the Ministry of Environment and Land Management was formed in 1991. The National Environmental Protection Programme was initiated in September 1990.

There was a virtual absence of statutory legislation dealing with major accident prevention. Industrialists were taking foreign legislation and regulations as points of reference. The same was true of legislation concerning prevention of work-related risks to the individual and general environmental protection. However in 1991 Law No. 91-39 made provisions relating to disaster prevention and the organisation of emergency services to deal with disasters should they occur. Decree No. 91-362 of 13 March 1991 made provision for Environmental Impact Assessments to be carried out in connection with the siting or extension of industrial units. Decree No. 93-942 of 26 April 1993 set out the ways in which the National and Regional Plans relating to response to disasters were to be elaborated and implemented.

Meanwhile, however, Tunisia started the APELL-Tunisia programme during 1988, in response to international and national recognition of the need to prepare for emergencies. The main aim was to make it easier for the various organisations concerned to work together. The programme was planned to have three stages :

- a local « diagnostic mission », to assess hazards and requirements ;
- a local awareness seminar ;
- a national APELL Seminar/Workshop.

The local assessment mission was carried out by two French experts over one week in October 1989 in the industrial zone of Gabès. Gabès had been identified as one of the industrial areas at high risk of major technological accidents; others are Sfax, Tunis, Bizerte, Gafsa and Kasserine. Until 1970 Gabès was a small town with agricultural, tourism and fishing activities. Today it is the capital of heavy industry, with the six phosphate processing and acid production plants of the Groupe Chimique de Gabès located in close proximity to the town. Not far from the chemical complex there are a gas and LPG storage centre and a gas bottling plant.

The assessment mission achieved the following tasks :

- identify the greatest risks on the site ;
- following this diagnosis, increase the awareness of the Gabès Chemical Group's management board concerning risk assessment ;
- formulate a local awareness programme according to results of the diagnosis and contact with those in charge ;
- publish a report with recommendations.

The local awareness seminar took place in October 1990 and lasted five days. It was preceded by a review of improvements carried out as a result of the assessment the previous year. The aims of the seminar were to :

- increase participants' knowledge of hazard identification and evaluation techniques ;
- prepare an internal plan for the emergency services ;
- create contact between the local APELL partners.

The regional authorities were invited to the opening and closing sessions of the seminar. Press and radio gave it publicity. The following highly satisfactory results were achieved:

- engineers who had not previously met, despite working on the same site, were brought together ;
- participants learnt about the possible hazards in their own plants by listening to other people's experiences ;
- media awareness of the problems of technological accidents was increased ;
- the acceptance in principle of the Governor was obtained that the industrial safety sector should be included in the regional commission for the organisation of the emergency services in the event of a natural catastrophe, thus opening the way to government/industry co-operation in the field of accident prevention, preparedness and response ;
- the Director General of the Groupe Chimique de Gabès decided to pursue the work undertaken by the working groups, with the aim of producing an on-site emergency plan.

The national APELL Seminar/Workshop took place in October 1991 in Tunis, building on the knowledge and experience gained through the local project in Gabès. Its objective was to create awareness and understanding of the seriousness of the technological accidents problem in organisations and institutions at national level, in regional authorities, in local communities and in the management of companies.

More than 150 people from all over Tunisia took part. Numerous Ministries were represented, including the Department of Trade and Industry, the Home Office and the Ministry of Public Health. Other representatives came from the National Environmental Protection Agency, industry, local communities and NGOs. Major subjects covered were :

- the role of government and local authorities in protecting citizens exposed to industrial risks ;
- prevention programmes ;
- land use planning ;
- transport of dangerous products ;
- communication with the public ;
- the study and evaluation of risk.

REVIEW

Tunisia has taken a deliberate approach to the introduction of APELL, starting locally with the intention of subsequently spreading the experience so gained. The three steps outlined above are regarded as the preliminaries to an effective national APELL programme. It is considered that they have created a growing consciousness of the problems, without scare-mongering, both among decision-makers and among the public.

The following activities are considered essential to effective dissemination of APELL in Tunisia :

- encouragement of the creation of associations of industry directors working in the same region and the co-ordination of these associations with local authorities ;
- creation of an association to promote both awareness and prevention of industrial disasters ;
- development and enforcement of legislation ;
- mapping of all high-risk installations throughout the country ;
- specific training throughout the country of all those involved in land use management at local level.

CONCLUSIONS

Development of a national APELL programme can proceed in parallel with development of legislation and regulations.

The phased approach can provide a firm base from which to « go national ».

APELL IN THE CZECH REPUBLIC A TOOL FOR TRANSITION (I)

THE COUNTRY :

Total area : 79,000 km sq
Population : 10.3 million (1991); growth rate 0.2 % (1989)
Language : Czech
Industries : iron and steel, machinery and equipment, cement, sheet glass, motor vehicles, armaments, chemicals, ceramics, wood, paper products, footwear.

APELL FOCAL POINTS

None.

OTHER CONTACT POINTS

Czech Environmental Management Centre, Politickych veznu 13, 1110 00 Praha 1, Czech Federal Republic.

Occupational Safety Research Institute (OSRI), Jeruzalemska 9, Praha 1, Czech Federal Republic.

APELL MATERIALS IN LOCAL LANGUAGE

The APELL Handbook is available in Czech.

APELL SEMINAR/WORKSHOPS

National (for the former Czech and Slovak Federal Republic) -15-18 September 1992 - Séc.

BILATERAL CONTACTS AND FOLLOW-UP

A UNEP Senior Industry Consultant visited the Kolin APELL pilot project and held discussions at the Chemopetrol chemicals site in Litvinov, North Bohemia, in September 1993. APELL has since been followed up by UNEP IE in conjunction with the World Environment Centre (WEC).

HISTORY

Former Czechoslovakia has been taking part for several years in the Interagency Risk Management Programme of IAEA, UNEP, UNIDO and WHO, which started in 1986. This programme is aimed at improving all aspects of the management of risks in large and complex industrial areas. UNEP has contributed the APELL process and the results of its APELL programme to the Interagency Programme and all country-level contacts made under its auspices. An Interagency Programme case study report for North Bohemia has been produced.

A workshop on «Safety in the Manufacture and Use of Chemicals» in the then Czech and Slovak Federal Republic (CSFR) was held under the auspices of the Department of Labour, the International Labour Organisation (ILO) and the US Environmental Protection Agency on 23-25 November 1991 in Séc, at which APELL was presented. As a result of this event, the Occupational Safety Research Institute in Prague began to develop proposals for major accident and hazard prevention. These included :

- tripartite co-operation between government, industry and labour, in co-ordination with international bodies ;
- adoption of frameworks and strategies for occupational hygiene, major hazard control, process safety and hazardous waste clean-up ;
- development of better community awareness concerning safety and the environment.

With specific reference to major industrial accident prevention and preparedness, it was decided to create an APELL pilot project in the industrial region of Kolin, with the aim of setting up a District Safety System. Kolin is a medium-sized town with two principal chemical facilities and three others in the vicinity. One of these plants is being modernised, including the creation of a network of safety and environmental automatic monitoring stations and a central emergency control room. The APELL Co-Ordinating Group based itself on the existing District Defence Council. The Group's members include State authorities, local civil defence and rescue services, the Red Cross, industrial plants and representatives of the firm Proteco and the Occupational Safety Research Institute. A fund was instituted to support the development of the District Safety System. The Group's activities have included :

- reorganising and co-ordinating the local emergency authorities, including the fire service and civil defence ;
- establishing an emergency preparedness centre, complete with computer and communication equipment and radio-telephones ;
- identifying and evaluating hazards ;
- revising existing emergency plans and developing new ones; including evacuation, shelters and supplies of food and other essentials for the population in case of necessity ;
- establishing a community awareness programme and creating a « street information system » for the whole city.

A group of labour inspectors took part in the hazard identification and evaluation exercise, with a view not only to registering hazards in the Kolin region but also to verifying the techniques used and providing the basis for a hazard information system.

The safety management principles prepared by OSRI and the Czech Occupational Safety Office require manufacturers to produce safety reports, which are both the source of information for on-site emergency planning and the basis for the emergency information system for the whole region. It is envisaged that this regional information system will link with the emergency information systems of national authorities, labour inspectorates, fire services and other partners in the emergency planning process.

Preliminary results from the Kolin project were presented at the national APELL Seminar/Workshop held on 15-18 September 1992 in Séc. During this event a technical visit for participants was arranged to the Synthesia Chemical Works in Pardubice, where an emergency exercise based on a simulated chlorine leak and a fire protection exercise were carried out.

As a next step, the Czech Republic planned to implement APELL in the area adjacent to the Chemopetrol Chemical Works in North Bohemia, including the local town of Litvinov. Chemopetrol is an enormous site, on which 10,000 people are employed. In 1974 it experienced an ethylene plant explosion comparable to the incident which occurred in the same year in Flixborough, UK. A UNEP Senior Industry Consultant visited Chemopetrol in September 1993, to explore possibilities for APELL implementation, and as a first step arranged to supply the firm with further information on past accidents.

At national level, legislation is being prepared which should provide an impetus for APELL-like schemes. This will cover, among other things, land-use planning, comprehensive insurance and public communication. Directives for on-site and off-site emergency planning are in preparation.

The Czech Republic has developed its own computer-aided systems for hazard recording, dispersion modelling, recording of emergency response plans and recording of accidents.

The Occupational Safety Research Institute (OSRI) is promulgating a basic concept of integrated safety management based on best current practices, particularly the philosophy of Total Quality Management as supported in ISO 9000, so as to set common standards for safety management as part of an overall quality culture.

This approach also permits the establishment of a control system, so that the company can monitor its own performance on occupational and environmental safety.

OSRI has established a national centre of expertise to assist in the development of more APELL schemes. It has also developed below its offices a shop for safety materials and literature, together with advisory counselling.

Plans for 1995 included the Czech Republic's first Chemical Emergency Prevention and Preparedness (CEPP) training course, to be held with support form U.S. EPA and WEC.

The purpose of CEPP is to introduce the basic concepts of emergency preparedness and prevention to all levels of officials in government and industry. It is envisaged that the CEPP course would be followed by the introduction of WEC's Local Awareness and Mitigation Programme (LAMP), as a tool to follow up the APELL initiative.

REVIEW

OSRI reviewed the implementation of APELL in the Czech Republic for the APELL Senior Level Expert Advisory Group meeting held in December 1992 in Paris. It concluded that the APELL process was making an important contribution to the creation of better emergency prevention, awareness and preparedness.

The process contained nothing new; its importance lay in the way in which it brought together theoretical knowledge and the results of practical experience in order to improve emergency planning.

Another big advantage of the process is the way in which it can be used to build on a country's existing institutional mechanisms.

In its report to the December 1994 Advisory Group Meeting, OSRI drew attention to some obstacles to speedy APELL implementation. These included :

- lack of priority attention to safety by plant management, consequent upon uncertainty due to the privatisation programme ;
- lack of an «umbrella law» establishing the competencies of state, regional and local authorities ;
- lack of financial resources to support the systematic development of a national major hazard prevention and preparedness system.

Nonetheless OSRI felt that there had been some progress both in safety management and in emergency planning. For the immediate future it pointed to the plans for an initial U.S. EPA CEPP training course and the introduction of WEC's LAMP programme.

The Ministry of the Environment intends to combine these various projects into one project, under the umbrella of APELL, which will be referred to as the « Major Accidents Prevention and Mitigation of Environmental Consequences in the Czech Republic ».

In former Czechoslovakia, people and institutions are having to adapt to the concept of a « public right to know » and a public right not to be threatened by unsafe industrial installations. APELL has provided a tool for getting to grips with a rapidly-changing situation.

CONCLUSIONS

APELL provides a tool for developing practical measures to combat or mitigate technological accidents through a process of co-operative planning.

APELL can be very useful to countries whose economies are in transition, particularly as a means of developing public participation and communication concerning industrial risk.

APELL can be combined with other initiatives in accident prevention and preparedness, such as U.S. EPA's CEPP courses and WEC's LAMP programme.

APELL IN HUNGARY
A TOOL FOR TRANSITION (II)

THE COUNTRY

Total area : 93,030 km sq
Population : 10,566,944 (July 1989), growth rate 0.2% (1989)
Language : Hungarian
Industries : mining, metallurgy, engineering industries, processed foods, textiles, chemicals (especially pharmaceuticals).

APELL FOCAL POINT

None.

OTHER CONTACT POINTS

Department for International Relations, Ministry for Environment and Regional Policy, 1 Fö utca 44-50, H-1394, Budapest, PO Box 351.

Deputy Director-General for Technical Affairs, Borsodchem TR, POB 208, Kazinbarcika 3702.

Regional Environmental Centre for Central and Eastern Europe, Mikloster 1, 1035 Budapest.

APELL MATERIALS IN LOCAL LANGUAGE

The APELL Handbook is available in Hungarian.

APELL SEMINAR/WORKSHOPS

National - 8-11 September 1992 - Kazinbarcika.

HISTORY

One of the features of the Hungarian political system before the changes of recent years was the centralisation of public administration. Prevention of and preparedness for industrial accidents were therefore matters for the central government and there was little scope for local initiative in planning for such disasters. However local authorities, in conjunction with industry and the state's hazard prevention organisation, had to prepare some emergency plans in accordance with national regulations and to carry out training based on them.

The Hungarian state emergency organisations were well-trained and -equipped and such on-site emergencies as did occur were overcome apparently without major effects on local communities or the local environment. However accidents during transport of hazardous goods highlighted the absence of local community awareness and preparedness for technological emergencies. Some industry managers considered that the effects of such accidents on local perceptions of industry were very bad and that this made it difficult for industry to live in harmony with its neighbours.

Since 1990 laws and regulations have been adopted for technical and worker safety, control of environmental hazards and disaster prevention. These have in most cases been modelled on laws and regulations within the European Community. Community « Right to Know » is not covered. Compliance with laws and regulations is considered to be a problem.

Also since 1990 local government has been further developed and this has provided an opportunity to consider the needs for local prevention and preparedness measures in relation to industrial accidents. However the Hungarian system of government and administration is still very much in a period of transition. Local authorities are now responsible for protecting the health, safety and property of the local population, together with the local environment. However in many cases local organisations competent to carry out these tasks are still to be developed, as expertise in these areas is still concentrated in central state organisations. The central government is also in charge of issuing industry with permits to operate, although local authorities are becoming more involved in issues of local industry safety. In this context, APELL is seen as a useful tool for developing much-needed co-operation between local authorities and communities and potentially hazardous industries.

In September 1990 a Workshop was held in Veszprem on « Preparedness for and Prevention of Chemical Accidents », with support from OECD, UNEP IE, WHO and the U.S Federal Government (Environmental Protection Agency and Occupational Safety and Health Administration).

A national APELL Seminar/Workshop was held in September 1992 in Kazincbarcika. Participants considered that APELL was in every way compatible with the legislative and regulatory framework which was being developed at national level. APELL provided a means for creating co-operation between potentially dangerous industrial complexes and the local population. It also offered industry and local authorities a means of creating co-ordinated plans for action to be taken in the event of an accident.

As a result of the Seminar/Workshop, it was decided to start an APELL pilot project in Kazincbarcika, based on the Borsodchem chemical plant. (Borsodchem, formerly « BVK », had been responsible for releasing 500 tons of mercury into the environment, causing severe contamination.) Borsodchem undertook responsibility for setting up the APELL Co-Ordinating Group and for spreading the word about APELL to industrial plants elsewhere in Northern Hungary and in other parts of the country.

Participants also felt that some actions should be taken at national level. An Inter-Ministerial Committee should be set up to consider the possibilities for a legal dissemination of the APELL process. The Ministry for Environment and Regional Policy agreed to be responsible for this. Industry nationally should look of methods of hazard identification and evaluation which could be accepted by all the APELL partners as a basis for their work and independent experts such as the Hungarian Chemical Association and the technical universities should also be involved in this process.

Since 1992 APELL programmes have also been developed in Tiszanjvaros (chemical plant, power plant, oil refinery); Szolnok Town Agglomeration (railroad transit storage, chemical plant, pipeline node); and Borsod-Abanj-Zemplem and Szabolcs-Szatmar-Bereg Counties (a highly polluted area with transboudary damage - transboundary impacts of industrial pollution and accidents are an important issue in Hungary). Veszprém County, a traditional chemical industry area, and Komarom County, a polluted industrial zone with coal mining and heavy industry, are now also starting their own APELL programmes.

A Centre for the Prevention of Industrial Accidents has been set up in Budapest, in the context of the UN Economic Commission for Europe (UNECE)'s Convention on the Transboundary Effects of Industrial Accidents. The Centre has agreed to promote the use of the APELL process within its activities, since APELL contributes to accident prevention.

REVIEW

A representative of Borsodchem reviewed APELL implementation in Hungary for the benefit of participants in the APELL Senior Level Expert Advisory Group meeting held in December 1992 in Paris. He identified the following obstacles to effective implementation :

- lack of support from some organs of central government ;
- lack of a tradition of local initiative ;
- slow progress with the privatisation of industry ;
- continuation of a weak national economy.

These factors taken together meant that it was unlikely that either industrial safety or locally co-ordinated emergency planning would receive high priority. Accordingly much would depend on the success or otherwise of the APELL pilot project in Kazincbarcika.

The report to the December 1994 APELL Advisory Group Meeting suggested that quite a high priority is in fact being given both to industrial safety and to local emergency planning. However the meeting's attention was also drawn to the number of international programmes active in this field. There is a need for better co-ordination and co-operation, both by the international organisations concerned and by their local contacts; this is seen as a pre-condition for improved feedback and monitoring of action taken. The potential uses of information technology in suporting co-ordination and monitoring, particularly in

the transboundary context, should be explored. Consideration should be given to defining a regional area within Central Europe, within which all accident prevention and preparedness activities should be co-ordinated. Meanwhile in Hungary the APELL and « APELL-RIM » Transboundary Pilot Projects will form an integrated part of regional development programmes. They will provide a nodal point for industrial manufacturing clean-up programmes, supported by the European Union, and projects supported by other donors from the OECD member countries, co-ordinated through the UNECE.

CONCLUSIONS

APELL provides a tool for developing local expertise and systems for emergency prevention, awareness and preparedness planning. However its effective implementation requires an act of will by all the APELL partners.

APELL can also provide a framework for co-ordination of various international programmes for accident prevention and preparedness within a region.

APELL IN LATVIA A TOOL FOR TRANSITION (III)

THE COUNTRY :

Total area : 65,000 km sq
Population : 2.6 million (December 1994), of which one third lives in the capital Riga
Language : Latvian
Industries : agriculture, forestry. The city of Ventspils is the largest export terminal of ammonia and oil in Europe and risks from transport and storage of hazardous substances are a major concern.

APELL FOCAL POINT

None.

OTHER CONTACT POINTS

Civil Defence Centre, O. Kalpaka bulvaris 6, LV 1050 Riga.

APELL MATERIALS IN LOCAL LANGUAGE

The APELL Handbook and UNEP IE Technical Report 12 « Hazard Identification and Evaluation in a Local Community » have been translated into Latvian (also into Estonian and Lithuanian) with the support of the Swedish government.

APELL SEMINAR/WORKSHOPS

Regional for the Baltic States (Estonia, Latvia and Lithuania) - 14-17 June 1994 - Jurmala (near Riga).

BILATERAL CONTACTS AND FOLLOW-UP

Within the context of the Interagency Risk Management Programme (IAEA/UNEP/UNIDO/WHO), a quantitative risk assessment project is being carried out in Ventspils with support from the Dutch Ministry for Housing, Physical Planning and the Environment.

The Swedish National Rescue Services Agency and UNEP IE are planning to field-test « APELL for Transport » in Daugavpils, in co-operation with the local fire service.

HISTORY

Latvia takes part in the Interagency Risk Management Programme of IAEA, UNEP, UNIDO and WHO, which started in 1986. This is aimed at improving all aspects of the management of risk in large and complicated industrial areas. UNEP has contributed the APELL process and the results of its APELL programme to the Interagency Programme and all country-level contacts made under its auspices.

A Risk Assessment Case Study for Ventspils was presented to the Interagency Programme Technical Committee Meeting organised by the IAEA on 12-16 September 1994 in Vienna, Austria, and appears in the proceedings of that meeting. The account which follows here of Interagency Programme activities in Ventspils is adapted from that report.

The total turnover of the port of Ventspils is in the region of 40 million tonnes per annum, of which 20 million tonnes consists of oil and oil products. This total also includes 2.7 million tonnes of calcium chloride, 1 million tonnes of ammonia and 0.5 million tonnes of other liquid chemicals; plus metals, dry chemicals and other cargoes.

Due to lack of enforcement of building regulations during the 1970s, transporting, processing and storage of large quantities of explosive, flammable or toxic substances takes place in the vicinity of areas of high population density. Failure of operating systems, leakage of hazardous substances and tanker explosions are just some of the hazards to which the population is exposed, not only in Ventspils itself but also in the surrounding region.

In 1990 the Mayor of Ventspils invited representatives of the Environmental Control Agency Rijnmond in Schiedam, the Netherlands, to visit and inspect the main installation requiring serious policy decisions, i.e. the ammonia storage and transfer installation in the port area. Twenty thousand people could be at risk in the event of a catastrophic accident in the ammonia storage area.

The Dutch experts recommended a quantitative risk assessment of the installation. This was carried out with the support of the Dutch Ministry of Housing, Physical Planning and the Environment. The results showed a high level of risk compared to comparable installations in western countries, due to :

- close proximity to the city ;
- the large amounts of ammonia being stored and trans-shipped ;
- the poor state of some equipment ;
- generally poor safety management of the operation. The consultants estimated the risk from this factor alone as being nearly three times as high as for the average western European plant.

The Dutch report recommended an immediate one-year programme to improve the safety management system and to make the railcar unloading activities safer. This was to be followed by a five-year intermediate programme and a ten-year long-term programme. Measures for the step-by-step reduction of risk

have been included in the Ventspils Emergency Preparedness Plan and confirmed by the Council of Local Deputies. About $US 8 Million were spent on implementing risk reduction measures in 1993 and $US 18 million in 1994.

It was subsequently agreed with the Dutch government that the work of quantitative risk assessment should be continued for other hazardous installations in the Ventspils Port area. These include plants using ACN, methanol, metyletylketone and isobutanol and the state enterprise « Ventspils Nafta » (crude oil and petrol), as well as food manufacturing plants using ammonia refrigerating equipment. For this study the SAVE II software package was used. This permitted quick determination of the physical effects of a putative accident and of the risk to individuals and society, taking into account population and meteorological data. It turned out that the total risk for both the ACN terminal and the « Ventspils Nafta » site was considerably lower than for the ammonia terminal and that the risk was in fact within limits which would have been considered acceptable in the Netherlands.

The authorities in Ventspils feel that quantitative risk analysis has proved its worth in helping them to set the correct priorities for use of limited resources. It is now policy that such studies will be carried out when new enterprises are being planned or designed, when old plants are being reconstructed or renovated and when new substances are to be handled, stored or trans-shipped through the port. Co-operation with the Dutch government continues on :

- implementation of emergency preparedness planning ;
- physical planning ;
- licencing ;
- ammonia risk reduction ;
- improved organisation, training and equipping of Ventspils' emergency planning and response organisation.

Immediate tasks are assessment of continuous emissions, analysis of hazardous wastes and assessment of transport risks.

Meanwhile the national Latvian Civil Defence Centre in Riga has found itself faced with an acute shortage of skilled and professionally trained personnel with good experience in emergency planning and management. In the 1970s and 1980s emergency preparedness and response in Latvia was the responsibility of the USSR civil defence system. A specialist military civil defence regiment was stationed near Riga but this was among the first to leave the country when Soviet troops were withdrawn.

This shortage is particularly severe in rural districts, since there are no relevant education or training centres in Latvia - during the period of Soviet rule, these were located elsewhere in the Soviet Union.

In December 1992 a new national law on civil protection was adopted. This provides for emergency preparedness and response at national and local levels, with the emphasis on the local level. The head of local government in

each of the country's seven cities and twenty-six rural districts has the responsibility for local emergency preparedness and response. There are usually one or two civil emergency officers in rural districts. The six largest cities have local Emergency Operations Centres. The Centre in Daugapvils is the biggest after that in Riga, with a staff of 25 ; this is because of the proximity of the Ignalina power plant.

Each city and district develops its own integrated emergency preparedness and response plan and these serve as the basis for the national plan.

The law provides that a city or district Emergency Operations Commission can be set up if necessary, in the event of a serious accident or disaster beyond the scope of the local government arrangements. This Commission is to be composed of senior civil emergency officers and representatives of services and organisations involved in emergency preparedness and response. If several administrative units are involved, there is provision for a State Emergency Operations Commission to co-ordinate operations at regional or national level. In this case the Latvian Civil Defence Centre would become the headquarters.

The Civil Defence Centre considers that local capabilities in the field of emergency preparedness and response have on the whole decreased over the last five years. One problem is lack of physical means of communication - mobile telephones, fax machines, even ordinary telephone lines.

It is also difficult to persuade decision makers to give high priority to emergency preparedness and response in a situation of economic stringency, particularly as Latvia has been fortunate not to experience any major natural or industrial disasters in recent years.

REVIEW

The Civil Defence Centre attaches high priority to giving information to the public - individual, family, school, local community, local authorities, etc. « If there is enough information, awareness and understanding, means and ways of building up emergency preparedness will be found ».

It was accordingly glad to host the Baltic APELL Regional Seminar/Workshop held in June 1994 near Riga. APELL is seen as a democratic and cost-effective way of making best use of limited resources, by combining all the resources available in a community.

CONCLUSIONS

APELL can complement other activities aimed at improving emergency awareness, preparedness and response, such as the quantitative risk assessment studies carried out under the Interagency Risk Management Programme.

APELL can be very useful to countries whose economies are in transition, particularly as a means of developing public participation and communication concerning industrial risk.

APELL IN THE RUSSIAN FEDERATION A TOOL FOR TRANSITION (IV)

THE COUNTRY :

Total area : 17,075,000 sq km
Population : 144 million (1989)
Language : Russian
Industries : extremely diverse but still particularly strong in heavy industry

APELL FOCAL POINT

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OTHER CONTACT POINTS

Head of Emergency Prevention Department, State Committee of the Russian Federation for Civil Defence, Emergencies and Elimination of the Consequences of Natural Disasters (EMERCOM), Teatralny proezd. 3, Moscow 103012.

APELL MATERIALS IN LOCAL LANGUAGE

The APELL Handbook is available in Russian. Two videos have been prepared: « The APELL Process: An Introduction » and « The APELL Process : System and Implementation ».

APELL SEMINAR/WORKSHOPS

National (also attended by representatives from Azerbaijan, Belarus, Kazakhstan and the Ukraine) - 9-11 December 1991 -Moscow

Local - 8-11 March 1994 - Tula.

BILATERAL CONTACTS AND FOLLOW-UP

A UNEP Senior Industry Consultant visited Moscow in May 1993 to discuss the furtherance of APELL implementation in Russia, including the local Seminar/Workshop planned to be held in Tula.

HISTORY

The main characteristics of the situation regarding major industrial hazards in the Russian Federation at the beginning of the 1990s are seen by SR&DO IRIS to be as follows :

- lack of interest by government at all levels ;
- out-of-date and inadequate legislation and regulations concerning industrial safety, which did not reflect the increased range and complexity of hazards arising from newer technologies ;
- lack of a «safety culture» at all levels of industry, because there was no pressure from government to institute one ;
- lack of scientific research in the field of loss prevention in the process industries ;
- lack of any concept of a «community right to know» or of society's involvement in siting and development of hazardous facilities, with consequent lack of any community involvement in these matters.

However emergency organisations (civil defence, fire brigades, hospitals etc.) had developed a good deal of experience in dealing with technological emergencies, although this was not reinforced by knowledge of experiences in other countries. Thus, Russia was good at responding when accidents did happen but less good at preventing them from happening in the first place and at encouraging the creation of an aware and prepared population to help mitigate their consequences.

SR&DO IRIS analysed the potential contribution of the APELL process in this situation as follows :

Problem	APELL Contribution
Lack of safety legislation and regulations for industrial safety	Encouragement of safety analysis, safety systems and on-site planning
Lack of community involvement	Methodology for including the community in the process of identifying and evaluating risk and in creating co-ordinated plans for emergency response should the need arise

Lack of « bonding agent » to manage the process	Creation of APELL Co-Ordinating Group to manage and support APELL implementation

SR&DO IRIS has adopted the approach of constructing scenarios of possible accidents, analysing them according to their three main phases: initiation (the «incident» of equipment failure, etc., which can spark off an accident) ; development (an accident happens); and emergency (the consequences of the accident spread off-site and do damage to the local community and local environment). This involves the collection and storage of data on past accidents and the elaboration of computer programs which enable scenarios to be modelled.

Special attention is being paid to the perception of risk by the public and its influence on the emergency awareness, preparedness and planning processes. A need has been identified to provide a system which informs the public but also takes into account the ways in which its perceptions of risk may differ from those of the experts. There is an acknowledgement that the public perception of a potentially hazardous installation can become extremely hostile if there is no communication about the facility's safety systems and on-site emergency plans.

In December 1991 an APELL Seminar/Workshop for the former Soviet Union was held in Moscow, in conjunction with a special session on pipeline safety; an important issue, particularly since the pipeline explosion involving two trains in 1989 near Ufa, which killed 645 people. This event included a visit to the Ochakovo LPG storage facility. The Moscow city government has applied APELL principles in its dealings with nearby residents and has subsequently requested that a network of APELL programmes be created to cover the whole of the Moscow area. There is considerable interest in other industrialised areas.

In 1992 SR&DO IRIS and the TNO Laboratory of The Netherlands jointly identified a project entitled « Risk Analysis for the Destruction of the Chemical Warfare System Agent Lewisite ». This project was adopted by the General Department for Radiological, Chemical and Biological Protection in the Ministry of Defence. An APELL Seminar/Workshop for the Tula region was held in March 1994 in connection with this.

Meanwhile EMERCOM is adopting the APELL process as an integral part of the Russian System of Emergency Prevention, Preparedness and Response (RSE), which is being set up as a result of the government's decision (Resolution No. 261 of the Council of Ministers of the Russian Federation, 18 April 1992). RSE will provide for co-ordination of all government agencies, local authorities and industrial structures for purposes of emergency prevention, preparedness and response, including the creation of regional and local sub-systems.

EMERCOM is supporting two SR&DO IRIS projects :

- practical realisation of APELL, in conjunction with the associated recommendations of the International Labour Organisation, in the Tula region (a major centre of the petrochemicals industry)
- development of the Russian version of CAMEO.

REVIEW

The representative of SR&DO IRIS reported to the APELL Senior Level Advisory Group meeting held in December 1992 in Paris that APELL had been welcomed in the Russian Federation as a tool for necessary social, administrative and industrial change. The APELL process was already being successfully used in the Moscow area and other areas were also very interested in it.

The adoption by EMERCOM of APELL as part of RSE should ensure its dissemination throughout the country.

CONCLUSIONS

APELL can supply the «missing ingredients» in accident prevention and preparedness, in situations where it is recognised that radical change is needed.

The APELL process can contribute to a wider system for emergency prevention, preparedness and response.

GENERAL CONCLUSIONS

Each of the dozen country overviews included in this account of APELL's first six years has lessons for APELL users worldwide and for the APELL programme in general. The editor has tried to draw these at the end of each section. However it is also possible to draw some general conclusions.

Perhaps the most significant of these is that many countries are finding it appropriate to adopt a «two-track» approach to APELL implementation; i.e. by action at both national and local level, which then becomes mutually reinforcing. APELL is above all a local awareness and preparedness programme -unless it helps local people in the vicinity of industrial installations to be better prepared, it has no real existence. However national enthusiasm and support are vital to the successful spread and long-term viability of the APELL programme.

A second general conclusion is that APELL can provide a vital addition to national legislative and regulatory activity. A comprehensive legislative and regulatory framework is not enough by itself; it must be complemented by local awareness and preparedness and integrated local emergency plans.

A third point is that APELL can be combined with the many other national and international initiatives in the field of industrial accident prevention and preparedness. It is now seen as the «awareness and preparedness module» of many programmes in this field. UNEP is happy to encourage other programmes to adopt APELL, with a view to integration of the various efforts to achieve better accident prevention and better emergency awareness and preparedness, which incorporate the community as well as the technical dimension.

Finally, it is evident that APELL can be implemented without outside help, e.g. from UNEP IE; although many international, national and private organisations have contributed assistance to APELL users and continue to do so. UNEP IE and APELL's many friends throughout the world need to study how this is done, in order to make APELL « self-starting » as the programme spreads more widely. The development of more methodological tools and training materials will continue to be needed to assist this process.

ABOUT UNEP INDUSTRY AND ENVIRONMENT CENTRE

The Industry and Environment centre was established by UNEP in 1975 to bring industry and government together to promote environmentally sound industrial development. UNEP IE is located in Paris and its goals are to:

1. Encourage the incorporation of environmental criteria in industrial development plans;
2. Facilitate the implementation of procedures and principles for the protection of the environment;
3. Promote the use of safe and clean technologies;
4. Stimulate the exchange of information and experience throughout the world.

UNEP IE provides access to practical information and develops co-operative on-site action and information exchange backed by regular follow-up and assessment. To promote the transfer of information and the sharing of knowledge and experience, UNEP IE has developed three complementary tools: technical reviews and guidelines; Industry and Environment - a quarterly review; and a technical query-response service. In keeping with its emphasis on technical co-operation, UNEP IE facilitates technology transfer and the implementation of practices to safeguard the environment through promoting awareness and interaction, training and diagnostic studies.

Some recent UNEP IE Publications

Industry & Environment (quarterly) deals with issues relevant to industrial development, such as auditing, waste management, industry-specific problems, environmental news.

Energy Savings in the Transport Sector (Technical Report Series No. 25), ISBN 92-807-1431-7, 79 p., 1995.

Cleaner Production Worldwide, Volume II, ISBN 92-807-144-9, 48 p., 1995.

Environmental Management of Mine Sites - A Training Manual (Technical Report Series No. 30), ISBN 92-807-1431-7, 311 p., 1994.

Company Environmental Reporting (Technical Report Series No.24), ISBN 92-807-1413-9, 118 p., 1994.

APELL Annotated Bibliography (Technical Report Series No. 21), ISBN 92-807-1411-2, 117 p., 1994.

Environmental Aspects of Industrial Wood Preservation - A Technical Guide (Technical Report Series No.20), ISBN 92-807-1403-1, 105 p., 1994.

Health Aspects of Chemical Accidents. Guidance on Chemical Accident Awareness, Preparedness and Response for Health Professionals and Emergency Responders (Technical Report Series No.19) - a joint IPCS/OECD/UNEP/WHO publication: OECD Environment Monograph n°81), 147p., 1994.

Landfill of Hazardous Industrial Wastes - A training Manual (Technical Report Series No.17), ISBN 92-807-1384-1, 315p., 1994.

The Textile Industry and the Environment (Technical Report Series No.16), ISBN 92-807-1367-1, 120p., 1994.

Government Strategies and Policies for Cleaner Production, ISBN 92-807-1442-2, 32 p., 1994.

Cleaner Production in the Asia Pacific Economic Cooperation Region, ISBN 92-807-1443-0, 41 p., 1994.

Hazard Identification and Evaluation in a Local Community (Technical Report Series No.12), ISBN 92-807-1331-0, 86p., 1992.

From Regulations to Industry Compliance: Building Institutional Capabilities (Technical Report Series No.11), ISBN 92-807-1342-X, 62p., 1992.

Companies Organization and Public Communication on Environmental Issues (Technical Report Series No.6), ISBN 92-807-1304-3, 130p., 1991.

International Directory of Emergency Response Centres (Technical Report Series No.8), (OECD Environment Monograph n°43), 77 p., 1991.

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