



# CHEMICAL DISASTER MANAGEMENT



**nidm**

Towards a disaster free India

National Institute of Disaster Management  
Ministry of Home Affairs



जहाँ है हरियाली ।  
वहाँ है खुशहाली ॥

Ministry of Environment and Forest  
Govt. of India



सत्यमेव जयते

Government of India

# CHEMICAL DISASTER MANAGEMENT

Proceeding Volume of the National Workshop

30 September- 01 October 2008, New Delhi

March 2009

**nidm**

Towards a disaster free India

National Institute of Disaster Management  
Ministry of Home Affairs



जहाँ है हरियाली ।  
वहाँ है खुशहाली ॥

Ministry of Environment and Forest  
Govt. of India

#### CITATION

Gupta, Anil K., Nair, Sreeja S. and Shard (2009). Chemical Disaster Management (Proceeding Volume of National Workshop on Preparation of National Action Plan). Ministry of Environment and Forests, Govt. of India and National Institute of Disaster Management, New Delhi. Pages 76.

#### ACKNOWLEDGEMENTS

The National Workshop on “Chemical Disaster Management” was organised by National Institute of Disaster Management (NIDM) as a national consultation process towards Preparation of National Action Plan on Chemical Disaster Management. Financial grant was provided by the Ministry of Environment & Forests (MoEF) for conduct of workshop and printing of the proceeding volume.

The workshop was organised under the supervision and guidance of Shri P.G.Dhar Chakrabarti, Executive Director, National Institute of Disaster Management, Ministry of Home Affairs, New Delhi and Dr.G.K.Pandey, Sr. Advisor and Dr. Chhanda Chowdhury, Director, Hazardous Substances Management Division (HSMD) in the Ministry of Environment & Forests, Govt. of India.

The Organising committee acknowledges the cooperation of dignitaries of inaugural session, subject experts on various themes, related agencies, corporate/industry, state authorities, non-governmental organisations, and all individuals who made the workshop a success. Suggestions and Inputs from Shri R.H. Khwaja, Additional Secretary, MoEF; Dr. Indrani Chandrasekhar, Advisor, Planning Commission and Prof. Santosh Kumar, NIDM, and whole-hearted support of Shri J. N. Jha, Ms. Geeta Sharma, Shri Surinder Bisht and other staff members of NIDM are acknowledged.

#### EDITORS

##### **Dr. Anil K. Gupta**

Associate Professor, NIDM

##### **Sreeja S. Nair**

Assistant Professor, NIDM

##### **Shri Shard**

Deputy Director, MoEF

# Contents

1.	<b>Introduction .....</b>	1
1.1.	Context .....	1
1.2.	Objectives of the workshop .....	2
1.3.	National Disaster Management Guidelines .....	3
2.	<b>Inaugural Session .....</b>	7
2.1.	Welcome Address .....	7
2.2.	Special Address .....	8
2.3.	Inaugural Address .....	10
3.	<b>Thematic Sessions .....</b>	11
3.1.	National and International Status - Recent Development & Issues .....	11
3.2.	GIS based Emergency Planning & Response System .....	14
3.3.	Strategy of Community Awareness for Emergency Preparedness .....	16
3.4.	Capacity Building and Knowledge Needs .....	19
3.5.	National Disaster Management Framework .....	22
3.6.	Public Health Dimension in Chemical Incidents .....	26
3.7.	Chemical Accident Information & Reporting System .....	28
4.	<b>Agency Presentations .....</b>	31
4.1.	Oil Industry Safety Directorate .....	31
4.2.	Indian Institute of Toxicological Research .....	32
4.3.	Federation of Indian Chamber of Commerce & Industry .....	33
4.4.	Indian Council of Medical Research .....	35
4.5.	Petroleum and Explosives Safety Organisation .....	37
4.6.	Directorate General of Factory Advice Service and Labour Institutes .....	39
4.7.	Police and Homeguards .....	41
5.	<b>State Presentations .....</b>	43
5.1.	Andhra Pradesh .....	43
5.2.	Chattisgarh .....	43
5.3.	Delhi .....	44
5.4.	Gujarat .....	45
5.5.	Karnataka .....	46
5.6.	Kerala .....	46
5.7.	Mizoram .....	47
5.8.	Maharashtra .....	48
5.9.	Orissa .....	48
5.10.	Tamil Nadu .....	49
5.11.	Uttar Pradesh .....	50
6.	<b>Group Discussion and Recommendations .....</b>	53
7.	<b>Valedictory Session .....</b>	55
	<b>Appendix A: List of Delegates .....</b>	57
	<b>Organising Team .....</b>	71

# INTRODUCTION

## Context

India is developing as a key global player in the industrial and technology sector. Rapid industrialization has increased the hazard, risk and vulnerability to the industry and the environment. Major Chemical (Industrial) disasters are low in frequency but are very significant in the terms of loss of lives, injuries, environmental impact and property damage. Frequency and severity of chemical disasters has increased in last few years due to rapid development of chemical and petrochemical industries and increase in size of plants, storage and carriers, specifically in densely populated areas.

At present there are over 1724 Major Accident Hazards (MAH) units and other small and medium-sized industries all across the nation and new industries are also establishing at a rapid rate. Chemical accidents can occur due to lack of safety measure, technical break down, or due to a human error. It, thereby, initiates a series of uncontrolled physiochemical phenomenon such as runaway chemical reactions, large spills, fires and explosions. These phenomenon eventually targets both human and non-human in the form of immediate and residual or long term consequences. Thus, it is imperative to develop preventive measures like adoption of safer engineering practices, improved safety devices and elimination of human errors by regular checks.

The Ministry of Environment and Forests (MoEF) and National Institute of Disaster Management (NIDM), Ministry of Home Affairs, New Delhi jointly organized a two days National Workshop on 'Chemical Disaster Management' during September 30 and October 01, 2008, at Mirza Ghalib Hall, Scope Complex, New Delhi.

The workshop was aimed to facilitate a policy level national dialogue on issues and challenges in the area of chemical disaster risk management at various levels in the country by assessing the current status of prevention, preparedness, and management for chemical disasters in the country, identify the gaps and develop a plan of action for implementation of the national policies and the guidelines for management of chemical disasters. At present, various Ministries, institutions are involved in chemical disaster management. At the national level National Disaster Management Authority, Ministry of Environment and Forest, Ministry of Home Affairs, Ministry of Labour & Employment, Ministry of Agriculture, Ministry of Petroleum, Ministry of Industry, etc. are involved with the process.

At the State level - State Disaster Management Authority, Department of Factories & Boilers, Pollution Control Board, Department of Health, Police, Fire, Industry & Commerce, etc. are directly responsible for industrial accident related issues. There is a need to workout better and effective institutional mechanism, coordination and strategies for ensuring synergy in the various activities of different Ministries and organization. A strategic framework is needed especially towards capacity building and integration with holistic environmental risk management within the framework of a multi-hazard risk reduction strategy. The workshop has provided a platform for the authorities at the national and state level and subject experts to discuss the relevant issues, identify potential gaps and suggest solutions to address the needs.

The workshop was attended by 138 delegates representing Central Ministries/Departments, State Government Departments representing Environment, Pollution Control Boards, Directorates of Industrial Health & Safety/ Factories & Boilers, State Disaster Management Authorities, Revenue, Police, Medical, Transport, Corporate Sector, Industries and the leading institutions like FICCI, CII, ASSOCHAM, NGOs, WHO, NSC, GTZ-ASEM, etc.

With the enactment of the Disaster Management Act, 2005 there is a paradigm shift in approach to disaster management from post disaster relief and rehabilitation to pre disaster prevention and preparedness. The Act ordnates the Government to prepare a National Plan for (a) the prevention of the disasters or the mitigation of the effects and measures to be taken (b) integration of mitigation measures in the development plans and (c) preparedness and capacity building to effectively respond to the threatening disaster situations or disaster. The National Plan has to be prepared in consultation with the State Governments and expert bodies or other organizations in the field of disaster management.

The Ministry of Environment and Forest (MoEF) is the nodal Ministry for the management of chemical disasters. MoEF has taken a number of initiatives for the prevention and preparedness and response of chemical disasters. The Umbrella Act EPA, 1986 enacted after the incidence of Bhopal Gas Tragedy in 1984, and the rules MHIHC Rules 1989, MHWL Rules 1989, EPPR Rules 1996, PLI Act 1991, besides Factories Act 1948 (amended thereafter) provided a systematic approach to disaster management framework at national, state, district and local levels, in the context of chemical accident management and emergency response. NIDM is a statutory organization under the Disaster Management Act 2005, mandated for training, capacity building, research, documentation, policy advocacy, knowledge management and networking on issues related to disaster risk reduction and management. NIDM supports a Disaster Management Centre in the Administrative Training Institutes in each state for catering to the capacity building services at state and district levels. Recently the National Disaster Management Authority (NDMA) has issued National Disaster Management Guidelines for Chemical Disasters. The Guidelines have laid emphasis on capacity building, risk assessment, information management and coordination of actions for enhancing the preparedness at various levels. Based on these Guidelines, a National Plan of Action for Management of Industrial and Chemical Disaster is required to be developed.

### **Objectives of the Workshop**

- To review the present scenario of Chemical Disaster Vulnerability and Risk in different regions of India
- To evaluate the present level of Institutional and legal framework and identify the gaps and critical challenges in addressing chemical disaster preparedness issues
- To identify and address the various mechanisms of managing information on chemical accident risk management and preparedness and capacity building needs

- To develop a framework for the preparation of an action plan for the management of the chemical disaster risk and strategy for implementation of the action plan.

## National Disaster Management Guidelines

The National Guidelines have been formulated as part of an integrated national all-hazard approach for the management of disasters. The prime objective is to ensure that the occurrence of chemical accidents are minimised and risks posed to life, environment and property are reduced. The 'National Disaster Management Guidelines—Chemical Disasters' document calls for a proactive, participatory, well-structured, fail-safe, multi-disciplinary and multi-sectoral approach involving all stakeholder groups, aimed at refining and strengthening the various mechanisms from stages of planning to field operations. These guidelines contain details that are required by the planners and implementers and will help in the preparation of plans by the central ministries/departments and the states.

There has been a paradigm shift in the government's focus from its rescue, relief, and restoration-centric approach to a planning, prevention/mitigation and preparedness approach. It has been realised that effective Chemical Disaster Management (CDM) is possible by the adoption of preventive and mitigation strategies as most chemical disasters are preventable in comparison to natural disasters that are difficult to predict and prevent.

Recognizing the gravity of the risk posed by Hazardous Chemicals the National Disaster Management Authority (NDMA) took up the task of strengthening Chemical Disaster Management. The main stakeholders in the management of chemical disasters are Ministry of Environment and Forests (MoEF; the nodal ministry); Ministry of Home Affairs (MHA); Ministry of Health and Family Welfare (MoH & FW); Ministry of Labour and Employment (MoLE); Ministry of Agriculture (MoA); Ministry of Shipping, Road Transport and Highways (MoSRT & H); Ministry of Defence (MoD); Ministry of Chemicals and Fertilizers (MoC&F); Ministry of Petroleum and Natural Gas (MoP & NG), Department of Atomic Energy (DAE); state governments and Union Territories (UTs) and the chemical industries. The Guidelines have been prepared to provide directions to ministries, departments and state authorities for the preparation of their detailed Disaster Management (DM) plans. The guideline has seven chapters.

Chapter 1 provides an introductory brief of risks, vulnerabilities and consequences of chemical accidents; provides an account of causal factors of chemical disasters so as to restrict and contain them; and enlists major chemical accidents—their initiators, and impact on human lives and the environment. Chapter 2 gives an overview of the existing Institutional, regulatory framework and practises. It also provides an overview of the functioning of research institutes, autonomous bodies, professional institutes, Non-Governmental Organizations (NGOs) and MAH units, their compliance to statutory safeguards, and the efforts of the MoEF in setting up crisis management groups in industrial areas to ensure chemical safety. Chapter 3 gives an overview of the salient gaps identified in various aspects of the management of chemical accidents,

transport accidents and medical emergencies. Chapter 4 includes comprehensive guidelines for a regulatory framework, code of practises, procedures and standards, testing and information, technical and technological information, preparedness including education, training, creation of appropriate infrastructure, capacity development, awareness generation, institutional framework, networking and communication, R&D, and response, relief and rehabilitation for CDM. Chapter 5 comprises comprehensive guidelines for installations and storages (including isolated storages of HAZCHEM) that incorporates good engineering practises for safety, accident reporting, investigation and analysis checklists and safety promotional activities as important tools for effective CDM. Chapter 6 deals with guidelines related to chemical accidents during transportation of HAZCHEM.

Chapter 7 sets out the approach to Implementation of the Guidelines and also highlights the key points for ensuring the implementation of the plans prepared by the central ministries, departments and states. Implementation of the guidelines at the national level could begin with the preparation of an Action Plan, that shall promote coherence among chemicals management mechanisms and strengthen capacities at various levels.

The National Plan needs to include:

- i) Measures to be taken for prevention of chemical disasters, or mitigation of their effects (leading to avoidable morbidity and mortality).
- ii) Actions to be taken for the integration of mitigation measures in the development plans.
- iii) Measures to be taken for preparedness and capacity building to respond to any threatening chemical disaster situations or disasters.
- iv) Roles and responsibilities of different ministries or departments of the Government of India, nodal ministry, industry, community and NGOs

The plan should also have detailed work areas, activities and agencies responsible, and indicate targets and time-frames. The plan prepared should also specify indicators of progress to enable their monitoring and review. The plan would be sent to the NDMA through the National Executive Council (NEC) for approval.

Certain weaknesses have been identified in the existing preparedness plans with regard to awareness generation, response time and other timely actions for evacuation and medical assistance. These aspects constitutes significant portion of the Off-Site emergency plans and have been found to be a weak link in emergency management which is required to be addressed in detail. The central and state governments need to evolve preparedness mechanisms through mock drills, awareness programmes, training programmes etc. and implement it with a view to sensitise and prepare officers concerned for initiating prompt and effective response.

## Implementation Model

The phasing of the implementation model will include the short term covering 0-2 years; the medium term covering 2-5 years; and the long term covering 5-8 years. The Action Plan shall indicate detailed work areas and activities/targets with suggested time-frames, suitable indicators of progress along with authorities/actors for the implementation of guidelines including monitoring mechanisms.

- A) Some of the important issues for the formulation of the CDM Action Plan are as follows:
- i) Putting in place a national mechanism covering all major disasters and reporting mechanisms at the district level.
  - ii) Dovetailing regulations governing HAZCHEM safety with the DM Act, 2005.
  - iii) Establishing of a national risk management framework criterion for chemical assessment.
  - iv) Strengthening of institutional framework for CDM and its integration with the activities of the NDMA, state authority/SDMA, district administration/DDMA and other stakeholders.
  - v) Renewed focus on model safety codes/ standards for prevention of accidents at industry level by matching processes, technologies for safety installations compared with the best in the world.
  - vi) Identifying infrastructure needs for formulating the mitigation plans.
  - vii) Implementing a financial strategy for allocation of funds for different national and state/district-level mitigation projects.
  - viii) Establishing an information networking system with appropriate linkages with state transport departments, state police departments and other emergency services. The states will ensure proper education and training of the personnel using information networking system.
  - ix) Identification/recognition of training institutions.
  - x) Strengthening of NDRF, fire services, MFRs, paramedics and other emergency responders.
  - xi) Revamping of home guards and civil defence for CDM.
  - xii) Develop a national medical emergency plan binding all government, private and public hospitals under an enactment with unified, well-established triage and other emergency procedures.
  - xiii) Develop highway DM plans for all the identified stretches, nodal points, and micro SOPs integrated in the driver's kit.
  - xiv) Establish a register of relevant national and international institutes and information exchange programme.

- xv) Establish post-disaster documentation procedures, epidemiological surveys and minimum criteria for relief and rehabilitation.
  - xvi) Sensitise the community regarding common chemical risks, and their expected cooperation and role during emergencies.
  - xvii) Sensitise corporate houses for more pro-active roles in the prevention of chemical accidents by instituting regular internal audits of plant safety measures, actuation of On-Site emergency plans and of mutual aid institutionalisation arrangements.
- B) Stop-gap arrangement till formulation and approval of Action Plan: The following recommendations can be taken up as a stop-gap measure for immediate action pending formulation of the Action Plan by the nodal ministry and other stakeholders followed by its approval by the NDMA through the NEC:
- (i) Preparation of a report to establish a summary baseline of information on hazard identification and risk assessment in chemical installations.
  - (ii) Risk analysis and assessment of pipelines to identify areas that are likely to be affected and have high exposure of natural hazards.
  - (iii) Incorporation of GIS technology which allows to collect, display, manage and analyse large volumes of specially referenced and associated data for emergency planning, preparedness and response.
  - (iv) Identify and incorporate legislative and institutional framework for preparedness with specific and measurable indicators.
  - (v) Analyse, summarise and disseminate past statistical information on disaster occurrence, impact and losses.
  - (vi) Develop, update and disseminate risk maps and related information to decision makers in an appropriate format.
  - (vii) Support the development and improvement of relevant data bases.
  - (viii) Research, analyse and report on long-term changes and emerging issues that might increase vulnerabilities and risks or the capacity of authorities and people to respond to disasters.
  - (ix) Prepare a national response plan indicating authorities and responsibilities with a view to enhance the ability of the country to prepare for and manage chemical disasters.
  - (x) The transport routes of HAZCHEM, the likely emergencies and resources available at defined locations are to be immediately documented.
  - (xi) CAS should be augmented (including the infrastructure facilities).
  - (xii) Isolated storages and warehouses in the country to be identified and documented.
  - (xiii) Continuation of CDM training and workshops.

## INAUGURAL SESSION

The inaugural session of the National Workshop on “Chemical Disaster Management” was held at Mirza Ghalib Hall on 29 September 2008 at 09.30 hours. The session was inaugurated by Shri R.H.Khwaja, Additional Secretary, Ministry of Environment & Forests. Shri P.G.Dhar Chakrabarti, Executive Director of the National Institute of Disaster Management (NIDM) and Dr.G.K.Pandey, Senior Advisor in the Ministry of Environment & Forests addressed the delegates. Dr. Anil K Gupta on behalf of the organising team briefed about the objectives and structure of the workshop. Shri Shard Kumar, Deputy Director, HSMD, MoEF delivered the Vote of Thanks at the end of the session.



### Welcome Address

#### **Dr. G. K. Pandey**

*Senior Advisor*

*Ministry of Environment & Forests, Government of India, New Delhi*

Dr. G.K. Pandey emphasized that outcome of the workshop would be quite significant for the preparation of a National Action Plan on Chemical Disaster Management. He expressed his happiness over the participation of a large number of delegates from State Pollution Control Boards, Industries, Labour and Factories Departments, Revenue and Disaster Management, Police and Medical Departments.

Citing the reference of Bhopal Gas Episode, Hindustan Petroleum Refinery fire at Vishakhapatnam, Reliance Plant Mumbai accident and Spillage of crude oil at Bombay High he pointed out that negligence/human error was the principal cause of these accidents. In spite of the best efforts accidents are happening. Accidents can not be eliminated completely but

certainly such incidences can be minimized by taking necessary precautions. Mentioning the MoEF initiative of corporate responsibility (2003) for 17 categories of industries, he emphasized the need of going beyond the standards, for assuring safer and cleaner production, minimum energy consumption and achieving the goal of zero discharge. In case of Bhopal gas disaster, people affected are not being compensated yet, and cases are pending in the courts. Similarly in Vishakhapatnam refinery, a major accident has occurred. In the Mumbai Reliance Plant, accident during maintenance and associated environmental damages due to off-shore installations is one more example. Accidents likely to occur during transportation of chemicals is another important aspect. There is an urgent need to take a stock of the situation and take necessary measures to minimise the risk.



A large number of regulations and standards are formulated by MoEF as well as other ministries. There is an urgent need to strengthen them and ensure the implementation of MSIHC Rules, Factories Act, etc. Various key stakeholders need to be strengthened and their capacity has to be further developed to address the emerging challenges. State Pollution Control Board and Environment Departments in the state governments and are adhered with the responsibility to deal with environmental damages in any situations. During a national meeting on "Corporate Responsibility on Chemical Disaster Management" in year 2003 the role of corporate sector, public-private partnership and government-industry partnership was highlighted. A large number of accidents are occurring in small scale industries but those industries have neither the resources nor the will for reducing such accidents. Whereas large-scale industries have the resources but sometimes meet the accidents due to even minor negligence. Dr. Pandey expressed that this workshop will initiate a dialogue among various stakeholders and concrete suggestions and recommendations which will help in evolving a national policy plan will come out as out put of the two day deliberations.

## Special Address

### **Shri P. G. Dhar Chakrabarti**

*Executive Director*

*National Institute of Disaster Management, New Delhi*

Shri P.G. Dhar Chakrabarti mentioned that the chemical disaster management in the country can be divided in the three major phases (a) Pre 1984 (Bhopal Gas Tragedy) phase where the focus was on the safety of the workers, as reflected in Factories Act, Boilers Act, Motor Vehicles

Act, etc; (b) Bhopal Phase (1984-2005) where the focus was on the management of affected communities and the environment, as reflected in the Environment Protection Act, 1986, and the regulations made thereafter that made it mandatory for the hazardous industries to prepare on-site and off-site management plans. Many industries already came up with on-site emergency plans but off-site emergency plans are not been prepared by the district and local authorities, (c) Post 2005; where focus is on holistic management of disaster risks and incidences in a multi-hazard framework, as reflected in the Disaster Management Act 2005 and the guidelines framed by National Disaster Management Authority (NDMA). As per the DM Act, a National Action Plan has to be formulated for implementing the national guidelines.



The legal and institutional mechanism set up by the Environmental Protection Act (EPA), 1986, shall be dovetailed with the Disaster Management Act (DM Act), 2005. In the case of natural disasters which cannot be fully prevented the option is to live with some level of risk. But total prevention of chemical disasters is possible. Convergence of institutional mechanisms for chemical disaster with the holistic disaster management framework is essential for achieving this goal. As per the EPA 1986, Crisis Groups were formed at National, State, District and Local levels whereas under the DM Act, 2005 Disaster Management Authorities has been set-up. Developing the convergence between two parallel institutional mechanisms is a key challenge since designating Crisis Group to work as an advisory body has implications on authority as the EPA provides them legal powers.

Shri Chakrabarti has pointed out that zero tolerance should be the ultimate objective in the case of Chemical Disaster Management. With the constraints of technological, financial and human resources, it may not be possible to prevent disasters altogether and, therefore, our efforts should be to reduce impacts of such disasters, to the extent possible, by various risk mitigation measures in a cost effective manner. Risk assessment is most important and total risk, acceptable risk and residual risks are yet to be assessed in our country. It is not completely possible to totally eliminate the risk and hence, our level of preparedness must be adequate for responding to the acceptable risks. The preparedness measures including early warning, capacity building and various structural and non structural measures which can reduce the risks of disasters substantially. Capacity building is the most cost effective and best investment. District Magistrates are mandated to prepare the Off-site Emergency Plan but are not having expertise and thus capacity building of district and local authorities has to be taken on priority basis. Capacity building has to be linked with technology transfer, modern tools and techniques like remote sensing, GIS, GPS and web-based learning has to be promoted at various levels.

He expressed the hope that this National Workshop would help in generating new ideas and creating better understanding among the stakeholders. He mentioned the practical approach towards phasing of the activities to accomplish the goal of zero tolerance in the national plan in an achievable and practical manner. National Disaster Mitigation Fund being constituted for pre-disaster prevention and risk reduction activities and also a monitoring and implementation evaluation approach to be established. Government, industry and public-private partnership are to be mobilised for resource development quoting 'APELL' an example of government-community-industry partnership for preparedness at local levels.

## Inaugural Address

### **Shri R. H. Khwaja**

*Additional Secretary*

*Ministry of Environment & Forests, New Delhi*

Sri R.H. Khwaja expressed his satisfaction on the participation of all the concerned organizations. Shri Khwaja also congratulated the MoEF and NIDM team for working together on this endeavour. He has pointed out that we are not good at preventing disasters. We are only handling emergencies and responding to disasters. He has referred a book titled "Man's Search for Meaning" by Viktor Frankl that gives an insight to survive in the disastrous situations. Shri Khwaja expressed that his expectations from the workshop delegates is to come up with constructive and concrete suggestions and recommendations that can be taken forward by MoEF in developing a National Action Plan on industrial Chemical Disaster to be developed in consultation with all the stakeholders. Referring to the principle of Mahatma Gandhi, the 'Power of One', he reminded the need of common consensus and effective coordination.



## THEMATIC SESSION

### National and International Status of Chemical Disaster Risk and Management - Recent Developments and Issues

**Dr. Chhanda Chowdhury**

*Director*

*Ministry of Environment & Forests, New Delhi*

Dr. Chhanda Chowdhury discussed in detail about the recent International Developments in Chemicals Management, National Legislations on Chemical Accidents, Chemical Crisis Management Setup & status of Implementation of Legislations, various projects and programs undertaken by Ministry of Environment & Forests, status of Chemical Crisis Management Structure in the country and key issues and challenges. It has been well recognised that the production and use of chemicals will continue to grow faster over the coming decades and sheer scale of chemical production and uses will pose serious challenges for proper management of chemical hazards. Some of the concerns are voluntary in nature and some are the legally binding instruments.



She has enumerated the recent international developments on management of chemical accidents. Notable amongst them are Rotterdam Convention-1998, Strategic Approach to International Chemicals Management (SAICM) 2006 and Stockholm Convention 2001/ 2004/ 2006 and India's commitments on different international treaties and conventions. SAICM is a voluntary initiative of UNEP adapted in the year 2006-for safe management of chemical by 2020. It has a global framework of action and a policy strategy. Under this initiative some 119 activities and 626 work areas have been identified. Stockholm Convention on Persistent Organic Pollutant has come into force in 2004. India is a party to the Stockholm Convention Since 2006. Convention poses restriction and eliminated production and use of 12 highly hazardous chemicals including 9 pesticides, one industrial chemical PCB, and two un-intentionally produced chemicals - dioxin and furans. As a part of the international commitment, India is preparing its national implementation plan for the Stockholm Convention that has to be forwarded to the Stockholm secretariat by 2010. National legislation in India has been developed in accordance to the national needs and international commitments.

At the National level the legislative provisions for Chemical Disaster Management are Factories Act, 1948 (amended 1987), Public Liability Insurance Act 1992, Chemical Weapon Convention (CWC) Act 2002, Environment (Protection) Act 1986 and Disaster Management Act 2005. MSIHC Rules 1989 & Chemical Accidents (EPPR) Rules 1996 and institutional developments, provisions

STATES	MSIHC RULES, 1989				CA(EPPR), RULES, 1996-Crisis Groups Constituted		
	MAH Units	Distt, with MAH Units	On-Site plan Prepared	Off-Site Plans	State	Distt,	Local
A&N	3	1	3	0	Not Const.	Not Const.	Not Const.
A.P.	132	23	125	8	Constituted	Constituted	Constituted
<b>Arunachal</b>	<b>No MAH Unit</b>		-	-	-	-	-
Assam	28	11	27	11	Constituted	Constituted	Constituted
Bihar	20	8	20	0	Constituted	Not Provided	Not Const.
Chandigarh	<b>No MAH Units</b>				Constituted	Constituted	Constituted
Chhatisgarh (2005)	19	5	18	5	Constituted	Constituted	Constituted
Daman & Diu	<b>No MAH Units</b>				-	-	-
Dadra & N. H.	<b>No MAH Units</b>				-	-	-
Delhi	18	7	15	7	Constituted	Constituted	Constituted
Goa	16	2	16	2	Constituted	Constituted	Not Necessary
Gujarat	537	22	513	22	Constituted	Constituted	Constituted
<b>Haryana</b>	52	12	Not Clear	Not Clear	Not Clear	Not Clear	Not Clear
<b>H. P.</b>	<b>Information not received</b>				Not Received	Not Received	Not Received
<b>J&amp;K (2004)</b>	11	5	8	5	Not Const.	Not Const.	Not Const.
<b>Jharkhand (Old)</b>	<b>Information not received</b>				Not Received	Not Received	Not Received
Karnataka	77	15	77	15	Constituted	Constituted	Constituted
Kerala	38	8	38	8	Constituted	Constituted	Constituted
Lakshdweep (2004)	<b>No MAH Units</b>				<b>No MAH Units</b>	<b>No MAH Units</b>	<b>No MAH Units</b>
M. P.	71	20	71	20	Constituted	Constituted	Constituted
Maharashtra	347	23	305	23	Constituted	Constituted	Constituted
Manipur (Old)	<b>Information not received</b>			Not Received	Not Received	Not Received	
Meghalaya	2	1	2	Incomplete Information	Constituted	Not Constituted	Not Constituted
Mizoram (Old)	<b>No MAH Units</b>				<b>No MAH Units</b>	<b>No MAH Units</b>	<b>No MAH Units</b>
Nagaland (2006)	3	2	1	Incomplete Information	Not Constituted	Not Constituted	Not Constituted
Orissa	31	12	31	6	Constituted	Constituted	Constituted
Puducherry	3	2	3	1	Constituted	Constituted	Constituted
Punjab	60	12	59 (1 Closed)	6	Constituted	Constituted	Constituted
Rajasthan	107	16	107	11	Constituted	Constituted	Constituted
Sikkim (Old)	<b>No MAH Units</b>				<b>No MAH Units</b>	<b>No MAH Units</b>	<b>No MAH Units</b>
Tamil Nadu	137	24	109 (22 Closed, 6 N.P)	5	Constituted	Constituted	Constituted
Tripura	2	1	2	Incomplete Information	Constituted	Constituted	Constituted
Uttar Pradesh	121	38	114	4	Constituted	Constituted	Constituted
Uttarakhand	29	4	4	0	Not Constituted	Not Constituted	Not Constituted
West Bengal	85	12	85	0	Constituted	Constituted	Constituted
<b>Total</b>	<b>1949</b>	<b>286</b>	<b>1607</b>	<b>159</b>			

and their implementation status, including chemical accident reporting, preparation of on-site and off-site plans, constitution of crisis groups at central, state and district levels, capacity building/training, voluntary arrangements, emergency response centres, mutual aid response group, UNEP's APELL, etc.



The Ministry has initiated the development of on GIS based Emergency Planning and Response, web-enabled system on Chemical Accident with the technical support of National Informatics Centre (NIC). A study on the vulnerability of the highway stretches have been carried out for transport of hazardous chemicals. There is an urgent need for specific provisions of chemical disaster risk management in all Disaster Management related documents at various levels and vice-versa disaster management as a key component in environmental management and sustainable development programmes. Key gaps identified are the Flow of Information, Accident Reporting in prescribed format, Lack of Communication, Lack of Infrastructure & Support- CIF/DIHS, Compliance of various provisions of the Rules, Compliance of CMV Act, 1989 - Transportation of Hazardous Chemicals, lack of dedicated human resources with the monitoring authorities. A designated focal point in the nodal ministries viz. Ministry of Environment & Forests and Ministry of Labour & Employment, at the central and state level and assigning of an emergency Coordinator/SDM at district level is essential for assuring the compliance and coordination at various levels. For assuring the effective participation of Stakeholders in Chemical Disaster Management the list of important duties along with the contact numbers of key personals should be there in the handbook of Disaster Management.

### **Key Issues**

- Flow of Information
- Accident Reporting in Prescribed format
- Lack of Communication
- Lack of Infrastructure & Support - CIF/ DIHS
- Compliance of various provisions of the Rules
- Compliance of CMV Act, 1989 - Transportation of Hazardous Chemicals
- Tendency of first responders (in drills) to 'rush into the scene without proper briefing

Emergencies (chemical release, fire, explosion hazard) require different actions (evacuation, safe shelter etc) and there is a need for effective early warning system and Regulatory/ statutory authorities/ responders need to be trained on first response (Hazardous Materials) and management of emergencies. First responders (in drills) tend to 'rush into the accident scene without proper briefing of the scenario. So it is essential to develop and implement a Community Awareness Emergency Response (CAER) program to include the training of members of the community. Strategies to overcome the issues include develop aid memoirs to assist Emergency Response Groups and personnel in the discharge of their duties.

The National Disaster Management Authority has brought the guidelines for various disasters including chemical disasters. As mentioned in the guidelines i.e. the Ministry of Environment & Forests, the nodal ministry for management of chemical disasters has to prepare a National Action Plan enumerating various actions and programmes to be carried out for implementation of the national guidelines and the time-frames and the responsible agencies/department and their respective roles. A mechanism has been established at national, state and district level to prevent the emergencies and to provide immediate relief in case of a disaster. Dr. Chowdhury concluded her presentation with the expectation that the workshop will bring out salient features, issues and challenges to be addressed in the National Action Plan.

## GIS Based Emergency Planning and Response System

**Shri Sanjay Gahlaut**

*Sr. Technical Director &*

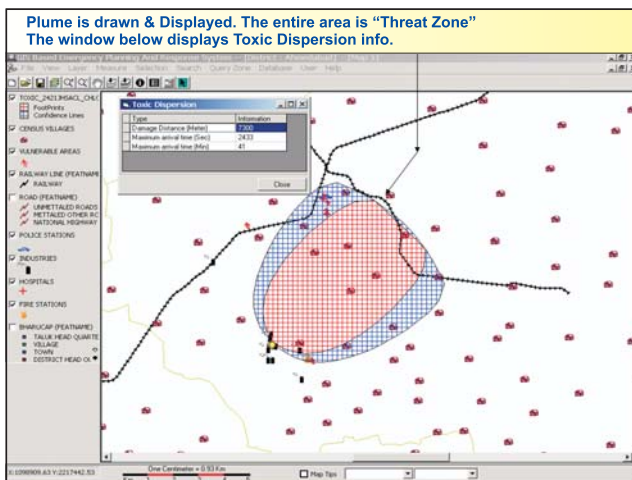
**Ms. Arpita Gupta**

*Senior Scientist*

*Environmental Systems Division, National Informatics Centre (NIC), New Delhi*

Dr. Sanjay Gahlaut demonstrated the GIS based Emergency Planning and Response System developed by NIC. This project, "Off-site Emergency Planning for MAH Industries in India" is sponsored by Ministry of Environment & Forests (MoEF), Government of India, which is nodal ministry dealing with chemical disasters in India. It is executed by National Informatics Centre (NIC), Ministry of Communication and Information Technology, Government of India. This System has been developed as a complete software package comprising of GIS tools and databases. The program is user-friendly and can be used along with district level offsite emergency plan not only for planning and mock trials of major chemical emergencies but also

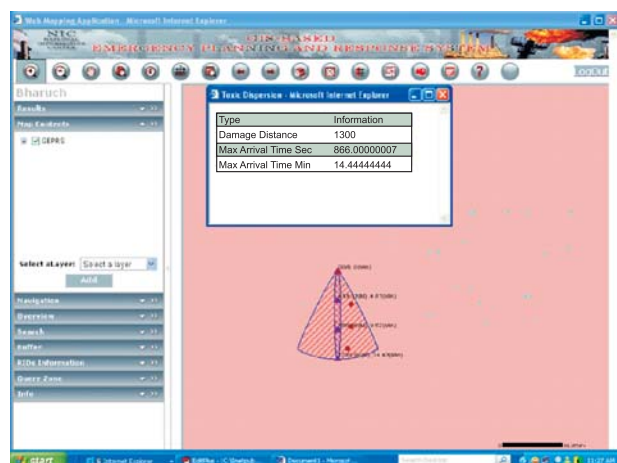




during actual emergency. This system will be able to help response agencies namely Central Crisis Group (CCG), State Crisis Group (SCG), District Crisis Group (DCG) and Local Crisis Group (LCG), during both pre-emergency state for planning and rehearsing and also during actual emergency situation so that a well planned response can contain the damage in time to the least possible extent.

The project covers all the districts with major industrial clusters in 10 states viz. Gujarat, Maharashtra, Andhra Pradesh, Tamil Nadu, Rajasthan, Uttar Pradesh, Haryana, Punjab, Madhya Pradesh, Assam, West Bengal, Kerala, Karnataka and Delhi. Extensive data collection exercise was undertaken to collect the first hand information (primary data) from all the industrial units and district level response agencies for all the major districts in fourteen states. First responders i.e. Police stations, fire stations, hospitals/nursing homes and sensitive areas – schools, colleges, cinemas, etc. surrounding the industrial units, were also identified and mapped.

The major components of the project are (i) Identification of Chemical Industries in the study area covering major states of India (ii) Database Design (iii) Collection of data pertaining to chemical storage and handling from identified industries (iv) Collection of resource data in terms of fire fighting equipment and stocks, Personal Protective Equipment (PPE), transportation facilities, etc. from industries (v) Collection of data on resources available with government



authorities such as police, fire and medical departments (vi) collection of spatial data with the help of GPS handsets for chemical industries, first responders – police, fire and medical and sensitive areas such schools, places of mass gathering etc. (vii) Identification and procurement of SOI toposheets for the study area (viii) Geo-referencing and Digitization of toposheets (ix) Chemical accident simulation using computer models for all the identified chemical accident scenarios (x) Development of front-end menu-driven software linking spatial data, scenario templates, industry data, resource data and response information data sheets (RIDS) for each chemical.

The application on Off-site Emergency Planning for MAH Industries in India is a unique approach, first of its kind integrating Spatial and non-spatial data on to a single GIS based system. The application has successfully delivered a highly interactive menu driven, user-friendly customized package for non-specialist end users at local level. Also it has delivered a powerful versatile digital geo-referenced database of maps, images, MAH data (locations, contact personnel, chemicals etc), vulnerability Zones, district resource data (fire, hospitals, police etc.).

The application developed in Phase I and II has been shared with State authorities and trainings have been provided. The Phase-III of the project will cover the selected districts of Gujarat and Maharashtra and incorporate the additional features in the software package to make it more interactive and user friendly. Considering the difficulties in updating data in standalone system, a web based system has also been developed.

## Strategy of Community Awareness for Emergency Preparedness

### R. P. Bhanushali

*Advisor (Technical)*

*National Safety Council, Mumbai*

Shri R.P. Bhanushali, made a presentation on the strategy of community awareness, through implementation of the APELL Projects in India. APELL stands for Awareness and Preparedness for Emergencies at Local Level (APELL). The programme initiated in the year 1992 and continued till 1997 and extended for two years as trans-APELL period. A National APELL Centre has been established at National Safety Council, Mumbai in association with United National Environment Programme (UNEP).

During the Pre-APELL stage there was the legal obligation in India to provide information about the public, the worker and the Chief Inspector of Factories regarding hazardous industries. However, there were no guidelines regarding what information in to be provided and how the information is to be provided to various stake holders including the community. APELL was a programme evolved by UNEP after the Bhopal disaster. It is a programme designed to (i) Create and increase public awareness of possible hazards within a community (ii) Stimulate the development of co-operative plans to respond to any emergency that might occur; (iii) Encourage prevention of accidents (iv) APELL is an initiative sponsored by the DTIE of UNEP, in co-operation with the US Chemical Manufacturers' Association and the Conseil European des Federations de l'Industrie Chimique (CEFIC).



Shri Bhanushali discussed about the concept, philosophy and organization of the APELL process, linkages and integration with the crisis management framework at different levels. There are three stake holders: industry, local government and local community were involved within the APELL process, as these three are the major stakeholders in emergency response. These three key stake holders have to come together to evolve an integrated community response plan. This feature is very important because the main stakeholders in managing the emergency owned the plan, and the implementation was more effective. It stimulated the development of cooperation plans.

APELL consisted of two parts (1) provision of information to the community, referred to as "community awareness"; (2) formulation of a plan to protect people, property and the environment, referred to as "emergency response". APELL addresses all emergencies with potential for fire, explosion, spills or releases of hazardous materials. The possibility of "combination accidents" should be noted at this point; for example, an earthquake which triggers an emergency in a chemical



factory, determination of which potential hazards should be covered by the APELL process is in principle the result of a risk assessment. In most cases, however, common sense will be sufficient to identify the facilities or areas which present a risk of a major accident. The criteria (lists of substances and threshold levels) given in international or national regulations or recommendations may also provide guidance. Key advantage of APELL programme is its flexibility. Countries differ in culture, value systems, legal and regulatory requirements, community infrastructure and response capabilities and resources. However, it is recognised that national governments and the chief executive officers of industries have a fundamental role in promoting and supporting these local efforts. Industry associations also have an important part to play in encouraging industry participation.

The APELL process consists of ten steps. (i) identify the emergency response (ii) participants and establish their roles, resources and concerns (iii) evaluate the hazards and risks that may result in emergency situations in the community (iv) have participants review their own emergency response plans for adequacy relative to a co-ordinated response (v) identify the required response tasks not covered by existing plans and match these tasks to the resources available from the identified participants (vi) make the changes necessary to improve existing plans, integrate them into an overall community plan and gain agreement (vii) commit the

integrated community plan to writing and obtain approval from local governments (viii) educate participating groups about the integrated plan and ensure that all emergency responders are trained (ix) establish procedures for periodic testing, review and updating of the plan (x) educate the general community about the integrated plan.

In order to assure the success of APELL Process the key stake holders ie. (i) Local authorities : include provincial, district, city or town officials, either elected or appointed, who are responsible for safety, public health and environmental protection in their area. (ii) Industry: Industrial plant managers from either state-owned or private companies are responsible for safety and accident prevention in their operations who prepare and implement specific emergency measures within the plant and review their application.. As leaders of industrial growth and development, they are in the best position to interact with leaders of local authorities and community groups, in order to create awareness of how the industrial facility operates and how it could affect its environment and to help prepare appropriate community response plans in the event of an emergency. The involvement and active participation of the workforce is also very important. (iii) Local community and interest groups: Such as environmental, health, social care, media and religious organisations and leaders in the educational and business sectors who represent the concerns and views of their members or constituents in the community. There are other partners, e.g. non-governmental organisations (NGOs).

The APELL process is designed to harmonise with other initiatives to reduce risks and their consequences, not to replace them. APELL process involved a structured and coordinated dialogue and the long-term goal of the project is to create disaster resistant communities with greater emphasis on mitigation measures and focus should be mainly on preventing the emergencies. Industry-community interaction, if facilitated is the best approach in preventing and managing emergencies whether for chemical hazards or other environmental disasters like natural hazards earthquakes, flood, cyclone, etc. For this there must be two way communications. Information is an important component and what information is to be given, in what form, and to what level is very important because it has to match with the understanding of the community. Providing the information must be very simple, may be by pictorial materials, videos, posters, etc. to contribute to easy understanding. Direct target group may be the persons who can influence the community. Sites of display of information may be the community gathering points like post-offices, schools, municipal offices, etc. Community festivals may also be used for this purpose to raise awareness. Information must include alarm signals, warning signals, evacuation routes, reporting procedures, antidotes, etc. Emergency preparedness for the tourists at the tourist places should also be included in the community awareness for chemical emergencies.

## Capacity Building and Knowledge Needs for Chemical Disaster Management

**Dr. Anil K. Gupta**

*Associate Professor &*

**Ms. Sreeja S. Nair**

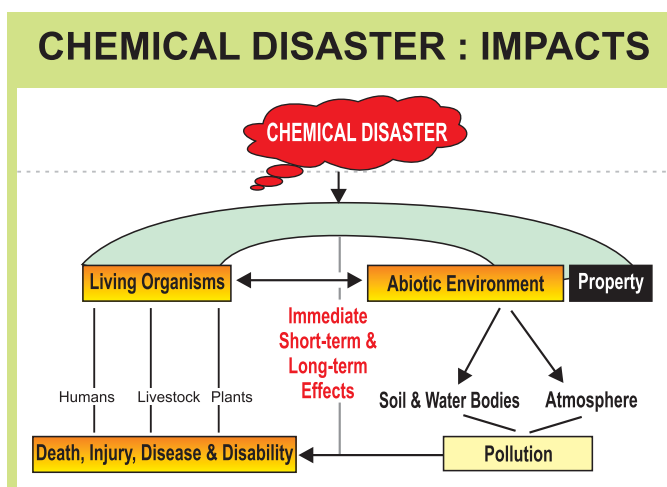
*Assistant Professor*

*National Institute of Disaster Management, New Delhi*

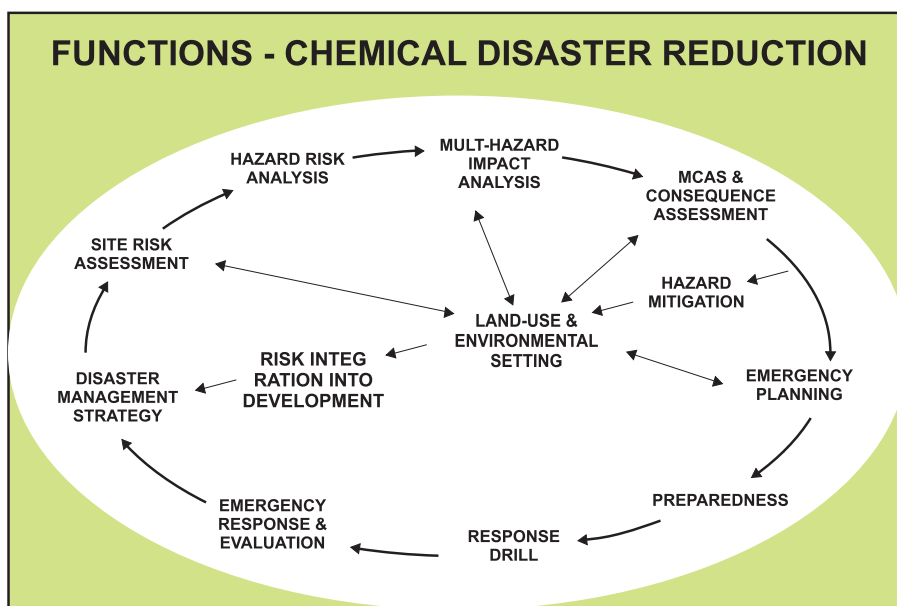
Capacity building is the most cost effective and the best investment. It is important to understand the purpose and context of capacity building. Capacity building thrust will vary from sector to sector and even from country to country or from region to region. For example, the capacity building for India may be different from UK or US. In the developed countries, the focus shall be on machines, technology, and materials, whereas in a country like India which is having human resources, the capacities have to be seen in human context. The figure shows the impacts on various components which are affected in case of chemical disasters. These include both the geo-hydrological components and the biological components.



‘Site risk assessment’ is the first step to understand the site characteristics including geo-hydrological, atmospheric, climatic, ecological that may make the conditions unfavourable for siting of any hazardous installation. If the site is found suitable after considering possible trigger factors including natural hazards, land-use pattern and socio-economic conditions, then



the risk due to materials properties conditions of storage, handling etc are to be assessed. The major challenge is the integration of chemical hazards within the multi-hazard risk management framework. The concept of the maximum credible accident scenarios (MCAA) has to be revisited for its application for the multi-hazard framework. Presently we apply the MCA scenario in a very small located can be in a coastal area prone to cyclone



and tsunami or in earthquake hazard zone or in a hilly terrain prone to landslides or in an ecologically sensitive area, it may suffer with the challenge of multiple or secondary hazards.

Capacity components can be divided into three groups (i) resources (ii) motivational and (iii) delivery or performance. We have yet mainly focussed on delivery or performance. But for a proper delivery or performances, motivational and resources are equally important. Resources include strategic and guiding (codes, manuals), non-structural and intellectual (knowledge pool, researchers and concept builders), structural and materials (laboratories, infrastructure, safety systems, and hazmat van) and Systemic and functional resources (include mechanisms, systems at the government, or within the industry or the corporate houses). Human resources are meant for delivery and performance. Despite of having the resources and the concern for delivery and performance, the 'motivational' factor may become a limiting factor. Insurance sector has a great role in implementation of chemical disaster management provisions, and also in giving a feel of self security – at the level of individual, organisation and systems. Examples are - levies, taxes, incentives, bonus, awards and promotions. Some system of facilitation of the capacities are necessary to facilitate the performer to perform. Strategic resources include the laws and plans. Without a plan, despite of the other capacities, performance can not be guaranteed.

There are certain strategic tools applied for the environment sector. EIA is an example. In almost all the EIAs, Disaster Management Plan (DMP) is a component but the DM plan is like a table-exercise in many EIAs and not actually based on the adequate risk assessment, except in case of major and reputed chemical industry. EIAs are, in principle, designed to take account of all types of environmental risks – geo-hydrological, chemical, atmospheric-climatic, biological, land-use, socio-economic 'quality of life' parameters, and mass assemblage, etc. Reputed

corporate houses prefer to carry out a detailed risk assessment as a part of their EIA process. Issues related to safety risk management have to be properly addressed from the beginning of the environmental decision making, in case of major hazard installations. Environmental Auditing in India is a mandatory requirement but still the safety component is inadequately addressed in the format (form-V) of environmental audit in India. However, many audits are voluntarily carried out at comprehensive levels. Life Cycle Assessment (LCA) is an important tool for assessing safety risk at every stage of its life. The Concept of Extended Producer Liability is a recent term being used in certain forum that designate the responsibility of the occupier not only for the safety and risk concern in storage or use but through out the life of the product on-site and off-site. "Ecological Footprint" concept has been applied in terms of geophysical and ecological environment but it may be redesigned as 'environmental footprint' to address safety risk also. The 'domino risk' is another concern where more than one units are located in the same area.

Environmental Systems application including various models viz. atmospheric stability, dispersion, hydrodynamics, Effects, WHAZAN, ISC, etc. are important for such studies.

Medical surveillance during the pre-disaster phase has to be a concern as a risk reduction function because operability is an important component in the risk management process. An operator may fail to take a proper decision at particular instance that may trigger a failure leading to a major disaster. It may also be due to his ill-health condition, physiological or mental, that affects the decision capacity of a person. As of now we lack failure data in our country and risk assessors use the failure data from the western world. Certain non-structural resources like land-use codes, guidelines and enforcement are also important. 'Building by-laws' have also to be implemented for industrial structures and buildings. Awareness is another component, for which the 'Safety Museum' may be a good concept and demonstration facilities may be developed at various levels. A devoted cell/division on Disaster Management in the relevant Ministries, for example one at the Ministry of Environment and Forests may be established to deal with disasters related issues including chemical and other environmental issues about natural disasters, climate change, environmental damages and losses, etc. Systemic and functional resources in the form of fixed responsibly and clear guidelines of roles are necessary. Defined time-frame for activities –and practicable standard procedures (SoPs) are important because many other priorities may come into picture before the completion of scheduled task. Three categories of human resources are needed: (i) core professionals with unquestionable performance quality- for assessment, audits, planning, designing, monitoring, concept development, training, etc, (ii) Execution –professionals to implement the measures and plans and executives to provide administrative support. Chemical disaster management also requires multi-disciplinary knowledge as it is the geophysical conditions, atmospheric conditions, urban structures, land-use settings, and vulnerabilities that determined the chemical disaster scenario and damages. There is very less focus on economic evaluation of environmental impacts or losses due to any disaster despite of international guidelines by organisations like

UNEP/UN-OCHA, US-GS, IUCN, ISDR, Care International, etc. State forensic laboratories may also be utilised as state of art of facilities. Experts on economic evaluation of disaster impacts – damages and losses are also needed. (iii) Governance – at district, local or state administration, industry or corporate, community, etc. Educators like – Universities, IITs, IIMs, CSIR, IGNOU - may be encouraged to initiate education and training programmes on the subject of disaster management under the discipline of environmental sciences/ management/ engineering, natural resources, community medicine, social welfare, etc. Ministry of Human Resource Development, UGC and NCERT may take necessary steps in this direction. An environmental systems facility and knowledge management centre on chemical disasters may also be established at national level to facilitate the information mobilization and sharing.

## National Disaster Management Framework and Management of Chemical Disasters in the Country

**Ms. Sreeja S. Nair**

*Assistant Professor*

*National Institute of Disaster Management, New Delhi*

Ms. Sreeja S. Nair has briefed about the institutional and legal framework for disaster management in the country. There has been a paradigm shift from relief centric approach to pre-disaster preparedness and mitigation.

Before the Super cyclone of Orissa in 1999, the approach of the government was totally relief centric. The High Power Committees (HPC) has been set up after 1999 super cyclone and that identified 33 types of disasters in our country which included water and climate related disasters, geologically related disasters, chemical and industrial disasters, accident related disasters, etc. now total 34 types of disasters including tsunami after 2004.

The paradigm shift has taken place from relief centric to mitigation and now on pre-disaster risk reduction by integrating component of DRR in developmental programmes with the enactment of Disaster Management Act 2005. The Disaster Management Act has come into force on 22 December 2005, a year after the Indian Ocean Tsunami. Now the disaster management framework is more structured and organised. This Act provides for the establishment of national disaster management authority, district disaster management authority and local disaster management authority. There is a National Disaster Management Authority (NDMA) at national level and similarly State Disaster Management Authority (SDMAs) and District Disaster Management Authorities (DDMAs) have been set-up at state and district levels. Provision of local DMAs is also envisaged under the law. Prior to this, the Ministry of



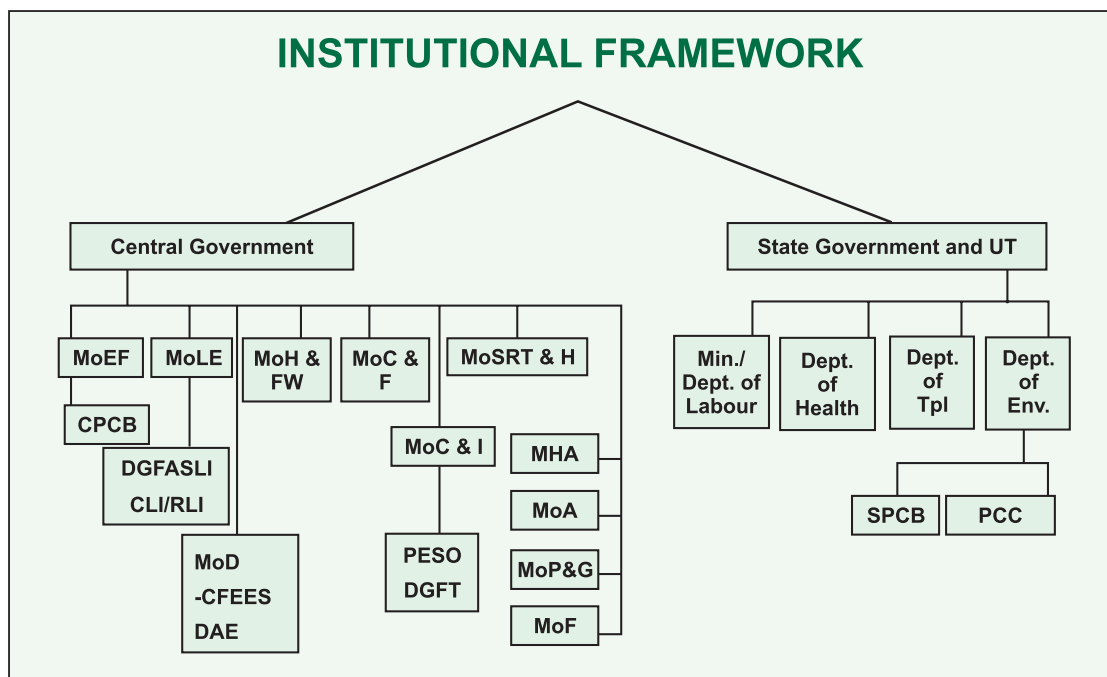
Agriculture was the nodal agency for disaster management. Now the Ministry of Home Affairs is the responsible Ministry for overall coordination of disaster management in the country. Now, there are nodal ministry identified for various disasters, for example, Ministry of Environment & Forests for Chemical Disasters, Ministry of Health and Family Welfare for Biological disasters, Ministry of Atomic Energy for Nuclear Disasters, Ministry of Railways for Rail accidents, etc. Ministry of Agriculture now looks after Drought. For chemical disaster management in our country, many ministries are involved – Ministry of Environment and Forests, Ministry of Labour & Employment, Ministry of Agriculture, Ministry of Petroleum and Natural Gas, Ministry of Commerce and Industry, Economic Affairs & Finance, Ministry of Surface Transport, etc. Ministry of Surface Transport takes care of the aspects related to accidents during road transport of chemicals.

There is a National Crisis Management Committee that meets at the time of a calamity but not in the pre-disaster stage. At the time of a calamity of national scale, crisis management committee under the chairmanship of the Cabinet Secretary gives policy directions and guidelines for the crisis management group where the national and international efforts are required. Crisis management Group at the Ministry of Home Affairs reviews the situation in Inter-ministerial meeting to coordinate various emergency support functions to the affected areas. Union Cabinet can set up the task force or committee for effective coordinate of the relief measures.



Similarly there is a mechanism at the state level where the crisis management committee under the Chief Secretary, responsible for the emergency management at state level. This

committee comprises of the state departments officers with representative of central government organisations. State Department of Relief has now been changed to Department of Disaster Management, will be the nodal coordinating the relief operations and disaster preparedness at the state level.. It is also proposed to rename Relief Commissioners as Disaster Management Commissioners.



The National Authority of Disaster Management has been constituted under the Chairmanship of the Prime Minister of India. There are nine members in the authority. NDMA's role is to lay down the guidelines and plans for disaster management, development of guidelines of minimum standards of relief, providing guidelines to the state governments and relevant central ministries. State Disaster Management Authority (SDMA) has the functions at states similar to NDMA has at state level and is chaired by Chief Minister. It provides guidelines to the state departments and the Districts. District Disaster Management Authority is chaired by the District Collector or the District Magistrate. District Authority is responsible for formulation of District Disaster Management Plan. In some states like Gujarat and Orissa the Disaster Management Authority was formed prior to the National Disaster Management Authority. So, in those states now also the chairperson is not the Chief Minister but the Relief Commissioner. This is because these authorities were formed before the enactment of the Disaster Management Act. Orissa Disaster Management Authority (OSDMA) was formed in 2000 and Gujarat Disaster Management Authority (GSDMA) was formed in 2001. Disaster Management Act provides the constitution of a Disaster Response Fund and now a Disaster Mitigation Fund.

Previously there was a National Centre for Disaster Management established by Ministry of Agriculture, established in the year 1995 which later been converted to the National Institute

of Disaster Management with wider mandates for training, capacity building, research, documentation, policy advocacy, knowledge management and networking on issues related to disaster risk reduction and management in the country. Besides this NIDM has a national network of Disaster Management Centres and other national and regional institutes working in different areas. National Disaster Response Force – 8 Battalions of Disaster Response Force has been raised including search & rescue team, medical team, technical support team and dog squad.

A National Policy on Disaster Management has been prepared but the convergence with other existing policies for example the National Environmental Policy -2006 and Integrate Coastal Zone Management Notification, is not clear. There is no chapter on Disaster Management in the National Environmental Policy. Inadequate focus on disaster management given in the national environmental policy despite of MoEF is playing significant role in Chemical Disaster Management as well as other natural hazards including coastal hazards and is a major lacunae.

National policy on disaster management is at the draft stage and is with the NDMA, for their final review and approval. In the preparation of the National Policy all the relevant Ministries were involved. Objective of the policy is to promote the culture of prevention and mitigation, ensuring risk reduction based on the state of art technologies and environmental sustainability, putting in place a techno-legal framework, providing a productive partnership with media, ensuring effective response and relief, ensuring reconstruction as an opportunity for better development. Other features of the policy are enforcement of codes and standards and revision whenever needed, promotion of microfinance and micro credit, safety of lifeline building, capacity building of various sectors including NGOs and community.

Training and education are given significant focus and a number of workshops, training and awareness initiatives have been undertaken by NIDM and NDMA. MoEF has already taken significant initiatives and recently NDMA has organised a series of Mock-drill at various places. Financial aspects are very important, there is to be a mitigation fund, as per the Disaster Management Act. Now every department has to allocate a percentage of the funds as mitigation fund.

The Disaster Management Act provides for penalties for the obstruction, false claims, false information, or giving false warning, etc. It provides that there shall be no discrimination on the ground of sex, caste, community for providing compensation or relief. Many times there are lot of disparities in providing relief. Misappropriation is a punishable offence under the DM Act. Any officer who takes leave during the emergency situation without permission can be penalised.

Multi disciplinary nature of the subject of Disaster Management and the involvement of various Ministries and Departments in the formulation and implementation of plans were not taken into consideration in most of the cases. Most of the Disaster Management Plans formulated under Disaster Risk Management Programme were formulated in isolation without taking inputs from the disaster/emergency management plans for various departments. Although India has come up

with a well developed legal and institutional framework for Disaster Management, the implementation is poor at various levels. It is important to assure the co-ordination between various departments and convergence of various plans including developmental plans with Disaster Management Plans to achieve Disaster Risk Reduction at various levels.

## Public Health Dimension in Chemical Incidents and Emergencies

**Dr. Alexander Von Hildebrand**

*Regional Advisor*


*World Health Organisation, New Delhi*

The ultimate objective of WHO in the area of chemical disaster management is to reduce the global burden of diseases (illness & dysfunction) attributable to chemical incidents. Chemical incident may occur as an accident or a deliberate release. In order to focus on prevention, discussion on the concept of chemical incidence is important. WHO defines Chemical Incident an uncontrolled release of a chemical from its containment that either threatens to, or does, expose people to a chemical hazard. Such an incident could occur accidentally or deliberately.

### Management of Chemical Incidents

**Chemical incident**  
An uncontrolled release of a chemical from its containment that either threatens to, or does, expose people to a chemical hazard. Such an incident could occur accidentally or deliberately.

The ultimate objective is to **reduce the global burden of disease** (illness & dysfunction) attributable to chemical incidents.



PREVENTION

PREPAREDNESS

SURVEILLANCE  
ALERT  
VERIFICATION

RESPONSE

FOLLOW-UP

The key roles of WHO include prevention by supporting routine activities to improve sound management of chemicals, preparedness by means of providing guidelines, and also serve as a source of information, developing training materials, surveillance and alert verification by

### Information on chemicals and methodologies

... and many others are available free of charge from the IPCS INCHEM database at <http://www.inchem.org>



**IPCS International Chemical Safety Cards**


PREVENTION

PREPAREDNESS

SURVEILLANCE  
VERIFICATION  
ALERT

RESPONSE

FOLLOW-UP



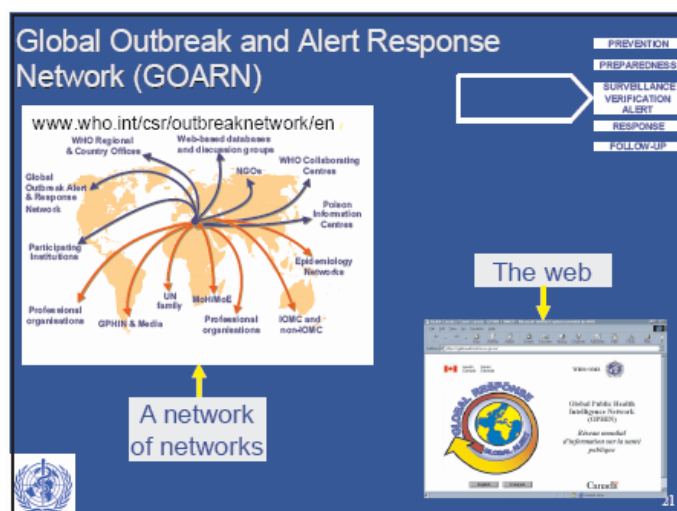
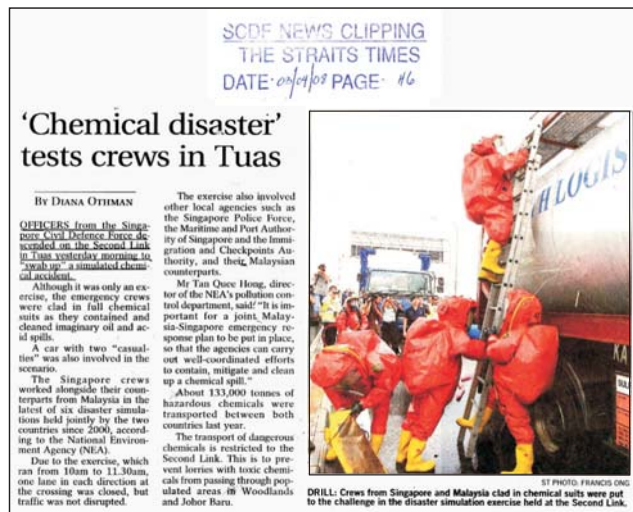
maintaining global outbreak alert system for illness of chemical origin, response by establishing & maintaining an international response network for chemical incidents and follow up by collecting & providing information in support of public health decision-making.

WHO uses the term Chemical incident/ Chemical Emergency in place of Chemical Disaster in terms of increasing order of severity and means an uncontrolled

release of a chemical from its containment that either threatens to, or does, expose people to a chemical hazard. Such an incident could occur accidentally or deliberately.

Various international guidelines developed by WHO on health aspects of Chemical Incidents. Notable among them are WHO Public health response to biological and chemical weapons (2001), IPCS Public Health and Chemical Incidents for National & Regional Policy Makers in the Public/Environmental Health Roles (1999), WHO/EURO Assessing the health consequence of major chemical incidents - epidemiological approaches (1997), WHO health assessment protocols for emergencies (1999), Health aspects of chemical accident awareness, preparedness and response for health professional and emergency responders, IPCS, OECD, UNEP-IE/PAC, WHO-ECEH (1994) and OECD Chemical incidents: prevention, preparedness and response (1992, currently being revised). The Poison centres are the basic tools. It has been realised looking to the need of poison information that ideally there should be at least one poison centre in each State.

Regular environmental-health monitoring should be conducted in order to prevent long-term exposure of the public to the chemicals of concern. WHO has established systems for chemical incident preparedness, alert & response, with mandate from Member States to include deliberate acts. The organisation focuses on public health & medical management aspects, working through networks of centres for alert/surveillance & response. WHO is also able to provide information regarding resources available at national & regional level and the tools for



collection/collation of internationally-comparable human health-related chemical incident data through Multi-regional (global) base of operations that enables data collection from non-OECD as well as OECD countries. Main examples are INCHEM (Information on chemicals and methodologies), IPCS INTOX Databank, Global Outbreak and Alert Response Network (GOARN), INTOX Poisons Information Management System, Global

Chemical Incident Reporting Programme etc. He informed the various international guidelines developed by WHO on health aspects of Chemical Incidents.

## Chemical Accident Information and Reporting System

**Shri Anil Kumar**

Senior Scientist

National Informatics Centre, Government of India, New Delhi



**Chemical Accident Information & Reporting System**

**CAIRS – A INTEGRATED WEB BASED SOLUTIONS**

*It is a Web Based System where concerned authorities as mentioned in schedule 5 of Manufacture, Storage, and Import of Hazardous Chemical Rule(MSHIC) Rule 1989 can online register (with password security) and post chemical accident information in the pre-set formats. It provides storing, retrieving and analyzing data in visual form for all the information related to the chemical accidents happening in India. The CAIRS project has been developed by Environment & Forest Informatics Division of NIC in close consultation with Hazardous Substances Management Division of the Ministry of Environment & Forests.*

**FEATURES**

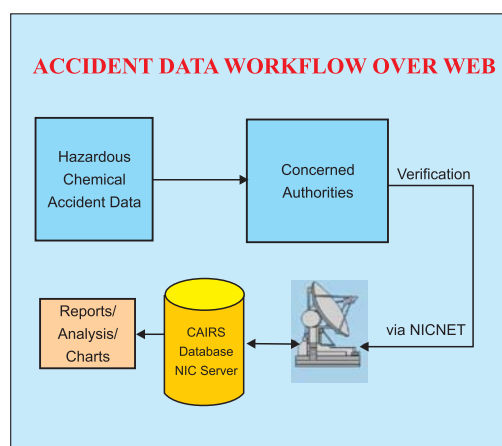
- Web based Customized software
- General Accident format for authorities
- Centralized database of Chemical Accidents
- Updated Chemical Accident details for all concerned authorities
- User authentication
- Online report/chart generation
- Simple and user friendly Design

CAIRS MODULES	CAIRS FUTURE
<p>The Current version of NIHWIS support following modules</p> <ul style="list-style-type: none"> <li>• CAIRS Admin</li> <li>• CAIRS For Authority               <ul style="list-style-type: none"> <li>▶ Data Updation</li> <li>▶ Add Industry</li> <li>▶ Change Password</li> </ul> </li> <li>• CAIRS Reports</li> <li>• Charts</li> </ul>	<ul style="list-style-type: none"> <li>• CAIRS is primarily developed to store, retrieve and analyze data for Chemical Accident happening in India.</li> <li>• Future enhancement can also be seamlessly integrated with existing modules.</li> <li>• It is envisaged to add more modules to CAIRS or customize it as and when demand arises from the user.</li> </ul>

Shri Anil Kumar from National Informatics Centre demonstrated the Web based Chemical Accident Information Reporting System (CAIRS) developed by the National Informatics Centre for MOEF. This is web based system and it allows the concerned authorities to online Add/Update/Delete the information related to Hazardous Chemical Accident using password security over web, so that only authentic users can update the information. It is GUI based with the capabilities to generate reports for concerned authorities. MoEF also analyses the accident information available in the form of various charts. These

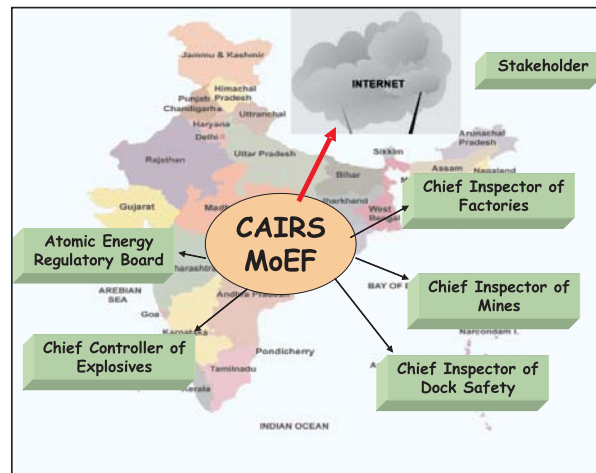
reports help MoEF in their decision making process, presentation to the Central Crisis Group and sharing with specific state or district crisis groups. CAIRS has three modules:

- (i) **Admin:** Here in this module, Administrator has the options to create new user account, delete user, adding new authority, region, and chemicals and assigning forms for the appropriate authority. General user has no role in this admin module.

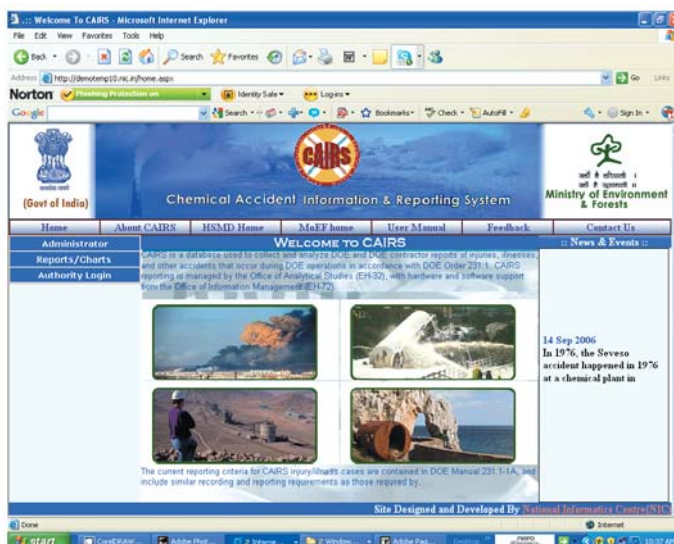


(ii) **Reports and Charts:** Reporting option caters in generating reports in many combinations of state, authority and district on the basis of accident date. Option for graphical reports that is Charts and Bar chart reports, has also been provided.

(iii) **Authority Login:** This is the part where concern authorities log into the application to input their accident details. Each Authority has different category (State wise, district wise, Region wise) to log in. For logging into the application user need a valid user ID and Password. The administrator will provide this user Id after receiving request from the user side. Here we have given the option to change password to maintain the privacy.



In the CAIRS concerned authorities as mentioned in schedule 5 of Manufacture, Storage, and Import of Hazardous Chemical Rule (MSHC) Rule 1989 can online register (with password security) and post chemical accident information in the pre-set formats. It provides storing, retrieving and analysing data in visual form for all the information related to the chemical accidents happening in India. Environment & Forest Informatics Division of NIC has developed the CAIRS project in close consultation with Hazardous Substances Management Division of the Ministry of Environment & Forests.



Key features of CAIRS are - Web based portal, General Accident format for authorities, Centralized database of Chemical Accidents, Updated Chemical Accident details for all concerned authorities, User authentication, Online report/chart generation and simple and user friendly design. He suggested sharing the project with all the stakeholders responsible for implementing the MSHC Rules and CA (EPPR) Rules.



## AGENCY/SECTOR PRESENTATIONS

### Oil Industry Safety Directorate

**Shri S. L. Chakaravorty**

*Joint Director*

*Oil Industry Safety Directorate (OISD), Ministry of Petroleum, Government of India, New Delhi*

Oil Sector is inherently hazard prone due to large inventory of Petroleum products which are highly inflammable, and being stored or processed at high pressure and temperature. Loss of Containment failures may results in fire/explosion risk as well. OISD is a self regulatory agency and technical directorate under the Ministry of Petroleum and Natural Gas. OISD has formulated a series of preventive self regulatory safety measures for Oil & Gas industry in India and monitors the compliance. There are six OISD standards codes in as per the Petroleum Rules-2002. Guidelines are also prepared on Disaster Preparedness and prescribed in codes OISD-145,168 & 206.



**OISD**  
A Self Regulatory Agency

- A technical directorate under MOP&NG
- Formulates a series of preventive self regulatory safety measures for Oil & Gas industry in India
- Monitors compliance
- Six OISD standards in Petroleum Rules-2002
- Guidelines available on Disaster Preparedness in OISD-145,168 & 206

OISD

emergency procedures for mobilisation & evacuation, etc. It also includes the role of emergency services and Interlinks know-how and resources that can be mobilised.

Various **attributes of On-site plan include** - Identification & Assessment of potential hazards, Plant Risk Evaluation, Area Risk Evaluation, Plant Emergency Organisation, Notification & Communication system,

OISD Guidelines on Preventive Measures include Exploration & Production (On/Off-shore operations), Refining, Gas processing & Petrochemicals, Cross Country Pipelines, LPG & POL Marketing Installations and Safety measures which cover various aspects of in-built Safety in Design, Mechanical integrity and Operational Safety. Disaster Management Plan document covers emergency planning for each plant, the chain of command & communication, enabling

**Onsite DMP... Attributes**

- Identification & Assessment of potential hazards
- Plant Risk Evaluation
- Area Risk Evaluation
- Plant Emergency Organisation
- Notification & Communication system
- Emergency Equipment & Facilities
- Training & Drills
- Regular tests & updates
- Post Emergency Procedures

OISD

Emergency Equipment & Facilities, Training & Drills, Regular tests & updates and Post-Emergency Procedures. Oil Industry in India is well equipped on Health, Safety &, Environment matters including preparation and review of Disaster Management Plans and conducting rehearsals and mock-exercises.

## Indian Institute of Toxicological Research

### Dr. Virendra Misra

*Scientist F and Deputy Director*

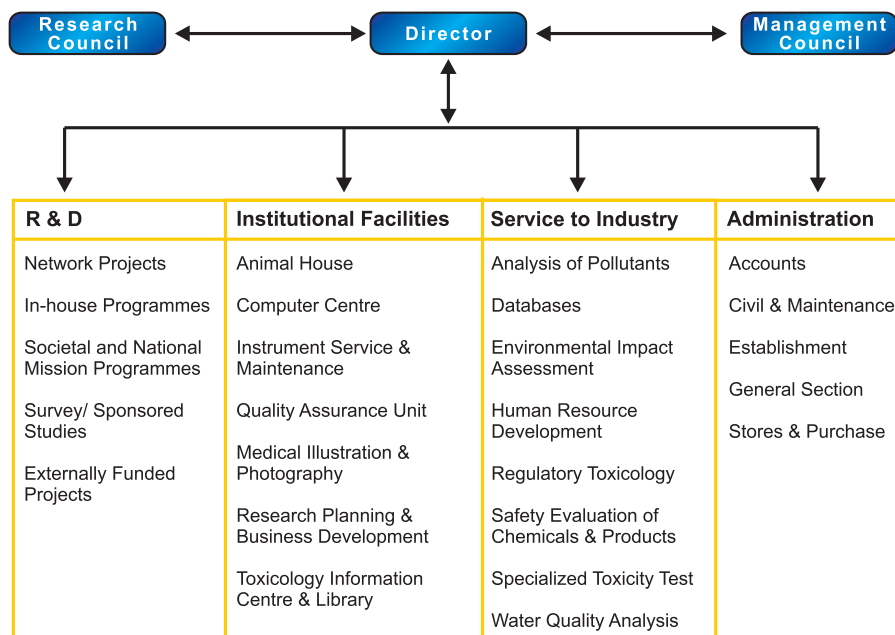
*Indian Institute of Toxicological Research (IITR), Lucknow*

IITR, formerly known as Industrial Toxicology Research Centre (ITRC) is well known organisation in the country under the Council of Scientific and Industrial Research. It has an ENVIS centre on Toxic chemicals established under the World Bank Scheme of environmental information, coordinated by the Ministry of Environment & Forests. IITR has been the focal custodian of the National Register for Potentially Toxic Chemicals (IRPTC) in India similar to International Register of Potentially Toxic Chemicals at Global level. It has a pesticide toxicology division and devoted laboratories and divisions on various other aspects of toxicological research including Risk Analysis, EIA, On-site and Off-site Emergency Planning, ecotoxicology, etc.

Noted scientists who have actively been involved in the chemical disaster management related issues at the national level included the names of Dr. P.K. Seth, Dr. Y.K. Gupta, Dr. Ashwini Kumar, Dr. S. K. Bhargava, Dr. Kanwar Rahman, etc. who contributed significantly in many strategic committees. ITRC also published books and manuals on emergency preparedness planning. Institute has done lot of initiatives towards generating awareness about the toxic materials and their hazard potential. IITR has come up with a database of 109 hazardous/toxic chemicals including agrochemicals. Institute publishes a bulletin that contains information regarding toxic chemicals.

The institute has published a toxicity atlas of pesticides and is about to publish a handbook on Industrial Toxicity. The Institute is also involved actively in post-disaster phase of Bhopal tragedy. Research Fellows working at ITRC for their M.Phil. and Ph.D. degrees produce papers of international standards covering wide range of aspects of chemical toxicology including phototoxicology, systemic toxicology, fire toxicology, microbial toxicology, impact assessment, monitoring, emergency planning, etc. ITRC maintains a record of Material Safety Data Sheet (MSDS) of the hazardous chemicals with their characteristics, precautionary measures, handling





Organisational Structure and Key Activities of IITR

and first aid responses, antidotes, etc. The institute publishes magazines and bulletins that inform recent researches and hazardous chemical characteristics as a regular feature. IITR has developed and published Toxicity Data Handbook containing 109 hazardous chemicals and also agrochemicals. This handbook is available in 4 volumes. IITR also prepared toxicity atlas of atlas in India. Library and Toxicology Information Centre of IITR serves as an excellent information resource in the field of toxicology in the country. About 30,000 books, journals, reports on varied scientific topics—from science and technology to microbiology, from biochemistry to environmental health are available.

A multi-disciplinary team of scientists from IITR carried out investigations after the Bhopal Gas Tragedy and also on release of acrylonitrile from the cylinders in Bhuj as an impact of earthquake. Environmental risk assessments and epidemiological studies, risk assessments, disaster management planning, emergency planning are the regular features and the project activities of the institute.

## Federation of Indian Chamber of Commerce & Industry

**Shri Surendra Kumar**

*Director*

*Federation of Indian Chamber of Commerce & Industry (FICCI), New Delhi*

Shri Surendra Kumar made a presentation covering the mandate and activities of FICCI in the areas of Disaster Management. Set up in 1927, Federation of Indian Chambers of Commerce

and Industry (FICCI) is the largest, oldest and an apex organization of Indian business. FICCI stands for quality, competitiveness, transparency, accountability and business-government-civil society partnership to spread the ethics based business practices to enhance the quality of life for the common people. It has various categories of memberships - Corporate Members (70), Associate Members (1700), Member - Bodies i.e. Chambers and Associations (375) and Joint Business Councils (68).

FICCI in partnership with CARE-International had set up 'FICCI-CARE Gujarat Rehabilitation Project' (FCGRP) for victim families of 26 January 2001 earthquake in the Kutch region of Gujarat. FCGRP achievements included reconstruction in 23 villages, 5000 Houses, 15 Schools, 11 Community Centre, 21 Anganwadi Centres, 12 Panchayat Ghars, 5 Sub Health Centres, Pipelines for water supply and sewage lines, Support for restoration of livelihoods, Mobile health vans, Fully equipped District Training Centre for health staff, etc. Similarly, significant financial contribution was extended through Ministry of Home Affairs during tsunami 2004 and J&K earthquake.



**FICCI**

**FICCI's Disaster Management Initiatives**

- **Disaster Response**
- ✓ FICCI in partnership with CARE set up '**FICCI-CARE Gujarat Rehabilitation Project' (FCGRP)** for rehabilitation of earthquake (26 January 2001) affected families in the Kutch region of Gujarat
- ✓ **FCGRP Achievements** - Reconstruction in 23 villages 5000 Houses, 15 Schools, 11 Community Centre, 21 Anganwadi Centres, 12 Panchayat Ghars, 5 Sub Health Centres, Pipelines for water supply and sewage lines, Support for restoration of livelihoods, Mobile health vans, Fully equipped District Training Centre for health staff

FICCI has organised many National Conferences for training, awareness generation and creation of community resilience. Feedback from all the conferences was taken constructively to improve subsequent programmes. Such National Conferences significantly concentrated on participation of primary and secondary off-site responders and also provoking industry to adopt PPP model on Disaster Management and take up very profoundly creation of community

resilience for minimizing sufferings in case of disasters. Nine such National Conferences were organized on "Prevention & Management of Chemical (Industrial) Accidents/ Disasters" with Ministry of Environment & Forests, Govt. of India, seven workshops with NDMA, three on Disaster Risk Reduction" jointly with National Institute of Disaster Management, International Conference on Spatial Data Infrastructure & its Role in Disaster Management, at Chennai during Oct., 2005 and International Conference on Marine - Hazards & Opportunities in Chennai, July, 2006.

FICCI is actively involved in preparing comprehensive guidelines on Chemical Disaster



Management in the form of a single document on the activities as Steering Group and Core Group Members. FICCI widely circulated the guidelines among the chemical industry in the country and also taken feedback for its use in making a very effective action plan at various levels. The organisation has also brought in off-site responders and stake holders under common platform with industry to understand the essence of the guidelines so that at the time of

implementation of the action plan there is smooth change over and is very eagerly looking forward to finalization of action plan and its implementation in all sectors connected with chemical disaster management, so that chemical disasters are prevented or have least possibility to occur.

## Indian Council of Medical Research

### Dr. S. Sriramachary

*Former Additional Director General*

*Indian Council of Medical Research (ICMR), New Delhi*

Dr. Sriramachary shared the witness of sufferings of people and difficulties faced by doctors and medical professionals in providing appropriate treatment after the Bhopal disaster in his presentation. The incident had happened on the night of 3<sup>rd</sup> December and there after an array of messages were received by ICMR. The institute started working on this issue from 10<sup>th</sup> of December onwards. Before that, Dr. Varadarajan, under the Council of Scientific and Industrial Research (CSIR) was assigned the main duty of handling the emergency medical services and operations which included the issues related to response as well as scientific aspects of investigations of the accidental site, incidence and the victims.



Early Challenges faced by the team in Clinical Rescue Operations were related to Immediate Therapeutic Solutions, Autopsies & Toxicology, Medico Legal Evidences, etc. Doctors remaining were extremely busy and occupied in the medical response and investigations while at the

**Mobilization of National Resources & Support to M.P. Government & MGM College**  
**(By CSIR, DRDO & ICMR)**

**ICMR Contribution:**

**Collaborating Institutes** - NIOH, IOP, NIN, TRC

**Research Projects** - Initiated 24 Projects

**Budget Allocation** - Over 6 Crores

**Duration** - Over 10 years

same time the city has been evacuated. Hundreds of bodies were left for post-mortem. People were affected by severe manifestations of critical breathlessness, eye injuries, laphrospasm, etc. rushing to the hospitals. Handling large number of patients with critical injuries and treating them was a real great challenge. Bhopal experiences was a critical challenge since that included a number of complex clinical and non-clinical

functions including pathological examinatiomns with very limited resources, etc.

Case studies of post-mortems and toxicological study reports of the Bhopal tragedy shown severe damages to the human systems and organs. Now such inventories of toxicological data and the knowledge about antidotes are available but those were not available at the time of Bhopal disaster. Lack of information has been a serious cause of the medical challenges in taking therapeutic decisions. Key issues were related to Symptomatic Therapeutic Aid to Survivors, quick Appraisal of Suspected Toxic Chemical, Quick Review of Established Antidotes, Choice of Safe Detoxifying Agents and Prevention & Prophylaxis of Side-Effects. Questions raised during the medical response of Bhopal disaster were (i) Is it enough to give a saline, or a steroid, or other antidotes? (ii) How to find a therapeutic solution? It may appear a simple issue today but it was a major challenge during the tragedy.

POST-MORTEM										
Date	Dec 1984	3	4	5	6-10	11-15	16-20	21-25	26-30	Total
Number of Bodies	311*	250	59	65	20	11	5	10	731	

\* Received 70 Bodies by 7 AM & 240 Bodies by 9 AM

**Lessons of Bhopal Gas Disaster**

- ✓ Monitoring & Prevention of Chemical Accidents.
- ✓ Prompt Rescue of Survivors.
- ✓ Ambulance, Oxygen Supply
- ✓ Saline & Blood Transfusions
- ✓ Analytical Chemistry & Forensic Toxicology
- ✓ Poison Treatment Centre ~ Antidote Inventory
- ✓ Tentative Detoxification, Pending Confirmation
- ✓ Cause of Death in Early & Late Autopsies

**THE DEAD TEACH THE LIVING**

ICMR mobilised all institutes including DRDO, CSIR with its whole family of laboratories, Institute of Pathology, Tuberculosis Research Centre, etc. Later there were discussions on whether such researches should be continued. Around 2000 people died and more number of cattle also lost lives. There is an urgent need of trans-disciplinary coordination among the experts and institutions for handling such risks and emergencies.

These problems and their suggestions are no mans individual territory and is thus cutting-across various disciplines.

He has narrated an incident where the team was staying in a guest-house in a deserted city. Hardly any 200 people were there and 780 bodies came for autopsies. 120 bodies were come on the first day. Autopsies means first cutting the body then examining under the microscope and then interpreting the observations for the report. Blood samples of the victims were showing very high concentration of MIC, and even the newborn babies were showing MIC in their blood. The studies were repeated for hundreds of bodies to confirm the results. However, by the time it was not clearly known that what leaked from the Union Carbide that killing thousands of people, as there were three hazardous chemicals being used in the industry. In summary Dr. Sriramachary quoted again that the story of Bhopal disaster was like *'Dead Teach the Living'*.

## Petroleum & Explosives Safety Organisation (PESO)

**Shri P B Yelda,**

*Joint Chief Controller of Explosives*

Government of India, Nagpur

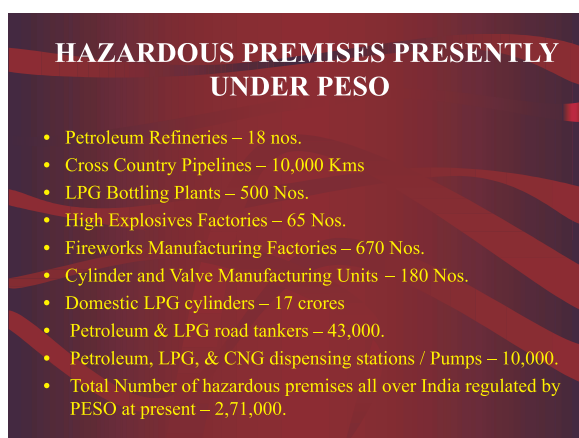
PESO was formerly known as Department of Explosives. It is an 110 years old organisation in the country. Its head office is at Nagpur and it has 5 circle offices, 13 sub-circle, and 5 field offices. The Chief Controller of Explosives, is the head of the organisation with a headquarter at Nagpur. The organisation has departmental testing station for statutory testing of explosives for authorisation and quality control and testing of packing material, safety fittings of petroleum tank trucks, testing of gas cylinders, testing explosives as per UN classification for export purposes and has a FRDC (Fire Works Research & Development Centre) at Sivakasi, Tamilnadu. Other mandates include development of environment friendly fireworks; introduce mechanization in fireworks manufacture, testing of raw materials, quality control services and to increase safety of personnel in the industry.



Hazardous premises presently under PESO are 18 Petroleum Refineries, Cross Country Pipelines of more than 10,000 Kms, 500 LPG Bottling Plants, 65 High Explosives Factories, 670 Fireworks Manufacturing Factories, 180 Cylinder and Valve Manufacturing Units, 17 crores Domestic LPG cylinders, 43,000 Petroleum & LPG road tankers, 10,000 Petroleum, LPG, & CNG dispensing stations / Pumps. Total Number of hazardous premises all over India regulated by PESO at present – 2,71,000.

PESO regulates safety of hazardous substances in the hazardous industries as per the regulatory frameworks:

- Import, export, manufacture, possession, transport, use and sale of explosives & pyrotechnics (fireworks) for commercial and industrial uses under the Explosives Rules, 1983.
- Import, storage, production, refining and blending of petroleum under the Petroleum Rules, 2002.
- Import, manufacture, filling and storage of compressed gas in cylinders under Gas Cylinder Rules, 2004.
- Import, manufacture, filling, transport and storage of compressed gases in bulk under SMPV (U) Rules, 1981.
- Acetylene generation and calcium carbide storage.
- Safety advisor to ports, defence establishments, railways.
- Making standards for safety with BIS, OISD, STEC



Major activities under Petroleum Rules, 2002 include approval of refineries, petrochemical/oil/ gas processing plants, transport of petroleum by water, land and pipeline, approval of flame-proof and other safety equipments for use in areas laden with flammable gas, licensing of storage installations, tank trucks, aircraft refuellers, MS/HSD dispensing stations, issuance of certificate of Gas Free for vessels/ ships carrying petroleum for dock entry/man entry/hot work etc.

Various pro-active safety measures in Petroleum industry include (i) Project Reports, Environment Impact Assessment, Risk Analysis reports / remedial measures, Clearances from MOEF, PCB's, Design Criteria for storage tanks, tank fittings, valves, pipelines, electrical equipment, and Standards followed for the layout, installation, testing and certification of safety by competent persons, measures for detection of leakages / hazards and preventive measures, preparation of on site emergency plan. (ii) NOC from the district authorities as applicable for

licences and (iii) Competent Persons for carrying out tests and issuing safety certificates are approved the CCE under rule 126 and 130.

PESO is taking care of safety in diverse fields all over India and managing safety in nearly 3 Lakh premises with a limited strength of only 100 officers. The number of hazardous industrial activities and the areas where intervention of PESO is desired is increasing by the day.

## Directorate General of Factory Advice Service and Labour Institutes

### Shri M. R. Rajput

*Dy. Director (IH)*

*Regional Labour Institute, Faridabad*

DGFASLI was set up in 1945 as an office of the Chief Advisor of Factories in the areas of occupational safety & health mainly in Manufacturing and Construction sectors in the country. DGFASLI is also a responsible agency for the activities under The Administration of Dock workers (Safety, Health and Welfare) Act 1986. Its functions mainly include (i) Rendering advice and carrying out support research activities in the field of OSH (ii) Administration of Dock Workers (Safety, Health and Welfare) Act 1986 and Regulations framed there under (iii) Educating and training employees and employers on matters relating to Safety and Health (iv) Co-ordinating technical and legal activities to facilitate uniform standards of safety and Health in manufacturing and port sectors



DGFASLI, as an organization comprises a Headquarters and a Central Labour Institute at Mumbai and 5 Labour Institutes at various locations. Most recent is the Faridabad Regional Labour Institute. DGFASLI has 11 Inspectorates of Dock Safety in Major Ports. The Headquarters has three divisions/ cells, namely:

- (i) Factory Advice Service Division,
- (ii) Dock Safety Division and
- (iii) Awards Cell.

Central Labour Institute (CLI), located at Mumbai, conducts regularly the courses and programmes, and offers professional supports in area of the Industrial Safety, Industrial Hygiene and Environmental Health, Industrial Medicine, Industrial Physiology, Industrial Psychology, Industrial Ergonomics and Environmental Engineering. CLI Mumbai is mainly responsible for

SAFETY & HEALTH INFO		
<a href="#">Search</a> <a href="#">Site Map</a> <a href="#">Contact Us</a>	<b>National Policy on OSH</b> <a href="#">English</a> <a href="#">Hindi</a>	<b>ICSC Cards</b> <a href="#">Hindi</a>
	<b>Video Clippings &amp; Safety &amp; Health Poster Gallery</b> <a href="#">Video film on OSH</a> <a href="#">Click here to download the posters</a>	<b>Fitness</b> <a href="#">Exercise and Cardiovascular Fitness</a> <a href="#">First Aid - English</a> <a href="#">First Aid - Hindi</a>
	<b>Industrial Safety and Health - 2008</b> <a href="#">Download logo</a>	<b>Case studies</b> <a href="#">Karnataka</a> <a href="#">Tamil Nadu</a> <a href="#">Meghalaya</a>
	<b>Statistics</b> <ul style="list-style-type: none"> <li>• Factories</li> <li>• Docks</li> </ul>	<b>Important Addresses</b> <a href="#">List of Chief Insp. of Factories</a> <a href="#">List of Dock Safety offices</a> <a href="#">List of Regional Labour Institutes</a> <a href="#">Other Institutions</a>
	<b>Others</b> <b>Standards Reference not 2007</b>	

activities like Staff Training, Small Scale Industries, Productivity, Major Accident Hazards Control, Management Information Services, Environmental (Public Health) Engineering, Safety and Health Communication and Construction Safety

The Regional Labour Institutes (RLIs) are located at Kolkata, Kanpur, Chennai and Faridabad. Their mandate areas include: Industrial Safety, Industrial Hygiene, Industrial Medicine, Staff Training and Productivity, Safety and Health Communication, Major Accident Hazards Control and Computerized Data Bank.

The Dock Safety Division of DGFASLI works for the effective implementation of the safety provisions under the Dock Workers (Safety, Health and Welfare) Act, 1986 that was enacted on 14th April, 1987 and the Dock Workers (Safety, Health and Welfare) Rules, 1990 framed under the Act. In addition, the Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989, framed under the Environment (Protection) Act, 1986, is also enforced by the Inspectorates of Dock Safety located in the major ports of India. The Awards Division of DGFASLI manages the two prestigious award categories, viz. Vishwakarma Rashtriya Puraskar for Workers, and the National Safety Awards for Industries.

The Major Accident Hazards Control Advisory Division (now known as MHCS) at the Central Labour Institute, Mumbai advises State Governments and MAH units on the following:

- control of Major Accident Hazards;
- preparation of emergency plans,
- Safety Audit, Risk Assessment etc.

It is a proposal to revisit the mandates and activities of DGFASLI and also to rename it to manifest the actions of industrial health, safety and environment as per the amendments in the Factories Act. Ministry of Labour & Employment is taking further steps in direction and providing consultations.

## Police and Homeguards

### **Shri Subhash Avate**

*Additional Director General of Police*

*Maharashtra, Mumbai*

Shri Avate discussed the role of police and home-guards in chemical disaster management. Police department has an important role to play in every aspect of life. Police play major role in managing incidences day and night. The department also has many grey areas with the whole system, for examples - the lack of coordination, lack of willingness to learn, and many other factors. Police is the department that receives first information about any such incidence. They are required to visit the site immediately after the information. In many of the states and districts the Police has not been given due focus. There are only mentions that the Police Department has to prepare its own SoPs, and police is already doing that. Police Departments have rehearsals every six month to update their schemes and also maintains control room. The first job of the control room is to inform to the concerned person or department. Police is like jack of all trades and may not have deep knowledge of the subject but has to play various roles from law and order to search and rescue, and transport, evacuation, etc. It is the experience in India as well as other developed countries, that the details of activities etc. for all the departments for example for factories department, health department, fire department is prescribed but not the police department.

Disaster Management is not an easy task and hence coordinated approach is necessary for developing preparedness and response capacities for any disaster. Crowd management, protection of site, protection of evidence, are the first jobs of Police. Diversion of traffic, and creation of parking for the then visiting vehicles carrying responding people, officers and resources, arranging transport, organise meetings, communications, arranging experts are other key activities. An important aspect is the VIP visit after a disaster. Management of VIP visit itself poses problems but are implicit in the democracy. Disaster tourism is also an issue, thousands of people start visiting the disaster affected areas to see their relatives. In the wake of Latur earthquake, more than 10,000 people visited (relatives) the site in just 3 days.

Preparation of helipad for VIP visit, management of shelters, carcasses transport and disposal, etc. are few of the other examples.. On-road chemical accidents are also a challenge to the police since traffic management is the responsibility of police. He has quoted an incidence where chemical was released from a damaged tanker during a road accident. People consumed and got hospitalised as it was industrial methyl spirit. These types of incidences make the duties of police department complex. Managing enquiry counters, investigations, prosecutions, rumours control, photography and videography of the scene, assessment of damage, listing of victims, etc. all the affairs and fall in the mandate of police charter of activities.



## STATE PRESENTATIONS

Objective of state presentations were to obtain an overview of the status of chemical disaster risk management and emergency preparedness at different levels in different states of the country, and to assess the mechanisms available, infrastructure needs and the multi-level feedback on crisis management. Presentations were made by the respective Chief Inspector of Factories & Boilers (Directorate of Industrial Health & Safety) or Chairman/Member Secretary of the State Pollution Control Boards.

### Andhra Pradesh

#### **Shri Koteswara Rao**

*Director of State Factories Department  
Andhra Pradesh*

Shri Koteswara Rao, director of State Factories department has given a detailed presentation on the status of hazardous industries and various initiatives at state level for reducing risk. 20 districts out of 23 districts of Andhra have MAH units. Total 143 hazardous units operate in the state and on-site plan exists for 137 such units. Off-site emergency plans are in place for only 07 districts. Constitution of state, district and local crisis groups has undertaken. In the year 2007 and also in the year 2008 no major accident has been reported so far. One Emergency Response Centre (ERC) is established in Visakhapatnam. The ERC has so far tackled 5 emergencies in the area. The department has taken up development of video films on emergencies of chemical accidents and crisis management, in vernacular languages. Major fertiliser industry in AP, the Nagarjuna Fertilisers and Chemicals, produced a video film on ammonia gas leak and crisis management. The Department of factories encourages the management of the industries to prepare and publish brochures and posters in vernacular language. A small film was screened by Shri Rao giving the glimpse of type of video films produced.

### Chattisgarh

#### **Dr. Anil Sharma**

*Chief Engineer  
Chhattisgarh Environmental Conservation Board, Raipur*

Dr. Anil Sharma gave an overview of the current status and emerging issues related to industrial safety and health in the State. Chhattisgarh is one of the fast growing states as far as industrialisation is considered. It is a new state carved out of Madhya Pradesh in 2002 and is a small state having lot of opportunities. 56% of the state is under green cover as per official figures. However, future risks of chemical accidents and disasters are likely to grow. The State has 20 MAH units and all have prepared their on-site plans and these plans have been approved.

These MAH units are located in 5 districts out of 16 districts. Off-site plans have been prepared in 3 districts and the off-site plans in other 2 districts are under preparation. State Crisis Group has been formed and District Crisis Groups are also formed in all the districts. There is no isolated storage installation in the state. Training programmes are being organised on chemical accidents and disaster management aspects at Pollution Control Boards and Disaster Management Centre at state ATI. A State level training workshop on chemical disasters was organised at Bhilai Steel Plant with the help of National Disaster Management Authority and Disaster Management Institute. Mock exercises have been scheduled by NDMA at Bhilai Steel Plant. Now, a State Level Disaster Management Authority has also been constituted as per the DM Act. Regular monitoring of accidents by appropriate agencies and district authorities is carried out. State level training programmes on District level disaster management planning (DDMP) and workshops of Remote Sensing and GIS applications in Disaster Management has also been organised by NIDM and Disaster Management Centre, Chhattisgarh Academy of administration at Raipur.

## Delhi

### **Shri K. L. Meena**

*Chief Inspector of Factories, NCT Delhi*

Shri K. L. Meena informed about the Industrial (Chemical) hazard profile and the institutional framework for Disaster management as well as Chemical Disaster Management in the NCT Delhi. There are 18 MAH units in Delhi located in seven out of nine districts. MAH units in Delhi are isolated storages, LPG bottling units and water treatment units. At present there is no manufacturing or chemical industry in the state because all such units have been shifted out of Delhi city or closed by the orders of the Supreme Court. State Crisis Group and District Crisis Groups are already constituted. Local Crisis Groups are also constituted but regular meetings are not being organised. The State Disaster Management Authority has also come up and District Disaster Management Authorities were constituted in all the districts. Now there are two parallel authorities but most of the members are common. There is an urgent need to integrate the chemical disaster management framework and crisis groups with holistic disaster management system at National Capital Territory level. It is proposed to transfer the role of Crisis Group to the Disaster Management Authority for integrated functioning. Some of the MAH units belonging to Delhi Jal Board have not yet prepared the On-site Disaster Management Plan. However, the risk assessment for the plants of Delhi Jal Board has been initiated. West district In Delhi has prepared and tested the off-site plan for Chemical Disasters by conducting a mock drill. Disaster management plans have also been formulated for all the nine districts of Delhi.

## Gujarat

### Shri V. N. Patel

*Director, Industrial Health & Safety*

*Ahmedabad*

Gujarat has more than 32,000 factories. Gujarat is the only state in India where provisions for construction worker safety have been implemented at around 10,000 sites, with provisions of multiple relieves including medical benefits, provident fund, etc. There are three important sectors of concern for chemical disaster management, viz., factories, pipelines and transportation. Gujarat believed in the philosophy of "prevention is the better approach than cure." Time factor is most important in case of chemical disasters and therefore prevention of a major emergency has to be time effective. Gujarat has 530 MAH units accounting highest number in India. On-site Emergency Preparedness Plans have already been prepared as per guidelines issued by the Chief Inspector of Factories. Guidelines have also been prepared and released by MoEF and NDMA. However, Gujarat had already prepared guidelines that contained 170 pages and 33 annexure, and all pre-emergency activities, prevention features were incorporated. These guidelines were prepared immediately after the Bhopal disaster. It is observed that the preventive aspects of chemical disaster management are not adequately given in the MoEF or NDMA guidelines. It is suggested that the On-site Plan should contain not only the emergency management but also the preventive and mitigation aspects with equal emphasis. However, it is not possible to update the guidelines frequently based on the day to day experience and therefore, Gujarat has introduced another system for guidelines improvement through the planning. Reference to the state legislatures and policies along the national legal framework on disaster management 25 District Crisis Groups and 43 Local Crisis Groups are in place. Initiatives have been taken by the industrial associations and mutual aid response groups (MARG) have been established for chemical disaster management. Express highway has been termed by a news-paper as 'death expressways'. This invites the attention towards prevention of accidents during transport of chemicals. Casualties can not be avoided without focussing on man. Therefore, the training and capacity building of people associated with various functions, departmental officer, workers, have been undertaken with priority in Gujarat. 3 modules have been developed by International Labour Organization: General safety, construction safety and chemical safety. The courses were conducted in Gujarat as per these modules. Induction and refresher trainings are conducted regularly in the industries. Celebration of Safety Week, and other programmes and promotional activities like "Apatti Jagrun Abhiyan" (disaster awareness), etc. have been undertaken in the state of Gujarat. Industrial Disaster Management System, a website (attached with number of links) has been developed by the Department. 02 other websites have been developed on construction safety and general safety. NIDM has also organised state level training courses on chemical disaster management at Gujarat Disaster Management Institute involving district officials, NGOs, Public sector and other industries. There are institutes in the state for safety officer courses which are recognised by DGFASLI. 66 districts have prepared GIS based plans for handling off-site emergencies and these are being further

upgraded. Control room is a very essential component in disaster prevention and response and also in mitigation. A specialised 24 hour - operational control room, manned with qualified personnel, also with diploma in industrial safety, etc. have been established as a model. Development of these types of control rooms in industrial areas is necessary. Gujarat is the first state which made a Disaster Management Act in 2003 wherein all the departments/ corporations/ authorities have been given responsibility and hence having their own plan. Development of SOPs for handling chemicals and emergencies have been taken up and published.

## Karnataka

### **Shri A R Vijayendra**

*Joint Director of Factories  
Government of Karnataka*

The state has 11,553 registered factories and 2,799 registered boilers. 1019 units identified as industries involving hazardous processes, out of which 77 industries are MAH installations. All the MAH units have their On-site emergency plan prepared and approved as per the MSIHC Rules and EPP Rules. These plans are reviewed once in a year or whenever there is a modification or upgradation/change in the plant. Technical details are assessed and risk assessments take into account the off-site effects including geo-physical environment, area, flora-fauna, surrounding population, available resources, etc. 1,41,000 employees are working in the 1019 industries and 25 units are supposed to conduct the safety audits as per law, out of which 13-14 are conducting regular safety reports. Other units are being persuaded to conduct the safety audit through the external agencies. So far, 212 mock-drills for accidents in MAH Units have been conducted. State Crisis Group has been constituted in 1998 and District Crisis Group exists in all the districts. Majority of MAH units are there in Rural and Urban Bangalore, Dakshin Kannada, Uttara Kannada, etc. District wise inventory of hazardous chemical storage and products and type of chemicals have been developed and based on this the off-site emergency plan have been developed. Inventory of chlorine and liquid oxygen has also been reduced by issuing technical instructions.

## Kerala

### **Shri S.D.Jeyprasad**

*Member Secretary  
State Pollution Control Board, Kerala*

Shri S.D.Jeyprasad informed that the green-looking Kerala is equally a MAH state and has 524 hazardous waste generating units. Chemical accidents transcend the boundaries, whether the boundary is of states, districts and the departments. There are 36 MAH units in Kerala, out of which 32 are functional and have prepared On-site emergency plans. 9 districts with MAH units have Off-

site emergency plans. State, District and Local Crisis Groups have been established. Accumulation of hazardous waste of industrial, municipal or biomedical origin is also noted to be a cause of chemical hazards posing accidents risks. 83,000 tonnes of hazardous wastes is generated in Kerala annually. GIS based off-site emergency plans have been prepared for some of the MAH districts of the State, Kochi being a good example. Concern of the multi-hazard and complex environmental risks at port areas/coastal sites due to natural/industrial complexities are important to be given due importance in disaster risk reduction. There is a need for proper training of Government officials on chemical disaster management and its integration with the holistic disaster management framework involving environment department and disaster management department. A site appraisal committee is also constituted to look after the siting of the industries in the state. Experts on various aspects for example land-use, urban development, planning, chemical, environment, revenue, industry, health etc. are involved in various committees for example environmental clearance, siting, disaster management, etc.

## Mizoram

### **Shri Dungalena**

*Chairman*

*State Pollution Control Board, Mizoram*

Shri Dungalena informed that major chemical industrial hazard is not an immediate concern in Mizoram, but certainly an issue for understanding the risk for the future. The changing face of landscape and land-use is presently posing serious environmental challenges and creating disaster situations and losses to people and assets in the state. It is likely to give rise to various disasters like flood, erosion, crisis for crops, water, etc. and will affect the population of Mizoram in near future which has to be visualised by now. The change in lifestyle is incorporating using non-degradable materials in our daily life and many such materials based on using many hazardous materials, may generate a lot of waste. Waste disposal is also a serious problem everywhere for which a major campaign level effort is needed to educate the people and children on how environmental deterioration is going to pose new challenges of disasters and also likely social conflicts. Focus is needed on convergence of livelihood, environmental and disaster management programmes at various levels. He stressed upon the need of integration of Disaster Management with main stream developmental projects and natural resource management for sustainable development. Emphasis should be given to meet this challenge by promoting education and training to college and school teachers and engineering and science students on how to develop thinking for sustainable development by adapting disaster prevention and preparedness for emergencies including chemical hazards even in schools of college laboratories.

## Maharashtra

### Shri V. S. More

*Director*

*Industrial Health & Safety, Maharashtra*

Mumbai, the capital city of the state and is the financial capital of India. Maharashtra has 35 districts. The state has 3177 chemical units other than 345 MAH units. Most of the MAH units are concentrated in areas of Chembur and Thane, 16 MAH units in Mumbai, Raigarh 66 MAH units, Ratnagiri 13 MAH units in the chemical zone at Lote Parashuram area. Pune, the cultural capital of Maharashtra has 54 MAH units, Nasik 22, Aurangabad 14, and Nagpur 11. Local Crisis Groups are constituted in several pockets, for example 11 LCGs are there in Thane district, 5 LCGs in Pune district. District Crisis Groups are constituted in almost all districts except the new districts. In Maharashtra, total number of factories is 36,161 and workers 12,90,000. Meeting of State Crisis Group is conducted every year and so far 12 such meetings have been conducted. Number of meetings for DCGs reported are 29 whereas for LCGs the number as per record is 61. On-site Disaster Management Plan is prepared by all MAH units and every district has an Off-site emergency plan. All MAH units are conducting mock-drills regularly and many of them conduct every quarterly. 03 Mutual Aid Response Groups (MARG) have been established in the state as industry's joint initiative. MARG is a new concept of mutual cooperation for emergency preparedness and response among industries in Maharashtra. These have been established at Worli, Andheri, Trombay, Thane, Korapur, Kalyan, Patalganga, Ratnagiri and Nagpur. An Emergency Response Centre (ERC) has been established at Rasayani which handled many emergencies related to transport of hazardous chemicals during recent past. 3672 drivers are trained in the state for driving and maintaining the hazardous substance transport vehicles. Police force personnel have also been trained. An institutional framework at state, district and local levels, and an established accident reporting system has been created in Maharashtra. There is a medical wing in the Department. There are in total 13 Joint Directors with 64 posts of Deputy Directors to perform the functions of the department.

## Orissa

### Shri S K Bahera

*Chief Scientific Officer*

*Orissa Pollution Control Board, Bhubaneswar*

A Multi-disciplinary Institute of Safety, Environment & Health has been established by the Government of Orissa, in partnership with private bodies including industry. All relevant departments - revenue, environment, health, factories, pollution, etc. are involved in the activities of the centre, which is actually a NGO sponsored by the Government. Sharing the provisions and procedures for site clearance for hazardous units and the role of State Department

of Environment, Shri Bahera focused on land-use related issues. IOCL established a LPG Bottling near District HQ in Jharsiguda. Construction was almost 70% done for the LPG Bottling plan and then the need of PCB's 'consent to establish' as per the MSIHC Rules came into need. As per the rule the LPG Bottling unit is as an isolated storage. IOCL was asked for obtaining a site clearance based on a risk assessment report. A consultant prepared a scenario based risk analysis report. The damage distance calculated was the 450 mtrs as the high damage area. Coincidentally there was a Central Reserve Police Force (CRPF) jail within the 300 mtrs, less than the damage distance zone of chemical accident scenario. Criticality about the evacuation of the prisoners in case of an accident Became a major issue. It was found that the site has been allocated by the District Collector and construction has already been taken place. The installation has already been certified by explosives department. It manifested evidently the gap in coordination among various departments and authorities. Government of Orissa is now planning to establish an Emergency Response Centre at MDC on Safety, Health & Environment.

### **Shri Purna Chandra Das**

*Joint Chief Inspector of Factories, Orissa*

Shri Das also spoke on the occasion and discussed the chemical disaster preparedness scenario in the state. Orissa has 30 districts with 15 of these district having MAH units. Total number of MAH units in Orissa is 48. On-site emergency plan is prepared by all the MAH units. Off-site emergency plan is prepared by only 6 districts. Pollution Control Board has taken initiative and developed an exhaustive inventory of hazardous chemicals handling in the state. Similar inventories may be prepared for all the states. A number of workshops and training programmes have also been organised in Orissa on various aspects of disaster management, chemical disasters, health issues, hazardous waste, biomedical waste, etc.

## **Tamilnadu**

### **Shri S. Elanguvan**

*Chief Inspector of Factories, Tamilnadu*

Shri Elanguvan informed that there are 117 MAH units in the State of Tamilnadu. Total number of registered factories in the state are 35,000. External safety audits for 46 MAH Units have been conducted and reports are received. State Crisis Group has been constituted. District Crisis Groups have been constituted in 22 districts. There is an observed need for the training programmes for the district and state officials and to develop an integrated framework to be developed for holistic DM framework along environmental risk management as a central theme in the disaster risk reduction. 109 MAH units have prepared On-site Emergency Plan and submitted to the Chief Inspector of Factories. Other 8 units have taken action for preparing the On-site Emergency Plan. There is a well realised need of GIS based district wise mapping of

MAH units. A legal backing is needed for this work to be undertaken with priority. At present, HAZOP and HAZAN studies are carried out before the approval of setting up of any MAH unit. Detailed layout drawing, risk assessment report and site details are to be submitted before setting up of any such hazardous industry. There is a safety audit cell in these industries. The safety audits are reviewed and recommendations are sent to the management for compliance and improvements accordingly. Many of the chemical industries and MAH units are located in coastal regions and have more complex risk of chemical spillage, pollution, hazardous waste along risk of surge, flooding and storms and thus, with a multi-hazard scenario.

## Uttar Pradesh

### Shri Ghanshyam Singh

*Chief Inspector of Factories, Uttar Pradesh*

Shri Singh and Shri G. D. Pandey of MAH Cell, Department of Factories and Boildes, UP, made a presentation on the status of chemical disaster management in Uttar Pradesh. There are 121 MAH Units in the state. 117 MAH Units have prepared and submitted their On-site Emergency Plan. Notification of site has been done for 92 units. Requirement of a Safety Report is applicable on 84 MAH Units and the safety report has been prepared and submitted by 54 of them. Need to carry out a Safety audit is applicable on 54 MAH Units and the preparation of safety audit report has been carried out and report submitted by 31 units. Off-site Emergency Plan has been prepared for MAH units in 38 districts. District Crisis Group has been constituted in 37 districts. A MAH unit has been established in the new district Gonda and the District Crisis Group is yet to be constituted there. District level Off-site Plan has been developed in 5 districts having MAH Units. In 6 other districts the draft of Off-site EPP is ready. Gautam Budh Nagar district prepared and also carried out a rehearsal of its Off-site Emergency Prepared Plan. Head Office of the Department of Factories and Boilers is at Kanpur. There are 18 regional offices with Assistant Directors. There are 07 Deputy Directors. As per the present structure and offices, minimum 38 Officers are needed but only available officers with the department are 16 in numbers. Only two of 25 offices have a telephone connection, none of them have a computer.

However, the Department is trying to perform to the expectations of government and community. Major suggestions for improvement of present situation are: districts having potential of major disaster (on the basis of risk) should be provided with complete mobile work area monitoring van with resources like - gas detection equipment with automatic data downloading facility, video-photography system, respiratory protections equipment, all PPEs of all ranges, Computers, Public Address System, First Aid Resources, etc. Assistant Director(s) of Factories have been nominated as Member Secretary of District Crisis Group, and the nodal officer for implementation of MHISC Rules, 1989. They must be provided with all necessary facilities, including computer, internet connectivity, sufficient training on management of hazardous chemicals including off-site emergency plan, application of GIS and web-enabled systems, and vehicle at-least on hire basis. A

proposal may be initiated in this line for developing their capacity. Databank is a basic need and it has to be developed and maintained as a primary requirement at District level. District Collector or District Magistrate is the chairman of the District Crisis Group and responsible for preparation of Off-site plan. District Magistrates, due to their busy schedule in other administrative work, are usually not available to review or to look into pre-disaster phase of risk management, mitigation and preparedness assessments, planning, etc. Therefore it is suggested that MoEF and NIDM should jointly initiate with Directorate of Factories of all states an orientation-cum-sensitization programme for all District Magistrates and key members of DCGs. A proposal for 37 districts where MAH units are located in UP has been initiated proposing a batch of 8 districts to be taken for this purpose. Since Off-site and On-site emergency plan being a technical subject, the lapse on part of proactive risk management and delay in dealing with such emergencies may result in worst scenarios. The MoEF may initiate a project jointly with relevant institutions like NIDM, State Training Institutions, and state departments, including rapid risk assessment, preparation of maps, rapid safety audits of each unit of vulnerable industrial pockets, and once every year a third party audit of MAH units, etc. Fire fighting resources in every districts many not be sufficient and therefore the other nearby resources have to be identified. Identified hazard prone districts have to be provided with all necessary fire-fighting resources. A trauma centre may be considered to be established in each such district. A burn ward to be necessarily maintained in the areas or districts having hazardous industries handling flammable and/or explosive materials. Lack of professional and support staff and infrastructure facilities including the basic needs, for example, telephone and computer, is a critical drawback. Need for infrastructure strengthening of the office of the CIF/regional offices in UP may be considered as a priority in this line.



## GROUP DISCUSSION AND RECOMMENDATIONS

Delegates were divided into five groups. Each group was constituted with an approach to involve representation of Chief Inspector of Factories (CIF) / Directorate of Industrial Safety & Health (DISH), Police, Fire, Medical, Industries, State Pollution Control Board (SPCBs), etc. Each group was assured.

1. Legal & Institutional Framework
2. Tools and Techniques in CDM
3. Risk-management integration to development
4. Capacity building needs and options
5. Information management & Knowledge networking

Group discussions were moderated by Dr. Chhanda Chowdhury and Shri Shard of MoEF, and Dr. Anil K Gupta and Ms. Sreeja Nair of NIDM. The recommendations of each group were presented by the respective group-representative before the delegates and experts, followed by discussions. Major recommendations by the groups, accepted by the panel of delegates are given in the following section.

### Recommendations

#### 1. Legal/Institutional framework

- Regulatory provision/governance on labeling of hazardous substances/chemicals are needed.
- Reporting system for chemical storage/handling and accidents/release has to be harmonized and in common format in all the districts of the states, and in all the states/UTs in the country.
- Legal framework for management of chemicals is already existing, the implementation is main challenge.
- Need to dovetail the existing regulatory provisions with Disaster Management Act, 2005.

#### 2. Tools and techniques in CDM

- Integration of safety risk assessment provisions in all environmental appraisal and site clearance tools/process and developmental planning process
- Emphasis on health risk assessment of product and process to be given adequate significance and practice
- A web based Chemical Accident Information and Reporting System developed by the NIC with the support of MoEF needs wider demonstration for creating the data base on chemical accidents.

### **3. Risk Management Integration to Development**

- Integration of chemical accident risk in multi-hazard risk assessments, land-use planning, impact assessment studies, State/District DM plans, and visualization of total chemical risk at spatial scales
- Consideration of chemical risk hotspots and vulnerability in urban management and environmental governance of commercial, semi-urban and industrial areas

### **4. Capacity building needs and Options**

- Strengthening the offices of the CIF/DISH and their Regional Offices responsible for implementing the provisions of MSIHC Rules 1989.
- Strengthening of the National Institutes/agencies for training/education, research and dissemination of information pool with a nationwide network
- Capacity strengthening of the Ministry of Environment with a dedicated Directorate/ Division on Disaster Management

### **5. Information management & Knowledge networking**

- Need for a common Information Management System on hazardous chemicals, location/ mapping, processes, storage, handling, decontamination, etc.
- A knowledge center to be created as a pool of relevant information resources including failure data, reports, accident analysis records, etc.
- The Phase-III of GTS based Emergency Planning and Response System which involves application of remote Sensing and GIS for vulnerability assessments and risk mapping be extended to cover all districts having MAH units.

## VALIDICTORY SESSION

Recommendations by the different working groups were summarised during the valedictory session of the national workshop. The valedictory session was chaired by Dr. G. K. Pandey, Sr. Advisor, Ministry of Environment and Forests as Shri R.H. Khwaja, Additional Secretary could not attend the valedictory session.

Summary recommendations were the following:

- States/UTs need to constitute Crisis Groups- State, District and Local Level immediately, in case not yet constituted
- Regular meetings of the State, District and Local Crisis Groups need to be organized to review the off-site emergency plan, monitor post accident situation, status etc. and forward the meeting reports along with follow-up actions to the nodal ministry.
- Public awareness especially with regard to chemical hazards needs more emphasis.
- State Crisis Group needs to forward the status of district off-site emergency management plan/reports to the Central Crisis Group.
- District Crises Group (DCS) to conduct at least one full scale mock drill for chemical accident every year and forward a report with strength and weakness of the plan to the State Crisis Group.
- Infrastructure support to the State Department of Factories/Industrial Health and Safety from MoEF.
- Every State should have at least one Poison Information Centre, to start with those states where hazardous industries (especially toxic) are more agglomerated with populated areas.
- Need for Information exchange on chemical accident management-including antidotes, root cause of accident, material safety datasheets, risk reduction measures, etc.
- International funding agencies such as UNEP, UNDP, WHO, etc. to be approached for assisting in developing programmes for international training, study tours of the officers, etc.
- District level mapping of MAH units and other hazardous installations is most important need, and State Governments to take initiative to develop GIS based mapping and information about the location, background environment, development and infrastructure.

- Chemical Risk Assessment to be an integral part of the Environmental impact assessment and land-use planning, and detailed geo-sensitivity based site risk assessment to be given importance in clearance process.
- States to provide information like Accident Reporting (detailed report as per the format), and the status of implementation of the Rules to the Centre within the stipulated time limit.
- Motivational, fiscal and educational initiatives are equally important to inculcate a culture of prevention, voluntary arrangements, and sense of accountability and security

Workshop ended with an elaborate vote of thanks to the chair and all those who made the workshop a successful event.

## APPENDIX A: LIST OF DELEGATES

### **Shri R. H. Khwaja**

Additional Secretary  
Ministry of Environment & Forests  
CGO complex, Lodi Road  
New Delhi  
Tel: +91 11 24362285, 011-24647280 (R)

### **Shri P.G. Dhar Chakrabarti**

Executive Director  
National Institute of Disaster Management  
I.P. Estate, Ring Road  
New Delhi-110002  
Tel: 011-23702445 (D), 011-23702446 (F)

### **Dr. G. K. Pandey**

Senior Advisor  
Ministry of Environment & Forests, 5th  
Floor, Paryavaran Bhawan, CGO Complex,  
Lodi Road, New Delhi - 110003.  
Tel : 011-24360467  
Email : pandey@nic.in

### **Dr. Chhanda Chowdhury**

Director  
Ministry of Environment and Forests, 7th  
Floor, Paryavaran Bhawan, CGO Complex,  
Lodi Road, New Delhi - 110003.  
Tel: 011-24360662, 011-24360662 (F)  
Email: Chhanda\_c@yahoo.com

### **Shri Sanjay Gahlaut**

Sr. Technical Director  
Environmental Systems Division,  
National Informatics Centre  
New Delhi

### **Shri R.P. Bhanushali**

Advisor  
National Safety Council, Mumbai,  
Tel: 022-27579924 (O) 022-25641373 (R),  
Email: rameshbhanu1942@yahoo.co.in

### **Shri S. L. Chakaravorty**

Joint Director  
Oil Industry Safety Directorate (OISD),  
Ministry of Petroleum,  
Government of India, New Delhi  
Tel: 11 -2331 3558  
Email: chakaravorty.sl@gov.in

### **Shri Shard**

Deputy Director  
Ministry of Environment and Forests,  
New Delhi  
Tel: 011-24360662

### **Dr. Anil K. Gupta**

Associate Professor  
National Institute of Disaster Management  
I.P. Estate, Ring Road  
New Delhi-110002,  
Tel: 91-11-23724311 (D), 23702443, 45, 32,  
Email: envirosafe2007@gmail.com

### **Ms. Sreeja S. Nair**

Assistant Professor  
National Institute of Disaster Management,  
I.P. Estate, Ring Road  
New Delhi-110002, Tel: Ph: 23702443, 45,  
32 Extn: 228  
Fax: 91-11-23702442/46  
Email: sreejanair22@gmail.com

### **Dr. Virendra Misra**

Scientist F and Dy. Director,  
Head-Eco-toxicology Division,  
Indian Institute of Toxicology Research  
P.O. Box. 80, Mahatma Gandhi Marg,  
Lucknow - 226 001  
Tel: 0522- 2627586, 2613786 Ext 267, 268  
Fax: 0522-2628227, 2611547  
Email:virendra\_misra2001@yahoo.co.in

**Shri M.R. Rajput**

Dy. Director (I.H.)  
DGFASLI, Ministry of Labour, Regional  
Labour Institute, Sector-47, Faridabad  
Tel: 95129-2437064 (O),  
Email: mrrajput57@yahoo.com  
Res: Tel: 9911027708 (M)

**Shri Purna Chandra Das**

Joint Director, (Factories & Boilers)  
Directorate of Factories and Boilers,  
Govt. of Orissa Unit-3 Janpath  
Bhubaneswar-751001  
Tel: 0674-2391824 (O) 2396130 (F)  
Email: pcdfacboil@yahoo.com

**Mrs. Arpita Gupta**

Senior Scientist  
Environmental Systems Division,  
National Informatics Centre,  
New Delhi  
Tel: 011-24364294  
Email: arpita@nic.in

**Shri Anil Kumar**

Senior Scientist  
National Informatics Centre, New Delhi  
Tel: 011-24363819 (O) 95120-4133894 (R)  
Email: anil.kumar@nic.in

**Shri Virendra N. Patel**

Director (IS&H)  
O/o the Director Industrial Safety & Health,  
Directorate Industrial Safety & Health  
3<sup>rd</sup>, 5<sup>th</sup> Floor, Shram Bhavan,  
Near Gun House Sutom Cama Marg,  
Khanpur, Ahmedabad-380001  
Tel: 079-25502349, 079-25502357 (F)  
Email: cif-ahd@gujarat.gov.in

**Dr. Chander Prakash**

Sr. Environmental Engineer  
Delhi Pollution Control Committee  
Planning, Coordination,  
Bio-Medicalwaste Management Cell,  
4th Floor, I.S.B.T. Building, Kashmere Gate,  
Delhi - 110 006.  
Tel: 011-23869389 (T&F) 9717593508 (M)  
Email: cpgogia@yahoo.co.in

**Shri A.R. Vijayendra**

Joint Director of Factories  
Directorate of Factories and Boilers,  
'Karmika Bhavan' IInd Floor, ITI Compound,  
Bannerghatta Road, Bangalore-29  
Tel: 080-26531201 (O) 080-26531202 (F)  
9845666691 (M)  
Email: arvijayendra@sify.com

**Shri R. Koteswara Rao**

Director of Factories  
Directorate of Factories, B.R.K.R. Bhawan  
#5<sup>th</sup> Floor, B Block Near Tank Bund  
Hyderabad-500063  
Tel: 040-23261305 (O) 040-27630667 (R)

**Dr. L. Swasticharan**

CMO (EMR), Emergencies Medical Relief,  
Room NO. 555 A Wing Nirman Bhawan  
New Delhi-11  
Tel: 011-23061302 (O) 23061457 (F)  
Email: drswasti@yahoo.com

**Shri Anil Kumar Sharma**

Chief Engineer  
Chhattisgarh Environment Conservation  
Board, 01, Tilak Nagar, Main Road Avanti  
Vihar, Raipur-492001 Chhattisgarh  
Tel: 0771-2443924 (T&F) 2443923 (O),  
9827126123 (M) 0771-2282939 (R)  
Email: akscecb@gmail.com

**Shri K.L. Meena**

Chief Inspector of Factories, Labour  
Department Govt. of NCT of Delhi,  
5, Sham Nath Marg, Delhi  
Tel: 01123973756, 23968706 (O)

**Shri Alexander V. Hildebrand**

Regional Adviser - Environmental Health  
World Health Organization South-East Asia  
Regional Office, New Delhi-110002,  
Tel: 011-23309505 (Direct) 9818662870  
(M) 011-23370804, 23370809-11  
Email: hildebranda@searo.who.int

**Shri S.L. Chakravorty**

Director (Process)  
Oil Industry Safety Directorate,  
New Delhi, Tel: 011-23313558  
Email: satya1354@yahoo.co.in

**Shri S. Elangovan**

Chief Inspector of Factories, Factories  
Inspectorate Dept., Govt. of Tamil Nadu,  
Chepak, Chennai-600005,  
Tel: 044-28511028 (O) 09444106048 (M),  
Tel: 044-26267170 (R)

**Shri S. D. Jeyaprasad**

Member Secretary  
Head Office, Kerala State Pollution Control  
Board Thiruvananthapuram-695004,  
Tel: 0471-2318151 (O) 2318152 (F)  
09447975700 (M),  
Email: jp@keralapcb.org

**Shri Kulwant Singh**

Dy. Superintendent of Police  
O/o the Director General of Police,  
Himachal Pradesh, Police Headquarters,  
Shimla. (SOUTHERN RANGE) District Solan  
(HP) Tel: 01792-223929, 01792-223842

**Shri Dunglela**

Chairman  
Mizoram State Pollution Control Board,  
Aizawl, Mizoram  
Tel: 0389-2326173 (O) 09436142013 (M)  
0389-2340627 (R)  
Email: mpcb-azr@yahoo.com  
miz@envig.nic.in

**Shri Subhash Avate**

IPS, Addl Director General  
State Police H.Q. Shahid Bhagat Singh Road  
Colaba Mumbai,  
Res: 32, Ambar, 6<sup>th</sup> Floor, Narayan Dabholkar  
Road Malibar Hill, Mumbai,  
Tel: 022-22023399 (T&F) 09821187053 (M)  
Email: smavate@hotmail.com

**Dr. Virendra Misra**

Scientist F and Dy. Director  
Eco-toxicology Division  
Indian Institute of Toxicology Research  
P.O. Box. 80, Mahatma Gandhi Marg,  
Lucknow - 226 001  
Tel: 0522- 2627586, 2613786 Ext 267, 268,  
Fax: 0522-2628227, 2611547  
Email: virendra\_misra2001@yahoo.co.in

**Shri A R Vijayendra**

Joint Director of Factories  
Government of Karnataka,

**Shri V. S. More**

Director  
Industrial Health & Safety  
Maharashtra.

**Shri S K Bahera**

Chief Scientific Officer  
Orissa Pollution Control Board,  
Bhubaneshwar,

**Shri Surendra Kumar**

Director  
Federation of Indian Chamber of  
Commerce & Industry (FICCI)  
New Delhi 110 002  
Tel: 011-23738760-70

**Dr. S. Sriramachary**

Former Additional Director General  
Indian Council of Medical Research (ICMR)  
New Delhi

**Shri P B Yelda**

Joint Chief Controller of Explosives  
Government of India  
Nagpur

**Shri M. R. Rajput**

Dy. Director (IH)  
Regional Labour Institute, Faridabad,  
Tel: 95129-2421964

**Shri P.B. Yedla**

Jt. Chief Controller of Explosives  
Petroleum and Explosives Safety  
Organisation (PESO) (formerly Depart. Of  
Explosives), A block 5<sup>th</sup> Floor,  
CGO Complex, Seminary Hills,  
Nagpur-440006 HQ. Nagpur  
Tel: 0712-2512094 (O) 09423018124 (M)  
Email: pbyedla@explosives.gov.in

**Dr. S. Srimachari**

INSA Hony, Scientist, Former Addl. Director  
General and  
C/o Institute of Pathology (ICMR)  
Safdarjung Hospital Campus, P.B. 4909  
New Delhi- 110 029  
Tel: 26198402-06 (O) 26198401 (F)  
9863828582 (M)  
Email: ssriramachari@hotmail.com

**Shri Subhash Avate**

Additional Director General of Police  
Maharashtra, Mumbai  
Tel: 022-22073232 (O) FAX: 22091804  
23691500 (R)

**Dr. Dillip Kumar Behera**

Sr. Env. Scientist  
State Pollution Control Board Orissa  
A/118, Nilakanth Nagar,  
Bhubaneswar-751012  
Tel: 0674-2564033 (O) 0674-2560955 (F)  
09437171174 (M)  
Email: dk\_behera@yahoo.com

**Shri Ghanshyam Singh**

Chief Inspector of Factories  
Uttar Pradesh, Kanpur,

**Shri R.C. Yadav**

Additional Director  
RTO (HQ), Additional Director - Transport  
Department, Govt. of Rajasthan, Jaipur,  
Tel: 0141-2709477 (302 ext),  
Tel: 0141-2651246 (R) 09414241549(M)

**Dr. Rachna Arora**

Programme Associate  
German Technical Cooperation - Advisory  
Services in Environmental Management  
(GTZ-ASEM),  
A-33, Gulmohar Park, New Delhi-110049  
Tel: 26528840, 26611021(O) 26537673 (F)  
Email: rachna@asemindia.com

**Shri Balvant Singh**

General Manager  
Driver Training Institute  
Murthal Sonapat  
Haryana  
Tel: 0130-2482563, 9466514115 (M)

**Shri Prasanna Acharya**

Addl. Collector-I, Collectorate  
South Goa District  
Margao- Goa  
Tel: 0832-2714453 (O) 0832-2420481 (R),  
09422388201 (M),  
Email: sprasann@yahoo.co.in,  
vprasann@yahoo.co.in

**Sri R.S. Deswal**

IPS, Dy. Director General of Police CID,  
Haryana, Chandigarh,  
Tel: 011-24363872, 26882068 (R) Delhi

**Shri Avinash Joshi**

Dy Coordinator  
O/o the Dy. Director Industrial Health,  
Safety & Labour, Dept (M.P) 1 Annex,  
Tel: 0733-2248867, 09425061634 (M),  
Res: 27, Anand Nagar Khandwa,  
Tel: 0733-2248789 (R)

**Shri S.C. Vishwakarma**

Asst. Director  
Noida U.P.

**Shri R.S. Mathur**

Asst. Director Factories  
Directorate of Factories,  
Kanpur U.P.  
Res: R-2/176, Raj Nagar, Ghaziabad U.P.  
Tel: 09891318500 (M)

**Shri G.D. Pandey**

Dy. Director  
Office of Director of Factories Labour  
Commissioner Office G.T. Road Kanpur  
Tel: 0512-2223886 (O) 2297142 (F)  
Tel: 09415062625 (M) 2306483 (R)  
Email: gopaldpandey@rediffmail.com,  
gopaldpandey@indiatimes.com

**Shri Rahul Jugran**

Disaster Mitigation and  
Management Center,  
Dehradun  
Uttarakhand  
Tel: 0135-2658448  
Email: capt\_jugran@yahoo.com

**Shri Pradeep Nathani**

Superintendent Engineer  
Superintendent Engineer Directorate Local  
Jaipur,  
Tel: 0141- 2222469 Ext. 739, Res: 2394648

**Shri Bhola Ram**

Dy.S.P.  
Office of the Director General of Police  
Police Training Centre  
Jaipur Rajasthan  
Tel: 01572-270031 (O) 09414650055 (M),  
Email: co(c)@com

**Shri Sandeep Kochhar**

Executive Officer  
The Associated Chambers of Commerce  
and Industry of India  
ASSOCHAM Corporate Office, 1,  
Community Centre Zamrudpur  
Kailash Colony, New Delhi - 110 048  
Tel: 9210992316(M)  
Email: sandeep.kochhar@assochem.com

**Shri Nakul Prakash Lakhe**

Executive Officer  
The Associated Chambers of Commerce  
and Industry of India  
ASSOCHAM Corporate Office, 1,  
Community Centre Zamrudpur  
Kailash Colony, New Delhi - 110 048  
Tel: 9958135866(M)  
Email: nakul.prakash@assochem.com

**Shri G. Sharan**

Director General (Road Development)  
NITHE, A-5, Institutional Area,  
Sector-62, NH-24 Bypass,  
NOIDA-201301 (UP),  
Tel : 95120-2401472 (Direct), 2400085,  
2400086 Fax : 95120-2400087

**Shri D.S. Narve**

IFS, Conservator of Forest  
O/o the Conservator of Forest & Dir Marine  
National Park, Indira Road,  
Opp. Nagnath Gate Police Stn. Gajiwada,  
Dist. Jamnagar-361001 Gujarat  
Tel: 0288-2679357 (O) 0288-2679371(D)  
09978406177 (M)  
Email: ds-f-fed@gujarat.gov.in,  
mnp-forest@yahoo.com

**Shri G.V. Narayana Rao**

District Fire Officer  
District Fire Officer Krishna District,  
District Fire Officer – Vijayawada,  
Tel: 0866- 2578877 (O) (DFO) 9949991060  
(ADFO)9949991061

**Shri Jagjeet Singh**

Dy. Director of Factories  
# 47, Phase 3-A, Mohali,  
Govt. of Punjab,  
Mohali (Punjab)  
Tel: 0172-2225526

**Shri Rajesh Mallik**

Dy. Manager (EMG)  
Singrauli Super Thermal Power Station  
Shaktinagar Distt. Sonebhadra U.P. 231222,  
Tel: 05446-236453, 238154 (O) 05446-  
233726 (F), 09415053381 (M)  
Email: rajeshmallik11@rediffmail.com,

**Sh Kabir Pasha B.**

Sr. Manager, (Env. Engg.)  
National Thermal Power Corporation,  
Engineering Office Complex, Plot No. A-8A,  
Sector-24, P.O. Box 13  
Noida-201301 U.P.  
Tel: 95120-2596853, 9868390636 (M)  
Email: kabir56@sify.com

**Shri Hemant Jain**

Engineer (Env. Engg.)  
NTPC, Engineering Office Complex, Plot No.  
A-8A, Sector-24, P.O. Box 13  
Noida-201301 U.P.  
Tel: 9968010480 (M)  
Email: badi\_2004@rediffmail.com

**Dr. B. Harnadh Reddy**

Dy. Chief Vigilance Officer and Dy.  
Commissioner (Trg)  
APVVP, Office of the Commissioner A.P.  
Vaidya Vidhana Parishad,  
Sultan Bazar, KOTI, Hyderabad

**Shri Prakash B. Patil**

Chartered Engineer  
PRESTELS, 112, Paras Chambers,  
Near Laxmi Narayan Cinema Pune,  
Tel: 020-24468408 (T) 020-24468409 (F),  
Res: 98/847, Maharshi Nagar Pune-411037  
09822257065 (M)

**Shri Pranav Patil**

Engineer  
PRESTELS, 112, Paras Chambers,  
Near Laxmi Narayan Cinema Pune  
Tel: 020-24468408 (T) 020-24468409 (F),  
Email: patilpranav@rediffmail.com,  
RES: 98/847, Maharshi Nagar  
Pune-411037, 09822322184 (M)

**Shri Satish Yadav**

Hindustan Insecticides Limited,  
Tel: 011-24364667

**Smt. Vimmi Sachdev Raman**

Commandant  
40th Bn. Police Department,  
40<sup>th</sup> Bn Haridwar,  
Tel: 01332-251986 (O) 9411112722 (M),  
01332-253200 (R)  
Email: vimmisachdeva.ips@yahoo.co.in

**Shri Pushkar Singh Sailal**

Commandant  
31<sup>st</sup> PAC Rudrapur

**Shri G. Udayabhaskar**

General Manager-Environment  
ESSAR Group, K.K. Marg  
ESSAR House, Mahalaxmi  
Mumbai-400034  
Tel: 022-66601100 (O) 09819730375 (M)  
Email: gullapalli.udayabhaskar@essar.com

**Shri R. Shankar**

Head HS&F,  
Essar Oil Ltd., Refinery Division,  
P.O. Box 24, Khamraliya,  
Dist. Jamnagar Gujarat,  
Tel: 02833-241444 (O) 09909908527 (M)  
Email: shankarr@essor.com

**Shri Raju Subramanyam**

Sr. Director-SHE  
Dr. Reddy's Laboratories Ltd. 7-1-27/1,  
Srinivasa Complex, Ameerpet,  
Hyderabad 500016,  
Tel: 040-66511690 (O), 040-23731955  
(T&F) 09704500722 (M)  
Email: rsubramanyam@drreddys.com

**Shri Amit Tuteja**

Sr. Programme Officer,  
SEEDS India, 15-A Institutional Area  
R.K. Puram Sector IV  
New Delhi,  
Tel: 9899001468 (M)  
Email: amittuteja02@gmail.com

**Shri Jagjit Singh**

Dy. Director of Factories  
Directorate of Factories  
Punjab S.C.O. No. 87-88,  
Sector 17-D, Chandigarh,  
Tel: 0172-2728610 (O) 0172-2704091 (F)  
09814484489 (M)

**Sri S. Sudheer Babu**

Sr. Env. Engineer  
Kerala State Pollution Control Board  
Thiruvananthapuram  
Tel: 0471-2318153 (O) 09447975711 (M),  
0471-2302985 (R)  
Email: sudheerbabu@yahoo.com

**Dr. T. Lalhmangaihi**

Dy. Director  
Health & Family Welfare Department  
Govt. of Mizoram

**Shri Kalicharan Singh Yadav**

Sr. Manager & Head of HSE & Fire  
Prevention  
NTPC Ltd.  
NTPC Dadri P.O. Vidyut Nagar Distt. Gautam  
Budh Nagar-201008,  
Tel: 9412774071 (M)

**Dr. Diwakar**

Sr. Manager  
Oil and Natural Gas Corporation Ltd.

**Shri P.D. Sahani**

HSE Officer  
 Chemical Terminal Trombay Ltd.  
 Behind Tata power Company  
 Mahual, Mumbai-400074,  
 Tel: 022-67030114 – 17, 022-67030116 (F)  
 09821336941 (M) 022-24370424 (R)

**Shri A.K. Das,**

Sr. Manager  
 Bharat Petroleum Corporation Ltd.  
 Kochi Refinery

**Shri K. Sivanandan**

Director (Tech.)  
 Fire and Rescue Services Govt. of Kerala  
 Housing Board  
 Thiruvananthapuram-695001  
 Tel: 0471-2320872 (O) 0471-2320868 (F)  
 09847068006 (M) 2471015 (R)

**Shri Alex Paul**

Sr. Dy. Transport Commissioner & Secretary  
 State Transport Authority Transport  
 Commissionerate, Kerala Trans Towers,  
 Vazuthacadeu, Thiruvananthapuram  
 Tel: 0471-2333323 (O) 0471-2333314 (F),  
 09447077999 (M)

**Shri Suryakant N. Bodhale**

Sr. Fire Officer  
 Bharat Petroleum Corp. Ltd.  
 Refinery Mahul  
 Mumbai-400074  
 Tel: 022-25545480 (O) 09892654005(M),

**Brig. Anil Harnal**

Dy. Director General  
 Perspective Planning (NBC Warfare),  
 Integrated Headquarters of Ministry of  
 Defence (Army)

New Delhi

Tel: 011-23011147 (T&F)

**Col. (Dr.) T.S. Sachdeva**

Director  
 Perspective Planning (NBC Warfare)  
 Medicine, New Delhi, R.No. 211  
 D-1 Wing, Sena Bhawan  
 General Staff Branch, Integrated  
 Headquarters of Ministry of Defence (Army)  
 New Delhi-110105  
 Tel: 23011147 (T&F) 9891119109 (M)  
 Email: tejinderpal\_sachdeva26@yahoo.co.in

**Shri D.C. Khanduri**

Consultant  
 Reliance Industries Ltd. (RIL)  
 2<sup>nd</sup> Floor, Gopal Das Bhawan, 28,  
 Barakhamba Road  
 New Delhi-110001  
 Tel: 011-23463759 (O) 09868277666 (M)  
 Email: dckhanduri@rediffmail.com,  
 dinesh.khanduri@ril.com

**Shri P.K. Tyagi**

Sr. Manager  
 Chambal Fertilisers and Chemicals Ltd.  
 P.O. Gadepan, Kota, Rajasthan-325208  
 Tel: 0744-2782230 (O) 0744-2782926/25  
 Email: pk.tyagi@chambal.in

**Shri K. Rama Chandra Rao**

AGM  
 Nagarjuna Fertilizers & Chemicals  
 Nagarjuna Road,  
 Kakinada East Godavari District  
 Andhra Pradesh  
 Tel: 0884-2360014, 0884-2362084 (F)  
 09949994576 (M)

**Dr. J.S. Sharma**

Dy. General Manager  
Oil and Natural Gas Corporation Ltd.  
(ONGC) 8<sup>th</sup> Floor, SCOPE Minar  
South Tower, Laxmi Nagar  
Delhi  
Tel: 011-22406672 (O) 22406681 (F)  
Email: sharmajswarup@hotmail.com

**Shri Bal Mukund Chaurasia**

Supdt. Engineer (Drilling)  
ONGC Corporate Health, Safety &  
Environment 8<sup>th</sup> Floor, Scope Minar,  
South Tower, Laxmi Nagar  
Delhi-92  
Tel: 011-22406671 (O) 22406681 (F)  
Email: chaurasia\_balmukund@ongc.co.in,  
bmchaurasia@yahoo.co.in

**Dr. Abhay Kumar**

Sr. Programme Officer  
Toxics Link H2 (Grnd Floor), Jungpura Extn.)  
New Delhi-110014,  
Tel: 2432071,24328006, 24321747 (F)  
Email: abhay@toxicslink.org,  
akumarabhay@gmail.com

**Er. N.V. Seshprasad**

Dy. Manager (Tech)  
Hindustan Insecticides Ltd.  
Scope Complex, Core-6, II<sup>nd</sup> Floor,  
7 Lodi Road New Delhi-03,  
Tel: 011-24364662, 24362625, 24362116  
(F) Tel: 95120-2506104 (R)  
Email: hilhq@nde.vsnl.net.in

**Shri G. Venkata Narayana Rao**

District Fire Officer  
Off: Andhra Pradesh Fire & Emergency  
Services Department,  
Tel: 0866-2578877 (O) 09949991060 (M)

**Dr. Sontakke Y.B.**

ROCHQ; I/C HSMS,  
Maharashtra Pollution Control Board  
(MPCB) 3<sup>rd</sup> Floor, Kalpataru Point Sioncircle,  
Mumbai-400 032  
Tel: 022-24010437 (O) 022-24024068 (F),  
Email:sontakkeyb@yahoo.com

**Shri Mukesh Sharma**

Reliance Industries Ltd. (RIL)  
2<sup>nd</sup> Floor, Gopal Das Bhawan,  
28, Barakhamba Road  
New Delhi-110001  
Tel: 011-27463603 (O) 23704089 (F)  
Email: mukesh.v.sharma@ril.com

**Shri Ghanshyam Singh**

Director  
Director of Factories Labour Department  
Govt. of U.P.  
G.T. Road Kanpur U.P.  
Tel: 0512-2223886 (O) 2297142, 2222868  
(F) 09456408036 (M)

**Shri Rakesh Solanki**

Chief Executive  
Health Care Projects and marketing  
Consultancy Organization H-Pamco  
E-986, II<sup>nd</sup> Floor, C.R. Park,  
New Delhi-110019,  
Tel: 011-26271092 (O) 9899007201 (M)  
Email: raksol@gmail.com

**Shri M.C. Shukla**

Environmental Engineer  
Gujarat Pollution Control Board  
Sector -10A, Gandhi Nagar  
Gujarat  
Tel: 079-23231745 (O) 09879657547 (M)  
Email: msshukla2001@yahoo.com

**Dr. Dewakar**

GM-CHSE  
ONGC, 8<sup>th</sup> Floor CHSE, Scope Minar,  
Laxminagar, Delhi 110 092  
Tel: 22406667 (O) 22406681 (F)  
9968282120 (M) 22242792 (R)  
Email: dewakaripe@yahoo.com

**Shri C.Y. Nagesh**

Env. Engineer,  
Andhra Pradesh Pollution Control Board,  
Sanath Nagar,  
Hyderabad. A.P.  
Tel: 040-23887546 (O) 09908418997 (M)  
Email: hwm\_ee@pcb.ap.gov.in

**Dr. B. Harinadha Reddy**

Vigilance Officer  
A.P.Varidhya Vidhana Parishad (APVVP)  
Koti Suthan Bazar:  
Hyderabad 195 A.P.  
Tel: 040-24656426 (O) 24651171 (F)  
09849739045 (M)  
Email: commapvvp@yahoo.co.in

**Shri U.K. Bhowmick**

CM (S&EP), Indian Oil Corporation Ltd.  
Refineries HQ, Scope Complex,  
Core-6, Laodhi Road  
New Delhi-110003  
Tel: 011-24365776 (O)  
Email: bhowmickuk@iocl.co.in

**Shri Satish Bhardwaj**

Manager (F&S)  
Chanderiya Lead Zinc Smelter,  
Chanderiya Chittorgarh,  
Rajasthan  
Tel: 01472-256220-4441(O) 01472-255816  
(F), Tel: 09928145635 (M)  
Email: satish.bhardwaj@vedants.co.in

**Shri Pravin Singh**

Sr. Executive, HONDA SIEL Cars India Ltd.,  
Plot No. A-1, Sector 40/41,  
Surajpur-Kasna Road, Greater Noida  
Industrial Development Area,  
Distt. Gautam Budh Nagar U.P.-201306  
Tel: 95120-2341326 (O) 9717412224 (M),  
Email: pravinsingh@hondacarindia.com

**Shri R. Sreekumar**

Sr. Manager, Hindustan Newsprint Ltd.  
Newsprint Nagar 686616.  
Kottayam Kerala State  
Tel: 04829-256211 Eext 168 (O)  
04829-251911 (F) 09446096293 (M)  
Email: hnl@hnlonline.com

**Shri K.V. Singh**

Sr. Manager F&S  
HPCL, Visakh Refineray  
Visakhapatnam,  
Tel: 0891-2894843 (O) 09849281805 (M),  
Email: kvsingh@hpcl.co.in,  
Tel: 0891-2746547 (R)

**Shri D. Murali Mohan**

District Fire Officer  
A.P. Fire & Emergency Services,  
Hyderabad, Tel: 0891-2568905 (O)  
09949991050 (M),  
Email: murali\_dfo@yahoo.co.in

**Shri Benoy P. Vargheese**

Fire Officer  
Hindustan Newsprint Ltd.  
Newsprint Nagar 686616  
Kottayam Kerala State  
Tel: 04829- 256211, 09446612781 (M),  
Email: benoyvp2000@yahoo.com,  
Tel: 09605054388 (R)

**Dr. Chandra Mohan**

District Health Officer  
O/o Civil Surgeon Gurgaon,  
Under Director General Health Services,  
Haryana,  
Tel: 95124-2322412 (O) 2322412 (F)

**Shri Ritu Raj Sharma**

Coy Commandar Officer  
Director General Home Guard &  
C/o H.P. Shimla  
Tel: 0177-2651423 (O) 09318813343 (M)

**Shri Saroj Ranjan Das**

Safety Officer  
HONDA SIEL Cars India Ltd. Plot No. A-1,  
Sector 40/41, Surajpur-Kasna Road  
Greater Noida Industrial Development  
Area Distt. Gautam Budh Naga, U.P.-201306  
Tel: 99104406366 (M)  
Email: srdas@hondacarindia.com

**Shri Mukesh Kr. Behra**

Manager Safety  
New Holland Trctors India Pvt. Ltd.  
Plot No. 3, Udyog Kendra  
Greater Noida U.P.  
Tel: 95120-3056191(O) 95120-3056929 (F),  
Email: mukesh.behra@cnh.com  
mukeshbehra@yahoo.co.in  
Tel: 9313869643 (M) 9910534034 (R)

**Dr. Siddhartha Singh**

Meteorologist-II  
Environmental Monitoring & Research  
Centre  
India Meteorological Dept, 6<sup>th</sup> floor  
INSAT Building Lodi Road  
New Delhi-3,  
Tel: 011-24620701 (O) 9868085602 (M)  
Email: siddhartha\_singh@hotmail.com

**Shri Sunil Kumar Goyal**

Assistant Environmental Engineer  
Delhi Pollution Control Committee  
4<sup>th</sup> Floor, ISBT Building  
Kashmere Gate, Delhi  
Tel: 011-23865119

**Shri P.K. Sarkar**

Regional Manager  
FACT Ltd.  
Karala  
Tel: 011-29832348 (O) 9910465577 (M),  
Email: sarkarpact@yahoo.co.in

**Shri Anil Kumar**

Dy. Chief Inspector of Factories, Delhi  
O/o Chief Inspector of Factories Labour  
Deptt Govt of Delhi  
5, Sham Nath Marg, Delhi,  
Tel: 23973965 (O) 9873002335 (M)

**Smt. Ajeeta D. Agrawal**

EE  
Delhi Pollution Control Committee,  
Planning Coordination,  
Bio-Medicalwaste Management Cell,  
4th Floor, I.S.B.T. Building,  
Kashmere Gate, Delhi - 110 006  
Tel: 011-23865119 (O) 23865121 (F)  
Email: ageeta1@yahoo.com

**Shri N.K. Joshi**

AEE  
Delhi Pollution Control Committee  
Planning, Coordination,  
Bio-Medical Waste Management Cell,  
4th Floor, I.S.B.T. Building,  
Kashmere Gate  
Delhi - 110 006.  
Tel: 9717593527(M)

**Shri S.K. Goyal**

AEE  
Delhi Pollution Control Committee  
Planning, Coordination, Bio-Medicalwaste  
Management Cell,  
4th Floor, I.S.B.T. Building  
Kashmere Gate, Delhi - 110 006  
Tel: 9717593538 (M)

**Shri S. Vijayasekar**

Dy. Director  
The Directorate of Tamilnadu Fire & Rescue  
Services No. 12 Rukmani Lakshmipathi,  
Salai Egmore, Chennai,  
Tel: 0416-2217820 (O) 044-28550931 (F)  
Email: vijay\_ddnwr@sify.com,  
Tel: 09443255385 (M) 0416-2257820 (R)

**Shri R.K. Singh**

Dy. Director of Factory & Boilers  
Labour Commissioner Office,  
Nainital Road Haldwani,  
Nainital, Uttarakhand  
Tel: 05946-282849 (O) 282805, 282049 (F)  
09412086592 (M)  
Email: nrageev004@yahoo.com

**Shri C.P. Paseband**

Jt. Director, IS&H,  
5<sup>th</sup> Floor, Commerce Centre, Tardeo  
Mumbai-400034  
Tel: 022-23522230 (O) 23522651 (F)  
09569146143 (M)  
Email: dishmurn@yahoo.co.in

**Shri Birbal Sharma**

Fire Station Officer  
Fire Station M.C.  
Gurgaon, Haryana,  
Tel: 95124-2320101, 2328868,  
9899846935 (M)

**Shri P.K. Chaubey**

Asst. Director of Factories  
Director of Factories U.P. Labour Deptt.  
Kanpur,  
Tel: 9873762129 (M)

**Shri Avinash Kaushik**

Dy. Director Industries  
District Industries Centre Alwar,  
Represented Industries Department-  
Rajasthan, Udyog Bhawan, Rajasthan,  
Tel: 0144-2700288 (T&F) 09414016466 (M)  
Email: kaushikavinash@rediffmail.com

**Shri P.T. Umare**

Jt. Director  
Directorate of Industrial Safety & Health  
M.S. State,  
Tel: 0250-2332618 (O) 09869276307 (M)

**Shri K.M. Rajan**

Redesedent Rep.  
Kerala State Pollution Control  
Board Delhi Rep.  
Tel: 9811505344 (M) 011-28539838 (R)  
Email: kmrajanr@yahoo.com

**Er. R.S. Dhariwal**

Addl Director  
O/o Chief Inspector of Factories Haryana,  
Labour Dept., 30 Bays Building  
Sector 17 B Chandigarh,  
Tel: 0172-2702918 (O) 0172-2701266 (F)

**Shri V. Rohit Kumar**

Asst. Engineer  
Tamilnadu Pollution Control Board,  
No. 76, Mount Road  
Chennai-600 032,  
Tel: 044-22353136-40, 26268603(O)  
Email: rohitrajaah@sify.com

**Ms. Nidhi Ladha**

Dy. Director  
Confederation of Indian Industry (CII)  
4<sup>th</sup> Floor, Core 4A, India Habitat Centre,  
Lodhi Road New Delhi  
Tel: 24682230-35 (O) 41504514-19 (O)  
24682229/ 24653407 (F) 9810109158 (M),  
Email: nidhi.ladha@ciionline.org

**Shri Arun Kr. Das,**

Sr. Manager, B.P.C.L. Kochi Refinery  
P.B.-2, Ambalamungae  
Ernakulam Kerala  
Tel: 0484-2720789/ 2821906 (O)  
09447509393 (M)  
Email: arunkumardas@bharatpetroleum.in

**Shri V.K. Sinha**

Addl PCCF  
Kerala Forest Dept. Govt. of Kerala,  
Tel: 0471-2337545 (O) 09447979001 (M)  
Email: sinha\_v\_k@yahoo.com

**Shri M.K. Jaggi**

Manager (Safety)  
India Yamaha Motor Pvt Ltd.  
A-3, Surajpur Industrial Area,  
NOIDA Dadri Road  
G.B. Nagar U.P.  
Tel: 95120-2350634 (O), Tel: 42137877 (R)  
9818749294

**Shri R. Kumar**

Jt. Chief Env. Engineer  
Tamil Nadu Pollution Control Board  
76, Anna Salai Guindy  
Chennai-32,  
Tel: 044-22353148 (O) 044-22353068 (F)  
Email: kumar\_jcee@yahoo.co.in  
Tel: 09840824240 (M)

**Dr. A.N. Harshwardhan**

Sr. Regional Officer, Maharashtra Pollution  
Control Board (MPCB)  
3<sup>rd</sup> Floor, Kalpataru Building  
2,3, & 4<sup>th</sup> Floor Mumbai-400 032  
Tel: 022-22640346 (O) 022-22640345 (F)  
Email: dxanantharshavardhan11@gmail.com

**Wing Cdr. R.K. Singh**

Jt. Director  
Indian Air Force Room No. 253,  
Air HQ (Vayu Bhawan) Rafi Marg  
New Delhi-110 011,  
Tel: 011-23010231 ext 7253 23017113 (F)  
Email: raj\_singh\_ind@yahoo.co.in

**Shri S.K. Mishra**

Sr. Inspector  
O/o Chief Inspector, Factories & Boilers,  
Rajasthan, 6-C, Jhalana Doongri  
Institutional Area, Jaipur,  
Tel: 0141-2709659 (O) 2709659 (F)  
Email: misrasharat@yahoo.com

**Shri S.K. Ruhil**

Jt. State Transport Controller  
Transport Department Govt. of Haryana  
IInd Floor, 30, Bays Building  
Sector-17, Chandigarh  
Tel: 0172-2713196 (O) 2710378 (F)  
Email: skruhil@yahoo.co.in  
09417537914 (M)

**Shri M.S.C. Chaudary**

Sr. Manager (F&S)  
Chennai Petroleum Corp. Ltd.  
Manali Chennai-600068  
Tel: 044-25944356 (O) 044-25941247 (F)  
09884411710 (M)  
Email: mscchoudary@cpcl.co.in

**Shri P. China Rao**

NTPC  
Sector 24 NOIDA,  
Tel: 95120-2410004 (O) 011-27860574 (R)  
Email: raopadala@yahoo.com

**Shri G.S. Raja**

Director  
Factories L.C. Office  
Kanpur,  
Tel: 09811655208 (M)

**Ms. Abantika**

(Student of Kurukshetra University Institute  
of Environmental Sciences)  
Trainee at NIDM  
Tel: 9990905548 (M)  
Email: abantika-d@rediffmail.com

**Ms. Monika**

(Student of GGS Indraprastha University  
Institute of Environmental Management),  
Trainee at NIDM  
Tel: 9871411388 (M)  
Email: india-sri-moni@yahoo.com

**Shri Paritosh Kumar**

Officer – SEZ  
Central Pollution Control Board  
Delhi  
Tel: 011-22304812 227733415 (R)

**Dr. S.D. Attri**

Director  
India Meteorology Department/IMS  
Tel: 011-24628701 (O) 26711358 (R)  
Email: sdattri@yahoo.com

**Shri S.S. Bose**

Sr.Dev. Officer  
M/s Commerce & Industry Deptt. of Indus  
Policy and Promotion  
Udyog Bhawan  
New Delhi  
Tel: 011-23062017 (O) 25058196 (R)  
Email: ss.bose.ense.in

**Shri Kalicharan Singh Yadav**

Sr. Manager & Head of HSE & Fire  
Prevention  
NTPC Ltd  
NTPC Dadri P.O.Vidyut Nagar  
Distt. Gautam Budh Nagar-201008  
Tel: 9412774071

**Dr. R.S. Dhaliwal**

Scientist 'E'  
Indian Council of Medical Research V.  
Ramalingam Swami Bhawan Ansari Nagar,  
New Delhi-110029  
Tel: 26588381 (T&F) 26588942 (T)  
Email: dhaliwalrs@icmr.org.in and  
dhaliwalicmr@yahoo.com

## ORGANISING TEAM

### NODAL PERSONS (MOEF)

**Dr. Chhanda Chowdhury**

Director

Ministry of Environment and Forest.

Ph: 91-11-24360662, Fax: 91-11-24360662

Email: chhanda\_c@yahoo.com

**Shri Shard**

Deputy Director

Ministry of Environment and Forest.

Phone: 011-24360662

### COORDINATORS (NIDM)

**Dr. Anil K. Gupta**

Associate Professor

Email: environ\_disaster@hotmail.com

Ph: 91-11-23724311 (D), 23702443, 45, 32, Extn: 211

**Sreeja S. Nair**

Assistant Professor

Email: sreejanair22@gmail.com

Ph: 91-11-23702443, 45, 32 Extn: 228, Fax: 91-11-23702442/46

### ADVISORY TEAM

**Dr. G K Pandey**

Sr. Advisor

Ministry of Environment and Forest

Ph: 91-11-246360467

Email: pandey@menf.delhi.in.in

**Shri P.G. Dhar Chakrabarti**

Executive Director

National Institute of Disaster Management

Ph: 91-11-23702445, Fax: 91-11-23702446

Email: dharc@nic.in

nidm

Towards a disaster free India

**NATIONAL INSTITUTE OF DISASTER MANAGEMENT**

NIDM Building, 5-B, IIPA Campus, IP Estate

Mahatma Gandhi Road, New Delhi - 110002

Tel: 23702445, 23702432, 23705583; Fax: 23702446

Website: [www.nidm.net](http://www.nidm.net)



जहाँ है हरियाली ।  
वहाँ है खुशहाली ॥

**MINISTRY OF ENVIRONMENT & FORESTS**

Paryavaran Bhawan,

CGO Complex, Lodi Road,

New Delhi - 110003

Website: [www.envfor.nic.in](http://www.envfor.nic.in)