GAS! GAS! HELP!

MANAGING TOXIC CHEMICALS IN INDIA

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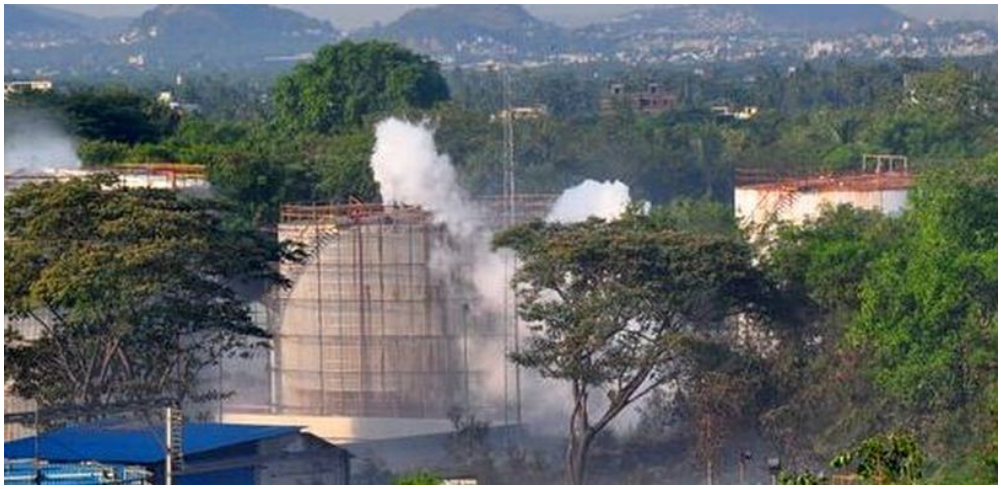

The Chemical industry is one of the oldest industries in India. It not only plays a crucial role in meeting the daily needs of the common man, but also contributes significantly towards the industrial and economic growth of the nation. Many of these chemicals are toxic, explosive, and/or reactive, thus posing a potential hazard to humans, other life forms, and the environment. **Chemical accidents** seem to occur with uncanny regularity and recent incidents of toxic gas leaks like the one at Vishakhapatnam on 07 May 2020 seem to indicate that we haven't learnt all our lessons. Such accidents reveal that we are inadequately prepared to deal with such disasters.

Defence industry uses many types of toxic chemicals in explosives, propellant compounds, thermoplastics, foams, paints and many other applications. Similarly, research establishments also use large quantities of toxic chemicals. Safety and security of such establishments is of prime importance. Then there is the danger of Terrorists using toxic chemicals. There is a need to inventory, secure and manage Toxic Industrial Chemicals (TIC) in a stringent manner to prevent their misuse.

This short paper strives to identify areas needing attention in this sector.

Indian Chemical Industry at a Glance

- The Indian chemicals industry is the sixth-largest industry in the world and the second largest in Asia in terms of volume.
- It is currently valued at around USD 108.4 Billion. India has a diversified manufacturing base with a capacity to produce quality chemicals for world consumers.
- The chemical sector accounts for about 17.6% of the manufacturing sector output, 13 to 14% in total exports and 8-9% of total imports of the country.
- Majority of exports are dyes, dyestuffs, pharmaceuticals and alkali chemicals
- The chemical industry in India is witnessing increased focus towards R&D, which in turn provides opportunities for growth of R&D hubs and industry specific institutes.

Indian chemical industries are mostly housed in the western and southern Indian states while major users are located in the northern states especially with respect to consumption of agrochemicals. The major concerns and thrust areas are:

- Storage and Transportation Safety,
- Occupational and process Safety,
- Environmental Impact - secured landfill sites, incinerators and effluent treatment plants
- Security of supply chains
- On-site/Offsite Disaster Management Plans

The **Ministry of Chemicals and Fertiliser (MoCF), Ministry of Environment, Forests and Climate Change (MoEFCC) and the National Disaster Management Authority (NDMA)** conduct many training courses covering these aspects. In addition, various Non-Governmental bodies such **Indian Chemical Council (ICC), Federation of Indian Chambers of Commerce and Industry (FICCI) and Confederation of Indian Industry (CII)** also conduct training courses on chemical management, safety, health and environment.

Use of Chemicals in the Defence Sector

Defence industry is a complex system ranging from high end weapons platforms to battlefield clothing. High speciality materials are used in many defence applications. High grade plastics like Polyvinyl Chloride, Polypropylene, Polycarbonate and Thermoplastic Elastomer are used in many applications for weapon systems, electro-optics, safety equipment and aviation industry as also packaging systems. Commonly used military energetic compounds include the explosives TNT, RDX, HMX and DNT. Multispectral camouflage paints, laminated fabrics, IR absorbent surface treatments all use many toxic chemicals. Most of these uses are by private industries in the defence sector. The security and management of these chemicals is of grave concern.

Chemical Terrorism

The use of **Chemical Warfare Agents** (CWAs) in modern warfare dates back to World War I (WWI). Sulphur Mustard and nerve agents were used by Iraq against the Iranian military and Kurdish civilians. Most recently the nerve agent Sarin, GB, was used by the Syrian military against their civilian population. Since the Japanese Sarin terror attacks in 1994–1995 and the ongoing **Chemical strikes in the Syrian conflict**, the

threat of terrorists using TIC is very real and many of these are used today in large amounts in industry. Some of them, including insecticides, Chlorine, Phosgene and Ammonia, could wreak as much damage and injury as the weaponized chemical agents.

Legislations and Instruments addressing Chemicals Management

As for legislation dealing with chemicals, India is quite well placed. Almost all steps of chemical management from cradle to grave have been covered. These Acts, Rules and Regulations can be classified into following groups:

Environmental Management	Chemical Safety and Emergency Management	Specific Chemicals / Containers / Transport	Customs and Other laws relevant to Chemicals Management
• The Air (Prevention & Control of Pollution) Act, 1981 amended 1987 • The Air (Prevention & Control of Pollution) (Union Territories) Rules, 1983 • The Water (Prevention & Control of Pollution) Act, 1974, amended 1988 • The Environment (Protection) Act, 1986 amended 1991 • Environmental (Protection) Rules, 1986 (amended in 1999, 2001, 2002, 2002, 2002, 2003, 2004) • Hazardous Wastes (Management and Handling) Rules, 1989 amended 2000 and 2003 • EIA Notification, 1994 • Ozone Depleting Substances (Regulation and Control) Rules, 2000 • Batteries (Management and Handling) Rules, 2001 • Insecticides Act and Rules • Explosives Act and Rules.	• Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989, amended 2000 • Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996 • Public Liability Insurance Act, 1991 amended 1992 and Rules, 1991 amended 1993 • Insecticides Act and Rules • Explosives Act and Rules. • Gas Cylinder Rules • Factories Act and Rules • Ozone Depleting Substances (Regulation and Control) Rules, 2000 • Petroleum Act and Rules 1934,2000 • The Static and Mobile Pressure Vessels (Unfired) Rules, 1981	• The Petroleum Act, 1934 and Rules, 2002 • The Calcium Carbide Rules, 1987 • The Explosives Act, 1884 and Rules, 1983 • The Gas Cylinder Rules, 2004 • The Static and Mobile Pressure Vessels (Unfired) Rules, 1981 • The Insecticides Act, 1968 and Rules, 1971 • The Essential Commodities Act, 1955 • The Fertiliser (Control) Order, 1985 • Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989, amended 2000 • Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996 • Public Liability Insurance Act, 1991 amended 1992 and Rules, 1991 amended 1993 • Factories Act and Rules • Ozone Depleting Substances (Regulation and Control) Rules, 2000 • Mines Act and Rules • Port and Dock Act and Rules • PFA Act and Rules	• Factories Act, 1948 • The Motor Vehicles Act, 1988 • The Central Motor Vehicles Rules, 1989 • The Mines Act 1952 • The Customs Act, 1962 • The Merchant Shipping Act, 1958 amended in 2002 and 2003 • Merchant Shipping (carriage of Cargo) Rules 1995 • The Indian Ports Act, 1908 • The Dock Workers (Safety, Health and Welfare) Act, 1986 • The Dock Workers (Safety, Health and Welfare) Rules, 1990 • Drugs and Cosmetics Act, 1940 • The Prevention of Food Adulteration Act, 1954 • The National Disaster Management Act, 2005 • The Prevention of Food Adulteration Rules, 1955 • The Prevention of Terrorism Act, 2002 • Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989, amended 2000 • The Petroleum Act, 1934 and Rules, 2002 • Explosives Act and Rules. • The Static and Mobile Pressure Vessels (Unfired) Rules, 1981 • Gas Cylinder Rules • Insecticides Act and Rules • Ozone Depleting Substances (Regulation and Control) Rules, 2000

The Environment (Protection) Act, 1986 serves as an umbrella Act and can link other Acts in one way or another, without interfering with the autonomy of any other Acts / Rules. Since the MoEFCC is the nodal ministry for enforcement of the Environment (Protection) Act, 1986, it is the co-ordinating ministry for management of chemicals and functions in close coordination with MoCF..

Following the 1984 Bhopal gas disaster, the Ministry of Environment and Forest (MoEF) notified two sets of rules - Manufacture, Storage and Import of Hazardous Chemicals (MSIHC) Rules, 1989 and Chemical Accidents (Emergency Planning, Preparedness, and Response), (CAEPPR) Rules, 1996 - to regulate the manufacturing, use, and handling of hazardous chemicals. Both these are under review since 2016 and upgraded versions are expected soon.

The role of National Authority for Chemical Weapons Convention (NACWC) is not known or understood by many including those in the Chemical industry and its management bodies. The NACWC can enforce measures via the CWC Act 2000 and the WMD Act 2005 to ensure non proliferation, prevent pilferage, misuse and loss of toxic chemicals and to penalise defaulters. It covers the aspect of Chemical Terrorism prevention.

National Action Plan for Chemicals (NAPC)

The Government of India in the Ministry of Environment, Forest and Climate Change (MoEF&CC) constituted on 05 Apr 2017 a National Coordination Committee (NCC) for preparation of National Action Plan for Chemicals (NAPC) under the World Bank-aided Capacity Building for Industrial Pollution Management (CBIPM) Project. This shall be a comprehensive plan to remove all shortcomings and enhance compliance to meet global chemical management standards. Three years since initiation, it is not known when the NAPC will be finalised.

Key Areas of Concern in Chemical Management n India

- **Insufficient Database for Risk Assessment.** There is a need for a well organised database for chemical risk management. The thrust areas are import-export loopholes, supply chain breaches, public and occupational health, storage and disposal of obsolete chemicals (including fertilizers and pesticides), chemical poisoning and chemical accident during transportation. These databases need to be analysed with respect to risk assessment on priority basis.
- **Developing Chemical Security Strategy.** Chemical security needs to be part of the National Chemical, Biological, Radiological and Nuclear (CBRN) Security paradigm. Stringent regulatory measures to address all possible proliferation and unauthorised use of toxic chemicals be made.
- **Inspection, Vigilance, Oversight and Public Awareness.** The inherent limitation is lack of trained manpower and standardisation of procedures for inspection and vigilance. This can be overcome by establishing standardised best practices and strict oversight mechanisms. Professional organisations and industry associations can play a vital role in framing policy, risk analysis and optimal implementation of risk reduction programme.
- **Adherence to Regulations.** Cradle to grave chemical management calls for strict and diligent adherence to safety regulations. Companies must set up internal audit measures to ensure no lapses take place. Strict action against lax staff and corrupt practices will improve safety standards.
- **Inventory of Chemicals.** Adequate data is available with concerned ministries, departments and agencies, National Informatics Centre (NIC) as also research institutes, universities and industry associations, but there has been no major effort to harmonise the data for analysis and inventory purposes.

International Support and Compatibility

India is also a party to many International Conventions/Protocols relating to chemical management such as The Basel, Rotterdam and Stockholm Conventions, Globally Harmonized System of Classification and Labelling of Chemicals (GHS) and The Chemical Weapons Convention. Most of the major international organisations such as the WHO, ILO, World Bank, UNIDO, FAO and others are working actively in India. Compliance to regulatory measures like TSCA (USA), REACH (EU), RoHS and CLP in India is currently exclusively for the exports market, especially to Europe and USA.

Major international programmes active in India are International Programme of Chemical Safety (IPCS), Strategic Approach to International Chemicals Management (SAICM), International Register for Potentially Toxic Chemicals (IRPTC) and UNEP cleaner production programme. With respect to awareness & understanding of workers and the public, the Central Pollution Control Board and the National Safety Council organise various courses on chemical safety, health and pollution control.

Improving India's Chemicals Management

- Develop and institute the National CBRN Security Strategy covering Chemical security.
- Speedy approval of the NAPC and priority revision and implementation of the MHISC and CAEPPR rules. These will enable optimal enforcement of the National CBRN Security Strategy in terms of Chemicals.
- Synergistic cooperation between Ministries, Organisations and Industry is essential.
- Standardised procedures and strict oversight mechanisms be promoted and ensured.
- Diligent adherence to safety procedures through stringent inspections and audits covering all aspects of occupational and process safety, safety in storage, handling and transport and in waste disposal.
- Strive for minimal environmental impact. Best practices in waste management should be enforced.
- Develop, train and optimally equip, capable On-Site Response mechanisms.
- Community Preparedness and awareness enhancement for participatory response.
- Swift and effective Medical response and management mechanism be established.
- Rapid redressal and business continuity measures post Chemical disasters.

Overall, it is observed that the India has the necessary legislation and infrastructure for implementing effective chemical management in the country. Chemical terrorism is a reality and stringent Chemical security enforcement is called for. Industrial safety and adherence to regulations needs to be made a habit by concerned industries and corporate houses. Internal audits and oversight can go a long way in ensuring an accident free environment. While there are some domestic shortcomings, the NAPC should empower India as a major Global chemical player.

About the Author:
***Col (Dr) Ram Athavale, PhD** is a Veteran Army Officer with extensive experience in varied Command and General Staff assignments. Col Athavale has been a Key Adviser to the Government of India (MoD and MHA) on CBRN Security. He has been a Key CBRN Expert for the EU CBRN Risk Mitigation Centres of Excellence initiative in Eastern and Central Africa. A Visiting Faculty at select Indian and overseas universities, prolific writer and a speaker on CBRN subjects, he holds a PhD in CBRN Security and Incident Management. He has authored a pioneering book titled "Toxic Portents" on 'CBRN Incident Management in India'. Presently he is a freelance CBRN Security and Risk Mitigation Consultant based at Pune, India.*