

The Hazard of Hazardous Waste Management in India: A Legal Overview

Mr. Srinet Kothwale,

V.M.Salgaoncar College of Law, Miramar- Goa.

Affiliated to Goa University, Goa

Abstract

Industrial development is playing a pivotal role in India for its economic growth and employment potential. So also Industrialization and generation of Hazardous waste are inevitable scenarios. More thrust is on maximisation of production and recovery and minimal disposal. Certain specific sectors of industries which are predominant in India such as petrochemicals, pharmaceuticals, chemicals, fertilisers, textiles and general engineering produce majority of hazardous wastes. The Ministry of Environment, Forest and Climate Change, Government of India defines hazardous waste as any waste which due to its physical, chemical or biological composition is likely to harm health or environment whether alone or in contact with other wastes or substances. Due to its peculiar chemical composition, non scientific treatment and disposal of hazardous waste is posing serious threats to human life, the ecology and environment. For instance, hazardous waste that is openly dumped or stored may leach into the groundwater, thereby causing contamination of an aquifers and region's water supply which in turn have particularly serious consequences in agricultural produce and public water supply. Untreated HW contains serious contaminants like heavy metals and carcinogens which may even affect genes thereby posing coupling threat to future generations like reproductive abnormalities, physical deformities, permanent disorders and even deaths. HW is generated at every second in India coupled with import of HW as a raw material and for metal recoveries. Whereas series of limiting factors like lack of government will, lack of scientific and technical knowhow in respect of treatment and disposal, limitations in compliance and regulation, and limited trained and skilled stakeholders, the management of hazardous solid waste in the country is largely ineffective and India is struggling with the growing challenge of managing and implementing the Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2016 and the desired objectives of waste minimisation and disposal maximisation appears to be far away. This paper outlines the overview about the hazardous waste management in India, the legislative and regulatory framework and suggest the majors towards effective and efficient Hazardous waste management strategy.

Keywords: HW, Management, Regulations, etc

I. INTRODUCTION

Man has always either created or generated waste materials which are either by-product of his activities, for which he could not find any further use, or products which have reached the end of useful life and cannot be used furthermore. Although this process was going on throughout the ages, it was not a problem until recent times because nature's own waste treatment and disposal processes like dispersion, dilution and degradation, which took care of these problems has been overburdened. The modern industrial process today is not so simple. The issue is due to both quantitative and qualitative nature of the wastes which our industries are producing due to over increasing needs and demands.

A major fraction of the wastes generated in the World constitute the Industrial or Hazardous wastes. As the name suggests hazardous wastes clearly pose a threat or hazard to the environment. Till the mid-seventies hazardous waste (HW) was referred to special industrial waste or chemical waste. The degree of hazard posed might be different for different wastes, but it is not the only criteria to evaluate the impact of the hazard [1].

During the past few decades industrial sector in India have registered a quantum jump, which has contributed to high economic growth and employment but simultaneously it has also given rise to severe environmental pollution. For classification of any waste as hazardous, it is usually evaluated based on its attributes such as nature, composition, and inherent physical and chemical characteristics. Hazardous waste is a waste with properties that make it dangerous or potentially harmful to human health or the environment [2, 3]. Hazardous waste in India until 2016 was defined as "any substance, excluding domestic and radioactive wastes, which because of its quantity and/or corrosive, reactive, ignitable, toxic and infectious characteristics causes significant hazards to human health or environment when improperly treated, stored, transported and disposed". In a nutshell the characteristics, classification, source and possible impact of HW is indicated in following table:

| Hazard Classification | Sources | Characteristics | Impact on Environment & Human Health |
|-----------------------|---|--|--|
| Flammable/ Explosive | Biomedical research facilities, colleges and university laboratories, offices, hospitals, nuclear power plants, etc | This type of waste may cause damage to the surroundings by Producing harmful gases at high temperature and pressure or by causing fire hazards | Air Pollution, Fire, Explosion, etc |
| Oxidizing | Chemical Units, laboratories, Pesticides, Power Plants, etc | This type of waste may yield oxygen and thereby cause or contribute to the combustion of other | Severe Water Pollution, loss of crop, severe effects on acquatic life, |

| | | materials. | etc |
|----------------------------|--|--|--|
| Poisonous (Acute) | Chemical Industries, Radioactive and Nuclear Units, etc | These waste have high potential to cause death, serious injury or to harm health if swallowed, inhaled or by skin contact. | Loss of productivity of land ,Behaviour abnormalities, Cancer, Physiological malfunctions |
| Infectious Substances | Research and Development Organisations, Health care Units, Bio Tech Laboratories, Drugs manufacturing units, etc | These waste contain micro-organisms and their toxins, and responsible for diseases in animals or humans. | Loss of fertility of land, water contamination, Contageous diseases, |
| Corrosives | General Manufacturing Units | These wastes are chemically active and may cause severe damage to the flora and fauna, or to the other materials by direct contact with them. | Loss of productivity of materials, Water contamination, etc |
| Eco-toxic | Bio Technology Industries, R & D Units, etc | These wastes may present immediate or delayed adverse impacts to the environment by means of bioaccumulation and/or toxic effects upon biotic systems. | Genetic mutations, Physical deformations, Birth defects, etc |
| Toxic (Delayed or Chronic) | Chemical and Pharma Units, Pharma Units, Fertilizers Units, Tanneries, etc | These wastes, if inhaled or ingested or if they penetrate the skin, may cause delayed or chronic effects, including carcinogenicity | Soil contamination, loss of production, etc |
| Organic Peroxides | Plastic and Rubber Industries, etc | These are organic waste containing bivalent-O-O-structure and may | Water Pollution, |

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|--|--|---|--|
| | | undergo exothermic self-accelerating decomposition. | |
|--|--|---|--|

II. SCENARIO OF HAZARDOUS WASTE GENERATION IN INDIA :

As per the estimates of Central Pollution Control Board, annually around 7.46 mn metric tonnes (MT) of hazardous waste is generated from 43,936 industries in the country, of which land fillable waste is 3.41 mn MT (46%), incinerable is 0.69 mn MT (9%) and recyclable hazardous waste is 3.35 mn MT (45%). It is presumed that about 10 to 15% of waste produced by industries are hazardous and the generation of hazardous wastes is increasing at the rate of 10 to 15% per year. Hazardous industrial wastes in India can be categorised broadly into two categories:

i. Hazardous wastes produced from various industries in India. The major HW generating industries in India include petrochemicals, pharmaceuticals, pesticides, paint and dye, petroleum, fertilisers, asbestos, caustic soda, inorganic chemicals and general engineering industries. HW from these industrial sectors contains heavy metals, cyanides, pesticides, complex aromatic compounds and other chemicals, which are toxic, flammable, reactive, and corrosive or have explosive properties.

ii. Hazardous industrial wastes brought into India from foreign countries for recycling and re-processing. This can be even called as 'imported waste' which is used as raw material by some industries in India or Waste is used for mere recovery of metals.

III. LEGISLATORY AND REGULATORY FRAMEWORK IN INDIA

The need for protection and conservation of environment and sustainable use of natural resources is reflected in the constitutional framework of India and also in the international commitments of India. The Constitution under Part IVA (Art 51A-Fundamental Duties) casts a duty on every citizen of India to protect and improve the natural environment including forests, lakes, rivers and wildlife, and to have compassion for living creatures. Further, the Constitution of India under Part IV (Art 48A-Directive Principles of State Policies) stipulates that the State shall endeavour to protect and improve the environment and to safeguard the forests and wildlife of the country.

Several environment protection legislations existed even before Independence of India. However, the serious thrust for putting in force a well-developed framework came only after the UN Conference on the Human Environment (Stockholm, 1972). After the Stockholm Conference, the National Council for Environmental Policy and Planning was set up in 1972 within the Department of Science and Technology to establish a regulatory

body to look after the environment-related issues. This Council later evolved into a full-fledged Ministry of Environment and Forests and Climate Change (MoEF & CL).

MoEF & CL was established in 1985, which today is the apex administrative body in the country for regulating and ensuring environmental protection and lays down the legal and regulatory framework for the same. Since the 1970s, a number of environment legislations have been put in place. The MoEF& CL and the pollution control boards/Committees ("CPCB", i.e. Central Pollution Control Board and "SPCBs", i.e. State Pollution Control Boards and "PCC" Pollution Control Committee i.e. case of UT's) together form the regulatory and administrative core of the sector.

To regulate management of Hazardous Waste generated within the country as well as export/import of such waste, the Hazardous Wastes (Management and Handling) Rules, 1989 were notified under the Environment (Protection) Act, 1986. The Hazardous Waste Management Rules (1989) amended in the years 2000 & 2003 enable to identify hazardous wastes by means of industrial processes and waste streams in Schedule-1 and also by way of concentration of specified constituents of the hazardous waste in Schedule-2. List of wastes applicable for trans-boundary movements are provided in Schedule-3 (Part A). Hazard characteristics of waste have been defined in Part B of Schedule-3. Categories of wastes banned for export and import of HW have also been defined (Schedule-8). The procedure for registration of the recyclers/re-processors with environment sound technologies for processing waste categories such as used lead acid batteries, non-ferrous metal and used oil is contained in schedule-4 and schedule-5 respectively. In September 2008, the said rules were repealed and new rules entitled "Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2008 were notified to brought out a guide for manufacture, storage and import of hazardous chemicals and for management of hazardous wastes.. These rules were further amended in the year 2009 & 2010. The new Rules titled the Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016 were notified in 2016. Any waste, which by virtue of any of its physical, chemical, reactive, toxic, flammable, explosive or corrosive characteristics causes danger or is likely to cause danger to health or environment, whether alone or when in contact with other wastes or substances has been defined as hazardous[4,5]

The salient features of these Rules include The ambit of the Rules has been expanded by including 'Other Waste', Waste Management hierarchy in the sequence of priority of prevention, minimization, reuse, recycling, recovery, co-processing; and safe disposal has been incorporated, stringent approach for management introduced, simplification of all procedure of obtaining approvals , clear demarcation of role of authorities . The Ministry of Environment and Forests (MoEF & CC) and the pollution control boards: Central Pollution Control Board (CPCB) and State Pollution Control Boards (SPCBs) together form the regulatory and administrative core of the waste management sector in India [6].

IV. CONCLUSION

Scientific and Safe disposal of Hazardous Waste Management is relatively a new concept for most of countries including that of India. The lack of scientific, technical and financial resources and failure of stringent regulatory control for the enforcement of HW Management Rules has serious impact on the Ecology, Environment and lives.

Under Swachh Bharat Abhiyan of the Central Government, the plastic waste has taken a centre stage compared to any other waste like Bio Medical, E-Waste, Hazardous waste which are undoubtedly poses more threat to ecology and environment than plastic waste. The Ministry of Environment, Forests and Climate Change, Government of India has revamped the HW Rules and has introduced the Hazardous Waste Rules 2016 with more clarity and has specified the role and responsibilities upon various stakeholders. Moreover, Generation of HW in India is increasing exponentially with growth of Industrial production. So also existing Industries are expanding and new Industries are being set up which will add up HW. It is pertinent to note that the HW which is already generated by Industries and lying unattended at various Industrial Estates and in open area across India is unaccounted. Till today there is no exact data available with either Central government or any of State Government or its agencies regarding already existed HW, rate of generation of new HW and projected growth at which HW will be generated due to rapid industrialisation. The specific study of exact impact of HW due its non-treatment and disposal on the Ecology and Environment and moreover regarding irreparable damage already caused is not carried out. The majority of generator of HW which are industries are non-compliant. The highly scientific and Technical aspects involved in proper disposal of HW is a great challenge not only for generators of HW but more to regulatory authorities like SPCB's , CPCB, State and Central Government and also to law enforcing authorities like National Green Tribunal.

The absence of adequate infrastructure including common facilities for scientific disposal of HW, as well as limitations in enforcement for managing hazardous waste has resulted in ineffective management of the HW in India. Indeed, industrialized states such as Gujarat, Maharashtra, Tamil Nadu, and Andhra Pradesh face problems relating to rising quantities of hazardous waste . For example, Gujarat is one of the fastest-growing states for industrial development in India, with an increasing number of chemical, petrochemical, medicines and pharmaceuticals, textiles, pesticides, paper, and fertilizer industries. As a result, it is one of the highest producers of hazardous waste in the country. Untreated waste from these factories is the main cause of pollution in this highly industrialised state.

Other key challenges include lack of financial resources, a shortage of staff, a lack of standardized protocols, and a lack of authority. The Hazardous and Other Wastes (Management and Trans-boundary Movement) Rules 2016 provides that owners of hazardous waste disposal facilities are liable to pay financial penalties if the rules of transportation, storage, and recycling of such waste are not complied with, and may even be imprisoned due to negligence. The rules also specifically direct the state governments

to identify locations for the construction of hazardous waste treatment facilities. However, no new sites have been built since the new rules came into effect. Many states like Karnataka, Kerala, Punjab, and Orissa do not have hazardous waste treatment facilities.

In summary, it can be said that in the developing countries, the thrust on economic development is often given priority to production costs than the best available technology and this result in more waste generation. It is difficult to develop alternative technology for total elimination of hazardous waste generation, yet we can take measures for using alternative resource as solar energy, wind energy in the production process instead of using the electricity for the production, as that can cause less emission of hazardous waste there by moving towards green—non pollution. With that we can formulate policies and strategies towards prioritizing waste reduction and minimization rather than mere disposal. Remediation strategy needs to focus on the ‘polluter pays principle’ with the polluter being asked to pay penalty as well as costs of cleaning up the pollution. Industries causing pollution repeatedly should be blacklisted. Where polluters are not traceable, a dedicated fund needs to be created by State Pollution Control Board/Pollution Control Committee (SPCB/PCC) for remediation. With that Waste Exchange Banks/Collection Centres should be developed to provide information on wastes as on the types of waste and the methods to manage waste, to provide information on wastes, and promote reuse, recovery, and recycling technologies which upscale the quality of resource recovery. India’s growing economic development and industrialization poses significant risks to the environment and to public health, due to the resulting generation of hazardous waste, and its ineffective management.

It is suffice to say that we require a more stringent integrated and strategic waste prevention framework to effectively address wastage related issues. There is an urgent need to build upon existing systems instead of attempting to replace them blindly with models from developed countries. To prevent any epidemic and to make each city a healthy city-economically and environmentally, there is an urgent need for a well-defined strategic waste management plan and a strong implementation of the same in India.

V. SUGGESTIONS

With flagships programme like “Make in India”, “Digital India”, “Ease of Doing Business” and “Skill India” introduced by the Government of India, the economic scenario of India will grow further and manufacturing and Industrial sector will continue to remain a driving force. This also means India’s growing economic development and industrialization poses significant risks to the environment and to public health, due to the resulting generation of hazardous waste, and its ineffective management. Under such circumstances immediate proper attention is required during storage, segregation, transportation and disposal of hazardous waste, because it cannot be is disposed of by common means like other waste like municipal solid waste so as to achieved the desired result of safe and scientific disposal of Hazardous waste in India. The following are the

Major suggestions made for effective and efficient management of Hazardous waste and Rules thereof in India.

- i. Though the revamped Hazardous Waste Management Rules of 2016 has set guidelines to ensure prevention, minimisation, recycling and safe disposal of hazardous waste do required major amendments .The Central Government through Ministry of Environment, Forests and Climate Change may consider for amendment to the Rules of 2016 to include standard operating practice and Standardised protocol in respect of treatment and disposal of HW by the generator, inspection and enforcement mechanism by State Pollution Control Boards. This will enable the Central Government to have a uniformity and overall effective mechanism across India.
- ii. These new Rules do not have any provisions for treatment or disposal of existing HW i.e. already generated waste which is in tunes of lakhs of tonnes lying abandoned in various Industrial Estates/corridors or open space. First and foremost priority should be given for treatment and disposal of this existing waste in a safe and scientific manner.
- iii. These rules also requires amendment to the extent to make it mandatory for the applicant Industry to submit a Bank Guarantee while submitting application for Authorisation to the SPCB which will ensure that in the event the industry does not take corrective actions within the negotiated timeframe, it forfeits the guarantee to the SPCB. This financial threat will be a strong incentive for non-compliant industries to take corrective actions within the negotiated timeframe.
- iv. Third party monitoring by utilizing the services of panel of experts outside the regulatory mechanism has shown great results in the developed countries like USA. The Rules shall provide a specific third Monitoring Mechanism or surprise Check being subject of HM management is highly scientific and technical in nature.
- v. There has been technological advancement for processing, treatment and disposal of solid waste. Energy-from-waste is a crucial element of solid waste management because it reduces the volume of waste from disposal also helps in converting the waste into renewable energy. Thus Waste to Energy Plant shall be given an independent identity as Industry thereby inviting investment in this sector on public private partnership or annuity or under any economic model for a viability of such units in India.

- vi. Stringent penal provisions are a must which can deter erring parties from violating rules. The Hazardous Wastes Rules do not have a deterrent mechanism such as imposing fines or penalties that could be imposed on non-complying industries. Powers through requisite amendment in the Environment Protection Act, 1986 shall be made to empower SPCBs and CPCB to impose penalties and fines under the polluters pay and precautionary principle.
- vii. Strengthening of regulatory mechanism:
Certain periodic challenges like a lack of financial resources, a shortage of staff, a lack of standardized protocols, and a lack of legal authority to enforcement authorities are directly associated with improper hazardous waste disposal and enforcement. The Government of India shall devise a “general enforcement sequence” for all SPCBs to maintain uniformity in its enforcement and taking all environmental cases to its logical conclusions. In furtherance of this all posts lying vacant in National Green Tribunal and State Pollution Control Boards should be filled immediately. A special division should be set up in all SPCBs in line with CPCB. Also all dormant circuit bench of NGT shall be made operational with immediate effect so that all pending cases of Environmental damages including HW management are disposed of.
- viii. Implementation of Success stories:
The HWM aspects did not differentiate between developed, developing and under developed countries and all were placed in equal footings in terms of its science, technology and legal aspects. It’s encouraging to know that there are various success stories in management of HW in the European Union, where certain types of HW can be used as an alternate fuel. The Government of India may devise a suitable policy in this regards.
- ix. Infrastructure development for public health and protection of the environment:
The State Government shall mandatorily earmarked a plot of sufficient area in every Industrial Estate /Zone /Corridor/SEZ exclusively for setting up of common facilities for disposal of HW. Necessary infrastructure towards the same to be provided by concerned State Governments and the facility could be given a legal status like a society wherein every generator of HW in the area shall be a member who will dispose of its HW in this facility. This will reduce burden on Individual unit to dispose of its HW due to space constraints and also save cost on setting up of individual facility. This could be also run with active participations of local bodies and NGOs.

- x. Specific Ban or Moratorium to be imposed on import of Hazardous waste in India:
Considering the fact that industries operating in India have already generated HW out of which substantial quantum is lying unattended and huge amount of waste is generated every second such import of HWs clearly camouflaging the definition of HWs into something which is not a waste. Thus the most pragmatic approach would be to impose a moratorium or ban for certain period like say five years for import of HW India so as to prevent India being used as a 'Dumping Destination' in garb of 'Recycling Destination'.
- xi. Implementation of Compulsory Hazardous waste management plan with top down approach shall be laid down by Government of India to make all the authorities and generator accountable.
- xii. Setting up of common Hazardous waste treatment facility in every District of India:
Industries being the major employer in India are set up in every District of India and so does the generation of hazardous waste. Steps should be taken to set up common Hazardous waste treatment facility in each District of India with strict monitoring of these facilities by implementation of Hazardous waste management plan and individual facilities / self disposal method should be discouraged because a systematic operational approach would naturally lack. And that would lead to air, water, soil and underground water pollution. Therefore, quality attention, management and monitoring is possible only in common treatment facility.

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