

Hazardous waste
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A solid waste or combination of solid wastes that, because of quantity, concentration or physical, chemical or infectious characteristics, may cause or significantly contribute to an increase in mortality or an increase in serious, irreversible, or incapacitating reversible illness or pose a substantial hazard to human health or the environment when improperly treated, stored, transported, disposed or otherwise managed.

World Health Organization (WHO, 1993): defines

" Environmental health comprises those aspects of human health, including quality of life, that are determined by physical, chemical, biologic, social, and psychosocial factors in the environment." And any external factor that negatively affects your health can be considered an environmental health hazard.

CHAPTER-2 CATEGORIES OF HAZARDOUS WASTE AND THEIR CHARACTERISTICS

2. 1 Categories of hazardous waste and their characteristics

India is the first country that has made constitutional provisions for protection and improvement of the environment. In the Directive Principles of State Policy of the Constitution, Article 48-A of Chapter IV enjoins the state to make endeavor for protection and improvement of the environment and for safeguarding the forest and wild life of the Country. In Article 51 A (g) of the Constitution, one of the fundamental duties of every citizen of India is to protect and improve the natural environment including forests, lakes, rivers and wild life and to have compassion for living creatures. In order to manage hazardous waste (HW), mainly solids, semi-solid and other Industrial wastes which are not covered by the Water & Air Acts, and also to enable the

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authorities to control handling, treatment, transport and disposal of waste in an environmentally sound manner, Ministry of Environment & Forests (MoEF). Government of India notified the Hazardous Waste (Management & Handling) Rules (HWM Rules) on July 28, 1989 under the provisions of the Environment (Protection) Act, 1986 and was further amended in the year 2000 & 2003. These amendments enable to identify hazardous wastes by means of industrial processes and waste streams in Schedule I and also by way of concentrations of specified constituents of the hazardous waste in Schedule II. The procedure for registration of the recyclers /reprocessors with environmentally sound facilities for processing waste categories such as used lead acid batteries, non-ferrous metal and used oil as contained in schedule-4 and schedule-5 respectively has also been laid down. Further, separate Rules have also been notified in continuation of the above Rules for bio-medical wastes as well as used lead acid batteries

2. 2 Hazardous waste categories

Waste Categories	Type of waste	Regulatory Quantities	Waste Category No
1	Cyanide waste	1 kilogram's per year calculated as cyanide	Waste Category No 1
No 2	Metal finishing waste	10 kilogram's per year the sum of the specified substance calculated as per metal	Waste Category No 2
No 3	Waste containing water soluble chemical compounds of lead, copper, zinc, chromium and antimony	10 kilogram's per year the sum of the specified substance calculated as per metal.	Waste Category No. 3
No. 4	Mercury, Arsenic, Thallium and Cadmium bearing wastes.	5 kilogram's per year the sum of the specified substance calculated as pure metal.	Waste Category No. 4
No. 5	Non-halogenated hydrocarbons including solvent.	200 kilogram's per year calculated as non-	Waste Category No. 5

halogenated hydrocarbons. Waste Category No. 6 Halogenated hydro-carbon including solvents 50 kilograms per year calculated as halogenated hydrocarbons. Waste Category No. 7 Wastes from paints, pigments, glue, varnish and printing ink. 250 kilogram's per year calculated as oil or oil emulsions. Waste Category No. 8 Wastes from Dyes and Dye intermediate containing inorganic chemical compounds. 200 kilogram's per year calculated as inorganic chemicals. Waste Category No. 9 Wastes from Dyes and Dye intermediate containing organic chemical compounds. 50 kilogram's per year calculated as organic chemicals. Waste Category No. 10 Waste oil and oil emulsions. 1000 kilogram's per year calculated as oil and oil emulsions. Waste Category No. 11 Tarry wastes from refining and tar residues from distillation or prolytic treatment. 200 kilogram's per year calculated as tar Waste Category No. 12 Sludges arising from treatment of waste waters containing heavy metals, toxic organics, oils emulsions and spend chemical and incineration ash. irrespective of any quantity. Waste Category No. 13 Phenols. 5 kilogram's per year calculated as phenols. Waste Cat No. 14 Asbestos. 200 kilogram's per year calculated as asbestos. Waste Category No. 15 Wastes from manufacturing of pesticides and herbicides and residues from pesticides and, herbicides formulation units. 5 kilogram's per year calculated as pesticides and their intermediate products. Waste Category No. 16 Acid/Alkaline/Slurry 200 kilogram's per year calculated as Acids/Alkalies. Wastes Category No. 17 Off-specification and discarded products. Irrespective of any quantity. Wastes Category No. 18 Discarded containers and Containers linear of hazardous and toxic wastes. Irrespective of any quantity

2.3 Convention of Hazardous waste

Hazardous waste management is a new concept for most of the Asian countries including India is a Party to the Basel Convention on transboundary movement of hazardous wastes. The basic objectives of the Basel Convention are control and reduction of transboundary movements of hazardous and other wastes subject to the Basel Convention, prevention and minimization of their generation, environmentally sound management of such wastes and active promotion of the transfer and use of cleaner technologies.

As a Party to the Convention, India is obliged to regulate and minimise the import of Hazardous Waste or other wastes for disposal or sham re-cycling and also to prohibit export of waste to Parties, which have prohibited the import of such wastes. Further, hazardous waste generated in the country is also required to be managed in an environmentally sound manner. India, as a Party, can prevent the import of hazardous waste or other waste if it has reason to believe that the waste in question will not be managed in an environmentally sound manner.

The lack of technical and financial resources and the regulatory control for the management of hazardous wastes in the past had led to the unscientific disposal of hazardous wastes in India, which posed serious risks to human, animal and plant life.

Characteristic of wastes

Characteristic Hazardous Wastes are defined as wastes that exhibit the following characteristics: ignitability, corrosivity, reactivity, or toxicity.

Ignitability

Ignitable wastes can create fires under certain conditions, are spontaneously combustible, or have a flash point less than 60 °C (140 °F). Examples include waste oils and used solvents. Test methods that may be used to determine ignitability include the Pensky-Martens Closed-Cup Method for Determining Ignitability, the Setaflash Closed-Cup Method for Determining Ignitability, and the Ignitability of Solids.

Corrosive

Corrosive wastes are acids or bases (pH less than or equal to 2, or greater than or equal to 12.5) that are capable of corroding metal containers, such as storage tanks, drums, and barrels. Battery acid is an example. The test method that may be used to determine corrosivity is the Corrosivity Towards Steel (Method 1110A) (PDF).

Reactivity

Reactive wastes are unstable under "normal" conditions. They can cause explosions, toxic fumes, gases, or vapors when heated, compressed, or mixed with water. Examples include lithium-sulfur batteries and explosives. There are currently no test methods available.

CHAPTER-3 HEALTH RISK RELATED HAZARDOUS WASTE

Who can come into contact with it?

Occupations (and others) that may be exposed to offensive/hygiene wastes include: collection workers/loaders; pickers hand sorting on picking lines/conveyor belts of materials recovery facilities (MRFs); maintenance

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engineers/employees working on conveyor belts of MRFs where waste is sorted or equipment used to shovel waste material onto conveyors; vulnerable members of the public (eg children or elderly people).

Risk assessment

It is a legal requirement for employers to carry out a risk assessment of their specific activities to identify where control measures need to be put in place. Risk assessment should be used to carry out this process by: identifying the hazards; identifying those potentially at risk; assessing the risks from those hazards. Where assessment shows that risk is not adequately controlled then steps should be taken to control the risk of injury and ill health. Control of risk should follow the hierarchy set out in the Control of Substance Hazardous to Health Regulations 2002, ie use of engineering controls, work processes and systems of work in preference to reliance on personal protective equipment. Vaccination, where appropriate, should also be considered as an additional control measure.

3. 1 Health risk associated with Hazardous waste:

Uncontrolled disposal sites containing hazardous waste and other contaminants have created national environmental problems. Because of potential health problems associated with the more than 33, 000 hazardous-waste sites in the United States, the Agency for Toxic Substances and Disease Registry (ATSDR) mention some toxic impact on human health. Since 1986, ATSDR has conducted public health assessments for more than 1200 of the nearly 1300 sites identified on the Environmental Protection Agency's National Priorities List (NPL) and has conducted more than 85 health-study activities. In addition, ATSDR has evaluated the chemicals that <https://assignbuster.com/hazardous-waste-managements-national-and-international-environmental-sciences-essay/>

pose the greatest human health hazards at NPL sites; the list of 275 hazardous substances was selected for their toxicity. According to exposure of hazardous chemicals human health effect can be divided into two was Occupational health hazards health hazards due to environmental contaminations

Occupational hazards associated with waste handling

Infections

Skin and blood infections resulting from direct contact with waste, and from infected wounds. Eye and respiratory infections resulting from exposure to infected dust, especially during landfill operations. Different diseases that results from the bites of animals feeding on the waste. Intestinal infections that are transmitted by flies feeding on the waste.

Chronic diseases

Incineration operators are at risk of chronic respiratory diseases, including cancers resulting from exposure to dust and hazardous compounds.

Accidents

Infecting wounds resulting from contact with sharp objects. Poisoning and chemical burns resulting from contact with small amounts of hazardous chemical waste mixed with general waste. Burns and other injuries resulting from occupational accidents at waste disposal sites or from methane gas explosion at landfill sites. Bone and muscle disorders resulting from the handling of heavy containers.

3. 2 Health hazards associated with environmental contaminations

Toxicants

Source of contamination

Health effect

Pesticides

Run-off from farms, backyards, and golf courses contain pesticides such as DDT. Leachate from landfill sites is another major contaminating source. Its effects on the ecosystems and health are endocrine and reproductive damage in wildlife. Groundwater is susceptible to contamination, as pesticides are mobile in the soil.

The organophosphates and the carbonates present in pesticides affect and damage the nervous system and can cause cancer. Some of the pesticides contain carcinogens that exceed recommended levels. They contain chlorides that cause reproductive and endocrinal damage.

Synthetic organics

Many of the 100 000 synthetic compounds in use today are found in the aquatic environment and accumulate in the food chain. POPs or Persistent organic pollutants, represent the most harmful element for the ecosystem and for human health, for example, industrial chemicals and agricultural pesticides. These chemicals can accumulate in fish and cause serious damage to human health. Where pesticides are used on a large-scale, groundwater gets contaminated and this leads to the chemical contamination of drinking water.

Benzene and other petrochemicals can cause cancer even at low exposure levels.

Lead.

Pipes, fittings, solder, and the service connections of some household plumbing systems contain lead that contaminates the drinking water source.

Lead is hazardous to health as it accumulates in the body and affects the central nervous system. Children and pregnant women are most at risk.

Fluoride.

Fluoride in the water is essential for protection against dental caries and weakening of the bones, but higher levels can have an adverse effect on health. In India, high fluoride content is found naturally in the waters in Rajasthan.

Excess fluorides can cause yellowing of the teeth and damage to the spinal cord and other crippling diseases

Arsenic

Arsenic occurs naturally or is possibly aggravated by over powering aquifers and by phosphorus from fertilizers. High concentrations of arsenic in water can have an adverse effect on health. A few years back, high concentrations of this element was found in drinking water in six districts in West Bengal. A majority of people in the area was found suffering from arsenic skin lesions. It was felt that arsenic contamination in the groundwater was due to natural causes.

Arsenic poisoning through water can cause liver and nervous system damage, vascular diseases and also skin cancer.

heavy metals

Industrial waste, mining waste

Some heavy metals like mercury can able to bio magnify through their food chain

Electronic waste

Discarded part of computer, electronic appliances, burning of mother board for harvesting heavy metals like gold and silver. The ash contain several persistent pollutant like chlorinated and brominated compounds contaminate soil and also ground water.

Dioxin originate from incineration contaminate air

Short-term exposure of humans to high levels of dioxins may result in skin lesions, such as chloracne and patchy darkening of the skin, and altered liver function. Long-term exposure is linked to impairment of the immune system, the developing nervous system, the endocrine system and reproductive functions.

3. 3 Case Study

3. 3. 1 International incident of hazardous waste

Large amounts of dioxins were released in a serious accident at a chemical factory in Seveso, Italy, in 1976. A cloud of toxic chemicals, including 2, 3, 7, 8-Tetrachlorodibenzo-p-dioxin, or TCDD, was released into the air and eventually contaminated an area of 15 square kilometers where 37 000

people lived. Extensive studies in the affected population are continuing to determine the long-term human health effects from this incident. In 1999, high levels of dioxins were found in poultry and eggs from Belgium. Subsequently, dioxin-contaminated animal-based food (poultry, eggs, pork), were detected in several other countries. Several fatal risk like adverse birth outcomes in populations living near landfill sites of Great Britain was observed. In July 2007, the European Commission issued a health warning to its Member States after high levels of dioxins were detected in a food additive - guar gum - used as thickener in small quantities in meat, dairy, dessert or delicatessen products. The source was traced to guar gum from India that was contaminated with pentachlorophenol (PCP), a pesticide no longer in use. PCP contains dioxins as contamination. In the year of 2001, Polybrominated diphenyl ether has been detected among workers at an electronic waste dismantling region in Guangdong, China. Beside this Minamata incident due to accumulation of methyl mercury in food chain is well known hazardous waste in early sixties

CHAPTER-4 CONCLUSION

4. 1 Hazardous waste management:

Waste Avoidance and Waste Minimisation

Technology shifting

The paper and pulp industry can shift to elemental chlorine free bleaching

Mercury cell based caustic soda plant can shift to membrane cell process unit

Dye manufacturing, pesticide industries can recover solvent for further production

Recycling of Hazardous Waste

Electronic waste can be recycled

Recycling of non-ferrous metallic wastes such as zinc dross, brass dross, used lead acid batteries, copper oxide mill scale and used lubricating oil offer attractive options for resource recovery

Safe disposal of Hazardous Waste Generated

Depending on the waste category, land disposal or incineration could be adopted. Design and operation of such facilities, either captive or common need to strictly adhere to the guidelines.

Setting up of Common Facilities

Interstate transportation of Hazardous Wastes

Use of Cement Kilns for HW incineration

Installation of common effluent treatment plant for small scale red categories industry

Personal hygiene

The most common way that micro-organisms and other harmful substances enter the body is by: eating, drinking or wiping the face with contaminated hands or gloves; through cuts, scratches or penetrating wounds such as injuries from hypodermic needles; through the surfaces of the eyes, nose and mouth; _by breathing them. Good personal hygiene when handling hygiene wastes is crucial and will reduce the residual hazards that can lead to ill health. This is likely to include: _ a clearly defined personal hygiene regime for all employees. It is essential that employees wash their hands before eating, drinking, smoking or using the phone, taking medication, inserting contact lenses or before wearing gloves, using the toilet or after becoming contaminated with infected material. The Department of Health recommended good practice for hand washing is ' wet, soap, wash, rinse, dry'Providing adequate hand washing facilities including mild soap. Avoid strong or abrasive cleansers that can cause irritant dermatitis; Provision and use of appropriate protective clothing, especially gloves and safety boots. Select appropriate personal protective clothing for the job and ensure that employees use them; Reporting any cases of ill health to the organisation's occupational health department. It is also important to ensure that if employees need to visit their doctor they let them know about their work activities.

Vaccination

Where effective vaccines are available against micro-organisms to which employees may be exposed, then employers are required to make them available, free of charge, to employees. Employees should be informed of the benefits and drawbacks of both vaccination and non-vaccination. It is recommended that employers keep a vaccination record. Remember that although it is a useful additional measure, vaccination/inoculation is not a substitute for other control measures.

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