



TOPIC 1: RELEVANT REGULATIONS IN HAZARDOUS WASTE MANAGEMENT

Content: Municipal solid waste and hazardous waste (management and handling), biomedical waste handling rules, batteries (management and handling), fly ash rules

ABSTRACT

This module gives an introduction to the rules and regulations governing management of different types of waste.

IITM-EWRE

Solid and Hazardous Waste Management

USEPA defines **Hazardous Waste** as waste that is dangerous or potentially harmful to our health or environment. Hazardous wastes can be liquid, solid, gaseous or sludge. They can be discarded commercial products, by-products from industries, or from households.

This module gives a brief introduction to the different kinds of waste and guidelines for waste management practices.

Hazardous Waste includes many different toxic chemicals (organic compounds as well as metals). They require complex treatment processes. Some of the commonly known priority chemicals are polychlorinated biphenyls (PCBs), furans, polyaromatic hydrocarbons (PAHs); and toxic metals include lead, cadmium, chromium, mercury. These pose serious health hazards and their migration must be contained.

- Further reading on Priority Chemicals (PCs):
 - <http://www.epa.gov/osw/hazard/wastemin/priority.htm>

Municipal Solid Waste Landfills (MSWLFs) receive household waste. MSWLFs can also receive non-hazardous sludge, industrial solid waste, construction debris. Some of the governing regulations are:

- Location: MSWLFs to be built away from faults, wetlands, plains, farmlands
- Composite liner: A geomembrane liner to protect groundwater and underlying soil
- Leachate removal and collection systems: Removes leachate from landfill
- Operation and management: Covering waste frequently with few inches of soil – to protect human and animal health
- Groundwater monitoring: To ensure materials have not escaped from landfill
- Closure and post-closure: Covering landfills and constant monitoring
- Corrective action: Control and clean-up discharges from landfill – to protect groundwater
- Financial assistance: Funding to maintain the landfill and the surrounding environment

Municipal Solid Waste Generation Quantity in Indian Cities:

It has been estimated that urban India generates about 188,500 tons of municipal solid waste per day, at a per capita generation of 500 grams per day.

Suggested Reading: *Sustainable Solid Waste Management in India*. Earth Engineering Center (EEC), Waste-To-Energy Research & Technology Council (WTER), Columbia University. 2011.

Hospital Waste is produced by hospitals, clinics, veterinary hospitals, dental practices and so on. Medical waste is mostly incinerated. However, burning of waste leads to air pollution; it must be seen if the resulting air emissions are well within the standards for that area. Open dumping of medical waste is not advised, as it will contribute to spread of diseases. There are some alternatives to incineration of medical waste:

- Thermal treatment (such as microwave)
- Steam sterilization
- Electropyrolysis
- Chemical treatment

Batteries contain heavy metals (mercury, zinc, nickel, cadmium) and improper disposal of batteries will contaminate the environment. It is important to recycle batteries:

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- Lead-acid (wet) batteries can be recycled. The battery is crushed into pieces, following which the plastic is reclaimed and processed into new plastic products; while the purified lead is used in battery manufacturing and other industries.
- Dry cell batteries (used in household items such as flashlight) contain zinc, mercuric oxide, silver oxide and lithium. The heavy metals can be reclaimed in this case as well.

Fly ash is the residue from combustion of coal is usually captured by the use of pollution control technology such as scrubbers. Fly ash constitutes the majority of particulate matter; and poses a significant problem when it mixes with groundwater (as leachate from landfills). USEPA has recently approved the use of fly ash in concrete, and this can be seen in a favourable light (sustainable materials management).

- The article can be found at:
 - http://www.worldcement.com/news/environmental/articles/EPA_approves_use_of_flyash_in_concrete_868.aspx#.U7TIFPmSwu8

Plastic Waste must be recycled – the repercussions of indiscriminate dumping of plastic waste has been made very clear. Plastic is recycled according to the resin type – it is shredded, the impurities eliminated, the remaining material is extruded into pellets and then used to manufacture other products. The most common one is PET (polyethylene terephthalate) bottle recycling – the mineral water bottle for instance.

Hazardous Waste Management Guidelines

Guidelines for Generator of Hazardous Waste

1. To keep a complete record of the types, quantities and characteristics of waste.
2. To segregate hazardous waste from non-hazardous waste at source.
3. To transport hazardous waste only through the specified and registered transporters.
4. To fulfill the pre-transport requirements before transporting hazardous waste.
5. To dispose of hazardous waste only at the notified disposable facilities.
6. The regulatory authorities shall ask the occupier or generator to submit quarterly reports.
7. The authorities should ensure that the occupier/generator sends a copy of the manifest to them as soon as the hazardous wastes is shipped for ultimate disposal.
8. The regulatory authorities may allow the occupier/generator to store his hazardous waste on-site provided that:
 - The waste is stored in the specified containers and occupier/generator follows the requirements for storing in the containers.
 - The date upon which each period of storage begins is clearly marked and visible on each container.
 - While being stored on-site, each container is labelled or marked with the words "**HAZARDOUS WASTE**", both in English and respective local language.
9. The regulatory authorities may allow the occupier/generator to store his hazardous waste on-site a maximum quantity of 10,000 kg or a truckload – whichever is less for a maximum period of 90 days.
10. If an occupier/generator generates less than 1,000 kg of hazardous waste in a month, he may be considered as a small quantity generator. Such type of generators may be allowed to store their waste on-site for a maximum period of 180 days. In any case, the quantity of waste should not exceed 6,000 kg at any given point of time.

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11. The regulatory authorities may provide an extension in the storage period to the occupier, on case-by-case basis, provided that:
 - An occupier/generator who generates less than 1000 kg of hazardous waste in a month and who transports his waste more than a distance of 500 km for off-site storage, treatment and/ or disposal may be allowed to store hazardous waste on-site for a maximum period of 270 days at the discretion of regulatory authorities. In any case the quantity of waste should not exceed 10,000 kg at any given point of time.
12. To ensure that the occupier/generator disposes their waste only in the notified disposal facilities.
13. In case of any unforeseen, temporary, and uncontrollable circumstances, the regulatory authorities may grant an extension to 90-day or 180-day or 270-day in the on-site period up to a maximum period of 30 days, after receiving written application from the occupier/generator.
14. An occupier/generator who generates less than 1000 kg of hazardous waste or more than 10,000 kg; or store hazardous waste more than 90 days or 180 days or 270 days, as the case may be; should be considered as an operator of a storage facility, unless an extension has been provided by the regulatory authorities.
15. An occupier may be allowed to store not more than one day's quantity of semi-solid hazardous waste at a time in containers near the source/point of generation, which is under the control of the operator generating the waste. In any case, the container should have marking of the words **"HAZARDOUS WASTE"** both in English and respective local language.
16. At all times there must be at least one employee either on the premises or on call with the responsibilities for coordinating all emergency response measures.
17. To inspect the on-site storage areas for proper storage.
18. In order to track the hazardous waste from the source of generation to the final disposal points, the regulatory authorities should introduce the manifest system. This system should not only help the regulatory authorities in tracking the hazardous waste but also ensure the safe disposal of the waste. The manifest system would serve as a "chain of custody" document. Every time the shipment changes hands, those responsible sign the manifest.

Guidelines for Transportation of Hazardous Waste

1. Transportation of hazardous waste being the important link in hazardous waste management system, it requires precise control to ensure safe disposal of such wastes. Therefore, it would be prudent to consider registering the transporters of hazardous waste with the Department of Environment & Forests, in addition to the Department of Transport. This would enable the Ministry of Environment and Forests/ respective State Pollution Control Boards to ensure safe and secured transport of hazardous wastes.
2. To ensure that the occupier/generator transport their hazardous waste only in the specified transport vehicles.
3. The transporters should be asked to train the drivers and helpers of hazardous waste transport vehicles to handle the wastes under emergency situations.

Guidelines for Owner/ Operator of Hazardous Waste Storage, Treatment and Disposal Facility

1. Licensing system: The regulatory authorities may issue a consent to an owner/operator of a facility who can demonstrate his technical, financial and managerial competence; and that his staff is properly

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trained. The authorities shall specify in the consent, the weights which a facility can receive, the operational conditions which must be met, the monitoring and control procedures to be carried out and the records which must be kept. Along with the application for consent, the following information should be furnished by the owner/operator of a facility:

- Area required for the facility
 - Types of wastes to be handled, stored, treated and/or disposed
 - Facilities available for managing these wastes
 - Environment Impact Assessment of the area where the activity has been proposed
 - Contingency plan of the facility
2. The regulatory authorities should ensure that the owner/ operator of a facility has the necessary equipment for fire control, decontamination, water spray and internal communication or alarm systems capable of meeting any emergency situation at the facility.
 3. Establishment of standards: The regulatory authorities should identify the Principal Organic Hazardous Constituents (POHCs) in the waste and fix standards for stack emission of POHC from the incinerator. The effluent and ground water quality should be monitored regularly. The records of the facility should be checked regularly.
 4. Post-closure care and use of property: The post closure-care for each hazardous waste storage, treatment, and/ or disposal facility should begin after closure of the facility and the regulatory authorities must ensure that post-closure monitoring continues for 30 days from date of closure. The local or state administrative body should be held responsible for post-closure care.
 5. To ensure that the copy of the manifest reaches the authorities after receiving the hazardous waste from the occupier/ generator. The owner/ operator should indicate the proposed treatment and disposal scheme to be followed for the hazardous waste. This copy of the manifest should be linked with the copy of the manifest sent by the occupier/generator.

Source: Ministry of Environment & Forests, India <http://www.envfor.nic.in/citizen/specinfo/hsmg.html>