
UNIT 7 BIO-MEDICAL AND SOLID WASTE POLLUTION

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7.1 INTRODUCTION

Hazardous waste means any waste, that because of characteristics, such as physical, chemical, biological, reactive, toxic, flammable, explosive or corrosive, causes danger to health, or the environment. It comprises the waste generated during the manufacturing processes of commercial products such as industries involved in petroleum refining, production of pharmaceuticals, petroleum, paint, aluminium, electronic products etc. Hazardous wastes could be highly toxic to humans, animals and plants and are highly inflammable or explosive. Hazardous wastes are classified based on their biological, chemical, and physical properties. These properties generate materials that are toxic, reactive, ignitable, corrosive, infectious, or radioactive. India generates around 7 million tonnes of hazardous waste every year. Household waste that can be categorized as hazardous waste includes old batteries, shoe polish, paint tins, old medicines, and medicine bottles. In this unit, we will be discussing the important provisions of the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016, the Bio-Medical Waste (Management and Handling) Rules, 1998 and the Bio-medical Waste Management Rules, 2016 and the Solid Waste Management Rules, 2016.

7.2 OBJECTIVES

After studying this unit, you should be able to:

- explain the provisions of the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016;

- explain the provisions of the Bio-Medical Waste (Management and Handling) Rules, 1998 and the Bio-medical Waste Management Rules, 2016; and
- explain the features of the Solid Waste Management Rules, 2016.

7.3 HAZARDOUS WASTE MANAGEMENT RULES

Under the provision of the Environment (Protection) Act, 1986, the Ministry of Environment, Forest and Climate Change (MoEF & CC) promulgated Hazardous Waste (Management and Handling) Rules, 1989. Hazardous Waste Management Rules are notified to ensure safe handling, generation, processing, treatment, package, storage, transportation, use, reprocessing, collection, conversion, and offering for sale, destruction and disposal of hazardous waste. In 2008, Hazardous Waste (Management and Handling) Rules, 1989 were amended and a new rule titled "Hazardous waste (Management, Handling and Transboundary Movement) Rules, 2008" was promulgated. Subsequently, these rules were amended in the years 2009 & 2010 to enable proper management and handling of hazardous waste in the country. We have discussed in the other unit of this course the Basel Convention on transboundary movement of hazardous waste and India has also ratified the Basel convention. Hazardous waste management rules have been amended to include other wastes such as Waste tyres, paper waste, metal scrap, used electronic items, etc. and also to reduce the movements of hazardous waste between nations.

In exercise of the powers conferred by sections 6, 8 and 25 of the Environment (Protection) Act, 1986 (29 of 1986), and in supersession of the Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008, except as respects things done or omitted to be done before such supersession, the Central Government notified the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.

These rules shall apply to the management of hazardous and other wastes. However, it shall not apply to wastewater and exhaust gases, wastes arising out of the operation from ships beyond five kilometres of the relevant baseline, radioactive wastes, bio-medical wastes and Municipal solid wastes. The Rules lay down corresponding duties of various authorities such as MoEF, CPCB, State/UT Govts., SPCBs/PCCs, DGFT, Port Authority and Custom Authority while State Pollution Control Boards/Pollution Control Committees have been designated with wider responsibilities touching across almost every aspect of Hazardous wastes generation, handing and their disposal. Hazardous Waste Management Rules provide for an effective inventorization and controlled handling, generation, collection, treatment, transport storage and disposal of hazardous wastes. Non-compliance or contradiction of any section of these rules is punishable under EPA, 1986.

Important provisions of the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016

1. Responsibilities of the occupier for management of hazardous and other wastes

The occupier and the operator of a facility shall be responsible for the proper collection, reception, treatment, storage and disposal of hazardous wastes. It shall be the responsibility of the occupier and the operator of a facility, to take all steps to ensure that the wastes listed in the schedules are properly handled, and disposed of without any adverse effects on the environment. For the management of hazardous and other wastes, an occupier shall follow the following steps, namely: (a) prevention; (b) minimization; (c) reuse, (d) recycling; (e) recovery, utilization including co-processing; (f) safe disposal. Indeed, the occupier shall be responsible for safe and environmentally sound management of hazardous and other wastes. The occupier shall take all the steps while managing hazardous and other wastes to contain contaminants and prevent accidents and limit their consequences on human beings and the environment; and provide persons working on the site with appropriate training, equipment and the information necessary to ensure their safety.

2. Responsibilities of State Government

Department of Industry in the State or any other government agency authorized by the State Government, ensure earmarking or allocation of industrial space or shed for recycling, pre-processing and other utilization of hazardous or other waste in the existing and upcoming industrial park, estate and industrial clusters.

As regards the welfare and safety of the workers, the Department of Labour in the State or any other government agency authorized by the State Government shall ensure recognition and registration of workers involved in recycling, preprocessing and other utilization activities. Further, the department undertakes industrial skill development activities for the workers involved in recycling, pre-processing and other utilization. It also undertakes annual monitoring to ensure the safety and health of workers involved in recycling, pre-processing and other utilization.

3. Grant of authorization for managing hazardous and other wastes

Every occupier of the facility who is engaged in handling, generation, collection, storage, packaging, transportation, use, treatment, processing, recycling, recovery, pre-processing, co-processing, utilization, offering for sale, transfer or disposal of the hazardous and other wastes shall be required to make an application to the State Pollution Control Board and obtain an authorization from the SPCB.

The authorized actual user of hazardous and other wastes shall maintain records of hazardous and other wastes purchased in a passbook issued by the State Pollution Control Board along with the authorization.

4. Power to suspend or cancel an authorization

The State Pollution Control Board may suspend or cancel an authorization if the holder of the authorization has failed to comply with any of the conditions of the authorization or with any provisions of the Act or these rules.

5. Import and Export of Hazardous and Other Wastes

The import of hazardous and other wastes from any country shall be permitted only for recycling, recovery, reuse and utilization including co-processing. Import of hazardous and other wastes from any country to India for disposal shall not be permitted. The export of hazardous and other wastes from India listed in Part A and Part B of Schedule III and Schedule VI shall be with the permission of the Ministry of Environment, Forest and Climate Change.

6. Treatment, Storage and Disposal Facility for Hazardous and Other Wastes

The State Government, occupier, operator of a facility or any association of occupiers shall individually or jointly be responsible for the identification of sites for establishing the facility for treatment, storage and disposal of the hazardous and other waste in the State.

7. Packaging, Labelling, and Transport of Hazardous and Other Wastes

Any occupier handling hazardous or other wastes and operator of the treatment, storage and disposal facility shall ensure that the hazardous and other wastes are packaged in a manner suitable for safe handling, storage and transport as per the guidelines issued by the Central Pollution Control Board from time to time.

8. Liability and Compensation

The occupier, transporter and operator of a facility shall be liable for damages caused to the environment resulting due to improper handling and disposal of hazardous waste listed in the schedule.

7.4 BIO-MEDICAL WASTE MANAGEMENT RULES

7.4.1 The Bio-Medical Waste (Management and Handling) Rules, 1998

The Bio-medical Waste (Handling and Management) Rules, 1998 were notified by the Ministry of Environment & Forests (MoEF) under the Environment (Protection) Act, 1986. These rules aim to streamline the process of waste segregation, collection, treatment and disposal. These rules apply to all persons who generate, collect, receive, store, transport, treat,

dispose, or handle bio-medical waste in any form.

1. Definitions

The following are the key terms defined in the Bio-medical Waste (Handling and Management) Rules, 1998:

- i) “Act” means the Environment (Protection) Act, 1986 (29 of 1986);
- ii) “animal house” means a place where animals are reared/kept for experiments or testing purposes;
- iii) “authorisation” means permission granted by the prescribed authority for the generation, collection, reception, storage, transportation, treatment, disposal and/or any other form of handling of bio-medical waste in accordance with these rules and any guidelines issued by the Central Government;
- iv) “authorised person” means an occupier or operator authorised by the prescribed authority to generate, collect, receive, store, transport, treat, dispose, and/or handle bio-medical waste in accordance with these rules and any guidelines issued by the Central Government;
- v) “bio-medical waste” means any waste which is generated during the diagnosis, treatment or immunisation of human beings or animals or in research activities pertaining thereto or in the production or testing of biologicals, and including categories mentioned in Schedule I;
- vi) “biologicals” means any preparation made from organisms or micro-organisms or product of metabolism and biochemical reactions intended for use in the diagnosis, immunisation or the treatment of human beings or animals or research activities pertaining thereto;
- vii) “bio-medical waste treatment facility” means any facility wherein treatment, disposal of bio-medical waste or process incidental to such treatment or disposal is carried out.
- viii) “occupier” in relation to any institution generating bio-medical waste, which includes a hospital, nursing home, clinic, dispensary, veterinary institution, animal house, pathological laboratory, blood bank by whatever name called, means a person who has control over that institution and/or its premises;
- ix) “operator of a bio-medical waste facility” means a person who owns or controls or operates a facility for the collection, reception, storage, transport, treatment, disposal or any other form of handling of bio-medical waste;
- x) “Schedule” means Schedule appended to these rules.

2. Duty of Occupier

It shall be the duty of every occupier of an institution generating bio-medical

waste which includes a hospital, nursing home, clinic, dispensary, veterinary institution, animal house, pathological laboratory, blood bank by whatever name called to take all steps to ensure that such waste is handled without any adverse effect to human health and the environment.

3. Treatment and Disposal

- i) Bio-medical waste shall be treated and disposed of in accordance with Schedule I, and compliance with the standards prescribed in Schedule V.
- ii) Every occupier, where required, shall set up in accordance with the time-schedule in Schedule VI, requisite bio-medical waste treatment facilities like incinerator, autoclave, microwave system for the treatment of waste, or, ensure requisite treatment of waste at a common waste treatment or any other waste treatment facility.

4. Segregation, Packaging, Transportation and Storage

- i) Bio-medical waste shall not be mixed with other wastes.
- ii) Bio-medical waste shall be segregated into containers/bags at the point of generation in accordance with Schedule II before its storage, transportation, treatment and disposal. The containers shall be labelled according to Schedule III.
- iii) If a container is transported from the premises where bio-medical waste is generated to any waste treatment facility outside the premises, the container shall, apart from the label prescribed in Schedule III, also carry information prescribed in Schedule IV.
- iv) Notwithstanding anything contained in the Motor Vehicles Act, 1988, or rules thereunder, untreated bio-medical waste shall be transported only in a such vehicle as may be authorised for the purpose by the competent authority as specified by the Government.
- v) No untreated bio-medical waste shall be kept stored beyond a period of 48 hours: Provided that if for any reason it becomes necessary to store the waste beyond such period, the authorised person must take permission of the prescribed authority and take measures to ensure that the waste does not adversely affect human health and the environment.
- vi) The Municipal body of the area shall continue to pick up the transport segregated non-bio-medical solid waste generated in hospitals and nursing homes, as well as duly treated bio-medical wastes for disposal at the municipal dump site.

5. Prescribed Authority

- i) The prescribed authority for enforcement of the provisions of these rules shall be the State Pollution Control Boards in respect of States and the Pollution Control Committees in respect of the Union territories and all pending cases with a prescribed authority appointed earlier shall stand

transferred to the concerned State Pollution Control Board, or as the case may be, the Pollution Control Committees.

- ii) The prescribed authority for the State or Union Territory shall be appointed within one month of the coming into force of these rules.
- iii) The prescribed authority shall function under the supervision and control of the respective Government of the State or Union Territory.
- iv) The prescribed authority shall on receipt of Form I make such enquiry as it deems fit and if it is satisfied that the applicant possesses the necessary capacity to handle bio-medical waste in accordance with these rules, grant or renew an authorisation as the case may be.
- v) An authorisation shall be granted for three years, including an initial trial period of one year from the date of issue. Thereafter, an application shall be made by the occupier/operator for renewal. All such subsequent authorisation shall be for three years. A provisional authorisation will be granted for the trial period, to enable the occupier/operator to demonstrate the capacity of the facility.
- vi) The prescribed authority may after giving reasonable opportunity of being heard to the applicant and for reasons thereof to be recorded in writing, refuse to grant or renew the authorisation.
- vii) Every application for authorisation shall be disposed of by the prescribed authority within ninety days from the date of receipt of the application.
- viii) The prescribed authority may cancel or suspend an authorisation, if for reasons, to be recorded in writing, the occupier/operator has failed to comply with any provision of the Act or these rules: Provided that no authorisation shall be cancelled or suspended without giving a reasonable opportunity to the occupier/operator of being heard.

6. Authorisation

- i) Every occupier of an institution generating, collecting, receiving, storing, transporting, treating, disposing and/or handling bio-medical waste in any other manner, except such occupier of clinics, dispensaries, pathological laboratories, blood banks providing treatment/service to less than 1000 (one thousand) patients per month, shall make an application in Form I to the prescribed authority for grant of authorisation.
- ii) Every operator of a bio-medical waste facility shall make an application in Form I to the prescribed authority for grant of authorisation.
- iii) Every application in Form I for grant of authorisation shall be accompanied by a fee as may be prescribed by the Government of the State or Union Territory.
- iv) The authorization to operate a facility shall be issued in Form IV, subject to conditions laid therein and such other conditions, as the prescribed

authority, may consider necessary.

7. Advisory Committee

- i) The Government of every State/Union Territory shall constitute an Advisory Committee. The Committee will include experts in the field of medical and health, animal husbandry and veterinary sciences, environmental management, municipal administration, and any other related department or organisation including non-governmental organisations.
- ii) As and when required, the Committee shall advise the Government of the State/Union Territory and the prescribed authority about matters related to the implementation of these rules.

8. Annual Report

Every occupier/operator shall submit an annual report to the prescribed authority in Form II by 31st January every year, to include information about the categories and quantities of bio-medical wastes handled during the preceding year. The prescribed authority shall send this information in a compiled form to the Central Pollution Control Board by 31st March every year.

9. Maintenance of Records

- i) Every authorised person shall maintain records related to the generation, collection, reception, storage, transportation, treatment, disposal and/or any form of handling of bio-medical waste in accordance with these rules and any guidelines issued.
- ii) All records shall be subject to inspection and verification by the prescribed authority at any time.

10. Accident Reporting

When any accident occurs at any institution or facility or any other site where bio-medical waste is handled or during transportation of such waste, the authorised person shall report the accident in Form III to the prescribed authority forthwith.

11. Appeal

- i) Any person aggrieved by an order made by the prescribed authority under these rules may, within thirty days from the date on which the order is communicated to him, prefer an appeal to such authority as the Government of State/Union Territory may think fit to constitute: Provided that the authority may entertain the appeal after the expiry of the said period of thirty days if it is satisfied that the appellant was prevented by sufficient cause from filing the appeal in time.

- ii) Any person aggrieved by an order of the Director General, Armed Forces Medical Services under these rules may, within thirty days from the date on which the order is communicated to him prefer an appeal to the Central Government in the Ministry of Environment and Forests.

12. Common Disposal/Incineration Sites

Without prejudice to rule 5 of these rules, the Municipal Corporations, Municipal Boards or Urban Local Bodies, as the case may be, shall be responsible for providing suitable common disposal/incineration sites for the biomedical wastes generated in the area under their jurisdiction and areas outside the jurisdiction of any municipal body, it shall be the responsibility of the occupier generating bio-medical waste/operator of a bio-medical waste treatment facility to arrange for suitable sites individually or in association, to comply with the provisions of these rules.

7.4.2 The Bio-medical Waste Management Rules, 2016

As per the Bio-medical Waste (Handling and Management) Rules, 1998, bio-medical waste was divided into eight categories. However, multiple categories of waste were clubbed to be disposed of into the four colour-coded bags. Multiple categories of waste have been observed to be confusing by the housekeeping staff. Further, the occupiers had their treatment facilities (such as an incinerator, burial pits, etc.) for the final disposal of bio-medical waste. Also, it was found that up to 82% of the healthcare facilities either had no credible bio-medical waste management or require improvement (Bhalla et al. 2019).

To address these issues, in the exercise of the powers conferred by Section 6, 8 and 25 of the Environment (Protection) Act, 1986 (29 of 1986), and in supersession of the Bio-Medical Waste (Management and Handling) Rules, 1998 and further amendments made thereof, the Central Government notified the Bio-medical Waste Management Rules, 2016. These rules apply to all persons who generate, collect, receive, store, transport, treat, dispose, or handle bio-medical waste in any form including hospitals, nursing homes, clinics, dispensaries, veterinary institutions, animal houses, pathological laboratories, blood banks, AYUSH hospitals, clinical establishments, research or educational institutions, health camps, medical or surgical camps, vaccination camps, blood donation camps, first aid rooms of schools, forensic laboratories and research labs.

The prescribed authority for enforcement of the provisions of these rules in respect of all the health care facilities located in any State/Union Territory is the respective State Pollution Control Board (SPCB)/ Pollution Control Committee (PCC) and in the case of health care establishments of the Armed Forces under the Ministry of Defence shall be the Director General, Armed Forces Medical Services (DGAFMS). These rules stipulate the duties of the Occupier or Operator of a Common Bio-medical Waste Treatment Facility as well as the identified authorities. According to these rules, every occupier or

operator handling bio-medical waste, irrespective of the quantity is required to obtain authorisation from the respective prescribed authority i.e., State Pollution Control Board and Pollution Control Committee, as the case may be. These rules consist of four schedules and five forms (<https://cpcb.nic.in/bio-medical-waste-rules/>).

The key differences between the Bio-Medical Waste (Management and Handling) Rules, 1998 and the Bio-medical Waste Management Rules, 2016 are as follows: (1) the removal of multiple categories and to continue with only four colour codes, and (2) that no occupier was permitted to establish an on-site treatment and disposal facility if service of a common biomedical waste treatment facility (CBMWTF) is available within a distance of 75 km (Bhalla et al. 2019).

The Bio-Medical Waste Management Rules, 2016 have also been amended in 2018 to improve compliance and strengthen the implementation of environmentally sound management of biomedical waste in India.

Salient features of Bio-Medical Waste Management (Amendment) Rules, 2018:

(Source: <https://pib.gov.in/Pressreleaseshare.aspx?PRID=1526326>)

1. “Bio-medical waste generators including hospitals, nursing homes, clinics, dispensaries, veterinary institutions, animal houses, pathological laboratories, blood banks, health care facilities, and clinical establishments will have to phase out chlorinated plastic bags (excluding blood bags) and gloves by March 27, 2019.
2. All healthcare facilities shall make available the annual report on their website within two years from the date of publication of the Bio-Medical Waste Management (Amendment) Rules, 2018.
3. Operators of common bio-medical waste treatment and disposal facilities shall establish barcoding and global positioning system for handling bio-medical waste in accordance with guidelines issued by the Central Pollution Control Board by March 27, 2019.
5. The State Pollution Control Boards/Pollution Control Committees have to compile, review and analyze the information received and send this information to the Central Pollution Control Board in a new Form (Form IV A), which seeks detailed information regarding district-wise bio-medical waste generation, information on Health Care Facilities having captive treatment facilities, information on common bio-medical waste treatment and disposal facilities.
6. Every occupier, i.e. a person having administrative control over the institution and the premises generating biomedical waste shall pre-treat the laboratory waste, microbiological waste, blood samples, and blood bags through disinfection or sterilization on-site in the manner as

prescribed by the World Health Organization (WHO) or guidelines on the safe management of wastes from health care activities and WHO Blue Book 2014 and then sent to the Common bio-medical waste treatment facility for final disposal".

7.5 SOLID WASTE MANAGEMENT RULES

7.5.1 Municipal Solid Wastes (Management and Handling) Rules, 2000

Municipal Solid Waste (MSW) consists of household waste, construction and demolition debris, sanitation residue, and waste from streets. With rising urbanization and change in lifestyle and food habits, the amount of municipal solid waste has been increasing rapidly and its composition also continuously changing. It was reported that 70% of the Indian cities lack adequate capacity to transport MSW and there are no sanitary landfills to dispose of the waste. The existing landfills are neither well equipped nor are not lined properly to protect against contamination of soil and groundwater. Over the last few years, the consumer market has grown rapidly leading to products being packed in cans, aluminium foils, plastics, and other non-biodegradable items that cause incalculable harm to the environment.

In exercise of the powers conferred by sections 3, 6 and 25 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government notified the Municipal Solid Wastes (Management and Handling) Rules, 2000 to regulate the management and handling of the municipal solid wastes. These rules shall apply to every municipal authority responsible for the collection, segregation, storage, transportation, processing and disposal of municipal solid wastes.

Municipal Solid Wastes (Management and Handling) Rules, 2000 are being implemented by the municipal authorities as these authorities are responsible for the management of municipal solid waste. The Rules are in force since September 2000. Local bodies are required to ensure that solid waste generated in the city/town is managed in accordance with the provisions of the Rule relating to the collection, segregation, storage, transportation, processing and disposal. Central Pollution Control Board (CPCB) during the reporting year interacted with State Pollution Control Boards (SPCBs) and Pollution Control Committees (PCCs) in union territories and provided feedback on various aspects of the Rule. SPCBs/PCCs persuaded local bodies to seek authorization and formulate an action plan for the management of solid waste.

The municipal authority shall comply with these rules as per the implementation schedule. Municipal Solid Wastes (Management and Handling) Rules, 2000 contain four schedules and these are required to be complied with by the local bodies.

Schedule I

1. Setting up of waste processing and disposal facilities
2. Monitoring the performance of waste processing and disposal facilities
3. Improvement of existing landfill sites as per provisions of these rules
4. Identification of landfill sites for future uses and making sites ready for operation.

Schedule II

1. Collection of municipal solid wastes

- a) Organizing house-to-house collection of municipal solid wastes through any of the methods, like community bin collection (central bin), house-to-house collection, collection on regular pre-informed timings and scheduling by using bell ringing of musical vehicle (without exceeding permissible noise levels);
- b) Devising collection of waste from slums and squatter areas or localities including hotels, restaurants, office complexes and commercial areas;
- c) Wastes from slaughterhouses, meat and fish markets, and fruits and vegetable markets, which are biodegradable, shall be managed to make use of such wastes;
- d) Bio-medical wastes and industrial wastes shall not be mixed with municipal solid wastes and such wastes shall follow the rules separately specified for the purpose;
- e) Collected waste from residential and other areas shall be transferred to the community bin by hand-driven containerized carts or other small vehicles;
- f) Horticultural and construction or demolition wastes or debris shall be separately collected and disposed off following proper norms. Similarly, wastes generated at dairies shall be regulated in accordance with the State laws;
- g) Waste (garbage, dry leaves) shall not be burnt;
- h) Stray animals shall not be allowed to move around waste storage facilities or at any other place in the city or town and shall be managed in accordance with the State laws.

2. Segregation of Municipal Solid Wastes

The municipal authority shall organize awareness programmes for the segregation of wastes and shall promote recycling or reuse of segregated materials. The municipal authority shall undertake a phased programme to ensure community participation in waste segregation.

3. Storage of Municipal Solid Wastes

Municipal authorities shall establish and maintain storage facilities in such a manner as they do not create unhygienic conditions around them.

4. Transportation of Municipal Solid Wastes

Vehicles used for transportation of wastes shall be covered. Waste should not be visible to the public, nor exposed to an open environment preventing their scattering.

5. Processing of Municipal Solid Wastes

Municipal authorities shall adopt suitable technology or a combination of such technologies to make use of wastes to minimize the burden on landfill. Land filling shall be restricted to non-biodegradable, inert waste and other waste that are not suitable either for recycling or for biological processing. Land filling shall also be carried out for residues of waste processing facilities as well as pre-processing rejects from waste processing facilities. Landfilling of mixed waste shall be avoided unless the same is found unsuitable for waste processing.

Schedule III

Schedule III lays specifications for the selection of landfill sites and the operation of landfilling.

- a) It shall be the responsibility of the concerned municipal authority to identify the landfill sites, operation and maintenance.
- b) The selection of landfill sites shall be based on an examination of environmental issues.
- c) The landfill site shall be planned and designed with proper documentation of a phased construction plan as well as a closure plan.
- d) The landfill site shall be fenced or hedged and provided with a proper gate to monitor incoming vehicles or other modes of transportation.
- e) The landfill site shall be well protected to prevent the entry of unauthorized persons and stray animals.
- f) Wastes subjected to landfilling shall be compacted in thin layers using landfill compactors to achieve a high density of the wastes.
- g) To prevent pollution problems from landfill operations, the following provisions shall be made, namely:
 - i) diversion of storm water drains to minimize leachate generation and prevent pollution of surface water and also for avoiding flooding and the creation of marshy conditions.
 - ii) Provisions for management of leachate collection and treatment

shall be made.

- iii) Prevention of run-off from landfill areas entering any stream, river, lake or pond
- iv) Construction of a non-permeable lining system at the base and walls of the waste disposal area.
- v) A vegetative cover shall be provided over the completed site by the selection of locally adopted non-edible perennial plants that are resistant to drought and extreme temperatures. The selected plants shall have the ability to thrive on low-nutrient soil with minimum nutrient addition. The plantation is to be made in sufficient density to minimize soil erosion.

Schedule IV

Schedule IV relates to the “Standards for Composting, Treated Leachates and Incineration”.

1. The waste processing or disposal facilities shall include composting, incineration, palletization, energy recovery or any other facility based on state-of-the-art technology duly approved by the Central Pollution Control Board.
2. In case of engagement of a private agency by the municipal authority, a specific agreement between the municipal authority and the private agency shall be made particularly, for the supply of solid waste and other relevant terms and conditions.
3. To prevent pollution problems from compost plants and other processing facilities, the following shall be complied with, namely:
 - a. The incoming wastes at the site shall be maintained before further processing. To the extent possible, the waste storage area should be covered. If such storage is done in an open area, it shall be provided with an impermeable base with a facility for collection of leachate and surface water run-off into lined drains leading to a leachate treatment and disposal facility;
 - b. Necessary precautions shall be taken to minimize the nuisance of odour, flies, rodents, bird menace and fire hazard;
 - c. In case of breakdown or maintenance of plant, waste intake shall be stopped and arrangements are worked out for diversion of wastes to the landfill site;
 - d. Pre-process and post-process rejects shall be removed from the processing facility on regular basis and shall not be allowed to pile at the site. Recyclables shall be routed through appropriate vendors. The non-recyclables shall be sent to well-designed landfill site(s).

- e. In the case of a compost plant, the windrow area shall be provided with an impermeable base. Such a base shall be made of concrete or compacted clay, 50 cm thick, having a permeability coefficient less than 10⁻⁷ cm/sec. The base shall be provided with a 1 to 2 per cent slope and circled by lined drains for collection of leachate or surface run-off;
- f. Ambient air quality monitoring shall be regularly carried out particularly for checking odour nuisance in the down-wind direction on the boundary of a processing plant.

7.5.2 The Solid Waste Management Rules, 2016

The Government has notified the new Solid Waste Management Rules, 2016 which will supersede the Municipal Solid Wastes (Management and Handling) Rules 2000. The salient features of the SWM Rules, 2016 are as follows (https://cpcb.nic.in/uploads/MSW/Salient_features_SWM_Rules.pdf; https://cpcb.nic.in/uploads/MSW/SWM_2016.pdf):

1. The jurisdiction of the rules has been extended beyond the municipal area. These rules apply to (i) Every urban local body (Megacity to Panchayat level), (ii) outgrowth in urban agglomerations, (iii) census towns as declared by the Registrar General and Census Commissioner of India, (iv) notified areas, (v) notified industrial townships, (vi) areas under the control of Indian Railways, (vii) airports/ airbases, (viii) Ports and harbours, (ix) defence establishments, (x) special economic zones, (xi) State and Central government organizations, (xii) places of pilgrims, (xiii) religious and historical importance as may be notified by the respective State government from time to time and (xiv) every domestic, institutional, commercial and any other non-residential solid waste generator situated in the areas.
2. The Waste Generators include every household, event organizers, street vendors, RWAs & Market Associations, Gated communities having more than area 5000 square metres, hotels & restaurants, etc. 3. Duties of Waste generators and Authorities:
 - i) Every Waste Generator shall segregate waste and store it separately and hand it over to Municipal workers or authorized waste pickers.
 - ii) Ministry of Environment, Forest & Climate Change shall constitute a "Central Monitoring Committee" to monitor and review every year.
 - iii) Ministry of Urban Development (MoUD) shall frame National Policy on Solid Waste Management (SWM) and coordinate with States/UTs, provide technical guidelines, financial support, training to local bodies, etc.
 - iv) Departments of Fertilizers and Chemicals shall assist in market

development for city compost and make it available to companies (3/4 bags compost: 6/7 bags Fertilizers).

- v) Ministry of Agriculture shall make flexible Fertilizer Control Order, promote utilization of compost, testing facility for compost and issue guidelines.
 - vi) Ministry of Power shall fix the tariff of power generation from the Waste-to-Energy project and ensure distribution through companies.
 - vii) Ministry of New and Renewable Energy (MNRE) shall facilitate infrastructure for waste-to-Energy plants and provide a subsidy.
 - viii) Secretary In-charge, Urban Development (state/Union Territories) shall prepare State Policy/Strategy, adopt waste reduction, reuse, recycling, recovery strategy, coordinate for state planning, identification of common/regional landfills, notify guidelines of buffer zones.
 - ix) District Collector/Magistrate shall facilitate identification of landfill site, and quarterly review the performance of local bodies.
 - x) Secretary, Panchayats performs the same functions as Secretary, Urban Development at the Panchayat level.
 - xi) CPCB shall coordinate with SPCBs/PCCs for monitoring and Annual Reports, formulation of standards, review of new technologies, prepare guidelines for buffer zones restricting residential, commercial and construction activities areas; and inter-state movement of waste.
 - xii) Local Authority/Panchayats shall prepare SWM plan with a timeline and its implementation, segregate, adopt waste reduction, reuse, recycling strategy, material recovery, processing/ disposal of Waste, user fee and levy spot fine.
 - xiii) SPCBs/PCCs shall monitor, issue authorization and regulate.
 - xiv) Manufacturers/Brand owners shall facilitate collecting back wastes of their products and provide a pouch for packaging sanitary wastes, etc.
 - xv) Industry (cement, power plant, etc.) shall use "Refused Derived Fuel" (RDF) within 100 km.
 - xvi) Operator of facilities shall follow guidelines/standards
4. The criteria and actions to be taken for solid waste management in hilly areas include avoiding landfill on the hills, making waste transfer stations, strict action for littering and constructing landfill in plain areas.
5. Criteria for waste to energy process:

- i) Non-recyclable waste having a calorific value of 1500 Kcal/kg or more shall not be disposed of in landfills and shall only be utilized for generating energy either through refuse-derived fuel or by giving away as feed stock for preparing refuse-derived fuel.
 - ii) High calorific wastes shall be used for co-processing in cement or thermal power plants.
6. Time Frame for Implementation of SWM Rules:
- a) Landfill Identification: 1 year
 - b) Procurement of waste processing facilities: 2 years
 - c) Ensure segregation of waste: 2 years
 - d) Cities up to 1 million population: 2 Years
 - e) Million plus cities: 3 years
 - f) Setting up sanitary landfills: 3 years
 - g) Bioremediation/capping of old landfills: 5 years
7. Review of implementation of rules at various levels:
- a) MoEF&CC, Central Monitoring Committee: Every year
 - b) District Collector review performance of Local authorities: Quarterly
 - c) SPCBs/PCCs review implementation of Rules with DMA: half yearly
 - d) Secretary In-charge, Urban Development- State level Advisory Committee: half yearly

Check Your Progress 1

Note: i) Use the space given below for your answers.

ii) Check your answers with those given at the end of the unit.

1. Explain the provisions of the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.

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2. Explain the provisions of the Bio-medical Waste Management Rules, 2016.

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3. Explain the features of the Solid Waste Management Rules, 2016.

7.6 LET US SUM UP

Scientific disposal of hazardous waste through the collection, storage, packaging, transportation and treatment in an environmentally sound manner minimizes the adverse impact on public health and the environment. The hazardous waste can be disposed of through captive treatment facilities installed by the individual waste generators or Common Hazardous Waste Treatment, Storage and Disposal Facilities. Hazardous waste such as lead acid battery scraps, used oil, waste oil, spent catalyst etc. and other waste such as waste tyres, paper waste, metal scrap etc. are used as raw material by the industries involved in recycling such waste and as a supplementary resource for material and energy recovery. Accordingly, it is always preferable to utilize such waste through recycling, or for a resource recovery to avoid disposal through landfill or incineration. Unscientific disposal of hazardous and other waste through burning or incineration leads to the emission of toxic fumes comprising Dioxins and Furans, Mercury, and heavy metals, causing air pollution and associated health-related problems. Unscientific dumping of hazardous waste on land may lead to the contamination of the surface/groundwater quality, which may have severe impacts on public health and cause diseases like cancer. Hazardous Waste Management Rules are notified to ensure safe handling, generation, processing, treatment, package, storage, transportation, use reprocessing, collection, conversion, and offering for sale, destruction and disposal of hazardous waste.

Biomedical waste is medical waste, it is defined as solid waste generated during the diagnosis, testing, treatment, research or production of biological products for humans or animals. Biomedical waste includes syringes, live vaccines, laboratory samples, body parts, bodily fluids and waste, sharp needles, cultures and lancets. The main sources of biomedical waste are hospitals, medical clinics and laboratories. As per the act passed by the Ministry of Environment and Forests in 1986 & notified the Bio-Medical Waste (Management and Handling) Rules in July 1998, it is the duty of every

institution or its premises, to take all steps to ensure that waste generated is handled without any adverse effect to human health and environment. The Bio-medical Waste (Handling and Management) Rules, 1998 aim to streamline the process of waste segregation, collection, treatment and disposal.

Management of municipal solid waste involves the collection, segregation and secondary storage, transportation, treatment and final disposal of waste. Reactive, toxic, flammable, explosive or corrosive waste is called hazardous waste. Their disposal is a difficult task because they cause danger or are likely to cause danger to health and/or the environment. Municipal Solid Wastes (Management and Handling) Rules, 2000 to regulate the management and handling of municipal solid wastes. These rules shall apply to every municipal authority responsible for the collection, segregation, storage, transportation, processing and disposal of municipal solid wastes. The Solid Waste Management Rules were notified in 2016. The jurisdiction of the rules has been extended beyond the Municipal area. The Solid Waste Management Rules were notified in 2016. The jurisdiction of the rules has been extended beyond the Municipal area.

In this unit, we have discussed the key provisions of the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016, the Bio-Medical Waste (Management and Handling) Rules, 1998 and the Bio-medical Waste Management Rules, 2016 and the Solid Waste Management Rules, 2016.

7.7 KEY WORDS

Environmentally Sound Management of Hazardous Wastes: Environmentally sound management of hazardous wastes means taking all steps required to ensure that the hazardous wastes are managed in a manner which will protect health and the environment against the adverse effects which may result from such wastes.

7.8 SUGGESTED FURTHER READING/REFERENCES

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Web Links

<https://www.npcindia.gov.in/NPC/Files/delhiOFC/EM/Hazardous-waste-management-rules-2016.pdf>

<https://cpcb.nic.in/bio-medical-waste-rules/>

<https://www.iwma.in/HWM%20Rules.pdf>

<https://cpcb.nic.in/rules/#:~:text=Hazardous%20Waste%20Management%20Rules%20are,and%20disposal%20of%20Hazardous%20Waste.>

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<https://pib.gov.in/Pressreleaseshare.aspx?PRID=1526326>

https://cpcb.nic.in/uploads/MSW/Salient_features_SWM_Rules.pdf;

https://cpcb.nic.in/uploads/MSW/SWM_2016.pdf

7.9 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1. Please refer to section 7.3
2. Please refer to section 7.4
3. Please refer to section 7.5