



Ministry of Housing & Urban Affairs
Govt. of India

CAPACITY BUILDING PROGRAMME ON IMPLEMENTATION OF WASTE MANAGEMENT RULES, 2016



Ministry of Environment, Forest &
Climate Change, Govt. of India



Tool Kit on Bio-Medical Waste Management Rules 2016



Central Pollution Control Board



National Productivity Council

TOOLKIT

Bio-Medical Waste Management Rules, 2016

**Salient Features
of
Bio Medical Waste
management
rules 2016**

**Management &
In House
Transportation &
storage of
Bio Medical Waste**

**Duties of
stakeholders**

**Treatment &
Disposal of
Bio-medical
waste**

Your Guide For
**Safe & Scientific Management Of
Bio-medical Waste**

1st Edition
June, 2019

Preface

National Productivity Council (NPC) is pleased to present to you the 'Toolkit on Bio-Medical Waste Management Rules 2016'. This toolkit has been crafted specially for all the stakeholders involved in the generation, collection, storage, transportation & treatment of bio-medical waste.

The toolkit has twelve sections broadly classified under duties of stakeholders involved in management of bio medical waste, segregation criteria, in house transportation & storage of bio-medical waste, treatment and disposal and finally procedure for obtaining authorization. It provides useful tips, dos and don'ts, methods and practices that should be followed in the bio-medical waste management.

The toolkit has been brought together by a team of good technocrats and environmentalists from various regulatory authorities in the country. It has been carefully reviewed by experts.

This toolkit is to ensure safe and scientific management of bio-medical waste for all the citizens everywhere at all times.

NPC would welcome any suggestions and feedback on this publication so that 'The Toolkit' becomes a trusted companion and part of all stakeholders.

K. D. Bhardawaj

Regional Director, Delhi

National Productivity Council

Compiled & Edited by:



National Productivity Council

Note: 1. All pictures used in the toolkit are from various sources, which have been duly referred to.
2. This publication is purely for education purpose and not for commercial purpose.

CONTENTS

1.	INTRODUCTION TO BIO MEDICAL WASTE	1
1.1	Application of Bio-Medical Waste, 2016	1
1.2	Risk Associated with Improper Management of Bio-medical Waste	3
1.3	Comparison of Bio-Medical Waste (Management& Handling) Rules, 1998 with Bio-medical Waste Management Rules, 2016	4
2.	WHO IS AN OCCUPIER	5
2.1.	Duties of Occupier	5
3.	WHO IS AN OPERATOR?	8
3.1	Duties of Operator	8
4.	DUTIES OF REGULATORY BODY	10
4.1	Duties of State Pollution Control Board or Pollution Control Committee	10
4.2	Duties of Ministry of Environment, Forest and Climate Change, Government of India	11
4.3	Duties of Central Pollution Control Board	11
4.4	Duties of Municipalities or Corporation, Urban Local Bodies and Gram Panchayat	12
4.5	Duties of Ministry of Defense	12
5.	MANAGEMENT OF BIO MEDICAL WASTE	13
5.1	Steps of Bio Medical Waste Management	13
5.2	Colour Coding and Type of Container/ Bags to be used for Waste Segregation & Collection	15
5.3	Bio Medical Waste Collection	16
5.3.1	Collection of waste	16
5.3.2	Time of Collection	16
5.3.3	Packaging	17
5.3.4	Labelling	18
5.3.5	Bar-coded label	18
5.3.6	Interim Storage	19
6.	IN HOUSE TRANSPORTATION OF BIO-MEDICAL WASTE	19
6.1	Transportation Trolleys & Carts	19
6.2	Route of intramural transportation of bio-medical waste	20
6.3	Central Waste Storage Room	20
7.	HANDING OVER THE BIO-MEDICAL WASTE TO CBMWTF	21
7.1	Record keeping	21
7.2	Updating Of Information in Website	22
7.3	Pre-treatment of Bio-medical Waste at Healthcare Facilities	23
8.	MANAGEMENT OF GENERAL WASTE	24
8.1	Construction of compost Pit	25
8.2	Vermi-Composting	26
8.3	Management of Other Wastes	26
8.3.1	Management of Used Batteries	26
8.3.2	Management of E-Waste	26

8.3.3	Management of Radioactive Waste	27
9.	TREATMENT AND DISPOSAL	27
9.1	A schematic diagram showing various options for treatment and disposal of BMW waste	27
9.2	Disposal by Deep burial	29
10.	PROCEDURE FOR AUTHORIZATION	29
10.1	Application	30
10.2	Information requirements of Application	30
10.3	Grant of Authorization	30
10.4	Validity of Authorization	30
10.5	Annual Reporting	30
10.6	Accident Reporting	31
10.6.1	Major Accidents	31
10.6.2	Minor Accidents	32
10.7	Other Reporting Requirements	32
10.8	Occupational Safety	32
10.9	Personal Protective Equipment	33
11.	DO'S AND DON'TS for HCFs	33
11.1	Do's	33
11.2	Don'ts	34
12.	TRAINING AND AWARENESS	35
12.1	Training need analysis	35
12.2	Training Schedule	35
12.3	Trainers	36
12.4	Training Material	36
12.5	Training Records	36
12.6	Training Effectiveness	37
	REFERENCES & BIBLIOGRAPHY	37

List of Tables

Table 1: Examples of Healthcare Waste	2
Table 2: Comparison of Bio-Medical Waste (Management& Handling) Rules, 1998 with Bio-medical Waste Management Rules, 2016	4
Table 3: Color Coding and Type of Container/ Bags of BMW	15

List of Figures

Figure 1: Application of Bio medical waste rules	1
Figure 2: People vulnerable to risks of BMW	3
Figure 3: Management of Bio medical waste	13
Figure 4: Labels for BMW waste	18
Figure 5: Examples of Waste Collection Trolleys for BMW Transportation	19
Figure 6: Storage rooms for Bio-medical waste	21
Figure 7: Transportation of Waste from HCF to the Common Bio-medical Waste Treatment Facility	23
Figure 8: Personal protective equipment (PPEs)	33

1. Introduction to Bio Medical Waste

"Bio-medical waste" means any waste, which is generated during the diagnosis, treatment or immunization of human beings or animals or research activities pertaining thereto or in the production or testing of biological or in health camps. Bio Medical waste includes all the waste generated from the Health Care Facility which can have any adverse effect to the health of a person or to the environment in general if not disposed properly. All such waste which can adversely harm the environment or health of a person is considered as infectious and such waste has to be managed as per BMWM Rules, 2016. This waste consists of the materials which have been in contact with the patient's blood, secretions, infected parts, biological liquids such as chemicals, medical supplies, medicines, lab discharge, sharps metallic and glassware, plastics etc.

1.1 Application of Biomedical Waste Management Rules, 2016

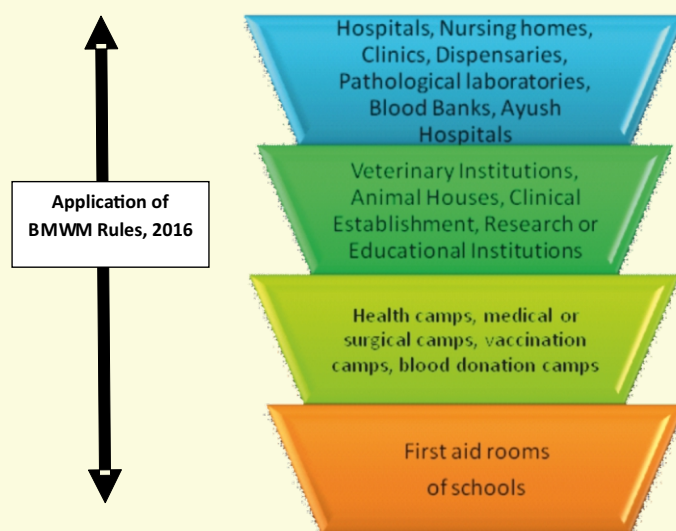


Figure : Application of Bio medical waste rules

Any person who generates, collects, receives, stores, transports, treats, disposes, or handles biomedical 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. "Health Care Facility" means a place where diagnosis, treatment or immunisation of human beings or animals is provided irrespective of type and size of health treatment system, and research activity pertaining thereto;

NOTE: "handling" in relation to bio-medical waste includes the generation, sorting, segregation, collection, use, storage, packaging, loading, transportation, unloading, processing, treatment, destruction, conversion, or offering for sale, transfer, disposal of such waste.

Table1: Examples of Healthcare Waste

HEALTH CARE WASTE

BIO-MEDICAL WASTE

- Human and animal anatomical Waste like body parts, tissues, organs etc.
- Soiled waste such as items contaminated with blood and body fluids like Dressings cotton, swabs etc.
- Expired or Discarded Medicines
- Chemical Waste such as Laboratory Chemicals used in production of biological, X-ray film developing liquid, discarded Formalin, liquid from laboratories and floor washings, cleaning, house-keeping and disinfecting activities .
- Discarded linen, mattresses, beddings contaminated with blood or body fluid.
- Microbiology, Biotechnology and other clinical laboratory waste such as Blood bags, Laboratory cultures, stocks or specimens of micro- organisms, live or attenuated vaccines, human and animal cell cultures used in research, industrial laboratories, and production of biological, residual toxins, dishes and devices used for cultures.
- Waste Recyclables such as wastes generated from disposable items such as tubing, bottles, intravenous tubes and sets, catheters, urine bags, syringes (without needles and fixed needle syringes) and vacuolators with their needles cut) and gloves Blood Bags, Attenuated Vaccines, Lab Cultures etc.
- Waste sharps including Metals such as Needles, syringes with fixed needles, needles from needle tip cutter or burner, scalpels, blades, or any other contaminated sharp object that may cause puncture and cuts. This includes both used, discarded and contaminated metal sharps
- Glassware including medicine vials and ampoules as well as metal body implants

GENERAL WASTE

- News paper, paper and card boxes
- Plastic water bottle
- Aluminium cans of soft drinks
- Covering of different materials
- Food Containers
- Compostable general waste

OTHER WASTE

- E-Waste
- Used Batteries
- Radioactive Wastes

1.2 Risk Associated with Improper Management of Bio-medical Waste

Improper management of Bio medical waste may have risk to people involved in handling of waste and even general public who directly don't deal with it.

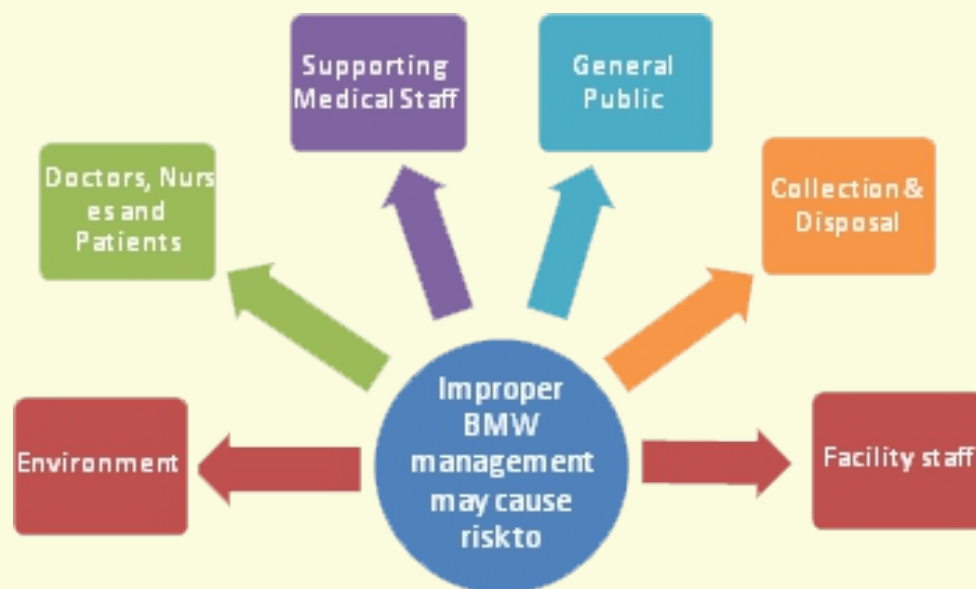


Figure 2: People vulnerable to risks of BMW

The nature of Risks due to improper BMW management may include:

- Nosocomial Infection in patients from poor infection control practice and poor waste management
- Risk of disease/infection due reuse of untreated biomedical waste (plastics)
- Risk of disease due reuse of expired medicines
- Risk of Infection outside Hospital for waste handlers and other people
- Risk to domestic / stray animals from biomedical waste and potential propagation of any infection to humans

Type of waste

Human / Animal waste/ Soiled waste

Sharps

Cytotoxic/ radioactive waste

Chemical waste

Health hazard

HIV, HBV ,HCV, cholera, salmonellosis, shigellosis, rabies, anthrax, TB, pneumonia, septicemia Sharps

HIV, HBV, HCV

Cancer, genetic mutation, birth defect
Chemical waste Poisonings, dermatitis, conjunctivitis, bronchitis

Poisoning, dermatitis, conjunctivitis, bronchitis

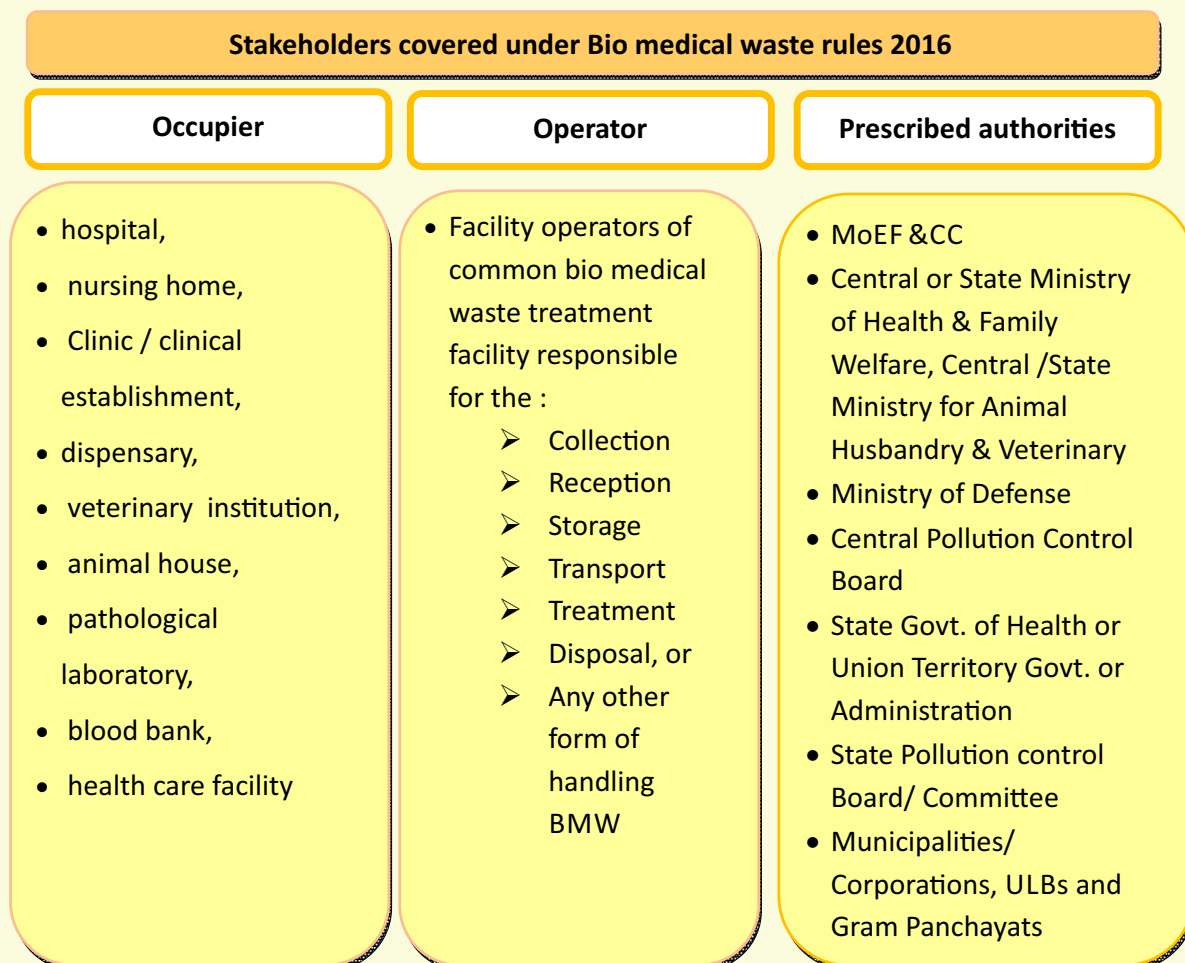
1.3 Comparison of Bio-Medical Waste (Management & Handling) Rules, 1998 with Bio-medical Waste Management Rules, 2016

Table 2: Comparison of Bio-Medical Waste Management Rules

S.No.	Bio-medical Waste (M & H) Rules, 1998	Bio-medical Waste Management Rules, 2016
1	Occupier with more than 1000 patients per month or more to obtain authorization	Every occupier generating BMW, including health camp and Ayush require to obtain authorization
2	Operator duties absent	Duties of the operator listed
3	Bio-medical waste classified into 10 category	Bio-medical waste divided into 4 categories
4	Rules restricted to HCE's with more than 1000 patients per month	Treatment and disposal of bio-medical waste mandatory for all HCE's.
5	Rules permits on-site treatment and disposal of bio-medical waste or disposal of Bio-medical waste through Common bio-medical waste treatment facility (CBMWTF)	Permits HCF to have on-site treatment provided if there is no CBMWTF within a distance of 75 Kms
6	No format for Annual Report prescribed	A format for annual report appended with rules
7	Schedule I,II,III,IV & V	Changes incorporated in schedule I,II, III & IV
8	Prescribed authority i.e., State Pollution Control Board/Pollution Control Board	List of Prescribed Authorities and the Corresponding Duties prescribed under the Rules

STAKEHOLDERS OF BIO MEDICAL WASTE MANAGEMENT RULES

The stakeholders broadly covered under the provisions of Bio medical waste management rules 2016 can be depicted as:



2. WHO IS AN OCCUPIER

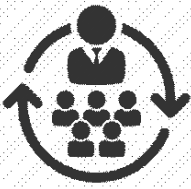



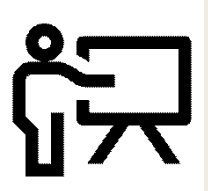



"Occupier" means a person having administrative control over the institution and the premises generating bio-medical waste, which includes a hospital, nursing home, clinic, dispensary, veterinary institution, animal house, pathological laboratory, blood bank, health care facility and clinical establishment, irrespective of their system of medicine. Bio Medical Waste Management Rules, 2016 are applicable 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.



2.1. Duties of Occupiers and research labs.

It shall be the duty of every occupier

<p>Management</p> 	<p>Take necessary measures to handle Bio-medical waste to avoid adverse effect to human health and the environment</p> <p>Segregation of bio-medical waste in colored bags or containers in the manner as specified in Schedule I of the BMWM Rules, 2016</p> <p>Phase out use of chlorinated plastic bags , gloves (excluding blood bags) by 27 March 2019;</p> <p>Review and monitor the activities related to bio-medical waste management</p> <p>Report major accident</p>
<p>Storage of Waste</p> 	<p>Provision within the premises for a safe, ventilated and secured location for storage of segregated and disinfected biomedical waste</p>

<p>Training</p> 	<p>Provide training to all its health care workers and others, involved in handling of biomedical waste at the time of induction and there after at least once every year;</p>														
<p>Safety of workers</p> 	<p>Immunize all its health care workers and others, involved in handling of bio-medical waste for protection against diseases including Hepatitis Band Tetanus that are likely to be transmitted by handling of bio-medical waste.</p> <p>Ensure occupational safety of all its health care workers and provide requisite personal protective equipment;</p> <p>Conduct health check up at the time of induction</p>														
<p>Bar Coding</p> 	<p>Establish a Bar-Code System for bags or containers containing bio -medical waste for further treatment & disposal in accordance with the guidelines issued by CPCB by 27 March 2019</p>														
<p>Wastewater Management</p> 	<p>Ensure segregation of liquid chemical waste at source and ensure pre treatment or neutralization prior to mixing with other effluent generated from health care facilities;</p> <p>(1) The effluent generated or treated from the premises of occupier or operator of a common bio medical waste treatment and disposal facility, before discharge into the sewer should conform to the following limits-</p> <table border="1" data-bbox="510 1220 1077 1400"> <thead> <tr> <th>PARAMETERS</th> <th>PERMISSIBLE LIMITS</th> </tr> </thead> <tbody> <tr> <td>pH</td> <td>6.5-9.0</td> </tr> <tr> <td>Suspended solids</td> <td>100 mg/l</td> </tr> <tr> <td>Oil and grease</td> <td>10 mg/l</td> </tr> <tr> <td>BOD</td> <td>30 mg/l</td> </tr> <tr> <td>COD</td> <td>250 mg/l</td> </tr> <tr> <td>Bio-assay test</td> <td>90% survival of fish after 96 hours in 100% effluent.</td> </tr> </tbody> </table> <p>1. Above limits are applicable to the occupiers of Health Care Facilities (bedded) which are either connected with sewerage network without terminal sewage treatment plant or not connected to public sewers.</p> <p>2. For discharge into public sewers with terminal facilities, the general standards as notified under the Environment (Protection) Act, 1986 (29 of 1986) shall be applicable.</p> <p>3 Health Care Facilities having less than ten beds shall have to comply with the output discharge standard for liquid waste by 31st December, 2019.</p> <p>4 Non-bedded occupiers shall dispose infectious liquid wastes only after treatment by disinfection.</p>	PARAMETERS	PERMISSIBLE LIMITS	pH	6.5-9.0	Suspended solids	100 mg/l	Oil and grease	10 mg/l	BOD	30 mg/l	COD	250 mg/l	Bio-assay test	90% survival of fish after 96 hours in 100% effluent.
PARAMETERS	PERMISSIBLE LIMITS														
pH	6.5-9.0														
Suspended solids	100 mg/l														
Oil and grease	10 mg/l														
BOD	30 mg/l														
COD	250 mg/l														
Bio-assay test	90% survival of fish after 96 hours in 100% effluent.														

Monitoring, Reporting & data collection



Make available the annual report on its web-site by March 2020

Inform the prescribed authority immediately in case the operator of a facility does not collect the waste.

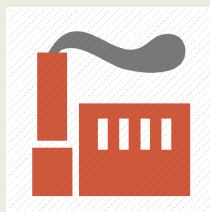
Develop system to review and monitor and maintain the record

Maintain the operating condition of in-house Incinerator as per standard operating condition mentioned in schedule II

Handover of segregated or pre-treated waste to CBMWF located within 75 KMs distance for safe treatment and disposal in accordance with the BMW Rules, 2016

Maintenance of records for a period of five years.

Emission



Existing incinerators to achieve the standards for treatment and disposal of bio-medical waste as specified in Schedule II for retention time in secondary chamber and Dioxin and Furans within two years from the date of this notification of Bio medical waste management rules, 2016

S no	Parameter	Standards	
1	2	3	4
		Limiting concentration in mg Nm ³ unless stated	Sampling Duration in minutes, unless stated
1	Particulate matter	50	30 or 1NM ³ of sample volume, whichever is more
2	Nitrogen Oxides NO and NO ₂ expressed asNO ₂	400	30 for online sampling or grab sample
3	HCl	500	30 or 1NM ³ of sample volume, whichever is more
4	Total Dioxins and Furans	0.1ngTEQ/Nm ³ (at 11% O ₂)	8 hours or 5NM ³ of sample volume, whichever is more
5	Hg and its compounds	0.05	2 hours or 1NM ³ of sample volume, whichever is more

3. WHO IS AN OPERATOR?

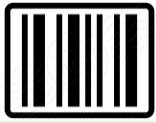



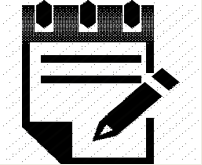
"Operator of a common bio-medical waste treatment facility" means a person who owns or controls a Common Bio-medical Waste Treatment Facility (CBMWTF) for the collection, reception, storage, transport, treatment, disposal or any other form of handling of bio-medical waste.



3.1 DUTIES OF OPERATOR

The duties of Operator of a common bio-medical waste treatment facility are given below:

Channelization of waste	Take all necessary steps to ensure that the bio-medical waste collected from the occupier is transported, handled, stored, treated and disposed of, without any adverse effect to the human health and the environment in accordance with the rules and guidelines issued by the Central Government or Central Pollution Control Board from time to time;
	Ensure timely collection of bio-medical waste from the occupier as per rules
	Inform the prescribed authority immediately regarding the occupiers which are not handing over the segregated bio-medical waste in accordance with these rules;
	Common bio-medical waste treatment facility shall ensure collection of biomedical waste on holidays also;

<p>Bar Coding</p> 	<p>Establish bar coding and global positioning system for handling of bio medical waste in accordance with guidelines issued by CPCB by 27 March 2019;</p>
	<p>Provide training for all its workers involved in handling of bio-medical waste at the time of induction and at least once a year thereafter;</p> <p>Assist the occupier in training conducted by them for bio-medical waste management;</p>
<p>Safety of workers</p> 	<p>Undertake appropriate medical examination at the time of induction and at least once in a year and immunize all its workers involved in handling of bio-medical waste for protection against diseases, including Hepatitis B and Tetanus, that are likely to be transmitted while handling bio-medical waste and maintain the records for the same;</p> <p>Ensure occupational safety of all its workers involved in handling of bio-medical waste by providing appropriate and adequate personal protective equipment;</p> <p>Report major accidents including accidents caused by fire hazards, blasts during handling of biomedical waste and the remedial action taken and the records relevant thereto, (including nil report) in form i to the prescribed authority and also along with the annual report;</p> <p>Maintain a log book for each of its treatment equipment according to weight of batch; categories of waste treated; time, date and duration of treatment cycle and total hours of operation;</p>
<p>Treatment of waste</p> 	<p>Allow occupier, who are giving waste for treatment to the operator, to see whether the treatment is carried out as per the rules;</p> <p>After ensuring treatment by autoclaving or microwaving followed by mutilation or shredding, whichever is applicable, the recyclables from the treated bio-medical wastes such as plastics and glass, shall be given to recyclers having valid consent or authorisation or registration from the respective state pollution control board or pollution control committee;</p> <p>Supply non-chlorinated plastic colored bags to the occupier on chargeable basis, if required;</p>
<p>Maintain records</p> 	<p>Maintain all record for operation of incineration, hydro or autoclaving for a period of five years;</p> <p>Shall display details of authorization, treatment, annual report etc on its web-site;</p> <p>Upgrade existing incinerators to achieve the standards for retention time in secondary chamber and dioxin and furans within two years from the date of notification of Bio medical waste management rules, 2016.</p>

4. DUTIES OF REGULATORY BODY

4.1 Duties of State Pollution Control Board or Pollution Control Committee

<ul style="list-style-type: none"> ▪ Inventorisation of Occupiers and data on bio-medical waste generation, treatment & disposal. 	<ul style="list-style-type: none"> ▪ Compilation of data and submission of the same in annual report to Central Pollution Control Board within the stipulated time period.
<ul style="list-style-type: none"> ▪ Grant and renewal, suspension or refusal cancellation or of authorization under these rules (Rule 7, 8 and 10). 	<ul style="list-style-type: none"> ▪ Monitoring of compliance of various provisions and conditions of authorization.
<ul style="list-style-type: none"> ▪ Action against health care facilities or common biomedical waste treatment facilities for violation of these rules (Rule 18). 	<ul style="list-style-type: none"> ▪ Organizing training programmes to staff of health care facilities and common bio - medical waste treatment facilities and State Pollution Control Boards or Pollution Control Committees Staff on segregation, collection, storage, transportation, treatment and disposal of bio-medical wastes.
<ul style="list-style-type: none"> ▪ Undertake or support research or operational research regarding bio-medical waste management. 	<ul style="list-style-type: none"> ▪ Any other function under these rules assigned by Ministry of Environment, Forest and Climate Change or Central Pollution Control Board from time to time.
<ul style="list-style-type: none"> ▪ Implementation of recommendations of the Advisory Committee. 	<ul style="list-style-type: none"> ▪ Publish the list of Registered or Authorized (or give consent) Recyclers.
<ul style="list-style-type: none"> ▪ Undertake and support third party audits of the common bio - medical waste treatment facilities in their State. 	

4.2 Duties of Ministry of Environment, Forest and Climate Change, Government of India

<ul style="list-style-type: none"> ▪ Making Policies concerning bio - medical waste Management in the Country including notification of Rules and amendments to the Rules as and when required. 	<ul style="list-style-type: none"> ▪ Providing financial assistance for training and awareness programmes on bio - medical waste management related activities to for the State Pollution Control Boards or Pollution Control Committees.
<ul style="list-style-type: none"> ▪ Facilitating financial assistance for setting up or up-gradation of common bio-medical waste treatment facilities. 	<ul style="list-style-type: none"> ▪ Undertake or support operational research and assessment with reference to risks to environment and health due to bio-medical waste and previously unknown disposables and wastes from new types of equipment.
<ul style="list-style-type: none"> ▪ Constitution of Monitoring Committee for implementation of the rules. 	<ul style="list-style-type: none"> ▪ Hearing Appeals and give decision made in Form V against order passed by the prescribed authorities.
<ul style="list-style-type: none"> ▪ Develop Standard manual for Trainers and Training. 	<ul style="list-style-type: none"> ▪ Notify the standards or operating parameters for new technologies for treatment of bio medical waste other than those listed in Schedule- I

4.3 Duties of Central Pollution Control Board

<ul style="list-style-type: none"> ▪ Prepare Guidelines on bio-medical waste Management and submit to the Ministry of Environment, Forest and Climate Change. 	<ul style="list-style-type: none"> ▪ Co-ordination of activities of State Pollution Control Boards or Pollution Control Committees on biomedical waste.
<ul style="list-style-type: none"> ▪ Conduct training courses for authorities dealing with management of bio -medical waste. 	<ul style="list-style-type: none"> ▪ Lay down standards for new technologies for 25 treatment and disposal of bio -medical waste (Rule 7) and prescribe specifications for treatment and disposal of bio -medical wastes (Rule 7).
<ul style="list-style-type: none"> ▪ Lay down Criteria for establishing common biomedical waste treatment facilities in the Country. 	<ul style="list-style-type: none"> ▪ Random inspection or monitoring of health care facilities and common bio -medical waste treatment facilities.

<ul style="list-style-type: none"> Review and analysis of data submitted by the State Pollution Control Boards on bio-medical waste and submission of compiled information in the form of annual report along with its observations to Ministry of Environment, Forest and Climate Change. 	<ul style="list-style-type: none"> Inspection and monitoring of health care facilities other than Medical Inspection (MI) rooms, sick bay/son board ships or submarines, station medical centres and field hospitals in forward locations operated by the Director General, Armed Forces Medical Services (Rule-9)
---	---

4.4 Duties of Municipalities or Corporation, Urban Local Bodies and Gram Panchayat

<ul style="list-style-type: none"> Provide or allocate suitable land for development of common bio-medical waste treatment facilities in their respective jurisdictions as per the guidelines of 27 Central Pollution Control Board. 	<ul style="list-style-type: none"> Collect other solid waste (other than the biomedical waste) from the health care facilities as per the Municipal Solid Waste (Management and Handling) Rules, 2000 or as amended time to time.
<ul style="list-style-type: none"> Any other function stipulated under these Rules. 	<ul style="list-style-type: none">

4.5 Duties of Ministry of Defence

<ul style="list-style-type: none"> Grant and renewal of authorization to Armed Forces health care facilities or common bio-medical waste treatment facilities (Rule 9). 	<ul style="list-style-type: none"> Conduct training courses for authorities dealing with management of bio-medical wastes in Armed Forces health care facilities or treatment facilities in association with State Pollution Control Boards or Pollution Control Committees or Central Pollution Control Board or Ministry of Environment, Forest and Climate Change.
<ul style="list-style-type: none"> Publication of inventory of occupiers and biomedical waste generation from Armed Forces health care facilities or occupiers 	<ul style="list-style-type: none"> Constitution of Advisory Committee for implementation of the rules.
<ul style="list-style-type: none"> (v) Review of management of bio-medical waste generation in the Armed Forces health care facilities through its Advisory Committee (Rule 11). 	<ul style="list-style-type: none"> Submission of annual report to Central Pollution Control Board within the stipulated time period (Rule 13).

5. MANAGEMENT OF BIO MEDICAL WASTE

Healthcare facilities are primarily responsible for management of the healthcare waste generated within the facilities, including activities undertaken by them in the community. The health facilities, while generating the waste are responsible for segregation, collection, in-house transportation, pre-treatment of waste and storage of waste, before such waste is collected by Common Waste Treatment Facility Operator. Thus for proper management of the waste in the healthcare facilities the technical requirements of waste handling are needed to be understood and practiced by each category of the staff.

All the waste generated from the health care facility can be classified as:

- Bio Medical Waste
- General Waste
- Other Wastes

5.1 Steps of Bio Medical Waste Management

The management of BMW bio-medical waste at Health Care Facilities can be summarized in following seven steps:

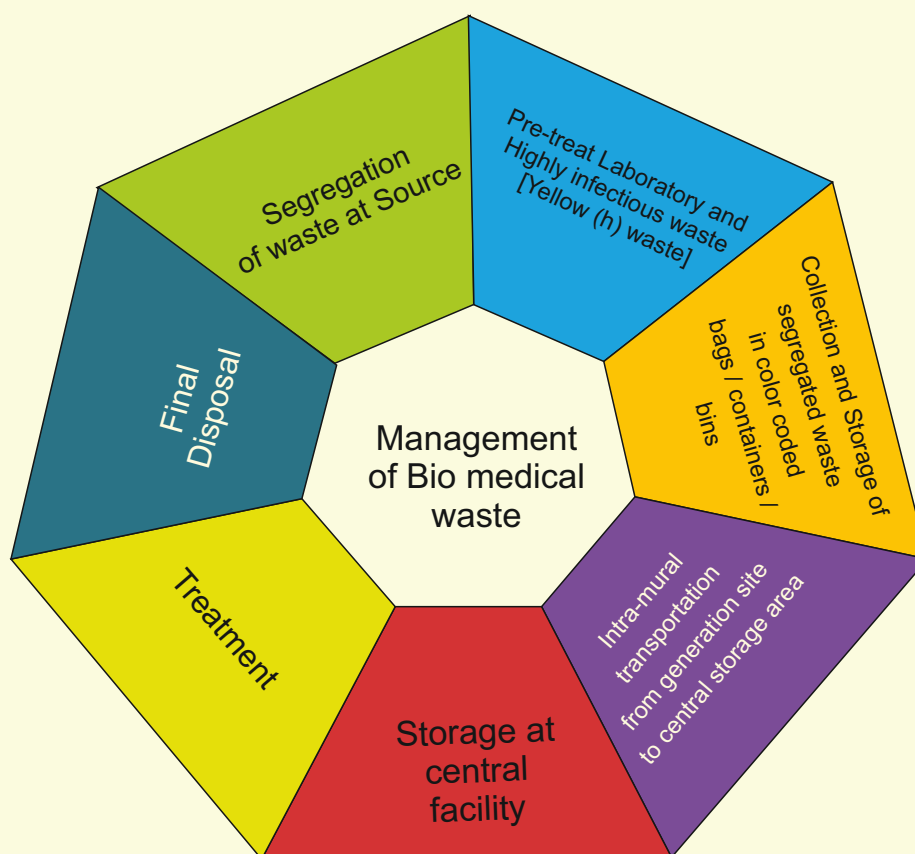


Figure 3: Management of Bio medical waste





First six steps (Segregation, Collection, pre-treatment, Intramural Transportation and Storage) is the exclusive responsibility of Health Care Facility. While Treatment and Disposal is primarily responsibility of Common Bio-medical Waste Treatment

Facility (CBMWTF) operator except for lab and highly infectious waste, which is required to be pre-treated by the Health Care Facility (HCF). Following are the responsibility of HCF for management and handling of bio-medical waste:

- (a) Biomedical Waste should be segregated in accordance with Schedule I at the point of generation in designated colour coded bin/ container.
- (b) Waste must be segregated at the point of generation of source and not in later stages. As defined earlier too, "Point of Generation" means the location where wastes initially gets generated, accumulates and is under the control of doctor / nursing staff etc. who is providing treatment to the patient and in the process generating bio-medical waste.
- (c) Adequate number of colour coded containers and desired colour coded bags (Non-chlorinated bags) provided with proper label as per Bio-medical Waste Management (BMWM) Rules, 2016 should be provided in all the wards at the designated location and away from the patient's areas, for ensuring segregation of waste at source.
- (d) The awareness posters should be displayed in all the wards with regard to the waste generated, type of colour coding should be used and the bins to be used for segregation of waste at source both in Hindi or Vernacular Language and in English.
- (e) Biomedical Waste & General Waste shall not be mixed. Storage time of waste should be as less as possible so that waste storage, transportation and disposal are done within 48 hours.
- (f) Chlorinated plastic bags for collection of biomedical waste should not be used by the HCF. All efforts shall be made to minimize the chlorinated plastics in biomedical waste.
- (g) No secondary handling or pilferage of waste shall be done at healthcare facility. If CBMWTF facility is available at a distance of 75 km from the HCF, bio-medical waste should be treated and disposed only through such CBMWTF operator.
- (h) Only Laboratory and Highly infectious waste shall be pre-treated onsite before sending for final treatment or disposal through a CBMWTF Operator.
- (i) All bags or containers containing segregated bio-medical waste shall be labelled (including bar code) before such waste goes for final disposal through a CBMWTF.
- (j) Provide Personnel Protective Equipment to the bio-medical waste handling staff.
- (k) All the wards as well as at all the salient points, spill collection procedures should be displayed and spill collection kits should be provided.
- (l) In place of the non-functional needle destroyers, standby instruments in working condition should be replaced immediately in the wards.

5.2 Colour Coding and Type of Container/ Bags to be used for Waste Segregation & Collection

Table 3: Colour Coding and Type of Container/ Bags of BMW

S. No.	Category	Type of waste	Colour & Type of Container
1.	Yellow Category	<ul style="list-style-type: none"> ▪ Human Anatomical Waste ▪ Animal Anatomical Waste ▪ Soiled Waste ▪ Discarded or Expired Medicine ▪ Microbiology, Biotechnology and other clinical laboratory waste ▪ Chemical Waste ▪ Chemical Liquid Waste 	<p>Yellow Coloured Non Chlorinated Plastic Bags (having thickness equal to more than 50 μ) or containers</p>  <p>Note</p> <ul style="list-style-type: none"> ▪ Chemical liquid waste such as spent hypo of X-Ray should be stored in yellow container and sold to recycler authorised by SPCB/PCC. ▪ Infected secretions, aspirated body fluids etc from laboratory should be disinfected before mixing with other wastewater from hospital. ▪ Liquid chemical wastes should be pre treated/neutralised before mixing with other wastewater from hospital.
2.	Red Category	Contaminated Waste (Recyclable)	<p>Red Coloured Non Chlorinated Plastic Bags (having thickness equal to more than 50 μ) and Containers</p> 
3.	White Category	Waste Sharps including metals	<p>White Coloured translucent, puncture proof, leak proof, Temper Proof containers</p> 
4.	Blue Category	Glassware Metallic Body Implants	<p>Cardboard boxes with blue colored marking or blue colored puncture proof, temper proof containers</p>  <p>Cardboard Box with Blue marking</p>

As per Schedule I of the Bio Medical Waste Management Rules, 2016 following colour coding and type of container/bags is needed to be used by the HCFs for segregation and collection of generated Bio Medical Waste from the facility.

NOTE: As per BMWM Rules, 2016, every occupier shall phase out use of non-chlorinated plastic bags within two years i.e. by 27.03.2019 and from 28.03.2019 onwards, the chlorinated plastic bags shall not be used for storing and transporting of bio-medical waste and the bags used for storing and transporting biomedical waste shall be in compliance with the Bureau of Indian Standards. Till the Standards are published, the carry bags shall be as per the Plastic Waste Management Rules, 2016.

5.3 Bio Medical Waste Collection

5.3.1 Collection of waste

- Engage dedicated House Keeping workers for collection of bio-medical waste.
- Waste should be collected periodically at least before change of shift or 2/3 filled colour coded Bags whichever is earlier should be immediately replaced with a bag of same colour. Bags should be labelled.
- Only closed type of trolley or wheel borrow of adequate capacity and labelled with bio-hazard symbol as per BMWM Rules, 2016 should be used for collection and intra-mural transportation of waste and from wards to the temporary waste storage area

5.3.2 Time of Collection

- Bio-medical waste should be collected on daily basis from each ward of the hospital at a fixed interval of time. There can be multiple collections from wards during the day.
- HCF should ensure collection, transportation, treatment and disposal of bio-medical waste within 48 hours.
- Collection times should be fixed and appropriate to the quantity of waste produced in each area of the health-care facility.
- General waste should not be collected at the same time or in the same trolley in which bio-medical waste is collected.
- Collection should be daily for most wastes, with collection timed to match the pattern of waste generation during the day. For example, in an In-Patient Department (IPD) ward where the morning routine begins with the changing of dressings, infectious waste could be collected mid-morning to prevent soiled bandages remaining in the area for longer than necessary.
- General waste collection must be done immediately after the visiting hours of the HCFs, as visitors coming to facility generate a lot of general waste and in order to avoid accumulation of such general waste in the HCF. The collection timings must enable the HCF to minimize or nullify the use of interim storage of waste in the departments.
- Bio-medical waste collected by the staff, should be provided with Personal Protection Equipments (PPEs).

5.3.3 Packaging

- Bio-medical waste bags and sharps containers should be filled to no more than three quarters full. Once this level is reached, they should be sealed ready for collection.
- Plastic bags should never be stapled but may be tied or sealed with a plastic tag or tie.
- Replacement bags or containers should be available at each waste-collection location so that full ones can immediately be replaced.
- Colour coded waste bags and containers should be printed with the bio-hazard symbol, labelled with details such as date, type of waste, waste quantity, senders name and receiver's details as well as bar coded label to allow them to be tracked till final disposal.
- Ensure that Bar coded stickers are pasted on each bag as per the guidelines issued by CPCB

PACKAGING AND DISPOSING OF BIOLOGICAL WASTE
Handling biological waste must be done with Standard/Universal Precautions.

5.3.4 Labelling

General labelling: All the bags/ containers/ bins used for collection and storage of bio-medical waste, must be labelled with the warning Symbol of Bio Hazard or Cytotoxic Hazard as the case may be as per the type of waste in accordance with the BMW Rules, 2016.



Bio-Hazard Label

Cyto-Toxic Label

Figure 4: Labels for Bio-Medical Waste

Apart from bar coding label, all the bags and containers to be transported to CBMWTF must also be labelled with following details as per BMW Rules, 2016:

- § Date of Generation
- § Type of waste category
- § Waste Quantity in kg
- § Name and Address of the hospital
- § Contact Person Name and Phone Number
- § Contact Details in case of any Emergency
- § Receivers contact details i.e. Name, Address and Contact Details

5.3.5 Bar-coded label

Bar coding: Barcode system is required to be adopted in compliance to the BMW Rules, 2016 by the Occupier as well as the Operator of a common facility. This helps in (i) tracking of waste from source of generation to final destination for final treatment and disposal; (ii) identification of waste in the event of source of generation in case waste is disposed of improperly; and (iii) Helps in quantification of bio-medical waste generated, colour coding-wise waste handed over to the CBMWTF operator by the Occupier, for further treatment and disposal in accordance with the BMW Rules, 2016. Bar code label specific to an occupier may be pre-printed directly on colour coded bags/containers or bar coded label for pasting on the colour coded bags/ containers as prescribed under the BMW Rules, 2016 shall be used. The guidelines published by Central Pollution Control Board on use of bar-code system for biomedical waste management should be adopted. Health Care Facilities shall procure Bar Coded Labels from the vendor (s) or the Common Biomedical Waste treatment Facility on payment of appropriate charges. At the temporary waste storage area a representative of Health Care Facility should ensure that all the bags and containers are scanned by facility operator and also collect the waste receipt generated by the bar-code scanner unit.



5.3.6 Interim Storage

- Interim storage of bio medical waste is discouraged in the wards / different departments of HCF.
- If waste is needed to be stored on interim basis in the departments it must be stored in the dirty utility/sections.
- No waste should be stored in patient care area and procedures areas such as Operation Theatre. All infectious waste should be immediately removed from such areas.
- In absence of dirty utilities/ sections such Bio-medical Waste must be stored in designated place away from patient and visitor traffic or low traffic area.

6. IN HOUSE TRANSPORTATION OF BIO-MEDICAL WASTE

6.1 Transportation Trolleys & Carts

In house transportation of Bio Medical Waste from site of waste generation/ interim storage to central waste collection centre, within the premises of the hospital must be done in closed trolleys / containers only, preferably fitted with wheels for easy manoeuvrability. Such trolleys or carts are designated for the purpose of Bio Medical Waste Collection ONLY. Patient trolleys must not be used for waste transportation. Size of such waste transport trolleys should be as per the volume of waste generated from the HCFs.

Figure 5: Examples of Waste Collection Trolleys for BMW Transportation



Waste Collection Cart

Waste Transport Trolley for a particular category of waste

6.2 Route of intramural transportation of bio-medical waste

Bio-Medical Waste Generated from different wards or laboratories in the Health care facilities must be transported in the covered trolleys/carts through a route which has low traffic flow of patients and visitors. Route of transportation preferably be planned in such a way that:

- Transportation does not occur through high risk areas
- Supplies and waste are transported through separate routes.
- Waste is not transported through areas having high traffic of patients and visitors
- Central Waste collection area could be easily accessed through this route
- Safe transportation of waste is undertaken to avoid spillage and scattering of waste

6.3 Central Waste Storage Room

Each Healthcare facility should ensure that there is a designated central waste collection room situated within its premises for storage of bio-medical waste, till the waste is transported for treatment and disposal to CBMWTF. Such room should be under the responsibility of a designated person and should be under lock & key. The following points may be considered for construction of central waste collection room;

- The location of central waste collection room must be away from the public/visitors access.
- The space allocation for this room must be as per the quantity of waste generated from the hospital. There should be separate space for different category (yellow, red, blue and white) of bio-medical waste.
- Storage area should have Good lighting provision.
- The planned space must be sufficient so as to store at least two days generation of waste.
- The planned space must also include space provisions for storage of waste collection trolleys.
- The entrance of this room must be accessible through a concrete ramp, suitably sized for easy transportation of waste collection trolleys.
- There should be easy access between central storage room and CBMWTF vehicles.
- Flooring should be of tiles or any other glazed material with slope so as to ease the cleaning of the room.
- Provision of water supply for daily cleaning and maintenance of the room with disinfectants. There should be provision of routing of wash water to ETP.
- During construction it is to be ensured that the room is kept ventilated through the use of exhaust fan or by use of wire meshes for ventilation.
- It is to be ensured by the health care facility that such central storage room is inspected for safety for potential fire hazard and based on such inspection preventive measures have to be taken by the health care facility like installation

- of fire extinguisher, smoke detector etc.
- There should also be provision for water supply adjacent to central waste storage area for cleaning and washing of this station and the containers. The drainage from the storage and washing area should be routed to the Effluent Treatment Plant.
- Take adequate measures for restricting the entry of rodents, insects and birds
- Sign boards indicating relevant details such as contact person and the telephone numbers should be provided.
- The entrance of this room must be labelled with “ENTRY FOR AUTHORIZED PERSONNEL ONLY” and logo of Bio Medical Waste Hazard.
- It is to be ensured that no general waste is stored in the central waste storage room.



Figure 6: Storage rooms for Bio-medical waste

7. HANDING OVER THE BIO-MEDICAL WASTE TO CBMWTF

Following steps are needed to be undertaken by Health Care Facility while handing over the bio medical waste to CBMWTF:

- Ensure that all the bags containing BMW are lifted by facility operator
- All the bags or containers containing bio- medical waste, to be sent out of the premises must also be labelled as per BMW Rules and also labelled with unique bar code.
- Collect or receive a receipt generated from bar-code scanning system.
- The HCFs must ensure that there is no secondary handling of the waste i.e. the waste is handed over to the CBMWTF directly from HCFs’ central waste collection room.
- If the waste collection agency or CBMWTF does not collect the waste within agreed time, which must not exceed beyond 48 hrs, it is the responsibility of the health care facility to immediately notify to the prescribing authority about any such lapse.

7.1 Record keeping

- Each healthcare facility needs to maintain and update a day wise, category wise record of Bio Medical Waste generated from the facility.
- Category wise quantity of waste generated from the facility must be recorded in Bio Medical Waste Register being maintained at central waste collection room

- under the supervision and authority of one designated person.
- A weighing machine as per the specifications given in CPCB guidelines for bar code system needs to be kept in central waste collection room or with a designated person responsible for handing over the waste to CBMWTF, for weighing the quantity of Bio Medical Waste.
 - The following records need to be maintained (to be kept atleast for five years) relating to:
 - Bio-medical Waste Generation (Ward-wise as well as Centralized)- for compilation of Annual Report.
 - Pre-treatment of Lab, Microbiology, Blood Bags and the Blood samples.
 - Wastes treated and disposed through recyclers approved by SPCB/PCC (as applicable).
 - Daily Waste disposed through CBMWTF
 - Accidents and remedial measures taken
 - Immunisation of Health Care Workers
 - Trainings organised to the HC Staff
 - Health status of the workers (Induction and once in a year)
 - Minutes of the meetings of the Committee c constituted by the HCF
 - Annual report submitted by June 30th of every year (By the HCFs) for the preceding calendar year to SPCB/PCC

7.2 Updating Of Information in Website

Every healthcare facility as prescribed under Bio-Medical Waste Management Rules, 2016 shall develop a separate page/web link in its website for displaying the information pertaining to their hospital. The following information should be uploaded and updated:

- (a) Contact Address and details of the Healthcare Facility
- (b) No. of beds
- (c) Details of Authorisation under Bio-Medical Waste Management Rules, 2016; Consent under Water (Prevention and Control of Pollution) Act, 1974 and Air (Prevention and Control of Pollution) Act, 1981
- (d) Total quantity of bio-medical waste generation (in kg/day)
- (e) Mode of disposal of bio-medical waste (through CBMWTF or through captive treatment facility)
- (f) Name and address of the CBMWTF through which waste is disposed off (as applicable)
- (g) In case, HCF is having captive treatment facility,
 - Bio-medical waste treated (in kg/day)
 - Details of treatment equipment (Nos. and capacity of each treatment equipment in kg/day)
 - Operating parameters of the treatment equipment as per Bio-Medical Waste Management Rules, 2016
- (h) Record of bio-medical waste generation (category wise)

- (i) No. of trainings conducted on Bio-medical Waste Management in the current year
- (ii) Stats of immunization of Health Care Workers involved in handling of BMW

7.3 Pre-treatment of Bio-medical Waste at Healthcare Facilities

No treatment of waste is required to be carried out at the health care facility other than waste which requires pre-treatment as prescribed under the BMW Rules, 2016. The following waste are required to be pre-treated within healthcare facility

- (a) laboratory waste,
- (b) microbiological waste,
- (c) blood samples and
- (d) contaminated blood bags

Figure 7: Transportation of Waste from HCF to the Common Bio-medical Waste Treatment Facility



The above waste can be pre-treated by autoclaving / microwaving / hydroclaving / Chemical disinfection on-site. The pre-treated waste shall be placed in yellow colour bag and sent to the common bio-medical waste treatment facility (CBMWTF) for final disposal.

All the vehicles used by the CBMWTF operator shall not be sub-letted or contract vehicles should not be used by the CBMWTF operator. All the vehicles owned by the CBMWTF operator and intended only for collection of bio-medical waste from the member health care facilities should be registered under the Motor Vehicle Act with the respective RTO/Transport Department and such vehicle numbers should also be registered with the respective SPCB/PCC for the purpose of collection of bio-medical waste from the member health care facilities. The bio-medical waste collected in designated colored containers shall be transported to the CBMWTF in a fully covered vehicle. Such vehicle shall be dedicated for transportation of bio-medical waste only. Depending upon the volume of the wastes to be transported, the vehicle may be a two or three-wheeler, light motor vehicle or heavy duty vehicle. In either case, the vehicle must possess the following:

- (a) Transportation vehicle shall be fitted with GPS to track the movement of the vehicle.
- (b) Separate cabins shall be provided for driver/staff as well as for placing the designated colour coded bio-medical waste containers.
- (c) Two wheeler registered under the Motor Vehicle Act shall be permitted for collection of bio-medical waste only from the clinics or dispensaries located in places where the

- lanes are narrow and not easily accessible to four wheeler vehicles. Such two wheeler vehicle (s) should have a provision of a suitable fixed waste collection box marked with bio-hazard symbol, contact details, proper lid, emergency spill collection procedure, first aid box and manifest record in accordance with the BMW Rules
- (d) The base of the waste cabin shall be leak proof to avoid pilferage of liquid during transportation.
 - (e) The waste cabin may be designed for storing waste containers in tiers and also should be provided with a lighting provision. (vi)The waste cabin shall be so designed that it is easy to wash and disinfect. (vii) The inner surface of the waste cabin shall be made of smooth surface to minimize water retention. (viii) The waste cabin shall have provisions for sufficient openings in the rear and/or sides so that waste containers can be easily loaded and unloaded.
 - (f) The vehicle shall be labeled with the bio-hazard symbol (as per Schedule IV of the BMW Rules) and should display the name, address and contact telephone and mobile number of the CBMWTF.
 - (g) The vehicle driver should carry always valid registration of the vehicle obtained from the concerned transport authority and also carry valid 'pollution under control certificate' issued by the authorized certificate issuing agency. Depending upon the area to be covered under the CBMWTF, the route of transportation shall be worked out. The transportation routes of the vehicle shall be designed for optimum travel distance and to cover all member healthcare units of the CBMWTF.

The CBMWTF operator should ensure online and real time tracking & monitoring provisions (GPS provision) should be given access with passwords to the SPCB/PCC and CPCB to cross check the movement of the transportation vehicles on any time by the SPCB/PCC/CPCB.

As far as possible, the transportation shall be carried out during non-peak traffic hours. If the area to be covered is very large, a satellite station may be established to store the bio-medical waste collected from the adjoining areas. The wastes so stored at satellite station may then be transported to the CBMWTF in a big vehicle. It shall be ensured that the total time taken from generation of bio-medical waste to its treatment, which also includes collection and transportation time, shall not exceed 48 hours.

8. MANAGEMENT OF GENERAL WASTE

As per Bio Medical Waste Management Rules 2016 the general waste generated from the healthcare facility must be disposed of in accordance with the provisions of Solid Waste Management Rules, 2016. Health care facilities must ensure that the general solid waste generated from the facility is segregated and collected in a separate bins filled in with non-chlorinated bags and shall not be mixed up with the BMW generated in the facility.

- Two separate bins should be provided at each place for dry waste (blue colour bin) and wet waste (green colour bin)
- Use only compostable plastic bags for collection of waste from wet bins
- Segregated wastes should be handed over to the Local Municipalities or Corporations, Urban Local Bodies and Gram Panchayats as per the Municipal Solid Waste (Management and Handling) Rules, 2016 or as amended from time to time.
- The wet waste should preferably be used in on site compost plant to produce organic compost.
- Used sanitary waste like diapers, sanitary pads etc. Generated from hospitals should preferably be wrapped in the pouches provided by the manufacturers or brand owners of these products or in a suitable wrapping material and disposed along with soiled waste yellow category waste for incineration.
- To store horticulture waste and garden waste generated from his premises separately in his own premises and dispose of as per the directions of the local body from time to time.
- No waste generator shall throw, burn or burry the solid waste generated by him, on streets, open public spaces outside his premises or in the drain or water bodies.
- All waste generators shall pay such user fee for solid waste management, as specified in the bye-laws of the local bodies.
- No person shall organize an event or gathering of more than one hundred persons at any unlicensed place without intimating the local body, at least three working days in advance and such person or the organizer of such event shall ensure segregation of waste at source and
- Handing over of segregated waste to authorized waste collector or agency as specified by the local body
- Such waste must not be stored in the central waste storage area meant for Bio Medical Waste generated for the facility, but is stored separately, till it is handed over to the local Municipalities or Corporations or Gram Panchayats
- Any BMW generated should not be mixed with the general waste and should not be handed over to the Municipality.
- For this purpose health care facilities has to ensure that all the staff of HCF segregates the waste at the generation site only and general waste is collected and stored in a separate non chlorinated bag

8.1 Construction of compost Pit

- A two-tank system for garden and general waste is recommended.
- A small tank of 1m x 1m x 1m is made above ground under may be a shade.
- The tank may be divided into two equal halves units vertically by a wall containing vents.
- Twigs wigs and small branches are put on the floor.
- The waste is deposited over this layer and spread in the tanks.

- After a layer of 15 to 20 cm dry/green leaves is formed, a thin layer of soil is used to cover it.
- Water is sprinkled over it. This process of alternate layers of waste and mud is followed till the tank is about $\frac{3}{4}$ full following which the other tank is used.
- The contents of the first tank are to be left alone for about two months and the contents can then be used as manure.

8.2 Vermi-Composting

In this method, few species of Earth-worms (*Eudriluseugeniae* or *Eiseniafoetida* and *Perionyx excavates*) are added to the compost. These help to break the waste and the added excreta of the worms makes the compost very rich in nutrients.

- To make a compost pit, a covered / selected site is selected.
- Preferably the pit should be lined with granite or brick to prevent nitrite pollution of the subsoil water.
- Each time when organic matter is added to the pit, it should be covered with a layer of dried leaves or a thin layer of soil which allows air to enter the pit.
- Usually after 6 to 8 weeks the rich pure organic matter is ready to be used.

8.3 Management of Other Wastes

8.3.1 Management of Used Batteries

As per the provisions under Batteries (Management & Handling) Rules, 2001, used lead acid batteries generated from health care facilities (HCFs) should be sold/auctioned/sent only to the authorised dealers, designated collection centres or authorised recyclers or any authorised agency. In no case the used batteries be handed over to an unauthorised person. Hospital having purchased more than 100 batteries should maintain records of number of batteries purchased, and number of used batteries sent to registered recyclers/authorised dealers/designated collection centres/any other agency as per Form-VIII of Batteries Rules, 2001 and the return shall be filed half yearly i.e. by 30th June and 31st December of every year to the concerned State Pollution Control board. D2.2

8.3.2 Management of E-Waste

As per provisions under E-Waste (Management) Rules, 2016, every generators of end of life electrical and electronic equipment (EEE) listed under Schedule-I are required to ensure that such E-Waste is sent to an authorized E-Waste dismantling or recycling facility or an authorised collection centre of the producers or through designated take back service providers of a producers. E-waste can also be auctioned only to the authorised E-Waste recyclers/dismantlers. Records of E-Waste transfer/sale should be maintained records in Form -2 for verification of the SPCBs/PCCs and Annual returns as per Form-3 of E-Waste (Management) Rules, 2016 should be submitted to SPCBs/PCCs by June 30th of every year.

E-Waste generated from hospital equipment not listed in Schedule-I should also be sold/ transferred to only the Authorized E-Waste Recyclers/dismantlers.

8.3.3 Management of Radioactive Waste

The Atomic Energy Regulatory Board (AERB) has been mandated by the Central Government, as the Competent Authority as per Atomic Energy (safe Disposal of Radioactive Wastes) Rules, 1987 notified under the Atomic Energy Act 1962. It exercises regulatory control over nuclear installations and the use of radioactive substances and radiation generating plants outside such installations.

AERB also empowered to perform the functions as stipulated under sections 10(1) (powers of entry) and 11(1) (powers to take samples) of Environmental (Protection) Act, 1986 and Rule 12 (agency to which information on excess discharge of pollutants to be given) of the Environmental (Protection) Amendment Rules, 1987 with respect to radioactive substances. As per provisions of Atomic Energy (safe Disposal of Radioactive Wastes) Rules, 1987, no person shall dispose of radioactive waste (a) unless he has obtained an authorisation from the competent authority under these rules; (b) in any manner other than in accordance with the terms and conditions specified in the authorisation issued under these rules; (c) in any location different from those specified in the authorisation; and (d) in quantities exceeding those specified in the authorisation.

Health Care Facilities generating radionuclides waste from treatment of Cancer patients and end-of-life equipment containing radio radionuclides shall obtain authorization from AERB for its disposal. As per the policy of AERB, radionuclides wastes are required to be re-exported back to the manufacturer. It was recommended that such generators shall ensure arrangement with manufacturer at the time of purchase of such equipment. Waste disposal facilities of AERB are regulated by Waste Disposal Agency (Division) of AERB.

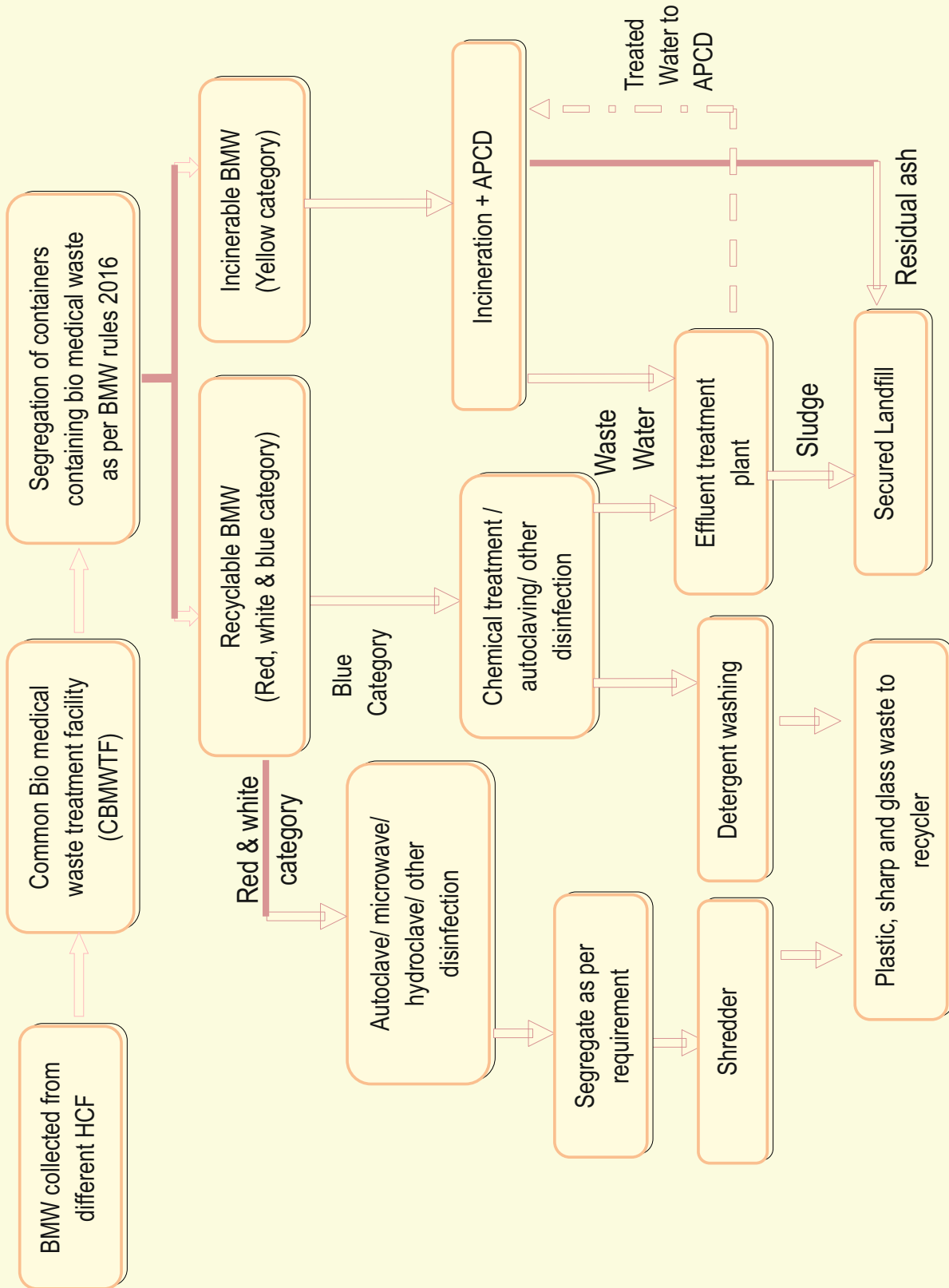
9. TREATMENT AND DISPOSAL

Biomedical waste shall be treated and disposed of in accordance with and in compliance with the standards provided in Schedule-II by the health care facilities and common bio-medical waste treatment facility. The requisite facilities for treatment of bio medical waste should be as per the provisions under BMW rules as well as the guidelines published by CPCB

9.1 A schematic diagram showing various options for treatment and disposal of BMW waste

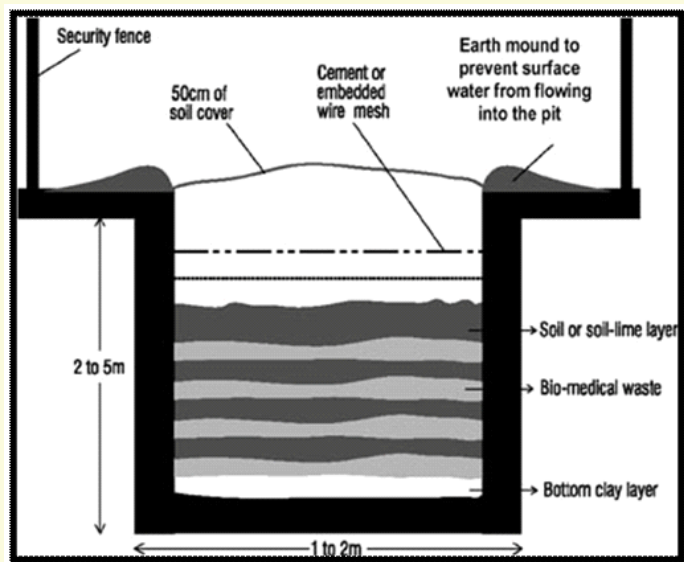
A schematic diagram showing various options for treatment and disposal of BMW

waste is shown in Figure below:



9.2 Disposal by Deep burial

Disposal by deep burial is permitted only in rural or remote areas where there is no access to common bio medical waste treatment facility. This should be carried out with prior approval from prescribed authority and as per standards specified in the rules. The deep burial facility should be located as per the provisions and guidelines issued by Central Pollution Control Board from time to time.



Deep burial pit for BMW

10. PROCEDURE FOR AUTHORIZATION



10.1 Application

Application must be submitted to the respective SPCB/PCC for fresh or renewal of authorization in prescribed format as per Form II as prescribed under Bio Medical Waste Management Rules, 2016

10.2 Information requirements of Application

- Particulars of Health Care Facility: Name, Address, Contact Details etc.
- Validity of Consents under Water (Prevention and Control of Pollution) Act, 1974 and Air (Prevention and Control of Pollution) Act, 1981
- Detail of HCF: Number of beds, Average number of patient treated per month
- Category wise Quantity of Waste Generated or disposed by the health care facility
- Detail of any treatment facility available in the premises of health care facility

10.3 Grant of Authorization

Upon verification and ensuring the HCF is having requisite facilities, the authorization is Granted by the respective State Pollution Control Board (SPCB)/Pollution Control Committee(PCC) in a prescribed form, with unique number of authorization and date of issue.

10.4 Validity of Authorization

(a) For bedded Healthcare Facilities

The validity of this authorization is synchronized with the validity of:

1. Consent under Air (Prevention and Control of Pollution) Act, 1981:
2. Consent under the Water (Prevention and Control of Pollution) Act, 1974

(b) For non-bedded Healthcare Facilities

The authorization for non-bedded healthcare facilities is for one time only. HCFs need to apply for a Fresh Authorization if there is any change or any variance in relation to the activities for which authorization is earlier granted by the respective SPCB/PCC.

10.5 Annual Reporting

As per the Bio Medical Waste Management Rules, 2016, the healthcare facility is required to submit the Annual Report to the SPCB/PCC on or before 30th June every year, for the period from January to December of the preceding calendar year.

The annual report should be filled in the prescribed format as per the Form IV prescribed under BMW Management Rules, 2016.

The annual report contains details of following:

- Particulars of Occupier/ HCF
- Quantity of waste generated in kg/annum
- Details of storage, treatment, transportation, processing and disposal facility

- Details of training conducted on Bio Medical Waste Management
- Details of accident Occurred
- Details Emission and Effluent testing
- Annual Report submitted to the State Pollution Control Board or Pollution Control Committee must also be enclosed with following details:
- Training imparted to the Health Care Workers involved in handling of bio-medical waste
- Minutes of Meeting of BMW Management Committee
- Details of Accident Occurred during one year, along with the remedial steps taken
- Records of testing of Emission of DG Sets
- Records of Effluent generated and its characteristics from health care facility
- Records of pre-treatment Of specified waste categories
- Record of recyclable waste handed over to the authorized recycler in kg/annum (where captive treatment facility is allowed by the SPCB/PCC)
- Records of health status of the Health Care Workers involved in handling of bio-medical waste
- Records of immunisation of Health Care Workers involved in handling of bio-medical waste
- Each healthcare facility must also ensure that the annual report submitted to the concerned SPCB/PCC is also published in its own website

10.6 Accident Reporting

Any accident occur during the handling of Bio Medical Waste in the healthcare facility is having potential to either harm the environment or safety of the human health must be recorded by the HCF. **As per the Bio Medical Waste Management Rules, 2016, the accidents are classified into two categories:**

10.6.1 Major Accidents

Major accidents includes but not limited to following:

- Toppling of the truck carrying bio-medical waste
- Accidental release of bio-medical waste in any water body
- Fire Hazard
- Blasts
- Flooding or Erosion of the deep burial pit etc

It is **mandatory** under Bio-Medical Waste Management Rules 2016, for healthcare facilities to report each/any major accidents, to the respective State Pollution Control Board/Pollution Control Committee, occurred during the handling of Bio-Medical Waste along with the records of remedial actions taken including corrective and preventive actions. The Accident Report is needed to be forwarded in written to the respective SPCB/PCC within **24 hrs of accident**. The reporting should be done on the prescribed **Form 1** given in Bio-Medical Waste Management Rules, 2016.

10.6.2 Minor Accidents

Minor accidents includes but not limited to following

- Needle stick injuries,
- Splash exposure or
- Mercury spills
- Chemical Spillage etc.

Such minor accidents need not to be immediately reported to the State Pollution Control Board/Pollution Control Committee but is required to be recorded by the health care facility and appropriate remedial actions must be taken by health care facility.

Healthcare facility also needs to submit the details of total number of accidents occurred both major and minor, along with the number of persons affected, remedial actions taken and number of fatalities, along with the annual report (for the preceding calendar year) to be submitted to SPCB/PCC, on or before 30th June of every year. Mercury spills should be managed as per the procedure outlined CPCB guidelines.

10.7 Other Reporting Requirements

Besides annual reporting and accident reporting each healthcare facility needs to report to the respective SPCB/PCC in event of following:

- If the waste collection agency or CBMWTF does not collect the waste within 48 hours of generation, it is the responsibility of the HCF to immediately notify to the respective State Pollution Control Board/Pollution Control Committee about any such lapse.
- It is also mandatory to report to the respective State Pollution Control Board/Pollution Control Committee, the reason of storing the waste in the facility for a period beyond 48 hours and also the remedial actions taken by the HCFs to ensure that the waste does not adversely affect human health and the environment.

10.8 Occupational Safety

It is the responsibility of the in charge of the healthcare facility to ensure the occupational safety of the healthcare workers and other staff involved in handling of Bio medical waste in the healthcare facility. As per Bio Medical Waste Management Rules, 2016 occupational safety of the staff is to be ensured in following methods:

- Providing adequate and appropriate Personal Protective Equipment (PPE) to the staff handling Bio Medical Waste
- Conducting health check-up of all the employees at the time of induction and also at least once in a year.
- Ensuring that all the staff of the health care facility involved in handling of BMW is immunized at least against the Hepatitis B and Tetanus.
- Taking remedial steps in accordance to any accident occurred, leading to any

harm to the employee, during the handling of Bio medical waste

10.9 Personal Protective Equipment

Health care facilities must ensure that all the staff involved in the handling of Bio Medical waste is provided with Personal Protective Equipment (PPE) for their safety.

Personal Protective Equipment (PPE) includes:

- Heavy Duty Gloves (Workman's Gloves)
- Gum Boots or safety shoes for waste collectors
- Face mask
- Head Cap
- Splash Proof Gowns or aprons etc.
- Disposal gloves for waste handlers
- Use of PPE while handling of Bio Medical Waste must be encouraged and must be monitored regularly to ensure occupational safety of staff.



Fig 8: Personal protective equipment (PPEs)

11. DO'S AND DON'TS for HCFs

11.1 Do's:

- Segregate biomedical waste at the source of generation itself in colour coded containers / bags as per the BMW Rules, 2016.
- Use same coloured container as that of colour coded bags according to waste category.
- Pre-treat only the infectious microbiology, biotechnology and other clinically laboratory waste.
- Use separate yellow coloured bag with Cytotoxic symbol for disposal vials, ampoules, gloves, IV sets etc. contaminated with cytotoxic drugs.
- Wash the bins with detergent or soap and water periodically.

- Collect the organic waste such as leftover food, fruit peels, etc., in green coloured wet bin, meant for general waste.
- Use only compostable bags in green coloured wet bin, meant for general waste.
- Collect the dry solid waste such as papers, wrappers, plastic bottles, etc. in blue coloured dry bin, meant for general waste.
- Transport the bio-medical waste from source of generation to Central collection Room inclosed trolleys only.
- Transport waste through a pre-defined route within the hospital.
- Ensure that entire biomedical waste is handed over to common facility for necessary treatment and disposal.
- Ensure that the colour coded bag has bio-hazard symbol, label and bar coded label.
- Remove plastic bags when $\frac{3}{4}$ full, tie the bags properly. Ensure bag is properly tied / sealed to avoid spillage.
- Provide Personal Protective Equipment to housekeeping staff handling biomedical waste.
- Maintain records with regard to bio-medical waste management vis-à-vis waste generation, storage, treatment & disposal.
- Knot or lock string the filled bags lightly so as to avoid the spillage.
- Disinfect and cut the waste mattresses into 4 to 6 pieces prior to disposal.
- Collect needles / syringes with fixed needles in white coloured containers.
- Collect empty glass vials or empty glass ampoules in cardboard boxes and handover the box to CBMWTF.
- Disinfect the liquid waste from laboratory prior to mixing the same with hospital effluent.
- Collect used sanitary waste like diapers or sanitary napkins generated from wards (patient area) into yellow coloured bag.
- Collect sanitary waste wrapped (in pouches or suitable wrapping material) generated from public toilets in dry solid waste bins (blue bins) as part of general waste.
- Sell or handover E-Waste and used lead acid batteries only to registered recyclers or authorized collection centres.
- Report to SPCBs in case waste is not picked up regularly by common facility.
- Paste placards or postures for bio-medical waste segregation in the wards and collection centres.
- Sell X-ray hypo solution to only the authorized recyclers.

11.2 Don'ts

- Never mix bio-medical waste with general waste.
- Don't use chlorinated plastic bags for collection of bio-medical waste.
- Never store infectious microbiology, biotechnology and other clinically

laboratory waste beyond 48 hrs.

- Don't set-up on-site or captive treatment facility in case a common facility exists at a distance of 75Km.
- Don't dispose sharps (used syringes with needles, broken glass, scalpels etc.) into yellow or red coloured bags.
- Don't dispose plastic waste into yellow coloured bags.
- Don't fill the bags till neck.
- Don't handle waste without Personal Protective Equipment such as protective clothing, gloves, masks, shoe etc.
- Don't drag the bags after removal. (Bags can burst and the site could be repulsive.)
- Don't fill more than 20kg of biomedical waste in a bag.
- Don't sell/dispose/auction used linen / bed-sheets without disinfection.
- Don't handover plastic waste to un-authorized persons.
- Don't keep lid of the waste bins in open condition.
- Don't use the lift meant for patients for intra-mural transportation of bio-medical waste.

12. TRAINING AND AWARENESS

As per Bio Medical Waste Management Rules, 2016 have been revised it is mandatory for all the employee of the healthcare facility to be trained on handling of biomedical waste management and handling as per Bio-Medical Waste Management Rules, 2016.

12.1 Training need analysis

It is mandatory for each health care worker inducted to the HCF to undergo the training on Bio Medical Waste Management at the time of induction. Though as per Bio-Medical Waste Management Rules, 2016 an annual training for the entire healthcare staff of HCF on Bio-Medical Waste Management is a mandatory requirement, it is suggested that the committee / person designated for monitor or review of the activities of Bio-Medical Waste Management does the Training need analysis of the staff based on following parameters:

- Theoretical Knowledge
- Demonstration of methods of handling of bio-medical waste
- Practical Implementation

If any scope of improvement is observed by the committee or designated person, training must be provided to the relevant section of staff or staff.

12.2 Training Schedule

As per the Bio-Medical Waste Management Rules, 2016 the minimum requirements for health care facilities is to conduct the training on Bio-Medical Waste activities at least annually for all the staff of the facility and also whenever a

new staff is inducted into Health Care Facility.

It is preferable for each health care facility to create a training calendar for imparting the training on Bio Medical Waste Management Handling and training must be provided as per the formed training plan.

12.3 Trainers

- As per the BMWM Rules, 2016 it is the responsibility of the CPCB/SPCB/PCC and CBMWTF to impart training on BMW Management in the health care facilities.
- State Institute of Health & Family Welfare (SIHFW) may take the responsibility to provide induction training to the newly recruited healthcare staff
- For In house trainings trainers can be arranged from CPCB/SPCB/PCC or CBMTF or already trained employee of the healthcare worker can take up the role of trainer.

12.4 Training Material

It is a requirement of Bio-Medical Waste Management Rules, 2016 to have a standard training module for imparting the training in the healthcare facilities. For this purpose, these guidelines can be used as training material for imparting the training or any other relevant material published by approved authorities like CPCB/SPCB/PCC, State Guidelines can be used as training material.

12.5 Training Records

Health care facilities need to ensure that all the training records pertaining to the Bio Medical Waste Management including the induction training records and in service training, for all the staff is needed to be kept for proving compliance.

Attendance records of each training needs to maintained and signed by the trainees with name and designation.

HCFs need to maintain, compile and provide details of trainings provided for Bio-Medical Waste handling to State Pollution Control Board (SPCB)/Pollution Control Committee (PCC). These details have to be submitted along with the annual report to the prescribed authority i.e. CPCB/SPCB/PCC, on or before 30th June of every year.

The training details include:

- Total Number of trainings conducted along with the date of imparting the training
- Total number of participant of each training
- Attendance Record

- Total Number of staff trained on BMW Handling
- Total number of staff trained on BMW handling at the time of Induction
- Total number of staff, not undergone any sought of training on BMW Handling.

12.6 Training Effectiveness

Effectiveness of the training can be evaluated by observing the same parameters as listed in training need analysis of the staff or through a test mock/verbal or written, to be conducted after training.

REFERENCES & BIBLIOGRAPHY

- “Bio-Medical Waste Management Rules 2016” by CPCB
- CPCB guidelines for “Management of Healthcare Waste in Health Care Facilities as per Biomedical waste Management Rules, 2016”
- CPCB “Revised Guidelines for Common Bio-Medical Waste Treatment and Disposal Facilities”
- CPCB Guidelines for “Barcode System for Effective Management of Biomedical Waste”
- Guidelines for Disposal of Bio-medical Waste Generated during Universal Immunization Programme (UIP)
- CPCB guidelines for “Environmentally Sound Management of mercury waste generated from the Health Care Facilities”
- Bio-Medical Waste Management- Self Learning document for Nurses and Paramedical by EPTRI
- M/s SMS Water Grace Pvt. Limited, Nilothi, Delhi.

Contribution by:

Shri K K Sinha, Director, M/s SMS Envirocare Pvt. Ltd., New Delhi

Central Pollution Control Board (CPCB) Team

Shri B. Vinod Babu, Scientist-E & Nodal Officer (Waste Management)

National Productivity Council (NPC) Team

Ms. Nikita, Assistant Director and Shri Vijay Kumar Nehra, Assistant Director



NATIONAL PRODUCTIVITY COUNCIL

NPC is a national level organization to promote productivity culture in India. Established as a registered society in 1958 by Government of India, it is an autonomous, tripartite, not for profit organization with equal representation from the Government, Employers and Employees' organizations, apart from technical & professional institution on its governing council. Besides providing training, consultancy and undertaking research in the area of productivity, NPC also implements the productivity promotion plans and programmes of the Tokyo based Asian Productivity Organization (APO), an inter-governmental body of which the Government of India is a founder member.

MISSION of NPC is Development, Dissemination and Application of knowledge and experience in productivity, for promoting consciousness and improvement in productivity, with the objective of strengthening the performance and competitiveness of the economy as well as of improving the working conditions and quality of working life.

The Union Minister for Industry is the President of NPC, and the Secretary (Industrial Development) is its Chairman. Director General is the Chief Executive Officer, and is a government appointee. NPC has 13 Regional Directorates in the country with its Head Quarters at New Delhi and strength of over 170 full time consultants.

CORE COMPETENCIES:

NPC offers TOTAL SOLUTIONS, as also specific services in management as well as technological areas. These include:

- › **Industrial Engineering:** Workload assessment, Organization Redesign, Systems & Procedures redesign, Material requirement planning, MIS, Project Management, Cost reduction. Total Quality Management, ISO 9000, Certification, Business Process engineering, KAIZEN, Benchmarking etc.
 - › **Human Resource Development:** Work culture, Participative group activities, Productivity Linked reward Scheme, Training needs assessment, Wage structure, Competency Matrix.
 - › **Information Technology:** Management Information system, E – Governance, IT Infrastructure Planning.
 - › **Energy Management:** Energy Audits, Co-generation, Demand side management, Renewable & Green energy sources, Process Optimization & energy Conservation.
 - › **Environment Management:** Integrated environment planning, Environmental Audit, Cleaner Production Techniques, Hazardous Waste Management, Waste Minimization & Utilization, Green Productivity, ISO 14000 & OHSAS 18000.
 - › **Productivity Implementation:** Policy Research & Techno-economic Consultancy, Productivity Audit.
 - › **Technology Management:** Condition Monitoring, Safety audit, Risk assessment, Total Productive Maintenance.
 - › **World Class Manufacturing:** Flexible/ cellular manufacturing, JIT, Cycle time reduction, Six Sigma.
 - › **Agribusiness:** Food Processing, Warehousing Logistics, Evaluation Studies, Soil & Water conservation.
- NPC brings out literature suitable to Indian situation on current and emerging subjects relating to productivity and quality. It also brings out following periodicals, PRODUCTIVITY, PRODUCTIVITY NEWS AND UTPADAKTA (Hindi).

Visit us on: <http://www.npcindia.gov.in>



National Productivity Council

5-6, Institutional Area, Lodhi Road

New Delhi - 110003

www.npcindia.gov.in