



सत्यमेव जयते

Directorate General of Health Services  
Ministry of Health & Family Welfare



Central Pollution Control Board  
Ministry of Environment, Forest & Climate Change

# GUIDELINES

for Management of Healthcare  
Waste as per Biomedical Waste  
Management Rules, **2016**







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प्रीति सूदन

सचिव

PREETI SUDAN

Secretary



भारत सरकार  
स्वास्थ्य एवं परिवार कल्याण विभाग  
स्वास्थ्य एवं परिवार कल्याण मंत्रालय

Government of India  
Department of Health and Family Welfare  
Ministry of Health & Family Welfare

Dated: 1<sup>st</sup> April, 2019



### MESSAGE

Proper management of healthcare waste including biomedical waste is essential and contributes to Infection Prevention and Control (IPC) and safety of patients in health care facilities. Bio-medical waste management was regulated by the Biomedical Waste Management Rules (BMWM Rules) 1998 under Environment (Protection) Act, 1986 and now by the revised Bio-medical Waste Management Rules (2016). The objective of the rules is to improve the collection, segregation, processing, treatment and disposal of these bio-medical wastes in an environmentally sound management thereby, reducing the bio-medical waste generation and its impact on health and environment.

Under Swachha Bharat Mission special focus is being accorded to proper handling and disposal of bio-medical and other health care waste. The revision and re-notification of BMW Rules (2016) by Ministry of Environment, Forest and Climate Change warranted the need for revision in guidelines on waste management, including bio-medical waste, in the country. These guidelines have, therefore, been prepared jointly by officials from Directorate General of Health Services (Dte.GHS), Ministry of Health and Family Welfare and Central Pollution Control Board (CPCB), Ministry of Environment, Forest and Climate Change. I congratulate Dte.GHS and CPCB for coming up with these guidelines to improve understanding of the rules in healthcare sector.

These guidelines have been put together by various experts associated with regulation as well as implementation of bio-medical waste management. I would urge all health care providers to adopt these guidelines in their health facilities and hope that the guidelines will help improve waste management in health care facilities in the country. They can also be used as guidance by private sector to train its health care personnel.

(Preeti Sudan) 1.4.19



डॉ. एस वेंकटेश

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दिनांक/Dated.....**10.04.2019**

### MESSAGE

Many types of waste are generated in healthcare setting like solid waste, biomedical waste and e-waste. Of these, biomedical waste can be potentially infectious and, if not properly handled, managed and allowed to mix with solid waste, can render the entire healthcare waste infectious. Therefore, biomedical waste management has recently emerged as an issue of major concern not only to healthcare institutions but also to the environment. However, only 15-35% of the waste in the hospitals is infectious.

Waste generated from healthcare units depend upon a number of factors such as waste management methods, type of healthcare units, occupancy of healthcare units, specialization of healthcare units, ratio of reusable items in use, availability of infrastructure and resources. In India waste handling, segregation, management and disposal is regulated by various rules like Biomedical Waste Management Rules (2016 & Amendment 2018), Solid Waste Management Rules (2016), E-waste Management Rules (2016).

The recent revision of these rules made it necessary to build the capacity of health care workers to ensure their effective implementation. Therefore, the Directorate General of Health Services in collaboration with Central Pollution Control Board, Ministry of Environment Forest & Climate Change has come out with Guidelines for Management of Healthcare Waste as per Biomedical Waste Management Rules, 2016.

The guidelines cover management of all kinds of waste generated in healthcare settings such as biomedical wastes, solid waste, e-waste, etc. in accordance with relevant waste management rules. These will clarify various provisions of BMWM Rules, 2016 including technical and managerial aspects in implementation. I hope that these guidelines will help improve the implementation of the rules in healthcare facilities in the country.

  
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**MESSAGE**

Dated the 28<sup>th</sup> March, 2019

It is the responsibility of Health administrators to manage hospital waste in a safe and environmentally sound manner. Health facilities are a source of different waste like bio-medical waste and solid waste etc. Inadequate bio-medical waste management causes environmental pollution, unpleasant smell, growth and multiplication of infectious agents and may lead to the transmission of diseases like typhoid, cholera, hepatitis and AIDS through injuries from contaminated syringes and needles.

Bio-medical waste constitutes 20% of hospital waste but can significantly render the entire health care waste infectious if improperly handled. Solid waste generated in health care settings, is similar to household waste but if not disposed properly can be unsightly and a source of vector breeding. Health care settings also see usage of electronic goods like computers and printers. The disposal of these wastes is regulated in India by various Rules such as Bio-medical waste Management Rules (2016 & Amendment 2018), Solid Waste Management Rules (2016), E-waste Management Rules (2016).

The comprehensive management of healthcare waste involves planning, implementation and monitoring of actions that aim to prevent exposure, ensure the safety of users and professionals involved, prevent the occurrence of environmental impacts while minimizing the generation of waste. These guidelines, therefore, bring together various waste management rules applicable in health care setting and cover technical and managerial aspects for proper management of different health care waste. I hope this guidance would strengthen health care waste management in the country.

With *regards,*

Yours sincerely

(Lav Agarwal)



### Preface

Bio-medical waste management was earlier being regulated by Bio-medical Waste Management Rules (1998) under Environment Protection Act (1986). Thereafter, Ministry of Environment Forest & Climate Change notified the Biomedical Waste Management Rules (2016) & Amendment (2018). Proper bio-medical waste management increases safety of patients and employees, reduces sharps injury potential, reduces risk of blood-borne pathogens, and reduces hospital-acquired infections (HAIs) such as HIV, Hepatitis B & C, Typhoid etc. All these elements ultimately contribute to Patient Safety and Workers Safety.

Health facilities generate a variety of other wastes and it is important that they should be able to follow the trail of different types of healthcare waste. These wastes should be controlled from time of generation to final treatment, also known as the cradle-to-grave approach to waste management. Different waste streams like solid waste, e-waste and construction waste are now regulated by recently notified Solid Waste Management Rules (2016), E-waste Management Rules (2016) and Construction & Demolition Waste Management Rules (2016). Hospitals should, have policies and procedures in place to ensure implementation of waste management rules with particular focus on bio-medical waste.

The new rules necessitated updating existing guidelines in health sector. Directorate General of Health Services (Dte.GHS) has developed 'Guidelines for Management of Healthcare Waste as per Biomedical Waste Management Rules, 2016', which have been vetted by Central Pollution Control Board, (MoEF&CC) and approved by MoHFW. The guidelines describe in detail procedures to be adopted by health care facilities for cradle to grave management of different type of health care waste. They elaborate upon type of health care waste; segregation treatment and disposal of bio-medical waste; management in outreach activities; management requirements; management of other waste such as general waste, used batteries, radioactive waste, E-waste.

These guidelines will benefit all health care personnel like doctors and nurses who generate bio-medical waste, and managers of bio-medical waste programmes in health facilities. I hope the adoption and implementation of these guidelines will improve management of waste in health sector in the country.

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# FOREWORD

The waste management rules, including Biomedical Waste Management Rules (2016), Solid Waste Management Rules (2016), E-waste Management Rules (2016) and Construction & Demolition Waste Management Rules (2016) were notified by Ministry of Environment Forest & Climate Change. Since healthcare facilities generate different streams of waste which need to be handled as per regulations, the Guidelines for Management of Healthcare Waste as per Biomedical Waste Management Rules, 2016 were developed by Directorate General of Health Services (Dte.GHS), MoHFW and have been vetted by Central Pollution Control Board (CPCB).

These Guidelines were developed and reviewed by experts from National Health System Resource Centre (NHSRC), VMMC & Safdarjung Hospital, Ministry of Environment Forest & Climate Change (MoEF&CC), Central Pollution Control Board (CPCB) and Directorate General of Health Service (Dte.GHS). I would like to thank Dr JN Srivastava, Advisor QA and his team from NHSRC and Dr KT Bhowmik, Addl MS Safdarjung Hospital & Dr Malini Capoor, Safdarjung Hospital for preparing first draft documents which contributed to the development of these guidelines. I take this opportunity to thank Dr S Venkatesh, DGHS and Dr Inder Parkash Advisor (PH) for their guidance and support in the development of this document.

I hope the guidelines would go a long way in improving capacity of healthcare workers in handling different waste streams.

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# ABBREVIATIONS

ANM	:	Auxiliary Nurse Midwife
AYUSH	:	Ayurveda Yoga Unani, Sidha and Homoeopathy
BMW	:	Biomedical Waste
C&D	:	Construction & Demolition
CBWTF	:	Common Biomedical Waste Treatment Facility
CHC	:	Community Health Centre
CMO	:	Chief Medical Officer
CPCB	:	Central Pollution Control Board
DMTAC	:	District Monitoring cum Technical Advisory Committee
DQT	:	District Quality Team
EEE	:	Electrical and Electronic Equipment
ETP	:	Effluent Treatment Plant
E-waste	:	Electronic Waste
HCF	:	Healthcare Facility
HCW	:	Healthcare Worker
IEC	:	Information Education and Communication
MO I/C	:	Medical Officer In charge
MS	:	Medical Superintendent
NHSRC	:	National Health System Resource Centre
PHC	:	Primary Health Centre
PMO	:	Principal Medical Officer
PPE	:	Personal Protective Equipment
PRO	:	Producer Responsibility Organization
SMO	:	Senior Medical Officer
SMTAC	:	State Monitoring cum Technical Advisory Committee
SPCB	:	State Pollution Control Board
WHO	:	World Health Organization

## 1.1 DEFINITIONS

**“Authorization”** means permission granted by the prescribed authority for the generation, collection, reception, storage, transportation, treatment, processing, disposal or any other form of handling of Biomedical waste in accordance with these rules and guidelines issued by the Central Government or Central Pollution Control Board as the case may be;

**“Authorized person”** means an occupier or operator authorized by the prescribed authority to generate, collect, receive, store, transport, treat, process, dispose or handle Biomedical waste in accordance with these rules and the guidelines issued by the Central Government or the Central Pollution Control Board, as the case may be;

**“Biological”** means any preparation made from organisms or micro-organisms or product of metabolism and biochemical reactions intended for use in the diagnosis, immunization or the treatment of human beings or animals or in research activities pertaining there to;

**“Biomedical 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;

**“Biomedical waste treatment and disposal facility”** means any facility wherein treatment, disposal of Biomedical waste or processes incidental to such treatment and disposal is carried out, and includes common Biomedical waste treatment facilities;

**“Handling”** in relation to Biomedical 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;

**“Healthcare facility”** means a place where diagnosis, treatment or immunization of human beings is provided irrespective of type and size of health treatment system, and research activity pertaining thereto. In pretext to these guidelines these Healthcare facilities includes District Hospitals, Sub Divisional Hospitals, Community Health Centres, Primary Health Centres and Sub centres;

**“Management”** includes all steps required to ensure that Biomedical waste is managed in such a manner as to protect health and environment against any adverse effects due to handling of such waste;

**“Occupier”** means a person having administrative control over the institution and the premises generating Biomedical waste, which includes a hospital, nursing home, clinic, dispensary, veterinary institution, animal house, pathological laboratory, blood bank, Healthcare facility and clinical establishment, irrespective of their system of medicine and by whatever name they are called;

**“Operator of a common biomedical waste treatment facility”** means a person who owns or controls a Common Biomedical Waste Treatment Facility (CBWTF) for the collection, reception, storage, transport, treatment, disposal or any other form of handling of Biomedical waste;

**“Prescribed authority”** mean the State Pollution Control Board in respect of State and Pollution Control Committee in respect of Union Territory;

**“Point of generation”** means the location where wastes initially generate, accumulate and is under the control of the operator of the waste-generating process;

**“Storage”** means the holding of Biomedical waste for a temporary period at the end of which the Biomedical waste is treated or disposed.

**“Treatment”** means any method, technique, or process, including neutralization, designed to change the physical, chemical, or biological characteristics or composition of any hazardous waste.

## 1.2 CLASSIFICATION OF HEALTHCARE WASTE

Healthcare Facilities (HCFs) are primarily responsible for management of the healthcare waste generated within the facilities, including activities undertaken by them in the community. The Healthcare 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 CBWTF 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 in accordance with the BMW Rules, 2016.

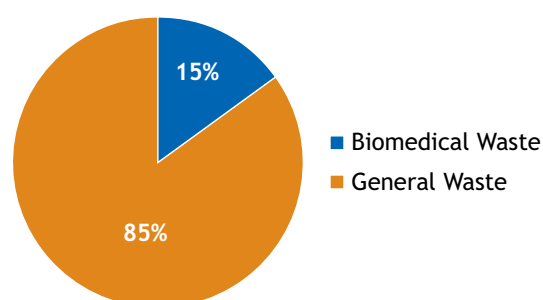
Waste generated from the healthcare facility is classified as:

- Biomedical Waste
- General Waste
- Other Wastes

### a) Biomedical Waste

**Biomedical 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. Biomedical waste includes all the waste generated from the Healthcare 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

**Figure 1:** Percentage-wise Classification of Waste Generated from the Healthcare Facility





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 BMW Rules, 2016.

The quantity of such waste is around 10% to 15% of total waste generated from the Healthcare Facility. 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.

Biomedical Waste Management Rules, 2016 categorises the Biomedical waste generated from the Healthcare facility into four categories based on the segregation pathway and colour code. Various types of Biomedical waste are further assigned to each one of the categories, as detailed below:

1. Yellow Category
2. Red Category
3. White Category
4. Blue Category

These categories are further divided as per the type of waste under each category as follows:

Table 1: Categories of Biomedical Waste	
CATEGORY	TYPE OF WASTE
YELLOW	<b>a. Human Anatomical Waste</b> Human tissues, organs, body parts and fetus below the viability period (as per the Medical Termination of Pregnancy Act 1971, amended from time to time).
	<b>b. Animal Anatomical Waste</b> Experimental animal carcasses, body parts, organs, tissues, including the waste generated from animals used in experiments or testing in veterinary hospitals or colleges or animal houses.
	<b>c. Soiled Waste</b> Items contaminated with blood, body fluids like dressings, plaster casts, cotton swabs and bags containing residual or discarded blood and blood components.
	<b>d. Discarded or Expired Medicine</b> Pharmaceutical waste like antibiotics, cytotoxic drugs including all items contaminated with cytotoxic drugs along with glass or plastic ampoules, vials etc.
	<b>e. Chemical Waste</b> Chemicals used in production of biological and used or discarded disinfectants.
	<b>f. Chemical Liquid Waste</b> Liquid waste generated due to use of chemicals in production of biological and used or discarded disinfectants, Silver X-ray film developing liquid, discarded Formalin, infected secretions, aspirated body fluids, liquid from laboratories and floor washings, cleaning, house - keeping and disinfecting activities etc.

CATEGORY	TYPE OF WASTE
	g. Discarded linen, mattresses, beddings contaminated with blood or body fluid, routine mask & gown.
	h. Microbiology, Biotechnology and other clinical laboratory waste (Pre-treated) Microbiology, Biotechnology and other clinical laboratory waste: Blood bags, Laboratory cultures, stocks or specimens of microorganisms, live or attenuated vaccines, human and animal cell cultures used in research, industrial laboratories, production of biological, residual toxins, dishes and devices used for cultures.
RED	Wastes generated from disposable items such as tubing, bottles, intravenous tubes and sets, catheters, urine bags, syringes without needles, fixed needle syringes with their needles cut, vacutainers and gloves.
WHITE	Waste Sharps including metals 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.
BLUE	Broken or discarded and contaminated glass including medicine vials and ampoules except those contaminated with cytotoxic wastes.

## b) General Waste

General waste consists of all the waste other than Biomedical waste and which has not been in contact with any hazardous or infectious, chemical or biological secretions and does not includes any waste sharps. This waste consists of mainly:

- News paper, paper and card boxes (dry waste)
- Plastic water bottles (dry waste)
- Aluminium cans of soft drinks (dry waste)
- Packaging materials (dry waste)
- Food Containers after emptying residual food (dry waste)
- Organic/Bio-degradable waste - mostly food waste (wet waste)
- Construction and Demolition wastes.

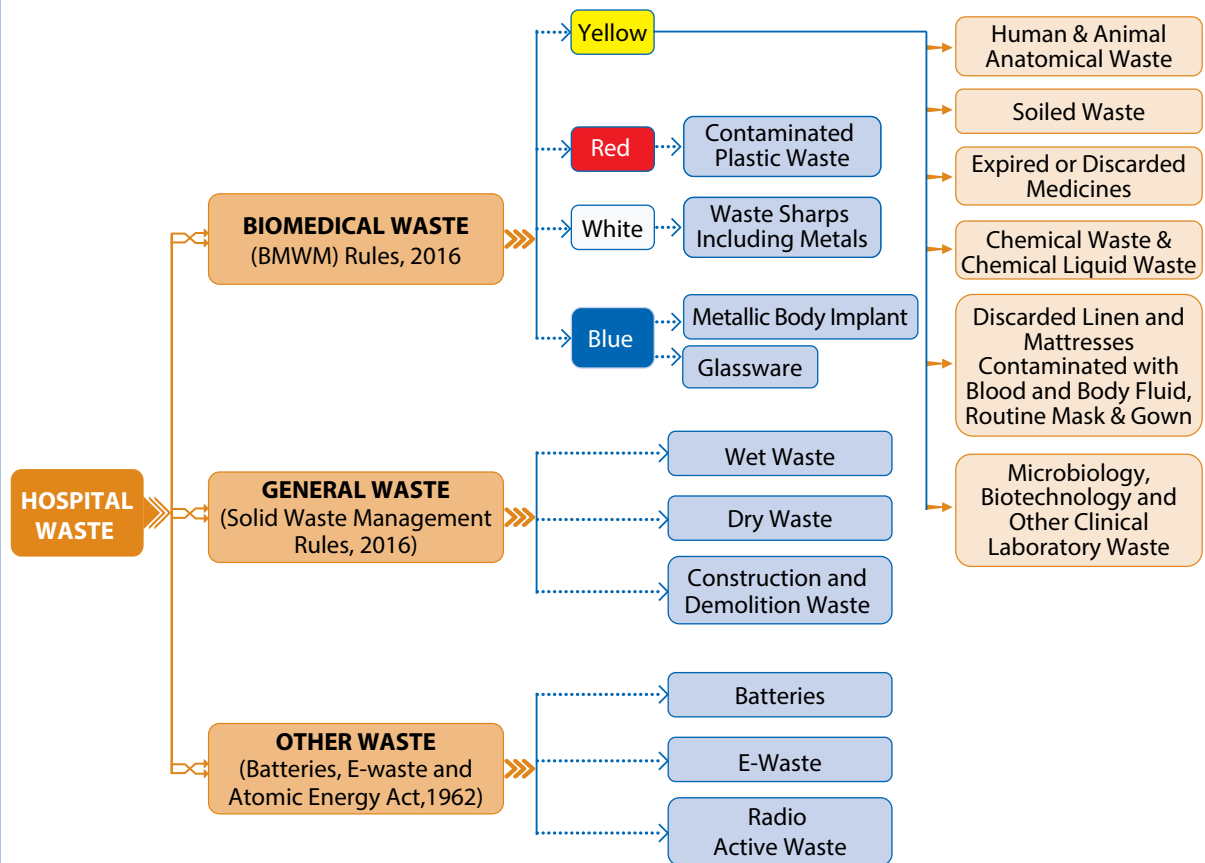
These general wastes are further classified as dry wastes and wet wastes and should be collected separately.

This quantity of such waste is around 85% to 90% of total waste generated from the facility. Such waste is required to be handled as per Solid Waste Management Rules, 2016 and Construction & Demolition Waste Management Rules, 2016, as applicable.

## c) Other Wastes

Other wastes consist of used electronic wastes, used batteries, and radio-active wastes which are not covered under biomedical wastes but have to be disposed as and when such wastes are generated as per the provisions laid down under E-Waste (Management) Rules, 2016, Batteries (Management & Handling) Rules, 2001, and Rules/guidelines under Atomic Energy Act, 1962 respectively.

**Figure 2: Categorization & Classification of Wastes in Healthcare Facilities**



## 2.1 STEPS INVOLVED IN BIOMEDICAL WASTE MANAGEMENT

First five steps (Segregation, Collection, pre-treatment, Intramural Transportation and Storage) is the exclusive responsibility of Healthcare Facility. While Treatment and Disposal is primarily responsibility of CBWTF operator except for lab and highly infectious waste, which is required to be pre-treated by the HCF. Following are the responsibility of HCF for management and handling of Biomedical waste:

1. Biomedical Waste should be segregated at the point of generation by the person who is generating the waste in designated colour coded bin/container.
2. Biomedical Waste & General Waste shall not be mixed. 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 is done within 48 hours.
3. Phase out use of chlorinated plastic bags (excluding blood bags) and gloves by 27/3/2019.
4. No secondary handling or pilferage of waste shall be done at healthcare facility. If CBWTF facility is available at a distance of 75 km from the HCF, Biomedical waste should be treated and disposed only through such CBWTF operator.
5. Only Laboratory and Highly infectious waste shall be pre-treated onsite before sending for final treatment or disposal through a CBWTF Operator.
6. Provide bar-code labels on all colour coded bags or containers containing segregated Biomedical waste before such waste goes for final disposal through a CBWTF.

The management of Biomedical waste can overall be summarized in the following steps:

- Waste Segregation in color coded and barcode labeled bags/containers at source of generation.
- Pre-treat Laboratory and Highly infectious waste.
- Intra-mural transportation of segregated waste to central storage area.
- Temporary storage of biomedical waste in central storage area.
- Treatment and Disposal of biomedical waste through CBWTF or Captive facility.



## 2.2 BIOMEDICAL WASTE SEGREGATION



Biomedical waste generated from a healthcare facility is required to be segregated at the point of generation as per the colour coding stipulated under Schedule-I of BMW Rules, 2016. Following activities to be followed to ensure proper waste segregation:



- 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 generate, accumulate and is under the control of doctor/nursing staff etc. who is providing treatment to the patient and in the process generating Biomedical waste.
- Posters/placards for Biomedical waste segregation should be provided in all the wards as well as in waste storage area.
- Adequate number of colour coded bins/containers and bags should be available at the point of generation of Biomedical waste.
- Colour coded plastic bags should be in line with the Plastic Waste Management Rules, 2016. Specifications for plastic bags and containers given at Annexure 1.
- Provide Personnel Protective Equipment to the Biomedical waste handling staff.

### 2.2.1 Color Coding and Type of Container/Bags to be Used for Waste Segregation & Collection

As per Schedule I of the Biomedical 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 Biomedical Waste from the facility.

**Table 2: Storage of Biomedical Waste**

S. No.	Category	Type of Waste	Colour & Type of Container
1.	Yellow Category	<ul style="list-style-type: none"> <li>○ Human Anatomical Waste</li> <li>○ Animal Anatomical Waste</li> <li>○ Soiled Waste</li> <li>○ Discarded or Expired Medicine</li> <li>○ Microbiology, Biotechnology and other clinical laboratory waste</li> <li>○ Chemical Waste (yellow-e)</li> <li>○ Chemical Liquid Waste</li> </ul>	<p>Yellow coloured non-chlorinated Plastic Bags</p>  <p>Note: (i) Chemical waste (yellow-e) comprising of un-used, residual or date expired liquid chemicals including spent hypo of X-Ray, should be stored in yellow container</p>
2.	Red Category	Contaminated Waste (Recyclable)	<p>Red Coloured Non Chlorinated Plastic Bags (having thickness equal to more than 50 μ) and Containers</p> 

S. No.	Category	Type of Waste	Colour & Type of Container
3.	White Category	Waste Sharps including metals	White Coloured translucent, puncture proof, leak proof, Temper Proof containers 
4.	Blue Category	<ul style="list-style-type: none"> <li>○ Glassware</li> <li>○ Metallic Body Implants</li> </ul>	Puncture proof, leak proof boxes or containers with blue coloured marking 

## 2.3 BIOMEDICAL WASTE COLLECTION

### 2.3.1 Time of Collection

- Biomedical 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 Biomedical waste as per BMWM Rules, 2016 and HCF should also ensure disposal of human anatomical waste, animal anatomical waste, soiled waste and biotechnology waste within 48 hours.
- Collection times should be fixed and appropriate to the quantity of waste produced in each area of the healthcare facility.
- General waste should not be collected at the same time or in the same trolley in which Biomedical 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 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.
- Biomedical waste collected by the staff, should be provided with PPEs.

### 2.3.2 Packaging

- Biomedical 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 receivers 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 of CPCB by 27 March, 2019.

### 2.3.3 Labelling

All the bags/containers/bins used for collection and storage of Biomedical waste, must be labelled with the 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.

Biomedical waste bags/containers are required to be provided with bar code labels in accordance with CPCB guidelines for “Guidelines for barcode System for Effective Management of Biomedical Waste.”

<p>SI No. 000xxxxxxxxxx</p>  <p>ALLIN110029DHBH00578</p> <p>QR Code</p>	OR	<p>SI No. 000xxxxxxxxxx</p>  <p>ALLIN110029DHBH00578</p> <p>Bar Code</p>
 <p>Bio-Hazard Label</p>		 <p>Cyto-Toxic Label</p>

### 2.3.4 Interim Storage

- Interim storage of Biomedical 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 BMW must be stored in designated place away from patient and visitor traffic or low traffic area.

## 2.4 IN HOUSE TRANSPORTATION OF BIOMEDICAL WASTE

### 2.4.1 Transportation Trolleys

In house transportation of Biomedical 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 preferably fitted with wheels for easy manoeuvrability. Such trolleys or carts are designated for the purpose of Biomedical Waste Collection only. Patient trolleys must not be used for BMW transportation. Size of such waste transport trolleys should be as per the volume of waste generated from the HCFs.



*Typical waste collection trolley for Red category of BMW*

### 2.4.2 Route of Intramural Transportation of Biomedical Waste

Biomedical Waste Generated from different wards or laboratories in the Healthcare 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 can be easily accessed through this route.
- Safe transportation of waste is undertaken to avoid spillage and scattering of waste.

## 2.5 CENTRAL WASTE COLLECTION ROOM FOR BIOMEDICAL WASTE

Each Healthcare facility should ensure that there is a designated central waste collection room situated within its premises for storage of Biomedical waste, till the waste is picked and transported for treatment and disposal at CBWTF. 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.





- The planned space must be sufficient so as to store at least two days generation of waste.
- Central waste collection room must be roofed and manned and should be under lock and key under the responsibility of designated person.
- The entrance of this centre must be accessible through a concrete ramp for easy transportation of waste collection trolleys.
- Flooring should be of tiles or any other glazed material with slope so as to ease the cleaning of the area.
- Exhaust fans should be provided in the waste collection room for ventilation.
- It is to be ensured by the Healthcare facility that such central storage room is safety inspected for potential fire hazard and based on such inspection preventive measure has to be taken by the Healthcare 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.
- Sign boards indicating relevant details such as contact person and the telephone number should be provided.
- The entrance of this station must be labelled with “Entry for Authorized Personal Only” and Logo of Biomedical Waste Hazard.
- It is to be ensured that no general waste is stored in the central waste collection area.

### Other Considerations for Central Waste Collection Area

- To ensure there is no pilferage of recyclables, it is to be ensured that central storage area is under lock & key, guarded by a designated person.
- Healthcare facilities need to maintain the record of waste generated and handed over to the authorized recyclers.
- To ensure protection from the animals, it is to be ensured by the Healthcare facility that there is no stray animal in the Healthcare facility premises and Healthcare facility has installed cattle traps at the entrance of the Healthcare facility.
- To ensure protection against the pests it is to be ensured by the HCFs that it has engagement of the pest control agency for taking the pest control measures in the central storage area on regular basis.

### 2.5.1 Central Storage for HCFs Having Captive Treatment and Disposal System

For the Healthcare facilities which are having captive treatment facility for treatment and disposal of biomedical waste through incinerators, autoclaves/microwaves, shredders etc. within its premises must ensure that waste generated from the HCF is stored in this central waste collection area till it is transported to reception area of captive waste treatment facility within the premises.

For HCFs having its own treatment and disposal facility through use of deep burial pits i.e. Primary Health Centres (PHCs) which doesn't fall under coverage area of any CBWTF, interim

Storage area used for daily waste collection will serve as Central Waste Collection Area. The collected waste is needed to be store in this place before it is disposed of by the deep burial pits as per the specifications given under the BMW Rules, 2016.

## 2.6 RECORD KEEPING

1. Every healthcare facility need to maintain the records w.r. to category wise Biomedical waste generation and its treatment disposal (either by captive facility or through CBWTF) on daily basis. (Please Refer to Annexure 2: Format for Biomedical Waste Register/Record).
2. Category wise quantity of waste generated from the facility must be recorded in Biomedical Waste Register/logbook being maintained at central waste collection area under the supervision of one designated person.
3. A weighing machine as per the specifications given in CPCB guidelines for bar code system needs to be kept in central waste collection centre of the HCF having 30 or more than 30 nos. of beds for weighing the quantity of Biomedical Waste.
4. HCFs having less than 30 beds shall maintain records of receipts printed by the CBWTF.
5. Records on Annual Report on Biomedical waste management submitted to SPCB/PCC.
6. Records w.r.t. Accident Report submitted to SPCB/PCC including “NILL” report.
7. Records shall be maintained on training on BMW Management including both Induction and in service training records.
8. Maintain records for Annual Health check-up of all the employees.
9. Maintain record on Immunisation of all the employees.
10. Records shall be maintained w.r.t. minutes of meeting of Biomedical Waste Management committee.
11. Records shall be maintained indicating details of accident occurred including preventive and corrective actions taken by the HCFs in relation to such accidents.
12. Records for the operation of the biomedical treatment equipment installed, if any for the treatment of biomedical waste. Please refer Annexure 9 for format of logbook/ records maintained for incinerator/plasma pyrolysis and autoclave/hydroclave.
13. Records of testing of Effluent generated from Healthcare facility.
14. Record of recyclable waste (plastic/glass) handed over to the authorized recycler in kg/annum.

The records related to the handling of BMW by healthcare facilities needs to be retained for a period of five years.

## 2.7 UPDATING OF INFORMATION IN WEBSITE

All bedded healthcare facilities as prescribed under BMW Rules, 2016 shall develop a separate page/web link in its website for displaying the information pertaining to their hospital by 15/03/2020. The following information should be uploaded and updated time to time:

1. Contact Address and details of the Healthcare Facility:

2. No. of beds:
3. Details of:
  - a) Authorisation under BMWM Rules, 2016:
  - b) Consent under Water (Prevention and Control of Pollution) Act, 1974 and Air (Prevention and Control of Pollution) Act, 1981:
4. Quantity of Biomedical waste generation (in kg/day):
5. Mode of disposal of Biomedical waste (through CBWTF or through captive treatment facility):
6. Name and address of the CBWTF through which waste is disposed off (as applicable)
7. In case, HCF is having captive treatment facility:
  - a) Biomedical waste treated (in kg/day)
  - b) Details of treatment equipment
  - c) Total nos. and capacity of each treatment equipment (in kg/day)
  - d) Operating parameters of the treatment equipment as per BMWM Rules, 2016
8. Monthly records of Biomedical waste generation (category wise):
9. No. of trainings conducted on Biomedical Waste Management in the current year:
10. Status of immunization of Healthcare Workers involved in handling of BMW:

# SEGREGATION, TREATMENT AND DISPOSAL OF BMW

## 3.1 TREATMENT OPTION FOR BIOMEDICAL WASTE

As per BMW Rules, 2016 the treatment and disposal of BMW generated from the HCF must be carried out in accordance with Schedule I, and in compliance with the standards provided in Schedule II of BMW Rules, 2016.

It is also emphasized in the rules that no healthcare facility shall establish on-site treatment and disposal facility for BMW, if a service of CBWTF is available within 75 km of travelling distance of the facility. All the public healthcare facilities within reach of 75 km of CBWTF needs to dispose of the BMW through such CBWTF only and are not allowed to establish its own treatment and disposal facility. For the public Healthcare facilities especially in rural areas where there is no CBWTF within range of 75 km, the disposal of BMW can still be made through a CBWTF who is willing to provide treatment services and authorized by the concerned SPCB/PCC to operate in an area beyond 75 km radial distance. In case of no reach to any CBWTF, the BMW generated from HCFs should be disposed in captive treatment and disposal facility or by deep burial pit as authorised by the respective SPCB/and as specified in these guidelines.

The collection, treatment, processing and disposal options for both the categories of healthcare facilities; having linkage with CBWTF or not having linkage with CBWTF, are detailed here as per Schedule I of BMW Rules, 2016.

### 3.1.1 Yellow Category

#### Type of Waste: Yellow (a) Human Anatomical Waste

**Segregation:** Human tissues, organs, body parts and fetus below the viability period. This includes, placenta and extracted tooth.

**Type of bag and container:** Collect the waste in yellow colored non chlorinated plastic bag and store in yellow coloured container.

**Treatment and Disposal:** For HCF having linkage with CBWTF - No treatment of waste is required to be carried out at the Healthcare facility except pre-treatment (sterilization) of Yellow (h) category waste by autoclaving/microwaving/hydroclaving or sterilize as per methods prescribed in WHO Blue book 2014. Yellow category waste along with pre-treated waste should be stored in central storage point and must be handed over to CBWTF. It is mandatory for each Healthcare facility that dead fetus waste should be handed over to

CBWTF in yellow bag with a copy of the official Medical Termination of Pregnancy (MTP) certificate from the Obstetrician or the Medical Superintendent/SMO/CMO of the HCF.

**For HCF without linkage to CBWT** - This waste should be disposed through Plasma Pyrolysis unit or twin chambered compact incinerator with 2 seconds retention time in secondary combustion chamber and adequate air pollution control devices to comply with revised emission norms prescribed under BMW Management Rules, 2016.

Disposal of the waste in the deep burial pit should not be practiced unless the hospitals is located in rural or remote isolated place. Use of deep burial pit should be as authorised by the respective SPCB/PCC.

Copy of official MTP certificate from the MO I/C for fetus below the vitality period must be kept with the HCF.

### **Type of Waste: Yellow (b) Animal Anatomical Waste**

**Segregation:** This waste include experimental animal carcasses, body parts, organs, tissues, including the waste generated from animals used in experiments or testing in veterinary hospitals or colleges or animal houses.

**Type of Bag and Container:** Collect the waste in yellow coloured non chlorinated plastic bag and store in yellow coloured container.

**Treatment and Disposal:** For HCF having Linkage with CBWTF - No treatment of waste is required to be carried out at veterinary hospital except pre-treatment (sterilization) of Yellow (h) category waste (if applicable) by autoclaving/microwaving/hydroclaving or sterilize as per methods prescribed in WHO Blue book 2014. Yellow category waste along with pre-treated waste should be stored in central storage point and must be handed over to CBWTF.

**For HCF having own Treatment and Disposal facility** - Animal anatomical waste should be disposed through Plasma Pyrolysis unit or twin chambered compact incinerator with 2 seconds retention time in secondary combustion chamber and adequate air pollution control devices to comply with revised emission norms prescribed under BMW Management Rules, 2016.

Animal anatomical waste can also be disposed in captive deep burial pits only in case of those veterinary hospitals located in rural or remote isolated place. Use of deep burial pit should be as authorised by SPCB/PCC.

### **Type of Waste: Yellow (c) - Soiled Waste**

**Segregation:** Items contaminated with blood/body fluids like dressings, plaster casts, cotton swabs and bags containing residual or discarded blood and blood components. This includes used infectious material such as caps, shoe-cover, blotting paper/gauze, wooden swab stick, paraffin blocks, indicators tapes and disposable (single use non-linen based) masks and gowns.

**Type of Bag and Container:** Collect the waste in yellow coloured non chlorinated plastic bag and store in yellow coloured container.

**Treatment and Disposal:** For HCF having linkage with CBWTF - No treatment of waste is required to be carried out at the Healthcare facility. Waste must be handed over to CBWTF.

**For HCF having own treatment and Disposal facility** - Soiled waste should be disposed through Plasma Pyrolysis unit or in twin chambered compact incinerator with 2 seconds retention time in secondary combustion chamber and adequate air pollution control devices to comply with revised emission norms prescribed under BMW Management Rules, 2016. In absence of above, soiled waste can also be treated by autoclaving or micro-waving/hydroclaving followed by shredding or mutilation or combination of sterilization and shredding for ultimate disposal through waste to energy plants.

Soiled waste can also be disposed in captive deep burial pits only in case of the hospitals located in rural or remote isolated place. Use of deep burial pit should be as authorised by SPCB/PCC.

### Type of Waste: Yellow (d) Expired and Discarded Medicine

**Segregation:** Pharmaceutical waste like antibiotics, cytotoxic drugs including all items contaminated with cytotoxic drugs along with glass or plastic ampoules, vials etc. This includes cytotoxic drugs dispensed in dextrose/saline bottles and disposables used in delivery of cytotoxic drugs.

**Type of Bag and Container:** Collect all the expired and discarded medicines except for cytotoxic drugs waste in a separate yellow colored non chlorinated plastic bag (different form being used for human anatomical waste) and store in yellow colored container.

All the cytotoxic drugs including all items contaminated with cytotoxic drugs along with glass or plastic ampoules, vials etc must be collected in separate yellow colored non chlorinated plastic bag labeled as cytotoxic hazard.

**Treatment and Disposal:** For HCF having linkage with CBWTF - No treatment of waste is required to be carried out at the Healthcare facility. As per BMW Rules, 2016 all the expired and discarded medicines including cytotoxic drugs expired cytotoxic drugs are either returned back to the manufacturer or are handed over to the CBWTF to be disposed of through incineration at temperature > 1200°C.

*For healthcare facilities where there no established system for returning the drugs to the manufacturer it is recommended that the expired and discarded medicines are handed over only to CBWTF for disposing of through incineration.*

**For HCF having own treatment and Disposal facility** - Expired and discarded medicines are required to be sent back to manufacturer or can be disposed through nearest common biomedical Waste or Hazardous waste incinerators with prior intimation to SPCBs/PCCs.

This waste can also be disposed through twin chambered captive incinerator with 2 seconds retention time in secondary combustion chamber, which can withstand a temperature of 1200°C and having adequate air pollution control devices to comply with emission norms.

### Type of Waste: Yellow (e) Chemical Waste

**Segregation:** This waste comprises of chemicals used in production of biological, discarded containers of chemicals and disinfectants etc. This includes solid or liquid residual chemicals used in HCFs.



**Type of Bag and Container:** Collect solid chemical waste in yellow coloured containers or non-chlorinated yellow plastic bag. Collect un-used, residual or date expired liquid chemicals in yellow container.

**Treatment and Disposal:** For HCF having linkage with CBWTF - No treatment is required to be carried out at the facility. The chemical waste (liquid or solid chemicals) should be collected into different yellow coloured plastic containers, whereas empty chemical containers with residual chemicals should be collected in yellow bags and handover to CBWTF operator for final disposal by incineration. It is required to specify the name of chemical on the yellow containers so that it would help CBWTF operator to decide whether to incinerate or transfer to Hazardous Waste TSDF for final disposal.

**For HCF having own treatment and Disposal facility** - This waste should be incinerated in captive incinerator or it can be sent to nearby Hazardous Waste TSDF for final disposal.

### **Type of Waste: Yellow (f) Chemical Liquid Waste**

**Segregation:** Liquid waste generated due to use of chemicals in production of biological and used or discarded disinfectants, silver X-Ray film developing liquid, discarded formalin, infected secretions, aspirated body fluids, liquid from laboratories and floor washings, cleaning, house-keeping and disinfecting activities, etc. Leftover, unused, residual or date expired liquid chemicals shall not be discharged as chemical liquid waste.

**Type of Bag and Container:** Not applicable since this liquid waste containing waste chemicals is collected and pre-treated prior to disposal through Effluent Treatment Plant. However, recyclable liquid chemicals such as spent X-ray hypo should be collected in yellow containers and sold or given to only authorised recyclers for resource recovery.

**Treatment and Disposal:** As per the BMW Rules 2016, the chemical liquid waste of the hospital must be collected through a separate collection system for pre-treatment. Hospitals with large standalone labs shall install separate drainage system leading to pre-treatment unit prior to mixing the same with rest of the wastewater from hospital for further treatment. For middle and small healthcare facilities having no system of separate drainage/collection system, the liquid waste is required to be collected on-site in containers for pre-treatment before mixing the same with other wastewater. Silver X-ray film developing fluid should be given or sold to the authorized recyclers for resource recovery, else it should be handed over to CBWTF as yellow(e) chemical waste.

Depending on type of chemical effluent generated, pre-treatment should comprise of neutralization/precipitation, followed by disinfection prior to mixing with rest of the wastewater from hospital. Prior to mixing with rest of the hospital effluent, disinfection should be done preferably by passing the effluent through UV sterilizer rather than using disinfecting chemicals since use of chemicals may affect performance of biological treatment in down-stream.

### **Type of Waste: Yellow (g) Discarded Linen, Mattresses, Beddings Contaminated with Blood, Body Fluids, Routine Mask and Gown**

**Segregation:** This includes discarded linen from bedsheets, beddings, re-usable routine masks and gowns.

**Type of Bag and Container:** Collect the waste in yellow coloured non-chlorinated plastic bag and store in yellow coloured container.

**Treatment and Disposal:** For HCF having linkage with CBWTF - Disinfect the waste linen with non-chlorinated chemical disinfection and hand over to the CBWTF operator for final disposal by incineration. The waste mattresses should be cut into pieces and disinfected and can be sent to the CBWTF operator for final disposal by incineration. Alternatively, waste mattresses can be cut into pieces and disinfected with non-chlorinated chemicals for disposal as general waste (dry-waste) for energy recovery in cities having waste to energy plants or RDF (Refuse Derived Fuel) plants.

The waste mattresses shall not be sold or auctioned. Used bed sheets that are not soiled and re-usable can be sold or auctioned only after washing and disinfection. Disposable (single use non-linen based) masks and gowns, after use shall be treated as yellow-c (soiled waste).

**For HCF having own treatment and Disposal facility** - The waste mattresses after cutting into pieces and disinfected with non-chlorinated chemicals and can be incinerated in captive incinerator or can be disposed as General waste in dry bins in cities having RDF or waste to Energy Plants.

### Type of Waste: Yellow (h) Microbiology, Biotechnology and Other Clinical Laboratory Waste

**Segregation:** Microbiology, Biotechnology and other clinical laboratory waste, waste blood bags (containing date expired or contaminated blood), Laboratory cultures, stocks or specimen of micro-organisms, live or attenuated vaccines, human cell cultures used in research, industrial laboratories, production of biological, residual toxins, dishes and devices used for cultures. This includes plastic culture plates and other highly infectious wastes.

**Type of Bag and Container:** Collect the waste in yellow coloured non chlorinated plastic bag and store in yellow coloured container.

**Treatment and Disposal:** For HCF having linkage with CBWTF - Pre-treatment by disinfection before handing over the waste to CBWTF operator. Pre-treatment can be done by autoclave/ microwave/Hydroclave.

Pre-treatment can also be done by using non-chlorinated chemical disinfectants like aldehydes, lime based powders or solutions, ozone gas, ammonium salts and phenolic compounds.

The pre-treated waste bags should be handed over to CBWTF operator on daily basis.

**For HCF having own treatment and Disposal facility** - Pre-treated waste should be disposed off by a HCF by installing twin chambered compact incinerator with 2 seconds retention time in secondary combustion chamber and adequate air pollution control devices to comply with revised emission norms prescribed under BMW Management Rules, 2016.

Pre-treated waste can be disposed in captive deep burial pits in case of the hospitals located in remote in rural or isolated places. Use of deep burial pit should be as authorised by SPCB/PCC.

### 3.1.2 Red Category

**Segregation:** Red category waste is contaminated recyclable waste containing primarily plastics generated from disposable items such as tubing, bottles, intravenous tubes and sets, catheters, urinebags, syringes (without needles and fixed needles syringes with their needles cut),

vacutainers and gloves. This includes waste pipette tips, plastic pipette, eppendorf, rubber teats, drains, oxygen mask, thick plastic splash proof gowns, rubber apron, ICT test cards, ELISA plate and vials not containing blood samples.

**Type of Bag and Container:** Collect the waste in red coloured non chlorinated plastic bag and store in red coloured container.

**Treatment and Disposal:** For HCF having linkage with CBWTF - Contaminated recyclable waste containing mainly plastics and rubber shall be put in red coloured non chlorinated plastic bags and containers. Syringes after removing/cutting the needles should also be put in this category. Vacutainers/vials with blood samples should be pre-treated as given at section 3.1.1.h and disposed as yellow-h category waste.

No onsite treatment of Red category waste is required. All such waste is needed to be sent to CBWTF for final treatment and disposal.

**For HCF having own treatment and Disposal facility** - All the recyclable waste generated from the HCF must be sterilised using autoclaving/microwaving/hydro-calving followed by shredding or mutilation or combination of sterilisation and shredding. Recyclable waste must never be disposed of along with general waste in dry stream and same is required to be disposed of only through registered or authorised recyclers or to waste to energy plants or plastics to diesel or fuel oil or for road making, whichever is possible.

### 3.1.3 White Category

**Segregation:** This waste comprises of 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 waste sharps such as lumbar puncture needle, trocar cannula, IABP cannula, arthroscopy blade, insulin pen needle, lancet needle, removac needle, eye needle, Cardioplegia needle and surgical stab knife.

**Type of Bag and Container:** Collect the waste in white translucent, puncture proof, leak proof, tamper proof container.

**Treatment and Disposal:** For HCF having linkage with CBWTF - After collection in puncture proof, leak proof, tamper proof container, handover the waste to CBWTF without any alteration or onsite treatment.

**For HCF having own treatment and Disposal facility** - Sharps waste should be disinfected either with autoclaving or dry-heat sterilization or a combination of autoclaving cum shredding; for each of these options, the methods for disposal are as below:

Method of Disinfection	Treatment	Options for final disposal
Autoclaving	Shredding; or Mutilation; or Encapsulation in cement concrete	Concrete pit; or sanitary landfill or steel foundry
Dy-heat sterilization	Encapsulation in metal container	
Autoclaving cum shredding as single unit operation	None	

In case there is difficulty in sending treated sharps waste to sanitary landfills for final disposal (such as apprehension of local bodies to pick such waste), it is recommended to adopt the option of final disposal either through concrete pit or sending for recycling in steel furnace/foundry.

### 3.1.4 Blue Category

#### Type of Waste: Blue (a) Glassware

**Segregation:** Broken or discarded and contaminated glass including medicine vials and ampoules except those contaminated with cytotoxic wastes. This includes glass slides and glass pipettes.

**Type of Bag and Container:** Puncture proof, leak proof boxes or containers with blue coloured marking.

**Treatment and Disposal:** For HCFs having linkage with CBWTF - Dispose of the empty glass bottles by handing over to CBWTF without any onsite treatment. The residual chemicals in glass bottle should be collected as chemical waste in yellow coloured container/bags and over to CBWTF as yellow(e) waste.

**For HCFs having own treatment and Disposal facility** - The waste glass bottles/broken glass has to be sterilized or disinfected (either by autoclaving or microwaving or hydroclaving or by Sodium Hypochlorite Solution) followed by soaking & washing with detergent prior to sending it for recycling. Broken glass should also be disinfected and if the same cannot be given/or sold for recycling it can be disposed in sharps pit. The residual chemical in glass bottle should be collected as chemical waste in yellow coloured container/bags as yellow(e) waste and send the same to either a CBWTF or common hazardous waste Treatment and Disposal Facility.

Glass vials with positive controls should be pre-treated and disposed as yellow(h) waste.

#### Type of Waste: Blue (b) Metallic Body Implants

**Segregation:** Implants used for orthopaedic surgeries. This include metal sternal wire, Gigli saw wire and Orthopaedic Splint.

**Type of Bag and Container:** Puncture proof, leak proof boxes or containers with blue coloured marking.

**Treatment and Disposal:** Dispose of the waste by handing over to CBWTF. In case of no access to CBWTF, metallic body implants should be disinfected (either by autoclaving or microwaving or hydroclaving or by Sodium Hypochlorite Solution) and later washed with detergent prior to sending/sold to metal recyclers.

#### Important Considerations

- The treatment of BMW must meet the standards for treatment of Biomedical waste as specified in Schedule II of BMW Rules, 2016.
- The autoclave used for sterilization of waste blood bags, microbiology waste, including vials containing vaccine/positive controls must be dedicated for treatment of Biomedical waste only.
- HCF must follow the standards for autoclaving of biomedical waste as listed in Schedule II of BMW Rules, 2016.
- ETP will be necessary if discharge from HCF is connected with City's/Town's public sewerage network not having any terminal sewage treatment plant or if the HCF is

not connected to public sewerage network. Treated wastewater from healthcare facility should conform to the standards of liquid waste as listed in Schedule II of BMW Rules, 2016.

- Bedded HCFs with >10 beds should establish suitable Effluent Treatment Facility with immediate effect, while HCFs with <10 beds, ETP should be installed by 31st December, 2019.
- Chemical disinfection is to be performed by 1-2% Hypochlorite Solution or equivalent disinfectant like aldehydes, lime, ammonium salts, phenolic compounds etc. (refer: WHO guidelines for Infection Control in Healthcare Facilities). Chemical disinfection performed must meet the standard of chemical disinfection as listed in Schedule II of BMW Rules, 2016. Refer to Annexure 6: Preparation of Hypochlorite Solution.
- HCFs may provide Biomedical wastes such as pleural fluid, ascetic fluid, HBsAG positive blood, placenta etc. only to the authorised vendors/pharmaceutical industry involved in utilization of the same for production of drugs, reagent chemicals, markers, etc. An intimation in this regard shall be provided to concerned SPCBs.

## 3.2 SPILL MANAGEMENT PROCEDURES

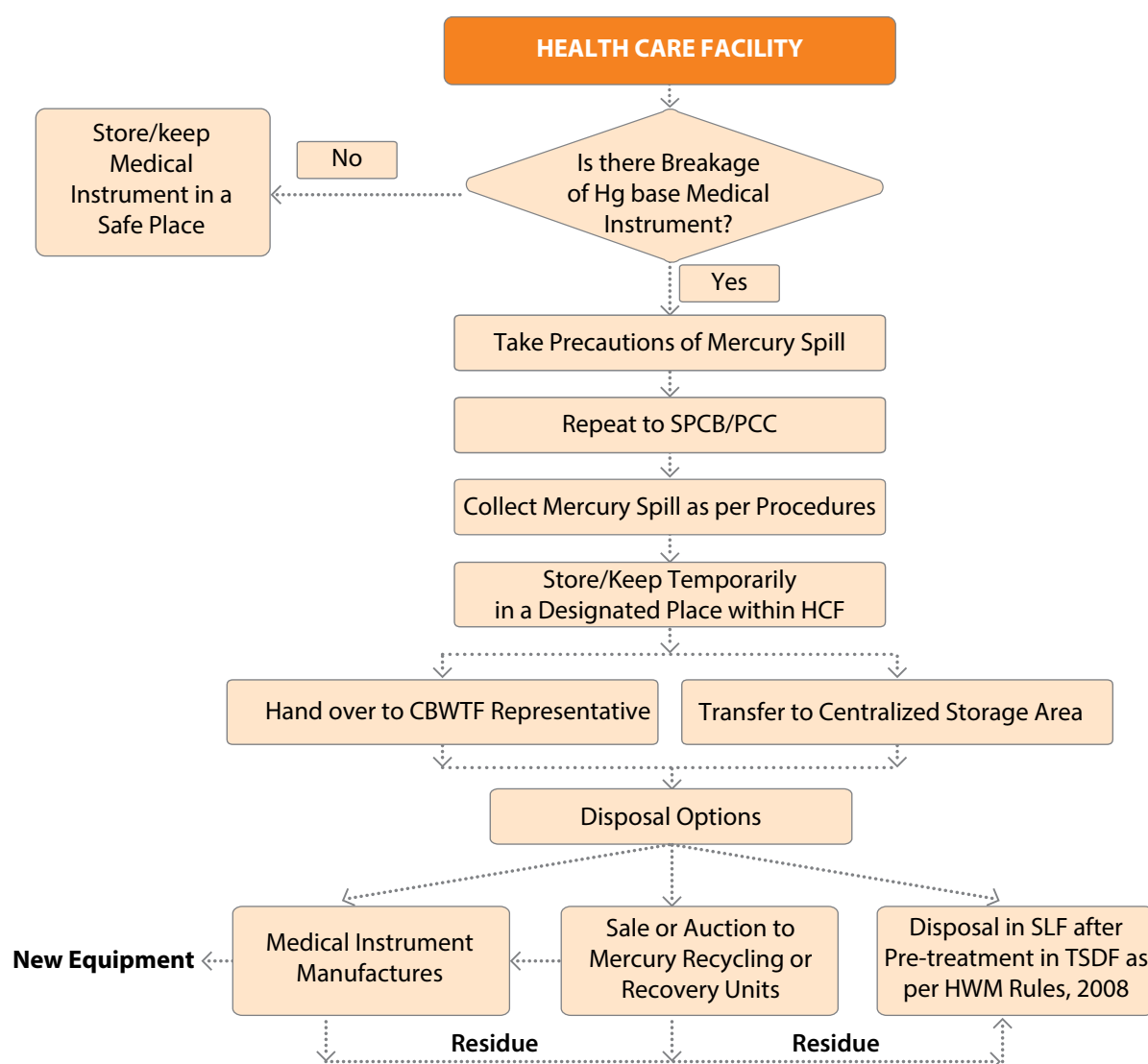
Healthcare Facilities have to ensure environmentally sound management of mercury or other chemical spills.

In case of mercury spill, the following steps as given in CPCB guidelines on “Environmentally Sound Techniques for Mercury Waste Generated from Healthcare Facilities” shall be followed:

1. Evacuate area: As far as possible, keep people who are not involved in the cleanup away from spill area to limit exposures and to prevent the spread of contamination.
2. Put on face mask: In order to prevent breathing of mercury vapour, wear a protective face mask.
3. Remove jewelry so that the mercury cannot combine (amalgamate) with the precious metals.
4. Put on rubber or latex gloves. If there are any broken pieces of glass or sharp objects, pick them up with care. Place all broken objects on a paper towel, fold the paper towel and place in a puncture proof yellow bag or container. Secure the plastic bag/container and label it as items contaminated with mercury.
5. Locate all mercury beads and look for mercury in any surface cracks or in hard-to-reach areas of the floor. Check a wide area beyond the spill. Use the flashlight to locate additional glistening beads of mercury that may be sticking to the surface or in small cracked areas. Cardboard sheets may be ‘used to push the spilled beads of mercury together’.
6. A syringe (without a needle) shall be used to suck the beads of mercury. Collected mercury should be placed slowly and carefully into an unbreakable plastic container/glass bottle with an airtight lid half filled with water. After removing larger beads, use sticky tape to collect smaller hard-to-see beads. Place the sticky tape in a punctured proof yellow bag and secure properly. Commercially available powdered sulfur or zinc stains mercury a darker colour and can make smaller beads easier to see (powder sulfur may be used because (i) it makes the mercury easier to see since there may be a color change from yellow to brown and (ii) it binds the mercury so that it can be easily removed and suppresses the vaporization of any missing mercury).

7. Place all the materials used during the cleanup, including gloves, mercury spills collected from the spill area into a yellow plastic bag or container with lid and sealed properly and labeled as mercury containing waste.
8. Sprinkle sulphur or zinc powder over the area. Either powder will quickly bind any remaining mercury. In case, zinc powder is used, moisten the powder with water after it is sprinkled and use a paper towel to rub it into cracks in the flooring. Use the cardboard and then dampened paper towels to pick up the powder and bound mercury. Place all towels and cardboard in a yellow plastic bag and seal all the bags that were used and store in a designated area. All the mercury spill surfaces should be decontaminated with 10% sodium thiosulfate solution. Keep a window open to ventilate after the cleanup. After ensuring all the mercury has been removed, resume normal vacuuming and utilize the cleaned area for routine operation.
9. All the bags or containers containing items contaminated with mercury should be marked properly and labeled as waste mercury containing. This waste shall be categorized as yellow-e chemical waste and shall be disposed as per the options given in flowchart (**Figure 3**).

**Figure 3:** Flow Chart Showing Management of Mercury Spills





Other chemical spills should be absorbed in suitable absorption media such as dry sand, proprietary booms, absorbent pads etc. and collected separately. Waste collected from chemical spills has to be categorized as yellow-e waste, which shall be collected in separate yellow bag and handed over to operator of CBWTF or Hazardous Waste TSDF (in case of captive facility).

### 3.3 STANDARDS FOR TREATMENT AND DISPOSAL AS PER BMWM RULES, 2016

#### 3.3.1 Standards for Incineration

All incinerators shall meet the following operating and emission standards:

##### A. Operating Standards

1. Combustion Efficiency (CE) shall be at least 99.00%.
2. The Combustion Efficiency is computed as follows:

$$C.E. = \frac{\%CO_2}{\%CO_2 + \%CO} \times 100$$

3. The temperature of the primary chamber shall be a minimum of 800°C and the secondary chamber shall be minimum of 1050°C+ or -50°C.
4. The secondary chamber gas residence time shall be at least two seconds.

##### B. Emission Standards

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

##### C. Stack Height

Minimum stack height shall be 30 meters above the ground and shall be attached with the necessary monitoring facilities as per requirement of monitoring of 'general parameters' as notified under the Environment (Protection) Act, 1986 and in accordance with the Central Pollution Control Board Guidelines of Emission Regulation Part-III.

**Important considerations for Captive Incinerators:**

- a. The existing incinerators shall comply with the above revised emission norms within a period of two years from the date of notification.
- b. The existing captive incinerators shall comply with the standards for Dioxins and Furans of 0.1ngTEQ/Nm<sup>3</sup>, within two years from the date of commencement of these rules. To achieve the same, the existing secondary combustion chambers of the incinerator and the pollution control devices shall be suitably retrofitted if required to achieve the emission limits.
- c. Wastes to be incinerated shall not be chemically treated with any chlorinated disinfectants.
- d. Ash from incineration of biomedical waste shall be disposed of at common hazardous waste treatment and disposal facility. However, it can also be disposed of in municipal landfill, if the toxic metals in incineration ash are within the regulatory quantities as defined under the Hazardous Waste (Management and Handling and Transboundary Movement) Rules, 2008 as amended from time to time.
- e. Only low Sulphur fuel like Light Diesel Oil or Low Sulphur Heavy Stock or Diesel, Compressed Natural Gas, Liquefied Natural Gas or Liquefied Petroleum Gas shall be used as fuel in the incinerator.
- f. Shall monitor the stack gaseous emissions (during optimum operational capacity of the incinerator) once in three months through a laboratory approved under the Environment (Protection) Act, 1986 and record of such analysis results shall be maintained and submitted to the prescribed authority. In case of dioxins and furans, monitoring should be done once in a year.
- g. Shall install continuous emission monitoring system for parameters as stipulated by State Pollution Control Board or Pollution Control Committees in authorization and transmit the real time data should be transmitted to the servers at State Pollution Control Board or Pollution Control Committees and Central Pollution Control Board.
- h. Incinerators (combustion chambers) shall be operated with such temperature, retention time and turbulence, as to achieve Total Organic Carbon content in the slag and bottom ashes less than 3% or their loss on ignition shall be less than 5% of the dry weight.
- i. Shall use combustion gas analyzer to measure CO<sub>2</sub>, CO and O<sub>2</sub> periodically so as to operate incinerator at suitable conditions to achieve desired combustion efficiency.

### 3.3.2 Operating and Emission Standards for Disposal by Plasma Pyrolysis or Gasification

#### A. Operating Standards

All the operators of the Plasma Pyrolysis or Gasification shall meet the following operating and emission standards:

1. Combustion Efficiency (CE) shall be at least 99.99%.

2. The Combustion Efficiency is computed as follows.

$$\text{C.E.} = \frac{\% \text{CO}_2}{\% \text{CO}_2 + \% \text{CO}} \times 100$$

3. The temperature of the combustion chamber after plasma gasification shall be  $1050 \pm 50^\circ\text{C}$  with gas residence time of at least 2 (two) second, with minimum 3% Oxygen in the stack gas.
4. The Stack height should be minimum of 30m above ground level and shall be attached with the necessary monitoring facilities as per requirement of monitoring of 'general parameters' as notified under the Environment (Protection) Act, 1986 and in accordance with the CPCB Guidelines of Emission Regulation Part-III.

## B. Air Emission Standards and Air Pollution Control Measures

1. Emission standards for combustion based incinerator shall be applicable for the Plasma Pyrolysis or Gasification also.
2. Suitably designed air pollution control devices shall be installed or retrofitted with the Plasma.
3. Pyrolysis or Gasification to achieve the above emission limits, if necessary.
4. Wastes to be treated using Plasma Pyrolysis or Gasification shall not be chemically treated with any chlorinated disinfectants and chlorinated plastics shall not be treated in the system.

## C. Disposal of Ash Vitrified Material

The ash or vitrified material generated from the 'Plasma Pyrolysis or Gasification shall be disposed at common hazardous waste treatment and disposal facility. However, it can also be disposed of in municipal landfill, if the toxic metals in incineration ash are within the regulatory quantities as defined at Schedule II under Hazardous and Other Waste Management and Handling Rules, 2016. Vitrified slag may be utilized as sub-surface material for road making with permission from concerned SPCB/PCCs.

### 3.3.3 Standards for Autoclave

The autoclave should be dedicated for the purposes of disinfecting and treating Biomedical waste.

- 1) When operating a gravity flow autoclave, medical waste shall be subjected to:
  - (i) A temperature of not less than  $121^\circ\text{C}$  and pressure of 15 pounds per square inch (psi) for an autoclave residence time of not less than 60 minutes; or
  - (ii) A temperature of not less than  $135^\circ\text{C}$  and a pressure of 31 psi for an autoclave residence time of not less than 45 minutes; or
  - (iii) A temperature of not less than  $149^\circ\text{C}$  and a pressure of 52 psi for an autoclave residence time of not less than 30 minutes.
- 2) When operating a vacuum autoclave, medical waste shall be subjected to a minimum of three pre-vacuum pulse to purge the autoclave of all air. The air removed during the

pre-vacuum, cycle should be decontaminated by means of HEPA and activated carbon filtration, steam treatment, or any other method to prevent release of pathogen. The waste shall be subjected to the following:

- (i) A temperature of not less than 121°C and pressure of 15 psi per an autoclave residence time of not less than 45 minutes; or
  - (ii) A temperature of not less than 135°C and a pressure of 31 psi for an autoclave residence time of not less than 30 minutes.
- 3) Medical waste shall not be considered as properly treated unless the time, temperature and pressure indicators indicate that the required time, temperature and pressure were reached during the autoclave process. If for any reasons, time temperature or pressure indicator indicates that the required temperature, pressure or residence time was not reached, the entire load of medical waste must be autoclaved again until the proper temperature, pressure and residence time were achieved.
- 4) **Recording of operational parameters:** Each autoclave shall have graphic or computer recording devices which will automatically and continuously monitor and record dates, time of day, load identification number and operating parameters throughout the entire length of the autoclave cycle.
- 5) **Validation test for autoclave:** The validation test shall use four biological indicator strips, one shall be used as a control and left at room temperature, and three shall be placed in the approximate center of three containers with the waste. Personal protective equipment (gloves, face mask and coveralls) shall be used when opening containers for the purpose of placing the biological indicators. At least one of the containers with a biological indicator should be placed in the most difficult location for steam to penetrate, generally the bottom center of the waste pile. The occupier or operator shall conduct this test three consecutive times to define the minimum operating conditions. The temperature, pressure and residence time at which all biological indicator vials or strips for three consecutive tests show complete inactivation of the spores shall define the minimum operating conditions for the autoclave. After determining the minimum temperature, pressure and residence time, the occupier or operator of a common biomedical waste treatment facility shall conduct this test once in three months and records in this regard shall be maintained.
- 6) **Routine Test:** A chemical indicator strip or tape that changes colour when a certain temperature is reached can be used to verify that a specific temperature has been achieved. It may be necessary to use more than one strip over the waste package at different locations to ensure that the inner content of the package has been adequately autoclaved. The occupier or operator of a common Biomedical waste treatment facility shall conduct this test during autoclaving of each batch and records in this regard shall be maintained.
- 7) **Spore testing:** The autoclave should completely and consistently kill the approved biological indicator at the maximum design capacity of each autoclave unit. Biological indicator for autoclave shall be *Geo-bacillus-tearo-thermophilus* spores using vials or spore Strips; with at least  $1 \times 10^6$  spores. Under no circumstances will an autoclave have minimum operating parameters less than a residence time of 30 minutes, a temperature less than 121°C or a pressure less than 15 psi. The occupier or operator of a common Biomedical waste treatment and disposal facility shall conduct this test at least once in every week and records in this regard shall be maintained.

### 3.3.4 Standards of Microwaving

- 1) Microwave treatment shall not be used for cytotoxic, hazardous or radioactive wastes, contaminated animal carcasses, body parts and large metal items.
- 2) The microwave system shall comply with the efficacy test or routine tests and a performance guarantee may be provided by the supplier before operation of the limit.
- 3) The microwave should completely and consistently kill the bacteria and other pathogenic organisms that are ensured by approved biological indicator at the maximum design capacity of each microwave unit. Biological indicators for microwave shall be *Bacillus atrophaeus* spores using vials or spore strips with at least  $1 \times 10^4$  spores per detachable strip. The biological indicator shall be placed with waste and exposed to same conditions as the waste during a normal treatment cycle.

### 3.3.5 Standards for Efficacy of Chemical Disinfection

Microbial inactivation efficacy is equated to “Log<sup>10</sup> kill” which is defined as the difference between the logarithms of number of test microorganisms before and after chemical treatment. Chemical disinfection methods shall demonstrate a 4 Log<sup>10</sup> reduction or greater for *Bacillus Subtilis* (ATCC19659) in chemical treatment systems.

### 3.3.6 Standards for Dry Heat Sterilization

Waste sharps can be treated by dry heat sterilization at a temperature not less than 185°C, at least for a residence period of 150 minutes in each cycle, which sterilization period of 90 minutes. There should be automatic recording system to monitor operating parameters.

#### (i) Validation test for Sharps sterilization unit

Waste sharps sterilization unit should completely and consistently kill the biological indicator *Geobacillus Stearothermophilus* or *Bacillus Atropheaus* spores using vials with at least log<sup>10</sup> 6 spores per ml. The test shall be carried out once in three months.

#### (ii) Routine test

A chemical indicator strip or tape that changes colour when a certain temperature is reached can be used to verify that a specific temperature has been achieved. It may be necessary to use more than one strip over the waste to ensure that the inner content of the sharps has been adequately disinfected. This test shall be performed once in week and records in this regard shall be maintained.

### 3.3.7 Standards for Liquid Waste

- 1) The effluent generated or treated from the premises of bedded HCFs before discharge into the sewer should conform to the following limits:

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.

- 2) Sludge from Effluent Treatment Plant shall be given to common Biomedical waste treatment facility for incineration or to hazardous waste treatment, storage and disposal facility for disposal.

**Note:**

- 1) Above limits are applicable to all bedded Healthcare Facilities in case their:
  - Discharge line is connected to public sewerage network, which is not having terminal sewage treatment plant; or
  - Discharge line is not connected to public sewers.

Healthcare Facilities meeting above criteria but having less than ten beds are given time till 31st December, 2019 to set up suitable effluent treatment plants and to comply with above standards.
- 2) In case discharge from HCF is connected to a public sewerage network having terminal Sewage Treatment Plant, then general discharge standards as notified under the Environment (Protection) Act, 1986 (29 of 1986) shall be applicable (as given at Annexure 8);
- 3) Non-bedded occupiers shall dispose infectious liquid wastes only after treatment by disinfection as per Schedule - II (6) of the principal rules.

### 3.4 STANDARDS FOR DEEP BURIAL

- Yellow (a), (b) and (c) wastes namely human anatomical, animal anatomical and soiled waste are permitted for deep burial only in rural or remote areas where there is no access to common Biomedical waste treatment facility after obtaining authorization from SPCB/PCCs.
- A pit or trench should be dug about two meters deep. It should be half filled with waste, and then covered with lime within 50 cm of the surface, before filling the rest of the pit with soil.
- It must be ensured that animals do not have any access to burial sites. Covers of galvanized iron or wire meshes may be used.
- On each occasion, when wastes are added to the pit, a layer of 10 cm of soil shall be added to cover the wastes.
- Burial must be performed under close and dedicated supervision.
- The deep burial site should be relatively impermeable and no shallow well should be close to the site.
- The pits should be distant from habitation, and located so as to ensure that no contamination occurs to surface water or ground water. The area should not be prone to flooding or erosion.
- The location of the deep burial site shall be authorized by the prescribed authority i.e CPCB/SPCB or District Pollution Control Board Office.



- The institution shall maintain a record of all pits used for deep burial.
- The ground water table level should be a minimum of six meters below the lower level of deep burial pit.

### 3.5 SUGGESTED METHOD FOR DESIGN OF CONCRETE PIT FOR WASTE SHARPS

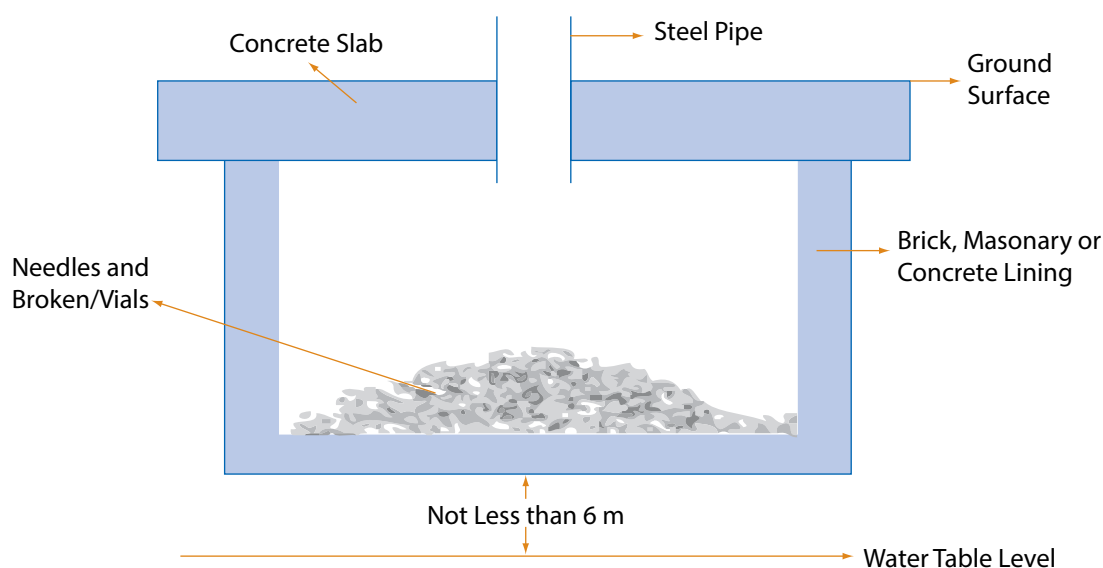
If required, a sharp pit must be constructed within the hospital premise to dispose of the sharp waste generated from the facility. Prior to disposal in concrete pit, sharps waste should be disinfected and treated in following methods:

- Autoclaving along with sharp containers followed by shredding or mutilation; or
- Combination of shredding cum autoclaving along with sharp containers.
- Sharp pit must be a 1m × 1m × 1m concrete lined circular or rectangular pit as shown in Figure 4.
- Pit can be dug and lined with brick, masonry or concrete rings.
- The pit should be covered with a heavy concrete slab, in which a galvanized steel pipe of about 1.0 m height and suitable diameter is fixed to feed the shredded or mutilated sharps waste.
- The top opening of the steel pipe shall have a provision of locking after the treated waste sharps has been disposed in.
- Once the pit filled up to 3/4th capacity, it can be encapsulation with binding material like cement. Once encapsulated mass is dry, sharp pit is sealed and another sharp pit is created for further use.
- For high water table regions where water table is less than 6m beneath bottom of the pit, a tank with above mentioned arrangements shall be made above the ground.

### 3.6 EFFLUENT TREATMENT PLANT

Effluent Treatment Plant should be provided in every HCF to treat the wastewater generated from the hospital in order to comply with the effluent standards prescribed under the BMWM

**Figure 4: Layout of Sharp Pit for Disposal for Sharp Waste**

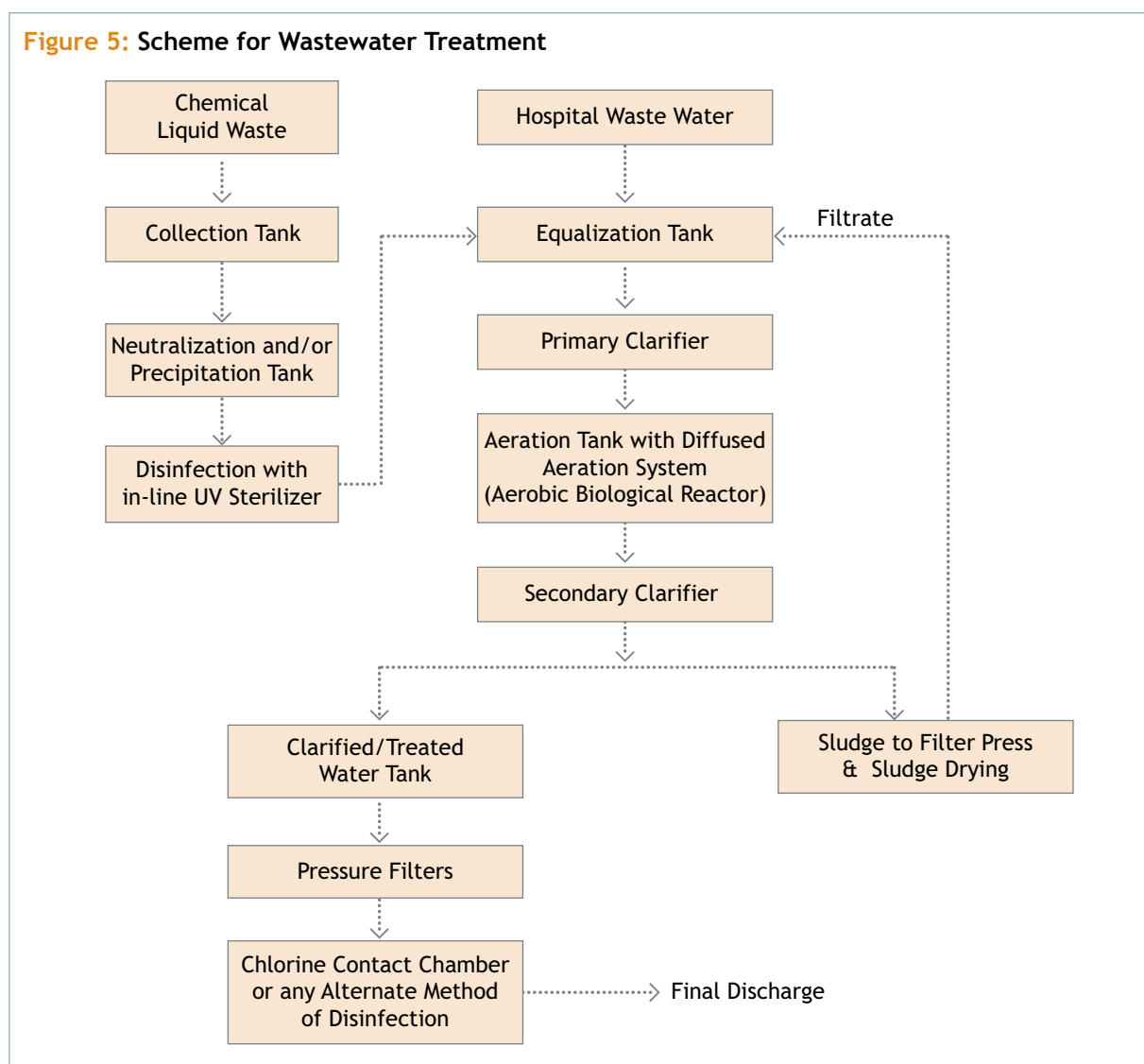


Rules, 2016. Sources of wastewater generation from the hospital are wards, laboratories, used disinfectants, floor washing, washing of patients area, hand washing, laundry, discharge of accidental spillage, firefighting, bathroom/toilet etc. Liquid waste generated due to use of chemicals or discarded disinfectants, infected secretions, aspirated body fluids, liquid from laboratories and floor washings, cleaning, house-keeping and disinfecting activities should be collected separately and pre-treated prior to mixing with rest of the wastewater from HCF.

The combined wastewater should be treated in the ETP having three levels of treatment; primary, secondary and tertiary:

- Primary Treatment: equalisation, neutralization, precipitation and clarification.
- Secondary Treatment: High rate aerobic biological treatment, secondary settling tank.
- Tertiary Treatment: Pressure Filtration, Disinfection and disposal to drain/sewer.

Typical flow chart for the Effluent Treatment Plant is given below:



Options for reuse of treated wastewater: Wastewater generated from the HCF is treated in the ETP and shall be disposed into drain/sewer or could be reused in: Flushing, Horticulture, and Scrubber.

# BMW MANAGEMENT AT OUTREACH ACTIVITIES AND BY OCCASIONAL GENERATORS

In public Healthcare facilities, each HCF is performing some outreach activities by providing services to the population outside the premises of HCF. Some of such activities like immunization programmes and home delivery services generate Biomedical waste and are needed to be handled in order to avoid any harm to environment and human health.

This section provides the details of the activities needed to be carried out by the Healthcare workers during such activities so as to ensure that handling of the BMW generated from these activities are done as per the BMW Rules, 2016. This section details about the responsibility for management of BMW during such activities, steps of BMW management for outreach activities and collection, treatment and disposal methods of BMW generated during such outreach activities.

## 4.1 RESPONSIBILITY

The occupier of the Healthcare facility organising the outreach activities is totally responsible for ensuring that waste generated during such activity is properly segregated, collected, treated and disposed of as per BMW Rules, 2016.

## 4.2 OUT REACH ACTIVITIES

Healthcare Facility may provide any of the outreach services given below:

- Blood donation camps/Health camps;
- Home delivery by Skilled Birth Attendant (SBA);
- Antenatal Care;
- Point of care diagnosis;
- Immunization;
- Family Planning activities;
- Other similar activity.

During the above activities, the Biomedical waste generated is required to be segregated, collected at the site of generation itself and has to be transported back to HCF for treatment and disposal. Alternatively, arrangement can be made with CBWTF operator to pick-up the segregated waste directly from camp-site after completion of activity. Anatomical waste and soiled waste needs to be treated and disposed within 48 hours once generated during the above activities.

## 4.3 STEPS FOR BIOMEDICAL WASTE MANAGEMENT FOR OUT REACH ACTIVITIES

1. Segregate biomedical waste at the point of generation i.e. during the outreach activity.
2. Collection and packaging of waste in colour coded and bar code labelled bags/containers.
3. Transportation of waste from outreach activity site to HCF or make arrangement with nearby CBWTF to collect the waste directly after completion of outreach activity.
4. Treatment & disposal at HCF or CBWTF.

## 4.4 BIOMEDICAL WASTE MANAGEMENT BY OCCASIONAL WASTE GENERATORS

Occasional Biomedical waste generator like first aid rooms at school, colleges, research laboratories at institutions, blood banks, health camps, first aid rooms at companies, etc. are also required to dispose the Biomedical waste generated waste as per the provisions of BMW Rules, 2016. Occasional generators are also required to obtain (one time) authorisation from the prescribed authority under BMW Rules, 2016. Following are the guidelines for the occasional Biomedical waste generators:

1. Obtain one-time authorisation under BMW Rules, 2016 from the prescribed authority.
2. Obtain agreement with the CBWTF operator for final treatment and disposal of Biomedical waste.
3. Inform CBWTF operator to pick-up Biomedical waste as and when it is generated;
4. Segregate the Biomedical waste as per colour coded categories stipulated under BMW Rules, 2016.
5. The colour coded bags/containers should be labelled with bar code label (provided by the operator of CBWTF or any authorised vendor).
6. It shall be ensured that anatomical waste, soiled waste and biotechnology waste if generated is treated & disposed within 48 hours.
7. Maintain record pertaining to quantum of category wise Biomedical waste generated and treated.

## 5.1 ROLE OF HEALTHCARE FACILITY

As per the BMW Rules, 2016, the liability for implementing these rules lies with the person having administrative control over the healthcare facility. This person in BMW Rules is termed as an “**Occupier**” and defined as” a person having administrative control over the institution and the premises generating biomedical waste, which includes a hospital, nursing home, clinic, dispensary, veterinary institution, animal house, pathological laboratory, blood bank, Healthcare facility and clinical establishment, irrespective of their system of medicine.”

In the context of public health systems in India, the role of an Occupier will be performed by designated Medical Superintendent (MS)/Chief Medical Officer (CMO)/Senior Medical Officer (SMO)/Principal Medical Officer (PMO) of the District Hospital, Sub Divisional Hospital and Community Health Centre (CHC).

In case of Primary Health Centre (PHC) and Sub Centre, the duties of occupier are to be performed by designated Medical Officer in charge (MO I/C) of the PHC.

The CMO/SMO/MS/Medical Officer in charge of the HCFs is responsible and liable for implementing, monitoring and review of activities related to Biomedical Waste Management.

### 5.1.1 Responsibility of the Healthcare Facility

It is the overall responsibility of the in charge of the HCF to take all necessary steps to ensure that Biomedical waste is handled without any adverse effect to human health and the environment and in accordance with the BMW Rules, 2016.

He/she has to ensure that the BMW generated from the Healthcare Facility is properly segregated, handled, stored, packaged, transported and disposed of, as per these guidelines to ensure successful implementation of BMW Rules, 2016.

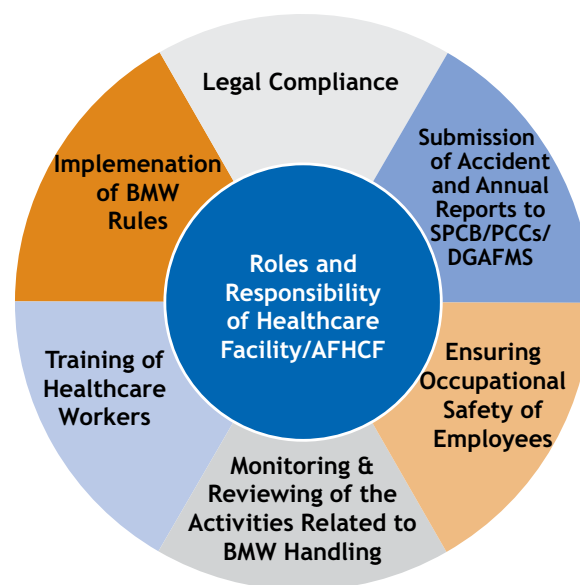
Over all roles and responsibility of the Healthcare Facility is given in Figure 6.

As per the provisions under BMW Management Rules, 2016, the following responsibilities have been bestowed upon Healthcare facilities:

- To ensure that all the legal requirements related to the Biomedical Waste Management are complied with and are regularly updated.
- To ensure that annual reports and accidents reports are submitted to SPCB in a timely manner.

- To ensure that Biomedical waste is handled without any adverse effect to human health and the environment.
- To make a provision within the premises for a safe, ventilated and secured location for storage of segregated biomedical waste at central storage area.
- To ensure that there shall be no secondary handling, pilferage of recyclables or inadvertent scattering or spillage by animals.
- To ensure that Biomedical waste from central storage area or the premises shall be directly transported to the common Biomedical waste treatment facility for the appropriate treatment and disposal.

**Figure 6:** Roles & Responsibility of Healthcare Facility



- To ensure pre-treatment of yellow-h waste comprising of microbiology, biotechnology and other clinical laboratory waste, waste blood bags (containing date expired or contaminated blood), Laboratory cultures, stocks or specimen of micro-organisms, live or attenuated vaccines, human cell cultures used in research, industrial laboratories, production of biological, residual toxins, dishes and devices used for cultures and other highly infectious wastes before handling to over to CBWTF for final disposal.
- To pre-treat vacutainers/vials containing blood samples and handover to CBWTF as Red category waste.
- To ensure that all the requirements related to establishment of a pre-treatment facility within its premises (as given at section 3.1.1.h) fully complies with standards stipulated under BMWM Rules, 2016.
- To phase out use of chlorinated plastic bags (excluding blood bags) and gloves by 27 March, 2019.
- To ensure that the solid waste other than BMW is disposed of as per Solid Waste Management Rules, 2016.
- To establish a bar-code system for bags or containers containing Biomedical waste destined for disposal at CBWTF or captive treatment and disposal facility before 27th March, 2019.
- To ensure all the staffs of HCFs are provided regular training on BMW handling both at the time of induction and on annual basis as well.
- To ensure occupational safety of all the employees through annual health check-ups, immunization and provisions of appropriate and adequate PPEs.
- To ensure that BMW Register is maintained and is updated on day to day basis.
- Bedded HCFs to ensure uploading annual records of the biomedical waste generated on its website by 15 March, 2020.
- To immediately inform the SPCB in case of any lapse by waste collection agency or CBWTF in collection of waste from the HCF.



- To ensure that all the activities of BMW management are monitored and reviewed.
- To ensure that the committee formed for monitoring and review of BMW management is functioning properly.
- To ensure that all the records related to BMW Management are maintained by HCF.

The above listed responsibilities are detailed in these guidelines, laying down steps needed to be undertaken by Healthcare facility to fulfil these responsibilities.

## 5.2 AUTHORIZATION

### 5.2.1 Responsibility

“Authorization” means permission granted by the prescribed authority for the generation, collection, reception, storage, transportation, treatment, processing, disposal or any other form of handling of Biomedical waste in accordance with these rules and guidelines issued by the Central Government or Central Pollution Control Board (CPCB) as the case may be.

As per BMW Rules, 2016, every hospital, nursing home, clinic, dispensary, veterinary institution, animal house, pathological laboratory, blood bank, Healthcare facility and clinical establishment, irrespective of their system of medicine and by whatever name they are called are required to obtain authorization from the prescribed authority i.e. State Pollution Control Board/Pollution Control Committee, as the case may be. Validity of authorization in case of bedded Healthcare facilities will be synchronized with the validity of the consents. Armed Forces Healthcare Establishments shall obtain authorization from DGAFMS.

Overall responsibility of having valid authorizations and consents under various acts lies with the In-charge of the Healthcare facility.

### 5.2.2 Authorization under Biomedical Waste Management Rules, 2016

#### Procedure for Authorization

In charge of the Healthcare facility needs to apply to the respective State Pollution Control Board (SPCB) in respect of States or Pollution Control Committees (PCC) in respect of Union Territories for fresh or renewal of authorization, for the activities being carried out in handling of Biomedical Waste Management by the Healthcare facility.

#### 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 Biomedical Waste Management Rules, 2016 given at Annexure 3.

#### Information Requirements of Application

- Particulars of Healthcare 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 (in case of bedded HCFs).
- Detail of HCF: Number of beds, Average number of patient treated per month.
- Category wise Quantity of Waste Generated or disposed by the Healthcare facility.
- Detail of any treatment facility available in the premises of Healthcare facility.

## Grant of Authorization

Upon verification and ensuring the HCF is having requisite facilities, the authorization is granted by the respective SPCB/PCC in a prescribed form, with unique number of authorization and date of issue.

## 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

One-time authorization is required to be obtained from respective SPCBs/PCCs in case of non-bedded Healthcare facilities such as clinic, dispensary, veterinary institution, animal house, pathological laboratory, blood bank, etc. These HCFs have to apply for a fresh authorization to amend earlier authorisation in case there is any change or variance in relation to the activities of HCF.

Authorization for non-bedded HCFs shall be deemed to have been granted, if not objected by the prescribed authority within a period of ninety days from the date of receipt of duly completed application along with such necessary documents.

## 5.2.3 Approval for Deep Burial Pits (For HCFs Not Under Agreement with CBWTF)

HCF if intends to dispose BMW through deep burial pits, they shall obtain authorization from the respective prescribed authority i.e. SPCB/PCC office for establishment of deep burial pits and records of such pits needs to maintained.

Disposal by deep burial is permitted only in rural or remote areas where there is no access to common Biomedical waste treatment facility. This will be carried out with prior approval from the prescribed authority and as per the Standards specified in Schedule-III. The deep burial facility shall be located as per the provisions and guidelines issued by CPCB from time to time.

## 5.2.4 Agreement with Common Biomedical Waste Treatment Facility (CBWTF)

Each Healthcare facility which is situated within reach of 75 km of CBWTF needs to have a valid agreement with authorised CBWTF for treatment and disposal of Biomedical Waste

generated from the HCF. HCFs located beyond 75 km may also join the CBWTF if operator is capable and willing to provide the services as required under BMW Rules, 2016.

It has to be ensured by the HCF, that the CBWTF operator collects the waste within a specified time, and the untreated biomedical waste especially untreated human anatomical, animal anatomical, soiled waste and biotechnology waste is treated and disposed within a period 48 hours. Agreement must also specify the responsibilities of CBWTFs and payment conditions including options such as supply of non-chlorinated bags, supply of bar-coded labels, etc.

## 5.3 REPORTING TO STATE POLLUTION CONTROL BOARD OR POLLUTION CONTROL COMMITTEE

### 5.3.1 Annual Reporting

As per the Biomedical Waste Management Rules, 2016, the healthcare facility is required to submit the Annual Report to the SPCB/PCC on or before 30<sup>th</sup> 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 Biomedical Waste Management
- Details of accident Occurred
- Details Emission and Effluent testing

Annual Report submitted to the SPCB or PCC must also be enclosed with following details:

- Training imparted to the Healthcare Workers involved in handling of Biomedical 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/boilers.
- Records of Effluent generated and its characteristics from Healthcare 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 Healthcare Workers involved in handling of Biomedical waste.
- Records of immunisation of Healthcare Workers involved in handling of Biomedical waste.

Each healthcare facility must also ensure that the annual report submitted to the concerned SPCB/PCC is also published in its own website.

*Please refer to Annexure 4: FORM IV: Annual Report*

### 5.3.2 Accident Reporting

Any accident occur during the handling of Biomedical 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 Biomedical Waste Management Rules, 2016, the accidents are classified into two categories; major and minor.

#### Major Accidents

Major accidents include but not limited to following:

- Toppling of the truck carrying Biomedical waste
- Accidental release of Biomedical waste in any water body
- Fire Hazard
- Blasts
- Flooding or erosion of the deep burial pit etc.

It is **mandatory** under BMW 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 BMW 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 **24hrs of accident**. The reporting should be done on the prescribed **Form 1** given in BMW Rules 2016.

#### Minor Accidents

Minor accidents include but not limited to following:

- Needle stick injuries
- Splash exposure or
- Spillage of mercury/chemicals etc.

Such minor accidents need not to be immediately reported to the SPCB/PCC but is required to be recorded by the Healthcare facility and appropriate remedial actions must be taken by Healthcare facility.

Healthcare facility also needs to submit consolidated report on accidents 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.

### 5.3.3 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 CBWTF does not collect the waste within 48 hours of generation, it is the responsibility of the HCF to immediately inform the

respective State Pollution Control Board/Pollution Control Committee about any such lapse.


- It is also mandatory to report to the respective SPCB/PCC, 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.

## 5.4 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 Biomedical waste in the healthcare facility.

As per Biomedical Waste Management Rules, 2016 occupational safety of the staff has to be ensured in following methods:

- Providing adequate and appropriate Personal Protective Equipment (PPE) to the staff handling Biomedical Waste. Use of PPE while handling of Biomedical Waste must be encouraged and must be monitored regularly to ensure occupational safety of staff.

	<p>Personal Protective Equipment (PPE) includes:</p> <ul style="list-style-type: none"><li>○ Heavy Duty Gloves (Workman's Gloves)</li><li>○ Gum Boots or safety shoes for waste collectors</li><li>○ Face mask</li><li>○ Head Cap</li><li>○ Splash Proof Gowns or aprons etc.</li><li>○ Disposal gloves for waste handlers</li></ul>
--	--

- 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 Healthcare 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 Biomedical waste.

## 5.6 EMPLOYEE HEALTH CHECK UP

As per Biomedical Waste Management Rules, 2016, every HCF must ensure that a comprehensive health check-up of each employee and other staff involved in BMW handling is carried out at the time of induction and also as a mandatory procedure to be followed for each year for every employee.

Comprehensive Health Check-up includes following but not limited to:

- Present Complaints (If any), with duration
- Vaccination History (especially with respect to Hepatitis B and Tetanus Toxoid)
- Past Medical History
- Past Surgical History

- General Physical Examination
- Dental Examination
- Systemic Examination including Cardiovascular System, Respiratory System, Central Nervous System, Gastrointestinal System, Uro Genital System, Gynae and Obstet. (in case of females), Musco-skeleton System, EYE and ENT.
- Lab Investigations including: Hb, TLC, DLC, RBS, Blood Urea, S. Creatinine, Urine, Stool etc.
- Radiological Investigations: Chest X-ray, USG (If needed), CT or MRI (if needed)
- Inference with Diagnosis

Health Check-up records of all the employees are needed to be maintained in the personal record of each employee for proving compliance.

***Please refer to Annexure 5: Suggested Format for Employee Health Check up Record***

## 5.7 IMMUNIZATION

All the staff involved in handling of Biomedical Waste in the Healthcare facility must be immunized against the communicable diseases especially against Hepatitis B and Tetanus.

Evaluation of immunization status of the staff must be included in the annual health check-up.

Hospital needs to maintain the immunization records of all the staff with dates of immunization and due date of first dose, Second Dose and Booster Dose.

## 5.8 TRAINING OF HEALTHCARE WORKERS

As per Biomedical Waste Management Rules, 2016, it is mandatory for all the employee of the healthcare facility to be trained on handling of biomedical waste management and handling.

### 5.8.1 Training Need Analysis

It is mandatory for each Healthcare worker inducted to the HCF to undergo the training on Biomedical Waste Management at the time of induction.

BMW Rules, 2016 also stipulates annual training to the healthcare staff involved in handling of Biomedical waste. It is suggested that the committee/person designated for monitor or review of the activities of BMW management does the training need analysis of the staff based on following parameters:

- Theoretical Knowledge
- Demonstration of methods of handling of Biomedical waste
- Practical Implementation

### 5.8.2 Training Schedule

As per the BMW Rules, 2016 the minimum requirements for Healthcare facilities is to conduct the training on BMW activities at least annually for all the staff of the facility and also whenever a new staff is inducted into Healthcare Facility.



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

### 5.8.3 Trainers

- Apart from professional trainers, HCFs may also invite the concerned officials of the SPCB/PCCs and operators of CBWTF to attend in-house training programmes organised by them so as to impart training to staff involved handling of BMW in Healthcare facilities.
- HCFs shall also depute the person designated and other identified staff for attending training programmes as and when conducted by SPCBs/PCCs.
- Nodal Officer for biomedical waste management in HCF may take the responsibility to provide induction training to the newly recruited healthcare staff.
- Trained employee of the healthcare worker can also take up the role of trainer.

### 5.8.4 Training Material

It is a requirement of BMWM 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 SPCB/PCC can be used as training material.

### 5.8.5 Training Records

Healthcare facilities need to ensure that all the training records pertaining to the Biomedical 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 BMW handling to SPCB/PCC. These details have to be submitted along with the annual report to the prescribed authority i.e. 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.

### 5.8.6 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.

## 5.9 BUDGET ALLOCATION FOR BIOMEDICAL WASTE MANAGEMENT

As per Schedule-III of the BMWM Rules, 2016, State Government of Health or Union Territory Government or Administration are required to allocate adequate funds to Government Healthcare facilities for Biomedical waste management.

HCFs may have a dedicated budget for BMWM as a part of annual budget of the Healthcare facilities. Such budget must include both recurring and non-recurring costs expected to be incurred by HCFs, related to Biomedical Waste Management.

States may include this budget for the Biomedical Waste Management in the yearly Programme Implementation Plan (PIP) for approval and funding from the Central Government of India.

The various budget heads under which the grant is awarded from the Centre can be:

- Training Heads
- Resources needed for BMW Management
- Request for Proposal (RFP) for contracting with CBWTF

Such budget must include action plan for:

- Logistics: Bins, bags, puncture proof containers, PPEs, trolleys, needle cutters, pre-treatment equipment, bar-code labels and chemicals
- Outsourcing: Waste Collection and Personnel
- Training
- IEC/Patient Education: Posters, Pamphlets

## 5.10 MONITORING AND REVIEW

Each healthcare facility must ensure that there is a system of monitoring and review of the activities related to the handling of Biomedical Waste Management.

Biomedical Waste Management Rules, 2016 stipulates that the system to be adopted for monitoring and review of the activities at all the levels of implementation. The monitoring and review is required to be done through following instruments:

- 1) Central Level: Monitoring Committee for implementation of the rules
- 2) State Level: State Advisory Committee
- 3) District Level: District Level Monitoring Committee
- 4) HCF Level: HCFs having 30 beds or more shall have Quality Team/Infection Control Committee/Biomedical Waste Management Committee and HCFs having less than 30 beds should designate Biomedical Waste Supervisor.

### 5.10.1 Monitoring and Review at HCFs having 30 Beds or More

BMWM Rules 2016 stipulates that monitoring and review of the activities related to handling of Biomedical waste, must be performed by an existing committee or by framing a new committee for this purpose, at the healthcare facility only.

Quality Team (QT), framed under National Quality Assurance standards, responsible for implementation of quality assurance can perform the overall role of monitoring and review the activities of BMW handling.

Biomedical Waste Management Committee: It is suggested that HCF must frame new committee at the facility level for monitoring of the BMW activities, which is to be termed as Biomedical Waste Management Committee.

The suggested composition of such committee is as follows:

- SMO/CMO/Medical Superintendent (Chairperson)
- District Quality Consultant/District BMW Officer (Invitee Members)
- Quality Manager
- Hospital Infection Control Nurse/Officer
- Nursing in-charge
- Medical Officer (Surgery)
- Medical Officer (Emergency)
- Medical Officer (Gynae & Obs)
- Microbiologist/Pathologist
- OT Nurse/Technician/Assistant
- Lab Technician
- Blood Bank/Storage Unit Technician
- Housekeeping in-charge
- Pharmacist

The responsibility of this committee are to:

- Improve and steam line the BMW management Systems for proper implementation of Biomedical Waste Management Rules 2016.
- Formulate and ensure implementation of the responsibilities of the various categories of the staff involved in the generation, collection, transportation, treatment and disposal of wastes.
- Monitor biomedical waste handling practices in the organization.
- Ensure periodic training of all categories of staff involved in generating and transporting waste.
- Maintenance of all the records related to BMW handling as per BMW Rules 2016.
- Ensuring submission of reports to prescribing authority like Accident Reporting & Annual Reporting to SPCB/PCC within the stipulated due dates.
- Update and maintain the valid authorization from SPCB/PCC.
- Have a valid agreement with Common Biomedical Waste Treatment Facility (CBWTF).
- Take appropriate remedial actions in event of any accident occurrence.

## Meeting Schedule

It is to be ensured by the HCFs that the committee framed for monitoring of activities of Biomedical waste handling in the facility must meet:

- At least once in six months and also when needed.
- Committee must meet in event of any accident reported.

## Agenda and Meeting Records

It is to be ensured that committee meetings are held in accordance with a predefined agenda for the meeting.

The Agenda of meeting, proceedings/minutes of meeting along with the planned actions with the responsibility delegated for implementation should be recorded and records are to be kept with BMW Committee for proving compliance.

All the minutes of meeting of this committee is to be forwarded along with the Annual Report to the prescribing authority i.e. SPCB/PCC. The meeting records for the period from January to December of the preceding year are to be submitted along with Annual Report on or before 30th June of every year.

### 5.10.2 Monitoring and Review at HCFs having less than 30 Beds

The healthcare facility having less than 30 beds must designate a qualified person for monitoring and review the activities of Biomedical Waste Management in the facility. He shall monitor the activities of BMW management and perform same functions as described for Biomedical Waste Management Committee (at section 5.10.1).

For monitoring at the sub-centre level it is advised that the person designated for monitoring at the PHC is also responsible for monitoring at the sub centre level.

The person designated will be overall responsible for implementation of BMW Rules, 2016 under direct supervision of Medical Officer I/c of the PHC Will also be responsible for collating the information required for submission of the annual report and will also be responsible for maintaining the records of BMW Trainings, Quantity of waste generated, number of accidents occurred in handling of BMW both major and minor, remedial actions taken by HCFs in event of such accidents etc.

### Indicators for Monitoring of Activities of BMW Management at Various Levels

The officials for monitoring and review for the activities of BMW management at various levels i.e. State, District and Facility level, needs to monitor the performance related to the BMW management at all the levels. For this purpose, format for “Indicators for monitoring of BMW Activities in the State” is given at Annexure 7.

## 5.11 LIABILITY OF HEALTHCARE FACILITY

As per the BMW Rules, 2016, the liability for implementing BMW Rules, 2016 lies with the occupier or the person having administrative control over the healthcare facility (as elaborated

at section 5.1). He/she shall be liable for any harm that may occur to the environment or people due to improper handling of the BMW generated from the facility.

In case of any violation, the occupier shall be liable for action under section 15 of Environment (Protection) Act, 1986. The occupier shall also be liable for complying with the directions if any issued under section 5 of Environment (Protection) Act, 1986 issued by concerned authorities.

To avoid any legal implications, the HCF must meet all the responsibilities as listed in these guidelines as well as BMW Rules, 2016.

Legal Actions that can be taken against HCFs for violation of the provisions or the 'Directions' under Section 5 of 'The Environment (P) Act, 1986' as follows:

- Closure, prohibition or regulation of any operation or process
- Stoppage or regulation of the electricity or water supply
- Closure of the HCFs

Legal Actions for violation of the provisions under Section 15 of 'The Environment (P) Act, 1986' includes:

- Imprisonment up to five years or fine up to one lakh rupees for each failure or contravention of the Rules or both;
- In case of violation continues, additional fine which may extend to five thousand rupees for every day of violation;
- If the contravention continues beyond a period of one year after the first date of contravention, the offender shall be punishable with imprisonment for term which may extend to seven years (as may be decided by Hon'ble Courts).

## 5.12 REQUIREMENTS FOR ESTABLISHMENT OF CBWTF WITHIN THE PREMISES OF HCFs

As per Biomedical Waste Management Rules, 2016, a Healthcare facility shall not install on-site captive treatment and disposal facility if service of a CBWTF available within 75 km from the HCF. In case a service of common Biomedical waste treatment facility is not available within 75 km, the HCFs can explore the possibility of sending BMW to a CBWTF located beyond 75 km distance if the operator is authorised to cover the area and also capable to provide services of collection, treatment and disposal within 48 hours as required under BMW Rules, 2016.

If a Healthcare facility not located within 75 km from CBWTF and also wishes to establish an onsite treatment and disposal facility within its premises; shall install requisite treatment and disposal facilities such as incinerator, autoclave or microwave, shredder within the premises of the facility; in addition, the Occupier shall meet the requirements of and "Operator" for complying with the standards as prescribed under BMW Rules, 2016.

If a Healthcare facility has a pre-existing captive treatment and disposal facility prior to notification of BMW Rules, 2016, it is suggested that such HCFs shall stop operating captive facilities and become member of CBWTF, since operation of captive facility within HCF premises may have adverse effects on patients. However, in case a HCF wish to continue operation of its captive facility, they shall obtain necessary authorization from concerned

SPCBs/PCCs. Moreover, operation of captive facility within HCF may require greater investment and effort for complying with revised stringent emission norms for incinerators, which may include refurbishing or augmenting secondary combustion chamber with 2 seconds residence time. It is also required to augment air pollution control equipment of captive facilities to comply with stringent emission standards for Particulate matter and Dioxins and furans.



As per Biomedical 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.

## GENERAL REQUIREMENTS FOR HCFs

Healthcare 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. Requirements of HCFs in management of solid waste are given below:

- Collect segregate waste in two separate streams namely bio-degradable waste and dry-waste. Green bins shall be provided for bio-degradable wastes and blue bin for dry wastes. Colour coded bins may be either painted or labelled with particular colour.
- Plastic sheets provided inside the bins shall be of minimum 50 mm thick as required under plastic waste management Rules, 2016. In case of bio-degradable waste collection bins, it is recommended to use compost able plastic bags of any thickness.
- Waste collected in bins shall be handed over to authorised waste pickers or waste collectors as per the direction or notification by the local authorities from time to time.
- HCFs having more than 5,000 sqm area should set-up on-site compost plants as far as possible.
- 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 c) category waste for incineration.
- To store horticulture waste and garden waste generated from his premises separately in their own premises and dispose of as per the directions of the local body (local authorities) from time to time.
- General waste shall not be throw or burnt on streets, open public spaces outside the premises or in the drain or water bodies.
- HCFs shall pay user fee for solid waste management, as may be specified in the bye-laws of the local body.
- HCFs shall hand over segregated waste to authorized waste collector or agency as specified by the local body.

- General waste should not be stored in central waste storage area meant for Biomedical Waste generated for the facility, but is stored separately, till it is handed over to authorised waste picker of local bodies or corporations or Gram Panchayats.
- Any BMW generated should not be mixed with the general waste. To ensure the same, Healthcare facilities have to train all the staff of HCF to segregate general wastes and they shall also caution or advise the visitors in HCFs to follow the same.

## 7.1 MANAGEMENT OF USED BATTERIES

As per the provisions under Batteries (Management & Handling) Rules, 2001, used lead acid batteries generated from Healthcare 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 returns shall be filed half yearly i.e. by 30th June and 31st December of every year to the concerned State Pollution Control board.

## 7.2 MANAGEMENT OF RADIOACTIVE WASTES

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 authorization from the competent authority under these rules; (b) in any manner other than in accordance with the terms and conditions specified in the authorization issued under these rules; (c) in any location different from those specified in the authorization; and (d) in quantities exceeding those specified in the authorization.

Healthcare 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.

## 7.3 MANAGEMENT OF E-WASTES

As per provisions under E-Waste (Management) Rules, 2016, as amended 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 Producer of EEE or through designated take back service providers of Producers or registered Producer Responsibility Organization (PRO) of a Producer. E-waste can be auctioned only to authorised E-Waste Recyclers/Dismantlers/PRO of a Producer. 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, as amended 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.

# ANNEXURES

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## ANNEXURE 1

### Specifications for Plastic Bags & Containers

#### Plastic Bags

- HCFs must ensure that use of chlorinated plastic bags for waste collection must be phased out. Plastic bags used for collection of biomedical waste should be as per the BIS standards or Plastic Waste Management Rules, 2016.
- As per the Plastic Waste Management Rules, 2016, each plastic bags must have labelling and marking as follows:
  - Name and Registration number of manufacturer and thickness of the bag.
  - Type of material
- Each Plastic Bags must bear a label of "Recycle" as per its compositions.
- In case of use of compostable plastic bags, there should be a label "**COMPOSTABLE**" and shall conform to the Indian Standard: IS or ISO 17088:2008 titled as Specifications for "Compostable Plastics."
- Each Non chlorinated plastic bags must be at least of 50-micron width. Thickness criteria would not apply in case of compostable plastic bags.

#### Containers

- For containers being used for collection of sharps and glassware the containers must meet the requirements as listed by World Health Organization (WHO) in "PQS Performance Specifications: Safety Box for disposal of waste sharps."

(Source: Document number: WHO/PQS/E10/SB01.1).

Note: BIS standards shall be applicable for plastic bags and containers as and when published by BIS.





## ANNEXURE 3

### Application for Authorization or Renewal of Authorization

(To be submitted by occupier of Healthcare facility or common Biomedical waste treatment facility)

To

The Prescribed Authority

(Name of the State or UT Administration)

Address:

1. Particulars of Applicant:

- (i) Name of the Applicant:  
(In block letters & in full)
- (ii) Name of the Healthcare Facility (HCF) or Common Biomedical Waste Treatment Facility (CBWTF)
- (iii) Address for correspondence:
- (iv) Tele No., Fax No.:
- (v) Email:
- (vi) Website Address:

2. Activity for which authorization is sought:

Activity	Please tick
Generation, segregation	
Collection,	
Storage	
Packaging	
Reception	
Transportation	
Treatment or processing or conversion	
Recycling	
Disposal or destruction	
Offering for sale, transfer	
Any other form of handling	

3. Application for fresh or renewal of authorization (please tick whatever is applicable):

- (i) Applied for CTO/CTE Yes/No

(ii) In case of renewal previous authorization number and date: .....

.....

(iii) Status of Consents:

a) Under the Water (Prevention and Control of Pollution) Act, 1974:

.....

b) Under the Air (Prevention and Control of Pollution) Act, 1981:

.....

4. (i) Address of the Healthcare Facility (HCF) or Common Biomedical Waste Treatment Facility (CBWTF): .....

(ii) GPS coordinates of Healthcare Facility (HCF) or Common Biomedical Waste Treatment Facility (CBWTF): .....

5. Details of Healthcare facility (HCF) or common Biomedical waste treatment facility (CBWTF):

I. Number of beds of HCF: .....

II. Number of patients treated per month by HCF: .....

III. Number healthcare facilities covered by CBWTF: .....

IV. No of beds covered by CBWTF: .....

V. Installed treatment and disposal capacity of CBWTF: ..... Kg per day

VI. Quantity of biomedical waste treated or disposed by CBWTF: ..... Kg/day

VII. Area or distance covered by CBWTF: .....  
(Please attach map a map with GPS locations of CBWTF and area of coverage)

VIII. Quantity of Biomedical waste handled, treated or disposed: .....

Category	Type of Waste	Quantity Generated or collected, kg/day	Method of Treatment and Disposal (Refer Schedule-I)
(1)	(2)	(3)	(4)
YELLOW	a) Human Anatomical Waste		
	b) Animal Anatomical Waste		
	c) Soiled Waste		
	d) Expired or Discarded Medicines		
	e) Chemical Solid Waste		
	f) Chemical Liquid Waste		
	g) Discarded linen, mattresses, beddings contaminated with blood or body fluid		
	h) Microbiology, Biotechnology and other clinical laboratory waste		

Category	Type of Waste	Quantity Generated or collected, kg/day	Method of Treatment and Disposal (Refer Schedule-I)
RED	Contaminated Waste (Recyclable)		
WHITE	Waste sharps including Metals:		
BLUE	Glassware		
	Metallic Body Implants		

6. Brief description of arrangements for handling of biomedical waste (attach details):

- i. Mode of transportation (if any) of Biomedical waste:
- ii. Details of treatment equipment (please give details such as the number, type & capacity of each unit)

Treatment Equipment	Number of Units	Capacity of each unit
Incinerators		
Plasma Pyrolysis		
Autoclaves		
Microwave		
Hydroclave		
Shredder		
Needle tip cutter or destroyer		
Sharps encapsulation or concrete pit		
Deep burial pits		
Any other treatment equipment		

7. Contingency plan of CBWTF (attach documents):

8. Details of directions or notices or legal actions if any during the period of earlier authorization.

9. Declaration

I do hereby declare that the statements made and information given above are true to the best of my knowledge and belief and that I have not concealed any information.

I do also hereby undertake to provide any further information sought by the SPCB in relation to these rules and to fulfill any conditions stipulated by the SPCB.

Date:

Signature of the Applicant

Place:

Designation of Applicant

## ANNEXURE 4

### Form IV: Annual Report

S. No.	Particulars													
1.	<b>Particulars of Occupier</b>													
	I. Name of Authorized Person (Occupier or Operator)													
	II. Name of HCF or CBWTF:													
	III. Address for Correspondence:													
	IV. Address of Facility													
	V. Tel. No, Fax. No:													
	VI. E-mail ID:													
	VII. URL of Website													
	VIII. GPS coordinates of HCF or CBWTF													
	IX. Ownership of HCF or CBWTF	(State Government or Private or Semi Govt. or any other)												
	X. Status of Authorization under the Biomedical Waste (Management and Handling) Rules	Authorization Number ..... Valid Up to: .....												
	XI. Status of Consents under Water Act and Air Act	Valid Up to: .....												
2.	<b>Type of Healthcare Facility</b>													
	I. Bedded Hospital:	No. of Beds:												
	II. Non-bedded Healthcare facility (Clinic or Blood Bank or Clinical Laboratory or Research Institute or Veterinary Hospital or any other )													
	III. License number and its date of Expiry													
3.	<b>Details of CBWTF</b>													
	I. Number healthcare facilities covered by CBWTF													
	II. No of beds covered by CBWTF :													
	III. Installed treatment and disposal capacity of CBWTF	.....kg/day												
	IV. Quantity of biomedical waste treated or disposed by CBWTF	.....kg/day												
4.	Quantity of waste generated or disposed in kg per annum (on monthly average basis)	<table border="1"> <thead> <tr> <th>Category</th><th>Quantity (kg/annum)</th></tr> </thead> <tbody> <tr> <td>Yellow</td><td></td></tr> <tr> <td>Red</td><td></td></tr> <tr> <td>Blue</td><td></td></tr> <tr> <td>White</td><td></td></tr> <tr> <td>General Solid Waste</td><td></td></tr> </tbody> </table>	Category	Quantity (kg/annum)	Yellow		Red		Blue		White		General Solid Waste	
Category	Quantity (kg/annum)													
Yellow														
Red														
Blue														
White														
General Solid Waste														

S. No.	Particulars			
5.	<b>Details of the Storage, treatment, transportation, processing and Disposal Facility</b>			
	I. Details of On Site Storage	Size:		
		Capacity:		
		Provision for Onsite Storage (Cold Storage or any other provisions):		
	II. Details of Onsite Disposal Facility	Type of Treatment Equipment	No. of Units	Capacity kg/day
				Quantity Treated or Disposed kg/annum
		Incinerators		
		Plasma Pyrolysis		
		Autoclaves		
		Microwave		
		Hydroclave		
		Shredder		
		Needle tip cutter or destroyer		
		Sharps encapsulation or concrete pit		
		Deep Burial Pits		
		Chemical Disinfection		
		Any other equipment used for treatment		
	III. Quantity of recyclable wastes sold to authorized recyclers after treatment in kg per annum.	Red Category (like plastic, glass etc.)		
	IV. No of vehicles used for collection and transportation of biomedical waste			
	V. Details of incineration ash and ETP sludge generated and disposed during the treatment of wastes in kg per annum		Quantity generated	Where disposed
		Incineration		
		Ash		
		ETP Sludge		
	VI. Name of the Common Biomedical Waste Treatment Facility Operator through which wastes are disposed of			

S. No.	Particulars	
	VII. List of member HCF not handed over Biomedical waste	
6.	<b>Do you have Biomedical waste management committee? If yes, attach minutes of the meetings held during the reporting period</b>	
7.	<b>Details of Training conducted on BMW</b>	
	I. Number of trainings conducted on II. BMW Management	
	III. Number of personnel trained	
	IV. Number of personnel trained at the time of induction	
	V. Number of personnel not undergone any training so far	
	VI. Whether standard manual for training is available?	
	VII. Any other Information	
8.	<b>Details of Accident Occurred</b>	
	I. Number of Accidents occurred	
	II. Number of the persons affected	
	III. Remedial Action taken (Please attach details if any)	
	IV. Any fatality occurred, details	
9.	<b>Are you meeting the standards of air Pollution from the incinerator? How many times in last year could not meet the standards?</b>	
	Details of Continuous online emission monitoring systems installed	
10.	<b>Liquid waste generated and treatment methods in place. How many times you have not met the standards in a year?</b>	
11.	<b>Is the disinfection method or sterilization meeting the log 4 standards? How many times you have not met the standards in a year?</b>	
12.	<b>Any other relevant information</b>	(Air Pollution Control Devices attached with the Incinerator)

**Certified that above report is for the period from**

.....  
 .....  
 .....  
 .....

**Name and Signature of Head of Institution**

**Date:**

**Place:**



## ANNEXURE 5

### Format for Employee Health Check UP

Designation:..... Date: .....

Name: ..... Father's Name: .....

Age: ..... years, Sex: ..... Married/Not Married. Blood Group: ..... Rh: .....

Address:.....

.....

Phone No:..... E-mail:.....

#### Present complaints with duration (if any):

- 1.
- 2.
- 3.
- 4.
- 5.

#### Vaccination history (Especially w.r.t Hepatitis-B and Tetanus):

Whether vaccination ever received in past? Yes/No

Name of Vaccine	First dose	Second Dose	Third Dose	Booster	Booster	Booster	Booster
Hepatitis-B							
Tetanus Toxoid							

#### Past medical history (if any):

Hypertension	Yes	No	Since When	Diabetes	Yes	No	Since When
Asthma	Yes	No	Since When	Arthritis	Yes	No	Since When
Tuberculosis	Yes	No	Since When	Allergies	Yes	No	Since When
Cancer	Yes	No	Since When	Others	Yes	No	Since When

#### Surgical history (if any):

## General Physical Examination

General Appearance: .....

Cyanosis: ..... Jaundice: ..... Clubbing: .....

Pulse: ..... BP: .....

Odema feet: ..... Oral hygiene: .....

Height: .....cm, Weight: .....kg,

## Dental Examination

### SYSTEMIC EXAMINATION

Cardiovascular System

Respiratory System

Central Nervous System

Gastrointestinal System

Urogenital System

Gynae. & Obstet (*In case of Females*)

Gravida	Para	Abortions

Musculoskeletal System

ENT

Eye

### INVESTIGATIONS

Lab Tests:

Hb	TLC	DLC	RBS	Bl. Urea	S. Creatinine
		P L M E			

Urine:

Stool:

ECG:

Others:

## Radiological examination

X-Ray Chest PA view:

USG (If Required)

CT scan/MRI (If required)

Others:

**Inference with Diagnosis, if any**

**Advice/Recommendations/Intervention done**

Name and signature of doctor

**Follow-up:**

Date	Complaints & Findings & Reports	Investigations ordered & Treatment	Name & Signatures of MO

## ANNEXURE 6

### Preparation of Hypochlorite Solution

#### Preparation of Chlorine Solution Using Concentrated Solution

Concentration of commercially available hypochlorite solution	Required Chlorine concentration	To Prepare 1000 ml	
		Solution in ml	Add water in ml
5%	1%	200	800
	2%	400	600
10%	1%	100	900
	2%	200	800

#### Preparation of Chlorine Solution Using Bleach Powder Solution

Strength of Stable Bleaching Powder (SBP)	Volume of Water	Desired Concentration	Bleaching powder in grams per litre
20%	1 Litre	1%	50
		2%	100
25%	1 Litre	1%	40
		2%	80
30%	1 Litre	1%	33
		2%	67

## ANNEXURE 7

### Indicators for Monitoring of BMW Activities in the State/District

#### Indicators for State/District Level Monitoring

1. Percentage of Healthcare facilities having valid authorization from SPCB:

Number of Facilities having valid authorization/Total Number of HCFs in State x 100

2. Percentage of Healthcare facilities under agreement with CBWTF:

Number of HCFs having agreement with CBWTF/Total Number of HCFs in State x 100

3. Category wise waste generated per bed

S. No.	Category of Waste	Total Quantity of Waste (a)	Total Number of Beds in State (b)	Waste Generated/ Bed (a/b)
1.	Yellow			
2.	Red			
3.	Blue			

4. Total number of facilities granted authorization by SPCB/Total Number of facilities applied for authorization
5. Total Number of Accidents Reported while BMW Handling
6. Total Number of Trainings conducted for BMW

## ANNEXURE 8

### General Standards for Discharge of Wastewater into Public Sewers

S.No.	Parameter*	Standards for discharge in Public Sewers
1.	Suspended solids mg/l, Max.	600
2.	pH Value	5.5 to 9.0
3.	Oil and grease mg/l Max.	20
4.	Biochemical Oxygen demand 1 [3 days at 27°C] mg/l max.	350
5.	Chemical Oxygen Demand in mg/l	Not applicable
6.	Bio-assay test	90% survival of fish after 96 hours in 100% effluent

*\*Standards for Parameters stipulated in Schedule II of BMWM Rules, 2016 are specified for discharge into public sewers by healthcare facilities.*

## ANNEXURE 9

### Log book for Operating the captive Incinerator/Plasma Pyrolysis

Date	Time of operation of the Incineration		Quantity of hourly BMW charged in Kg (Total BMW charged in a day in Kg)	Temperature maintained in °C		Negative draft in primary chamber (in mm of water column) (Pl. indicate range i.e., min. to max)	Pressure drop across APCD (in mm of water column) (Pl. indicate range i.e., min. to max)	pH level of scrubbed liquid used (Pl. indicate range - min. to max.)	Average values of flue gas analysis results (continuous online ) observed during the incineration/plasma pyrolysis process operation			Consumption of electricity/Diesel whichever is applicable			Net Quantity of Bio-medical waste received in kg	Net Quantity of Biomedical Waste left over in a day (in kg)		
	Start	End		Pri-ary Chamber	Sec-ondary Chamber				CO in mg/ Nm <sup>3</sup>	O <sub>2</sub> in %	CO <sub>2</sub> in %	% combustion Efficiency	Power (indicate electricity meter reading)	Diesel in liters (pl. indicate daily or weekly diesel consumption)			Initial reading	Final reading
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19) (19)=(18) - (4)

Note: Fill the details whichever is applicable

### Log Book for Operating the Captive Autoclave/Hydroclave

Date	Time of operation of the Autoclave or Hydroclave		Batch number	Quantity of waste feeding per batch in kg (Total waste treated by autoclaving/hydroclave in kg)	Temperature and Pressure in every ten minutes		Strip test result (pl. paste the strip test for each batch with a proof)	Consumption of electricity (indicate electricity meter reading)		Net Quantity of waste received in Kg	Net Quantity of Waste left over in kg
	Start	End			Temperature in °C	Pressure in psi		Initial reading	Final reading		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)=(11)-(5)



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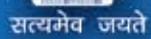
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