

# UNIT 20 OFF-SITE TREATMENT AND DISPOSAL OF HEALTH CARE WASTE

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## 20.0 OBJECTIVES

After studying this unit, you should be able to:

- identify the need for setting up a CBMWTF
- enumerate the criteria for development, location, land requirement and coverage area of a CBMWTF and the environmental laws applicable to it
- discuss the procedures for collection, transportation, treatment and disposal options available
- describe infrastructural set up, records maintained and its periodic inspection, monitoring or performance evaluation

## 20.1 INTRODUCTION

You have already read about the generation, segregation, collection and storage of waste in a health care facility (HCF) in the Unit 6, Block 2, BHM-101. You have also learnt about the pre-treatment in the previous unit.

The various treatment technologies used for treating the health care waste may cause harmful emissions which include particulate matter and toxic gases if not operated in accordance with the prescribed operating standards. This can have adverse health impacts on the patients undergoing treatment in the Health Care Facility (HCF), if the HCF is operating an on-site Bio-Medical Waste Treatment Facility besides causing impact on the immediate environment. Various hazards of the treatment technologies will be covered in the next block i.e. Block 2, BHM-102. Keeping this concern in mind and other issues like cost, maintenance, regulation, monitoring etc, the concept of a Common Bio-Medical Waste Treatment and Disposal Facility (CBMWTF) was introduced in 1998 in the Country. All the bio-medical waste generated from a HCF is collected and treated in a CBMWTF, on daily basis. The treated recyclable waste is finally sent for recycling or disposal in a secured landfill if it does not have any recyclable value. In this unit, you shall be reading about the criteria for development of a CBMWTF and other related issues. **This unit basically focuses on a CBMWTF, in reference to the Bio-Medical Waste Management Rules, 2016, as amended notified by the Government of India under the Environment (Protection) Act, 1986.** However, some examples from other parts of the world have also been included and documented in this unit.

## 20.2 NEED FOR A COMMON BIO-MEDICAL WASTE TREATMENT AND DISPOSAL FACILITY (CBMWTF)

Waste is generated, segregated and collected in a health care facility. However installation and use of individual treatment facility by health care facility is not encouraged with the issues enumerated in **Box 20.1**.

- |  |
|--|
| a. Comparatively high capital investment and no recurring cost.  |
| b. Separate dedicated and trained skilled manpower requirement.  |
| c. Dedicated infrastructure required for proper operation and maintenance of treatment systems to avoid non-compliances. |

### Think and reflect

Does your health care institution have a tie up with a CBMWTF ?  
What are the advantages of sending the waste to this CBMWTF ?

d.	Pose threat to the hospital environment and its vicinity, if not operated properly.
e.	Increases monitoring pressure on the regulatory authorities/agencies by having on-site treatment facilities by the HCFs.
f.	Cost of treatment of waste economically not cheaper when compared to CBMWTF.
g.	Failure of treatment of waste within the intended time period results in violation of provisions and actions under the Environment (Protection) Act, 1986 on the HCFs.

**Box 20.1: Issues associated with treatment of health care waste in a CBMWTF**

The concept of CBMWTF is that it not only addresses problems listed in **Box 20.1**, but also prevents proliferation of treatment technologies in a particular town or city. By running the treatment equipment at a CBMWTF to its full capacity, the cost of treatment of per kilogram bio-medical waste gets significantly reduced. Its considerable advantages have made CBMWTF a popular and proven concept in most part of the world. The CBMWTF is set up, based on the need for ensuring environmentally sound management of bio-medical waste. The techno-economic feasibility, viable operation of the facility and minimal impact on human health and environment are some of the factors that should be kept in mind while setting up a CBMWTF.

The definitions of a CBMWTF and Operator according to the Bio-Medical Waste Management Rules, 2016 are given in **Box 20.2**.

<p><b>Bio-Medical Waste Treatment and Disposal Facility (CBMWTF)</b> means any facility where treatment, disposal of bio-medical waste or processes incidental to such treatment and disposal is carried out, and includes common bio-medical waste treatment facilities.</p>
<p><b>“Operator of a Common Bio-Medical Waste Treatment Facility”</b> means a person who owns or controls a Common Bio-Medical Waste Treatment Facility (CBMWTF) for the collection, reception, storage, transport, treatment, disposal or any other form of handling of bio-medical waste.</p>

**Box 20.2: Definitions as per BMWM Rules, 2016, as amended**

**20.3 CRITERIA FOR DEVELOPMENT OF A NEW COMMON BIO-MEDICAL WASTE TREATMENT AND DISPOSAL FACILITY**

The BMWM Rules, 2016, as amended eased the bottleneck in upbringing the CBMWTF by making department in the business allocation of land assignment in the respective State or Union Territory (UT) administration responsible for providing a suitable site(s) within its jurisdiction. The concept of CBMWTF is also being widely accepted in India among the health care units, medical associations and entrepreneurs.

Prior to allowing any new CBMWTF for a locality or region, criteria as outlined in the **Box 20.3** need to be assessed. The diagrammatic representation of the steps is also depicted in **Fig. 20.1**.

- a. Prescribed authority under the BMW Rules, 2016, as amended is the State Pollution Control Board (SPCB) in the respective State or Pollution Control Committee (PCC) in the respective Union Territory.
- b. As per revised Guidelines for CBMWTF, the prescribed authority is required to prepare an inventory or review with regard to the bio-medical waste generation at least once in five years in the coverage areas of the existing CBMWTF. The prescribed authority is also required to extrapolate the coverage-area wise bio-medical waste generation for the next ten years.
- c. SPCB/PCC is required to conduct a gap analysis w.r.to the coverage area of the bio-medical waste generation and also projected over a period of next ten years, the adequacy of existing treatment capacity of the CBMWTF in each coverage area of radius 75 km. All the SPCBs and PCCs shall conduct the gap analysis and based on the gap analysis, action plan for development of new CBMWTFs is required to be prepared and submitted to MoEF&CC & CPCB within six months' time. In case of States/UTs, where no CBMWTF is available, in such a case, SPCB/PCC being prescribed authority under the BMW Rules is required to submit the detailed proposal to MoEF & CC/MoH & FW through the respective State Government or UT Administration. Also, the option of forming association by the group of health care facilities (HCFs) to develop their own CBMWTF should also be encouraged following these guidelines. In case, any coverage area requires additional treatment capacity, in such a case, action may be initiated by the prescribed authority for allowing a new CBMWTF in that locality without interfering the coverage area of the existing CBMWTF and beds covered by the existing CBMWTF.
- d. SPCB/PCC shall identify the coverage area, which requires additional treatment facility and brings it to the notice of the concerned department in the business allocation of land assignment in the respective State Government or UT Administration. The department in the business allocation of land assignment shall be responsible for providing suitable site in the identified coverage area for setting up of a CBMWTF, in consultation with the prescribed authority (i.e., SPCB/PCC), other stakeholders and in accordance with the guidelines issued by CPCB from time to time.
- e. Alternately, a CBMWTF may also be allowed to be established on a land procured by an entrepreneur in accordance with the location criteria suggested under these guidelines.
- f. The SPCB/PCC or concerned department in the business allocation of land assignment in the respective State Government or UT Administration may seek expression of interest from the proponents for development of new CBMWTF(s) in the identified coverage area. Upon allocation of site to the proponent, the proponent is Revised Guidelines for Common Bio-Medical Waste Treatment Facilities are required to take necessary approvals as required under the Environment (Protection) Act, 1986 for development of the new CBMWTF in accordance with these guidelines.
- g. In the absence of expression of interest by any proponent, then SPCB/PCC shall insist health care facilities to form association and to develop

**Did you know ?**

To facilitate the treatment and disposal of bio-medical waste generated from the HCFs, at present (as per Annual Report 2014 submitted by the SPCBs/PCCs), there are 192 no. of CBMWTFs in operation and 33 no. of CBMWTFs are under construction.

**Did you know ?**

The Bio-Medical Waste Management Rules, 2016, as amended (BMW Rules) notified under the Environment (Protection) Act, 1986, as amended by the Government of India restricts occupier for establishment of an on-site or captive bio-medical waste treatment and disposal facility, if a service of common bio-medical waste treatment and disposal facility is available within a distance of seventy-five kilometer.

**Think and reflect**

Have you ever wondered how the CBMWTF came into existence in your area ? Visit the CBMWTF of your area and try to find out what were the criteria for it's establishment.

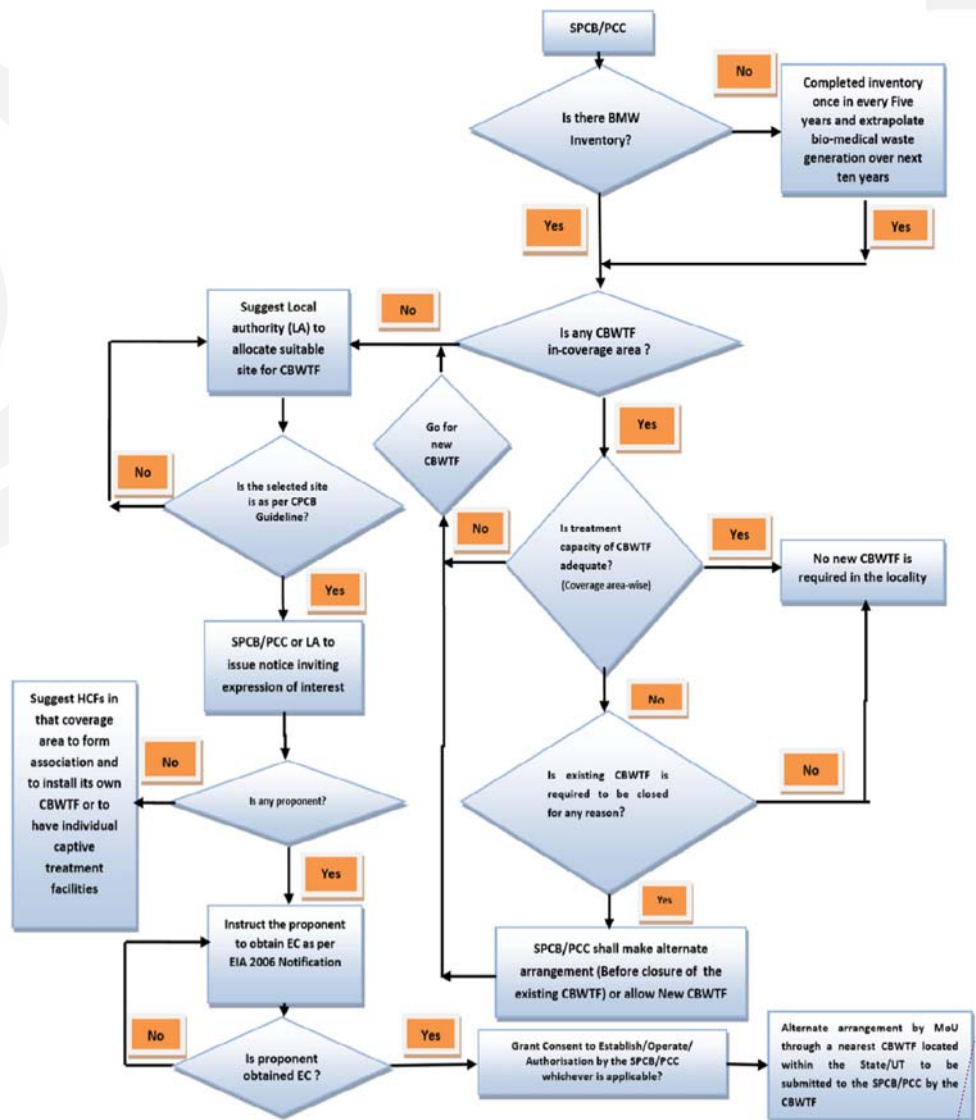
its own CBMWTF in line with these guidelines or to have captive treatment facilities for ensuring treatment and disposal of generated bio-medical waste as stipulated under the BMWM Rules, 2016, as amended.

h. In case of any regulatory action including closure of any existing CBMWTF is inevitable, the respective SPCB/PCC may take action under the BMWM Rules, 2016, as amended including for making alternate arrangement to ensure safe disposal of the bio-medical waste generated from the member health care facilities of such default CBMWTF through CBMWTF located nearby.

i. In case of hilly areas considering the geography, only one CBMWTF with adequate treatment capacity may be developed covering at least two districts to cater treatment services to the HCFs located in the respective Districts. The selection and allocation of site etc., should be done as per the criteria suggested under these guidelines. The treatment charges to be prescribed by the respective SPCB/PCC in consultation with the State Advisory Committee.

**Box 20.3: Criteria for development of new CBMWTF**

*Source:* [http://cpcb.nic.in/cpcbald/wast/bioimcdalwast/Common\\_Bio\\_Medical\\_Waste\\_treatment\\_facilities.pdf](http://cpcb.nic.in/cpcbald/wast/bioimcdalwast/Common_Bio_Medical_Waste_treatment_facilities.pdf)



**Fig. 20.1: Criteria for development of a CBMWTF in a coverage area**

*Source:* [http://cpcb.nic.in/cpcbald/wast/bioimcdalwast/Common\\_Bio\\_Medical\\_Waste\\_treatment\\_facilities.pdf](http://cpcb.nic.in/cpcbald/wast/bioimcdalwast/Common_Bio_Medical_Waste_treatment_facilities.pdf)



*Source:* [http://cpcb.nic.in/cpcbald/wast/bioimcdalwast/Common\\_Bio\\_Medical\\_Waste\\_treatment\\_facilities.pdf](http://cpcb.nic.in/cpcbald/wast/bioimcdalwast/Common_Bio_Medical_Waste_treatment_facilities.pdf)

Various steps to be followed for establishment of a CBMWTF are outlined in **Box 20.4**.

a.	Complete inventory (with regard to the gap between the bio-medical waste generation and the existing bio-medical waste treatment capacity i.e., gap analysis or assessment) must be done once in every five years and one must extrapolate bio-medical waste generation over next ten years.
b.	Local Authority (LA) is required to allocate suitable site for development of a CBMWTF.
c.	SPCB/PCC or LA needs to issue notice inviting expression of interest for development of a CBMWTF in the desired coverage area.
d.	Upon allocation of site to the entrepreneur by the LA or SPCB/PCC, the project proponent is required to obtain necessary approvals as required under the Environment (Protection) Act, 1986 which include obtaining of Environmental Clearance under Environmental Impact Assessment, 2006 Notification and amendments made thereof from time to time, consent to establish/operate under Water (Prevention and Control of Pollution) Act, 1986 & Air (Prevention and Control of Pollution) Act, 1981 and authorisation under BMW Rules, 2016, as amended from the respective SPCB/PCC whichever is applicable.
e.	In case no entrepreneur is selected for development of a CBMWTF in a particular coverage area, HCFs in that coverage area are required to form an association for installing CBMWTF or to have individual captive treatment facilities.
f.	In order to ensure proper treatment and disposal of bio-medical waste generated from the coverage area of the existing CBMWTF in case of closure of a CBMWTF for violation of the provisions or closure of a CBMWTF, CBMWTF is required make alternate arrangement by MoU through a nearest CBMWTF located within the State/UT to be submitted to the SPCB/PCC by the CBMWTF or else standby treatment equipment are required to be made.

**Think and reflect**

Does your HCF have an attachment with a CBMWTF? What were the steps for establishment of CBMWTF on your area. If the HCF does not have an attached CBMWTF, how is the treatment and disposal of the waste generated in your HCF ensured?

**Box 20.4: Steps for establishing or use of the existing CBMWTF**

**Note:** For detailed criteria and steps to be followed for development of a CBMWTF, CPCBs revised guidelines for CBMWTFs may please be referred

**Source:** [http://cpcb.nic.in/cpcb/old/wast/bioimediawast/Common\\_Bio\\_Medical\\_Waste\\_treatment\\_facilities.pdf](http://cpcb.nic.in/cpcb/old/wast/bioimediawast/Common_Bio_Medical_Waste_treatment_facilities.pdf)

**Check Your Progress 1**

1. Fill the blanks regarding the need for a CBMWTF.
  - a. Comparatively \_\_\_\_\_ capital investment and no \_\_\_\_\_ cost.
  - b. Separate dedicated and \_\_\_\_\_ manpower requirement.
  - c. Dedicated infrastructure required for proper operation and maintenance of treatment systems to avoid \_\_\_\_\_ .

**Source:** [http://cpcb.nic.in/cpcb/old/wast/bioimediawast/Common\\_Bio\\_Medical\\_Waste\\_treatment\\_facilities.pdf](http://cpcb.nic.in/cpcb/old/wast/bioimediawast/Common_Bio_Medical_Waste_treatment_facilities.pdf)



- d. Pose \_\_\_\_\_ to the hospital environment and its vicinity if not operated properly.
  - e. Increases \_\_\_\_\_ pressure on the regulatory authorities/agencies by having on-site treatment facilities by the HCFs.
2. Write true or false and correct the false statement.
- a. CBMWTF is required to prepare an inventory or review with regard to the bio-medical waste generation in the coverage areas of the existing CBMWTF facility.
  - b. SPCB/PCC is required to project over a period of next two years, the adequacy of existing treatment capacity of the CBMWTF in each coverage area of radius 75 km.
  - c. In case of hilly areas considering the geography, only one CBMWTF with adequate treatment capacity may be developed covering at least two districts to cater treatment services to the HCFs located in the respective Districts.
  - d. Ministry of Health and Family Welfare (MoH & FW) is required to allocate suitable site for development of a CBMWTF.
  - e. In case no entrepreneur is selected for development of a CBMWTF in a particular coverage area, HCFs in that coverage area are required to form an association for installing CBMWTF or to have individual captive treatment facilities.

## 20.4 DUTIES OF THE OPERATOR OF A CBMWTF

You have already read in the previous section that an “Operator of a Common Bio-Medical Waste Treatment Facility” means a person who owns or controls a Common Bio-Medical Waste Treatment Facility (CBMWTF) for the collection, reception, storage, transport, treatment, disposal or any other form of handling of bio-medical waste.

The duties of the operator of a Common Bio-Medical Waste Treatment and Disposal Facility (CBMWTF) as enunciated under Rule 5 of the Bio-Medical Waste Management Rules, 2016, as amended shall be ensured and complied with. These duties have been elaborated in the **Box 20.5**.

- a. Take all necessary steps to ensure that the bio-medical waste collected from the occupier is transported, handled, stored, treated and disposed of, without any adverse effect to the human health and the environment, in accordance with these rules and guidelines issued by the Central Government or, as the case may be, the central pollution control board from time to time.
- b. Ensure timely collection of bio-medical waste from the occupier as prescribed under these rules.
- c. Establish bar coding and global positioning system for handling of bio-medical waste within one year.

d.	Inform the prescribed authority immediately regarding the occupiers which are not handing over the segregated bio-medical waste in accordance with these rules.
e.	Provide training for all its workers involved in handling of bio-medical waste at the time of induction and at least once a year thereafter.
f.	Assist the occupier in training conducted by them for bio-medical waste management.
g.	Undertake appropriate medical examination at the time of induction and at least once in a year and immunise all its workers involved in handling of bio-medical waste for protection against diseases, including Hepatitis B and Tetanus, that are likely to be transmitted while handling bio-medical waste and maintain the records for the same.
h.	Ensure occupational safety of all its workers involved in handling of bio-medical waste by providing appropriate and adequate personal protective equipment.
i.	Report major accidents including accidents caused by fire hazards, blasts during handling of bio-medical waste and the remedial action taken and the records relevant thereto, (including nil report) in Form-I ( as per BMW Rules, 2016, as amended) to the prescribed authority and also along with the annual report.
j.	Maintain a log book for each of its treatment equipment according to weight of batch; categories of waste treated; time, date and duration of treatment cycle and total hours of operation.
k.	Allow occupier, who are giving waste for treatment to the operator, to see whether the treatment is carried out as per the rules.
l.	Shall display details of authorisation, treatment, annual report etc on its web-site.
m.	After ensuring treatment by autoclaving or microwaving followed by mutilation or shredding, whichever is applicable, the recyclables from the treated bio-medical wastes such as plastics and glass, shall be given to recyclers having valid consent or authorisation or registration from the respective State Pollution Control Board (SPCB) or Pollution Control Committee (PCC).
n.	Supply non-chlorinated plastic coloured bags to the occupier on chargeable basis, if required.
o.	Common Bio-Medical Waste Treatment Facility shall ensure collection of bio-medical waste on holidays also.
p.	Maintain all record for operation of incineration, hydroclaving, autoclaving for a period of five years.
q.	Upgrade existing incinerators to achieve the standards for retention time in secondary chamber and Dioxin and Furans within two years from the date of this notification.

**Think and reflect**

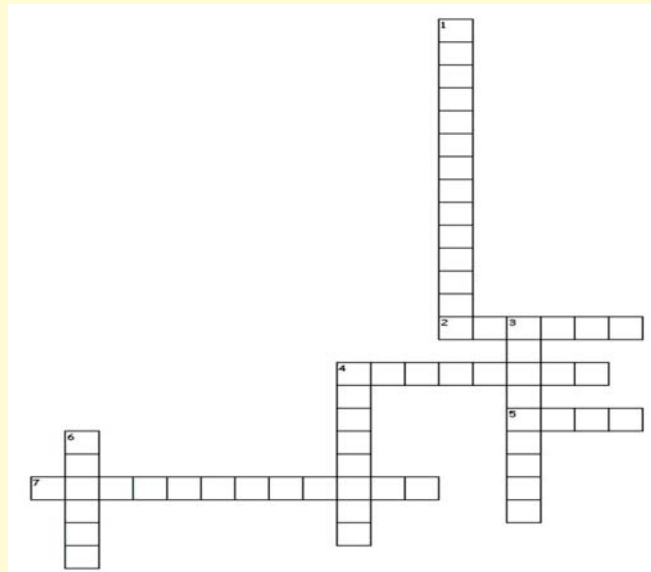
What are the hazards in case the waste is not treated and disposed of in a proper manner ?

**Box 20.5: Duties of operator of a CBMWTF**



### Check Your Progress 2

1. Please complete the crossword



Across

2. Frequency of conducting an appropriate medical examination
4. ensure timely collection of bio-medical waste from the occupier as prescribed under these rules
5. CBMWTF is required to prepare an inventory or review with regard to the bio-medical waste generation at least once in how many years ?
7. An important way to protect infection from Hepatitis B

Down

1. is required to allocate suitable site for development of a CBMWTF
3. protection it is the Environment
4. Hands over waste to the operator
6. Who may also be allowed to be established on a land procured by an entrepreneur

## 20.5 ENVIRONMENTAL LAWS APPLICABLE FOR COMMISSIONING OR OPERATION OF A CBMWTF

Operation of a CBMWTF leads to air emissions as well as wastewater generation as in case of an industrial operation. Most common sources of wastewater generation in CBMWTFs are vehicle washing, floor washing, and scrubbed liquid effluent from air pollution control systems attached with the incinerator/plasma pyrolysis. Incineration as well as DG Set is the general source of air emissions. Details of environmental laws is mentioned in **Box 20.6**.

- a. Any approvals (such as Land Use /Change in Land Use as applicable) required from the concerned authorities under various laws as applicable have to be complied with by the proponent of the CBMWTF prior to development of a CBMWTF.

b. Environmental Clearance under EIA Notification 2006 Ministry of Environment, Forest & Climate Change (MoEF & CC), notified amendment to the EIA Notification, 2006 and published vide MoEF & CC Notification of S.O. 1142 (E) dated April 17, 2015. According to this notification, the 'Bio-Medical Waste Treatment Facility' is categorised under the Item 7 (da) in the schedule, requiring 'environmental clearance' from the State Environment Impact Assessment Authority (SEIAA). Therefore, the CBMWTF operator is also required to obtain 'Environmental Clearance (EC)' from the respective SEIAA or Ministry of Environment, Forest & Climate Change (MoEF&CC), as the case may be, before any construction work, or preparation of land by the projects management. These activities have been listed below.

- i. All new projects or activities pertaining to the Bio-Medical Waste Treatment Facility expansion and modernisation with additional treatment capacity of existing Bio-Medical Waste Treatment Facility (excluding augmentation of incineration facility for compliance to the residence time as well as Dioxins and Furans without enhancing the existing treatment capacity).
- ii. Any expansion or modification in the treatment capacity or relocation of the existing CBMWTF (requires compliance to the relevant provisions notified under the Environment (Protection) Act, 1986 by the MoEF&CC).

c. Consents under Water (Prevention and Control of Pollution) Act, 1974 and Air (Prevention and Control of Pollution) Act, 1981 as well as Authorisation under the BMW Rules, 2016, as amended.

d. The project proponent of the CBMWTF is required to obtain 'Consent to Establishment' under Rule 25 of the Water (Prevention and Control of Pollution) Act, 1974 and under Rule 21 of the Air (Prevention and Control of Pollution) Act, 1981, from the respective prescribed authority i.e. SPCB/PCC and as applicable. Upon installation of the requisite equipment, the CBMWTF Operator is also required to obtain authorisation under BMW Rules, 2016 co-terminus with consent to operate under Water (Prevention and Control of Pollution) Act, 1976 & Air (Prevention and Control of Pollution) Act, 1981 from the respective SPCB/PCC prior to commencement of the CBMWTF.

**Box 20.6: Environmental laws applicable**

**20.6 LOCATION CRITERIA OF A CBMWTF**

Buffer zone with respect to the CBMWTF represents a separation distance between the source of pollution i.e., – CBMWTF and the receptor – following the principle that the degree of impact reduces with increased distance. The parameters to be considered for ascertaining buffer distance on case-to-case basis are enumerated in the **Box 20.7**.

- a. Potential for spread of infection from wastes stored in the premises
- b. Applicable standards for pollution control and the relative efficiency of the existing incinerators and emission control systems

c.	Potential of fugitive dust emission from incinerators
d.	Potential for discharge of wastewater
e.	The potential for odour production
f.	The potential for noise pollution
g.	The risk posed to human health and safety due to exposure to emissions from incinerator
h.	The risk of fire
i.	Significance of the residual impacts such as bottom ash

**Box 20.7: Parameters to be considered for ascertaining buffer distance on case-to-case basis**

As far as possible, a CBMWTF shall be located near to its area of operation in order to minimise the transportation distance in waste collection, thus enhancing its operational flexibility as well as for ensuring compliance to the time limit for treatment and disposal of bio-medical waste as stipulated under the BMW Rules (i.e., within 48 hours). Also, the location of the CBMWTF should be in conformity to the CRZ Norms and other provisions notified under the Environment (Protection) Act, 1986. The location shall be decided in consultation with the State Pollution Control Board (SPCB)/ Pollution Control Committee (PCC). The location criteria for development of a CBMWTF has been documented in **Box 20.8**.

**Think and reflect**

Why should the CBMWTF be located at a buffer distance from residential areas? What type of impact can it have ?

a.	A CBMWTF shall preferably be developed in a notified industrial area without any requirement of buffer zone (or)
b.	A CBMWTF can be located at a place reasonably far away from notified residential and sensitive areas and should have a buffer distance of preferably 500 m so that it shall have minimal impact on these areas. In case of non-availability of such a land, the buffer zone distance from the notified residential area may be reduced to less than 500 m by SPCB/PCC (but not less than 250 m) without referring the matter to CPCB by prescribing additional control measures such as <ol style="list-style-type: none"> <li>i. adoption of best available technologies (BAT) by the proponent of CBMWTF;</li> <li>ii. prescribing stringent standards for operation of the CBMWTF by the SPCB/PCC;</li> <li>iii. Adoption of zero liquid discharge by the CBMWTF, and</li> <li>iv. in case of any complaints from the public, then CBMWTF should prove that the facility is not causing any adverse impact on environment and habitation in the vicinity. If SPCB/PCC is not in a position to resolve the issue relating to buffer zone while selecting the site for CBMWTFs, in such a case, SPCBs/PCCs may refer the matter to CPCB.</li> </ol>
c.	The CBMWTF can also be developed as an integral part of the Hazardous Waste Treatment Storage and Disposal Facility (TSDF) subject to obtaining

of necessary approvals from the authorities concerned including 'environmental clearance' as per Environmental Impact Assessment, 2006 Notification and further amendments notified under the Environment (Protection) Act, 1986, provided there is no CBMWTF exists within 150 km distance from the existing TSDF.

**Box 20.8: Location criteria for development of a CBMWTF**

## 20.7 LAND REQUIREMENT FOR CBMWTF

Sufficient land shall be allocated to the CBMWTF to provide all requisite systems which include dedicated space for storage of waste (both treated and untreated), waste treatment equipment, vehicle washing bay, vehicle parking space, ETP, incineration ash storage provision, administrative room, space for DG Set etc.,. The guidelines for land allocation are given in **Box 20.9**.

- a. Preferably, a CBMWTF shall be set up on a plot size of not less than one acre in all the areas. However, a CBMWTF can be developed in adjacent plots but cannot be set up in two or more different plots located in different areas. Separate plots can be permitted only for vehicle parking if located in the close vicinity of the proposed CBMWTFs or the existing CBMWTFs.
- b. In case of upcoming or new CBMWTFs (both in municipal limits with population more than 25 lakhs or in rural areas), the land area requirement may be relaxed (but in any case not less than 0.5 acre) by the SPCB/PCC, with additional control measures such as zero liquid discharge, increase in stack height, stringent emission norms, odour control measures or any other measures felt necessary by the prescribed authority on case-to-case basis, only in consultation with CPCB.

**Box 20.9: Allocation of land for CBWMTF**

## 20.8 COVERAGE AREA OF A CBMWTF

The suggested coverage area for development of a CBMWTF is given in **Box 20.10**.

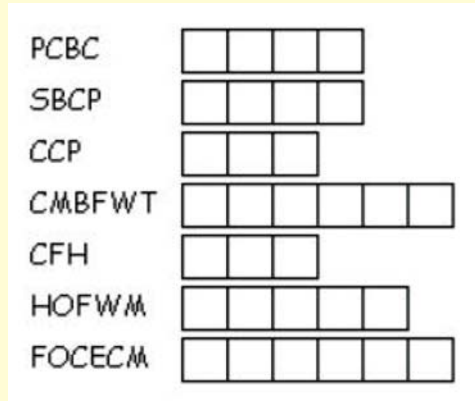
- a. A CBMWTF located within the respective State/UT shall be allowed to cater health care units situated at a radial distance of 75 km. However, in a coverage area where 10,000 beds are not available within a radial distance of 75 km, existing CBMWTF in the locality (located within the respective State/UT) may be allowed to cater the health care units situated upto 150 km radius w.r.to its location provided the bio-medical waste generated is collected, treated and disposed of within 48 hours as stipulated under the BMW Rules.
- b. In case, number of beds is exceeding >10,000 beds in a locality (i.e. coverage area of the CBMWTF under reference) and the existing treatment capacity is not adequate, in such a case, a new CBMWTF may be allowed in such a locality in compliance to various provisions notified under the Environment (Protection) Act, 1986, to cater services only to such additional bed strength of the HCFs located.
- c. In case of hilly areas, considering the geography, only one CBMWTF with adequate treatment capacity may be developed covering at least two

districts to cater treatment services to the HCFs located in the respective Districts. The selection and allocation of site etc. should be done as per the criteria suggested under these guidelines. The treatment charges to be prescribed by the respective SPCB/PCC in consultation with the State Advisory Committee to be constituted under the BMWM Rules by the respective State Government or UT Administration.

**Box 20.10: Suggested coverage area for development of a CBMWTF**

**Check Your Progress 3**

The abbreviations have got jumbled up. Can you figure them out?



**Did you know?**  
Incineration is a controlled combustion process where waste is completely oxidised and harmful microorganisms present in it are destroyed/denatured under high temperature.

**20.9 REQUIRED TREATMENT EQUIPMENT AND OTHER PROVISIONS**

For ensuring proper treatment of bio-medical waste in accordance with the Bio-Medical Waste Management Rules, 2016, as amended as well as authorisation granted by the respective State Pollution Control Board (SPCB)/ Pollution Control Committee (PCC), the Common Bio-Medical Waste Treatment Facility, should have the treatment facilities, as given in **Box 20.10**.

**Did you know?**  
Plasma Pyrolysis is an alternate to incinerator, Plasma Pyrolysis treatment technology can be installed for disposal of bio-medical waste categories as per BMWM Rules, 2016 wherein destruction of bio-medical waste similar to incineration can be achieved.

**a. Incineration/Plasma Pyrolysis**

The CBMWTF “Guidelines for Bio-Medical Waste Incinerators and Plasma Pyrolysis or Gasification” issued by CPCB should be followed for augmenting the existing incinerator.

In case of plasma pyrolysis, waste is treated at high temperature under controlled condition to form gases like methane, hydrogen and carbon monoxide which are subjected to combustion (oxidation) in secondary chamber. In the plasma pyrolysis process waste is converted into small clinker which can be disposed in secured landfills.

Conventional twin chamber incinerator, rotary kiln incinerator as well as plasma pyrolysis are given in **Fig. 20.2, Fig. 20.3 and Fig. 20.4**.

You will read in details about the working of the incinerator, The type of waste incinerated and their advantages and disadvantages in Unit 21 and Unit 22 Block 2, BHM-102.



Courtesy: By a CBMWTF i.e., SMS Water Grace Pvt. Limited., Niloti, Delhi.

Fig. 20.2: Conventional Twin Chamber Incinerator



Fig. 20.3: Rotary Kiln Incinerator



Courtesy: FCIPT, Ahmedabad

Fig. 20.4: Proto Type Plasma Pyrolysis

**Did you know ?**

For ease and safety in operation, the system should be horizontal type and exclusively designed for treatment of bio-medical waste. For optimum results, pre-vacuum based system be preferred against the gravity type system. It shall have tamper-proof control panel with efficient display and recording devices for recording critical parameters such as time, temperature, pressure, date and batch number etc. as required under the BMWM Rules, 2016, as amended.

**b. Autoclaving/Hydroclaving**

- i. Autoclaving is a low-heat thermal process where steam is brought into direct contact with waste in a controlled manner and for sufficient duration to disinfect the wastes as stipulated under the Bio-Medical Waste Management Rules, 2016 as amended.
- ii. Hydroclaving is similar to that of autoclaving except that the waste is subjected to indirect heating by applying steam in the outer jacket. The waste is continuously tumbled in the chamber during the process.

A typical autoclave used by a CBMWTF is given in **Fig. 20.5**.



**Fig. 20.5:** Autoclave operated at Nilothi CBMWTF, New Delhi

**c. Microwaving**

In microwaving, microbial inactivation occurs as a result of the thermal effect of electromagnetic radiation spectrum lying between the frequencies 300 and 300,000 MHz. Microwave heating is an inter-molecular heating process. The heating occurs inside the waste material in the presence of steam.

**d. Chemical disinfection**

Though chemical disinfection or alternates as stipulated under the BMWM Rules, 2016, as amended is also an option for treatment of certain categories of bio-medical waste such as glass waste but looking at the volume of waste to be disinfected at the CBMWTF and the pollution load associated with the use of chemical disinfectants, the chemical disinfection for treatment of bio-medical waste as part of a CBMWTF may be used sparingly or avoided as far as possible.

**e. Dry heat sterilisation**

This is the additional option for treatment of waste sharps as stipulated under the BMWM Rules. In this method, waste sharps are treated using Revised Guidelines for Common Bio-Medical Waste Treatment Facilities 12 dry heat (hot air) at a temperature not less than 185°C, at least for a residence period of 150 minutes in each cycle ( with sterilisation period of 90 minutes).

**f. Shredder**

Shredding is a process by which waste are de-shaped or cut into smaller pieces so as to make the wastes unrecognisable. It helps in prevention of reuse of bio-medical waste and also acts as identifier that the wastes have been disinfected and are safe to dispose of. A shredder to be used for shredding bio-medical waste should be as per the minimum requirements. More details of the requirements have been provided in the Unit 25, Block 2, BHM-102.

**g. Sharp pit/ Encapsulation**

A sharp pit or a facility for sharp encapsulation in a metal container or cement concrete should be used for treated sharps (i.e., treatment by autoclaving or dry heat sterilisation followed by shredding or mutilation). An option may also be worked out for recovery of metal from treated and shredded waste sharps within the CBMWTF or iron foundries having consent to operate from the SPCBs/PCCs and located nearby, as per the conditions imposed in authorisation granted under BMW Rules by the SPCB/PCC. You will read in details about the sharp pits and encapsulation in the Unit 26, Block 2, BHM-102.

**h. Deep burial**

Disposal of bio-medical waste by deep burial is allowed in places where there is no access to a CBMWTF. The specification of the deep burial pit should be as per Schedule-II of the Bio-Medical Waste Management Rules, 2016, as amended. As per revised guidelines for CBMWTFs issued by Central Pollution Control Board states that any SPCB/PCC should not allow the 'deep burial' of bio-medical waste as a part of CBMWTF. Any existing CBMWTF having disposal of bio-medical waste by deep burial should have the requisite treatment equipment as stipulated under the BMW Rules. You will read in details about deep burial in the Unit 26, Block 2, BHM-102.

**i. Waste to energy plants for disposal of waste**

Such technology is permitted only after prior approval of MoEF & CC and only after obtaining authorisation under the BMW Rules from the respective SPCB/PCC for the purpose of carrying out trial runs for assessment of efficacy of the treatment equipment.

**Question**

Name one waste which can be disposed of in a pit or by encapsulation?

**Answer**

Sharps.

**Box 20.10: Treatment facilities in CBMWTF**

**20.10 INFRASTRUCTURE SET UP IN CBMWTF**

CBMWTF should have enough space within it to install required treatment equipment, untreated and treated waste storage area, vehicle-parking, vehicle and containers washing area, Effluent Treatment Plant (ETP), administration room or staff room etc.

The required area for CBMWTF would depend upon the projected amount of bio-medical waste to be handled by it. A CBMWTF shall have the infrastructure as mentioned in **Box 20.11**.

- a. Treatment Equipment Room: A separate housing may be provided for each treatment equipment at the CBMWTF such as incinerator room, autoclave room, microwave room etc., as applicable. Each room shall have well-designed roof and walls. Such room shall be well ventilated and easy to wash. The floor and interior finishing of the room shall be such that chances of sticking/harbours of microorganisms are minimised.
- b. The various treatment technologies like incinerator, plasma pyrolysis, autoclave, shredder etc.
- c. Generator set - of adequate capacity as standby and should comply with the necessary requirement as per DG Set norms notified under the Environment (Protection) Act, 1986.
- d. Continuous emission monitoring system (CEMS) - for the incinerator/ plasma pyrolysis stack emission shall be installed by the CBMWTF.

**Did you know ?**

If any CBMWTF desires to adopt any other technology other than referred under Schedule-I of the BMW Rules, may adopt new technology only with the prior approval from MoEF & CC and is also required to obtain authorisation under the BMW Rules, 2016, as amended from the respective SPCB/PCC for carrying out trial run for assessment of efficacy of the new technology.



**Did you know?**

The CBMWTF should have provision for mercury storage as per the guidelines issued by CPCB. The capacity of the mercury storage provision should be maximum of 90 days and by which the collected mercury bearing waste shall have to be disposed of through a TSDF located nearby following the manifest as per Hazardous and Other Waste (Management and Transboundary Movement) Rules, 2016.

- operators for the parameters as stipulated by the respective SPCB/PCC as per the authorisation granted under the BMW Rules, 2016, as amended.
- e. Vehicle/containers washing facility.
  - f. Every time a vehicle is unloaded, the vehicle and empty waste containers shall be washed properly and disinfected. Washing can be carried out in an open area but on an impermeable surface and liquid effluent so generated shall be conveyed and treated in an effluent treatment plant. The impermeable area shall be of appropriate size so as to avoid spillage of liquid during washing.
  - g. Effluent Treatment Plant - A suitable Effluent Treatment Plant (ETP) shall be installed to ensure that liquid effluent generated during the process of washing containers, vehicles, floors etc. is treated and reused after treatment. Proper treatment of wastewater shall be ensured in case of zero discharge by recirculation of treated wastewater for scrubbing. You will learn more about the wastewater management in the Unit 27, Block 3, BHM-102.
  - h. Vehicle Parking - for parking, unloading and loading of waste, meant for transporting waste to and from the facility. In case of a space constraints, multi-storey parking or a separate provision may be allowed.
  - i. Display and sign board - display the details of the operator and the operation details.
  - j. Washing Room - for eye washing/hand washing/ bathing etc. for the workers.
  - k. Site Security - to prevent unauthorised access to the site by humans and livestock.
  - l. Fire safety - Fire safety equipment at all the salient points.
  - m. First Aid Box - with necessary provisions
  - n. Green Belt - in open area
  - o. Website - develop own website in accordance with the BMW Rules 2016, as amended and upload all the essential documents and clearances.
  - p. Other important provisions like lighting, telephone, pest control, PPE, immunisation etc.

**Box 20.11: Infrastructure at CBMWTF**

## 20.11 RECORD KEEPING

Maintenance of records as prescribed under the BMW Rules, 2016, as amended for all operations carried out at the CBMWTF is very important. The record maintenance serves many purposes as outlined in **Box 20.12**.

- a. Monitor overall operation of the CBMWTF.
- b. Helps in submission of the required information to be submitted to the 'Prescribed Authority' by 30th June of every year as per the format prescribed under the BMW Rules, 2016 as amended or provided by the SPCB/PCC.
- c. Enables the facility operator to produce all information of the activities on demand of the concerned prescribed authority.

**Box 20.12: Purpose of record keeping**

**Think and reflect**

Do you think it is a good idea to have records? Why do you think this is important?

Various records to be maintained by the CBMWTF Operator are listed in the **Box 20.13**.

- a. Manifest for daily collection of waste from member HCFs
- b. Bio-Medical Waste Collection (HCF-wise)
- c. Wastes received and treated at CBMWTF
- d. Log books of the treatment equipment as per the prescribed formats
- e. Efficacy test of the autoclave
- f. Treated Waste disposed through recyclers approved by SPCB/PCC.
- g. Accidents and remedial measures
- h. Immunisation of Workers
- i. Trainings organised for the waste handlers
- j. Health status of the workers ( at the time of Induction and once in a year)
- k. Details such as water consumption and wastewater generation
- l. Flue gas analysis results
- m. Records pertaining to the periodic stack emissions and effluent monitoring results
- n. Log books of the incinerator/plasma pyrolysis or autoclave are required to be maintained by the operator of a CBMWTF as per the guidelines issued by CPCB

**Box 20.13: Records to be maintained by the CBMWTF operator**

## 20.12 COLLECTION AND TRANSPORTATION OF BIO-MEDICAL WASTE

Collection and transportation are the two operations where the chances of segregated bio-medical waste coming in contact with the public, rag pickers, animals/birds, etc. are high. Therefore, all care shall be taken to ensure that the segregated bio-medical waste handed over by the health care units reach CBMWTF without any damage, spillage or unauthorised access by public, animals etc.

### 20.12.1 Collection of Bio-Medical Waste

The precautions to be taken in this regard are enumerated in **Box 20.14**.

- a. Generator of the bio-medical waste is responsible for providing segregated waste in accordance with the provisions of the Bio-Medical Waste Management Rules, 2016, as amended to the CBMWTF operator.
- b. Dedicated temporary storage at health care unit shall be designated.
- c. The coloured bags handed over by the health care units shall be collected in similar coloured containers with proper cover. Each bag shall be labelled as per Schedule-IV of the Bio-Medical Waste Management Rules as well as with bar coding system (to be complied by the occupier or operator of a CBMWTF as per BMW Rules) so that at any time, the health care units can be traced back that are not segregating the bio-medical wastes as per BMW Rules.

#### Think and reflect

Can you think of the ways in which the care can be taken to ensure that the segregated waste landed over by the health care units reach CBMWTF without any damage, spillage or unauthorised access by public, animals etc.

- d. The coloured containers should be strong enough to withstand any possible damage that may occur during loading, transportation or unloading of such containers.
- e. These containers shall also be labelled as per Schedule-IV of the Rules.
- f. Sharps shall be collected in puncture resistant container.
- g. The person responsible for collection of bio-medical wastes shall also carry a register with him to maintain the records such as name of the health care unit, the type and quantity of waste received, time at which waste collected from the member HCF, signature of the authorised person from the health care unit etc.

**Box 20.14: Precautions during collection of waste**

**20.12.2 Transportation of the Collected Bio-Medical Waste to the CBMWTF**

The guidelines to be followed are enumerated in **Box 20.15**.

- a. All the vehicles used by the CBMWTF operator shall not be sub-let or contract vehicles should not be used by the CBMWTF operator.
- b. All the vehicles should be owned by the CBMWTF operator and intended only for collection of bio-medical waste from the member health care facilities. They should be registered under the Motor Vehicle Act with the respective RTO/Transport Department and such vehicle numbers should also be registered with the respective SPCB/PCC for the purpose of collection of bio-medical waste from the member health care facilities.
- c. The bio-medical waste collected in designated coloured containers should be transported to the CBMWTF in a fully covered vehicle. Such vehicle should be dedicated for transportation of bio-medical waste only. Depending upon the volume of the wastes to be transported, the vehicle may be a two or three-wheeler, light motor vehicle or heavy duty vehicle.
- d. Transportation vehicle should be fitted with GPS to track the movement of the vehicle.
- e. Separate cabins should be provided for driver/staff as well as for placing the designated colour coded bio-medical waste containers.
- f. Two wheeler registered under the Motor Vehicle Act should be permitted for collection of bio-medical waste only from the clinics or dispensaries located in places where the lanes are narrow and not easily accessible to four wheeler vehicles. Such two wheeler vehicle(s) should have a provision of a suitable fixed waste collection box marked with bio-hazard symbol, contact details, proper lid, emergency spill collection procedure, first aid box and manifest record in accordance with the BMW Rules.
- g. The waste cabin should meet all the norms set by the CPCB.
- h. The vehicle should be labelled with the bio-hazard symbol (as per Schedule-IV of the BMW Rules) and should display the name, address and contact telephone and mobile number of the CBMWTF.
- i. The vehicle driver should carry always valid registration of the vehicle obtained from the concerned transport authority and also carry valid

- 'pollution under control certificate' issued by the authorised certificate issuing agency.
- j. The transportation routes of the vehicle should be designed for optimum travel distance and to cover all member health care units of the CBMWTF.
  - k. The CBMWTF operator should ensure online and real time tracking and monitoring provisions (GPS provision) should be given access with passwords to the SPCB/PCC and CPCB to cross check the movement of the transportation vehicles on any time by the SPCB/PCC/CPCB.
  - l. As far as possible, the transportation should be carried out during non-peak traffic hours.
  - m. It should be ensured that the total time taken from generation of bio-medical waste to its treatment, which also includes collection and transportation time, should not exceed 48 hours.

**Box 20.15: Guidelines for transportation of the collected bio-medical waste to the CBMWTF**

**20.13 DISPOSAL OPTION OF SOLID WASTE GENERATED FROM A CBMWTF**

Treated plastic waste, incineration ash, treated waste sharps and glass waste, Oil and Grease waste and ETP sludge are generally generated from the CBMWTF from the treatment systems such as autoclaving/microwaving, incineration, chemical disinfection and effluent treatment plant respectively. The treated bio-medical waste should be disposed as per the options suggested in the **Table 20.1**.

**Table 20.1: Suggested treatment and disposal options of the different categories of treated waste**

Sl. No.	Treated Waste Category	Suggested Treatment and Disposal Options
1.	Plastic wastes after disinfection and shredding	Plastic waste should not be sent to landfill sites. Treated plastic waste to be (i) sent to registered or authorized recyclers <b>(or)</b> (ii) for energy recovery <b>(or)</b> (iii) for diesel or fuel oil recovery <b>(or)</b> (iv) for road making, whichever is possible.
2.	Disinfected Sharps (including needles and syringes) (i.e., Treatment by Autoclaving or Dry Heat Sterilization followed by shredding or mutilation combination of shredding cum autoclaving)	Encapsulation in metal container or cements concrete; (or) sent for final disposal to iron foundries (having consent to operate from the SPCBs/PCCs (or) sanitary landfill or designated concrete waste sharp pit.
3.	Incineration ash	Incineration ash (ash from incineration of any bio-medical waste) shall be disposed through hazardous waste treatment, storage and disposal facility (TSDF), if toxic or hazardous constituents are present beyond the prescribed limits as given in Schedule –II of the Hazardous and Other Waste Management & Transboundary Movement Rules or as revised from time to time.
4.	Other treated solid wastes like Glass waste	Disinfection (by soaking the washed glass waste after cleaning with detergent and Sodium Hypochlorite treatment) or through autoclaving or microwaving or hydroplaning and then sent for recycling.
5.	Oil & Grease	By Incineration
6.	ETP Sludge	After drying in sludge drying beds or removal of moisture content using 'Filter Press' and such ETP sludge shall be given to CBWTF for incineration or to the hazardous waste treatment, storage and disposal facility (HWTSDF) for disposal in Secured Landfill
7.	Hazardous Waste	Disposal through a TSDF located nearby following the manifest as per the Hazardous and Other Waste (Management & Transboundary Movement) Rules, 2016

## 20.14 COST TO BE CHARGED BY THE CBMWTF OPERATOR FOR THE HEALTH CARE FACILITIES

Cost to be charged from the health care facilities plays an important role in financial viability and sustainable operation of a CBMWTF project, for providing the best treatment services to the Health care Units and for ensuring compliance to the BMWM Rules. The cost should be so worked out that neither it becomes a monopoly of the CBMWTF operator nor the interest of the CBMWTF operator is overlooked. It is recommended that cost should to be charged from the health care units, depending on the size, no, of beds and the distance from the location of the CBMWTF and same should be worked out in consultation with the concerned SPCB/PCC and the local Medical Association, keeping in view of the options provided in **Box 20.16**.

- a. In case of non-bedded health care units, fixed charges depending on the average quantity of waste generation per day, in case of the nursing homes/clinics/sample collection Centres /Dental Centres, dispensary, pathological laboratory, blood banks, and other non-bedded hospitals irrespective of their system of medicine including ayush hospitals.
- b. In case of bedded hospitals, fixed charges per bed per day basis and based on the no. of beds for which consents under the Water Act, 1974/Air Act, 1981 and authorisation granted under the BMWM Rules, by the prescribed authority.

### Box 20.16: Options available for charging the HCFs

## 20.15 PERIODIC INSPECTION/ MONITORING OR PERFORMANCE EVALUATION OF THE CBMWTF

To have uniformity in performance evaluation of the CBMWTF throughout the country, a check list for performance evaluation of the CBMWTF for carrying out inspection/monitoring/compliance verification has been prepared. This has already been discussed in details in the Unit 16, Block 4, BHM-101.

All the prescribed authority (SPCB/PCC) should inspect the CBMWTF at least once in six months located in the respective State/UT and a copy of the inspection reports should be submitted to CPCB and MoEF&CC along with a copy of the action taken for ensuring compliance to the BMWM Rules and CPCB guidelines issued from time to time and also such information is required to be uploaded in SPCB/PCC website.

CPCB should carryout random inspection of the CBMWTFs once in a quarter and any violations observed further actions shall be initiated by CPCB if required under the Environment (Protection) Act, 1986.

### Did you know?

- i. Rates are required to be revised once in a year based on the Wholesale Price Index (WP/Index) or Consumer Price Index (CPI) Index/considering the prevailing market price especially in respect of the labour expenses diesel prices, electricity, operating cost etc.), by the Scane Advisory Committee in consultation with the concerned SPCB/PCC local Medical Association and the representatives of the CBW/TF Association.
- ii. The Health Care Facilities are required to ensure timely payment to the CBW (F) for ensuring timely treatment services it compliance to the BMWM Rules as well as agreement made with the concerned CBWTF Operator.

### Check Your Progress 4

In the word search find words related to the various treatment and disposal options

H	G	T	I	A	B	U	R	L	R	E	W	N	S	C
Y	Q	N	U	N	T	U	L	N	N	B	O	K	I	G
D	I	T	I	H	C	I	R	K	W	I	H	P	S	J
R	G	M	O	V	F	I	U	I	T	B	D	I	Y	L
O	H	S	Q	D	A	X	N	A	A	I	Q	T	L	P
C	Q	J	N	H	C	W	L	E	S	L	Y	S	O	Y
L	D	A	X	W	O	U	O	I	R	E	F	O	R	S
A	L	M	I	L	S	V	N	R	I	A	R	D	Y	S
V	R	Q	P	P	N	F	W	K	C	J	T	M	P	S
I	B	B	A	J	E	L	D	K	X	I	I	I	B	D
N	Q	C	L	C	B	L	W	K	M	N	M	Y	O	T
G	N	S	T	E	R	I	L	I	S	A	T	I	O	N
E	A	I	H	G	N	I	V	A	L	C	O	T	U	A
S	O	J	K	P	S	H	R	E	D	D	E	R	M	D
N	I	P	T	X	L	C	T	S	A	Q	S	G	G	L

### 20.16 LET US SUM UP

In this unit the facilities for off-site treatment of health care waste and disposal have been described. There is a need for a CBMWTF to ensure that the waste can be disposed of in an environmentally sound manner. It also helps in reducing the load and adverse effects of the treatment technologies in the health care facilities and the areas around. You have also learnt the various criteria for the development of a new CBMWTF, the location criteria, the land requirement and the coverage area. You were also familiarised with the environmental laws governing its commissioning.

The duties of the operator and the infrastructural facilities and the treatment technologies have been outlined in this unit. The laid down criteria for a transport vehicle, the records to be maintained and the periodic monitoring are also some of the topics covered here. The summary of the concepts covered in the unit have been presented in the mind map in **Fig. 20.6**.

## Off-Site Treatment and Disposal of HCW

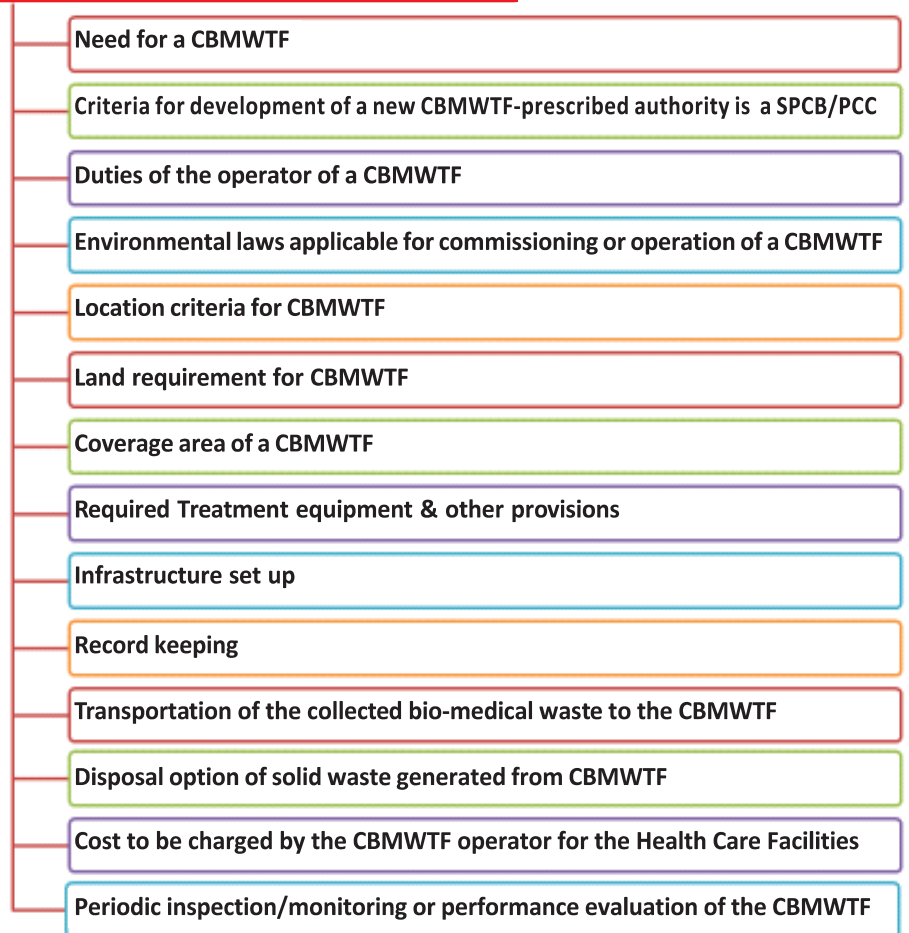


Fig. 20.6: Mind Map

## 20.17 GLOSSARY

<b>APCD</b>	:	Air Pollution Control Device
<b>BMWM Rules</b>	:	Bio-Medical Waste Management Rules
<b>CBMWTF</b>	:	Common Bio-Medical Waste Treatment and Disposal Facility
<b>CO</b>	:	Carbon Monoxide
<b>CO<sub>2</sub></b>	:	Carbon Dioxide
<b>CPCB</b>	:	Central Pollution Control Board
<b>CRZ</b>	:	Coastal Regulation Zone
<b>DG</b>	:	Diesel Generator
<b>EC</b>	:	Environmental Clearance
<b>EIA</b>	:	Environment Impact Assessment
<b>ETP</b>	:	Effluent Treatment Plant
<b>GPS</b>	:	Global Positioning System
<b>HCFs</b>	:	Health Care Facilities

<b>HCl</b>	:	Hydrochloric Acid
<b>HOWM &amp; TM Rules</b>	:	Hazardous and Other Waste (Management & Transboundary Movement) Rules, 2016
<b>MHz</b>	:	Mega Hertz
<b>MoEF&amp; CC</b>	:	Ministry of Environment, Forest & Climate Change
<b>KM</b>	:	Kilometer
<b>KW</b>	:	Kilowatt
<b>MoU</b>	:	Memorandum of Understanding
<b>NABL</b>	:	National Accreditation Board for Testing and Laboratories
<b>NO<sub>x</sub></b>	:	Oxides of Nitrogen
<b>O<sub>2</sub></b>	:	Oxygen
<b>PCC</b>	:	Pollution Control Committee
<b>PLC</b>	:	Programmable Logical Control
<b>SEIAA</b>	:	State Environment Impact Assessment Authority
<b>SLF</b>	:	Secured Landfill
<b>SPCB</b>	:	State Pollution Control Board
<b>TSDF</b>	:	Treatment Storage and Disposal Facility
<b>TOC</b>	:	Total Organic Carbon
<b>VOCs</b>	:	Volatile Organic Compounds

## 20.18 ANSWERS TO CHECK YOUR PROGRESS

### Check Your Progress 1

- Fill in the blanks
  - High, Recurring
  - trained skilled
  - non-compliances
  - threat
  - monitoring
- Answers to True false
  - False - SPCB/PCC is required to prepare an inventory or review with regard to the bio-medical waste generation in the coverage areas of the existing CBMWTF facility
  - False – SPCB/PCC is required projected over a period of next **ten** years, the adequacy of existing treatment capacity of the CBMWTF in each coverage area of radius 75 km.



- c. True
- d. False - Local Authority (LA) is required to allocate suitable site for development of a CBMWTF
- e. True

### **Check Your Progress 2**

Across

- 2. Yearly
- 4. Operator
- 5. Five
- 7. Immunisation

Down

- 1. Local Authority
- 3. Act of 1986
- 4. Occupier
- 6. CBMWTF

### **Check Your Progress 3**

CPCB, SPCB, PCC, CBMWTF, HCF, MOHFW, MOEFCC,

### **Check Your Progress 4**

Incineration, pyrolysis, autoclaving, hydroclaving, microwaving, encapsulation, burial, pits, landfill, shredder, sterilisation, disinfection

## **20.19 REFERENCES AND FUTURE READINGS**

- 1. Bio-Medical Waste Management Rules, 2016
- 2. CPCB website: [www.cpcb.nic.in](http://www.cpcb.nic.in)



- 3. MoEF& CC website: [www.envfor.nic.in](http://www.envfor.nic.in)



- 4. Revised Guidelines for CBMWTFs.