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Revised Draft Guidelines for Common Bio-medical Waste Treatment Facilities

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CONTENT

Abbreviations

APCD	-	Air Pollution Control Device
BMWM Rules	-	Bio-medical Waste Management Rules
CBWTDF	-	Common Bio-medical Waste Treatment Facility
CO	-	Carbon Monoxide
CO_2	-	Carbon Dioxide
CPCB	-	Central Pollution Control Board
CRZ	-	Coastal Regulation Zone
DG	-	Diesel Generator
EC	-	Environmental Clearance
EIA	-	Environment Impact Assessment
ETP	-	Effluent Treatment Plant
GPS	-	Global Positioning System
HCFs	-	Health Care Facilities
HCl	-	Hydrochloric Acid
HOWM & TM Rules	-	Hazardous and Other Waste Management & Transboundary Movement Rules, 2016
MHz	-	Mega Hertz
MoEF & CC	-	Ministry of Environment, Forest & Climate Change
KM	-	Kilometer
KW	-	Kilowatt
NO_x	-	Oxides of Nitrogen
O_2	-	Oxygen
PCC	-	Pollution Control Committee
PLC	-	Programmable logical control
SEIAA	-	State Environment Impact Assessment Authority
SLF	-	Secured Landfill
SPCB	-	State Pollution Control Board
TSDF	-	Treatment Storage and Disposal Facility
TOC	-	Total Organic Carbon
VOCs	-	Volatile Organic Compounds

1) Introduction

A Common Bio-medical Waste Treatment Facility (CBWTF) is a set up where biomedical waste, generated from member health care facilities is imparted necessary *treatment* to reduce adverse effects that this waste may pose on human health and environment. The treated waste may finally be sent for disposal in a landfill or for recycling purposes.

According to the Bio-medical Waste Management Rules, 2016, "bio-medical waste treatment and disposal facility" means any facility wherein 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 and "operator of a common bio-medical waste treatment facility" means a person who owns or controls a Common Bio-medical Waste Treatment and Disposal Facility (CBWTF) for the collection, reception, storage, transport, treatment, disposal or any other form of handling of bio-medical waste.

The Bio-medical Waste Management Rules, 2016 (hereafter referred as BMWM Rules) restricts occupier for establishment of on-site treatment and disposal facility, if a service of common bio- medical waste treatment facility is available at a distance of seventy-five kilometer, as installation of individual treatment facilities by healthcare units requires comparatively high capital investment. In addition, it requires separate dedicated and trained skilled manpower and infrastructure development for proper operation and maintenance of treatment systems. The concept of CBWTFF is not only addresses such problems but also prevents proliferation of treatment technologies in a city. In turn it reduces the monitoring pressure on regulatory agencies. By running the treatment equipment at CBWTF to its full capacity, the cost of treatment of per kilogram gets significantly reduced. Its considerable advantages have made CBWTF popular and proven concept in many developed countries.

The common bio-medical treatment facilities are also required to set up based on the need for ensuring environmentally sound management of bio-medical waste keeping in view the techno-economic feasibility and viable operation of the facility with minimal impacts on human health and environment.

CBWTF as an option has also been legally introduced in India. Considering the likely impacts that may cause to the patients undergoing treatment because of

operation of the captive treatment equipment, now the Bio-medical Waste Management Rules, 2016 restricts the Occupier for ensuring treatment and disposal of generated bio-medical waste through a common bio-medical waste treatment facility, located within a distance of 75 KM. Further, these rules eased the bottleneck in upbringing the CBWTF by making department in the business allocation of land assignment in the State or UT administration are responsible for providing suitable site within its jurisdiction.

The concept of CBWTF is also being widely accepted in India among the healthcare units, medical associations and entrepreneurs. In order to set up a CBWTDF to its maximum perfection, care shall be taken in choosing the right technology, development of CBWTF area, proper designing of transportation system to achieve optimum results etc. These key features of CBWTF have been addressed in the following sections and will form the guidelines for the establishment of CBWTFs throughout the country.

2) Criteria for development of a new Common Bio-medical Waste Treatment Facility for a locality or region.

Prior to allowing any new Common Bio-medical Waste Treatment Facility, following criteria or steps may be followed:

a) Prescribed authority is required to prepare an inventory or review with regard to the bio-medical waste generation i atleast once in three years in the coverage areas of the existing bio-medical waste treatment facility.

b) SPCB/PCC is required to assess existing common bio-medical waste treatment and disposal facility treatment capacity (region-wise)

c) Prescribed authority is required to assess the region-wise gaps if any in the bio-medical waste generation and the available bio-medical treatment capacity. In case, any region requires additional treatment capacity, in such a case, action may be initiated by the prescribed authority for allowing a new CBWTF in that locality without interfering the coverage area of the existing CBWTF.

d) SPCB/PCC shall identify the regions which require additional treatment facility and bring it to the notice of the concerned department in the business allocation of land assignment. The selection of site for setting up of such facility shall be

made in consultation with the prescribed authority, other stakeholders and in accordance with guidelines published by the Ministry of Environment, Forest and Climate Change (MoEF & CC) or Central Pollution Control Board (CPCB). The department in the business allocation of land assignment shall be responsible for providing suitable site for setting up of CBWTF in the State Government or Union Territory Administration.

e) The department in the business allocation of State Government or Union Territory Administration shall handover the site to the respective State Pollution Control Board (SPCB) /Pollution Control Committee (PCC) for development of additional CBWTF in that region within a period of three months.

f) Thereafter, the SPCB/PCC may seek expression of interest from the proponents for development of new CBWTFs in that region. Later, the proponent is required to take necessary approvals as required under the Environment (Protection) Act, 1986 for development of the CBWTF in accordance with the CPCB 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 own CBWTF in line with these guidelines or to have e captive treatment equipment for ensuring treatment and disposal of generated bio-medical waste as stipulated under the BMWM Rules, 2016.

h) In case of closure of any existing CBWTF is inevitable in view of the violation of the provisions notified under the E (P) Act, 1986 consecutively two times or to comply with any Hon'ble Courts directions, before closure of such a default CBWTF, the respective SPCB/PCC may take action for making alternate arrangement i.e. to ensure the waste generated from the member health care facility of such default CBWTF to the CBWTF located nearby. In case, no CBWTF is available in the vicinity, the default CBWTF shall be suggested to operate in compliance to the BMWM Rules till the alternates arrangements are made under the supervision of the respective SPCB/PCC.

The criteria for development of CBWTFs is also given in Figure……

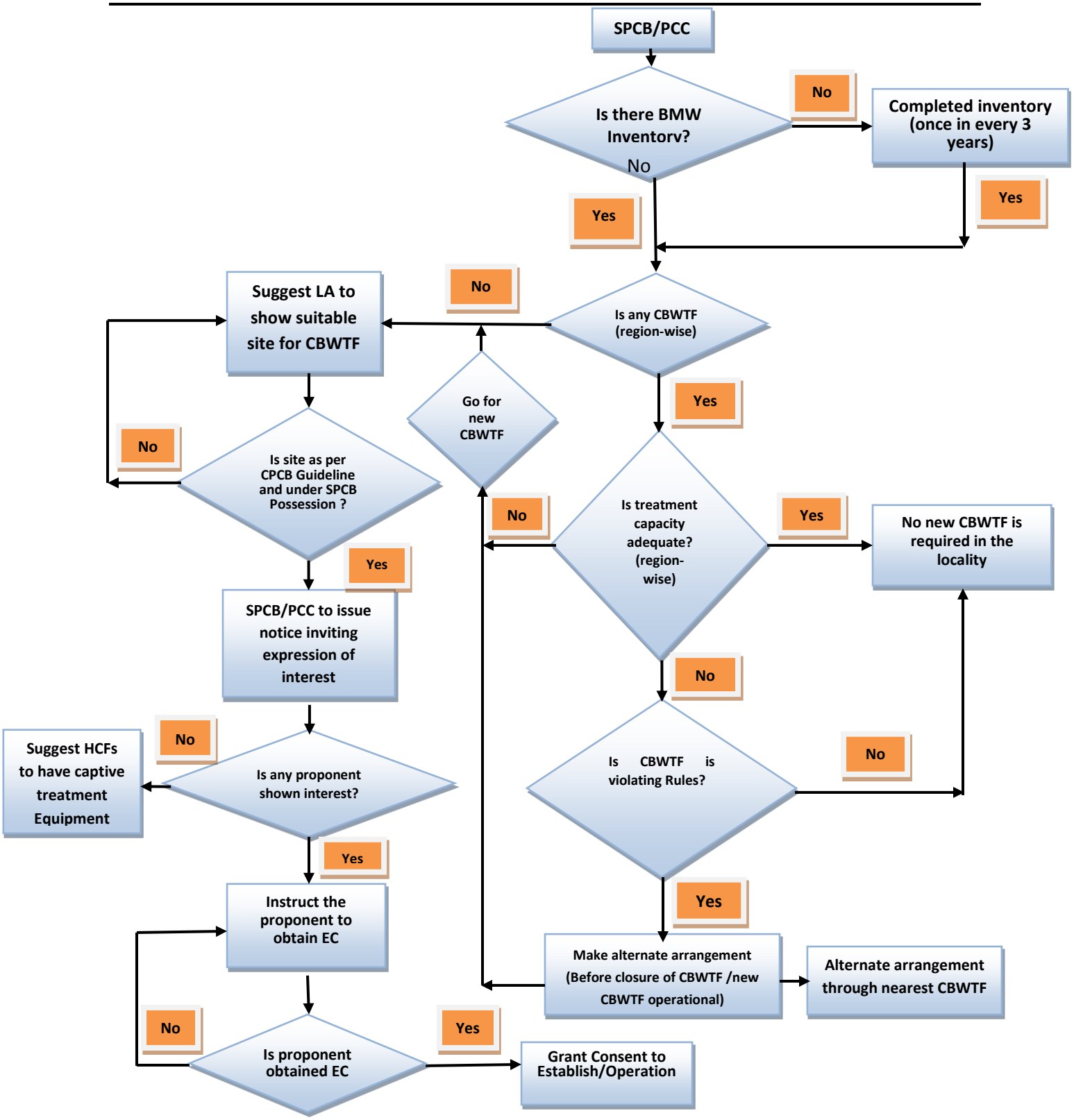

Figure 1. Criteria for Development of a CBWTF in a Region

3. Duties of the operator of a common bio-medical waste treatment facility

The duties of the operator of a common bio-medical waste treatment (CBWTF) as stipulated under Rule 5 of the Bio-medical Waste Management Rules, 2016 is reproduced below. It shall be the duty of every operator to: -

(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 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 or Pollution Control Committee;

(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 biomedical waste on holidays also;

(p) maintain all record for operation of incineration, hydro or autoclaving for a period of five years; and

(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 notification of the Bio-medical Waste Management Rules, 2016 vide GSR 343(E) dated 28th March, 2016.

3) Applicability of these guidelines

These guidelines are applicable to all the upcoming CBWTFs. In case of the existing CBWTFs, these guidelines shall be applicable as and when

(a) the existing CBWTFs desires to expand the treatment capacity of the existing CBWTF (or)

(b) the existing CBWTFs desires to modernize the existing treatment equipment with the new equipment (or)

(c) the existing common bio-medical waste treatment plant completed maximum of 08 years of life from the date of commissioning and requires replacement or installation of new treatment equipment.

Any changes or modification in the activity of the existing CBWTF requires compliance to the relevant provisions notified under the Environment (Protection) Act, 1986.

4) Environmental laws applicable for commissioning or operation of a CBWTF

Operation of a CBWTF leads to air emissions as well as waste water generation as in case of an industrial operation. Most common sources of waste water generation in CBWTFs 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. Any other approvals required from the concerned authorities under various laws have to be complied with by the proponent of the CBWTF prior to development of a CBWTF and however, following environmental laws are applicable for a CBWTF.

5.1 Consents under Water (Prevention and Control of Pollution) Act, 1974 and Air (Prevention and Control of Pollution) Act, 1981 as well as Authorization under the BMWM Rules, 2016

The CBWTF operator 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. State Pollution Control Board (SPCB)/ Pollution Control Committee (PCC). Upon installation of the requisite equipment, the CBWTF Operator is also required to obtain authorization as required under

Rule 10 of the BMWM Rules, 2016 from the respective SPCB/PCC prior to commencement of the CBWTF.

5.2 Environmental Clearance under EIA Notification 2006

Ministry of Environment, Forest & Climate Change (MoEF & CC), notified amendment to the EIA Notification 2006 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 categorized under the Item 7 (da) in the schedule, requiring 'environmental clearance' from the State Environment Impact Assessment Authority (SEIAA). Therefore, the CBWTF 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 lad by the projects management, which include the following:

a) All new projects or activities pertaining to the bio-medical waste treatment facility; and

b) Expansion and modernization with additional of capacity of existing bio-medical waste treatment facility.

5) Location criteria

The CBWTF shall be located near to its area of operation as possible in order to minimize the transportation distance in waste collection, thus enhancing its operational flexibility as well as for ensuring compliance to the time limit as stipulated under the BMWM Rules and also the location 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). Suggested location criteria for development of a CBWTDF are as follows:

a) A CBWTF shall be located at a place reasonably far away from residential and sensitive area and should have a buffer zone of atleast of 500 m so that it shall have no impact on these areas **(or)** The CBWTF shall be developed in a notified industrial area;

b) The CBWTF shall be located at least at a distance of 1 KM away from the surface water body; and (c) CBWTF shall also be developed as an integral part of Hazardous Waste Treatment Storage Treatment and Disposal Facility (TSDF) subject to obtaining of necessary approvals from the concerned authorities including environmental clearance from the concerned authority as per EIA rules notified under the Environment (Protection) Act, 1986, provided there is no CBWTF exist within 150 KM distance from the existing TSDF location.

6) Land requirement

Sufficient land shall be allocated for CBWTF to provide all requisite systems which include space for storage, waste treatment facilities, ETP, vehicle washing and parking space. So, preferably, a CBWTF be set up on a plot size of not less than one acre in all the areas. Considering the availability of land, relaxation in this regard shall be examined and approved by the concerned State Pollution Control Board (SPCB) /Pollution Control Committee (PCC) only in consultation with CPCB.

In case of upcoming CBWTFs in any locality, the facility should be developed conforming to these guidelines in an area not less than 2 acres of land. A facility cannot be set up in two or more different plots even if they are located in close vicinity. However, separate plots can be permitted only for vehicle parking if located in close vicinity.

7) Coverage area of CBWTF

Suggested coverage area of development of a CBWTF is as follows:

a) Considering the economic viability and feasibility and to have minimal impacts on the environment, in any area, only one CBWTF may be allowed to cater only up to 10,000 beds, at the approved rate by the Prescribed Authority.

b) A CBWTDF shall be allowed to cater healthcare units with 10,000 beds situated at a radial distance of 75 KM. However, in an area where 10,000 beds are not available within a radial distance of 75 KM, existing CBWTF in the locality may be allowed to cater the healthcare units situated outside the said 75 KM radius, provided if there is no any facility in the next 75 KM radial distance.

c) In case, number of beds is exceeding > 10,000 beds in a locality, in such a case, new CBWTF may be allowed in such locality in compliance to various provisions

notified under the E (P) Act, 1986 to cater services only to such additional bed strength of the HCFs, without hampering the economic viability of the existing CBWTF in operation in that area.

d) In case, the existing CBWTF is not complying with the BMWM Rules or CPCB guidelines consecutively for two times, whichever is applicable, in such a case, (a) the bed strength of the CBWTF proposed to be closed shall be distributed among the other CBWTFs located nearby depending on the treatment capacities of the respective CBWTFs. In such a case, area of influence shall be prescribed suitably by the SPCB/PCC in consultation with CPCB. till the existing CBWTF upgrades to comply with the BMWM Rules and the CPCB Guidelines, to the satisfaction of the prescrined authority or new CBWTF in that locality becomes operational in compliance to the various provisions notified under the E (P) Act, 1986.

e) In case of North-Eastern States/Hilly States, considering the geography, only one CBWTDF with adequate treatment capacity may be developed in each district to cater treatment services to the HCFs located in the respective District, as per the treatment charges to be prescribed in consultation with CPCB by the respective SPCB/PCC.

8) Treatment equipment

The Common Bio-medical Waste Treatment Facility should treat only the bio-medical waste as per BMWM Rules and as per the authorisation granted by the prescribed authority. The Common Bio-medical Waste Treatment Facility (CBWTF) should have the following treatment facilities:

a) Incineration

It is a controlled combustion process where waste is completely oxidized and harmful microorganisms present in it are destroyed/ denatured under high temperature. The guidelines for "Design & Construction of Bio-medical Waste Incinerators" **(Annexure–I)** prepared by CPCB shall be followed for selecting/installing a better bio-medical waste incinerator. The incinerator should be fitted with separate 'energy meter' for recording total energy consumed for operation of the incinerator.

b) Plasma Pyrolysis

Alternate to incinerator, Plasma Pyrolysis treatment technology can be installed for disposal of bio-medical waste categories as per BMWM Rules wherein destruction of bio-medical waste similar to incineration can be achieved. 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.

c) 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. For ease and safety in operation, the system should be horizontal type and exclusively designed for the 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.

(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.

d) ***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.

e) ***Chemical disinfection***

Though chemical disinfection as stipulated under the BMWM Rules is also an option for treatment of certain categories of bio-medical waste but looking at the volume of waste to be disinfected at the CBWTF and the pollution load associated with the use of disinfectants, the use of chemical disinfection for treatment of bio-medical waste at CBWTF may be avoided.

f) ***Dry heat sterilization***

This is the additional option for treatment of Waste sharps as stipulated under the BMWM Rules. In this method, waste sharps are treated using dry heat at a temperature not less than 185^0C, at least for a residence period of 150 minutes in each cycle (with sterilization period of 90 minutes).

g) ***Shredder***

Shredding is a process by which waste are de-shaped or cut into smaller pieces so as to make the wastes unrecognizable. 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 off. A shredder to be used for shredding bio-medical waste shall confirm to the following minimum requirements:

(i) The shredder for bio-medical waste shall be of robust design with minimum maintenance requirement;

(ii) The shredder should be properly designed and covered to avoid spillage and dust generation. It should be designed such that it has minimum manual handling;

(iii) The hopper and cutting chamber of the shredder should be so designed to accommodate the waste bag full of bio-medical waste;

(iv) The shredder blade should be highly resistant and should be able to shred waste sharps, syringes, scalpels, glass vials, blades, plastics, catheters, broken ampoules, intravenous sets/ bottles, blood bags, gloves, bandages etc. It should be able to handle/ shred wet waste, especially after microwave/ autoclave/hydroclave;

(v) The shredder blade shall be of non-corrosive and hardened steel;

(vi) The shredder should be so designed and mounted so as not to generate dust, high noise & vibration;

(vii) If hopper lid or door of collection box is opened, the shredder should stop automatically for safety of operator;

(viii)]In case of shock-loading (non-shreddable material in the hopper), there should be a mechanism to automatically stop the shredder to avoid any emergency/accident;

(ix) In case of overload or jamming, the shredder should have mechanism of reverse motion of shaft to avoid any emergency/accident;

(x) The motor shall be connected to the shredder shaft through a gear mechanism, to ensure low rpm and safety;

(xi) The unit shall be suitably designed for operator safety, mechanical as well as electrical;

(xii) The shredder should have low rotational speed (maximum 50 rpm). This will ensure better gripping and cutting of the bio-medical waste;

(xiii) The discharge height (from discharge point to ground level) shall be sufficient (minimum 3 feet) to accommodate the containers for collection of shredded material. This would avoid spillage of shredded material;

(xiv) The minimum capacity of the motor attached with the shredder shall be 3 KW for 50 Kg/hr, 5 KW for 100 kg/hr & 7.5 KW for 200 Kg/hr and shall be three phase induction motor. This will ensure efficient cutting of the bio-medical wastes as prescribed in the Bio-medical Waste (Management & Handling) Rules; and

(xv) The shredder also should be fitted with separate 'energy meter' for recording total energy consumed for operation of these equipment.

h) Sharp pit/ Encapsulation

A sharp pit or a facility for sharp encapsulation shall be provided for treated sharps. An option may also be worked out for recovery of metal from treated and shredded waste sharps within the CBWTF or in a foundry or a factory located

nearby as per the conditions imposed in authorization granted under BMW Rules by the State Pollution Control Board/Pollution Control Committee.

i) Deep burial

Any SPCB/PCC should not allow the 'deep burial of bio-medical waste as a part of CBWTF' Any existing CBWTF having disposal of bio-medical waste by deep burial should have the requisite treatment equipment as stipulated under the BMWM Rules, within six months from the date of finalization of these guidelines..

j) Non-burn technology

Non-incineration technologies for disposal of bio-medical waste are adopted in some of the developed countries. Non-incineration technology comprises of shredding and disinfection by autoclaving/microwaving or chemical treatment. The treated waste can be disposed along with municipal solid waste in sanitary landfills or waste to energy plants. Such option can also be adopted in places where the sanitary landfill or waste to energy plant for disposal of municipal solid waste is available. Such technology is permitted only after prior approval of CPCB and after obtaining authorization under the BMWM Rules from the respective SPCB/PCC for the purpose of carrying out trial runs for assessment of efficacy of the treatment equipment.

k) Vehicle/Containers washing facility

Every time a vehicle is unloaded, the vehicle and empty waste containers shall be washed properly and disinfected. It 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.

i) 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 waste water shall be ensured in case of zero discharge by recirculation of treated wastewater for scrubbing. *ETP should have required treatment unit operations* comprising at least collection tank, O & G trap, chemical dosing, co-agulation chamber, primary settling tank, biological treatment process, secondary settling tank, pressure filter

and activated carbon filter *so as to co*mply with the regulatory discharge standards stipulated under the Bio-medical Waste Management Rules, 2016 and amendments made thereof. ETP should also have the following provisions:

(i) separate 'energy meter' so as to know total consumption of electricity for operation of the machinery attached with the ETP.

(ii) pH meter so as to know pH level of treated water as well as pH level of treated water used for recycling in APCD attached with the incinerator or any utility within the CBWTF.

(iii) A 'magnetic flow meter' should also be fitted at all the water supply extraction points of the CBWTF as well as the outlet to know the total wastewater treated for further end use or discharge in compliance to the BMWM Rules.

(iv) Provision of 'press filter' or 'sludge drying bed' for drying the sludge generated from the ETP and after drying, same need to be disposed off in an environmentally sound manner depending upon the hazardous constituents present in it as per Hazardous and Other Waste Management and Transboundary Movement) Rules, 2016.

Note:

a) If any CBWTDF desires to adopt any other technology other than referred under BMWM Rules, may adopt new technology only with the prior approval from MoEF & CC and is also required to obtain authorization under the BMWM Rules from the respective SPCB/PCC for carrying out trial run for assessment of efficacy of the technology.

b) All the treatment equipment should be operated and complied with the norms as stipulated under Schedule II of the Bio-medical Waste Management Rules, 2016 published by MoEF & CC vide GSR 343(E). dated 28th March, 2016.

c) Incinerator/Plasma Pyrolyisis/ Autoclaving/ Microwaving / Hydroclaving/shredder/Dry Heat Sterilisation/ETP should be fitted with separate 'energy meter' for recording total energy consumed for operation of these equipment.

d) In the event of any operational problem in the treatment equipment, to ensure bio-medical waste is treated within the time limit as stipulated under the BMWM Rules, each CBWTF should also be provided with stand by treatment equipment especially incinerator/plasma pyrolysis/autoclave.

(10) Infrastructure set up

The CBWTF shall 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 CBWTF would depend upon the projected amount of bio-medical waste to be handled by it. A CBWTF shall have the following infrastructure:

a) Treatment Equipment Room

A separate housing may be provided for each treatment equipment at the CBWTF 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/harbouring of microorganisms are minimized. This can be attained by providing smooth & fine floor and wall surfaces (to a height of 2 metre from floor) preferably of tiles. The number of joints in such surfaces shall be minimal. The equipment room shall also have a separate cabin, to supervise the operation of the equipment and to record the waste handling and equipment operational data attached to each equipment room. There shall be two waste storage rooms, one for storage of untreated wastes and another for treated wastes and may be located at a distance from each other. The storage room shall have provisions similar to that of equipment room being well-ventilated with easy to wash floors & walls, smooth and fine surfaces etc. All the treatment equipment rooms and waste storage rooms should be provided with 'fly catcher/killing device'. The room has to be washed and cleaned with a suitable disinfectant every day.

b) Main waste storage space

Separate space shall be provided near the entry point of the CBWTF to unload and store all biomedical wastes that have been transported to the CBWTF by its own transportation vehicle. The size of the room shall be adequate to store all wastes transported to the CBWTF. The front portion of the room shall be utilized for unloading the wastes from the vehicle and back or side portion shall be utilized for shifting the wastes to the respective treatment equipment. In the front portion of the room where transportation vehicle is parked for unloading, the floor shall be made impermeable so that any liquid spilled during unloading does not percolate into the ground. The liquid generated during handling of wastes

and washing, shall be diverted to the inlet of effluent treatment plant (ETP). In the main storage room, wastes shall be stacked with clear distinction as per the color coding of the containers by providing partitions. From here, the colored containers may be sent to the respective treatment equipment by using suitable closed type of conveyance (trolley etc.,) . The main storage room too shall have provisions similar to that of equipment room such as roofing, well ventilated, easy to wash floors & walls, smooth and fine surfaces etc.

Apart from the above, a CBWTF should have separate storage provision for storage of mercury bearing waste collected from the member health care facilities as per the procedure given in CPCB guidelines. Mercury storage provision should be provided as per the guidelines issued by CPCB (refer www.cpcb.nic.in). 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. Charges for collection and disposal shall be collected from the respective member HCF.

c) Treated waste storage room

Separate space should be provided to store the wastes treated in different treatment units. The wastes shall be stored in separate group as per the disposal options. Other provisions in the room shall be similar to the main storage room. Waste such as incineration ash generated in the process of incineration shall be stored in a separate area under the shed so as to avoid entry of rain water during the monsoon and for easy collection and in case, incineration ash is hazardous waste in nature same should be disposed through any authorized TSDF operator located nearby following the manifest as per Hazardous and Other Waste Management and Transboundary Movement Rules, 2016.

d) Administrative Room

This room shall be utilized for general administration, record keeping, billing etc.

e) Generator set

Every CBWTF shall have generator set as standby arrangement for power, with sufficient capacity to run the treatment equipment during the failure of power

supply. The generator set shall comply with the necessary requirement as per DG Set norms notified under the Environment (Protection) Rules, 1986.

f) Flue gas monitoring provision

Monitoring provision for continuous monitoring of the incinerator/plasma pyrolysis stack emission especially for flue gas parameters such as CO_2, O_2, CO, during its operation is required to be made as per guidelines of CPCB and records maintained. The flue gas monitoring system should be installed as per the guidelines issued by CPCB.

g) Vehicle Parking

Provision for parking shall be made within the confines of the site for parking of required number of vehicles, loading and unloading of the vehicles meant for transporting waste to and from the facility, etc.. In case of a CBWTF with space constraints, multy-story parking or a separate provision may be allowed only for parking of vehicles.

h) Surveillance cameras (CCTV)

Surveillance cameras (CCTV) should be provided in the vulnerable location of the facilities (Waste storage, waste feeding, treatment equipment (incinerator and autoclave). The real time data also should be shared in the respective SPCB/PCC websites for the purpose of verification by the SPCB/PCC as well as CPCB.

i) Display and sign board

An identification board (Display) of durable material and finish shall be displayed at the entrance to the facility. This shall clearly display the name of the facility, owner name, address and telephone number of the operator and the prescribed authority, no. of hours of operation, telephone numbers of the personnel to be contacted in the event of an emergency, validity period of authorization as well as total daily waste treated and disposed. Also, sign boards should be provided at all the salient points (untreated waste storage, treatment equipment, treated waste storage area, ETP, firefighting equipment) within the facility. The display board also should indicate the operational hours of the CBWTF.

j) Washing Room

A washing room shall be provided for eye washing/hand washing/ bathing etc.

k) Site Security

High walls, fencing and guarded gates shall be provided at the facility to prevent unauthorized access to the site by humans and livestock.

l) Fire safety

Fire safety equipment such as sand buckets and fire extinguishers should be provided at all the salient points of the CBWTF including at the diesel storage areas, diesel tanks connected with the incinerator etc. Fire alarm also should be provided within the CBWTF to prompt the workers in the event of any fire hazard. Workers should be provided training in First Aid administration.

m) First Aid Box

First Aid Box with necessary provisions need to be provided at all the salient points within the facility.

j) Green Belt

The open area within the CBWTDF shall be developed into greenbelt.

Besides the provisions suggested in the earlier paras, following important provisions should also be made in a CBWTF:

(i) A telephone shall be provided and maintained at the facility.
(ii) A First Aid Box shall be provided and maintained at the CBWTDF.
(iii) Proper lighting shall be provided at the facility.
(iv) Proper care shall be taken to keep the facility and surroundings free from odours.
(v) Proper fire fighting facilities and emergency alarm shall be installed.
(vi) Measures shall be implemented to control pests and insects at the site.

(vii) Measures shall be implemented to control the escape of litter from the site.

(viii) Necessary provision shall be made to prevent and control noise generated, if any, due to the activities at the site.

(ix) Necessary protective gear for the waste handlers shall be provided.

(x) Immunization to all the workers of CBWTF especially Tetanus and Hepatitis -B as stipulated under Bio-medical Waste Management Rules.

(xi) Workers should have provisions such as washing, toilets, and place for eating.

(xii) Workers should also be provided with N-95 mask besides other PPEs such as hand gloves, gumboots, goggles etc.

Every CBWTF operator shall submit a work-plan to the Prescribed Authority. The work-plan should include the details of facilities at the CBWTF, the collection, transportation & storage of the bio-medical wastes, operational details etc.

11) Record keeping

Maintenance of records for all operations carried out at the CBWTF is very important to monitor overall operation of the CBWTF. It also helps in submission of the required information to be submitted to the 'Prescribed Authority' by 31 st June of every year as per the format prescrined under the BMWM Rules. A well-maintained record of all the activities at the CBWTF also enables the facility operator to produce all information of the activities on demand of the concerned prescribed authority. The record should include all information relating to each activity at the CBWTF site as per BMWM Rules which include accidents occurred (spills, injury, fire accident) and the measures taken and also, however, minimum requirement is outlined below:

a) Records of Waste Movements

Daily records shall be maintained for the waste accepted and treated waste removed from the site. This record shall include the following minimum details:

(i) **Waste Accepted: -** Records on day-to-day basis (as per the format given at **Annexure-II**) shall be maintained with respect to the waste collection date, name of the healthcare unit with bar cade, waste category as per BMWM Rules, category-wise quantity of waste accepted, vehicle

registration number used for collection of bio-medical waste from member health care facilities, time at which waste collected from member HCFs, name of the vehicle driver and his signature and waste receiving date & time (at CBWTF site). Similar information to be acknowledged to the member health care facility by the CBWTF operator on daily basis.

(ii) **Treated Waste to be Disposed:-** Date, treated waste type, Quantity, vehicle number, disposal as stipulated under BMWM Rules.

b) Logbook for the treatment equipment

A logbook shall be maintained for each treatment equipment installed at the site and shall include the following:

(i) The weight of each batch.
(ii) The categories of waste as per the Rules.
(iii) The time, date and duration of each treatment cycle and total hours of operations.
(iv) The complete details of all operational parameters during each cycle.

Log book to be maintained for operating the incinerator/plasma pyrolysis as well as the autoclave as per the formats given at **Annexure –III.**

c) Monitoring and reporting of operations in the CBWTF: The monitoring of the key operating parameters of treatment equipment provides several benefits. First, monitoring provides the operator with information needed to make decisions on necessary combustion control adjustments. Second, properly maintained monitoring records can provide useful information for identifying operating trends and potential maintenance problems. Following are the suggested parameters for monitoring of the treatment equipment

(i) **Monitoring of operating parameters of the incinerator/plasma pyrolysis:** Following operating parameters can be monitored in case of incinerator:

- Charge rate.
- Combustion gas temperature in primary and secondary chamber as well as the temperature of the stack exit gas (flue gas).
- Condition of the draft (negative draft in primary chamber).

- Combustion gas oxygen level in primary and secondary chamber as well as stack exit gas.
- Air flow rate through the incinerator/plasma pyrolysis.
- Carbon-Di-Oxide (CO_2), Oxygen (O_2) and Carbon Monoxide (CO) level in the flue gas.
- Quantity of auxiliary fuel usage as well as the power consumption (in every batch).
- Pressure drop in the primary and APCD attached with the incinerator /plasma pyrolysis and
- Bottom Ash or slag quality (for Total Organic Carbon (TOC) as well as loss on ignition and the hazardous constituents (at least once in a quarter).

(ii) **Monitoring of operating parameters of the Autoclave:** Following operating parameters can be monitored during the sterilization using autoclave:

- Time at which sterilization started and time at which sterilization completed.
- Temperature conditions maintained throughout the sterilization
- Conditions of pressure maintained throughout the sterilization
- Duration of sterilization
- Validation test results

Records concerning the above parameters need to be maintained and checked periodically for taking remedial measures during the operation of the incinerator or plasma pyrolysis or autoclave. In case of other treatment processes, the operational conditions as well as the efficacy tests to be complied with as per the standards prescrined under the BMWM Rules.

(iii) Frequency of monitoring:

The CBWTF operator shall carry out following tests 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 (SPCB/PCC), as suggested below:

- **Stack emission monitoring:** Stack Emission shall be monitored (under optimum capacity) for parameters such as Particulate Matter, HCl, NO_x, Hg & compounds and combustion efficiency once in three months as

required under schedule II of the Bio-medical Waste Management Rules 2016 (All monitored values shall be corrected to 11% Oxygen on dry basis). In case of dioxins and furans, monitoring should be done once in a year (monitored values shall be corrected to 11% Oxygen on dry basis).

- **Validation test of autoclave/microwave/chemical treatment/Dry heat sterilization:** Suggested validation test for treatment of bio-medical waste by autoclave/microwave/chemical treatment/Dry heat sterilization is given in **Table 1.**

Table 1: Suggested validation test for treatment of bio-medical waste by autoclave/microwave/chemical treatment/Dry heat sterilization

S. No	Type of equipment used for treatment of bio-medical waste	Type of Validation Test	Frequency
(i)	Autoclave	(i) biological indicator strips or vials (Geobacillus stearothermophilus spores with at least $1X10^6$ spores),	once in three months
		(ii) chemical indicator strip or tape	each batch of waste treated
(ii)	Microwave	Bacillus atrophaeus spores using vials or spore strips with at least 1 x 10^4spores per detachable strip	-
(iii)	Chemical treatment	Bacillus Subtilis (ATCC 19659)-4 Log10 reduction or greater	-
(iv)	Dry heat sterilisation	consistently kill the biological indicator Geobacillus Stearothermophillus or Bacillus Atropheaus spoers using vials with at least 6 log10 spores per ml.	Once in three months
		A chemical indicator strip or tape	Once in a week

(iv) Liquid effluent: Parameters such as pH, Suspended Solids, Oil & Grease, BOD, COD, Bio-assay for liquid effluent being discharged from the CBWTDF.

d) Site Records:

Site records shall include the following:

(i) All the approvals obtained from other concerned departments other than the prescrined authority
(ii) Details of construction or engineering works;
(iii) Maintenance schedule, breakdowns/trouble shootings and remedial actions;
(iv) Emergencies;
(v) Incidents of unacceptable waste received and the action taken; and
(vi) Details of site inspections by the officials of the regulatory authorities and necessary action on the observations.

Daily, monthly and annual summary records of all the above shall be maintained and made available at the site for inspection and same submitted whenever required by an authorized official of the concerned regulatory authorities.

12) Collection and transportation of bio-medical waste

The collection and transportation of bio-medical waste shall be carried out in a manner so as to prevent any possible hazard to human health and environment. 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 healthcare units, reach CBWTF without any damage, spillage or unauthorized access by public, animals etc. A responsible person from the CBWTF operator shall always accompany the vehicle to supervise the collection and transportation of bio-medical waste.

a) Collection of bio-medical waste:

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, to the CBWTF operator. Dedicated temporary storage at healthcare unit shall be designated. The coloured bags handed over by the healthcare units shall be collected in similar coloured containers with proper cover. Each bag shall be labeled as per Schedule IV of the Bio-medical Waste Management Rules as well as with bar coding system (to be complied by the occupier as per BMWM Rules) so that at any time, the healthcare units can be traced back that are not segregating the bio-medical wastes as per the Rules. The coloured containers should be strong enough to withstand any possible damage that may occur during loading, transportation or unloading of such containers. These containers shall also be labeled as per the Schedule IV of the Rules. Sharps shall be collected in puncture resistant container. 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 healthcare unit, the type and quantity of waste received, time at which collected from the member HCF, signature of the authorised person from the healthcare unit etc**.** During transportation, the containers should be covered in order to prevent exposure of public to odours and contamination.

(b) Transportation of the collected bio-medical waste to the CBWTF:

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

(i) Transportation vehicle shall be fitted with GPS to track the movement of the vehicle.

(ii) Separate cabins shall be provided for driver/staff as well as for placing the designated colour coded bio-medical waste containers.

(iii) The base of the waste cabin shall be leak proof to avoid pilferage of liquid during transportation.

(iv) The waste cabin may be designed for storing waste containers in tiers and also should be provided with a lighting provision.

(v) The waste cabin shall be so designed that it is easy to wash and disinfect.

(vi) The inner surface of the waste cabin shall be made of smooth surface to minimize water retention.

(vii) The waste cabin shall have provisions for sufficient openings in the rear and/or sides so that waste containers can be easily loaded and unloaded.

(viii) The vehicle shall be labeled with the bio-hazard symbol (as per Schedule IV of the BMWM Rules) and should display the name, address and contact telephone and mobile number of the CBWTDF.

(ix) The vehicle driver should carry always valid registration of the vehicle obtained from the concerned transport authority and also carry valid 'pollution under control certificate' issued by the authorized certificate issuing agency.

Depending upon the area to be covered under the CBWTF, the route of transportation shall be worked out. The transportation routes of the vehicle shall be designed for optimum travel distance and to cover all member healthcare units of the CBWTF. The CBWTF operator should ensure online and real time tracking & monitoring provisions should be given access with passwords to SPCB/PCC and CPCB to cross check the movement of the transportation vehicles on any time by the SPCB/PCC/CPCB. As far as possible, the transportation shall be carried out during non-peak traffic hours. If the area to be covered is very large, a satellite station may be established to store the bio-medical waste collected from the adjoining areas. The wastes so stored at satellite station may then be transported to the CBWTF in a big vehicle. It shall be ensured that the total time taken from generation of bio-medical waste to its treatment, which also includes collection and transportation time, shall not exceed 48 hours.

13) Disposal option of solid waste generated from the CBWTF

Treated plastic waste, incineration ash, treated waste sharps, glass waste, Oil & glass waste and ETP sludge are generally generated from the CBWTF from the treatment systems such as autoclaving/microwaving, incineration, chemical disinfection and effluent treatment plant respectively. The treated bio-medical waste shall be disposed as per the options suggested in the **Table 2** given below:

Table 2: Suggested Disposal option of solid waste generated from the CBWTSF

Sl. No.	Treated Waste Category	Suggested Treatment and Disposal Options
1.	Plastic wastes after disinfection and shredding	Treated plastic waste to be sent to registered or authorized recyclers or for energy recovery or plastics to diesel or fuel oil recovery or for road making, whichever is possible. Plastic waste should not be sent to landfill sites.
2.	Disinfected Sharps (including needles and -syringes)	Treatment by Autoclaving or Dry Heat Sterilization followed by shredding or mutilation or encapsulation in metal container or cements concrete; combination of shredding cum autoclaving; and sent for final disposal to iron foundries (having consent to operate from the State Pollution Control Boards or Pollution Control Committees) 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, if toxic or hazardous constituents are present beyond the prescribed limits as given in 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 and disposal in Secured Landfill if toxic or hazardous constituents are

Sl. No.	Treated Waste Category	Suggested Treatment and Disposal Options
		present beyond the prescribed limits as given in the Hazardous and Other Waste Management & Transboundary Movement Rules, 2016, or as revised from time to time

14) Cost to be charged by the CBWTF Operator for the Health Care Facilities

Cost to be charged from the health care facilities plays an important role in financial viability and sustaining the Operation of a CBWTF project and for providing the best treatment services to the Health Care Units and for ensuring compliance to the BMWM Rules. The cost shall be so worked out that neither it becomes a monopoly of the CBWTF operator nor the interest of the CBWTF operator is overlooked. It is recommended that cost to be charged from the healthcare units.

Depending on the size, no, of beds and the distance from the location of the CBWTF and same shall be worked out in consultation with the concerned SPCB/PCC and the local Medical Association, keeping in view the following options:

a) Fixed charges depending on the average quantity of waste generation per day, in case of the nursing homes/clinics/Sample Collection Centres/Dental Centres and other non-bedded hospitals depending on the size;

b) Fixed charges per bed per day basis to the low bed strength hospitals (upto 30 beds). In case of less than 30 bedded hospitals, charges may be reduced proportionately by the CBWTF based on the bed strength to be declared by the HCF in their web site.

c) Charges to the hospitals having 30 or more beds. However, reduction in the charges need to be levied by the operator depending on the no. of beds of the individual HCF based on the occupancy of the beds to be declared by the HCF in the web site as per BMWM Rules.

Note:

(i) Rates are required to be revised once in two years considering the prevailing market price especially in respect of the labour expenses, diesel prices, electricity, operating cost etc.,.

(ii) The Health Care Facilities are required to ensure timely payments to the CBWTFs for ensuring timely treatment services in compliance to the BMWM Rules.

(iii) Also, SPCB/PCC shall impose a condition to every HCFs while granting authorisation under the BMWM Rules to submit the 'No Due Certificate' obtained from the CBWTF operator along with the annual report to be submitted by the prescrined authority by 30 th June 30 of every year.

15) Check list for development of CBWTF

The criteria for development of CBWTDF have been discussed in detail in the previous sections. However, to have at a glance check in developing CBWTDF, checklist is reproduced for convenience and is annexed **(Annexure-IV).**

16) Periodic inspection/monitoring or performance evaluation of the CBWTF

To have uniformity in performance evaluation of the CBWTF throughout the country, a check list for performance evaluation of the CBWTF for carrying out inspection/monitoring/compliance verification has been prepared and is annexed **(Annexure –V)**. All the prescribed authority (SPCB/PCC) shall inspect the CBWTDFs at least once in six months located in the respective State/UT and a copy of the reports shall 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. Upon receipt of the inspection reports from the SPCBs and PCCs, CPCB shall carryout random inspections once in a quarter.

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Annexure –I

Design and Construction of Bio-medical Waste Incinerator

1. General

i. These guidelines shall be applicable only to the new installation of incinerators. However, the existing incinerator shall be retrofitted with Air Pollution Control Device as mentioned in these guidelines.

ii. Incinerator shall be allowed only at Common Bio-medical Waste Treatment Facility (CBWTF).

iii. Installation of individual incineration facility by a healthcare unit shall be discouraged as far as possible but approval may be granted only in certain inevitable situations where no other option is available.

2. Incinerator

Following design criteria may be adopted for better performance:

i. The incinerator shall be designed for capacity more than 50 kg/hr. For 50 kg/hr capacity, the minimum hearth area shall be 0.75 sq. m (8 sq. feet) and the minimum flow of the flue gas in the secondary chamber shall be $0.6m^3$/sec at 1050°C. Each incinerator must be installed with an air pollution control system (as specified in the section 3).

ii. The size of the opening through which the waste is charged shall be larger than the size of the waste bag to be fed. The volume of the primary chamber shall be at least five times the volume of one batch.

iii. The double chamber incinerator shall preferably be designed on "controlled-air" incineration principle, as particulate matter emission is low in such incinerator. Minimum 100% excess air shall be used for overall design. Air supply in the primary and secondary chamber shall be regulated between 30%-80% and 170%-120%of stoichiometric amount respectively. Primary air shall be admitted near / at the hearth for better contact. Flow meter / suitable flow measurement device shall be provided

on the primary & secondary air ducting. The combustion air shall be supplied through a separate forced draft fan after accounting for the air supplied through burners. *Optional:* For higher capacity incinerators, typically above 250 kg/hr, other design e.g. *Rotary Kiln shall be preferred, in case the total bio-medical waste treated in a batch (8 hour) is exceeding 2.5 Tons.*

iv. A minimum negative draft of 1.27 to 2.54 mm of WC (Water Column) shall be maintained in the primary chamber to avoid leakage of gaseous emissions from the chamber and for safety reasons. Provision shall be made in the primary chamber to measure the Water Column pressure.

v. The waste shall be fed into the incinerator in small batches after the fixed interval of time in case of fixed hearth incinerator and continuous charging using appropriate feeding mechanism in case of rotary kiln incinerator or as recommended by the manufacturer. The size of the hearth i.e. primary chamber shall be designed properly.

vi. The sides and the top portion of the primary and secondary chambers shall preferably have rounded corner from inside to avoid possibility of formation of black pockets/dead zones.

vii. The size of the secondary chamber shall be properly designed so as to facilitate a minimum of two seconds residence time to gas flow. For the estimation of residence time in the secondary chamber its volume shall be calculated starting from the secondary burner tip to the thermocouple.

viii. The refractory lining of the chamber shall be strong enough to sustain minimum temperature of 1000° C in the primary chamber and 1200° C in the secondary chamber. The refractory & insulation bricks shall have minimum 115 mm thickness each & conform to IS:8-1983 & IS:2042-1972 respectively.

ix. The Incinerator shell shall be made of mild steel plate of adequate thickness (minimum 5 mm thick) & painted externally with heat resistant aluminum paint suitable to withstand temperature of 250°C with proper surface preparation. Refractory lining of the hot duct shall be done with refractory castable (minimum 45 mm thick) & insulating castable

(minimum 80 mm thick). Ceramic wool shall be used at hot duct flanges & expansion joints.

x. The thermocouple location shall be as follows: In Primary chamber- Before admission of secondary air In Secondary chamber - At the end of secondary chamber or before admission of dilution medium to cool the gas.

xi. There shall be a separate burner each for the Primary & Secondary chamber. The heat input capacity of each burner shall be sufficient to raise the temperature in the primary and secondary chambers as minimum of 800 °C and 1050±50°C respectively within maximum of 60 minutes prior to waste charging. The burners shall have automatic switching "off/on" control to avoid the fluctuations of temperatures beyond the required temperature range.

(a) Each burner shall be equipped with spark igniter and main burner.
(b) Proper flame safeguard of the burner shall be installed.
(c) Provide view ports to observe flame of the burner.
(d) Flame of the primary burner

- shall be pointing towards the centre of the hearth.
- shall be having a length such that it touches the waste but does not impinge directly on the refractory floor or wall.
- The secondary burner shall be positioned in such a way that the flue gas passes through the flame.

xii. There shall not be any manual handling during charging of waste in to the primary chamber of the incinerator. The waste shall be charged in bags through automatic feeding device at the manufacturer's recommended intervals ensuring no direct exposure of furnace atmosphere to the operator. The device shall prevent leak age of the hot flue gas & any backfire. The waste shall be introduced on the hearth in such a way so as to prevent the heap formation. Suitable raking arrangement shall be provided for uniform spreading of waste on the hearth.

xiii. A tamper-proof PLC (Programmable Logic Control) based control system shall be installed to prevent:

(a) Waste charging until the required temperature in the chambers is attained during beginning of the operation of the incinerator.

(b) Waste charging unless primary & secondary chambers are maintained at the specified temperature range.

(c) Waste charging in case of any unsafe conditions such as - very high temperature in the primary & secondary chambers; failure of the combustion air fan, ID fan, recirculation pump; low water pressure& high temperature of the flue gas at the outlet of air pollution control device.

xiv. The incineration system must have an emergency vent. The emergency vent shall remain closed i.e. it shall not emit flue gases during normal operation of the incinerator.

xv. Each incineration system shall have graphic or computer recording devices which shall automatically and continuously monitor and record dates, time of day, batch sequential number and operating parameters such as temperatures in both the chambers. CO, CO_2 , and O_2 in gaseous emission shall also be measured daily (at least ½ hour at one minute interval).

xvi. The possibility of providing heat recovery system/heat exchanger with the incinerator shall also be considered wherever possible.

xvii. Structural design of the chimney / stack shall be as per IS: 6533-1989. The chimney/stack shall be lined from inside with minimum of 3 mm thick natural hard rubber suitable for the duty conditions and shall also conform to IS:4682 Part I-1968 to avoid corrosion due to oxygen and acids in the flue gas.

3. Air Pollution Control Device

It is not possible to comply with the emission limits prescribed under the BMWM Rules, 2016 without Air Pollution Control Device (APCD). A bio-medical waste

incinerator shall always be equipped with suitable APCD and no incinerator shall be allowed to operate unless equipped with APCD. Therefore, Pollution control devices are required to comply with prescribed standards especially for particulate matter, HCl, NOX, combustion efficiency, Mercury & its compounds and Dioxins/Furans as prescribed under the BMWM Rules, 2016. There are many combinations of treatment equipment (both wet systems and dry systems or in combination) for gas cleaning and removal of air pollutants, to comply with the standards. Designed treatment scheme may comprise of the following equipment, in combination, with adequate efficiencies to meet the emission standards:

i. **Particulate matter:** Fine particulates in the flue gases requires specific dust separation technologies such as settling chamber, bag filters, electro static precipitator or wet scrubbers in order to meet flue gas standard. In case of electro static precipitators, special care is required to avoid electric sparks due to the dust to avoid reformation of dioxins and adsorption to the fine dust.

ii. **HCl**: In order to control HCl to the desired level, in particular chlorides, conventionally alkali scrubbers (having pH around 7 to 8.5) are permitted.

iii. **Mercury:** If the feeding bio-medical waste contains mercury and its compounds, there is an every chance of these emissions to get air borne. Therefore, requires specific treatment for control of these emissions. (Eg. activated carbon, conversion into mercuric chloride and then to mercuric sulphide etc.).

iv. **Dioxins:** Keeping De-novo synthesis in the backdrop, steps must be taken to prevent reformation of dioxins by rapidly lowering the flue gas temperatures, particularly from 500° C to less than 200° C by adopting rapid quench / catalyst / adsorption by activated carbon etc.

v. **Mist** : Often Bio-medical waste incinerators often need to eliminate the mist in the stack emissions, therefore, wherever necessary de-mister may be provided.

vi. **Oxygen correction:** *Oxygen correction to the measured concentrations is to be done only when the measured % oxygen concentration is higher*

than the standard % oxygen concentration (i.e. 11%). Correction Formula to calculate the emission concentration at standard percentage of oxygen concentration is as follows:

$$Es = \frac{(21 - Os)\ (Em)}{(21 - Om)}$$

Where,
Es = Calculated emission concentration at the standard percentage oxygen concentration
Em = Measured emission concentration.
Os = Standard oxygen concentration.
Om = Measured oxygen concentration.

vii. Stack height and the monitoring provision

Stack height shall not be less than 30 meters as stipulated under the BMWM Rules, 2016.

viii. Stack Monitoring provision: The sampling location and other monitoring specification of porthole, platform ladder etc. shall be as per the Emission Regulations, Part-3 (COINDS/20/1984-85), published by CPCB to collect stack samples from the chimney for monitoring the air pollutants, as and when required. For monitoring of Dioxins and Furans, separate monitoring provision is required as per **Annexure-VI.**

ix. **Frequency of monitoring:** The bio-medical waste incinerator operator shall carry out stack emission monitoring 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 (SPCB/PCC). Stack Emission shall be monitored (under optimum capacity) for parameters such as Particulate Matter, HCl, NO_x, Hg & compounds and combustion efficiency once in three months as required under schedule II of the Bio-medical Waste Management Rules 2016 (All monitored values shall be corrected to 11% Oxygen on dry basis). In case of dioxins and furans, monitoring should be done once in a year (monitored values shall be corrected to 11% Oxygen on dry basis). Also, the bio-medical waste treatment facility shall install continuous emission monitoring system for

the parameters as stipulated by State Pollution Control Board or Pollution Control Committees in authorisation and transmit the data real time to the servers at State Pollution Control Board or Pollution Control Committees and Central Pollution Control Board as stipulated under the BMWM Rules, 2016. Complete details of operation & compliance with regulatory requirements need to be made available to the public in the Web-site by all the bio-medical treatment facility operators in compliance to the BMWM Rules, 2016.

x. **Monitoring of Dioxins and Furans:**

Dibenzo-p-dioxins and dibenzofurans: Analysis of dioxins and furans as well as reference measurement methods to calibrate automated measurement systems shall be carried out as given by CEN-standards. If CEN-standards are not available, ISO standards, National or International Standards, which will ensure the provision of data of an equivalent scientific quality, shall apply.

The total concentration of dioxins and furans is to be calculated by multiplying mass concentrations of following Dibenzo-p-dioxins and dibenzofurans with their toxic equivalence factors, before summing:

Name of Congener		Toxic equivalence factor
2,3,7,8	Tetrachlorodibenzodioxin	1.0
1,2,3,7,8	Pentachlorodibenzodioxin	0.5
1,2,3,4,7,8	Hexachlorodibenzodioxin	0.1
1,2,3,6,7,8	Hexachlorodibenzodioxin	0.1
1,2,3,7,8,9	Hexachlorodibenzodioxin	0.1
1,2,3,4,6,7,8	Heptachlorodibenzodioxin	0.01
	Octachlorodibenzodioxin	0.001
2,3,7,8	Tetrachlorodibenzofuran	0.1
2,3,4,7,8	Pentachlorodibenzofuran	0.5

1,2,3,7,8	Pentachlorodibenzofuran	0.05
1,2,3,4,7,8	Hexachlorodibenzofuran	0.1
1,2,3,6,7,8	Hexachlorodibenzofuran	0.1
1,2,3,7,8,9	Hexachlorodibenzofuran	0.1
2,3,4,6,7,8	Hexachlorodibenzofuran	0.1
1,2,3,4,6,7,8	Heptachlorodibenzofuran	0.01
1,2,3,4,7,8,9	Heptachlorodibenzofuran	0.01
	Octachlorodibenzofuran	0.001

xi. **Quench/scrubber liquid waste management:**

Appropriate treatment to the wastewaters from cleaning of exhaust gases shall be provided. Also, the treated wastewater shall conform to the disposal specific effluent standards.

4. Incinerator room and waste storage room

i. The incinerator structure shall be built in a room with proper roofing and cross ventilation. There shall be minimum of 1.5 m clear distance in all the directions from the incinerator structure to the wall of the incinerator room.

ii. Adjacent to the incinerator room, there shall be a waste storage area. It shall be properly ventilated and so designed that waste can be stored in racks and washing can be done very easily. The waste storage room shall be washed and chemically disinfected daily.

iii. The floor and inner wall of the incinerator and storage rooms shall have outer covering of impervious and glazed material so as to avoid retention of moisture and for easy cleaning.

iv. The incineration ash shall be stored in a closed sturdy container in a masonry room to avoid any pilferage. Finally, the ash shall be disposed in a secured landfill.

4. Operator of the incinerator

i. A trained /competent person shall be designated to operate and maintain the incinerator. The operator shall have adequate qualification in relevant subject and shall be certified by the incinerator supplier in operation & maintenance of the incinerator.

ii. There shall be at least one assistant designated at the incinerator plant to keep track of the wastes, records of incinerator operation, cleanliness of the surrounding area and incinerator & waste storage room. They shall also take care of waste charging and incineration ash disposal.

iii. All the staff at the incinerator plant shall put on protective gears such as gumboots, gloves, eye glasses, etc. for safety reasons.

iv. Any accident occurred shall immediately be reported to the facility operator. The facility operator shall have well defined strategies to deal with such accident/emergency.

Note:

(I) APCD suggested under this guideline is only recommendatory and the operator is required to provide suitable APCD of his/her choice to comply with the norms stipulated under schedule II of the BMWM Rules, 2016 and existing incinerator operator are also required to upgrade the requisite APCD as per the stipulated time period, to ensure compliance to the dioxins and furans in stack emissions.,

(II) These guidelines are also applicable to the plasma pyrolysis. The operating parameters of the plasma pyrolysis and the emission standards should be in line with schedule II of the BMWM Rules, 2016.

(III) The guidelines will help in selection/installation of better incinerator system. However, it shall be ensured that the incinerator shall comply with the standards stipulated under schedule II of the Bio-medical Waste Management Rules, 2016 notified under the Environment (Protection) Act, 1986.

Annexure-II

Format for maintaining the Records by the CBWTF Operator alongwith the transportation Vehicle used for collection of bio-medical waste from the member HCFs

Name of the CBWTF :
Address of the CBWTF with contact details :
Vehicle Registration Number (certificate to be carried by the vehicle driver) :

Date	Time of arrival of the vehicle	Vehicle Speedometer mileage readings in KM		Name of the HCF from whom waste collected	Category-wise quantity of bio-medical waste received in kg					Name of the Vehicle driver	Signatures	
		Initial	Final		Yellow	Red	Blue	Out dated medicines	Waste Sharps		Vehicle Driver	Representative of the HCF

Route covered (indicate places) by the vehicle :

Annexure -III

Log book for Operating the Incinerator/Plasma Pyrolysis

Date	Time	Quantity of BMW charged in one hour in Kg	Temperature maintained in ^{o}C			Negative draft in primary chamber *(in mm of water column)*	Pressure drop across APCD *(in mm of water column)*	p^{H} level of scrubbed liquid used	Average values of flue gas analysis results 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 bio-medical Waste left over in a day (in Kg)
			Primary Chamber	Secondary Chamber	After scrubbing in exit stack gas				CO in mg/Nm^3	O_2 in %	CO_2 in %	Power (indicate electricity meter reading)		Diesel in liters		
												Initial reading	Final reading			(17)=(16) – (3)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	14)	(15)	(16)	(17)

Log Book for Operating the Autoclave

Date	Time	Batch number	Quantity of waste feeding per batch in Kg	Temperature and Pressure in every ten minutes		Strip test result (indicate for each batch with a proof)	Consumption of electricity and Diesel			Net Quantity of waste received in Kg	Net Quantity of Waste left over in Kg
				Temperature in ^{o}C	Pressure in psi		Power (indicate electricity meter reading)		Diesel in liters		
							Initial reading	Final reading			(12)= (11) – (4)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)

Annexure -IV

CHECK LIST FOR DEVELOPMENT OF A COMMON BIO-MEDICAL WASTE TREATMENT FACILITY & FOR ISSUING 'CONSENT TO ESTABLISHMENT' UNDER WATER & AIR ACTS

1.	Name of the Proponent	:			
2.	Proposed location of the CBWTF	:			
3.	No. of HCFs in the locality	:			
4.	No. beds	:			
5.	Total Bio-medical Waste Generation in kg/day	:			
	(i) Incinerable in kg/day	:			
	(ii) Autoclavable in kg/day	:			
	(iii) Glass waste in kg/day	:			
	(iv) Waste sharps in kg/day	:			
6.	**Proposed location of the CBWTDF**: located away from				
	a) Residential area	:	Yes □	No □	
	b) Sensitive area	:	Yes □	No □	
	c) Industrial area	:	Yes □	No □	
	d) Is it located at a distance 1 KM from residential & sensitive area	:	Yes □	No □	
	e) Is it as a part of TSDF	:	Yes □	No □	
	f) Is the facility proposed in Metropolitan city:		Yes □	No □	
	g) Is the facility proposed in Hilly Region	:	Yes □	No □	
7.	**Proposed land for CBWTF:**				
	a) Area about 1 acre	:	Yes □	No □	
	b) Area less than 1 Acre	:	Yes □	No □	
	c) Area more than 1 Acre	:	Yes □	No □	
8.	**Proposed coverage area of the CBWTF:**				
	a) Any facility located upto a radius of 150 KM from the proposed locality	:	Yes □	No □	
	b) No. of beds covered by the existing facility/proposed facility:				
	(i) more than 10, 000 beds	:	Yes □	No □	
	(ii) less than 10,000 beds	:	Yes □	No □	

c) Is there any CBWTF within the radius of 150 KM: Yes □ No □

d) Is locality requires any additional capacity (within a radius of 150 KMs) ?. : Yes □ No □

(i) If so, indicate reason: .....

e) BMW Waste generation in a region under consideration: ..... Kg/day

f) Existing CBWTF treatment Capacity :

(a) Incineration/plasmapyrolysis : ..... Kg/day

(b) Autoclave/ hydroclave /chemical treatment : .....Kg/day

9. Requirement of Treatment Facility: Following treatment facilities shall be provided in any common facility:

a) Autoclave (Pre-vaccum horizontal feeding) / Hydroclave / Microwave. : Yes □ No □

a) Incineration : Yes □ No □

b) Shredder : Yes □ No □

c) Sharp pit (with drawing details) : Yes □ No □

d) Encapsulation/Recovery of metal in some factory: Yes □ No □

e) Provision for floor washing/vehicle washing: Yes □ No □

f) Effluent Treatment Plant : Yes □ No □

g) Secured land fill/Disposal of ash in TSDF: Yes □ No □

10. Segregation

(i). Segregation shall be as per the Bio-medical Waste Management Rules, 2016 as amended as well as compatible with treatment facilities at CBWTDF as suggested by the operator

(ii). Generator is responsible for providing segregated waste to the operator.

(iii). The operator shall not accept un-segregated waste and report the matter to the prescribed authority.

11. Collection

(i) Respective coloured bags provided with bar code should be kept in similar coloured container i.e. coloured bags shall not be directly kept in vehicle.

(ii) Sharps shall be collected in puncture resistant, leak proof, rigid containers.

(iii) Temporary storage at healthcare unit shall be designated.

12. Transport Vehicle

(I) Dedicated vehicles for collection of Bio-medical waste.

(II) Separate cabins shall be provided for driver/staff and the bio-medical waste containers.

(III) The base of the waste cabin shall be leak proof to avoid pilferage of liquid during transportation.

(IV) The waste cabin may be designed for storing waste containers in tiers.

(V) The waste cabin shall be so designed that it is easy to wash and disinfect.

(VI) The inner surface of the waste cabin shall be made of smooth surface to minimize water retention.

(VII) The waste cabin shall have provisions of sufficient openings in the rear and/or sides so that waste containers can be easily loaded and unloaded.

(VIII) The vehicle shall be labeled with the bio-hazard symbol (as per Schedule IV of BMWM Rules) and should display the name, address and telephone number of the CBWTF.

13. Storage

(I) Sufficient ventilated storage space for untreated and treated bio-medical waste shall be provided.

(II) The flooring and walls (to a height of 2M from floor) shall be finished with smooth and fine material. There shall be minimum number of joints.

14. Record Keeping

(I) Documents such as collection advice taken from health care units for each category of waste, records of waste movements, logbook for the equipment and site records shall be maintained.

(II) All the record shall be available at the CBWTF site for inspection.

: Yes □ No □

15. Proposed Treated Waste Disposal method:

(i). Incineration ash - Secured landfill/near by TSDF: Yes □ No □

(ii). Plastic waste after disinfection and shredding – Registered Recycling Unit

: Yes □ No □

(iii). Sharps, after disinfection (if encapsulated) - Municipal landfill

: Yes □ No □

(iv). Treated wastewater – Discharge into sewer/drain or recycling in APCD

: Yes □ No □

(v). Oil & grease –By incineration: : Yes □ No □

16. Estimated energy consumption and fuel consumption per month :

(i) Estimated energy consumption per month

(a)	General lighting in the facility	:
(b)	Incinerator	:
(c)	Autolcave/microwave	:
(d)	Shredder	:
(e)	ETP	:
(f)	Any other	:

(ii) Estimated fuel consumption:

(a)	Diesel consumption	:..... in Kl per month
(b)	No. of hours of operation of DG Set	:
(c)	No. of hours of incineration	:

17. Whether the proponent obtained necessary approvals from the concerned departments as required : Yes □ No □

(i) If yes, attach details

18. Whether the proposal recommended for issuing consent to establish : Yes □ No □

(Signature of the official verified with date)

Annexure -V

Check List for Performance Evaluation of the Common Bio-medical Waste Treatment Facility (CBWTF)

S.No.	Details		Particulars
01.	Name of CBWTF with contact details	:	
02.	Date of visit	:	
03.	Location details of the CBWTF	:	a) In /near to Residential area: :Yes ☐ No ☐ b) In/near Sensitive area: Yes ☐ No ☐ c) In Industrial area : Yes ☐ No ☐ d) Is it located at a distance at least 1 KM from residential & sensitive area: Yes ☐ No ☐ Indicate exact distance: in KM e) Is it as a part of TSDF: Yes ☐ No ☐ f) Is the facility proposed in Metropolitan city : Yes ☐ No ☐ (i)Name of the City: ..... g) Is the facility proposed in Hilly Region : Yes ☐ No ☐ (i)Name of the City: .....
04	Month / year of establishment and the Consents status	:	Establishment Month/Year :
05.	CBWTF set up by	:	
06.	CBWTF operated by	:	
07.	Total number of healthcare facilities and beds covered (as on date of visit)	:	No. of HCFs : No. of Beds : No. of beds upto 150 KM radius :

S.No.	Details		Particulars
08.	Total BMW Treatment Capacity of CBWTF (in kg / day)	:	Incineration : Autoclave : Any other treatment and disposal:
09.	**Consents and Authorization details :**		
9.1	Consent under Water (Prevention and Control of Pollution) Act, 1974	:	☐ Applied for ☐ Possess Valid Consent ☐ Not renewed ☐ No consent If obtained: Consent is valid upto ..... and issued by .....SPCB/PCC vide letter dated .....
9.2	Consent under Air (Prevention and Control of Pollution) Act, 1981	:	☐ Applied for ☐ Possess Valid Consent ☐ Not renewed ☐ No consent If obtained: Consent is valid upto ..... and issued by .....SPCB/PCC vide letter dated .....
9.3	**Environmental Clearance (EC)**		☐ Applied for ☐ Not applied ☐ Obtained ☐ Not obtained If obtained: EC issued by SEIAA or MoEF & CC vide letter dated .....
9.4	Authorization under BMW Rules, 1998	:	☐ Applied for ☐ Possess Valid Consent ☐ Not renewed ☐□ No consent If obtained: Consent is valid upto ..... and issued by .....SPCB/PCC vide letter dated .....
10.	Investment in setting up the CBWTF	:	
11.	Area of plot size for CBWTF (Sq. ft.)	:	
12	Annual Report submission for the year	:	Submitted before due date : :Yes ☐ No ☐ If yes, provide details of waste collected, received and treated & disposed of: .....

S.No.	Details		Particulars
12.	Coverage area of CBWTF (radius in KM covered)	:	Coverage area upto 150 km radius: Yes ☐ No ☐
13.	Name of Districts/Cities / places being covered	:	
14.	Daily operation schedule (timings)	:	Collection : ...am to .... pm. Incineration :....AM to ....PM
15.	Cost charged to the healthcare facilities	:	
16.	**Total quantity of bio-medical waste treated: kg/day (avg.)**		
16.1	Incinerable	:	..... %
16.2	Autoclaving	:	.....%
16.3	Others (please specify)	:	.....%
17.	**Staff involvement in CBWTDF operation (number of persons):**		
17.1	Managerial / Administration	:	
17.2	Equipment operations	:	
17.3	Transportation of BMW	:	
17.4	Sanitation and others	:	
17.5	Total persons excluding managers	:	
18.0	**Collection and Transportation of bio-medical waste from member HCFs :**		
18.1	No. of Vehicles used for collection of waste from member HCFs	:	
18.2	Vehicles are labeled as per BMW Rules	:	
18.3	Vehicles used are as per CPCB Guidelines	:	
19.0	Temporary untreated waste storage area	:	☐ Satisfactory ☐ No satisfactory

<table>
<tr><th>S.No.</th><th>Details</th><th></th><th>Particulars</th></tr>
<tr><td>20.0</td><td>Mode of conveyance of bio-medical waste from untreated waste storage area to the treatment equipment within the CBWTF</td><td>:</td><td>☐ Closed Trolley/Pull cart with bio-hazard symbol
☐ No Closed Trolley/Pull cart
☐ Others like .....</td></tr>
<tr><td>21.0</td><td colspan="3">Treatment equipment installed at CBWTDF</td></tr>
<tr><td>21.1</td><td>Incinerator capacity and make</td><td>:</td><td>..... kg /hr.</td></tr>
<tr><td>21.2</td><td>Daily Operation schedule of the incinerator (timings)</td><td>:</td><td></td></tr>
<tr><td>21.3</td><td>Consumption of auxiliary fuels</td><td>:</td><td>
<table>
<tr><th>S. No</th><th>Type of Fuel</th><th>Consumption Quantity in liters per day</th><th>Bill numbers of purchase of fuel</th></tr>
<tr><td>a)</td><td></td><td></td><td></td></tr>
<tr><td>b)</td><td></td><td></td><td></td></tr>
<tr><td>c)</td><td></td><td></td><td></td></tr>
<tr><td>d)</td><td></td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td>21.4</td><td>Stack attached with the incinerator</td><td>:</td><td>Diameter: m Height : m</td></tr>
<tr><td>21.5</td><td>Monitoring provision attached with the stack</td><td>:</td><td>☐ Platform ☐ Porthole ☐ access to the platform</td></tr>
<tr><td>21.6</td><td>Is stack monitoring provision satisfactory and as per CPCB guidelines</td><td>:</td><td>☐ Yes No</td></tr>
<tr><td>21.7</td><td>air pollution control systems attached with the incinerator</td><td>:</td><td>Quenching : ☐ Yes ☐ No
Venturi scrubber : ☐ Yes ☐ No
Droplet separator : ☐ Yes ☐ No
Mist eliminator : ☐ Yes ☐ No
Activated Carbon : ☐ Yes ☐ No
ID Fan : ☐ Yes ☐ No</td></tr>
</table>

S.No.	Details		Particulars
			Any other : ☐ Yes ☐ No (If Yes pl. indicate details:.....)
21.8	Waste feeding mechanism	:	Manual feeding : ☐ Yes ☐ No Automatic feeding : ☐ Yes ☐ No
21.9	Is PLC and automatic recording system (for recording operating parameters of the incinerator) attached with the incinerator	:	(i) PLC synchronized with waste feeding mechanism & in working condition: ☐ Yes ☐ No (I) PLC synchronized with recording system attached with incinerator and in working condition: ☐ Yes ☐ No
21.10	Operational conditions of the Incineration as observed during the visit	:	Temp. in Primary Chamber (range): .....^{O} C Temp. in Secondary Chamber (range):.....^{O} C Negative draft in Primacy Chamber : .....mm of WC Pressure drop in the Venturi: ..... mm of WC
21.11	Is on-line monitoring system/Flue gas analyser attached with the incinerator for flue gas analysis (i.e CO, O_2 and CO_2)	:	(i) Online monitoring system attached with incinerator: ☐ Yes ☐ No (ii) Flue gas analyser attached with the incinerator: ☐ Yes ☐ No (iii) Observed values of flue gas parameters: CO_2:. % ; O_2: ..... % and CO: ..... % (iv) Observed Combustion Efficiency: .....%
21.12	Fire safety measures adopted within the facility	:	☐ Yes ☐ No
21.13	Log book for operation of the incinerator is maintained and satisfactory	:	☐ Yes ☐ No

S.No.	Details		Particulars
21.14	Details of heat recovery system installed with incinerator	:	☐ Yes ☐ No
22.0	**Capacity of autoclave and-- make**	:	Autoclave of capacity ……..kg/cycle and make …… installed.
22.1	Operating conditions of utoclave/microwave as observed during the visit	:	Temperature : in ^{O}C Pressure : in psi Residence time : in minutes
22.2	Provision made for the autoclave /micorwave	:	Trolley for waste feeding : ☐ Yes ☐ No Graphic or computer recording device attached: ☐ Yes ☐ No
22.3	Spore test or strip test conducted regularly and records maintained	:	☐ Yes ☐ No
22.4	Performance of autoclaving by spore testing or routine test	:	☐ Satisfactory ☐ Not satisfactory
22.5	Log book maintained for autoclave is satisfactory	:	☐ Yes ☐ No
23.0	**Capacity of shredder and make**	:	….. kg/hr. Self designed & got fabricated locally.
24.0	Details of sharp pit / Encapsulation facility	:	Sharp Pit provided : ☐ Yes ☐No Is it as per CPCB guideline : ☐ Yes ☐No Records maintained : ☐ Yes ☐No Total quantity of waste sharps stored: Total quantity of waste sharps treated and disposed:

<table>
<tr><th>S.No.</th><th>Details</th><th></th><th>Particulars</th></tr>
<tr><td>25.0</td><td colspan="3">Water Balance</td></tr>
<tr><td>25.1</td><td>Source and quantity of water intake per day (cu.m / day)</td><td>:</td><td>Water consumption source:

Water is drawn at ….. KLD approximately.

Is magnetic water flow meter attached to the water source/water storage tank :
☐ Yes ☐No
Magnetic water flow meter readings as per record (for last month):
1 St Day of Month :
Last day of month :
Magnetic Flow meter as observed during the visit:
<table>
<tr><th rowspan="2">S. No</th><th rowspan="2">Month</th><th colspan="2">Magnetic flow meter reading</th></tr>
<tr><td>Initial</td><td>Final</td></tr>
<tr><td>(1)</td><td>Previous month ……</td><td></td><td></td></tr>
<tr><td>(2)</td><td>On the date of visit:……</td><td></td><td></td></tr>
</table>
If water requirement is met from outside through tankers, provide following details:

No. of Tankers procured in a previous six months:

Total quantity of water consumed during the previous six months : .. ….. in KLD</td></tr>
<tr><td>25.2</td><td>Break up of water usage (such as washing, scrubbing etc.)</td><td>:</td><td>Scrubber – KL/hr or KLD
Washing – KLD
Disinfections – KLD
Gardening – KLD
Domestic – KLD</td></tr>
<tr><td>26.0</td><td>Total wastewater effluent generated per day</td><td>:</td><td>About ……KLD generated
Quantity of treated water reused/recycled in %:
Any other mode of disposal:</td></tr>
</table>

S.No.	Details		Particulars
27.	**Effluent treatment plant details**		
27.1	ETP Capacity	:	..... KL/Cycle
27.2	Flow Chart of ETP	:	ETP comprising of : .... Unit operations
27.3	Intake and Discharge of ETP	:	(i) Magnetic Flow measuring device provided at the outlet of ETP: ☐ Yes ☐ No (ii) Energy meter attached to the ETP: ☐ Yes ☐ No (iii) Energy consumed over a period of one month: = ... Units (iv) pH meter attached at the outlet of ETP: ☐ Yes ☐ No
27.4	Final mode of disposal of treated water	:	(i) Treated water is reused in the scrubber: ☐ Yes ☐ No (ii) Treated water is reused for gardening: ☐ Yes ☐ No (iii) Treated water is discharged in drain: ☐ Yes ☐ No (iv) Treated water is discharged in open area: ☐ Yes ☐ No
28.	**Status of infrastructure (Yes / No)**		
28.1	Separate treatment equipment room	:	☐ Yes ☐ No
28.2	Main waste storage room	:	☐ Yes ☐ No
28.3	Treated waste storage room	:	☐ Yes ☐No

S.No.	Details		Particulars
28.4	Administrative room	:	☐ Yes ☐No
28.5	Generator set	:	☐ Yes ☐No
	(i) Capacity	:	
	(ii) Stack attached as per DG Set norms	:	☐ Yes ☐ No
	(iii) Acoustic enclosure provided as per DG Set norms	:	☐ Yes ☐ No
	(iv) Is DG Set complying to the emissions norms and noise level norms	:	☐ Yes ☐ No
28.6	Site security (high walls, fencing, guarded gates etc.)	:	High walls on all four sides : ☐ Yes ☐ No Fencing on all the sides : ☐ Yes ☐ No Guarded Gates : ☐ Yes ☐ No
28.7	Parking facility	:	☐ Yes ☐ No
28.8	Sign board	:	☐ Yes ☐ No
28.9	Green belt	:	☐ Yes ☐ No
28.10	Washing room	:	☐ Yes ☐ No
28.11	First aid box	:	☐ Yes ☐ No
28.12	Lighting arrangements in the facility	:	☐ Yes ☐ No
28.13	Odour problem remedial	:	☐ Yes ☐ No
28.14	Fire fighting and emergency facilities	:	☐ Yes ☐ No
28.15	Measures for control of pests / insects etc.	:	☐ Yes ☐ No
28.16	Protective gear for waste handlers	:	☐ Yes ☐ No
28.17	Telephone facility	:	☐ Yes ☐ No

S.No.	Details		Particulars
28.18	Provision of washing, toilets and safe place for eating for the workers		☐ Yes ☐ No
29.	**Record keeping details**		
29.1	Waste Movement /Manifest record	:	☐ Yes ☐ No
29.2	Log book for treatment equipment	:	☐ Yes ☐ No
29.3	Site records	:	☐ Yes ☐ No
29.4	Incineration ash generation and final disposal records	:	☐ Yes ☐ No
29.5	Treated plastic waste generation and its sale to the registered recycler	:	☐ Yes ☐ No
29.6	Syringes treated and its final disposal record	:	☐ Yes ☐ No
29.7	Workers health status records maintained		☐ Yes ☐ No
29.8	Whether records maintained with regard to the accidents (such as fire, spills and injury to the workers and measures taken during such accidents)		☐ Yes ☐ No
30.	**Collection and transportation status (Yes / No)***		
30.1	Whether waste collected in a container of similar colour with label as per the Rules?	:	☐ Yes ☐ No

S.No.	Details		Particulars
30.2	Whether the person who collects BMW maintain a register with him / her?	:	☐ Yes ☐ No
30.3	Has due attention have been given in vehicles to prevent spillage / pilferage/ loading / unloading etc.?	:	☐ Yes ☐ No
30.4	Is the vehicle labeled with the symbol and display the name, address, telephone number etc.?	:	☐ Yes ☐ No
30.5	Does the CBWTF operator use satellite station to store the waste? If yes, give details	:	☐ Yes ☐ No
30.6	The CBWTF operator collects waste daily or alternate day? Whether criterion of 48 hours is complied?	:	☐ Yes ☐ No
31.	**Disposal of treated waste:**		
31.1	Plastic waste after treatment	:	Plastic waste Sold to:.....
31.2	Treated sharps	:	Treated syringes disposal by: .....
31.3	Incineration ash	:	Incineration ash disposal by: Disposal in Sanitary Landfill: ☐ Yes ☐ No Disposal through TSDF: ☐ Yes ☐ No

<table>
<tr><th>S.No.</th><th>Details</th><th></th><th>Particulars</th></tr>
<tr><td>31.4</td><td>Other treated solid wastes</td><td>:</td><td></td></tr>
<tr><td>31.5</td><td>Oil & grease</td><td>:</td><td></td></tr>
<tr><td>31.6</td><td>Treated wastewater</td><td>:</td><td></td></tr>
<tr><td>32.</td><td>Frequency of incinerator / autoclave / microwave / hydroclave / ETP discharge effluent testing and name of the laboratory (specify approved or not under E(P) Act, 1986 or NABL Accredited Lab.). Give details of compliance / non-compliance)</td><td>:</td><td>The reported frequency of monitoring was: -
Stack monitoring : Monthly/Quarterly/Yearly
Waste water : Monthly/Quarterly/Yearly
Incineration ash : Monthly/Quarterly/Yearly
Name of the Laboratory conducted test:
.....
Is the Laboratory approved: ☐ Yes ☐ No
Copies of the analysis reports of treated effluent, incinerated ash, stack monitoring .....</td></tr>
<tr><td>32.1</td><td>Frequency of site inspection by SPCBs/PCCs/CPCB/any other agencies</td><td>:</td><td>..... .....no. of times in a year by .....SPCB/PCC/CPCB</td></tr>
<tr><td>33.</td><td colspan="3">Monitoring Results :</td></tr>
<tr><td>33.1</td><td>Incinerator stack emission (parameters stipulated in the Rules, temperature attainment in the chambers, residence time in the secondary chamber etc.)</td><td>:</td><td>
<table>
<tr><th>Parameter</th><th>PM</th><th>HCl</th><th>NOx</th><th>Hg & com-pounds</th><th>Dioxins and Furans</th><th>C.E.</th></tr>
<tr><td>Date</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>LIMIT</td><td>50</td><td>50</td><td>400</td><td>0.05</td><td>0.1 ng TEQ per Nm^3</td><td>99.00%</td></tr>
</table>
Date of monitoring:
All values are in mg/Nm^3, except CE</td></tr>
<tr><td>33.2</td><td>Whether Stack emission norms are complied with by the CBWTF</td><td></td><td>□ Yes □ No</td></tr>
<tr><td>33.3</td><td>Incineration ash characteristics</td><td>:</td><td>Characteristics as per Schedule –II of HOWM & TM Rules, 2016.....
Is it hazardous waste as per HOWM&TM Rules, 2016
□ Yes □ No</td></tr>
</table>

<table>
<tr><th>S.No.</th><th>Details</th><th></th><th>Particulars</th></tr>
<tr><td>33.4</td><td>ETP inlet/outlet characteristics</td><td>:</td><td>
<table>
<tr><th>Parameter</th><th>pH</th><th>TSS</th><th>COD</th><th>BOD</th><th>O&G</th></tr>
<tr><td>ETP Inlet Result</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>ETP Outlet Result</td><td></td><td></td><td></td><td></td><td></td></tr>
</table>
All values are in mg/l except pH
</td></tr>
<tr><td>33.5</td><td>Whether liquid effluent discharge norms are complied with by the CBWTF</td><td>:</td><td>☐ Yes ☐ No</td></tr>
<tr><td>33.6</td><td>Whether CBWTF is submitting the annual report within the due date for the preceding year</td><td>:</td><td>☐ Yes ☐ No
If Yes, annual report submitted vide letter No…….. dated……..</td></tr>
<tr><td>34.</td><td>Name of the officials inspected /monitored the facility</td><td>:</td><td></td></tr>
<tr><td>35.</td><td>Any other relevant observations</td><td></td><td>(pl. enclose as annexure)</td></tr>
</table>

Annexure-VI

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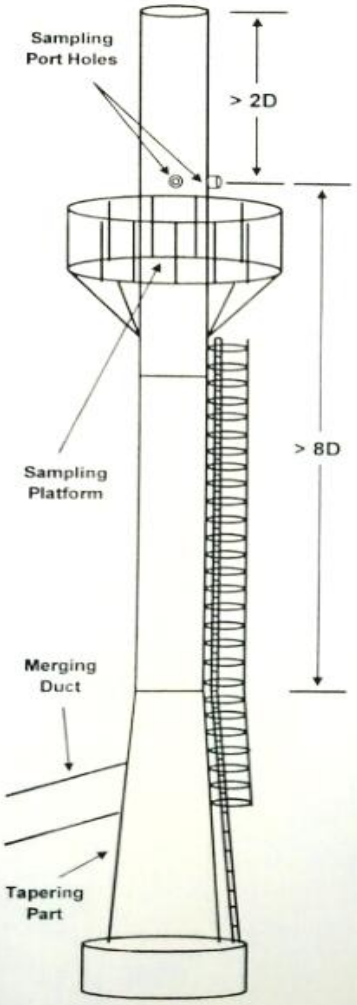
STATIONARY SOURCE EMISSION MONITORING

MODIFICATIONS TO BE MADE TO SAMPLING PLATFORM AND SAMPLING PORT HOLE



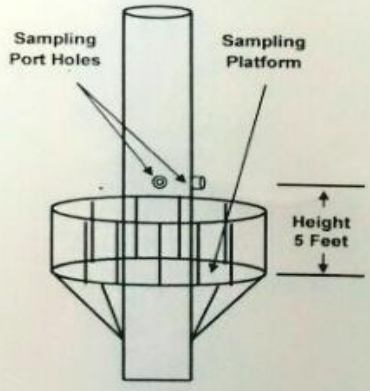
Number of Port Holes : Minimum two numbers of Port Holes at 90° apart from each other at a horizontal plane.

Location of Port Holes : Minimum 8 times of Internal Diameters of Stack downstream (upward direction of stack) from any duct confluence, bends and tapering & minimum 2 times of Internal Diameters of Stack upstream (downward direction of stack) from stack exit.

Location of Sampling Platform : 5 feet upstream (downward direction of stack) from the Port Hole as determined above.

Port Hole Flange : If the internal diameter of the flange is 4 inch or more then there is no need to change, if it is less than 4 inch than it has to be replaced with 4 inch flange. The flange should not protrude out more than 6 inches from the outer wall of the stack (it shall be kept as less as possible).

Sampling Platform Modification : A semi-circular extension of the existing platform (width extending outward by 6 feet from outside wall of the stack and covering at least one third of the circumference) may be provided for access to both the Port Holes. This area can be extended from the existing Platform and if deemed necessary for safety of the personnel a counter extension in opposite direction may also be provided. The extended Platform shall be strengthened with requisite support from the stack.



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Note: Ladder should be spiral or steps but not monkey ladder

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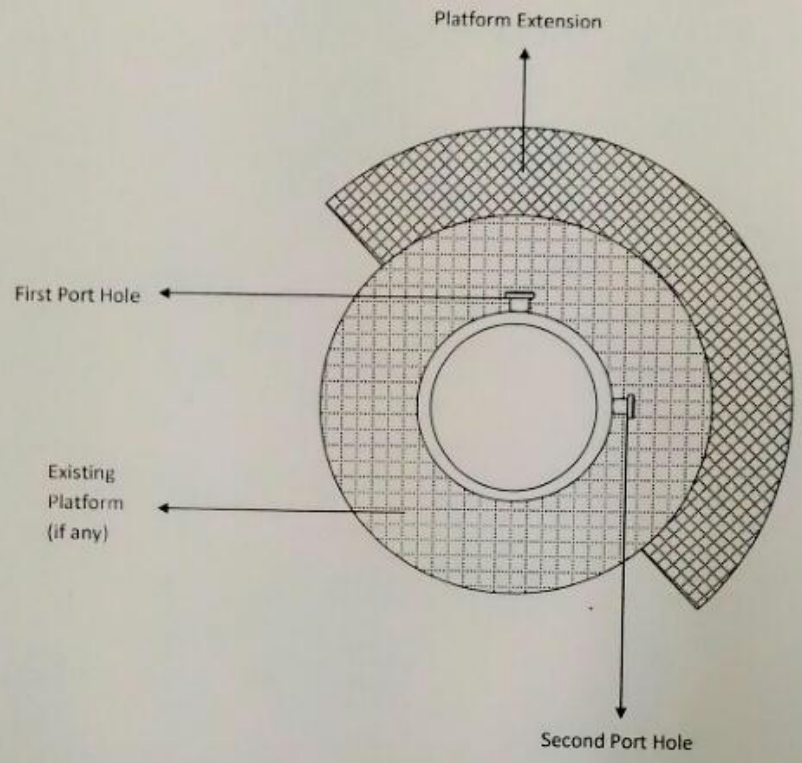
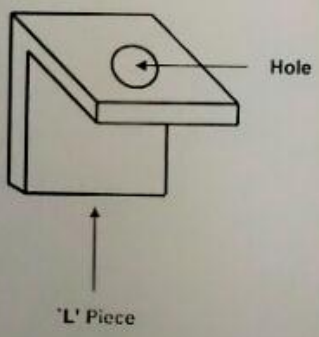


Sampling Platform Modification / Extension



Fixing of 'L' Pieces on the stack wall : Two 'L' shaped pieces are to be fixed on the stack wall for mounting the Mono-Rail & Chain (part of the Sampling Kit for movement of sampling Train in & out through the Sampling Port Hole). The 'L' pieces shall be made of approximately 6 mm thick galvanized iron to have 5 cm long arms. One arm of the 'L' piece shall be welded on the stack wall and another arm shall have a hole of 14 mm diameter near the open end. Both the 'L' Pieces shall be welded on the stack wall at specified distances (as shown in the diagram on the next page) from the centre of Sampling Port Hole (in a vertical axis on the Stack Wall).

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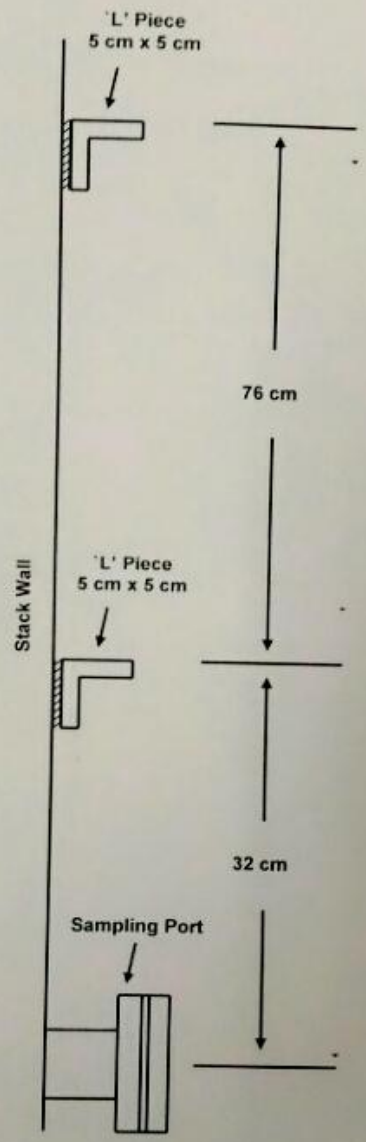

Fixing of `L' Pieces on the Stack Wall

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