Management of the degradable and non-degradable waste

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7.1.3 Describe the facilities in the Institution for the management of the degradable and non-degradable waste.

Response:

The University places top priority for the waste management and adhere strictly to the 5'R's (Refuse, Reduce, Reuse, Repurpose, Recycle) and a hierarchical waste management system as per its policy. Key Initiatives taken by the University and its Colleges are as under:

(1) **Waste Collection and Composting:** All constituent Colleges are equipped with facilities to collect degradable waste. This waste is recycled into compost, which is then used as manure to enhance soil fertility in using various research trials of Post-graduate students as well as various AICRP- Projects. Manure is also prepared in the compost pits in Hostels to convert the food waste into compost that is reused as manure for maintaining greenery in and around campuses. Vermi compost units also consume wet waste for the production of valuable nutrient supplement for the soil which is in great demand by the plant lovers. Bio-waste recycling plant is also developed in the University Head Quarter under IDP-NAHEP.

(2) **Paper Reuse**: Official communications are conducted primarily through email to minimize paper consumption. The University promotes the reuse of paper by using single-sided printed sheets for rough work.Paper waste from exams is disposed of through a proper vending process. The University Head Quarter has Waste Paper Recycling Plant developed under NAHEP that uses waste papers and change them in fresh envelops, bags, greeting cards, folder, photo frame and many other useful products.

(3) **Sanitary Waste Management**: Vending machines are available for the hygienic disposal of sanitary napkins. These sanitary pad incinerators are installed in the Girls' Hostels of the Colleges and also in the wash rooms of the each College building.

(4) **Furniture Reuse and Disposal**: Old and broken furniture is reviewed for potential repairs and reuse. Furniture that is not fit for reuse is disposed by following government norms. However, the furniture and articles are brought to the maximum utilization before they are discarded.

(5) **Solid Waste Disposal**: Solid waste is either collected by Municipal Corporation or by hired housekeeping agency and transported to recycling plants. These measures ensure that the University and constituent Colleges effectively manage waste and promotes sustainability across its campuses.

(6) **e-Waste management:** The University as well as the constituent Colleges takes care of e-Waste management by adhering strictly with the **e-Waste** disposal policy of Government of Madhya Pradesh (MP-e waste policy).

(7) **The rain water harvesting system:** It exists to collect and store rain water in Water Harvesting Tank for further reuse in the field for irrigation.

(8) **Liquid Waste Management System:** For the disposal of liquid waste the services of Municipal Corporation is taken as and when the need arises. Before the tanks meant for the collection of liquid waste reaches to its fullest capacity the Municipal Corporation is contacted and they collect liquid wastes from the tanks with the help of suction machine and they dispose of the waste without creating the mess of any kind in and around the University's Colleges.

Implementation Guidelines for E-Waste (Management) Rules, 2016

Central Pollution Control Board, Delhi

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1.0 Introduction

E- Waste (Management & Handling) Rules, 2011 were notified in 2011 and had come into force since 1st May, 2012. In order to ensure effective implementation of E-Waste Rules and to clearly delineated the role of producers in EPR, MoEF & CC, Government of India in supersession of E-Waste (Management and Handling) Rules, 2011 has notified the E-Waste (Management) Rules, 2016 vide G.S.R. 338(E) dated 23.03.2016 which will be effective from 01-10-2016. These rules are applicable to every producer, consumer or bulk consumer, collection centre, dismantler and recycler of e-waste involved in the manufacture, sale, purchase and processing of electrical and electronic equipment or components specified in schedule – I of these Rules.

Two categories of electrical and electronic equipment namely (i) IT and Telecommunication Equipment and (ii.) Consumer Electricals and Electronics such as TVs, Washing Machines, Refrigerators Air Conditioners including fluorescent and other mercury containing lamps are covered under these Rules. The main feature, of these rules, is Extended Producer Responsibility (EPR).

Target based approach for implementation of EPR has been adopted in the **E-Waste (Management) Rules, 2016,** which stipulate phase wise collection target to producers for the collection of e-waste, either in number or weight, which shall be 30% of the estimated quantity of waste generation during first two year of implementation of rules followed by 40% during third and fourth years, 50% during fifth and sixth years and 70% during seventh year onwards.

The E-Waste (Management) Rules, 2016 mandate CPCB to prepare guidelines on implementation of E-Waste Rules, which includes specific guidelines for extended producer responsibility, channelisation, collection centres, storage, transportation, environmentally sound dismantling and recycling, refurbishment, and random sampling of EEE for testing of RoHS parameters. In this document all the above guidelines have been compiled except guidelines for random sampling of EEE for testing of RoHS parameters. These guidelines are given in separate sections of this document.

2.0 Guidelines for Implementing Extended Producer Responsibility

Extended Producer Responsibility (EPR) is the responsibility of every producer of electrical and electronic equipment (EEE) for channelisation of e-waste to an authorised dismantler / recycler to ensure environmentally sound management of such waste. EPR authorisation is mandatory and has to be obtained by all the producers including importers, e-retailers/on-line sellers/e-bay etc. of EEE covered in E-Waste (Management) Rules, 2016. A producer can implement its EPR either through take-back system or by setting up collection centres or both for channelisation of e-waste/end of life products to authorised dismantlers/recyclers. The producers are required to have arrangements with authorised dismantlers/recyclers either individually or collectively or through a Producer Responsibility Organisation (PRO) or E-Waste Exchange system as spelt in their EPR Plan which is approved/authorised by Central Pollution Control Board (CPCB). Selling or placing of EEE in the market by any producer without EPR Authorisation shall be considered as violation of the Rules and causing damage to the environment, which shall attract provisions under E (P) Act, 1986.

2.1 Extended Producer Responsibility Plan (EPR- Plan)

EPR Plan is an implementation plan of the producer where the producer gives its overall scheme to fulfil its Extended Producer Responsibility for achieving targets and details out the mechanism for collection and channelisation of e-waste generated by the producer.

The EPR plan requires estimating the quantity of E-waste generated from their end-of-life products, outlining a scheme for collection and channelization of their end-of-life products or products with same EEE code to authorised dismantlers/recyclers, estimated budget for implementing EPR, outline the scheme of creating awareness, declaration on ROHS compliance and submission of documents in this regard. Every producer should make an application seeking EPR authorisation in Form-1 of the E-Waste (M) Rules, 2016 addressed to the Member Secretary, Central Pollution Control Board. Form-1 should contain the relevant information pertaining to collection and channelization of their end-of-life products as detailed in sections 2.1.1 to 2.1.7. The Producers has liberty to revise their EPR Plan from time to time with information to CPCB. In such cases the EPR authorisation need amendments.

2.1.1 **Estimation of E-Waste Generation** - E-waste generated by producer for a specific EEE category code is to be estimated on the basis of quantity (number or weight) of EEE placed in the market in the previous years and taking into consideration the average life of the equipment. Such estimate should be carried out using the following method;

The generation of e-waste from end of life products:

E-waste generation (weight or number) in the financial year 'x – y' = Sales in the financial year '(x-z) - (y-z)'

where, 'x – y' = financial year in which generation is estimated, and

z= average life span of EEE (Examples are given at **Annexure - I**)

Average life of the EEE to be used in the above formula is given below:

Sr. No.	**Categories of electrical and electronic equipment**	**EEE Code**	**Average Life**
i.	**Information technology and telecommunication equipment**		
	Centralized data processing:	ITEW1	
	Mainframe		10 Years
	Minicomputer		5 Years
	Personal Computing: Personal Computers (Central Processing Unit with input and output devices)	ITEW2	6 Years
	Personal Computing: Laptop Computers(Central Processing Unit with input and output devices)	ITEW3	5 Years
	Personal Computing: Notebook Computers	ITEW4	5 Years
	Personal Computing: Notepad Computers	ITEW5	5 Years
	Printers including cartridges	ITEW6	10 Years
	Copying equipment	ITEW7	8 Years
	Electrical and electronic typewriters	ITEW8	5 Years
	User terminals and systems	ITEW9	6 Years
	Facsimile	ITEW10	10 Years
	Telex	ITEW11	5 Years
	Telephones	ITEW12	9 Years
	Pay telephones	ITEW13	9 Years
	Cordless telephones	ITEW14	9 Years
	Cellular telephones	ITEW15	
	Feature phones		7 Years
	Smart phones		5 Years
	Answering systems	ITEW16	5 Years
ii.	**Consumer electrical and electronics:**		

Sr. No.	**Categories of electrical and electronic equipment**	**EEE Code**	**Average Life**
	Television sets (including sets based on (Liquid Crystal Display and Light Emitting Diode technology)	CEEW1	9 Years
	Refrigerator	CEEW2	10 Years
	Washing Machine	CCEW3	9 Years
	Air-conditioners excluding centralized air conditioning plants	CCEW4	10 Years
	Fluorescent and other Mercury containing lamps	CEEW5	2 Years

2.1.2 **Estimation of Target for Collection** – the target for collection of E-Waste shall be based on estimated generation calculated for each EEE code for a specific financial year as specified above. E-Waste collection target for the financial year 2016 – 2017 would be 15% of the estimated E-waste generation, and for the year 2017 – 2018, the collection target would be 30%. These targets would increase to 40 % for next 2 financial years between 2018 – 2020, 50% for the financial years between 2020 - 2022 and 70% of the estimated E-waste generation for the financial years 2022 – 2023 onwards. Here it may be observed that collection targets would be applicable depending on life of the product given in above table and accordingly, if a producer enters the business in the year 2016 - 2017 for item code ITEW7(copying equipment), the collection targets for which would be applicable from the year 2021-22 at 50% collection target.

2.1.3 **Details of Extended Producer Responsibility Plan** – Producers should submit their own EPR plans appended to Form-1 for seeking EPR authorization. Producers may submit multiple options and schemes for channelization of E-Waste and such scheme should be described with a brief write-up along with a schematic flow chart/diagram of E-waste movement. The options and schemes for E-Waste channelization may comprise the following;

- Details of scheme/incentive for returning of e-waste by consumers /bulk consumers whether through dealers or buy-back arrangements or take-back systems or exchange scheme for channelization of e-waste.
- If producer is opting to manage its EPR responsibility through PRO, then details of PRO's organisational structure and system of collection and channelisation to the authorised dismantlers/recyclers of e-waste.

- If e-waste exchange is part of channelisation then the details thereof.
- If producer is opting for 'deposit refund scheme' (DRS) or exchange scheme for collection and channelisation of e- waste, then the details of mode of refund of the deposited amount taken from the consumer or bulk consumer at the time of sale has to be specified along with interest that becomes due at the prevalent rate for the period of the deposit at the time of take-back of the end-of life products.
- Producers of item code: CEEW5 (fluorescent and other mercury containing lamp) may provide list of waste deposition centre or collection points financed by them as per their obligation under rule 17 (1) of the Solid Waste Management Rules 2016 for channelizing such wastes to recyclers or TSDFs.

2.1.4 **Collection and Storage plan** - Information pertaining to collection and storage should be appended to Form-1. It should be ensured that collection and storage of E-waste is managed as per the guidelines for 'collection and storage of e-waste' as given in section 3.0 of this document.

Channelization Plan - Form-1 should provide information pertaining to channelization. The following points should be considered in planning a system for E-Waste channelisation;

- make assessment of potential collection of e-waste, area or region wise.
- take help of any professional agency like Producer Responsibility Organisation (PRO) and e-waste exchange.
- identify authorised dismantlers/recyclers for channelisation of quantum of e-waste assessed above. Assess the capacity and capability of each identified authorised dismantlers/recyclers to ensure environmentally sound management of e-waste channelised to them.

2.1.5 **Collection Centres** – Producers shall specify details of their own collections centres or the collection centres with which they have agreement. Following details on collection centres should be provided in Form-1 if the collection centres are part of their channelisation;

- details of collection centres such as address and name(s) of the entity (producer, group of producers, refurbisher, recyclers or dismantlers) who are operating the collection centres in tabular form.

- The number of collection centres should be proportionate and justifiable with the estimated generation for channelization of e-waste. These collections centres or collection points should have facilities as specified in section 4.0 of this document.

2.1.6 **Dismantlers & Recyclers** – Details such as name, location, processing capacity and contact details of the authorised dismantling /recycling facilities, which are part of channelisation of E-waste of the producer should be provided in a separate table to Form-1. The details provided above should be commensurate and justifiable with the quantum of e-waste estimated as per section 2.1.2 of this document.

2.1.7 **Treatment, Storage, Disposal Facilities (TSDFs)** – In case there are no recyclers available for recycling of end-of-life EEE item code: CEEW5 (fluorescent and other mercury containing lamps), then the producers should provide list of Treatment Storage and Disposal Facilities with whom they have agreement.

2.2 Documents required with Form-1

Every producer of EEE listed in Schedule-I has to apply in Form-1 address to the Member Secretary, CPCB for seeking EPR Authorisation within a period of ninety (90) days starting from 01/10/2016. In case of renewal of EPR Authorisation, the application to CPCB has to be made before one hundred and twenty (120) days of its expiry. The following documents are required to be submitted along with Form-1:

- Documents related to EPR plan as envisaged in sections 2.1.
- Details of proposed awareness programmes and allied initiatives.
- Estimated budget earmarked for Extended Producer Responsibility (EPR)
- Copies of agreement document with dealers, collection centres, dismantlers, recyclers, treatment, storage and disposal facilities (TSDFs) etc.
- Self-declaration for compliance of RoHS as per the format given at Annexure – II.
- The technical documents (supplier declaration- description of product, document for materials, parts, and/or sub-assemblies and analytical test result) as an evidence that the reduction of hazardous substance (RoHS) provisions are complied by the product based on standard EN 50581 of EU as at Annexure - III

- Copy of the permissions/licences from the relevant ministry/department for marketing various products or for doing the business as given below:
    i. TIN details
    ii. PAN details
    iii. Incorporation certificate
    iv. Copy IEC in case of importers
- Copy of authorisation issued by the SPCBs/PCCs earlier under E-Waste (Management & Handling) Rules, 2011 in case of those producers who are operating in the country prior to 01-10-2016.

3.0 Guidelines for Collection and Storage of E-Waste

- After assessing their requirement of collection of e-waste, producers may device a collection mechanism which may include take-back through dealers, collection centres or directly through authorised dismantlers/recyclers.
- For collection of e-waste producer may take help of any professional agency like Producer Responsibility Organisation (PRO)/e-waste exchange. Producer may manage a system directly for collection of e-waste by involving relevant stakeholders such as consumer, bulk consumer, informal sector, resident associations, retailers and dealers, etc.
- Producers may also have an arrangement of collection of e-waste from individual consumers and bulk consumers as well.
- The producers may publicize their collection system which may include details of their collection points, bins and collection vans linked to collection centres, take-back system, deposit refund scheme, e-waste exchange, retailers/dealers and PRO etc. for making collection system effective and workable.
- If take - back system is being provided, then it should be accessible to any citizen located anywhere in the country and may be provided through retailers/dealers or through service centres.
- The producers may provide consumer/ bulk consumer following details of take-back system:
    (i) Link of their web site where information pertaining to take-back system is available
    (ii) Toll free number to be available during working hours (10 A.M. to 6 P.M.) for consumers / bulk consumers.
    (iii) Phone number/mobile numbers of grievance redressal in case, toll free number is not working
    (iv) Details of their dealers, retailers, collection points/bins/pick up vans linked to collection centres for depositing of e-waste by the consumer/bulk consumers if they are part of the take-back system
    (v) Details of any incentive scheme for consumers / bulk consumers for returning of e-waste
    (vi) Details of authorised dismantlers/recyclers who can take-back e-waste on behalf of the producer if dismantlers/recyclers are part of take-back system
- Producers may maintain data base of consumers while selling EEE so that consumers/ bulk consumers can be approached for collection of e-waste / end of life products.

- Every Producer, collection centre, dealer, dismantler, recycler and refurbisher may store the e-waste for a period not exceeding one hundred and eighty (180) days and shall maintain a record of collection, sale, transfer and storage of wastes and make these records available for inspection. The period of storage of one hundred and eighty (180) days may be extended by the concerned SPCBs/PCCs up to three hundred and sixty-five (365) days in case the e-waste needs to be specifically stored for research development of a process for its recycling or reuse.
- Storage of end of life products may be done in a manner which does not lead to breakage of these products and safe to workers handling such products.
- During storage of e-waste care may be taken:
  (i) To avoid damage to refrigerators and air-conditioner so as to prevent release of refrigerant gases such as CFC, HFS, HCFC etc. and to prevent spillage of oils (mineral or synthetic oil) and other emissions.
  (ii) To avoid damage to Cathode Ray Tube
  (iii) To avoid damage to fluorescent and other mercury containing lamps
  (iv) To avoid damage to equipment containing asbestos or ceramic fibres to avoid release of asbestos or ceramic fibres in the environment.
- After collection of fluorescent and other mercury containing lamps, it should be sent only to a recycler or to a TSDF in case no recycler is available.
- Loading, transportation, unloading and storage of E-Waste / end of life products should be carried out in such a way that its end use such as re-use after refurbishing or recycling or recovery is unaffected.
- The storage area should have fire protection system in place.

4.0 Guidelines for Collection Centre

- Collection centre or collection points are part of E-waste channelisation, and can be established by producers, refurbishers, dismantlers and recyclers. Collection Centre may collect and store e-waste, on behalf of producer / dismantler / recycler /refurbisher and transfer the same to authorised dismantlers / recyclers.
- Only those collection centres may operate which are specified in EPR-Authorisation of the producers including the collection centres established by dismantlers / recyclers / refurbishers and having agreement with Producers.
- If the collection centres are operating on behalf of many producers, then all such producers should provide this information in their EPR application.
- Collection centres have to collect e-waste on behalf of producers including those arising from orphaned products. Collection centres established by producers can be managed by their PRO or dismantler and recycler having agreement with producers.
- The collection points/bins can be at designated places where e-waste can be collected from residential areas, office complexes, commercial complexes, retail outlets, customer care stores, educational and research institutions, resident welfare associations (RWAs). These collection points have to be part of producer's collection and channelisation plan.
- Mobile collection vans can be used for door to door collection of e-waste from institutions/ individuals/small enterprises and such vans shall be linked to collection centres, and if provided by producers, shall be part of their EPR Plan.
- Material from collection centres should be send only to the authorised dismantlers and Recyclers except in case of used Fluorescent and other mercury containing lamps, which can be sent to TSDF in case recyclers are not available.

4.1 Facilities at Collection Centres

- Collection Centre should have weighing equipment for weighing each delivery received by it and maintain a record in this regard.
- Loading, transportation and unloading, storage of end of life product should be carried out in such a way that there should not be any damage to health, environment and to the product itself particularly care should be taken for Cathode Ray Tubes (CRT), LCD/LED/Plasma TV, Refrigerator, Air Conditioners and fluorescent and other mercury containing lamps so as to avoid breakage.

- Cathode Ray Tubes (CRT), LCD / LED / Plasma TV and fluorescent and other mercury containing lamps should be stored either in containers or stored in stable manner to avoid damage or breakage.
- The storage capacity of any collection centre should commensurate with volume of operations (weight and numbers) and category of E-waste. Space needed for storage of different category of e-waste is given below:

(i)	ITEW1 to ITEW6	- 4.0 m^3/tonne
(ii)	Monitors (CRT)	- 5.0 m^3/tonne
(iii)	ITEW7 to ITEW10	- 5.0 m^3/tonne
(iv)	ITEW11 to ITEW14	- 3.0 m^3/tonne
(v)	ITEW15	- 1.0 m^3/tonne
(vi)	ITEW16	- 3.0 m^3/tonne
(vii)	CEEW1	- 6.5 m^3/tonne
(viii)	CEEW2	- 10.0 m^3/tonne
(ix)	CEEW3	- 7.5 m^3/tonne
(x)	CEEW4	- 6.0 m^3/tonne
(xi)	CEEW5	- 1.0 m3/tonne

- Collection Centre should store e-waste product category wise.
- Collection Centre should maintain the records of E-Waste collected and account the same to respective producers.
- The collection centre where refrigerator and air conditioners are also stored should have adequate facilities for managing leakage of compressor oils, coolant/refrigerant gases such as CFCs/HCFCs and mercury from end of life fluorescent and other mercury containing lamp etc. Spills involving broken Fluorescent lamps, Oils spills should first be contained to prevent spread of the material to other areas. This may involve the use of dry sand, proprietary booms / absorbent pads, stabilizing chemicals etc. for subsequent transfer of hazardous waste to TSDFs.
- Covered shed/spaces have to be used for storage of E-Waste.
- Collection Centre should necessarily have adequate fire-fighting arrangement, escape route, for emergency exit.

5.0 Guidelines for Transportation of E-Waste

- The sender of E-Waste, that may be a producer, manufacturer, recyclers, dismantler, bulk-consumer, refurbisher and collection centre should identify transporter or make arrangements for a transporting e-waste in such a manner that environmental consequences of hazards associated with its transport could be kept at minimum.
- Transport of E-Waste should be carried out as per the manifest system as per the provisions made in rule 19 of the E-Waste (M) Rules, 2016 and the transporter will be required to carry a document (three copies) as per form 6 of the rules provided by the sender. The responsibility of safe transportation of E-waste shall be with the sender of E-Waste.
- Fluorescent and other mercury containing lamps may be transported to TSDF in the cases where no recyclers of CFL are available
- The manufacturers and recyclers while transporting waste generated from manufacturing or recycling destined for final disposal to a treatment, storage and disposal facility will follow the provisions under Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.

6.0 Guidelines for Environmentally Sound Dismantling of E-Waste

6.1 Dismantler

- Any person or organisation or registered society or a designated agency or a company or an association can engage in dismantling of e-waste into their components by obtaining authorisation from the respective SPCBs/PCCs. Dismantlers may set up their collection centre, details of which shall be entered in their authorisation. These collection centres shall not require separate authorisation.
- A dismantler shall be connected to either Producers or PRO or e-waste exchange or take-back system or authorised recycler.
- A dismantler has to obtain consent to establish from SPCBs/PCCs under the Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act, 1981
- A dismantler has to obtain consent to operate from SPCBs/PCCs under the Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act, 1981
- A dismantler has to obtain authorisation from SPCBs/PCCs under E Waste (Management) Rules, 2016, provided that any person authorised/registered under the provisions of the Hazardous Wastes (Management, Handling and Transboundary Movements) Rules, 2008, and the E-waste (Management & Handling) Rules, 2011 prior to the date of coming into force of these rules shall not be required to make an application for authorisation till the period of expiry of such authorisation/registration.
- A dismantler should have weigh bridge and other appropriate weighing equipment for weighing each delivery received by it and maintain a record in this regard.
- The unloading of e-waste/end of life products should be carried out in such a way that there should not be any damage to health, environment and to the product itself. Unloading of Cathode Ray Tubes (CRT), LCD / LED / Plasma TV, refrigerator, air conditioners and fluorescent and other mercury containing lamps should be carried out under supervision in such a way to avoid breakage.
- A dismantler should have facilities for destroying or permanently deleting data stored in the memory of end of life products (Hard Disk, Telephones, Mobile phones) either through hammering or through data eraser.

6.2 Dismantling Process

Dismantling operation is essentially manual operation for segregating various components/ parts and sending them to respective users/ recyclers.Directly usable components can be sent only to an authorised refurbisher. The other parts can be sent to recyclers having valid CTO / authorised e-waste recyclers depending upon the nature of the part. For example, steel or aluminium part which contains no hazardous constituents can be sent to respective recyclers. Other parts which may contain hazardous constituents have to be sent to authorised e-waste recyclers.

- Dismantlers may perform the following operations
  - (i) De-dusting
  - (ii) Manual dismantling

- Dismantling operation shall comprise of physical separation and segregation after opening the electrical and electronic equipment into the component by manual operations.
- Dismantler may use screwdrivers, wrenches, pliers, wire cutters, tongs and hammers etc. for dismantling. The dismantled components should be sent to authorised e-waste recyclers or recyclers having valid consent to operate (CTO).
- Manual dismantling operations should be carried out over the dismantling table with space de-dusting system so as to maintain desirable work zone air quality as per the factories Act as amended from time to time. The de dusting system should consist of suction hoods over dismantling table connected with a cyclone, bag filter and venting through a chimney of three-meter height above roof level.
- Collection boxes should be placed near dismantling table for keeping the dismantled components.
- The workers involved in dismantling operation should have appropriate equipment such as screwdrivers, wrenches, pliers, wire cutters, tongs and hammers etc. for dismantling the e-waste.
- During dismantling operations, the workers should use proper personal protective equipment such as goggles, masks, gloves, helmet and gumboot etc.
- The following dismantled items and components must be removed from end of life products and stored in a safe manner for transportation to recyclers:
  - (i) Batteries
  - (ii) Printed Circuit Boards (PCBs) of EEE
  - (iii) Toner cartridges

(iv) Plastic

(v) External Electrical Cables

- Volume/Size reduction may be carried out after dismantling operations for the parts like steel/aluminium/plastic, for ease of transportation. Dismantled and segregated plastic from e-waste shall only be given to registered plastic recyclers having registration under Plastic Waste (Management) Rules, 2016.
- During the volume/size reduction of dismantled steel/aluminium/plastic parts, the dismantlers should have arrangement for dust and noise controls. These operations should be under acoustic enclosure for noise reduction.
- Dismantlers shall not carry out shredding / crushing / fine grinding/wet grinding/ enrichment operations and gravity/ magnetic/density/eddy current separation of printing circuit board or the components attached with the circuit board.
- Dismantlers shall not be permitted for dismantling of fluorescent and other mercury containing lamps, CRT / LCD / Plasma TV.
- Dismantlers shall not be permitted for chemical leaching or heating process or melting the material.
- In case of dismantling refrigerators and air conditioners, only skilled manpower having required tools and personal protective equipment (PPEs) must be deployed to manually separate compressors. Prior to dismantling the compressors, adequate facilities should be provided for collection of coolant/refrigerant gases and compressor oil.
- Dismantled circuit boards, capacitors, batteries, capacitors containing PCBs (Polychlorinated biphenyls) or PCTs (Polychlorinated terphenyls) etc. shall not be stored in open.
- Dismantlers should have adequate facilities for managing leakage of compressor oils, coolant/refrigerant gases such as CFCs/HCFCs and mercury from end of life fluorescent and other mercury containing lamp etc. Spills involving broken Fluorescent lamps, Oils spills should first be contained to prevent spread of the material to other areas. This may involve the use of dry sand, proprietary booms / absorbent pads, stabilizing chemicals etc. for subsequent transfer to hazardous waste TSDFs.
- The premise for dismantling operation should fulfil the following requirements:
    a) Water proof roofing and impermeable surfaces.
    b) Storage space for dissembled spare parts.
    c) Separate containers for storage of batteries, capacitors containing PCBs (Polychlorinated biphenyls) or PCTs (Polychlorinated terphenyls)

6.3 Space requirement for Dismantlers

A dismantler needs space for storage of electrical and electronic equipment up to 180 days, for process of dismantling and volume reduction and space for storage of dismantled and segregated material and free space for movement and office/ administration and other utilities. It is estimated that a minimum of 300 square meter area for a dismantling capacity of 1T/day is required for storage of raw material, segregated material, dismantling operations and office/ administration & other utilities.

7.0 Guidelines for Environmentally Sound Recycling of E-Waste

7.1 Recycler

- As per these rules any person who is engaged in recycling and reprocessing of waste electrical and electronic equipment or assemblies or their component is a recycler. Recyclers may set up their collection centres, details of which shall be entered in their authorisation. These collection centres shall not require separate authorisation. Recyclers can obtain raw material such as waste electrical and electronic assemblies or components or used components from producers/PRO/e-waste exchange/dismantlers and consumers / bulk consumers.
- The Product of recyclers has to be sent or sold to users or other recyclers having valid CTO from SPCBs/PCCs. Any hazardous waste generated during the recycling processing will be sent to TSDF'
- A recycler should be part of producer's channelisation system.
- A recycler has to obtain consent to establish from SPCBs/PCCs under the Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act, 1981
- A recycler has to obtain consent to operate from SPCBs/PCCs under the Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act, 1981
- A recycler has to obtain authorisation from SPCBs/PCCs under E Waste (Management) Rules, 2016, provided that any person authorised/registered under the provisions of the Hazardous Wastes (Management, Handling and Transboundary Movements) Rules, 2008, and the E-waste (Management & Handling) Rules, 2011 prior to the date of coming into force of these rules shall not be required to make an application for authorisation till the period of expiry of such authorisation/registration.
- A recycler should have weigh bridge and other appropriate weighing equipment for weighing each delivery received by it and maintain a record in this regard.
- The unloading of end of life product should be carried out in such a way that there should not be any damage to health, environment and to the product itself. Unloading of Cathode Ray Tubes (CRT), LCD/LED/Plasma TV, Refrigerator, Air Conditioners and fluorescent and other mercury containing lamps should be carried out under supervision in such a way to avoid breakage.

- A recycler should have facilities for destroying or permanently deleting data stored in the memory of end of life products (Hard Disk, Telephones, Mobile phones) either through shredding or grinding or through data eraser.

7.2 Recycling Process

- The functions of the recyclers include dismantling along with recovery operation. There shall be no restriction on degree of operations that can be permitted for recyclers provided they have requisite facilities. The following processes should be employed by recyclers:
  - (i) Manual / semi- automatic / automatic dismantling operations
  - (ii) Shredding / crushing / fine grinding/wet grinding/ enrichment operations, gravity/ magnetic/density/eddy current separation
  - (iii) Pyro metallurgical operations - Smelting furnace
  - (iv) Hydro metallurgical operations
  - (v) Electro-metallurgical operations
  - (vi) Chemical leaching
  - (vii) CRT/LCD/Plasma processing
  - (viii) Toner cartridge recycling
  - (ix) Melting, casting, moulding operations (for metals and plastics)
- A recycling facility may accept e-waste and even those electrical and electronic assemblies or components not listed in Schedule- I for recycling, provided that they do not contain any radioactive materials and same shall be declared while taking the authorisation from concerned SPCBs/PCCs;
- The recycling facilities shall comply with the requirements as specified for dismantlers in the guidelines for dismantling in section 6.0.
- A recycling facility shall install adequate wastewater treatment facilities for process wastewater and air pollution control equipment (off gas treatment, wet/alkaline/packed bed scrubber and carbon filters) depending on type of operations undertaken.
- De dusting equipment such as suction hood shall be installed where manual dismantling is carried out.
- Fume hoods connected with bag dust collectors followed wet (chemical) scrubbers and carbon filters shall be installed for control of fugitive emissions from furnaces or reactor.
- Noise control arrangement for equipment like crusher, grinder and shredder needs to be provided.

- The discharges from the facility shall comply with general standards under E (P) Act, 1986 for discharge of wastewater. Discharge standard are at Annexure IV
- In case of air emissions, the unit shall comply with emission norms prescribed under Air (Prevention and Control of Pollution) Act, 1981. In case of furnace, a minimum stack height of 30 meter shall be installed depending on emission rate of SO2. Emission Standards are at Annexure V.
- The workers involved in recycling operations shall use proper personal protective equipment such as goggles, masks, gloves, helmet and gumboot etc.
- Adequate facilities for onsite collection and storage of bag filter residues, floor cleaning dust and other hazardous material shall be provided and sent to secure landfill by obtaining membership of TSDF.
- The CRT / LCD / Plasma TV should be processed only at a recycler's facility.
- For recycling of CRT monitor and TVs care should be taken to contain release of harmful substances. The steps for processing of CRT are as below:

  (i) CRT monitors and TVs should be manually removed from plastic/ wooden casing. The CRT should be split into funnel and panel glass using different splitting technology such as Ni-Chrome hot wire cutting, Diamond wire method or Diamond saw separation in a closed chamber under low vacuum conditions (650 mm of Hg).

  (ii) The funnel section is then lifted off from the panel glass section and the internal metal gasket is removed for facilitating the removal of internal phosphor coating.

  (iii) The internal phosphor coating from the inner side of panel glass is removed by using an abrasive wire brush with suction arrangement under low pressure as given above at (i). The extracted air is cleaned through high efficiency bag-filter system and collected in appropriate labelled containers and then disposed at an authorised TSDF.

  (iv) Manual shredding, cutting, and segregation operations for CRTs should be carried out in low vacuum (650 mm of Hg) chambers where the dust is extracted through cyclones, bag filters, ID fan and a suitable chimney.

  (v) Segregated CRTs can also be shredded in mechanical/automatic shredding machines connected with dust control systems. The mixed shredded glass is separated into leaded glass and glass cullet using electro-magnetic field or by density separation.

- For LCD and Plasma TV a recycler should have sealed vacuum dismantling platform for dismantling of LCD / Plasma panels. The LCD / Plasma TV should be dismantled piece by piece, starting with the removal of the plastic backing shell, printed circuit boards, aluminium or

steel frame, screen, PET plastics, LCD Panel and backlight. The metal frame, wire, other metallic material and plastic backing cabinet may be sent to recyclers with valid CTO. Printed Circuit Board and LCD panel may be recycled or in case recycling facility is not available then sent to respective authorised recycling facility.

- The user of the products obtained in the recycler facility should be identified and an agreement may be entered with them for selling of the products obtained in these recycling facilities. This is for tracking the product of recycling, to ascertain where the products are going.
- Recovery of resource and particularly of precious metals present in the e-waste should be given importance.
- For fluorescent and other mercury containing lamp recycling, the unit shall have at least following systems:

  (i) Mechanical feeding system.
  (ii) Mercury spill collection system.
  (iii) Lamp Crushing System, under vacuum, for separation of mercury-contaminated phosphor powder & mercury vapors from other crushed components, so as not to cause release of any pollutant, including mercury vapor.
  (iv) System for segregation of mercury vapour from the phosphor powder through a distillation system for separation & recovery of mercury.
  (v) Air pollution control system (APCS) which shall include HEPA (High Efficiency Particulate Arrestor) filter system or activated carbon filter system or any other equivalent efficient system for separation/ removal of mercury vapor from mercury-contaminated phosphor powder'
  (vi) Arrangement for disposal of mercury contaminated filter pads to TSDF.
  (vii) On line mercury monitoring system, to have check on emission of mercury, which has to be in compliance to the consented norms.

- The fluorescent and other mercury containing lamp recycling unit shall have following obligations:

  (i) The emission outlet shall comply with the norms for mercury prescribed in the consent document. The norm for mercury emission is 0.2 mg/m^3 (Normal) as prescribed under E (P) Act, 1986 for mercury emission from other category of industries.
  (ii) For discharge of effluent the limit for mercury as (Hg) should be less than equal to 0.01mg /liter as prescribed under E (P) Act, 1986.

(iii) The unit shall have trained / skilled manpower to handle hazardous substances such as mercury mixed phosphor in respect of treatment/recycling.

(iv) The unit shall dispose all the unrecoverable wastes from the treatment site, to a TSDF

(v) The unit shall maintain record of used fluorescent and other mercury containing lamp collected & recycled, recovery of mercury and other components. It shall, also, maintain the records pertaining to the generation, storage, transport and disposal of the wastes generated in the process.

(vi) The unit shall take up ambient air quality monitoring, particularly, in reference to mercury levels with a frequency of once in a month through a recognized laboratory, for third party verification.

7.3 Space requirement for Recyclers

As a general rule a recycler of capacity of 1 Ton per day shall require a minimum of 500 square meters area. Authorisation to recyclers may be preferred if they have minimum operational capacity of 5 MT/day with an area of about 2500 square meter.

8.0 Guidelines for Refurbisher

- Refurbishment means repairing of used electrical and electronic equipment and it should be carried out in such a way that there should not be any damage to health and environment.
- A refurbisher has to obtain consent to establish under the Water (Prevention and Control of Pollution) Act, 1974, (25 of 1974) and the Air (Prevention and Control of Pollution) Act, 1981 (21 of 1981) from the concerned State Pollution Control Board/Pollution Control Committee.
- A refurbisher has to obtain certificate of registration and proof of installed capacity from District Industries Centre or any other government agency authorised in this regard;
- A refurbisher has to obtain one-time authorization from concerned State Pollution Control Board/Pollution Control Committee.
- A refurbisher should have system to manage leakage of coolant/refrigerant gases and compressor oils from used electrical and electronic equipment during refurbishing operations.
- The refurbishing area should be ventilated and have proper dust control equipment.
- De-dusting system over refurbishment tables should be provided
- Any e-waste generated during refurbishment should be collected separately and sent to collection centre /authorised recycler. In case of refurbisher not having own collection centre, the e-waste so generated may be channelized to an authorised recycler.
- The premise for refurbishing should fulfil the following requirements:

    (i) Water proof roofing and impermeable surfaces

    (ii) As a general rule a refurbisher of capacity of 1 Ton per day shall require a minimum of 150 square meters' area for refurbishing, temporary storage of e waste generated and space for refurbished EEE

- If refurbisher opts to sell refurbished EEE then he is required to seek EPR authorisation from CPCB. In no circumstances, the refurbisher shall sell any refurbished EEE without having EPR authorization.

9.0 Guidelines for Consumers and Bulk Consumers

9.1 Consumers:

- The Consumers should channelised their e-waste through collection centre or dealer of authorised producer or dismantler or recycler or through the designated take back service provider of the producer to authorised dismantler/recycler.
- The consumer should not throw e-waste in municipal bins.
- The consumers shall ensure that they do not throw end of life fluorescent and other mercury containing lamp in the municipal bin but hands them over (in a properly packed form) to take back system / collection and channelisation system of producer or to a collection centre of an authorised recycler who is part of producer channelisation system.
- The end of life intact fluorescent and other mercury containing lamp may be stored either in the same boxes in which new lamps are brought or other boxes of similar size. They should be sorted upright. The due precaution may be taken while packing more than one used lamp, so as not to cause the possibility of breakage during the storage and transpiration.

9.2 Bulk Consumers:

- The bulk consumers may ensure that e waste generated by them is handed over only to producer take back system or to authorised dismantler/recycler who is part of producers take back/channelisation system.
- The bulk consumers should ensure that used lamps are not disposed in the municipal bin but handed over (in a properly packed form) to take back system / collection and channelisation system of producer or to a collection centre of an authorised recycler who is part of producer channelisation system.
- The bulk consumers must create special type of disposal bins (suitable for the purpose) at site for depositing the end of life intact fluorescent and other mercury containing lamp only. The management of the institute may issue necessary instructions, to ensure this, to staff and workers handling such lamps.
- The end of life intact fluorescent and other mercury containing lamp, as collected above, may be stored either in the same boxes in which new lamps are brought or other boxes of similar size. They should be stored upright. The due precaution may be taken while packing more than one used lamps, so as not to cause the possibility of breakage during the storage and transportation.

ABBREVIATIONS

BFR	-	Brominated Flame Retardant
CCC	-	Common Collection Centre
CFC	-	Chloro Fluro Carbon
CFL	-	Compact Fluorescent Lamp
CPCB	-	Central Pollution Control Board
CRT	-	Cathode Ray Tube
CTE	-	Consent to Establish
CTO	-	Consent to Operate
DRS	-	Deposit Refund Scheme
EEE	-	Electrical Electronic Equipment
EoL	-	End of Life
EPR	-	Extended Producer Responsibility
EST	-	Environmentally Sound Technology
HCFC	-	Hydro Chloro Fluro Carbon
HW (M)	-	Hazardous Waste (Management)
IT& TE	-	Information Technology & Telecommunication Equipment
IEC	-	Importer/ Exporter Code
LCD	-	Liquid Crystal Display
LED	-	Light Emitting Diode
MoEF& CC	-	Ministry of Environment, Forest and Climate Change
MT	-	Metric Ton
NGOs	-	Non-Governmental Organisation
PAN	-	Permanent Account Number
PCB	-	Printed Circuit Board
PCBs	-	Polychlorinated Biphenyls
PCC	-	Pollution Control Committees
PCTs	-	Polychlorinated Terphenyls
PRO	-	Producer Responsibility Organization
PWB	-	Printed Wire Board
RoHS	-	Reduction of Hazardous Substances
RWAs	-	Resident Welfare Associations
SPCB	-	State Pollution Control Board
TIN	-	Taxpayer Identification Number
TSDF	-	Treatment, Storage & Disposal Facility
TV	-	Television

REFERENCES:

1. CPCB's guidelines for Environmentally Sound Management of E-waste
2. CPCB's guidelines for Implementation of E-waste Rules 2011
3. CPCB's guidelines for environmentally sound mercury management in fluorescent lamp sector
4. Department of electronics and information Technology's (DeitY) SOP's for dismantler and Recycler
5. UNU-IAS E-Waste Statics, Guidelines on classification, reporting and indicators
6. Estimation of outflows of e-waste in India by Shri R.K. Mittal and Shri Maheshwar Dwivedy
7. An Investigation into E-waste flows in India by Shri R.K. Mittal and Shri Maheshwar Dwivedy
8. Forecasting e-waste amounts in India - by Shri Sirajuddin Ahmed, Ms. Rashmi Makkar, Shri Anubhav Sharma (Department of civil Engineering, Jamia Millia Islamia, Delhi)
9. UNEP Report - E-Waste volume II (E-waste Management Manual)

Annexure - I

Example for Calculation of E-waste Generation

E-waste generation (weight or number) in the financial year '*x – y'*

= Sales in the financial year '(x-z) - (y-z)'

'x – y' = financial year in which generation estimated,

z= average life span of EEE)

For example

For financial year 2016 -17,

x - y = 2016 -17 (April 2016 to March 2017)

If EEE, for which generation is to be estimated, is **ITEW 15**

means cellular phones that is either smart phone or feature phones then

z= 5 years or z = 7 years as from the table in chapter 2.1

1. The estimated generation of end of life **ITEW 15 – smart phone** in the FY 2016-17
   = Sales in the (FY year 2016-5 – 2017-5)
   = Sales in the financial year 2011-12

or

2. The estimated generation of end of life **ITEW 15 – feature phone** in the FY 2016-17
   = Sales in the (FY year 2016-7 – 2017-7) either in terms of weight or number
   = Sales in the financial year 2009-10 in terms of weight or number

   - Therefore, generation of end of life of **smart phone in the FY 2016-17** = Sales in the financial year 2011 – 12 either in terms of weight or number
   - Similarly, generation of end of life of **feature phone =** Sales in the financial year 2009-2010 either in terms of weight or number

3. Also during financial year 2016 -17 the collection target is to be for the period October, 2016 to March 2017 (six months) so generation calculation should also be on pro-rata basis and accordingly target may be estimated

4. For financial year 2017 - 18 and subsequent financial year, the generation of end of life should be calculated as given in the example above.

Annexure – II

Date:

Self-Declaration Form

(As per E-Waste (Management) Rules, 2016)

Producer Details:

S.No.	Required Information	Details
1.	Company Name with Complete Address from where business/sale in the entire country is being managed:	
2.	Name of Authorised Person Email: Telephone: Fax: Mobile Number: Complete Postal Address:	
3.	Brand name (if any):	

Self-Declaration for Compliance of
Reduction in the use of Hazardous Substances (RoHS)
(As per E-Waste (Management) Rules, 2016)

We_____being the Producer as per E-Waste (Management) Rules, 2016, hereby declare that all the EEE, being offered for sale in the country by our company and covered in the Schedule – I of the E-Waste (Management) Rules, 2016 and listed at enclosure - A comply with the sub rule (1) of the Rule16 of the above said Rule.

Authorizing Signatory
(Name/Signature/Seal)

Date:

Enclosed: Enclosure A

Enclosure – A

S. No.	Product Category & Code* (as per Schedule I of E-Waste (M) Rules, 2016	Product name**	Model No.**	Weight of Product (kgs) or Numbers	Date of placing on market (In case of import, date of entry in the country)	Compliance with RoHS Yes/No/ Partial	RoHS Information provided on product information booklet Yes/No	In case Product is imported from other country, name of the country where product is manufactured

**Add additional rows for products and models

Authorizing Signatory
(Name/Signature/Seal)

Date:

Annexure – III

Technical Documents for RoHS(EN 50581 of EU)

1. General description of the product
2. Documents for materials, parts and/or sub-assemblies
3. Supplier declarations (covering specific material, part and/or sub-assembly, or a specific range of materials, part and/or sub-assemblies) and/or contractual agreement, such as:

    (i) Supplier declarations, confirming that the restricted substance content of the material, part, or sub-assembly is within the permitted levels and identifying any exemptions that have been applied
    (ii) Signed contracts confirming that the producer's specification for the maximum content of restricted substances in a material, part, or sub-assembly is fulfilled.

4. Material Declarations:

    (i) Material declarations providing information on specific substance content and identifying any exemptions that have been applied.

and/or

5. Analytical test results:

    (i) Analytical test results using the methods described or referenced in EN 62321

Annexure – IV

GENERAL STANDARDS FOR DISCHARGE OF ENVIRONMENTAL POLLUTIONTS: - EFFULENTS

S.No.	Parameter	Standards			
		Inland surface water	Public Sewers	Land for irrigation	Marine coastal areas
1	2			3	4
		(a)	(b)	(c)	(d)
1.	Colour and odour	Not desirable	---	Not desirable	Not desirable
2.	Suspended solids mg/l, Max.	100	600	200	(a) For process waste water- 100 (b) For cooling water effluent 10 percent above total suspended matter or influent.
3.	Particulate size of suspended solids	Shall pass 850 Micron IS Sieve	--	--	(a) Floatable solids, Max. 3 mm. Settle able solids, Max. 850 microns.
4.	pH Value	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0
5.	Temperature	Shall not exceed 5°C above the receiving water temperature	---	---	Shall not exceed 5°C above the receiving water temperature
6.	Oil and grease mg/l Max.	10	20	10	20
7.	Total residual chlorine mg/l Max	1.0	---	--	1.0
8.	Ammonical nitrogen (as N), mg/l Max.	50	50	--	50
9.	Total Kjeldahl Nitrogen (as NH_3) mg/l, Max.	100	--	--	100
10.	Free ammonia (as NH_3) mg/l, Max.	5.0	--	--	5.0
11.	Biochemical Oxygen demand [1][3 days at 27°C] mg/l max.	30	350	100	100
12.	Chemical Oxygen Demand, mg/l, Max.	250	--	--	250
13.	Arsenic (as As), mg/l, Max.	0.2	0.2	0.2	0.2
14.	Mercury (as Hg), mg/l, Max.	0.01	0.01	--	0.01

S.No.	Parameter	Standards			
		Inland surface water	Public Sewers	Land for irrigation	Marine coastal areas
1	2			3	4
		(a)	(b)	(c)	(d)
15.	Lead (as Pb) mg/l, max.	0.1	1.0	--	2.0
16.	Cadmium (as Cd) mg/l, Max.	2.0	1.0	--	2.0
17.	Hexavalent chromium (as Cr+6), mg/l max.	0.1	2.0	--	1.0
18.	Total Chromium (as Cr.) mg/l, max.	2.0	2.0	--	2.0
19.	Copper (as Cu) mg/l, Max.	3.0	3.0	--	3.0
20.	Zinc (As Zn.) mg/l, Max.	5.0	15	--	15
21.	Selenium (as Se.) mg/l Max.	0.05	0.05	--	0.05
22.	Nickel (as Ni) mg/l, Max.	3.0	3.0	--	5.0
23.	Cyanide (as CN) mg/l Max.	0.2	2.0	0.2	0.2
24.	Fluoride (as F) mg/l Max.	2.0	15	--	15
25.	Dissolved phosphates (as P), mg/l Max.	5.0	--	--	--
26.	Sulphide (as S) mg/l Max.	2.0	--	--	5.0
27.	Phenolic compounds (as C_6H_5OH) mg/l, Max.	1.0	5.0	--	5.0
28.	Radioactive Materials:				
	(a) Alpha emitter micro curie/ml.	10^{-7}	10^{-7}	10^{-8}	10^{-7}
	(b) Beta emitter micro curie/ml.	10^{-6}	10^{-6}	10^{-7}	10^{-6}
29.	Bio-assay test	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent	90%survival of fish after 96 hours in 100%effluent	90%survival of fish after 96 hours in 100% effluent
30.	Manganese (as Mn)	2 mg/l	2 mg/l	--	2 mg/l
31.	Iron (as Fe)	3 mg/l	3 mg/l	--	3 mg/l
32.	Vanadium (as V)	0.2 mg/l	0.2 mg/l	--	0.2 mg/l

S.No.	Parameter	Standards			
		Inland surface water	Public Sewers	Land for irrigation	Marine coastal areas
1	2			3	4
		(a)	(b)	(c)	(d)
33.	Nitrate Nitrogen	10 mg/l	--	--	20 mg/l

Annexure – V

NATIONAL AMBIENT AIR QUALITY STANDARDS

Sl. No.	Pollutant	Time Weighted Average	Concentration in Ambient Air		
			Industrial, Residential, Rural and Other Area	Ecologically Sensitive Area (notified by Central Government)	Methods of Measurement
(1)	(2)	(3)	(4)	(5)	(6)
1	Sulphur Dioxide (SO_2), µg/m^3	Annual *	50	20	- Improved West and Geake
		24 hours**	80	80	- Ultraviolet Fluorescence
	-	-			
2	Nitrogen Dioxide (NO_2), µg/m^3	Annual *	40	30	- Modified Jacob & Hochheiser (Na- arsenite)
		24 hours**	80	80	- Chemiluminescence
3	Particulate Matter (size less than 10 µg/m_3) or PM_{10} µg/m^3	Annual *	60	60	- Gravimetric - TOEM
		24 hours**	100	100	- Beta Attenuation
4	Particulate Matter (size less than 2.5µm) or $PM_{2.5}$ µg/m^3	Annual *	40	40	- Gravimetric - TOEM
		24 hours**	60	60	- Beta attenuation
5	Ozone (O_3) µg/m^3	8 hours * *	100	100	- UV photometric - Chemiluminescence
		1 Hour**	180	180	- Chemical Method
6	Lead (Pb) µg/m^3	Annual *	0.50	0.50	- AAs/ICP method after sampling on EPM 2000 or equivalent filter paper
		24 hours**	1.0	1.0	- ED-XRF using Teflon filter
7	Carbon Monoxide (CO) mg/m^3	8 hours**	02	02	- Non Dispersive Infra-Red(NDIR) Spectroscopy
		1 hour**	04	04	
8	Ammonia (NH_3) µg/m^3	Annual *	100	100	- Chemiluminescence - Indophenol blue method
		24 hours**	400	400	
9	Benzene (C_6H_6) µg/m^3	Annual *	05	05	- Gas chromatography based continuous analyzer - Adsorption and Desorption followed by GC analysis
10	Benzo (a) Pyrene (Bap)- Particulate phase only, ng/m^3	Annual *	01	01	- Solvent extraction followed by HPCL/GC analysis
11	Arsenic (As), ng/m^3	Annual *	06	06	- AAS/ICP method after sampling on EPM 2000 or equivalent filter paper
12	Nickel (Ni), ng/m^3	Annual *	20	20	- AAS/ICP method after sampling on EPM 2000 or equivalent filter paper

***Annual arithmetic mean of minimum 104 measurements in a year at a particular site taken twice a week 24 hourly at uniform intervals.**

**** 24 hourly or 08 hourly or 01 hourly monitored values, as applicable, shall be complied with 98% of the time in a year. 2% of the time, they may exceed the limits but not on two consecutive days of monitoring.**

Note. – Whenever and wherever monitoring results on two consecutive days of monitoring exceed the limits specified above for the respective category, it shall be considered adequate reason to institute regular or continuous monitoring and further investigation.

Annual Contract for Mechanized House Keeping Services at RVSKVV, Gwalior

RAJMATA VIJAYARAJE SCINDIA KRISHI VISHWA VIDYALAYA, GWALIOR (M.P.)

Rajamata Vijyaraje Scindia Krishi Vishwa Vidyalaya

Gwalior

E-Tender No. E.E./ 2022/Gwl/403

Dated 27-05-2022

E-Tender Document for

Annual Contract for Mechanized House Keeping

Services at RVSKVV, Gwalior

Rajamata Vijyaraje Scindia Krishi Vishwa Vidyalaya, Gwalior

E-Tender Notice for Providing House Keeping Services

No./E.E./2022/Gwalior/403 **Dated 27-05-2022**

RVSKVV, Gwalior invites online e-tenders under two bid systems from eligible firms/companies for providing housekeeping services for its office located at the above mentioned address

The online E-Tender document (Technical Bid duly filled and signed) should be addressed to The Executive Engineer, RVSKVV, Gwalior–474002 on or before dated 28-06-2022 up to 5:30 P.M. Tender received after stipulated time and date shall be rejected summarily

Cost of Tender Document:	Rs. 2000/- (Two Thousand only) + portal charges
Earnest Money Deposit: (online e payment)	: Rs. 50,000/- (Fifty Thousand only) in favour of Executive Engineer RVSKVV, Gwalior
Security Money Deposit	:Rs. 5% of yearly contract amount in form of FDR in favour of Executive Engineer RVSKVV, Gwalior

Download of E-Tender Document from

http://www.mptenders.gov.in	: From 30-05-2022 to 24-06-2022
Last Date for submission of online E-Tender :	24-06-2022
Last Date for submission of Tender Document in	
Department Technical Bid envelop	: 28-06-2022 up to 5:30 PM
Date and time of opening of Tender	: 29-06-2022 at 12:30 PM (Mandatory Documents)
	: 14-07-2022 at 03:00 PM (Financial Bid)
Tender document delivery mode	: through E-Tender online (http://www.mptenders.gov.in) only
Duration of Tender	:One year from the date of awarding of contract, which is further extendable for a period of one year with same rates and terms & conditions, subject to satisfactory performance each year.

The tender document may download from web site http://www.mptenders.gov.in

The RVSKVV, Gwalior reserves the right to accept / reject any of the Tender(s) without assigning any reason what soever and decision shall be final and binding to the tenderers.

CONTACT DETAILS FORM

Details of Bidder

1. **Name of Company :……**
2. **Name and Designation of**

   Authorized Signatory :……
3. **Communication Address :……**
4. **Phone No. / Mobile No. :……**
5. **Fax :……**
6. **E-Mail ID :……**
7. **Pan No. :……**

Particular Details of the Bidder's Representative

1. **Name of the Contract Person :……**
2. **Designation :……..**
3. **Phone No./ Mobile No. :……..**
4. **E-Mail ID :……**

UNDERTAKING

1. I, the undersigned certify that I have gone through the terms and conditions mentioned in the bidding document and undertake to comply with them.
2. The rates quoted by me are valid and binding upon me for the entire period of contract and period of extension and it is certified that the rates quoted are the lowest rates as quoted in any other institution of India.
3. I give the rights to the RVSKVV, Gwalior to forfeit the Earnest Money/Performance Security Deposit by me/us in case of breach of conditions of Contract.
4. I hereby undertake to provide the housekeeping services as per the provisions in the tender document/contract agreement.
5. I/We abide by the provision of minimum wages act, contract Labour Act and other statutory provision like Provident Fund Act,ESI, Gratuity, Leave, Relieving charges, Uniform and allowance thereof and any other charges applicable from time to time. I/We will pay the wages to the personnel deployed as per minimum wages act as amend by the respective Government from time to time and shall be fully responsible for any violation.

Signature of the Authorized Signatory

Date:
Place:

Designation:
(Office seal of the Bidder)

GENERAL CONDITIONS

1. The person provided by the contractor must be properly trained and have requisite experience and having the skills for caring out a wide verify of house keeping work using appropriate materials and tools/ equipments and contractor must hire adult labour only including police verification and other formalities.

2. RVSKVV, Gwalior however reserves the right to terminate the contract by serving one month notice. In righting if the university is not satisfied about the services of the contractor. Contract will give to second lowest firm but he has to provide the house keeping facilities till the next agency take over.

3. The online E-Tender documents should be delivered in the Work Section of this office on or before the stipulated date and time. The technical bid must be sealed in separate envelope "Tender for Housekeeping Contract Services". This envelope should be sealed and delivered to The Executive Engineer Office, Work Section, RVSKVV, Gwalior.

4. **The tender document may downloaded from web site** http://www.mptenders.gov.in

5. While all efforts have been taken to avoid errors in the drafting of the tender document, the Bidder is advised to check the same carefully. No claim on account of any errors detected in the tender documents shall be entertained.

6. Each page of the Tender documents must be stamped and signed by the person or authorized persons submitting the Tender in token of his/their having acquainted himself/themselves and accepted the entire tender documents including various conditions of contract. Any Bid with any of the Documents not so signed is liable to be rejected at the discretion of the RVSKVV, Gwalior **NO PAGE SHOULD BE REMOVED/DETACHED FROM THIS BIDDING DOCUMENT.**

7. The bidder shall attach the copy of the authorization letter / power of Attorney as the proof of authorization for signing on behalf of the Bidder.

8. All Bidders are hereby explicitly informed that conditional offers or offers with deviations from the conditions of Contract, the bids not meeting the minimum eligibility criteria or any other requirements, stipulated in the tender documents are **liable to be rejected.**

(Signature) **(Stamp)**

9. No request for transfer of any previous deposit of earnest money or Performance Security Deposit or adjustment against any pending bill held by the RVSKVV in respect of any previous work will be entertained.

10. Tenderer shall not be permitted to withdraw his offer or modify the terms and conditions thereof. In case the tenderer fails to observe and comply with the stipulations made herein or back out after quoting the rates, the EMD will be forfeited.

11. Right of Acceptance: The RVSKVV, Gwalior reserves all rights to reject any or all tenders without assigning any reason.

12. Communication of Acceptance — Successful bidder shall give acceptance within 10 days from the date of receipt of the work order, failing which, the work order issued stands cancelled and the EMD will be forfeited.

13. Corrigendum/Amendment to the tender will be affected if required.

14. The tenderer shall bear all cost associated with preparation and submission of tender form.

15. The bidder shall submit the tender form legibly in English and attach copies wherever required.

16. Bidders sending their bids through E-Tender online should also ensure that their bids are received on the said address by the stipulated date and time. No time extension shall be granted.

17. The Technical Bid will be opened on in the said date and time at our office.

18. In case of any accidents caused the house keeping personnel during the work period it, is the soil responsibility of the agency to meet any expenditure in this regards.

19. The tenderer should have sufficient employees. Full list of the employees, VIZ, name, age, employees code, experience in the field of house keeping service, P.F., ESI detail should be attached with the technical bid. (E-seva documents).

20. All house keeping tools and materials should be provided by the service provider. There should be sufficient stock of above said cleaning material at any point of time.

21. The house keeping staff should be in proper dress and name plates.

22. Vendor/Contractor/Bidder can site visit before quote the Rates in financial bid.

(Signature) **(Stamp)**

22. Absence of bidder or representative shall not impair legality of the opening procedure.

23. After opening of Technical bid and verifying the EMD amount(online e payment), the technical bids shall be evaluated later on to ensure that, the bidders meet the eligibility criteria as specified in the tender document.

24. Cleaning services should be provided on all days including Sunday and other holidays (If required).

25. It is the responsibility of contractor, to keep round the clock a housekeeping staff who is expert in the clearance of chocking of sinks, wash basins, floor traps, nahani traps, EWC, IWC, P Traps, Rain water pipes, sewer chamber & sewer lines, the chocking shall be cleaned within 2(Two) hours after reporting the complaint. If there is any loss/ inconvenience to RVSKVV, Gwalior owing to chocking, appropriate penalties shall be imposed on the contractor.

26. The technical bids shall be evaluated based on the available documents submitted by the bidder. To assist in the examination, evaluation, and comparison of the bids, and qualification of the bidders.

27. Guest House Services timing for House Keeping Staff will be 7:00 AM to 9:00 PM and office timing 8:00 am to 4:00 pm.

28. An increase in the minimum wage from time to time in the future will have to comply, whose responsibility will be of bidder. University will not be responsible for Labour EPF,ESI and any increment in notified rates.

29. Financial bid will be opened for the qualified technical bidders.

30. Stamp of Rs. 100 for self certified information.

31. No. of buildings notified in tender document can be increased or decreased as per V.V. requirement.

- **Note:-interested bidders can view the NIT on website http://www.mptenders.gov.in**
- **Amendments of NIT if any, would be published on website only, & not in News Paper.**

Date:

Place:

(Name and Signature of Tenderer with stamp of the firm)

ELIGIBILITY CRITERIA:-

1. The agency firm applying should possess valid income tax, PAN No. and GST no. The agency should have a minimum experience of 03 years providing mechanized cleaning services.
2. The tenderer must have an average annual turn over of minimum Rs. 10.00 lakhs during the last 03 years in the house keeping work.
3. Copies of the following document submitted along with the Bid.
   a. Audited profit and loss account of last 03 years i.e., 2018-19, 2019-20 & 2020-21
   b. GST Registration Certificate.
   c. PAN No.
   d. Income Tax return for last 03 years i.e., 2018-19, 2019-20 & 2020-21
   e. ISO certification for mechanized cleaning services.
   f. The Earnest Money Deposit (E.M.D.) of Rs. 50,000.00 (Rs. Fifty Thousand only) online e payment in favour of Executive Engineer RVSKVV, Gwalior.
   g. A copy of Registration Certificate under Contract labour (R&A) Act, 1970.
   h. Copy of Registration No. allotted letter is issued ESIC along with copies of the paid challans for the last year.
   i. Copy of Registration No. allotted letter is issued EPFO along with copies of the paid challans for the last year.

(Name and Signature of Tenderer with stamp of the firm)

Scope of work and Penalty Clause

Housekeeping / cleaning services should be provided round the clock on all days including Holidays(if required), so that all areas will be neat and clean all the time. Working hours should be adjusted in such a manner that cleaning work in the morning should be completed well before 10:00 am, where work will start at 10:00am. Contractor will arrange manpower for special VIP visits if required and provide full support and cooperation during functions, seminars, conferences organized by the Vishwa Vidhalaya.

S.No.	Type of service	Frequency of service	Method	Penalties For Non Completion/ Unsatisfactory work
1.	Sweeping & wet mopping of all floors i.e. Ground, 1st to last Floor, including lift area, cabin enclosures, other working/office areas etc.	Daily Once Work complete Before 10am	Manually/ Mechanized	Rs. 100/- per floor per day
2.	Cleaning, scrubbing and disinfecting bathrooms, toilets , wash basins, sanitary fittings, floors etc. of all the areas at regular on daily basis.	Daily Once Work complete Before 10am	Manually/ Mechanized	Rs. 100/- per floor per day & 50/- per wash room per day
3.	Cleaning sweeping, mopping with disinfectant cabins, lobbies, reception, pantries, kitchen, canteen, Corridors Ceilings, Office Rooms, at regular on daily basis.	Daily Once	Manually/ Mechanized	Rs. 50/- per floor per day
4.	Cleaning, dusting electrical switch boards, name plates, doormats, fire fighting equipments, computer systems, phones, doors, windows, furniture, grills, curtains etc.	Daily Once	Manually using dry & wet cloth as per requirement	Rs. 100/- per floor per day
5.	Cleaning of dust bins, waste paper baskets, etc.	Daily Once	Manually	Rs. 50/- per floor per day
6.	Spraying room fresheners in all rooms on daily basis at regular	Daily Once	…….	Rs. 50/- per day

7.	Cleaning of all open areas between the building and boundary including sweeping of roads lawns, paths, cleaning open drains, common areas of Buildings, Old Buildings, Guest House, AC Plants, Electrical Substation, Main Gate, etc.	Daily Once	Manually/ Mechanized	Rs. 100/- per day
8.	Glass cleaning in passages and corridors and of cabins from inside & outside	Weekly Once	Manually using dry & wet cloth using spray liquid cologne.	Rs. 200/- per floor per day
9.	Scrubbing and washing of stairs & removing pan stains if any from the corners	Weekly Once	Manually/ Mechanically as the circumstances may demand	Rs. 500/- per week
10.	Removing of cobwebs from the Highted walls/ceiling etc. Daily check is to be maintained.	Weekly Once	Manually/ Mechanized as the circumstances may demand	Rs. 500/- per week
11.	Dry vacuum cleaning.	Monthly Once	Mechanized vacuuming	Rs. 500/- per month
12.	Cleaning of Internal and External surface of Glasses (Buildings front & back side wall glasses) and External Granite surface & Sills of all windows of Building	Monthly once	Manually using necessary tools and cleaning materials In addition safety belts and other security arrangements.	Rs. 15000/- per Month
	Other penalties			
13.	House keeping Staff to be in proper uniform with name plates.	Per day		Rs. 50 per day per person
14.	If it is found that no action is been taken within one hour after the complaint of un-clean premises and improper house keeping	--	--	Rs.100 per complaint

Note:-Tenderer will has to give per day report in the specified format of housekeeping services which is available after tender and this report must be verified weekly by concerning authority.

Signature of the Authorized Signatory

EQUIPMENTS TO BE USED

Sr. No.	Machine Type	Function
1	Scrubber Driers-Heavy duty	Scrubbing, Drying of Floors at Passage, Reception area, Waiting area, Passage in wards etc.
2	Stair (Height of 50 feet approx)	Cleaning of Internal and External surface of Glasses (Buildings front & back side wall glasses) and External Granite surface & Sills of all windows of Building
3	Single Disc Scrubber (02 machine required)	Scrubbing of floors at Toilet, Lift Lobby, Heavy footfall area etc.
4	Hand Scrubbers	Dado Area, Skirting's, Unreachable corners and Staircases.
5	Wet and Dry Mop/Steel Scrubber	Scrubbing, Drying of Floors at Offices, Cabins, meeting rooms, Toilet etc. Heavy footfall area etc.
6	Dry Vacuum Cleaners	Dry Vacuuming at store, Consulting rooms, Reception desk, Window channels, Computers Telephone etc.
7	Hand Gloves/Toilet Brush/	Toilet Cleaning for Urinals & Commodes
8	Glass/Glass Wipers	Office items, Laminated Furniture, PC, Xerox machine/printer cleaning ,Glass
9	Jet pressure Machine	Disinfecting& cleaning of Toilet etc.

List of Building for House Keeping Services

S.No.	Building Name	Area
(A) 1.	Administrative Block (New Campus) **(G+I+II floor)**	**5733 sqm**
2.	Library and computer center (New Campus) **(G+I+II+III floor)**	**3000 sqm**
3.	VC Bungalow (New Campus) **(Ground floor)**	**400 sqm**
4.	International Hostel (**G+I floor)**	**1500 sqm**
5.	Museum Building(**G+I floor)**	**1500 sqm**
6.	E.E. Office	**442 sqm**
7.	KVK	**1600 sqm**
8.	Guest House	**522 sqm**
9.	Farmer hostel **(G+I floor)**	**840 sqm**
10.	Dormitory **(G+I floor)**	**820 sqm**
11.	Biotechnology center	**2400sqm**
13.	Electric Sub Station at New Campus	**260 sqm**
14.	ATIC Building	**405 sqm**
15.	Centre for Agribusiness Incubation and Entrepreneurship, Gwalior	**1332 sqm**
16.	Auditorium	**3310 sqm**
	Total	**24064 sqm**
(B)	Complete Parking, Roads, Loan etc. (open area) **(approximately)**	**12000 sqm**

Signature of the Authorized Signatory

Technical Bid Documents

Mandatory details to be provided with seal & signature else tender will be rejected summarily.

Sl. No.	Particulars	********
1.	Name of the tenderer/firm office Address, Telephone No. Fax No. Mobile No. E-Mail (Please attach registration certificate of firm).	
2.	EPF Registration No. Documents of Monthly Return submitted for the last year.	
3.	ESI Registration No. if applicable	
4.	Experience certificate from existing employers/past employers Experience certificate should be enclosed for three years.	
5.	Income tax return for the past three years	
6.	GST Registration No.	
7.	ISO certification of mechanized cleaning services.	
8.	Registration certificate under contract labour (R&A) act 1970.	
9.	PAN No.	
10.	Tender fees details	
11.	Furnish the list of services person and operator to be deputed in mechanized cleaning services.	
12.	Furnish the list of machine to be deputed in cleaning work.	
13.	Stamp of Rs. 100 for self certified information	

Date:

Place: **(Name and Signature of Tenderer with stamp of the firm)**

Financial Bid Documents
In House Keeping rates (per sqm) must be included material and Machinery cost

S.No.	Item Description	Area	Units	Rate per sq.mtr. **per month** to be entered by the Bidder (Rs. In Figures)	GST Amount in INR	Total Amount without Taxes **(Col. No. 03x05 = 07)**	Total Amount with Taxes (In Figures) **(Col. No. 06+07 = 08)**	Total Amount in words
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
(A)	**Constructed Area**							
	Administrative Block**,** Library and computer center**,** VC Bungalow**,** International Hostel**,** Museum Building**,** E.E. Office**,** KVK Building**,** Guest House**,** Farmer Hostel**,** Dormitory**,** Biotechnology center, Electric Sub Station, ATIC Building Centre for Agribusiness Incubation and Entrepreneurship, Auditorium etc. (Details of Building Area enclosed in Tender document P. No. 10)	**24064 sqm**	sqm					
(B)	**Open Area**							
	Complete Roads, Loan etc. (New campus + old campus)	**12000 sqm**	sqm					
C.	Cleaning of wall Glass of building notified in tender document	**One Time cleaning rate in a month for all wall glasses**	Job work					

Note:- Above rate include all type taxes i.e. income tax, EPF/ESI) etc. as applicable by Gov. rule

Date: ……

(Name and Signature of Tenderer with stamp of the firm)

Solid Waste Management

RAJMATA VIJAYARAJE SCINDIA KRISHI VISHWA VIDYALAYA, GWALIOR (M.P.)

Solid Waste Management System by Vermicompost component

Certificate for solid waste Management

कार्यालय नगर पालिक निगम, इंदौर
झोन कं. 11

कमांक 129 - " प्रमाण पत्र " - दिनांक 20/05/2024

प्रमाणित किया जाता है,कि कृषि महाविधालय ,इन्दौर ओल्ड सिहोर रोड के ठोस अपशिष्ट,तरल,ई वेस्ट प्रबंधन के अन्तर्गत महाविधालय मे उत्पन्न होने वाले ठोस अपशिष्ट का निदान डिस्पोज का कार्य नगर निगम इन्दौर द्वारा किया है ,उक्त प्रमाण पत्र कृषि महाविधालय ,इन्दौर ओल्ड सिहोर रोड इन्दौर की मांग अनुसार प्रदान किया जाता है।

20/05/2024
झोनल अधिकारी
राजमाता सिंधिया झोन कं. 11
नगर पालिक निगम, इन्दौर

कार्यालय नगरपालिका परिषद मंदसौर (म0प्र0)

दूरभाष कार्यालय–405960, फैक्स 244246
(ई–मेल: cmomandsaur@mpurban.gov.in)

कमांक 247 /स्वा. शाखा/2024 मंदसौर दिनांक:– 01 /05/2024

प्रमाणीकरण

एतद द्वारा प्रमाणित किया जाता है, कि के. एन. के. उद्यानिकी महाविद्यालय, मंदसौर के ठोस अपशिष्ट प्रबंधन के अंतर्गत वर्ष (2019–20, 2020–21, 2021–22, 2022–23 एवं 01.04.2023 से 31.03.2024) में महाविद्यालय में उत्पन्न होने वाले ठोस अपशिष्ट का निदान (डिस्पोज) का कार्य निकाय द्वारा किया गया। उक्त प्रमाण–पत्र के. एन. के. उद्यानिकी महाविद्यालय, मंदसौर की मांग अनुसार प्रदान किया जाता है।

मुख्य नगर पालिका अधिकारी
नगर पालिका परिषद मंदसौर

कार्यालय नगर पालिका परिषद सीहोर जिला सीहोर म.प्र.

क्रमांक 114/स्वा.शा/न.पा.सी./2024 सीहोर दिनांक 25/04/2024

//प्रमाणीकरण//

प्रमाणित किया जाता है कि निकाय द्वारा रफिक अहमद किदवइ कृषि महाविद्यालय एवं परिसर में प्रतिदिन कचरा संग्रहण वाहन क्र. MP- 37.L.1689 भेजा जाता है। जो महाविद्यालय एवं परिसर से कचरा संग्रहण कर प्रसंस्करण हेतु निकाय के टेचिंग ग्राउंड पर भेजा जाता है।

नोडल अधिकारी
स्वास्थ्य अधिकारी एवं स्वच्छता निरीक्षक
नगर पालिका परिषद सीहोर

नगर पालिका प्रशासन सीहोर
ULB Code 802314

Dustbins are placed for degradable and non-degradable waste in campus

Solid waste management in collaboration with Nagar Palika

Liquid Waste Management

RAJMATA VIJAYARAJE SCINDIA KRISHI VISHWA VIDYALAYA, GWALIOR (M.P.)

Liquid waste management

Waste water deposition Tank

Tanks for waste water

Liquid waste from Cattle shed goes into pits which is used to decompose Farm waste from cattle feeding and waste of crops and vegetation along with cattle dung. This type of partially decomposed material is used for feeding of earthworms in the Vermi composting unit to generate vermin compost.

Biomedical Waste Management

RAJMATA VIJAYARAJE SCINDIA KRISHI VISHWA VIDYALAYA, GWALIOR (M.P.)

Biomedical Waste Management

Segregation of Solid Biomedical Waste

NON INFECTED WASTE	INFECTED WASTE			
Cytotoxic drugs & Chemical waste	Soiled waste	Anatomical Waste	Infected Plastics	Sharps
	Infected dressing, PoP casts	Placenta, Body parts & Pathological waste	Syringe, gloves & Plastic waste	Needles & cut glasses
BLACK Plastic Container	RED Plastic Container	yellow Plastic Container	BLUE Plastic Container	white Plastic Container
CHEMICAL TREATMENT	AUTO CLAVE		DISINFECTED WITH 1% CHLORINE SOLUTION	
SECURED LAND FILLING	DEEP BURIAL		RECYCLER	SHARP PIT

Disposal Method

Common Treatment Facilities

Note: Use any other coloured bin other than black, red, yellow, blue and white for disposal of general waste

Role of University

- Provide safe, ventilated and secured location for storage of segregated biomedical waste as per the color codes.
- Provide vaccination to all staff members involved in handling the biomedical waste.
- Provide personal protective equipment to all staff members involved in handling the waste
- Provide training to all the staff members involved in biomedical waste management
- Conduct regular health check-up for staff members (handling waste) at least once in year
- Make available the annual report with all health care facility on university website

Environmental Safeguard Measures

ICAR-National Agricultural Higher Education Project PIU, 5th Floor, Krishi Anusandhan Bhavan-II, New Delhi-110012

https://nahep.icar.gov.in/ @nahep.icar.goi @nahep.icar @nahep

Safe Disposal of Hazardous Chemical Wastes

Discharge Chemical Waste

- Hazardous materials are **NEVER** to be disposed in the sink nor intentionally evaporated
- Waste solution may be poured to the sewer lines after fulfilling the discharge norms prescribed for CETP.
- Never store waste in the labs more than 180 days (6 months)

Safety Measures

- Always keep container in good condition with no leaks or cracks.
- Always pour waste through funnel and close the lid tightly.
- Always segregatewastes and store in clean and compatible secondary containment.

Role of University

- Ensure safe and sound management while handling the hazardous waste.
- Ensure that waste generated in labs disposed of in an authorised disposal facility.
- Provide containment to prevent accidents and limit their consequences on human being and environment.
- Provide training to the members involved in segregation, storage and disposal system.
- Provide information necessary to ensure safety in the form of display poster, etc.

Do's

- Wear safety equipment like gloves, boots, goggles, overalls, aprons etc while handling chemicals.
- Always have a second person to assist, while handling the chemicals.
- Read all labels prior to handling or moving chemicals.
- Label chemicals clearly with permanent stickers.
- Segregate waste as hazardous and nonhazardous waste.

Don'ts

- Don't mix unknown chemicals together and dispose.
- Don't store/keep chemicals on floor.
- Don't eat, drink, gum chewing, during the disposal process.
- Don't dump the cloth,soaked in spilled chemicals in waste bin.
- Don't use mobile phone while handling disposals.

Corrosive Material

Examples : Hydrochloric Acid, Sodium Hydroxide, etc

Air or Water Reactive Material

Examples : Zinc Dust, Magnesium Metal, etc

Flammable Materials

Examples : Alcohols, Acetone Ethers, Acetic Acid, etc

Oxidizer's Material

Examples : Concentrated Hydrogen Peroxide, Potassium Permaganate, Bleach, etc

Toxic Material

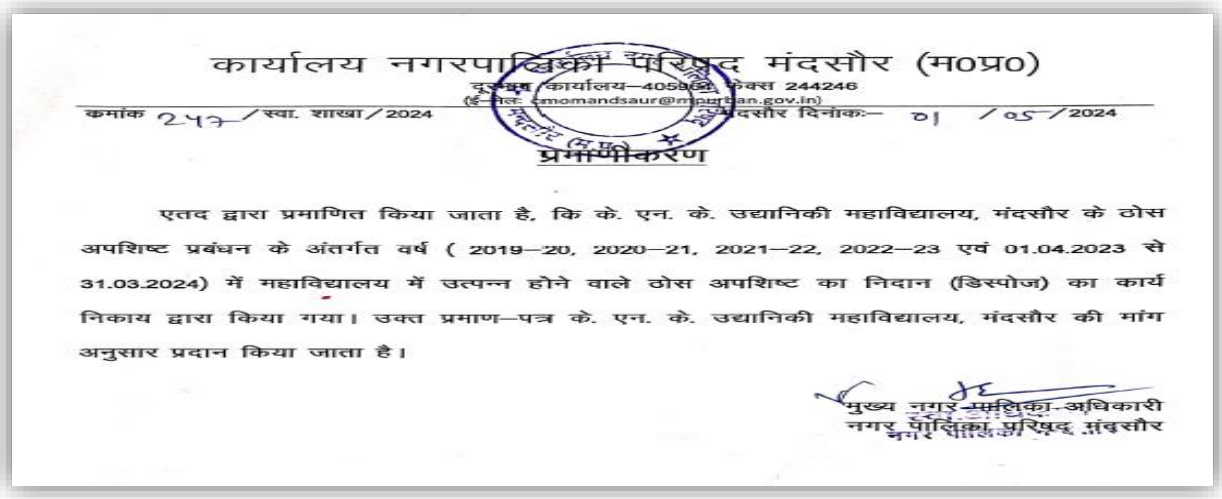
Examples : Mercury, Ethyl Acetate, Formaldehyde, Ethidium Bromide, etc

Environmental Safeguard Measures
ICAR-National Agricultural Higher Education Project PIU,
5th Floor, Krishi Anusandhan Bhavan-II, New Delhi-110012
https://nahep.icar.gov.in/ @nahep.icar.goi @nahep.icar @nahep
ICAR
NAHEP

Sanitary pad burning machines installed at Girls Hostels

Bio Waste Recycling Unit

A very limited amount of biomedical waste is produced from campus, which is safely disposed of through Nagar Palika collection vehicles.



कार्यालय नगरपालिका परिषद मंदसौर (म0प्र0)

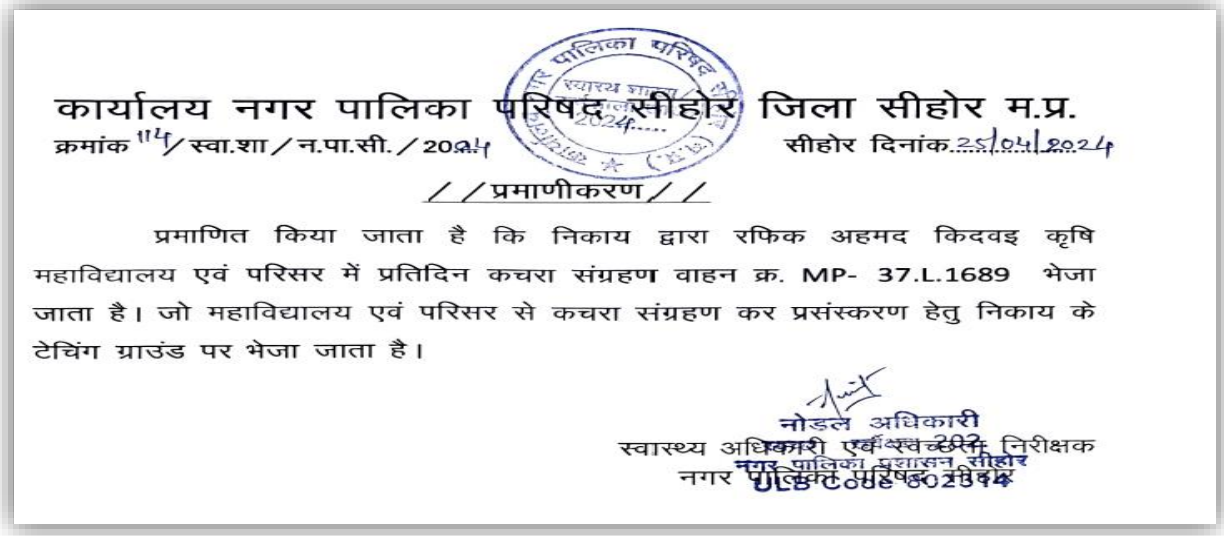
दूरभाष कार्यालय–405050, फैक्स 244246
(ई-मेल: momandsaur@mpurban.gov.in)

क्रमांक 247 /स्वा. शाखा/2024 मंदसौर दिनांक:– 01 /05/2024

प्रमाणीकरण

एतद द्वारा प्रमाणित किया जाता है, कि के. एन. के. उद्यानिकी महाविद्यालय, मंदसौर के ठोस अपशिष्ट प्रबंधन के अंतर्गत वर्ष (2019–20, 2020–21, 2021–22, 2022–23 एवं 01.04.2023 से 31.03.2024) में महाविद्यालय में उत्पन्न होने वाले ठोस अपशिष्ट का निदान (डिस्पोज) का कार्य निकाय द्वारा किया गया। उक्त प्रमाण–पत्र के. एन. के. उद्यानिकी महाविद्यालय, मंदसौर की मांग अनुसार प्रदान किया जाता है।

मुख्य नगर पालिका अधिकारी
नगर पालिका परिषद मंदसौर



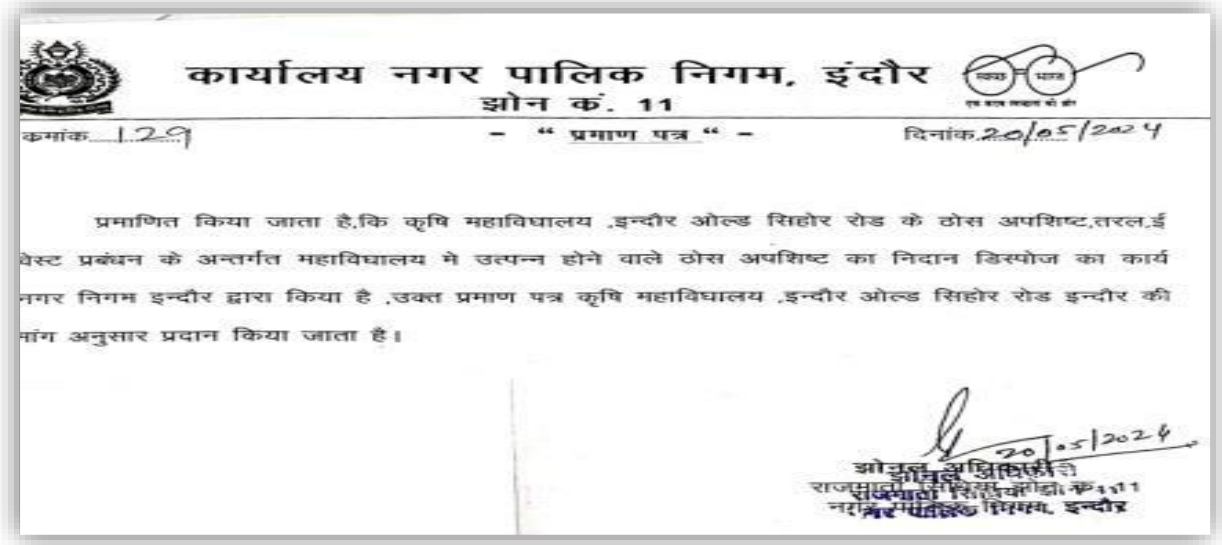
कार्यालय नगर पालिका परिषद सीहोर जिला सीहोर म.प्र.

क्रमांक 114/स्वा.शा/न.पा.सी./2024 सीहोर दिनांक 25/05/2024

//प्रमाणीकरण//

प्रमाणित किया जाता है कि निकाय द्वारा रफिक अहमद किदवइ कृषि महाविद्यालय एवं परिसर में प्रतिदिन कचरा संग्रहण वाहन क्र. MP- 37.L.1689 भेजा जाता है। जो महाविद्यालय एवं परिसर से कचरा संग्रहण कर प्रसंस्करण हेतु निकाय के टेचिंग ग्राउंड पर भेजा जाता है।

नोडल अधिकारी
स्वास्थ्य अधिकारी एवं स्वच्छता निरीक्षक
नगर पालिका प्रशासन, सीहोर



कार्यालय नगर पालिक निगम, इंदौर
झोन कं. 11

क्रमांक 129 – " प्रमाण पत्र " – दिनांक 20/05/2024

प्रमाणित किया जाता है,कि कृषि महाविधालय ,इन्दौर ओल्ड सिहोर रोड के ठोस अपशिष्ट,तरल,ई वेस्ट प्रबंधन के अन्तर्गत महाविधालय मे उत्पन्न होने वाले ठोस अपशिष्ट का निदान डिस्पोज का कार्य नगर निगम इन्दौर द्वारा किया है ,उक्त प्रमाण पत्र कृषि महाविधालय ,इन्दौर ओल्ड सिहोर रोड इन्दौर की मांग अनुसार प्रदान किया जाता है।

20/05/2024
झोनल अधिकारी
राजमाता सिंधिया झोन कं. 11
नगर पालिक निगम, इन्दौर

Guidelines for Safe Disposal of Hazardous Wastes Generated from Laboratories

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Guidelines for Safe Disposal of Hazardous Wastes Generated from Laboratories

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Abbreviations

BMWM: Bio – Medical Waste Mangement Rules

CETP: Common Effluent treatment Plant

CPCB: Central Pollution Control Board

DRI: Diary Research Institutions

FAO: Food and Agriculture organization

HWC: Hazaroud Chemical waste

HWMR : Hazardous Waste Managemnt Rules

ICAR : Indian Council of Agricultural Research

PPE : Personal Protective equipment

SPCBs: State Pollution Control Boards

SWMR: Soild Waste Management Rules

TSDF: Treatment, Storage and Disposal Facility

VI: Veterinary Institute

Foreword

Unscientific disposal of hazardous and other waste through burning or incineration leads to emission of toxic fumes comprising of Dioxins & Furans, Mercury, heavy metals, causing air pollution and associated health-related problems. Disposal in water bodies, or in municipal dumps leads to toxic releases due to leaching in land and water entailing into degradation of soil and water quality. The workers employed in such unscientific practices suffer from neurological disorders, skin diseases, genetic defects, cancer etc.

Proper chemical management is necessary to protect the health and safety of the university and surrounding communities and the environment. There are federal and state regulations that require all generators of chemical waste receive training and follow proper waste management and disposal procedures. These regulations have severe monetary and civil penalties associated with them. Its Institution responsibility to minimize the amount of waste produced and follow the scientific disposal methods in a way that has the least impact on environment and human health.

This booklet provides the proper management and safer alternate methods of disposals to help minimize risks and maintenance of safe laboratory environment. Integrating these guidelines in to teaching curriculum will help reinforce the students on importance of lessening the impact and protecting the environment. I am confident these guidelines are necessary, timely and will prove to be useful and practical to implement.

Dr. R.C. Agrawal
National Director, NAHEP

Preface

The hazardous wastes belong to a category of special wastes containing certain chemicals, metals and pathogenic organisms which can cause damage to the environment even at low concentrations. If not properly managed for safe disposal, it can have frightening repercussions on health and environment. Indiscriminate disposal of these wastes into the environment without proper treatment could lead to contamination of water resources (Source: ENVIS, CPCB, 2012).

All of the ICAR institutes have chemical, biological and veterinary laboratories established for academic and research (also service purposes, at times). While the types of waste generated are largely non-hazardous, there are few wastes that fall under hazardous categories (eg spent concentrated Sulphuric acid, phenols etc). There are Legal and Regulatory Requirements, Standard Operating Procedures (SOPs), recommended practices etc. for safe methods of disposals of these wastes. Accordingly there are organized systems/practices in place for collection and safe disposals. All the Institutes follow the prescribed methods and some have established their own facilities for treatment and safe disposals including establishment of Effluent Treatment Plants (ETPs). However, at times the disposal of these wastes is an issue as the quantities are small and the disposals though the organized disposal system proves costly. In view of the potential issues that could emerge out of unsafe storage and disposals, the institutes should consider using the organized systems of waste disposals and strictly adhere to SOPs. In cases where the quantities are small and organized disposal becomes costly, the alternate safe methods (eg: disinfection and disposal, autoclaving and disposal, dilution and disposal) needs to be followed.

In keeping with the requirements of the Institutions and the challenges it can pose, especially in terms of environmental and health risk, the Envrionemnt Safeguard Unit - NAHEP has devised to serve as a reference guide at laboratories

Editors

ESS- NAHEP

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Section 1 – Safe Disposal of Hazardous Chemical Wastes

Photo courtesy: CCSHAU, Hisar

The Hazardous Waste Management Rules 3(1)(17) defines hazardous waste as, any waste which by reason of characteristics such as physical, chemical, biological, reactive, toxic, flammable, explosive or corrosive, causes danger or is likely to cause danger to health or environment, whether alone or in contact with other wastes or substances, and shall include – (i) waste specified under column (3) of Schedule-I; (ii) waste having equal to or more than the concentration limits specified for the constituents in class A and class B of Schedule-II or any of the characteristics as specified in class C of Schedule-II; and (iii) wastes specified in Part A of Schedule-III in respect of import or export of such wastes or the wastes not specified in Part A but exhibit hazardous characteristics specified in Part C of Schedule-III.

While the Institutes are following the SoPs and using the organized systems for disposal, certain constraints exist, especially in cases where the quantities are small (smaller than the prescribed quantities as per Hazardous Waste Management (HWM) rules eg: the chemicals like Benzene, Arsenic Cadmium, etc used and generated in the laboratories are less than the quantity (i.e., ranges from 1.5 to 5 mg /L per annum) prescribed as per the HMW rules.

Management of the hazardous wastes at the laboratory site may not be feasible considering the limitation of technical expertise, time and manpower. Considering this, suggested that, the hazardous waste of (Chemical wastes, expired reagents/solvents, remnants of samples after analysis) may be transferred to nearest Treatment, Storage and Disposal Facility (TSDF), by following the guidelines as per The Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 Similarly, the liquid waste may be handover to Common Effluent Treatment Plant (CETP) for treatment purpose or treat the chemical waste as per the discharge norms prescribed by CETP. Norms are stated in annexure 1

Institutions are advised to collect the wastes in amber colored bottles and handover to TSDF at every 3 to 4 months[1] intervals based on the quantity generated.

The most common chemical wastes generated in the universities that are classified under Class A & C and safer alternate methods of disposals are listed hereunder. The universities are advised to discuss the option internally and consult State Pollution Control Boards (SPCB) and opt for the most suitable and safe methods.

1 Institution can decide the months based on the quantity generated and hand over to authorized agency but never discharge the chemical waste into sewers without treatment.

Table 1: Hazardous Chemicals Classification and Alternative Disposal Options

S. NO	Type of wastes generated in labs	Hazard category quantity /Type	Alternate methods of disposal
Class A & Concentration limit: 50 mg/kg			
1	**Antimony**	**Class A : A1 Concentration limit: 50 mg/ kg**	**Steps:** **A**dd the salt to large amount of water. **P**repare a solution with 400 grams of sulfur, 1100 grams of NaOH and add water to bring the volume of the solution up to 4 liters. To this solution add, 216 grams of soda ash, Na2CO3, and let it dissolve[2]. Let this stand 24 hours. **R**emove aqueous layer, check the pH and then neutralize with acid or basic material, to bring, to pH 6-8. **H**andover to a Common Effluent Treatment Plant (CETP) for treatment purposes or treat the waste as per the discharge norms prescribed for CETP. **T**he sludge may be disposed of in a landfill, in accordance with local regulations.

2 https://patents.google.com/patent/CA2147249A1/en

2	**Arsenic**	**A2 Concentration limit : 50 mg / kg**	**Methods:** **P**lace the chemical in a trench or pit and ignite from a safe distance with a detonating cord ("det cord"). Caution should be taken to ensure that any solvents are completely burnt. OR **D**ispose of the reagent, both solid and solution, by cautiously adding it to a solution of ethyl acetate in dry Tetrahydrofuran (THF) in ratio of 1:2 under an atmosphere of nitrogen. Never add reagent residues to water or alcohols. Treat the contaminated apparatus with ethyl acetate. Later, at least after 1 hour, wash the apparatus with water and dilute hydrochloric acid and then re-rinse it with water. Handover to a Common Effluent Treatment Plant (CETP) for treatment purposes or treat the waste as per the discharge norms prescribed for CETP
3	**Benzene**	**A18 Concentration limit: 50 mg / kg**	**Method:** **D**issolve or mix with flammable solvent (flammability rating 2 or 3) and then burn in pit or trench in an area at least 10 meters away from combustible material or in a 45/55- gallon drum (use slow burning to ignite)
4	**Phenol**	**A 19 Concentration limit: 50 mg / kg**	**Methods:** **L**ow levels of solid waste (e.g. gels, contaminated paper towels etc) should be placed into a suitable, leak-tight container and then into a yellow bag and treat as clinical waste for incineration.

			Phenol/chloroform mixtures can be treated as halogenated waste solvent and disposed of accordingly. **I**ncineration is the recommended method of disposal. Dissolve the phenol with a combustible solvent and burn in chemical incinerator equipped with an afterburner or scrubber[3] **A**queous solutions or buffer containing phenol may be disposed off in shatter proof bottle using the carrier. Low levels of solid waste (e.g. gels, contaminated paper towel) should be placed into suitable, leak-tight container and then into a yellow bag and treated as clinical waste for incineration.
			If phenol waste is the solid waste form, it should be disposed buy making packages of phenol in paper or other flammable material and burning in suitable combustion chamber. If it is in a liquid form, by absorbing it in vermiculite, dry sand, earth or similar material and disposing in a secured sanitary landfill or atomizing in a suitable combustion chamber.[4]

3 https://apps.who.int/iris/bitstream/handle/10665/39958/9241510889-eng.pdf?sequence=1&isAllowed=y (Phenol: health and safety Guide published by WHO for international programme on chemical safety (a collaborative programme of UNEP, the International Labour Organization, and the World Health Organization)

4 https://www.researchgate.net/post/How_can_I_dispose_phenol
(Yogesh Chandra Tripathi, Forest Research Institute Dehradun/FRI. Division of Chemistry and Bioprospecting (Ph.D. Chemistry – Medicinal Chemistry))

5	**Ammonia & Ammonia Compounds**	**C1 Concentration limit is 20,000 mg /kg**	**Steps:** **D**ilute the alkali 1 to 10 times with water (diluted alkalis are less dangerous). **S**elect an acidic material. Strong acids (e.g., hydrochloric acid, sulphuric acid) must be diluted 1:10 or greater prior to utilization. **Neutralization procedure** ***S****lowly add diluted base to a solution of the acidic material selected above. (Always check pH.)* ***C****ontinue the process until a pH of between 6 and 8 is obtained.* ***D****ilute the solution further, approximately 1 to 10, with water.* ***H****andover to a Common Effluent Treatment Plant (CETP) for treatment purposes or treat the waste as per the discharge norms prescribed for CETP.*
6	**Inorganic peroxides**	**C2 Concentration limit is 20,000 mg /kg**	**Steps:** **A**dd oxidizing agent to a large volume of a concentrated solution of sodium hypo-bisulfite (sodium metabisulfite) or a ferrous salt. **A**cidify with dilute Sulphuric acid.
			When reduction is complete (i.e., when heat generation stops), neutralize the solution with soda ash or dilute hydrochloric acid. **D**ispose of in sewer system with a large amount of excess water.

7	**Acidic halides**	**C16 Concentration limit is 20,000 mg /kg**	**Steps:** **T**ake a large container, containing an excess of sodium bicarbonate (or sodium carbonate, or calcium carbonate) and slowly add in the organic acid halide, and mix thoroughly. **D**ilute with water until pH of approximately 6-8 is obtained, let it stand 24 hours. **H**andover to a Common Effluent Treatment Plant (CETP) for treatment purposes or treat the waste as per the discharge norms prescribed for CETP. **A**lways remember that organic halides may react violently with water. Take necessary precautions while diluting with water. Wear PPE, maintain safe distance, keep first aid kit handy etc.
8	**Inorganic acids**	**D2 Concentration limit: 50,000 mg /Kg**	***Steps:*** **D**ilute acids 1 to 10 with water. Dilute acids are less dangerous. Dilution should always be by adding acid to water (until fizzing stops), but not water to acid which should be strictly avoided. **S**elect a basic material, such as sodium bicarbonate, potassium bicarbonate, calcium bicarbonate, limestone. Strong bases (e.g., sodium hydroxide and potassium hydroxide) must be diluted 1:10 times with water prior to utilization

			Neutralization procedure ***S****lowly add diluted acid to a solution of the basic material selected above. (Always check pH.)* *Continue the process until a pH between 6 and 8 is obtained.* ***D****ilute the solution further, approximately 1 to 10 times, with water.* ***H****andover to a Common Effluent Treatment Plant (CETP) for treatment purposes or treat the waste as per the discharge norms prescribed for CETP*
Others **(Following chemical waste are not categorized as hazardous but might pose some threats)**			
9	**Alkali Metals**		**Method 1** **G**enerate the metal alkoxide and hydrogen: Small amounts of the metal (approximately 1 gram) are allowed to react with an alcohol (e.g., ethyl alcohol) in a slow, controlled fashion (for example, in a cooled reaction flask). **T**he hydrogen gas is released into the atmosphere. **T**he metal alkoxide is subsequently hydrolyzed with water by adding to the mixture drop-wise to yield the metal hydroxide and alcohol. (This procedure presents a high fire risk) Take necessary precautions while diluting with water (wear PPE, maintain safe distance, keep first aid kit, fire extinguisher handy etc.) **H**andover to a Common Effluent Treatment Plant (CETP) for treatment purposes or treat the waste as per the discharge norms prescribed for CETP.

			OR **Method 2** **A**lkali metals such as those employed in liquid metal coolant systems can be safely reacted to form hydroxides by first dissolving the alkali metal in relatively inert metals such as lead or bismuth. **T**he alloy thus formed is contacted with a molten salt including the alkali metal hydroxide and possibly the alkali metal carbonate in the presence of oxygen. This oxidizes the alkali metal to an oxide which is soluble within the molten salt. **T**he salt is separated and contacted with steam or steam-CO. sub.2 mixture to convert the alkali metal oxide to the hydroxide. **T**hese reactions can be conducted with minimal hydrogen evolution and with the heat of reaction distributed between the several reaction steps[5].

5 Johnson, T R. *Method for the safe disposal of alkali metal*. United States: N. p., 1977. Web. https://www.osti.gov/biblio/5454959-method-safe-disposal-alkali-metal

10	**Aqueous solutions of water-miscible flammable organic solvents (e.g., solutions of less than 18% acetone, ethanol, methanol and other water-soluble and water-miscible solvents**		**Steps:** **A**dd solution to an available flammable solvent (acetone, acetonitrile, benzene, etc of flammability rating 2 or 3) **B**urn in pit or trench, in an area 10 meters away from any combustible material, or in a 45/55-gallon drum (use slow burning fuse to ignite)
11	**Iodine**		**Steps:** **I**n the fume hood, if possible, cautiously add iodine to a solution of sodium thiosulfate (300 ml of 4%) containing sodium carbonate (0.1 g). **S**tir until all of the iodine has dissolved (solution becomes colorless). **N**eutralize to a maximum pH of 8.5 with sodium carbonate (if pH larger than 9, iodine will re-dissolve). **W**hen reduction is complete, add sodium carbonate or dilute hydrochloric acid to neutralize the solution.

			Handover to a Common Effluent Treatment Plant (CETP) for treatment purposes or treat the waste as per the discharge norms prescribed for CETP
12	**Sodium Hypo-chlorite**		**Steps:** **T**o the sodium hypochlorite solution, add a large excess of a bisulfite or a ferrous salt and acidify with dilute sulphuric acid. **W**hen the reduction is complete, add soda ash or dilute hydrochloric acid to neutralize the solution. **H**andover to a Common Effluent Treatment Plant (CETP) for treatment purposes or treat the waste as per the discharge norms prescribed for CETP
13	**Cyanides**		**Steps:** **P**lace in a large container (e.g. 5 liters drum) and make alkaline (pH > 10) with a sodium hydroxide solution. **A**dd an excess of ferrous sulphate solution. **H**andover to a Common Effluent **T**reatment Plant (CETP) for treatment purposes or treat the waste as per the discharge norms prescribed for CETP

Disposals of hazardous chemical wastes: Dos and Don'ts

Do's

- Wear safety equipments like gloves, boots, goggles, overalls, aprons, while handling the chemicals.
- Always have a second person to assist, while handling the chemicals.
- Read all labels prior to handling or moving chemicals.
- Label chemicals clearly with permanent stickers.
- Segregate waste as hazardous and nonhazardous waste.
- Always dilute acids at a ratio of approximately 1:10 prior to neutralization.

Don'ts

- Don't mix unknown chemicals together and dispose.
- Don't store/ keep chemicals on floor.
- Don't use the chemicals from unlabeled containers.
- Don't eat, drink, gum chew, during the disposal process.
- Don't sweep spilled chemicals with broom.
- Don't dump cloth soaked in spilled chemicals in waste bin.
- Don't use mobile phone while handling disposals.

General Instructions:

1. Consider the above-mentioned methods in the table only after proposer understanding and in case of no other alternatives.
2. In case of dilutions – always add the material to be diluted to water but not *vice versa*. In case of acids, dilution can be done until the fizzing stops.

3. Wear protective gear and keep the fire safety equipment like fire extinguisher, fire alarm box, telephone, emergency shower/eyewash, and first aid kit, etc ready. Where there is a chance of flames/fire accidents in the process.

4. The personnel following the mentioned methods should take all precautions that are necessary.

5. Make sure that, vehicle is available to reach hospital in case of any unwanted incidents like explosions.

Eye Washer

Photo courtesy: CIFE, Mumbai

Section 2 – Safe Disposal of Biological Wastes - Laboratory Cultures

CCSHAU, Hisar 1

Biological waste with objectionable or putrescent characteristics, containing viable microorganisms that are either not known to be hazardous to humans or are minimally potentially hazardous, is not considered as infectious laboratory waste. However, safe disposal of lab cultures through disinfection is important to avoid any unexpected consequences.

Steam autoclaving usually is considered to be the method of choice for decontaminating cultures and the laboratory glassware etc. used for the same. Location of the autoclave within the laboratory minimizes storage and transport problems. It provides a technically proved treatment method for rendering any potentially infectious material safe. Autoclaved waste can be disposed of as general waste.

All the AUs must make the autoclaving facility accessible for students and researchers and provide necessary instructions on use and safe disposal

of all cultures. The instructions can also be placed in the laboratory for information. The procedure of the autoclaving and disposal mechanism is presented below:

1. Sharps Contaminated with Biological Waste

Sharps are items that are capable of puncturing, cutting or abrading the skin, e.g., needles, scalpel blades, slides and cover slips. Sharps are deactivated by autoclaving. Place sharps in a container that is red, rigid, puncture resistant, leak-proof and labelled with the biohazard symbol.

- Autoclave your sharps container for a minimum of 30 minutes at 121°C and 15psi.
- Log the autoclave run duration, quantity of processed waste, date, and operator.
- Label the sharp container with the words "autoclaved".
- Deface any biohazard symbols.
- Dispose of the container as follows:
  - Submit to an authorized agency. Note on the request that the container has been autoclaved.
  - Leave your autoclaved container at collection point to pick up by agency.

2. Liquid Waste

Liquid wastes, e.g., cell culture media and serum are deactivated either by autoclaving or chemical disinfection.

Most liquid wastes can be deactivated with bleach.

1. Chemically disinfect with a 1:10 final dilution (vol/vol) of household bleach.
2. Swirl flask contents and allow a contact time of 30 minutes
3. Pour down a sink drain connected to the campus sewage system and flush the plumbing with an excess of water

Alternatively, liquid waste may be autoclaved for 30 minutes at 121°C and 15psi

3. Solid Waste

- Solid biological waste, e.g., pipettes, tissue culture flasks, and multiple well plates, are typically deactivated by autoclaving.
- Collect solid biological waste directly into autoclavable bags
- Tie a knot at the upper third of the bag and affix heat sensitive indicator tape near the knot
- Use a secondary container to place all autoclave bags till its disposal
- Ensure that the autoclave operates for 30 minutes at 121°C and 15psi
- Record in the log book, details of autoclave in run duration, quantity of processed waste, date and operator
- Deposit the bag in the red-lidded totes designated for laboratory waste

List of Dos and Don'ts

Dos

- Restrict access to the laboratory when experiments are in progress.
- Always use mechanical pipetting devices.
- Wash hand after handling the material and before the exiting the laboratory.
- Wipe the bench with a cleaning agent; after complition.

Don'ts

- Never do mouth pipetting.
- Do not eat, drink, smoke, and apply cosmetics in the work area.
- Ensure that all other tubes and tips used in the project do not come in contact with the bacteria

Section 3 – Safe Disposal of Bio-Medical Wastes

The Bio-Medical Waste Management and Handling Rules (BWMH), 2016 defines the following rules:

- As per the rule 3 (f) 'Bio-medical Waste' means any waste which is generated during the diagnosis, treatment or immunization of human beings or animals or research activities pertaining thereto or in the production or testing of biological or in health camps, including the categories mentioned in Schedule I.
- BWMH rules are applicable to all persons who generate, collect, receive, store, treat, dispose or handle bio medical, waste in any form includes hospital, nursing homes, clinics, dispensaries, veterinary institutions, animal houses, pathological laboratories, blood banks, Ayush hospitals, clinical establishment, research or educational institutions, health camps, medical or surgical camps, vaccination camps, blood donation camps, first aid rooms of schools, forensic laboratories and research labs.
- Rule 8 (1) states no untreated Bio Medical waste shall be mixed with other waste and containers and bags referred to in sub rule (2) shall be labeled as (Biohazard and Cytotoxic hazardous) specified in Schedule IV.

In case of ICAR institutes, BMW is produced in Veterinary institutes/ universities (VI) and dairy research institutes (DRI) from academic laboratories, referral laboratories, research facilities, semen stations, hospitals, health camps etc.

In case of veterinary operations involving the study of zoonotic diseases, infected animal carcasses and tissues, contaminated fomites such as disposable instruments and supplies, and contaminated bedding materials are the most common sourse for Bio Medical waste. As per the prescribed procedures the disposal of such wastes is done through vendors/agencies/

etc. recognized or authorized by State Pollution Control Boards. All ICAR institutes/ universities follow these norms and procedures. However, there are certain wastes like spent phenols which are used for cleaning/ disinfection in postmortem facilities etc, cannot be disposed into drains and need to collect in a separate tank and handed over to appropriate agencies when appropriate quantity of waste collected in the tank. *(Collection and quantity of waste need to be discussed with state pollution control board)*

Listed below are the most common Bio-medical wastes produced from VI and DRI of academic laboratories, referral labs, research labs, hospital, health camps, etc and the appropriate methods of disposals as per the prescribed rules/ procedures and standards:

Photo Courtesy: TANUVAS Chennai

Table 2: Biomedical waste classification – categories, treatment, processing and disposal options as per the Schedule I

Category (Color)	Type of Waste	Type of bag and container to be used	Appropriate disposal methods
Yellow	**Animal Anatomical Waste** Experimental animal carcasses, body parts, organs, tissues, including the waste generated from animals used in experiments or testing in veterinary hospitals or colleges or animal houses.	Yellow colored non chlorinated plastic bags	Disposal should be through Incineration or plasma pyrolysis or deep burial. In the absence of above facilities, autoclaving or microwave/hydroclaving followed by shredding/mutilation/ combination of sterilization and shredding. Treated waste can be sent
	Soiled Waste Items contaminated with blood, body fluids like dressings, plaster casts, cotton swabs and bags containing residual or discarded blood and blood components.	Yellow colored non chlorinated plastic bags	for energy recovery
	Expired/Discarded Medicines Pharmaceutical waste like antibiotics, cytotoxic drugs including all items contaminated with cytotoxic drugs along with glass or plastic ampoules, vials etc.	Yellow colored non-chlorinated plastic bags or containers	Expired `cytotoxic drugs and items contaminated with cytotoxic drugs to be returned back to the manufacturer or supplier for incineration at temperature >1200^{0}C Encapsulation or Plasma Pyrolysis at >1200^{0}C the wastes can also be directly sent to common bio-medical waste treatment facility

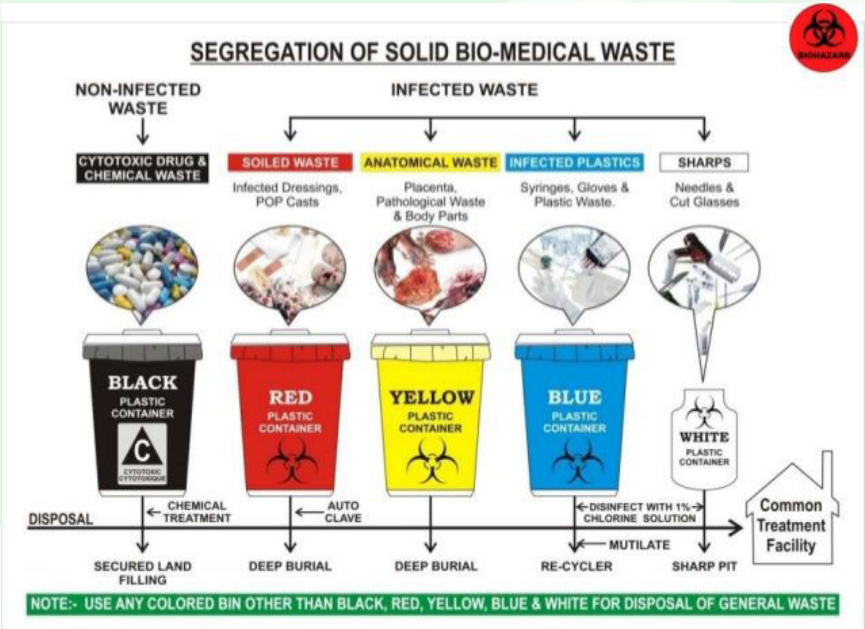
	Chemical Waste Chemicals used in production of biomedicals, chemicals used in disinfection as insecticides, etc	Yellow coloured containers or non-chlorinated plastic bags	Dispos of by incineration or Plasma Pyrolysis or Encapsulation in hazardous waste treatment, storage and disposal facility.
	Chemical Liquid Waste Liquid waste generated due to use of chemicals in production of biological and used or discarded disinfectants, Silver X-ray film developing liquid, discarded formalin, infected secretions, aspirated body fluids, liquid from laboratories and floor washings, cleaning, house-keeping and disinfecting activities etc.	Separate collection system leading to effluent treatment system	After resource recovery, the chemical liquid waste shall be pre-treated before mixing with other waste forms. The combined discharge shall conform to the discharge norms given in Schedule III.
	Discarded linen, mattresses, beddings contaminated with blood or body fluid.	Non-chlorinated yellow plastic bags or suitable packing material	Non- chlorinated chemical disinfection followed by incineration or Plasma Pyrolysis or sent for energy recovery. In absence of above facilities, shredding or mutilation or combination of sterilization and shredding can be followed.

	Microbiology, Biotechnology and other clinical laboratory waste Blood bags, laboratory cultures, stocks or specimens of microorganisms, live or attenuated vaccines, human and animal cell cultures used in research, industrial laboratories, production of biological, residual toxins, dishes and devices used for cultures.	Autoclave safe plastic bags or containers	Pre-treat to sterilize with non-chlorinated chemicals on-site as per National AIDS Control [6]Organization or World Health Organization guidelines, thereafter send for Incineration.
Red	**Contaminated waste (Recyclable)** Wastes generated from disposable items such as tubing, bottles, intravenous tubes and sets, catheters, urine bags, syringes (without needles and fixed needle syringes) and vaccutainers with their needles and gloves.	Red coloured non-chlorinated plastic bags or containers	Autoclaving or micro-waving/ hydroclaving followed by shredding or mutilation or combination of sterilization and shredding. Treated waste to be sent to registered or authorized recyclers or for energy recovery or plastics to diesel or fuel oil or for road making, whichever is possible. Plastic waste should not be sent to landfill sites.

6 https://dhr.gov.in/sites/default/files/Bio-medical_Waste_Management_Rules_2016.pdf

White (Translucent)	**Waste sharps including metals** Needles, syringes with fixed needles, needles from needle tip cutter or burner, scalpels, blades, or any other contaminated sharp object that may cause puncture and cuts. This includes both used, discarded and contaminated metal sharps.	Puncture proof, leak proof, tamper proof containers	Disposal methods can be by autoclaving or dry heat sterilization followed by shredding or mutilation or encapsulation in metal container or cement 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.
Blue	**(a) Glassware:** Broken or discarded and contaminated glass including medicine vials and ampoules except those contaminated with cytotoxic wastes.	Cardboard boxes with blue colored marking	Disposal can be after disinfection (by soaking the washed glass waste after cleaning with detergent and sodium hypochlorite treatment) or through autoclaving or microwaving or hydroclaving and then sent for recycling.
	(b) Metallic Body Implants	Cardboard boxes with blue colored marking	Disposal can be after Disinfection or through autoclaving or microwaving or hydroclaving and then sent for recycling.

Figure 1: System of Segregation of Solid Bio-Medical Wastes



Source: https://www.greengenra.com/how-to-get-bio-medical-waste-registration-in-delhi-ncr/

Photo courtesy: IVRI, Izatnagar

3.1. Carcass Disposal Methods

There may be a need for carcass disposals in case of livestock research institutes, laboratories associated with veterinary colleges, breeding farms etc. safe disposals become utmost important in such facilities.

Further it is mandatory under Prevention and Control of Infectious and Contagious Diseases Animal Act, 2009, to dispose of the fall animal / carcasses properly.

Measures to be taken While Transporting Carcasses to Disposal Site

- The site where the animal died is to be disinfected with 5% formaldehyde after removal of the carcass. Sprinkling of bleaching powder can also be done. The personnel handling the carcass should wear complete PPE.
- Separate system should be instituted for collection of carcasses.
- The transport of material must be carried out by vehicles, which are easy to clean and disinfect. The bottom of the vehicles must be water proof to prevent infective material or liquid from leaking out during transportation.
- It should not be overloaded – half a metre or more (depending on distance to be travelled and temperature) should be left clear for expansion of carcasses.
- Carcasses should not be slashed before loading.
- Vehicles should travel slowly to avoid splashing of contaminated material.
- Staff should carry a supply of an approved disinfectant and basic equipments to deal with minor spills during the journey.
- The diseased animal should not be touched without protective clothing and gloves. The personnel involved in handling should wear PPE, especially if the cause of death is a contagious or zoonotic disease.

- ❖ All vehicles must be cleaned and disinfected before leaving the premises and after unloading.
- ❖ The quantity of wash water generated during cleaning of vehicles should be treated with freshly prepared 3% solution of DuPont "RelyOn" multipurpose disinfectant cleaner or freshly prepared (<24hrs) 10% bleach solution (1part household bleach, 9 parts clean water).

Carcuss Disposal Options:

1. Incineration:

a. Complete combustion of carcasses to be ensured.

b. Air pollution control devices should be installed and the emission from incinerators should comply the General Emission Standards mentioned under Standard for incineration section in SWM Rules. 2016.

2. Deep Burial:

a. Burial should be according to different species, such as 1.5 meters for mature cow, 0.3 cubic meters per mature sheep, 1.0 cubic meters per 200 grown broilers/ commercial layer chicken which requires adaquate land.

b. Place carcasses in the trench. Consider puncturing/venting the carcass before they are placed in the trench to minimize the likelihood of gas-filled carcasses emerging from the soil cover. If more than several layers of carcasses will be placed in the trench due to the number of animals culled, a layer of feed, straw or hay (bedding materials, which should be destroyed) should be placed between each layer of carcasses. Alternately, place 0.5 metres of soil over the carcasses after they have been placed in the trench to allow the methane to dissipate for the first week, then finish filling the trenches to ground level.

[7]Recommended procedures for managing blood spills and trauma scenes. 2014. Environment health and safety, Towson University.
https://www.towson.edu/public-safety/environmental-health-safety/documents/blood-spills-and-trauma-scenes-8-1-14.pdf

c. Cover the carcasses with the excavated earth, being sure to grade the surface soil to facilitate runoff.

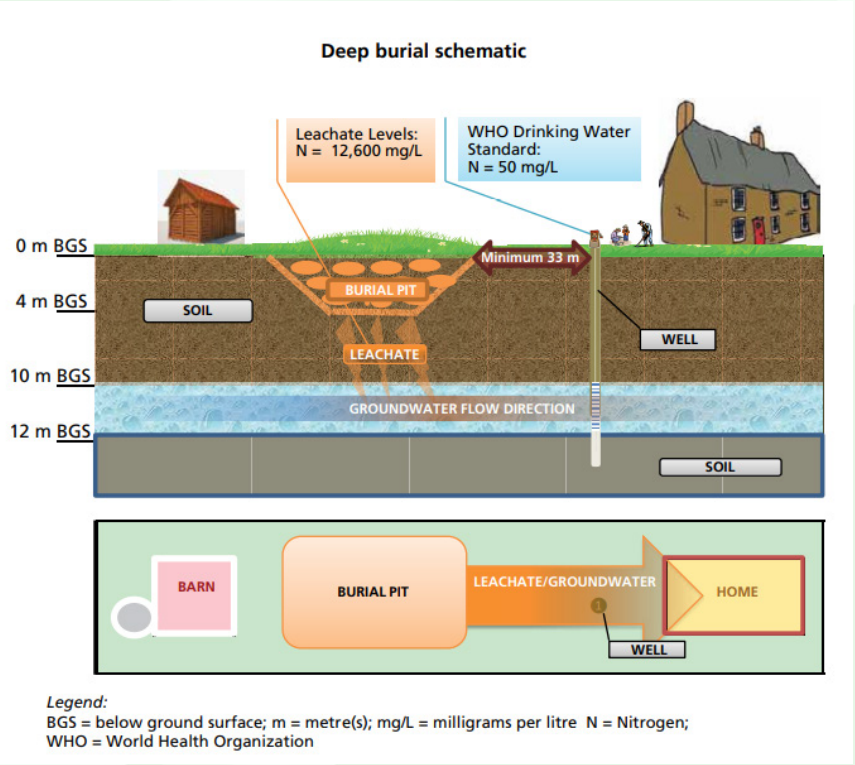
d. Regularly inspect and maintain the site by adding additional backfill to prevent pooling of water if necessary.

Measures to be taken up for Deep Burial:

- ❖ Ensure all employees involved in the operation wear personal protective equipment in accordance with an assessment of potential hazards.
- ❖ Ensure that personnel who will be operating equipments are properly trained in its use.
- ❖ Ensure that all equipments should thoroughly be washed, clean and disinfected befor disposal.
- ❖ Do not excavate near existing buildings and roads, which could undermine structural stability and cause collapse.
- ❖ Ensure the accessibility of heavy transport vehicles to disposal site.
- ❖ Consider nature of soil/rock formation in the available area.
- ❖ Ensure that the deep burial site should be relatively impermeable and no shallow well should be close to the site. Ensure that the ground water table level should be a minimum of six meter below the lower level of deep burial pit.
- ❖ Proximity to habitation and water catchment areas, bores and wells: The pits should be distant from habitation, and sited so as to ensure that no contamination occurs to the surface water or ground water. The area should not be prone to flooding or erosion.
- ❖ Ensure that burial site is away from services like water, gas, electricity, telephone lines, drainage, sewerage and other improvements or structures, including aerial lines.

Deep Burial: Advantages and Disadvantages

Advantages	Disadvantages	Time/ Cost
• On farm • Easy to implement	• Public health risk • Biosecurity risk • Pathogens may survive • Not sustainable • Regulatory limitations • Limited future land use • Required heavy equipments or excessive labour	• Fast • Low cost



Source: Lori Miller, USDA, 2018, Carcass management guidelines, FAO

3. Above Ground Burial

a. Land should be adequately available for burial according to type of species such as 1.5 cubic metres per mature cow, 0.3 cubic metres per mature pig or sheep, 1.0 cubic metres per 200 grown broiler/ commercial layer chickens.

b. Excavate the trench 50 to 60 cm deep and place a 30 cm deep layer of carbonaceous material in the trench. Carbon material to line trenches such as wood chips, rice straw, or similar materials. To estimate the amount of carbon material, use 0.75 cubic metres per mature cow, 0.15 cubic metres per mature pig or sheep, or 0.5 cubic metres per 200 grown broiler/commercial layer chickens.

c. Place carcasse in the trench. Before filling the rest of the pit with soil lime is added to pits to prevent earthworms from bringing contaminated material to the surface after pit closure.

d. Puncture/vent the carcasse by stabbing the area posterior to the ribs and the thoracic and abdominal cavities.

e. Cover the carcasse with the excavated earth, being sure to grade the surface soil to facilitate runoff.

f. Stabilize or seed the surface of the excavated area in accordance with local requirements to minimize soil erosion.

g. Place plastic or metal mesh on top of the piles, if needed, to prevent scavenger intrusion.

Measures to be taken up for Above-Ground Burial

I. Ensure that animals do not have any access to burial sites. Covers of galvanised iron/wire meshes may be used. Fence the area, to restrict access by scavengers and unauthorized persons.

II. Burial must be performed under close and dedicated supervision.

III. The institution shall maintain a record of all pits for deep burial. Ensure all disposal personnel are trained in safety, biosecurity and operational procedures.

IV. Thoroughly clean and disinfect all disposal equipments after the burial.

V. Verify that the technique is proven for the pathogen of concern before use

VI. Groundwater and bedrock should at least be120 cm to 240 cm below the ground surface or as recommended by a qualified soil scientist. (60 cm to 120 cm below the trench bottom).

Above Burial: Advantages and Disadvantages

Advantages	Disadvantages	Time/ Cost
• Safe • On-farm • Readily available • Fast Implementation • Public acceptance • Scavenger not observed to disturb properly constructed piles	• No	• Fast • Low cost

Source: Carcass management guidelines - FAO

The location of the deep burial site should be authorised by the prescribed local authority (eg: SPCB, Municipal Corporation etc.)

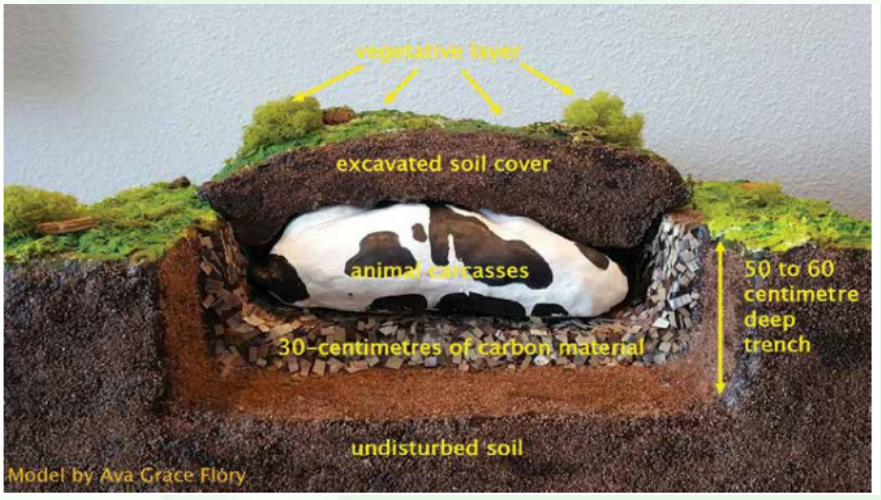


Figure 3: Above- ground burial schematic

Source: G.A. Flory consulting, Carcass management

Instructions to Worker's Protection

- Use recommended PPE includes gloves, boots, overalls, goggles mask etc.
- Avoid touching the eyes, mouth, and nose after touching any contaminated material while wearing PPE
- Do not eat, drink, smoke, after wearing PPE
- Perform good hand hygiene such as hand-washing with soap and water or incase of non availability of soap and water use an alcohol-based hand rub after removing PPE.
- The persons handling carcasses should avoid any contact with other persons or animals without bathing, changing clothing and taking appropriate disinfection measures.
- Persons to handling infected animals or carcasses should first be vaccinated against the particular diseases.

CCSHAU, Hisar

Section 4: Basic Requirements & Instructions at Laboratories

A standard list of basic laboratory safety rules is given below, to be followed in every laboratory that uses hazardous materials or processes. These basic rules provide behavior, hygiene, and safety information to avoid accidents in the laboratory. Laboratory specific safety rules are required for specific processes, equipment, and materials, which should be addressed by laboratory specific SOPs

Design & Construction of Laboratories

- It should have sufficient space and ventilation.
- It should have lighting and continuous water supply facility.
- It should have stack rooms, store rooms etc. should be spacious and well ventilated.

Electricity supply and safety measures in Laboratories

- It should have regular and stabilized electricity supply (220-230 volts) preferably captive should be ensured.
- It should have provision of standby source for power supply to sensitive and costly equipments.
- Ground all sources of power supply for human and equipment safety.

Fire safety measures in Laboratories

- All the laboratories should be equipped with firefighting facilities, first aid kit, look into the feasibility for provision of eye wash fountains, safety showers, etc.
- An efficient hood system is necessarily required at laboratories in order to remove various toxic and hazardous fumes from the work place generated during use of organic solvent/or during acid digestion.

The top surface of working bench should be made of acid and alkali resistant materials

All the students, technicians, housekeeping staff should be oriented on immediate response to accidental burns, acid spills, fire etc.

What to do when a fire breaks out

- Escape to safe place.
- Shout for help and call fire station.
- Find a safe passage to exit the building, if trapped.
- Always use the staircase if you are trapped in a high-rise building.
- Grab wet blanket, wrap your body it and crawl out.
- If door is on fire, wet some cloth and place them under the door to stop smoke from entering the room.
- Do not run if your body catches fire. stop drop and roll to put out the fire.
- Provision of adequate number of exit doors in case of emergency.
- Fire safety instructions should be displayed in the form of posters.
- Organize mock trails.

Photo courtesy: ANGRAU, Guntur

Waste management in Laboratories

- Segregated the hazardous waste as per the colour code.
- Laboratories should have separate channel for liquid waste collection.
- Label all the hazardous waste substances with precautions for the users in the laboratories.

Photo courtesy: GADVASU, Ludhiana

Annexures 1

Treated Effluent QualityStandards

S. No.	Industry	Parameter	Standards		
(1)	**(2)**	**(3)**	(4)		
"55"	**Common EffluentTreatment Plants (CETP)**				
	A. Inlet Quality Standards	For each Common Effluent Treatment Plant (CETP), the State Board will prescribe Inlet Quality Standards for General Parameters, Ammoniacal- Nitrogen and Heavy metals as per design of the Common Effluent Treatment Plant (CETP) and local needs & conditions.			
	B: Treated Effluent Quality Standards		Max. permissible values (in milligram/litre except for pH and Temperature)		
			Into inland surface water	**On land for irrigation**	**In to sea**
		General Parameters			
		pH	**6 - 9**	**6 - 9**	6-9
		Biological Oxygen Demand, BOD_3, 27 °C	30	100	100
		Chemical Oxygen Demand (COD)	250	250	2 50

		Total Suspended Solids(TSS)	100	100	100
		Fixed Dissolved Solids(FDS)	2100	2100	NS*
		Specific parameters			
		Temperature, ° C	Shall not exceed more than 5°C above ambient water temperature	Shall not exceed more than 5°C above ambient water temperature	Shall not exceed more than 5°C aboveambien t water temperature
		Oil & Grease	10	10	10
		Ammonical –Nitro-gen	50	NS*	50
		Total Kjeldahl Nitrogen (TKN)	50	NS*	50
		Nitrate-Nitrogen	10	NS*	50
		Phosphates, as P	5	NS*	S*
		Chlorides	1000	1000	NS*
		Sulphates, as SO_4	1000	1000	NS*
		Flouride	2	2	15

		Sulphides, as S	2	2	50
		Phenolic compounds (as C_6H_5OH)	1	1	50
		Total Res. Chlorine	1	1	10
		Zinc	5	15	15
		Iron	3	3	30
		Copper	3	3	30
		Trivalent Chromim	2	2	20
		Manganese	2	NS*	20
		Nickel	3	NS*	30
		Arsenic	0.2	NS*	02
		Cyanide, as CN	0.2	NS*	02
		Vanedium	0.2	NS*	02
		Lead	0.1	NS*	0.1
		Hexavalent Chromium	0.1	NS*	0.1
		Selenium	0.05	NS*	0.05
		Cadmium	0.05	NS*	0.05
		Mercury	0.01	NS*	0.01
		Bio-assay test	As per industry-specific standards	As per industry-specific standards	As per industry-specific standards

*NS-Not specified

Notes:

1. *Discharge of treated effluent into sea shall be through proper marine outfall. The existing shore discharges shall be converted to marine outfalls. In cases where the marine outfall provides a minimum initial dilution of 150 times at the point of discharge and a minimum dilution of 1500 times at a point 100 m away from discharge point, then, the State Board may relax the Chemical Oxygen Demand (COD) limit:
   Provided that the maximum permissible value for Chemical Oxygen Demand (COD) in treated effluent shall be 500 milligram/litre.
2. *Maximum permissible Fixed Dissolved Solids (FDS) contribution by constituent units of a Common Effluent Treatment Plant (CETP) shall be 1000 milligram/litre. In cases where Fixed Dissolved Solids (FDS) concentration in raw water used by the constituent units is already high (i.e. it is more than 1100 milligram/litre) then the maximum permissible value for Fixed Dissolved Solids (FDS) in treated effluent shall be accordingly modified by the State Board.
3. In case of discharge of treated effluent on land for irrigation, the impact on soil and groundwater quality shall be monitored twice a year (pre- and post-monsoon) by Common Effluent TreatmentPlants (CETP) management. For combined discharge of treated effluent and sewage on land for irrigation, the mixing ratio with sewage shall be prescribed by State Board.
4. Specific parameters for some important sectors, selected from sector-specific standards

	Sector	Specific Parameters
	Textile	Bio-assay test, Total Chromium, Sulphides, Phenolic compounds
	Electroplating Industries	Oil & Grease, Ammonia-Nitrogen, Nickel, Hexavalent Chromium, Total Chromium, Copper, Zinc, Lead, Iron, Cadmium, Cyanide,Fluorides, Sulphides, Phosphates, Sulphates,

	Tanneries	Sulphides, Total Chromium, Oil & Grease, Chlorides
	Dye & Dye Intermediate	Oil & Grease, Phenolic compounds, Cadmium, Copper, Manganese, Lead, Mercury, Nickel, Zinc, Hexavalent Chromium, Total Chromium,Bio-assay test, Chlorides, Sulphates,
	Organic chemicals manufacturing industry	Oil & Grease, Bio-assay test, Nitrates, Arsenic, Hexavalent Chromium,Total Chromium, Lead, Cyanide, Zinc, Mercury, Copper, Nickel, Phenolic compounds, Sulphides
	Pharmaceutical industry	Oil & Grease, Bio-assay test, Mercury, Arsenic, HexavalentChromium, Lead, Cyanide, Phenolic compounds, Sulphides, Phosphates."

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7. *https://www.ehs.ucsb.edu/files/docs/ls/factsheets/Biowaste_FS20_2.pdf*

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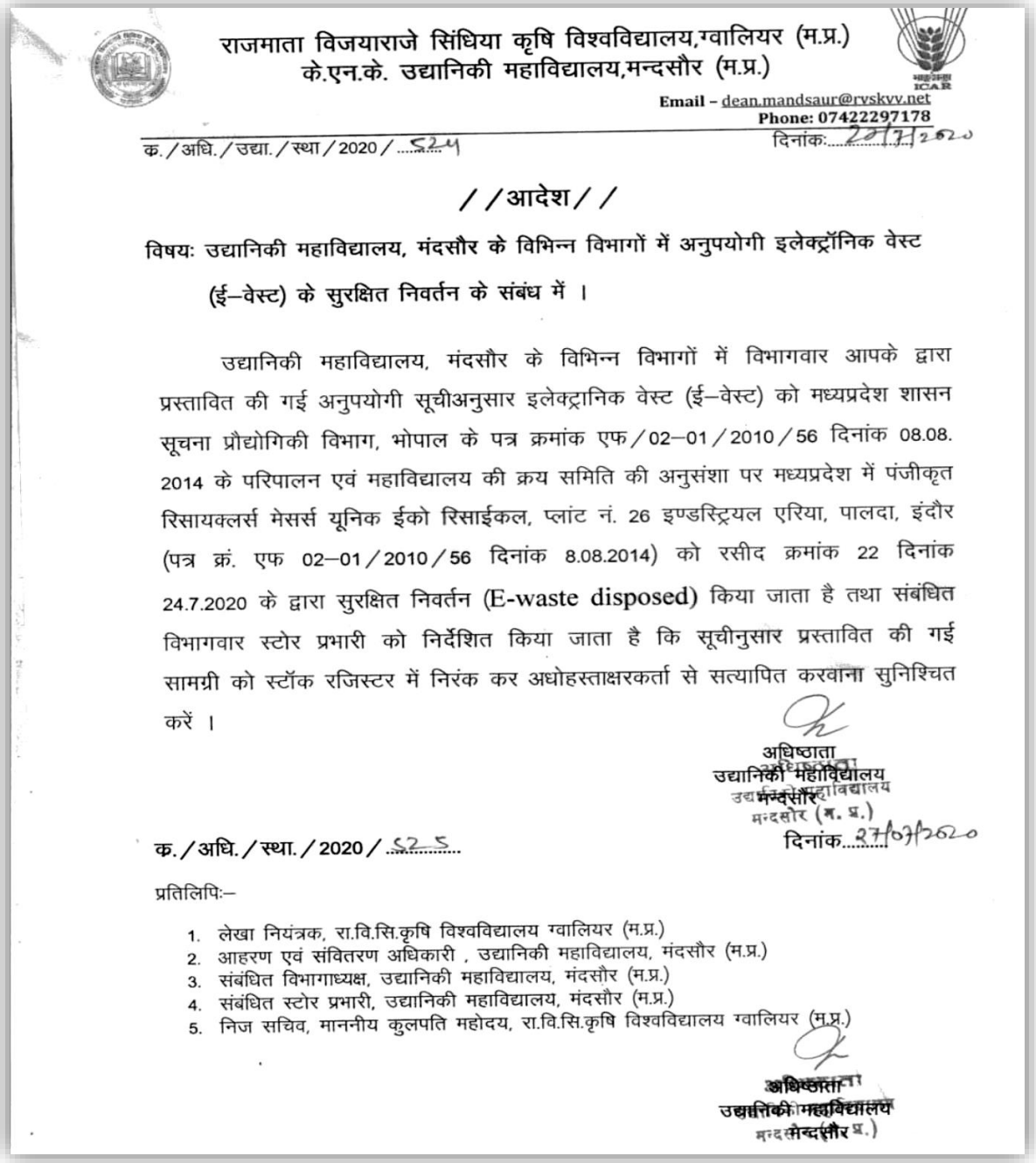
E-waste Management

RAJMATA VIJAYARAJE SCINDIA KRISHI VISHWA VIDYALAYA, GWALIOR (M.P.)

E-waste management

RVSKVV has identified certified vendors for E-waste disposal. The electronic equipment that needs to be disposed is collected at a central store and then handed over to the certified vendors. We get certificate from the vendor ensuring that the E-waste will be disposed as per prevailing norms without harming the environment.



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क./अधि./उद्या./स्था/2020/524 दिनांक: 27/7/2020

//आदेश//

विषयः उद्यानिकी महाविद्यालय, मंदसौर के विभिन्न विभागों में अनुपयोगी इलेक्ट्रॉनिक वेस्ट (ई–वेस्ट) के सुरक्षित निवर्तन के संबंध में ।

उद्यानिकी महाविद्यालय, मंदसौर के विभिन्न विभागों में विभागवार आपके द्वारा प्रस्तावित की गई अनुपयोगी सूचीअनुसार इलेक्ट्रानिक वेस्ट (ई–वेस्ट) को मध्यप्रदेश शासन सूचना प्रौद्योगिकी विभाग, भोपाल के पत्र क्रमांक एफ/02–01/2010/56 दिनांक 08.08.2014 के परिपालन एवं महाविद्यालय की क्रय समिति की अनुसंशा पर मध्यप्रदेश में पंजीकृत रिसायक्लर्स मेसर्स यूनिक ईको रिसाईकल, प्लांट नं. 26 इण्डस्ट्रियल एरिया, पालदा, इंदौर (पत्र क्रं. एफ 02–01/2010/56 दिनांक 8.08.2014) को रसीद क्रमांक 22 दिनांक 24.7.2020 के द्वारा सुरक्षित निवर्तन (E-waste disposed) किया जाता है तथा संबंधित विभागवार स्टोर प्रभारी को निर्देशित किया जाता है कि सूचीनुसार प्रस्तावित की गई सामग्री को स्टॉक रजिस्टर में निरंक कर अधोहस्ताक्षरकर्ता से सत्यापित करवाना सुनिश्चित करें ।

अधिष्ठाता
उद्यानिकी महाविद्यालय
मन्दसौर (म. प्र.)

क./अधि./स्था./2020/525 दिनांक 27/7/2020

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Acctt. 25

RAJMATA VIJAYARAJE SCINDIA KRISHI VISHWA VIDYALAYA, GWALIOR

Office of the Dean College of Horticulture mds

S. No. 22 Date 24/07/2020

Shri M/s Unique Eco Recycle 26 Udyog Nagar Palda Indore (M.P.)

No. or Qnty.	Particulars	Rs.	P.	Amount Rs.	P.
	Payment of E-waste material Disposed of Colt. Mandsaur Payment thr. NEFT UCo Bank mds C/A No. (14)			16800=00	
	(Rs Sixteen thousand eight hundred only)	Total		16800=00	

Signature

Dr Fazal Husain,

Dean
College of Horticulture
MANDSAUR (M. P.)

Waste Recycling System

RAJMATA VIJAYARAJE SCINDIA KRISHI VISHWA VIDYALAYA, GWALIOR (M.P.)

Waste recycling system- Turning Trash into Treasure

Waste paper & Bio waste recycling units

Ready Products from Waste Paper recycling Unit

Organic waste recycle unit for producing organic liquid

Farm waste is primarily used to produce vermicompost on the college farm, which is sold to farmers and used on the college campus farm to improve soil health and fertility for better crop yields.