



University of Hawai'i Biological Waste Disposal Guidelines

A. PURPOSE

The University of Hawai'i (UH) is committed to providing a safe and healthy work environment for those who work in research and academic laboratory settings. In general, UH follows the appropriate County, State and Federal guidelines and regulations for the management of biological material / biohazardous waste on the various campuses. The management of the various wastes generated within each facility requires a dedicated and informed effort in order to maintain proper segregation, handling, and disposal. Risk of personnel contamination and environmental release is a concern for any biological/biohazardous waste that is not properly handled prior to leaving the University facilities. This document provides guidance in the explanation of the various types and categories of biological/biohazardous waste materials that might be encountered and "...establishes minimum requirements for their management, segregation, handling, treatment, transport, storage, and disposal in order to ensure practices that will protect the health and safety of persons living in Hawaii." (Hawaii Administrative Rules, Title 11, Department of Health, Office of Health Care Assurance Chapter 104.1, Management and Disposal of Infectious Wastes, 12 Jul 2007).

B. DEFINITIONS / ABBREVIATIONS

Definitions

Biological waste. ALL wastes at the University of Hawaii that have come into contact or contain **any** biological materials are considered as a biological waste. . Biological waste includes, but is not limited to; Petri dishes, surgical wraps, culture tubes, syringes, needles, blood vials, absorbent material, personal protective equipment and pipette tips.

Biohazardous / Infectious waste. Any wastes that may contain infectious agents of sufficient virulence and quantity that present a risk or potential risk to the health of humans, other animals, or plants, either directly through infections or indirectly through disruption to the environment (EPA chapter 2.1)

Decontamination. A process that that reduces or eliminates the microorganisms on an area, object or material, thus reduces the risk of exposure to harmful pathogens. . (BMBL 5th edition pg. 329)

Disinfection. A procedure or process that "eliminates **nearly all** recognized pathogenic microorganisms but not necessarily all microbial forms (e.g. bacterial spores) on inanimate objects." (BMBL 5th edition, pg. 327)

Sharps. Any material or object that can puncture or cut skin and cause injury. These include but are not limited to: needles, syringes, glass slides, broken glass, plastic pipettes, pipette tips, Pasteur pipettes, lancets, capillary tubes, etc.

Sterilization. A procedure or process “that kills **ALL** microorganisms, including high numbers of bacterial endospores.” (BMBL, 5th edition pg. 327)

Abbreviations

ASHP - American Society of Health System Pharmacists

CFR - US Code of Federal Regulations

CLSI - Clinical and Laboratory Standards Institute

CDC - Centers for Disease Control and Prevention

DOT - United States Department of Transportation

EPA - United States Environmental Protection Agency

HAR - Hawai'i Administrative Rules

HDOA - Hawai'i Department of Agriculture

HDOH - Hawai'i Department of Health

NIH - National Institutes of Health

NIOSH - National Institute for Occupational Safety and Health

OSHA - Occupational Safety and Health Administration, US Department of Labor

UBHS - Universal Biological Hazard Symbol

USDA - United States Department of Agriculture

C. RESPONSIBILITIES

All laboratories that generate biological wastes must comply with these **UH Biological Waste Disposal Guidelines** and appropriate City and County, State and Federal rules and regulations. It is the responsibility of the principal investigator / supervisor of each lab to make sure that all employees are familiar with these guidelines and have received the proper training in the management of the specific biological materials that they generate. The proper segregation, processing and disposal of biological wastes generated in any UH laboratory are the responsibility of the person or persons who have generated the waste.

D. TYPES OF WASTES (HAR §11-104.1-4 & EPA chapter 2.2)

1. Cultures and Stock(s) of Biohazardous/Infectious agents and associated biologicals, products. Including concentrating of specimens.

- a. These wastes have potentially high concentrations of organisms. Included in this category are specimen cultures, stocks of biohazardous/infectious agents, and wastes from the production or use of these biologicals. (EPA chapter 2.2.2)
- b. Steam sterilization (autoclaving) is the preferred method of treatment for these types of waste prior to disposal.

2. Human and Animal Blood, Blood Products and Other Body Fluids.

- a. These include: blood and body fluids cells, serum, plasma, seminal fluids, vaginal fluids, cerebrospinal fluid, synovial fluid, pleural fluid, peritoneal fluid, amniotic fluid, and other potential infectious materials. Does not include: nasal secretions, sputum, tears, urine, feces, sweat, and vomitus, unless they contain visible blood or known to contain infectious agents (however, dispose of as biological wastes). These types of waste are considered biohazardous because of their potential for bloodborne pathogens and zoonotic diseases.
- b. Two recommended treatment methods are autoclaving and incineration (EPA chapter 5.4). In addition, chemical treatment may be used for small volumes (less than 100 ml) of these products that may be then discharged into the sanitary sewer. Use of chemical treatment may be restricted by permit. Check your permit conditions.

3. Human Pathological and Tissue Cultures

- a. Human pathological waste composed of cells, tissues, organs, and body parts are considered biohazardous waste due to their possibilities of unknown pathogens in the patients, cadaver or diagnostic samples.
- b. For aesthetic purposes, *recognizable body parts* must NOT be disposed of in the normal biohazardous waste stream. These types of wastes must be incinerated. Please contact the *Department of Anatomy, Biochemistry, and Physiology*, John A. Burns School of Medicine at 692-1446 for more information on proper disposal of these wastes.
- c. Human cells or tissue cultures whether infected or not, must be autoclaved or chemically treated before disposal into a sanitary sewer.

General Procedure for chemical treatment of cell cultures

- Pour spent tissue culture(s) (medium and cells) whether infectious or not, into a beaker or other containment vessel for decontamination.
- Add enough sodium hypochlorite (bleach) so volume of bleach is 10% of total volume.
- Mix well and hold overnight. Label container as Biological Waste, 10% Bleach and Date.
- Neutralize with thiosulfate, bisulfite (metabisulfite), ascorbic acid, or hydrogen peroxide.
- Carefully pour neutralized (decant) supernatant down sink with copious amounts of water to flush. Fluids must be pH neutral
- Any particulates/precipitant must be deposited into a biohazard bag and processed as regular biological waste.
- Containment beaker or other vessels should be autoclaved before reuse or disposal.

4. Animal Pathological and Tissue Cultures

Contact UH Animal and Veterinary Services (AVS) (956-4444) on proper procedures for disposal of animal carcasses, body parts, organs tissues and soiled bedding originating from biomedical vivarium.

Non-vivarium animals please contact Biosafety Program for more information.

Non-laboratory carcass (i.e., road kill). Call Building and Grounds Management at 956-8686 or Department of Public Safety at x6911 (after hours) to report this situation (immediate action necessary). Other campuses contact your campus Facilities.

- a. Chemically Preserved Animal Carcasses and Tissues
 - Carcasses from the biomedical vivarium must be disposed of through AVS.
 - Non vivarium animals, call Biosafety Program for more information.
 - Tissues, body parts and carcasses must be separated from any liquids. Liquid preservatives (i.e., Formalin, alcohol, DMSO, etc.) should be screened to eliminate all solid material and may be regulated as a hazardous waste; please contact the Hazardous Materials Management Program (HMMP) at x63198 for disposal procedure for these liquids. If possible neutralize the preservative.
 - Preserved tissues must be thoroughly rinsed and dried prior to wrapping. Wrap tissues/carcasses in newspaper or other absorbent material.
 - Wrapped tissues should then be double bagged and sealed. No free liquid should be present in the bags. Identify bags with: P.I. name, location (department), and emergency phone number, weight and a label indicating contents. Do not exceed 10 lb per bag.
 - Place the bagged tissue in a freezer.
 - Frozen material can be placed in building dumpster for disposal. Place in dumpster before next scheduled pick-up, not before holiday or long weekends.
 - b. Unpreserved Animal Carcasses and Tissues
 - Carcasses from the biomedical vivarium must be disposed of through AVS.
 - For non-biomedical vivarium carcasses, please call Biosafety Program for more information.
 - Wrap tissues/carcasses in newspaper or other absorbent material.
 - Wrapped tissues should be double bagged and sealed in plastic. No free liquid should be present in the bags. Identify bags with: P.I. name, location (department), and emergency phone number, weight and a label indicating contents.
 - Place the bagged tissue in a freezer. Do not exceed 10 lb per bag.
 - Frozen material can be placed in building dumpster for disposal. Place in dumpster before next scheduled pick-up, not before holiday or long weekends.
4. **Contaminated Agriculture and Plant Wastes** (Miscellaneous Contaminated Waste –EPA 1986, NIH rDNA guidelines 2009)

- a. A contaminated agriculture or plant waste that is infected with plant diseases, insects, other biological agents, or has been genetically modified. Please follow permit conditions as required by Federal or State Department of Agriculture and/or State Department of Land and Natural Resources.
- b. Steam sterilization can also be considered as an acceptable method of decontamination for infected/contaminated plant materials.
- c. See your conditions of your permit for either the federal agencies (USDA, EPA, and DOT) or state (HDOA or HDOH) for any additional treatments or restrictions on disposal.

5. Contaminated Biological Sharps

- a. Discarding of biologically contaminated sharps, including but not limited to hypodermic needles, syringes, Pasteur pipettes, broken glassware, broken plastic ware, lancets, glass slides, cover slips, plastic pipettes, pipette tips or any other material that is able to puncture a plastic trash bag, must be placed into impervious, rigid, puncture-resistant, and leak proof containers to avoid injury. These sharps containers must be located as close to the usage site as possible. Clipping, recapping, bending, manipulating, and breaking of needles is prohibited since this may result in the production of potentially infectious aerosols and personal injury. Containers should be labeled with the originating **Lab number** and contact **phone number**. *Chemical contaminated sharps contact your EHSO.*
- b. **Metal Sharps:** All metal biologically contaminated sharps (needle with syringe, lancets, scalpel, razor blades, dissecting needles, etc.) must be disposed of directly into a dedicated **Red colored** sharps container. DO NOT recap, shear, or cut contaminated sharps.
- c. Metal sharps must be treated to eliminate the biohazardous potential. Both steam sterilization and/or incineration provide effective treatment for contaminated sharps. Chemical decontamination may also be used, with the approval of the Biological Safety Officer/Compliance Office. Contact the Biosafety Program 956-3197 for pickup of full, **treated red metal sharps** containers for disposal.
- d. Sharps containers **for nonmetal sharps** (i.e. plastic pipette tips) can be recycled laundry detergent bottles (plastic) or sturdy corrugated boxes doubled lined with heavy gauged plastic bags that are able to withstand autoclaving and remain intact.

6. Mixed Wastes (Biohazardous-Radioactive, Biohazardous-Chemical, Biohazardous- Chemotoxic, etc.)

DO NOT AUTOCLAVE or chemically treat BIOLOGICAL MIXED WASTES without first doing an assessment of the *types* of mixed waste! Autoclaving mixed waste could cause the potential release of volatile radionuclides and/or fume or toxic chemicals!

- a. Mixed wastes consist of materials that exhibit multiple hazardous properties: biological, radioactive, chemical, carcinogenic, pharmaceutical, etc.

- b. Biological waste must be managed separately from chemical waste

Radioactive → Biological → Chemical is the order from high to low hazard, with the exception of a toxin or carcinogen which is either equal to or higher than the biological depending on the risk group of the biological. This ranking will determine the best method for decontamination before discard.

- c. Radioactive mixed wastes should be managed through the *Radiation Safety Office* at 956-6475 (EHSO). Contact them for proper handling and disposal.
- d. For more information regarding chemically contaminated mixed wastes contact the *Hazardous Materials Management Office* at 956-3198 (EHSO).

7. Recombinant Materials

The NIH Guidelines for Research Involving Recombinant or Synthetic Nucleic Acid Molecules (NIH Guidelines) April 2019, 84 FR 17858 requires all contaminated liquid or solid wastes must be decontaminated before disposal (Appendix G-II-A-1-c) and all wastes generated from laboratories and animal rooms must be appropriately decontaminated before material disposal.

Steam sterilization (autoclaving) is the preferred method of treatment for these types of waste prior to disposal.

Biomedical animal carcasses must be disposed in accordance to Animal and Veterinary Services Carcass Disposal Standard Operating Procedures and Policy.

8. Liquid Biological Wastes

Liquid biological waste should be collected in containers for autoclaving or chemical disinfection. Autoclaved or chemically disinfected liquid wastes can be disposed via the laboratory sink. Do not pour melted agarose down the drain. Allow it to cool and solidify, then dispose of it as solid waste in biohazardous waste bags

These liquids must be stored in closed, leak-proof containers while awaiting treatment and disposal. Collection vessels should be secured so that they cannot be tipped over. Secondary containment is strongly recommended and can be achieved by placing the vessel in a bucket or deep tray.

Storage vessels or the secondary container must be labeled with the biohazard label if the liquids will not be treated and disposed of within the shift. If disinfectant is added to the vessel, provide labeling so that the chemical hazard is identified as well. For instance, if your collection flask contains waste cell media and bleach, you should place biohazard label on the flask (or secondary container) as well as the words "bleach-treated cell culture materials" to properly identify both the chemical and biological hazard.

NOTE: Diluted bleach solutions may go down the drain in most cases. It is recommended that bleach solutions be neutralized prior to disposal via drain or autoclaving. However, many chemicals used for disinfection cannot be discarded down the drain. Contact EHSO to determine if sink disposal of disinfectants other than diluted bleach solutions is acceptable.

Safety Note: DO NOT autoclave liquids containing chemical disinfectants!

E. SIGNS, LABELS, AND MARKINGS

1. A **Universal Biological Hazard Symbol (UBHS)** (see Fig. 1) is used to indicate the actual or potential presence of a Biohazard and to identify equipment, containers, rooms, materials, experimental animals, or combinations thereof that contain, could contain, or are contaminated with viable biological commodities (Laboratory Safety Monograph, A Supplement to the NIH Guidelines for Recombinant DNA Research 1-2-1979).
2. Proper identification of biohazardous agents is necessary to alert support personnel, who may enter the lab area, to take precautions and to restrict traffic to hazardous areas. It is the primary responsibility of the principal investigator to properly identify all biohazards in their lab.
3. The UBHS must be placed so that it can be easily seen and displayed only for the purposes of signifying the presence of or the potential for biological hazards.
4. The UBHS is usually **fluorescent orange** or an **orange-red** in color. There is no requirement for the background color as long as there is sufficient contrast to permit the symbol to be clearly defined. The symbol must be as prominent as practical, of a size consistent with the size of the equipment or material to which it is affixed, and easily seen from as many directions as possible.

Fig. 1



5. Appropriate wording may be used in association with the symbol to indicate the nature or identity of the hazard, name of the individual responsible for its control, precautionary information, etc., but this information should never be superimposed directly on the symbol.
6. An emergency contact information with telephone number must be posted

F. BIOHAZARD WASTE CONTAINMENT

1. Non-sharps, non- liquid waste containers

- a. Biohazardous waste containers must be made to ensure containment of the waste, to protect the waste handlers, other personnel, and the public from injury and diseases that could be potentially caused by contact with the wastes.
- b. Containers should be: (OSHA 1910.1030(d) (4) (iii) (B))
 - Closable.
 - Lined with non-soluble autoclavable bags that are red in color or clearly labeled with the UBHS.

- Constructed in such a way as to contain all contents and prevent leakage of fluids during handling, storage, transport, or shipping. (OSHA 1910.1030(d)(4)(iii)(B))
- Closed prior to removal to prevent spillage or protrusion of contents during handling, storage, and transport.

2. Plastic Bags (polyethylene or polypropylene)

- a. All biohazardous waste should be deposited/collected into a *biohazard autoclave bag* (red only, three ml thickness). These bags must be used for **NON-SHARPS, NON-LIQUID WASTES**. All biohazardous bags must be tear-resistant, leak proof, able to contain the waste completely from its point of generation, through movement, and treatment. Is able to withstand autoclave temperature and pressure. All bags must be properly labeled with the UBHS at the point of generation. (HAR 11-104.1-11)

3. Sharps containers (OSHA 1910.1030(d) (4) (iii) (A) (1))

- a. **Sharps waste** must be deposited at the usage site (point of generation) or as soon as feasible into a special closable, rigid, leak proof, puncture resistant, autoclavable, container with a lockable lid which is unable to be re-opened once locked in place, which is red in color and/or clearly marked with the UBHS. Needles must not be re-capped, sheared, or cut. Containers should be labeled with the originating **Lab number** and contact **phone number**. Sharps waste must never be deposited into plastic biohazard bags alone. (OSHA 1910.1030(d) (4) (iii) (A) (1))
- b. All metal sharp waste containers should be steam sterilized. For metal *red sharps containers* once they have been sterilized call the Biosafety Program at 956-3197 for pickup and disposal. Non-metal sharps containers once sterilized must be placed in a dark plastic trash bag, sealed and disposed of in regular trash. Do not deposit directly into building dumpster. County regulation forbid sharps container into their system.

4. Alternate Types of Containers

- a. In selection of alternate containers, consideration must take into account the type of treatment that will be used metal, rigid plastics, corrugated cardboard, fiberglass, and glass are generally suitable materials for biological wastes containers. They have an advantage of greater rigidity and strength than plastic bags alone. The disadvantages include: glass containers are breakable; corrugated cardboard and fiberboard containers are not leak proof and must be used only with double plastic bag liners.
- b. All alternate containers must be lined with double plastic bags listed above in section F, 2a. Sharps containers for *nonmetal sharps* (i.e. plastic pipette tips) can be recycled laundry detergent bottles (plastic) or sturdy corrugated boxes double lined with heavy gauged plastic bags.

5. Containers for Liquid Waste

Liquids must be placed within leak proof containers for movement to the site of treatment. The size of the containers should be large enough in order to minimize and control spills and use of a covered leak proof

secondary container are essential for transport and autoclaving. The use of an absorbent packing material between the primary container and the secondary container should also be considered.

G. HANDLING AND TRANSPORTING BIOHAZARDOUS MATERIALS

1. Untreated biohazardous waste being transported to another location within a facility for any reason must be placed in autoclave able plastic bags, sealed, labeled with the UBHS, and placed in a **rigid, sealable and leak proof secondary container** for transport. (HAR §11-104.1-12). All individual transport biological wastes must be trained Transportation of Biological Commodities (Laulima On-line training ORC 103).
2. Terminal disposition of biological agents and of all materials contaminated or suspected of being contaminated with biological/biohazardous material, including dead animals, tissues, and equipment must be preceded by autoclaving or inactivation by other approved methods (e.g. tissue digestion, incineration) for agents involved before disposal or cleaning.

H. TREATMENT

These are general guidelines and information on various types of treatment processes. Your individual situations may vary and require adjustment to meet the needs and intent of these guidelines.

1 Steam sterilization

- a. Steam sterilization of biological/biohazardous waste utilizes **saturated (live) steam** within a **pressure vessel** at temperatures sufficient to kill **ALL** biological/ biohazardous agents present in the wastes (usually pressurized steam at 15 psi and 250 to 270^oF / 121 to 132^oC).
- b. There are two general types of steam sterilizers. In both, the air is replaced with pressurized steam; the temperature increases to a level within the waste load that is sufficient to sterilize any biological/biohazardous agents. The **gravity displacement type**, in which the displaced airflows out the drain through a steam activated exhaust valve. The **pre-vacuum type**, in which a vacuum is pulled to remove the air before steam is introduced into the chamber. Most modern autoclaves are a hybrid of both these types.

There are three basic autoclave cycles:

- **Fast Exhaust** cycle. Is usually used to decontaminate or sterilize dry goods, glassware etc. This cycle charges the chamber with steam and holds it at a set temperature for a set time. When finished the chamber returns quickly to atmospheric pressure.
- **Pre-Vacuum** cycle. This cycle is typically used for decontaminating porous material, animal bedding etc. In this cycle the chamber is evacuated of air before the steam is introduced, which allows the steam to better penetrate throughout the load.
- **Slow Exhaust** cycle. Also known as the “liquid cycle”, steam is exhausted after completion of decontamination “slowly” in order to prevent sterilized liquids from boiling over.

- c. Treatment by steam sterilization is **TIME, PRESSURE and TEMPERATURE** dependent; therefore, it is essential that the entire waste load be exposed to the necessary temperature for the defined period of time, under the designate pressure.
- d. The principle factors that must be considered when treating biological/biohazardous waste by steam sterilization are:
- **Type of waste:** solids, liquids, equipment, animal bedding etc.
 - **Packaging and containment:** bags, box, metal container etc.
 - **Volume** of waste load.
 - **Configuration and arrangement** in the treatment chamber.

2. Preparing items for autoclaving

- a. When bags or containers are approximately **3/4 FULL** they should be prepped for autoclaving. **DO NOT** pack down or compress contents as this will prevent and/or hinder steam penetration. Add 100-250ml of water to each bag prior to processing, amount of added water will vary and be determined by the size and contents of bag or container. Bags should be loosely closed allow steam access.
- b. Materials waiting to be autoclaves should be properly stored and contained in a secondary leak proof container. Never store untreated waste directly on the floor.
- c. All waste being prepared for autoclaving should be **properly labeled** in order to be able to track waste back to the generating laboratory if necessary. Each autoclave location should have a labeling system and log in place that provides this documentation. Label should have at minimum department information and contact telephone number.
- d. Autoclaves must be packed **loosely** to allow air to escape and steam to enter. Open mouth containers must not be inverted and should be placed on their sides especially in a gravity displacement autoclave to prevent trapping air.
- e. Select a suitable sterilization cycle. Cycle times are usually **double** when used for decontamination of waste. General suggested guidelines for Temperatures, Times and Pressures for decontaminating/sterilizing various waste materials (.
 - Trash: 250°F (121°C) for 1 hour, 15 psi.
 - Liquids: 250°F (121°C) for 1 hour for each gallon, at 15 psi.
 - Glass: 250°F (121°C) for 1 hour, 15 psi.
 - Tissue: 250°F (121°C) for 1 hour for each pound, 15 psi.
 - Laundry: 250°F (121°C) for 30 minutes, 15 psi.
- f. Always follow manufacturer's specific instructions for proper use of the particular autoclave you are using. **Training** on its proper use and operation must always be completed and documented by the PI or facility before using any autoclave in the University of Hawai'i system. Written operating instructions should be available at each autoclave location.
- g. General routine autoclave maintenance:

- Remove and clean drain strainer daily
 - Gauges, temperature recorders, timers' etc. should be routinely checked/monitored and calibrated periodically to assure accuracy.
 - Wash chamber periodically with tri-sodium phosphate or a mild detergent. Never use a strong abrasive or steel wool.
 - Rinse chamber with tap water and dry.
 - Wash, rinse, and dry loading carts/carriages as indicated or needed
 - Periodically flush and clean chamber discharge drain.
 - Additional requirements as directed by manufacturer's instruction.
- h. Again remember that biohazardous wastes that have **multiple/mixed hazards MUST NOT be steam sterilized** because of the potential for exposure of equipment and equipment operators to toxic, radioactive, anti-neoplastic drugs, or other hazardous chemicals that could be fume or volatilized by the temperatures utilized in steam sterilization.

3. Loading and Unloading the Autoclave

Persons involved in steam sterilizing biohazardous/infectious wastes must be educated and trained in the proper techniques to minimize personal exposure to hazards posed by these wastes and the autoclaving process. Proper personal protective equipment (PPE) should be worn when preparing, loading and unloading the autoclave. This includes the use of at minimum, safety glasses or face shield, lab coat with long sleeves and heat resistant gloves. When loading and unloading the autoclave, personnel should be dutiful in order to, minimize formation of aerosols, prevent the spillage of waste during the loading and unloading process and be aware of possible vapor inhalation and burn hazards especially when opening and unloading the autoclave.

4. Autoclave Monitoring, Performance evaluation and documentation

All autoclaves, steam sterilizers, and pressure vessels operating on the UH campus' must be routinely inspected, serviced and certified. This is to verify that the autoclave is functioning properly. **NOTE:** Certification for autoclaves that are hard plumbed to a buildings steam lines is required by the State of Hawai'i and is performed by the Hawai'i State Department of Labor and Industrial Relations, Division of Occupational Health and Safety, Boiler and Elevator Inspection Bureau.

- **Biological indicators:** It is highly recommended that a biological indicator (BI) utilizing *Geobacillus stearothermophilus* spores are used on a regular scheduled basis to determine and document that the autoclave is functioning properly and within desired parameters. They should be run at regular intervals, weekly, monthly or quarterly, to verify function ability and logged. Import of Biological indicators requires a valid Hawaii Department of Agriculture import and use permit.
- **Class 5 - Integrating Indicators:** Class 5 Integrating indicators or chemical indicators (CI's) are devices designed to respond to the various physical conditions within the autoclave with a chemical or physical change. Class 5 CI's have been approved by the FDA as equivalent in performance to a biological indicator. They use multiple parameters to give an indication of how well the autoclave is functioning and can serve as a valuable tool for immediate load monitoring and compliance more economically and quickly than standard biological indicators. Class 5 CI's however **DO NOT** replace the use of spore.

BI's which should continue to be used periodically and logged for each autoclave.

Documentation. All waste being prepared for autoclaving should be properly labeled in order to be able to track waste back to the generating laboratory if necessary. Each autoclave location should have a labeling system and log in place that provides this documentation.

5. Training

All users of the autoclaving and processing biological wastes must be trained and records of training must be kept. Any new or additional procedures must be trained and documented prior to initiation of the procedures. Training records must be available during biosafety laboratory audits.

BIOHAZARDOUS / INFECTIOUS WASTE MANAGEMENT PLAN

Laboratory Specific - Biohazardous Waste Management Plan

Each research or instructional laboratory at the UH that utilizes any form of biological/biohazardous materials is required to have a *written Biohazardous Waste Management Plan* as part of the laboratories Biosafety manual. It should be specific and designed for each individual laboratory and delineate the procedures for the labs management of their particular biohazardous/infectious waste stream.

According to HAR §11-104.1-33, EPA 1986 each infectious waste generator and transporter of untreated infectious waste shall have a written plan that contains policies and detailed procedures that:

- 1 Outline the handling, safety and effective management, and disposal of infectious waste in accordance with these rules (HAR §11-104.1). Suggested sections for waste plan (EPA 1986):
 - Designation
 - Segregation
 - Packaging
 - Storage
 - Transport
 - Treatment
 - Disposal
 - Contingency Planning
 - Staff training
- 2) Ensure the health and safety of persons living in Hawaii and the environment in accordance with applicable federal, state, and local regulations, which include, but are not limited to, those regulations issued by the NIH, CDC, OSHA, EPA, and CLSI, as well as HRS §11-58.1 (Solid Waste Management Control), HAR §11-62 (Waste Water).

A copy of this plan shall be kept in the laboratory or administrative offices of the generator and the transporter.

The plan shall also provide for contingencies in emergency situations. At a minimum this shall include, but not be limited to, procedures to be used in the following circumstances:

- A **Spills of liquid infectious waste.** The plan shall include provisions for containment, protection of personnel, clean up procedures, disinfection and disposal of the spill residue and contaminated containers; See: *UH Spill Plan – Safe Handling of Biohazardous Laboratory Spills*.
- b) **Rupture of plastic bags or other loss of containment.** The plan shall include provisions for containment, protection of personnel, clean up procedures, disinfection, and repackaging of waste; and
- c) **Equipment failure.** The plan shall include contingent arrangements for waste storage, transportation, and treatment.

- d) **Quality Control.** Use of Chemical indicators (chemical autoclave tape), Biological Indicators (spore or integrators) and Time checks.

TEMPLATE: BIOHAZARDOUS WASTE MANAGEMENT PLAN

(As mandated by Hawaii Administrative Rules; §11-104-10 - Management and Disposal of Infectious waste)

1. In an event of spillage of non-liquid infectious/biologically contaminated wastes (solids, non-sharp, plastics, paper, disposable gloves, rubber, etc.) prior to decontamination materials will be placed in non-soluble plastic bags (red autoclave bag) using non-breakable scoops or dustpan-like aids as necessary, closed tightly and placed in an outer autoclave bag that will also be tightly sealed. If generated in rooms _____ these bags shall be autoclaved in room _____. If the primary autoclave in room _____ is inoperable this wastes shall be transported to the autoclave in room _____ in a covered non-breakable container, after autoclaving, place red bag in a clear or transparent plastic bag, labeled with date, time and lab name and disposed of in the ordinary dumpster. Personnel performing this clean-up will be appropriately dressed in personnel protective equipment (e.g., laboratory coat, water resistant apron, utility gloves, and safety goggles). After pick-up all surfaces exposed must be covered with paper toweling and moderately flooded with disinfectant (type and conc. _____). The disinfectant must sit for a minimum 30 minutes. This toweling must be disposed of by autoclaving as above. Any non-disposable containers used for cleaning up infectious spills shall be autoclaved, cleaned, labeled "sterilized" and returned to use.
2. In an event of spillage of liquid infectious wastes prior to decontamination the entire volume shall be covered with absorbent paper toweling (spill kit) and moderately flooded with appropriate disinfectant (type and conc. _____). After an interval of at least 20 minutes this wastes will be removed and placed in a non-soluble red autoclave bag. This bag will be sealed, placed in a second labeled autoclave bag and autoclaved prior to disposal. The surface shall be treated with further toweling or spill kit material and disinfected with disinfectant as above. All toweling will be autoclaved prior to disposal. Any non-disposable containers used for cleaning up infectious spills shall be autoclaved, cleaned, labeled as sterilized and return to use.
3. In an event of unavailability of primary autoclave in room _____, the autoclave wastes shall be transported to the secondary autoclave located at room _____, in a covered non-breakable container, autoclaved, bagged in a clear/transparent bag, labeled with date, time and lab name and disposed of in ordinary trash (location _____). Personnel performing this clean-up should be appropriately gowned and gloved. After pickup all surfaces exposed should be covered with paper toweling or spill kit and moderately flooded with appropriate disinfectant (type and conc. _____).

This toweling shall be disposed of by autoclaving as described in above. Any non-disposable containers used for cleaning up infectious spills shall be autoclaved, cleaned, labeled sterilized, and returned to use.

In the event that both primary and secondary autoclave is down, please store wastes in a refrigerator until the autoclave is repaired. If this cannot be done, please call Biological Safety, to authorize chemical treatment.

4. Autoclaves shall be monitored for performance using a biological indicator, chemical indicator (autoclave tape) and time checks at least quarterly. Date and results (positive or negative) will be recorded in the autoclave monitor log kept at (room _____). Corrective actions will be instituted immediately if the working temperature, pressure, or time checks of the autoclave are insufficient and verified as corrected before resuming operations.
5. All biologically contaminated sharps will be collected in red sharp containers. When filled to the fill line (approximately 7/8 filled) the lids of these containers shall be securely fastened with strapping tape and the containers transported to room _____ for storage until collection by _____ for proper disposal.

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Bio-contaminated Disposal Reference Guide

<p>BIOLOGICAL CONTAMINATED METAL SHARPS: Hypodermic Needles with attached.: • Syringes (Barrels & Plungers, m with or without needles) • Tubing. (Butterfly. etc). • Blades. (Scalpels, Razors. Lancet)</p>	<p>RED SHARPS CONTAINERS Strap lid with filament and autoclave tape. Autoclave place in orange/blue totters</p>
<p>PIPETS (Plastic or glass) PASTEUR PIPETS (Plastic or glass) PLASTIC PIPETTIPS</p>	<p>Non-vendor (not red) sharps container puncture resistant (Double bag lined corrugated box or capable plastic container-like., plastic detergent bottles. Autoclave Box Dumpster</p>
<p>BIOHAZARDOUS LIQUIDS WITHOUT CHEMICALS:</p> <ul style="list-style-type: none"> • Liquid tissue Culture Media/growth media • Animal or Human Blood and other Blood Components • Animal or Human Body Fluids 	<p>Autoclave Screen particulate Treat particulate as SOLID BIOLOGICAL WASTE (see below) Flush remaining liquid down the drain with copious amounts of water</p>
<p>SOLID BIOLOGICAL WASTE: Petri Dishes / Tissue Culture Flasks, Gloves, PPE All other items contaminated with biological materials:</p> <ul style="list-style-type: none"> • Contaminated Paper Towels., Kim Wipes. Bench Paper, etc. • Glass; cover slips, glass slides, broken, tubes • Inoculation loop, stirring devices 	<p>Use RED autoclave bag Autoclave Delete/obliterate Universal biohazard symbol Place in dark/opaque plastic trash bag Dumpster.</p>
<p>CHEMICALLY PRESERVED TISSUE SPECIMENS: Animal (vertebrate/invertebrate) and Plant</p>	<p>Separate tissue from liquid. Dry and wrap tissue, double plastic trash bag Dumpster. Liquid preservative call EHSO about disposal of <u>liquid</u>.</p>
<p>BIOHAZARDOUS-CHEMOTOXIC MIXED WASTE: (Neoplastic, Genotoxic, Pharmaceutical Cytotoxic, Experimental Organisms) Not exceeding 3% of total volume</p>	<p>Call Biological Safety Program for assistance.</p>
<p>BIOHAZARDOUS-RADIOACTIVE MIXED WASTE:</p>	<p>Contact Radiation Safety Program at 956-8591 for Assistance.</p>

Table 1 Sharps/Wastes Disposal Quick Reference Guide

Sharp Type	Action	Container	Labeling	Disposal
Biohazardous (metal, plastic, or glass)	Place directly into container	Red and hard walled	Biohazardous sharps	Autoclave - then deposit into orange-blue totes
Hazardous chemical <u>metal</u> sharps *See a. Below OR Non-hazardous <u>metal</u> sharps (also new and unused)	Rinse if contaminated, collect rinsate if P-coded / insoluble OR Drain disposal of rinsate otherwise	Non-red and hard walled	(Specific chemical name) hazardous metal sharps OR Non-hazardous metal sharps (if decontaminated / new / unused)	EHSO Hazardous Waste Group using waste turn in form
Hazardous chemical glass / plastic *See b. below	Place directly into container	Non-red and hard walled	(Specific chemical name) hazardous sharps	EHSO Hazardous Waste Group using waste turn in form
Non-hazardous glass / plastic *See c. below	Place directly into container	Non-red and hard walled OR double lined plastic bag in a cardboard box	Non-hazardous glass / plastic	Place container in box, tape, label as non-hazardous glass / plastic - then place beside dumpster
Radioactive (metal, plastic, or glass) short lived <120 day half life	Place directly into container	White and hard walled	Radioactive sharps short lived	EHSO Radiation Safety
Radioactive (metal, plastic, or glass) long lived >120 day half life	Place directly into container	White and hard walled	Radioactive sharps long lived	EHSO Radiation Safety

- a. Metal sharps contaminated with hazardous chemicals. For metal sharps contaminated with hazardous chemicals (e.g., needles, razors, scalpels, or blades) rinse the metal sharp to remove the contamination. If the contaminate is a "P" chemical or insoluble collect the rinsate and turn it in to EHSO for disposal. Otherwise dispose of the rinsate down the drain. Place the decontaminated metal sharps in a non-red covered plastic container. Use the EHSO waste turn in form for pick up. This procedure can also be used for metal sharps that are non-hazardous, new, and / or unused.
- b. Glass or plastic contaminated with hazardous chemicals. For glass or plastic sharps contaminated with hazardous chemicals (e.g., pipet tips), turn them in to EHSO as excess hazardous material / hazardous waste and include the name, (e.g., pipet tips contaminated with phenol, ethidium bromide, or mercury).
- c. Non-hazardous glass or plastic. Dispose of the glass / plastic by placing the containers (boxed non-red hard walled container or plastic lined cardboard box) and place beside dumpster for disposal.

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