

STANDARD OPERATING PROCEDURE

Biological Waste Management and Disposal Instructions

Definition of Biological (or Special) Waste

[The Texas Department of State Health Services](#) (TDSHS) has identified biological or special waste as requiring special handling to protect human health or the environment. The items selected for regulation were deemed to have the highest potential to transmit infectious disease(s) if improperly treated or handled.

The term “biological (or special) waste” refers to regulated waste that includes the following categories:

- microbiological waste
- sharps
- human blood, blood products, and other potentially infectious materials (OPIM)
- pathological waste
- animal waste and bedding of animals intentionally exposed to pathogens

The Texas Commission on Environmental Quality ([TCEQ rules](#)) and the [TDSHS rules](#) regulate biological waste.

Treatment of all laboratory biological waste prior to disposal is good laboratory practice, but biohazardous waste must be treated prior to disposal. Biohazardous waste that is mixed with hazardous chemical waste, radioactive waste, or both must be treated to eliminate the biohazard prior to disposal. After treatment, the waste must be managed as hazardous chemical waste or as radioactive waste through the Environmental Health and Safety Office (EH&S).

All generators of biohazardous waste and sharps must strictly adhere to the following University of Texas at Arlington (UTA) waste disposal guidelines. Biohazardous waste is defined as all biologically contaminated waste that could potentially cause harm to humans, domestic/wild animals, or plants. Examples include human blood, certain body fluids, and cells/tissues, recombinant, or synthetic nucleic acid molecules, and human, animal or plant pathogens. Common decontamination methods for biohazardous waste include heat sterilization (e.g., autoclaving), chemical disinfection and incineration.



Biological Waste Streams at UTA

Liquid Biohazardous Materials (such as Bacterial Cultures in Liquid Media, Human Blood/OPIM, Body Fluids of Animals Experimentally Infected with Pathogens, etc.)

Decontaminate by autoclaving (follow [Standard Operating Procedure: Steam Autoclaves](#)) or treat with an appropriate chemical disinfectant for the sufficient contact time. After decontamination, liquids may be disposed of by pouring them down the drain to the sanitary sewer if they do not contain hazardous chemicals or radioactive materials. No liquids should be put in regular trash or dumpsters.

Human blood and blood products mean:

- discarded human blood waste
- serum
- plasma
- other blood components / materials containing free-flowing blood and blood products

The following human body fluids are referred to as other potentially infectious materials (OPIM) considering that these materials may also contain bloodborne pathogens (BBP), including hepatitis B virus (HBV) and human immunodeficiency virus (HIV):

- semen
- vaginal secretions
- cerebrospinal fluid
- synovial fluid
- pleural fluid
- pericardial fluid
- peritoneal fluid
- amniotic fluid
- saliva if visibly contaminated with blood
- any body fluid that is visibly contaminated with blood
- all body fluids in situations where it is difficult or impossible to differentiate between body fluids

All liquid human blood, blood products, and OPIM need to be gathered in waste containers marked with biohazard sign and stored in secondary containment. Contents of the waste container need to be listed in the attached waste tag.

Items contaminated with human blood, blood products, or OPIM need to be collected in biowaste boxes lined with red bag marked with biohazard signs (Stericycle boxes with liners are available through EH&S). These biowaste boxes are used as the terminal receptacle. Close the red

biohazard bag securely before closing the Stericycle box (follow Standard Operating Procedure: [How to Package Biohazard \(Stericycle\) Boxes](#)).

In order for the liquid blood, blood products, OPIM waste, or biowaste boxes to be picked up, please send a request for disposal through [Chemical Environmental Management System \(CEMS\)](#) by following the instructions in the [Standard Operating Procedure: Request for Biological Waste Removal](#). Stericycle boxes do not need inventory tags as liquid biohazardous waste containers do.

Disposable Solid Items (Non-Sharps, and not Animal Carcasses/Tissues)

Collect all non-sharp disposable items (such as gloves, plastic ware, Kim wipes, etc.) contaminated with biohazardous materials in leak proof **autoclavable** biohazard bags with universal biohazard symbol. Transport biohazardous waste from the laboratory to an autoclave room in a closed, leak-proof bag or container. Contain bags in a leak proof tray. Do not leave non-inactivated waste unattended. Proceed as stated in the [Standard Operating Procedure: Steam Autoclaves](#).

Alternatively, collect all non-sharp disposable items contaminated with biohazardous materials in biowaste boxes lined with red bag marked with biohazard signs (Stericycle boxes, available through EH&S). These sturdy, pre-printed cardboard biowaste boxes displaying the biohazard sign are used as the terminal receptacle. Do not overfill the boxes: boxes need to be closable and weight no more than 43 lbs. Follow Standard Operating Procedure: [How to Package Biohazard \(Stericycle\) Boxes](#). In order for the biowaste boxes to be picked up, please send a request for disposal through [CEMS](#) by following the instructions in the [Standard Operating Procedure: Request for Biological Waste Removal](#). Stericycle boxes do not need inventory tags as liquid biohazardous waste containers do.

Non-Disposable or Reusable Items

Decontaminate non-disposable or reusable items (such as equipment, glassware, bench tops, etc.) contaminated with biohazardous materials by using a chemical disinfectant (such as 10% bleach, a quaternary ammonium compound, an iodophor, etc.). Choose a chemical disinfectant appropriate for the specific biohazardous material being used and allow for sufficient contact time.

Animal Carcasses, Tissues, Bedding Infected with Human Pathogens or Transgenic

Dispose of all animal carcasses/animal body parts and animal carcasses/tissues intentionally exposed to pathogens using the incinerator located on the roof of the Life Science Building. Collect and store all animal waste in leak proof biohazard bags (double bagged) and store in a freezer before incinerated. Double bagging of all animal waste helps to prevent leakage when transporting it to the incinerator. Use secondary containment for transporting! If you need special assistance regarding incineration, contact EH&S, 817-272-2185 or the Animal Care Facility



(ACF), 817-272-5236. Bedding of animals infected with human pathogens needs to be autoclaved. Proceed as stated in the [Standard Operating Procedure: Steam Autoclaves](#).

Note: *In vitro* animal tissue cultures that have not been intentionally exposed to pathogens are exempt from these regulations.

Sharps

A sharp is an item that could cause cuts or punctures. Sharps include:

- hypodermic needles
- hypodermic syringes with attached needles (syringe body is not considered to be a sharp. If a syringe body is contaminated with medicine, it is classed as pharmaceutical waste)
- scalpels and blades
- razor blades
- disposable razors
- Pasteur pipettes
- broken glassware

Sharps that are contaminated with infectious material(s) are classified as hazardous/special waste. This waste must be stored, transported and disposed of as hazardous/special waste to make sure it does not cause a risk to human health or the environment. Hazardous/special waste must not be mixed with other waste or with other types of hazardous/special waste. Waste must be segregated so that different waste types do not get contaminated.

Sharps containers need to be kept in each work area that generates sharps. Collect all sharps contaminated with biohazardous materials in rigid, leak proof, puncture resistant red biohazard containers which have been labeled with the universal biohazard symbol. These sharps containers are available through EH&S. Follow the instructions given in [Tips and Information for Laboratory Personnel](#) to prevent needle sticks. After using a needle, do not re-cap, bend, break, remove it from the syringe, or manipulate it in any way. Many people have been accidentally stuck with a needle during the process of re-capping it. Simply place the needle and other sharps into a sharps container to prevent any injuries.

Collect sharps that have never been contaminated with biohazardous materials (e.g., used only with chemicals) in containers labeled as “Non-Biological Sharps”.

Sharps contaminated with biohazardous materials shall be disposed of as infectious waste. EH&S will pick up and dispose of sharps containers at no charge. In order for the sharps containers to be picked up, please send a request for disposal through [CEMS](#) by following the instructions in the [Standard Operating Procedure – Request for Biological Waste Removal](#).

When sharps waste is generated, it is important that:

- the containers are not overfilled (sharps containers should not be more than $\frac{3}{4}$ full when picked up)
- sharps containers are not disposed of with the regular trash
- sharps containers are not incinerated

Place broken glassware that has not been contaminated with biohazardous materials into broken glass containers that are provided by Custodial Services, the chemical stockroom (Chemistry Department), or EH&S. Custodial Services dispose the full broken glass containers. Please, close and secure the broken glass container lid with tape, mark the container as trash, and deposit outside the laboratory for pick-up.

Biological Waste Treatment Methods

Biohazardous waste can either be treated on-site by laboratory personnel or can be given to EH&S for disposal. Acceptable methods of treatment and disposal of biowaste at UTA include steam sterilization, chemical disinfection, and incineration.

Steam Sterilization

To allow sufficient steam access/penetration to the waste, the waste shall be packaged and loaded into the autoclave chamber according to the instructions given by EH&S in the [Standard Operating Procedure: Steam Autoclaves](#), and autoclave operated according to the recommendations provided by the manufacturer. Strong oxidizing materials (chemicals) must not be autoclaved with organic material: **Oxidizer + Organic Material + Heat = Possible Explosion.**

When subjecting waste to steam under pressure:

- The temperature in the autoclave chamber must reach at least 250°F (121°C).
- The gauge pressure must be at least 15 pounds-force per square inch (lbf/in² or psi).
- The treatment time must be at least 30 minutes. For solid biohazardous waste in autoclave bags, the length of time must be 50-60 minutes.

Procedure for decontamination of biohazardous waste:

- Items must be autoclaved in autoclavable bags or containers that are in a rigid, autoclavable secondary container.
- Add one cup of water to each bag of solid waste and close bags only loosely. Steam cannot penetrate closed bags.



- A load of liquid filled containers should be of similar size, shape, content, and volume because exposure time is based on these characteristics. The caps of liquid biohazardous waste containers should never be closed tightly!
- Use steam chemical integrators inside each load to monitor time, temperature, and steam exposure conditions and to provide the necessary sterilization assurance needed when decontaminating biohazardous waste (= load control). Follow the instructions in [Standard Operating Procedure: Steam Chemical Integrators – Sterilization Assurance – Steam Autoclave Kill Cycle](#).
- Follow the guidelines set by the posted autoclave parameter signs when setting the cycle time.
- To prevent spills and accidents, be sure that the exhaust setting is appropriate for the type of material you are autoclaving. Fast exhaust should be used for solid items/solid waste and slow exhaust for liquids/liquid waste.
- After the cycle is complete, let the autoclaved load cool before removing it from the autoclave. Use heat resistant autoclave gloves!
- Interpret Steam Chemical Integrator result.
- If the Steam Chemical Integrator result indicates that the sterilization of the biowaste was successful, securely close the autoclaved bag and attach a sticker to the bag that states: **“Treated in accordance with the provisions of 25 TAC § 1.136(a)”**
- Place autoclaved bags into opaque bags and close them securely before disposing with normal trash.
- Do not pour melted agarose down the drain. Allow it to cool and solidify, then dispose of it as solid waste in waste bags.
- Autoclaved liquid waste can be poured down the drain.

The following personal protective equipment (PPE) should be worn when operating an autoclave:

- Heat resistant autoclave gloves for loading and unloading the autoclave.
- Rubber apron in addition to rubber sleeve protectors when removing items from the autoclave.
- Splash goggles/face shield to protect against a splash.

Autoclaves used for biohazardous waste treatments are tested periodically by EH&S for their effectiveness using biological indicators (*Geobacillus stearothermophilus* spores) ([Standard Operating Procedure: Performance Verification of Steam Autoclave Kill Cycle](#)).

Chemical Disinfection

Use a chemical agent that is registered with [the U.S. Environmental Protection Agency \(EPA\)](#) in accordance with the manufacturer's instructions.



One option for disinfecting biosafety level (BSL)-1 and BSL-2 **liquid biological waste** for drain disposal is to use bleach. Bleach, a sodium hypochlorite solution (NaOCl), is a broad-spectrum disinfectant that is an effective disinfectant for enveloped viruses (e.g., HIV, HBV, herpes simplex virus), vegetative bacteria (e.g., *Pseudomonas*, *Staphylococcus*, and *Salmonella*), fungi (e.g. *Candida*), mycobacterium (e.g. *Mycobacterium tuberculosis* and *M. bovis*), and non-enveloped viruses (e.g. adenovirus and parvovirus).

Recommended PPE when handling bleach includes laboratory coat, latex or nitrile gloves, and safety glasses. The appropriate concentration of NaOCl for disinfecting liquid BSL-1 and BSL-2 waste (e.g., supernatants from cell cultures) is 5000 ppm, approximately 0.5%. Household bleach is 5.2 - 6.1 % NaOCl, therefore a 1:10 (v/v) dilution of bleach to liquid biological waste is appropriate. Please, note that 1:10 bleach solution is caustic and thus direct contact with skin and eyes should be avoided. The bleach solution should be prepared in a well-ventilated area.

An appropriate contact time of NaOCl with liquid waste is at least 30 minutes, after which time the disinfected liquid waste can be poured down the sink and the drain flushed with water.

Bleach should be stored between 50 and 70°F (10 – 21°C). Undiluted household bleach has a shelf life of six months to one year from the date of manufacture, and a 1:10 bleach solution has a shelf life of 24 hours.

Decontaminate **solid materials contaminated with biohazards** by immersing them in a liquid chemical disinfectant appropriate for the specific biohazard and allow for sufficient contact time.

Solid waste material that has been immersed in a liquid disinfectant (e.g., a freshly prepared solution of household bleach diluted 1:10 with water or a solution of 70% by volume 2-propanol (isopropyl alcohol) must be thoroughly drained before disposal.

Chemically disinfected solid biological waste can be disposed of through the regular trash as long as the following procedures are followed:

- Place a label on the original bag or container stating:

“Treated in accordance with the provisions of 25 TAC § 1.136(a)”

This relates to approved methods of treatment and disposition.

- Place the bag or other container into another bag or container that is opaque, e.g., a black or green trash bag.

Please, also see: [Standard Operating Procedure: Proper Use of Bleach \(Sodium Hypochlorite\) as a Chemical Disinfectant in Biolaboratories.](#)

Incineration

Incineration is a waste treatment process that involves the combustion of organic substances contained in waste materials. Incineration and other high temperature waste treatment systems are described as "thermal treatment". Incineration of waste materials converts the waste into ash, flue gas (combustion exhaust gas), and heat.

Incineration is used for disposing of animal carcasses at UTA. The incinerator is located on the roof of the Life Science Building. Please, refer to "Record Keeping" section below to get the knowledge what information about incineration needs to be entered in the logbook. Logbooks are located in the Life Science Building, Biology Department Office and in Animal Care Facility.

Operational procedures for the use of the incinerator are as follows:

- The incinerator is designed to destroy up to 100 pounds of biological waste per hour. The incinerator should not be overloaded.
- The incinerator shall only be operated during daylight hours.
- Aerosol cans, closed containers, or flammable liquids must not be burned in the incinerator.
- The incinerator must not be used to burn paper such as office records, computer paper, or telephone books.
- Before incinerating, waste must be weighed.
- When loading waste into the incinerator, make sure that all waste is on the burning chamber hearth (not on the door block) and is not obstructing air passages.
- Close the door, set the timer for a minimum of two hours, and let the load burn.
- Do not open the door or add more trash until the load has burned totally. This could cause two problems:
 - overloading of the incinerator
 - the possibility of explosion which could injure the operator
- If the main charging door is opened while the incinerator is operating, the primary burner will be shut off by the door safety switch.
- Always open and close charging door slowly to avoid flame and smoke puffs.
- Do not use water to cool hot refractory or brick.
- Description of incinerated waste needs to be logged in logbook (see "Record Keeping").
- EH&S arranges the cleaning of the incinerator on regular bases (approximately two times a year). If ashes build up above the bottom of the burner port or obstruct air passages, please contact EH&S to arrange the cleaning of the incinerator.



Record Keeping

Personnel who treat and dispose special wastes onsite in accordance with the guidelines described in this Standard Operating Procedure must keep the following records:

- date of treatment (also time for incineration)
- amount of waste treated
- method/conditions of treatment
- name (printed) and initials of person(s) performing treatment
- for generators of more than 50 pounds per month, a written procedure for the operation and testing of any equipment used and a written procedure for the preparation of any chemicals used in the treatment

Personnel must maintain records of biological waste treatments. EH&S collects the autoclave waste treatment logs which must be kept for three years and be available for review on request.

Biological Waste Management and Disposal Instructions apply only to biohazardous/biological waste streams. Radioactive waste and [Environmental Protection Agency \(EPA\)](#) regulated chemical waste need to be handled as specified in the [UTA Radiation Safety Manual](#) and the [UTA Laboratory Safety Manual \(Chemical Hygiene Plan\)](#), respectively.

Contact EH&S at 817-272-2185 if you are unable to treat and dispose of biological waste yourself, and with any questions or concerns regarding waste disposal.

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