

TEXAS A&M UNIVERSITY-CORPUS CHRISTI

Management and Disposal of Biological Waste

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MANAGEMENT AND DISPOSAL OF BIOLOGICAL WASTE AT TEXAS A&M UNIVERSITY – CORPUS CHRISTI

I. INTRODUCTION

The purpose of this document is to provide information, requirements, guidelines and procedures for the handling and disposal of both hazardous and non-hazardous biological waste for all departments and units of Texas A&M University – Corpus Christi (TAMU-CC).

In Texas, the disposal of biohazardous waste is regulated by the Texas Department of State Health Services (DSHS) and the Texas Commission on Environmental Quality (TCEQ). Local regulations of the City of Corpus Christi also apply to all waste that will be disposed in the Corpus Christi Municipal Landfill (e.g. TAMU-CC trash dumpsters).

BIOLOGICAL WASTE means discarded biological material from teaching, clinical, and research laboratories and operations. This does not include household or office trash or waste from Food Services, Physical Plant, or bedding and litter from non-infectious animals. BIOHAZARDOUS WASTE means any solid or liquid biological waste that is hazardous because of its physical and/or biological nature. All waste that contains infectious material or which, because of its biological nature, may be harmful to humans, animals, plants, or the environment is biohazardous waste. This includes: waste from infectious animals; bulk human blood or blood products; infectious microbiological waste (including contaminated disposable culture dishes and disposable devices used to transfer, inoculate, and mix cultures); pathological waste; sharps; and hazardous products of recombinant deoxyribonucleic acid (rDNA) technology. NON-HAZARDOUS BIOLOGICAL WASTE means any waste that has undergone treatment to significantly reduce or eliminate the hazardous characteristics, or that reduce the amount of a waste. Definitions of terms used in this document can be found in APPENDIX 3.

Treatment of all laboratory biological waste prior to disposal is good laboratory practice, and is highly recommended, but biohazardous waste **MUST** be treated prior to disposal. Acceptable treatment methods include thermal or chemical disinfection, encapsulation (solidification), or incineration.

The key requirements for disposal of biohazardous waste are that it must be:

- 1) segregated from other waste of any kind;
- 2) treated to eliminate the biological hazard;
- 3) specifically labeled to indicate the method of treatment;
- 4) securely packaged after treatment;
- 5) once securely packaged after treatment, transported to and placed in the dumpster by appropriately trained personnel, and;
- 6) documented by maintenance of appropriate records.

CAUTION: Refrain from using chemical treatments that cause the biohazardous waste to become a chemical hazard. With exception of sharps, glassware, and plastics,

all infectious material should be incinerated (even after disinfection). Sharps must be segregated from other waste and placed in puncture resistant containers; all metallic sharps, regardless of their use, are considered biohazardous and must be encapsulated prior to disposal. Liquid biohazardous waste should be disinfected and discharged into the Sewer System.

Biohazardous waste, which 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 TAMU-CC Environmental Health and Safety (EHS) Department. EHS does not collect biohazardous waste for disposal. Nor does EHS fund the disposal of untreated biohazardous waste or the purchase of autoclaves or any other resources for biohazardous waste treatment. Funding for these costs is the responsibility of each department that generates biohazardous waste.

II. RESPONSIBILITY

The Principal Investigator (PI), faculty member, or other person with operational responsibility shall assure compliance with these requirements within his/her laboratory or area of responsibility. In order to accomplish the six-step, risk management process referenced in the most current edition of Biosafety in Microbiological and Biomedical Laboratories (BMBL), the responsible party for each lab must prepare a chemical and/or bioagent inventory for submittal to EHS before the beginning of activity for each research project, and annually by November 1st thereafter until the research project ends. The bioagent inventory must include a list of biological agents used in the lab and agent summary statement(s) or safety data sheets (SDSs) for each biological agent used in the lab.

III. SEGREGATION OF BIOLOGICAL WASTE IN THE LABORATORY

- Any waste that could produce laceration or puncture injuries must be disposed of as "SHARPS". Sharps must be segregated from other waste. Metal sharps and broken glass may be commingled with each other, but not with non-sharp waste.
- Waste that is to be incinerated should not be commingled with glass or plastics.
- Biological waste must not be commingled with chemical waste or any other laboratory trash.
- Biohazardous waste should be segregated from other biological waste.

IV. CONTAINERS

Containers must be appropriate for the contents, not leak, be properly labeled, and maintain their integrity if chemical or thermal treatment is used. Containers of biohazardous material should be kept closed.

- **METAL SHARPS:** Place in a rigid, puncture resistant container (heavy walled plastic is recommended). Never attempt to retrieve items from a sharps container. Do **not** place sharps in plastic bags or other thin-walled containers.
- **BROKEN GLASSWARE:** Place in a rigid, puncture resistant container (plastic,

- heavy cardboard or metal), seal securely, and clearly label "BROKEN GLASS".
- **SOLID BIOHAZARDOUS WASTE:** Use heavy duty plastic "BIOHAZARD BAGS" (autoclave bags) or containers for solid biohazardous waste (including contaminated disposable plastic labware, paper, bedding, etc. (NOT SHARPS)).
- **NONHAZARDOUS BIOLOGICAL WASTE:** Heavy duty plastic bags or any other appropriate container without a Biohazard label are preferred. Red or orange biohazard bags or containers should **not** be used for nonhazardous material.
- **LIQUIDS:** Place in leak-proof containers capable of withstanding thermal or chemical treatment. Do **not** use plastic bags to contain liquids.

V. STORAGE OF BIOLOGICAL WASTE

Biohazardous waste should be treated and disposed of promptly and not allowed to accumulate. Containers holding biohazardous material must be clearly labeled, including the Biohazard Symbol. Biological waste may be held temporarily under refrigeration, prior to disposal, in a safe manner that does not create aesthetic (visual or odor) problems. Storage enclosures must be clean and orderly with no access to unauthorized persons (warning signs must be posted).

VI. TREATMENT OF BIOHAZARDOUS WASTE

Biohazardous waste must be rendered harmless by appropriate treatment prior to disposal. Waste should be treated as near the point of origination as possible. Treatment methods include incineration; chemical disinfection; thermal disinfection; encapsulation.

VII. HANDLING AND TRANSPORT

- Properly trained laboratory personnel (not custodial) shall be responsible for transporting treated biological waste from the generation site to the dumpster. Untreated biohazardous waste shall be handled only by properly trained technical personnel.
- Treated waste must be properly contained and labeled before transport to the disposal site or placement in a TAMU-CC dumpster for disposal.
- Avoid transportation of untreated biohazardous materials or foul, visually offensive material through non-lab or populated areas.
- Trash/laundry chutes, compactors, or grinders cannot be used to transfer or process untreated biohazardous waste.

VIII. LABELING OF BIOHAZARDOUS WASTE

- Each container of untreated biohazardous waste must be clearly identified as such and must be labeled with the Biohazard Symbol.
- Each container of treated biohazardous waste intended for disposal in the Landfill must be labelled to indicate the method of treatment and to cover the biohazard markings.
- Label autoclave bags with commercially available autoclave tape that produces the

word "AUTOCLAVED" upon adequate thermal treatment. Apply this tape across the Biohazard Symbol on the bag immediately before autoclaving, and no earlier, to avoid confusion over whether the biohazardous waste has been autoclaved or not.

- All containers of encapsulated sharps must be labelled as "ENCAPSULATED SHARPS".

NOTE:

Containers of non-hazardous biological waste are not required to be labelled, but it is recommended that such containers are labelled as "NON-HAZARDOUS BIOLOGICAL WASTE".

IX. DISPOSAL METHODS

Material that remains hazardous because it contains hazardous chemicals must be disposed of through the EHS Department. Do **not** send hazardous chemicals to the Landfill or discharge into the Sewer System.

- A. **ANIMAL CARCASSES or SOLID ANIMAL WASTE** must be thermally or chemically disinfected, double bagged in heavy duty black trash bags, and placed in an approved dumpster for Landfill disposal. An approved dumpster is located behind the Natural Resources Center (NRC) Building.
- B. **LIQUID WASTE** including bulk blood and blood products, cultures and stocks of etiologic agents and viruses, cell culture material and products of rDNA technology should be disinfected by thermal or chemical treatment then discharged into the Sewer System.

NOTE:

Excess proteinaceous material can clump and cause drain clogging. Grinding or Landfill disposal of treated waste may be necessary. Do not grind untreated biohazardous material.

- C. **METAL SHARPS:** Discarded metal sharps (contaminated or not) that may cause puncture or cuts, **MUST** be contained, encapsulated, and disposed of in a manner that prevents injury to laboratory, custodial, and Landfill workers. Needles, blades, etc., are considered BIOHAZARDOUS even if they are sterile, capped, and in the original container.
 - 1. Disposal Method: Encapsulate (solidify) in a properly labeled, puncture resistant container; place in a TAMU-CC dumpster for deposition in the Landfill. (See "Encapsulation", APPENDIX 3.)
 - 2. Do not attempt to recap, bend, break or cut discarded needles.

NOTE:

NEVER PLACE SHARPS IN A TRASH CONTAINER OR PLASTIC BAG THAT MIGHT BE HANDLED BY CUSTODIAL STAFF.

D. PASTEUR PIPETS AND BROKEN GLASSWARE:

1. CONTAMINATED WITH BIOHAZARDOUS MATERIAL:

- a. Place in a properly labeled, leak proof and puncture resistant container; disinfect by thermal or chemical treatment; place in a TAMU-CC dumpster for disposal in the Landfill; or
 - b. Encapsulate in a properly labeled, rigid, puncture resistant container, and place in a TAMU-CC dumpster for deposition in the Landfill. **NOTE:** Encapsulation is required if glass is commingled with metal sharps.
- 2. NOT CONTAMINATED:** Place in a puncture resistant container, then place in a TAMU-CC dumpster for deposition in the Landfill. The container must be clearly labeled to indicate that it contains BROKEN GLASS.
- 3. DO NOT INCINERATE GLASSWARE**

E. PLASTIC WASTE:

- 1. CONTAMINATED WITH BIOHAZARDOUS MATERIAL:** Place in a properly labeled, leak proof container; disinfect by thermal or chemical treatment; place in a TAMU-CC dumpster for deposition in the Landfill.
- 2. NOT CONTAMINATED:** Place in a TAMU-CC dumpster for disposal in the Landfill.
- 3. DO NOT INCINERATE PLASTICS**

F. MICROBIOLOGICAL WASTE:

- 1. SOLID:** Place in a properly labeled, leak proof container; disinfect by thermal or chemical treatment; place in a TAMU-CC dumpster for disposal in the Landfill.
- 2. LIQUID** waste should be disinfected by thermal or chemical treatment then discharged into the Sewer System. **NOTE:** Excess proteinaceous material can clump and cause drain clogging. Grinding or Landfill disposal of treated waste may be necessary. Do not grind untreated biohazardous material.

G. GENETIC MATERIAL: Disposal of materials containing rDNA or genetically altered organisms must be consistent with applicable National Institute of Health (NIH) Guidelines, in addition to complying with the requirements contained in this document.

H. NONHAZARDOUS BIOLOGICAL WASTE:

1. Biological waste that is not infectious or otherwise hazardous to humans, animals, plants, or the environment may be discarded as regular municipal waste (solid) or sewage (liquid).
2. There are no record keeping or labeling requirements for nonhazardous biological waste.
3. It is good laboratory practice to autoclave or disinfect all microbial products. Culture materials and biological specimens, including bacterial or "normal" cell cultures and primary tissues should be autoclaved or treated with a 10% sodium hypochlorite (or equivalent) solution. Liquid waste should be discharged into the Sewer System. Avoid conditions that may create visual or

odor problems.

4. Nonhazardous waste should not be identified as hazardous. Containers should be labeled "NONHAZARDOUS LABORATORY WASTE". Do **not** use Biohazard bags or "red bags" for nonhazardous waste.
 5. Nonhazardous bedding (laboratory animal) and agricultural waste (e.g., bedding, manure, etc.) should be used as compost or fertilizer whenever practical. Minimize deposition of recyclable material in the Landfill.
- I. **RADIOACTIVE WASTE:** Biological waste that contains radioactive material must be disposed according to the procedures of the Radiological Safety Program of the EHS Department.
- J. **CHEMICAL WASTE:** Biohazardous waste which also contains hazardous chemicals must be treated to eliminate the biohazard, then managed as hazardous chemical waste through the EHS Department. Hazardous chemicals must **not** be sent to the Landfill or discharged into the Sewer System.

X. TRAINING AND HAZARD COMMUNICATION

The PI or individual with primary supervisory responsibility must assure that all personnel who work with, or who may contact potentially biohazardous material are informed of the hazards and are trained in the proper procedures and equipment needed to avoid exposure, proper disposal of biohazardous wastes, and recognition of symptoms of infection or exposure. Proper documentation of training is required.

XI. WRITTEN PROCEDURES AND RECORDS

Each biohazardous waste generating entity at TAMU-CC is required to maintain written records which, at a minimum, contain the following information:

- Contact information for the generator;
- If applicable, the name, address, telephone number, and the TCEQ authorization number of the mobile treatment operator providing treatment;
- Date of treatment;
- Quantity of waste treated;
- Method/conditions of treatment;
- Name (printed) and initials of the person(s) performing the treatment.

If an entity generates more than fifty (50) pounds of biohazardous waste per calendar month (Large Quantity Generator), the records must also include:

- A written procedure for the operation and testing of any equipment used and a written procedure for the preparation of any chemicals used in treatment.

The treatment process operator shall demonstrate a minimum four log ten reduction (as defined in 25 TAC 1.132) on routine performance testing using appropriate *Bacillus* species biological indicators. The operator shall conduct testing at the following intervals:

- 50 – 100 pounds per calendar month requires testing once per month
- 101 – 200 pounds per calendar month requires testing biweekly

- More than 200 pounds per calendar month requires testing weekly.

For those processes that the manufacturer has documented compliance with the performance standard prescribed in 25 TAC 1.135, based on specified parameters (for example, pH, temperature, pressure), and for previously approved treatment processes that a continuous readout and record of operating parameters is available, the operator may substitute routine parameter monitoring for biological monitoring. The operator shall confirm that any chemicals or reagents used as part of the treatment process are at the effective treatment strength. The operator will maintain records of operating parameters and reagent strength, if applicable, for three years for EACH CONTAINER of biohazardous waste treated (including sharps that are encapsulated).

NOTE: *There are no record requirements for nonhazardous biological waste.*

XII. REFERENCES:

- A. Title 30 Texas Administrative Code (30 TAC), Chapter 330, Subchapter A §330.3(154) Special waste.
- B. Centers for Disease Control/National Institutes of Health, Biosafety in Microbiological and Biomedical Laboratories, 6th Edition, 2020.

These references are available in the TAMU-CC EHS Department or various public libraries.

APPENDIX 1

BSL-1/BSL-2 Biohazardous Waste Disposal General Guidelines (For Reference)

Types of Biological Wastes	Container Requirements For Biohazardous Waste	Treatment Methods For Biohazardous Waste	Disposal Of Treated Biohazardous Waste
ANIMAL WASTE			
• Carcasses	B	D	M, O, P
• Tissue and Body Parts	B	D	O, P
• Whole blood, serum, plasma, and other blood components	B	D, E, G	J, O
• Animal bedding	A	D, E	O
MICROBIOLOGICAL WASTE²			
• Solid	A	D, E, F, G	I, O
• Liquid	B	D, E, G	J, O
PATHOLOGICAL WASTE (HUMAN)			
• Materials removed during surgery, labor and delivery, autopsy, or biopsy including body parts, tissues and organs	B	D, E, G	I, O, (K ³)
• Laboratory specimens of blood, tissues and body fluids	B	E, G	J
• Anatomical remains	B	G	K ³
SHARPS			
• Metal sharps including hypodermic needles, syringes with needles, scalpel blades, razor blades	C	H	N
• Pasteur pipets and broken glass	C	E, F, G, H	L, N

I. CONTAINER REQUIREMENTS FOR BIOHAZARDOUS WASTE

- A. Heavy duty plastic bag or other appropriate container such as BIOHAZARD BAGS.
- B. Heavy duty leak proof container.
- C. Puncture resistant container.

II. TREATMENT METHODS FOR BIOHAZARDOUS WASTE

- A. Incinerate.
- B. Autoclave [120 C.;15 psi; 30 min. (minimum)]. Longer times may be required depending on the amount of waste, the presence of water and the type of

- container used.
- C. Dry heat [160 C., 2 hr.(minimum)]. Time of exposure begins after attaining the specific temperature and does not include lag time.
 - D. Chemical disinfection – 10% hypochlorite or EPA-approved chemical disinfectant or sterilant used according to manufacturer's direction.
 - E. Encapsulate in a solid matrix [e.g., plaster of Paris or a commercial encapsulant (Isolyser)].

III. DISPOSAL OF TREATED BIOHAZARDOUS WASTE

- A. Deposit treated waste in a dumpster for disposal in the Landfill.
- B. Flush disinfected liquid into the Sewer System.
- C. Interment or cremation.
- D. Place in a puncture-resistant container and deposit in a dumpster for deposition in the Landfill.
- E. Carcasses of animals that die in the field may be buried on site, under certain conditions.
- F. Place encapsulated sharps in a dumpster for Landfill disposal.
- G. Dispose of ashes in the Landfill.
- H. Send to commercial rendering plant.

IV. LABELING REQUIREMENTS

Containers of biohazardous materials must be clearly identified and marked with the BIOHAZARD symbol. Containers of treated biohazardous waste must be labeled to indicate the method of treatment and to cover the Biohazard Symbol. Waste that is not biohazardous prior to treatment should not be placed in a "BIOHAZARD" container.

APPENDIX 2

BIOHAZARDOUS WASTE TREATMENT LOG

DEPARTMENT: _____

BUILDING: _____ LAB: _____

SUPERVISOR: _____ PHONE NUMBER: _____

Date	Quantity Of Waste Treated	Description Of Waste	Treatment Methods And Parameters	Technician	Procedure Code

APPENDIX 3

DEFINITION OF TERMS

ANIMAL WASTE – Includes carcasses; body parts; whole blood and blood products, serum, plasma and other blood components; and bedding of animals.

BIOHAZARDOUS WASTE – Includes any waste that is infectious or, because of its physical and/or biological nature, may be harmful to humans, animals, plants, or the environment.

Biohazardous waste includes:

- a. Animal waste known or suspected of being contaminated with a pathogen
- b. Bulk human blood or blood products
- c. Microbiological waste
- d. Pathological waste
- e. Infectious waste
- f. Waste products of rDNA biotechnology and genetic manipulation
- g. Sharps

BIOLOGICAL INDICATOR – Commercially available microorganism (e.g., spore strips or vials of *Bacillus* species) which can be used to verify the performance of waste treatment equipment and/or processes.

BIOLOGICAL WASTE – Discarded biological material from teaching, clinical, and research laboratories and operations. This does not include household or office trash or waste from Food Services, Physical Plant, or bedding and litter from non-infectious animals.

BULK BLOOD AND BLOOD PRODUCTS – Discarded bulk (>100 ml.) blood and blood products (higher primate or human) in a free draining, liquid state; body fluids contaminated with visible blood; and materials saturated or dripping with blood.

CHEMICAL DISINFECTION – Means the use of a chemical agent such as 10% hypochlorite or EPA-approved chemical disinfectant/sterilant (used according to manufacturer's direction) to significantly reduce biological activity of biohazardous material.

DEPOSITION IN A LANDFILL – Means in accordance with Title 30, Chapter 330 of the Texas Administrative Code and the requirements of the Corpus Christi Municipal Landfill.

DISCHARGE INTO THE SEWER SYSTEM – Means the discharge or flushing of treated biological waste into the TAMU-CC sanitary sewer system followed by copious quantities of water.

ENCAPSULATION – Is the treatment of waste, especially sharps, using a material such as Plaster of Paris (or a commercial product such as Isolyser) which when fully reacted, will encase the waste in a solid protective matrix. The encapsulating agent must completely fill the container. The container and solidified contents must withstand an applied pressure of 40 psi without disintegration.

INCINERATION – Means burning biological waste in an incinerator permitted by the TCEQ.

INFECTIOUS WASTE – Is waste containing pathogens or biologically active material which because of its type, concentration, and quantity is capable of transmitting disease.

MICROBIOLOGICAL WASTE – Includes the following:

- a. discarded cultures and stocks of infectious agents and associated biological material
- b. discarded cultures of specimens from medical, pathological, pharmaceutical, research, and clinical laboratories
- c. discarded live and attenuated vaccines
- d. discarded disposable culture dishes intentionally exposed to pathogens
- e. discarded disposable devices used to transfer, inoculate, and mix cultures intentionally exposed to pathogens.

NON-HAZARDOUS BIOLOGICAL WASTE – Any waste that has undergone treatment to significantly reduce or eliminate the hazardous characteristics, or that reduce the amount of a waste.

PATHOGENS – Include any diseases that are transmissible to humans.

PATHOLOGICAL WASTE – Pertains to materials from human and higher primates and includes, but is not limited to:

- a. human materials removed during surgery; labor; delivery; spontaneous abortion; autopsy; or biopsy including body parts, tissues, fetuses, organs, bulk blood, and body fluids
- b. laboratory specimens of blood, tissue, or body fluids after completion of laboratory examination
- c. anatomical remains

SHARPS WASTE – Any device having acute rigid corners or edges, or projections capable of cutting or piercing, including:

- a. hypodermic needles, syringes, and blades
- b. glass pipettes, microscope slides, and broken glass items.

THERMAL TREATMENT – Means 1) autoclaving at a temperature of not less than 121° C, and a minimum pressure of 15 psi for at least 30 minutes (longer times may be required depending on the amount of waste, water content, and the type of container used) or 2) subjecting biological material to dry heat of not less than 160° C, under atmospheric pressure for at least two hours. Exposure begins after the material reaches the specific temperature and does not include lag time.

TREATMENT – Refers to chemical, thermal, or mechanical processes that significantly reduce or eliminate the hazardous, infectious, or harmful characteristics of a biological waste, or that reduce the amount of a biological waste.