MANAGEMENT AND DISPOSAL OF

BIOLOGICAL WASTE AT

TEXAS A&M INTERNATIONAL UNIVERSITY

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MANAGEMENT AND DISPOSAL OF BIOLOGICAL WASTE AT TEXAS A&M INTERNATIONAL UNIVERSITY

I. INTRODUCTION

The purpose of this document is to provide information, requirements, guidelines and procedures for the handling and disposal of hazardous and nonhazardous biological waste for all departments and units of the Texas A&M International University.

In Texas, disposal of biohazardous waste is regulated by the Texas Department of Health (TDH) and the Texas Natural Resource Conservation Commission (TNRCC). Local regulations of the City of Laredo also apply. "BIOLOGICAL WASTE" means discarded biological material from teaching and research laboratories and operations. This does not include household or office trash, waste from Food Services, Physical Plant, bedding and manure from normal agricultural operations or bedding and litter from noninfectious animals. "BIOHAZARDOUS WASTE" means any solid or liquid biological waste that is hazardous because of its physical and/or biological nature and is differentiated from that which contains hazardous chemicals or radioactive materials. 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 DNA biotechnology and genetic manipulation. Definitions of other terms used in this document can be found in APPENDIX A.

Biohazardous waste generated at Texas A&M International University is treated by thermal or chemical disinfection, by encapsulation (solidification), or by incineration. Certain disinfected liquid waste may be discharged into the TAMIU Sanitary Sewer System (hereafter referred to as the Sewer System). All animal carcasses (except those contaminated with radioactive material which must be disposed of differently) and recognizable body parts must be incinerated or sent to a commercial rendering plant.

All infectious material should be disinfected before removal from the laboratory. (**CAUTION**: Refrain from using chemical treatments that cause the waste to be 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 waste should be disinfected and discharged into the Sewer System. Treatment of all laboratory biological waste prior to disposal is good laboratory practice, and is highly recommended. Biohazardous waste must be treated and properly labeled and records must be maintained. Personnel with potential for contact with biohazardous material must be appropriately trained.

The key requirements for disposal of TAMIU's biohazardous waste are that it must be (1) segregated from other waste; (2) treated to eliminate the biological hazard; (3) specifically labeled to indicate the method of treatment; (4) securely packaged; (5) transported to, and placed in the dumpster by appropriately trained personnel and (6) documented by maintenance of appropriate records.

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 through the TAMIU Physical Plant Department or as radioactive waste through the TAMIU Physical Plant Department.

TABLE 1 summarizes requirements for treatment and disposal of biohazardous waste at TAMIU. TABLE 2 provides a model form for maintaining the record of treatment of biohazardous waste. Questions or written requests for any variance from these procedures should be directed to the Physical Plant Department.

II. RESPONSIBILITY

The Principal Investigator, faculty member or other person with operational responsibility shall assure compliance with these requirements within his/her laboratory or area of responsibility.

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 other laboratory trash.
- Hazardous biological 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.

A. **METAL SHARPS** -- Place in a rigid, puncture resistant container (heavy walled plastic is recommended). The container should be used for encapsulation (see SectionI.4.) and disposal. Label the container "ENCAPSULATED SHARPS". Container and encapsulated contents must withstand an applied pressure of 40 psi

without rupture. Never attempt to retrieve items from a sharps container. Do not place sharps in plastic bags or other thin-walled containers.

B. **BROKEN GLASSWARE** -- Place in a rigid, puncture resistant container (plastic, heavy cardboard or metal), seal securely and clearly label "BROKEN GLASS".

C. **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]).

D. **NONHAZARDOUS BIOLOGICAL WASTE** -- Heavy duty plastic bags or other appropriate container without a Biohazard label are preferred. Red or orange biohazard bags or containers should not be used for nonhazardous material.

E. **LIQUIDS** should be placed in leak-proof containers able to withstand 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 or incinerator. 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 TAMIU dumpster for disposal.
- Transport of untreated biohazardous materials or foul or visually offensive material through non-lab or populated areas should be avoided.

- Trash/laundry chutes, compactors, 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 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 before autoclaving.
- All containers of encapsulated sharps must be labelled as "ENCAPSULATED SHARPS".

NOTE:
Containers of nonhazardous biological waste are not required to be labelled, but it is recommended that such containers are labelled as "NONHAZARDOUS BIOLOGICAL WASTE".

IX. DISPOSAL METHODS

Material that remains hazardous because it contains hazardous chemicals must be disposed of through the Physical Plant Department. **DO NOT** send hazardous chemicals to the Landfill or discharge into the Sewer System.

A. **ANIMAL CARCASSES AND BODY PARTS** must be incinerated or sent to a commercial rendering plant for disposal. The Landfill will not accept carcasses or recognizable body parts.

B. **SOLID ANIMAL WASTE**: All animal waste, including bedding, that is infectious or harmful to animals, humans or the environment, should be appropriately treated prior to disposal, regardless of the origin of contamination. The following disposal methods are acceptable:
   1. Preferred Method: incineration followed by deposition of the residual ash in the Landfill.
   2. Thermal or chemical disinfection followed by deposition in the Landfill.

C. **LIQUID WASTE** including bulk blood and blood products, cultures and stocks of etiologic agents and viruses, cell culture material and products of recombinant DNA 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 of treated waste may be necessary. Do not grind untreated biohazardous material.

D. METAL SHARPS: Discarded 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.

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

1. Disposal Method: Encapsulate (solidify) in a properly labeled, puncture resistant container; place in a TAMIU dumpster for deposition in the Landfill. (See "Encapsulation", APPENDIX A.)
2. Needles, such as those used for gas chromatography, should be thoroughly rinsed to remove hazardous chemicals, then disposed with non-contaminated broken glassware.
3. Do not attempt to recap, bend, break or cut discarded needles.

E. 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 TAMIU dumpster for deposition in the Landfill; OR
   b. Encapsulate in a properly labeled, rigid, puncture resistant container, and place in a TAMIU 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 TAMIU dumpster for deposition in the Landfill. The container must be clearly labeled to indicate that it contains BROKEN GLASS.

3. DO NOT INCINERATE GLASSWARE

F. PLASTIC WASTE:

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

3. DO NOT INCINERATE PLASTICS

G. **MICROBIOLOGICAL WASTE**:

1. **SOLID:** Place in a properly labeled, leak proof container; disinfect by thermal or chemical treatment; place in a TAMIU 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 of treated waste may be necessary. Do not grind untreated biohazardous material.

H. **HUMAN PATHOLOGICAL WASTE**:

1. Human cadavers, recognizable body parts: must be cremated or buried in accordance with 25 TAC 1.136(a)(4) December 21, 1994.
2. Other pathological waste from human and higher primates must be incinerated.

I. **GENETIC MATERIAL**: Disposal of materials containing recombinant DNA or genetically altered organisms must be consistent with applicable NIH Guidelines, in addition to complying with the requirements contained in this document.

J. NONHAZARDOUS BIOLOGICAL WASTE:

1. Biological waste (other than animal carcasses or body parts) 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). Animal carcasses and body parts must be incinerated or sent to a commercial rendering plant for treatment.
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 such as bedding, manure, etc. should be used as compost or fertilizer whenever practical. Minimize deposition of recyclable material in the Landfill.

K. **RADIOACTIVE WASTE**: Biological waste that contains radioactive material must be disposed according to the procedures of the Radiological Safety Division of EHSD in College Station (409-845-1361).

L. **CHEMICAL WASTE:** Biohazardous waste which also contains hazardous chemicals must be treated to eliminate the biohazard, then managed as hazardous chemical waste through the Physical Plant Department. Hazardous chemicals must not be sent to the Landfill or discharged into the Sewer System.

X. TRAINING AND HAZARD COMMUNICATION

The Principal Investigator 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 TAMIU is required to maintain written records which, at a minimum, contain the following information:

- 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, 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.
- With processes for which the manufacturer documents compliance with specified performance standards (e.g., temperature, pressure, pH, etc.), and for processes which produce a continuous readout (e.g. strip chart or chart paper), routine parameter monitoring may be used to verify efficacy. Otherwise, biological monitoring is required to document a 99.99% reduction using an appropriate biological indicator (Bacillus species) 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.
- Records must be maintained for at least 3 years for EACH CONTAINER of biohazardous waste treated (including sharps that are encapsulated).

See TABLE 2 for suggested format and model log sheet.

***NOTE**:*

There are no record requirements for nonhazardous biological waste.

XII. REFERENCES:

A. Title 25 Texas Administrative Code, Chapter 1, 1.131-1.137. December 21, 1994. (Definition, Treatment and Disposition of Special Waste from Health Care Related Facilities).

B. Title 30 Texas Administrative Code, Chapter 330, 330.24, 330.136, 330.641-643, 330.1001-1010. December 20, 1994. (Solid Waste Management Rules for Medical Waste Management, Disposal, Transportation, Collection, & Storage).

C. Centers for Disease Control / National Institutes of Health, Biosafety in Microbiological and Biomedical Laboratories, 3rd Edition, 1993.

These references are available in the Texas A&M University Environmental Health and Safety Department in College Station or various public libraries.

TABLE 1.

TREATMENT AND DISPOSAL OF BIOHAZARDOUS WASTE[1] AT TEXAS A&M INTERNATIONAL UNIVERSITY

Treatment Disposal	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 WASTE[2]			
• Solid	A	D[3], 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)
• Laboratory specimens of blood, tissues and body fluids	B	E, G	J
• Anatomical remains	B	G	K
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

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

III. DISPOSAL OF TREATED BIOHAZARDOUS WASTE[1]

I. Deposit treated waste in a TAMIU dumpster for disposal in the Landfill.
J. Flush disinfected liquid into the Sewer System.
K. Interment or cremation.
L. Place in a puncture-resistant container and deposit in a TAMIU dumpster for deposition in the Landfill.
M. Carcasses of animal that die in the field may, under certain conditions, be buried on site under supervision of the University Veterinarian.
N. Place encapsulated sharps in a dumpster for Landfill disposal.
O. Dispose of ashes in the Landfill.
P. 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.

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[1]All biohazardous waste must be treated prior to disposal.
[2]Includes contaminated disposable culture dishes and devices used to transfer, inoculate and mix cultures and waste products of recombinant DNA and genetic engineering research.
[3]Do not incinerate glass or plastic labware.

TABLE 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 A.

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 recombinant DNA 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.

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 College Station Municipal Landfill.

DISCHARGE INTO THE SEWER SYSTEM means the discharge or flushing of treated biological waste into the Texas A&M International 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 Office of Air Quality, Texas Natural Resource Conservation Commission.

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:

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.

PATHOGENS includes 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 and fetuses; organs; bulk blood and body fluids
b. laboratory specimens of blood, tissue or body fluids after completion of laboratory examination
a. 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 pipets, microscope slides, and broken glass items.

THERMAL TREATMENT means (1) autoclaving at a temperature of not less than 121^{o}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^{o}C., under atmospheric pressure for at least two hours. (Exposure begins after thematerial 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 characteristics, or that reduce the amount of a waste.

APPENDIX B

INFORMATION AND ASSISTANCE

TAMIU PHYSICAL PLANT DEPARTMENT

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Albert Lopez
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Safety Coordinator
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