

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

July 2003

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

## A. INTRODUCTION

The purpose of this document is to provide information, requirements, guidelines and procedures for the handling and disposal of hazardous and non-hazardous biological waste for all departments and units on the Texas A&M University campus in College Station and at the Riverside Campus.

In Texas, the disposal of biohazardous waste is regulated by the Texas Department of Health and the Texas Commission on Environmental Quality. Local regulations of the City of College Station also apply to all waste that will be disposed in the College Station Municipal Landfill (e.g., TAMU trash dumpsters and residual ash from the TAMU incinerators).

**"BIOLOGICAL WASTE"** means discarded biological material from teaching, clinical, 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"**<sup>1</sup> 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; microbiological waste; pathological waste; sharps; and hazardous products of recombinant DNA biotechnology and genetic manipulation. Definitions of terms used in this document can be found in APPENDIX A.

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; (2) securely packaged; (3) specifically labeled to indicate the method of treatment; (4) transported to the point of treatment or disposal by appropriately trained personnel; (5) treated to eliminate the biological hazard; and (6) documented by maintenance of appropriate records.

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 through the Environmental Health and Safety Department (EHSD) or as radioactive waste through the Radiological Safety Division of EHSD.

TABLE 1 summarizes requirements for treatment and disposal of biohazardous waste at TAMU.

TABLE 2 provides a model form for maintaining the record of treatment of biohazardous waste.

Questions or requests for any variance from these procedures should be directed to the Environmental Health and Safety Department (845-2132, Mail Stop 4472).

## B. 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.

## C. SEGREGATION

1. 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

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<sup>1</sup>Biohazardous Waste may also be called "medical waste", "special waste", "regulated waste", "red bag waste", "infectious waste", or "pathological waste." For simplicity, the present document will refer to all such material as "BIOHAZARDOUS WASTE". Definitions in this document are derived from Title 25, Texas Administrative Code, Chapter 1.

- other, but not with non-sharp waste.
2. Waste that is to be incinerated should not be commingled with glass or plastics.
3. Biological waste must not be commingled with chemical waste or other laboratory trash.
4. Biohazardous waste should be segregated from other biological waste.

#### **D. 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.

1. LIQUIDS – Use leak-proof containers able to withstand thermal or chemical treatment.
2. METAL SHARPS -- Use a rigid, puncture-resistant container (heavy-walled plastic is recommended) suitable for encapsulation and disposal. Container and encapsulated contents must withstand an applied pressure of 40 psi without rupture.
3. NON-HAZARDOUS SOLID BIOLOGICAL WASTE – Use heavy-duty plastic bags or other appropriate containers without a Biohazard Symbol. Red or orange biohazard bags or containers should not be used for non-hazardous material.
4. PASTEUR PIPETS and BROKEN GLASSWARE – Use a rigid, puncture-resistant container (e.g., plastic, heavy cardboard or metal) that can be sealed.
5. SOLID BIOHAZARDOUS WASTE -- Use heavy-duty plastic "BIOHAZARD BAGS" (autoclave bags) or containers for solid biohazardous waste.

#### **E. STORAGE**

Biological waste may be held temporarily under refrigeration, prior to disposal, in a safe manner that does not create aesthetic (visual or odor) problems. 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. Temporary holding areas for biohazardous waste must be clean and orderly with no access to unauthorized persons (warning signs should be posted).

#### **F. LABELING BIOHAZARDOUS WASTE CONTAINERS**

1. Each container of untreated biohazardous waste must be clearly identified as such and must be labeled with the Biohazard Symbol.
2. Each container of treated biohazardous waste to be placed in a TAMU trash dumpster must be labeled to indicate the method of treatment and to cover biohazard markings.
3. 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.
4. All containers of encapsulated sharps must be labeled as "ENCAPSULATED SHARPS".

**NOTE:** It is not a requirement to label containers of non-hazardous biological waste, but it is recommended to label such containers as "NON-HAZARDOUS BIOLOGICAL WASTE".

#### **G. HANDLING AND TRANSPORT**

1. Only properly trained technical personnel can handle or transport untreated biohazardous waste.
2. Treated waste must also be transported by properly trained technical personnel (not custodial).
3. Avoid transporting untreated biohazardous materials or foul or visually offensive material through non-lab or populated areas.
4. Trash/laundry chutes, compactors, grinders cannot be used to transfer or process untreated biohazardous waste.

## H. TREATMENT AND DISPOSAL METHODS (summarized in TABLE 1 )

**NOTE: Waste should be treated as near the point of origination as possible.**

1. ANIMAL CARCASSES AND BODY PARTS may be incinerated, biodigested, landfilled, or rendered. (Exceptions: see H. 3 and H. 11) Animal carcasses or recognizable body parts may only go to the College Station (BVSWM) landfill using the TAMU Special Waste Permit from the Texas Commission on Environmental Quality (TCEQ). Contact EHSD regarding this permit before transporting carcasses to the BVSWM landfill. Carcasses of animals that die in the field may not be buried on site.
2. ANIMAL WASTE, SOLID (bedding, manure, etc):
  - a. BIOHAZARDOUS ANIMAL WASTE:
    - 1) Incinerate; OR
    - 2) Disinfect by thermal or chemical treatment; place in a TAMU trash dumpster; OR
    - 3) Alternative method, with approval of the University Veterinarian.
  - b. NON-HAZARDOUS ANIMAL WASTE: Use as compost or fertilizer whenever practical.
3. CHEMICAL WASTE: Biohazardous waste which also contains hazardous chemicals must be managed as hazardous chemical waste through the EHSD.
4. 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.
5. HUMAN PATHOLOGICAL WASTE:
  - a. Human cadavers, recognizable body parts: dispose by cremation or interment.
  - b. Other solids – incinerate, or disinfect for disposal in TAMU trash dumpster.
  - c. Body fluids – disinfect by thermal treatment for disposal in TAMU trash dumpster, or by chemical treatment for discharge into the sewer system
6. METAL SHARPS: Discarded metal sharps **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.  
**Never place sharps in a trash container or plastic bag that might be handled by custodial staff.**
  - a. Place containers of encapsulated sharps in a TAMU trash dumpster.
  - b. Gas chromatography needles should be thoroughly rinsed to remove hazardous chemicals, then disposed with non-contaminated broken glassware.
  - c. Do not attempt to recap, bend, break or cut discarded needles.
7. MICROBIOLOGICAL WASTE:
  - a. Solid -- Disinfect by thermal or chemical treatment; place in a TAMU trash dumpster.
  - b. Liquid -- Disinfect by thermal or chemical treatment; discharge into the sewer system.
8. NON-HAZARDOUS BIOLOGICAL WASTE:
  - a. It is good laboratory practice to autoclave or chemically treat all microbial products prior to disposal, even if the material is not hazardous.
  - b. Solid – Place in a TAMU trash dumpster.
  - c. Liquid – Discharge into the sewer system.
9. PASTEUR PIPETS and BROKEN GLASSWARE:
  - a. CONTAMINATED WITH BIOHAZARDOUS MATERIAL:
    - 1) Disinfect by thermal or chemical treatment; place in a TAMU trash dumpster; OR
    - 2) Encapsulate and place in a TAMU trash dumpster. **NOTE: Encapsulation is required if metal sharps are commingled with glass sharps.**
  - b. NOT CONTAMINATED: Place in a TAMU trash dumpster.
  - c. **DO NOT INCINERATE GLASSWARE.**
10. PLASTIC WASTE:
  - a. CONTAMINATED WITH BIOHAZARDOUS MATERIAL: Disinfect by thermal or chemical treatment; place in a TAMU trash dumpster.
  - b. NOT CONTAMINATED: Place in a TAMU trash dumpster.
  - c. **DO NOT INCINERATE PLASTICS.**
11. RADIOACTIVE WASTE: Biological waste that contains radioactive material must be disposed according to the procedures of the Radiological Safety Division of EHSD.

**TABLE 1. TREATMENT AND DISPOSAL OF BIOHAZARDOUS WASTE AT TEXAS A&M UNIVERSITY**

TYPE OF WASTE		CONTAINER	TREATMENT METHOD	DISPOSAL METHOD
<b>ANIMAL WASTE</b>				
a.	Carcasses	B	D	O
		B	I	P
		B	-	Q
		B	-	R
b.	Tissue and Body Parts	B	D	O
		B	I	P
c.	Bulk blood and blood products	B	D	O
		B	E or G	K
d.	Animal bedding	A	D	O
		A	E or G	J
<b>MICROBIOLOGICAL WASTE</b>				
a.	Solid	A	D <sup>1</sup>	O
		A	E, F, or G	J
b.	Liquid	B	E or G	K
<b>PATHOLOGICAL WASTE</b>				
a.	Materials removed during surgery, labor and delivery, autopsy or biopsy including body parts, tissues and organs	B	D	O
		B	E or G	J
b.	Anatomical remains	B	G	L
c.	Bulk blood and blood products	B	D	O
		B	E	J
		B	G	K
<b>SHARPS</b>				
a.	Metal sharps including hypodermic needles, syringes with needles, scalpel blades, razor blades	C	H	N
b.	Pasteur pipets and broken glass	C	E, F, or G	J
		C	-	M

**CONTAINER REQUIREMENTS**

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

**TREATMENT METHODS**

- D. Incinerate.  
 E. Steam autoclave [120 C.; 15 psi; 30 min. (minimum)].  
 F. Dry heat [160 C., 2 hr. (minimum)].  
 G. Chemical disinfection - 10% hypochlorite or EPA-approved chemical disinfectant or sterilant used according to manufacturer's direction.  
 H. Encapsulate in a solid matrix [e.g., plaster of Paris; or a commercial encapsulant (Isolyser)].  
 I. Biodigestion

**DISPOSAL METHODS**

- J. Deposit treated waste in a TAMU trash dumpster.  
 K. Discharge disinfected liquid into the sewer system (NOTE: Excess proteinaceous material can clump and cause drain clogging. Grinding treated waste may be necessary. Do not grind untreated biohazardous material.)  
 L. Interment or cremation.  
 M. Place in a puncture-resistant container and deposit in a TAMU trash dumpster.  
 N. Place encapsulated sharps in a TAMU trash dumpster.  
 O. Residual incinerator ash is disposed at the College Station landfill.  
 P. Effluent is discharged to sanitary sewer.  
 Q. Send to commercial rendering plant.  
 R. College Station (BVSWM) landfill using the TAMU Special Waste Permit issued by TCEQ.

**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.

<sup>1</sup>DO NOT INCINERATE GLASS OR PLASTIC LABWARE.

**I. 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 treatment and disposal of biohazardous wastes, and recognition of symptoms of infection or exposure.

**J. WRITTEN PROCEDURES AND RECORDS**

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

1. Date of treatment
2. Quantity of waste treated
3. Method/conditions of treatment
4. Name (printed) and initials of the person performing the treatment.

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

1. A written procedure(s) for: the operation and testing of any equipment used; and the preparation of any chemicals used in treatment.
2. Documentation of efficacy. 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 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:
  - a. 50 - 100 pounds per calendar month requires testing once per month
  - b. 101 - 200 pounds per calendar month requires testing biweekly
  - c. 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 non-hazardous biological waste.

**K. REFERENCES:**

1. 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).
2. 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).
3. Centers for Disease Control / National Institutes of Health, Biosafety in Microbiological and Biomedical Laboratories, 4th Edition, 1999.
4. "Management of Medical Waste", City of College Station, August 1993.

**TABLE 2. BIOHAZARDOUS WASTE TREATMENT LOG**

DEPARTMENT: \_\_\_\_\_  
BUILDING \_\_\_\_\_ LAB \_\_\_\_\_  
SUPERVISOR: \_\_\_\_\_ PHONE NUMBER \_\_\_\_\_

[illegible]

## APPENDIX A. DEFINITION OF TERMS

1. **ANIMAL WASTE** includes carcasses; body parts; bulk whole blood and blood products, serum, plasma and other blood components; and bedding of animals.
2. **BIODIGESTION** is a heated alkaline hydrolysis tissue digestion system permitted by the TCEQ.
3. **BIOHAZARDOUS WASTE** 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
4. **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.
5. **BULK BLOOD AND BLOOD PRODUCTS** - Discarded bulk (>100 ml.) blood and blood products in a free draining, liquid state; body fluids contaminated with visible blood; and materials saturated or dripping with blood.
6. **CHEMICAL DISINFECTION** means the use of a chemical agent such as 10% bleach or EPA-approved chemical disinfectant/sterilant (used according to manufacturer's direction) to significantly reduce biological activity of biohazardous material.
7. **DISCHARGE INTO THE SEWER SYSTEM** means flushing treated liquid biological waste into the TAMU sanitary sewer system followed by copious quantities of water.
8. **ENCAPSULATION** is the treatment of sharps waste 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.
9. **INCINERATION** means burning biological waste in an incinerator permitted by the Office of Air Quality, TCEQ.
10. **INFECTIOUS WASTE** is waste containing pathogens or biologically active material which because of its type, concentration, and quantity is capable of transmitting disease.
11. **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 used disposable culture dishes
  - e. discarded used disposable devices used to transfer, inoculate, and mix cultures

NOTE: in vitro tissue cultures that have not been intentionally exposed to pathogens are exempt from the definition of microbiological waste.
12. **PATHOGENS** includes any diseases that are transmissible to humans.
13. **PATHOLOGICAL WASTE** pertains to human materials 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
  - c. anatomical remains.
14. **SHARPS** - 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.
15. **THERMAL TREATMENT** means:
  - a. 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
  - b. 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).
16. **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**

### **1. INCINERATION or BIODIGESTION**

Receptionist, 845-4654  
Dr. John Edwards, 845-4608  
Dr. Kenneth Turner, 862-3968  
Department of Veterinary Pathobiology  
College of Veterinary Medicine

### **2. UNIVERSITY VETERINARIAN**

University Veterinarian  
Laboratory Animal Resources and Research Facility (LARR)  
845-7433

### **3. ENVIRONMENTAL HEALTH AND SAFETY DEPARTMENT**

845-2132

### **4. FOR ASSISTANCE WITH AUTOCLAVES NOT ON SERVICE CONTRACT**

Physical Plant, Area Maintenance 7  
845-3125