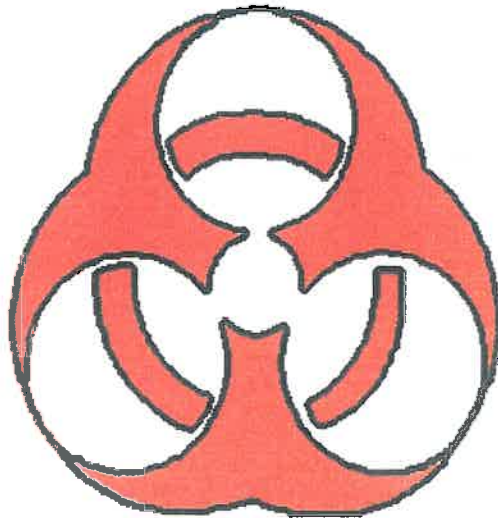


**OFFICE OF ENVIRONMENTAL HEALTH AND
SAFETY**

BIOSAFETY MANUAL

ALABAMA A & M UNIVERSITY



**ALABAMA A & M UNIVERSITY
ENVIRONMENTAL HEALTH AND SAFETY**

PREFACE

The policy of Alabama A & M University is to provide a safe and healthful work environment for employees, students and visitor. It is the intent of Alabama A & M University to minimize to the extent practicable all recognizable hazards and to comply with all Federal and State laws and regulations. The implementation of this policy is the responsibility of all employees of the University. Supervisors at all levels must be accountable for the health and safety of employees engaged in activities under their supervision. Supervisors must insist that employees comply with health and safety rules and work in a safe manner.

CHAPTER 1 - INTRODUCTION

Microbiological laboratories pose a number of special circumstances that set them apart from other types of laboratories. Most of these circumstances exist because the work conducted within them often involves organisms that are infectious to humans. The purpose of this manual is to define the appropriate kinds of facilities and work practices for microbiological laboratories to reduce the probability of infection of laboratory personnel. All principal investigators, faculty, staff and students working with infectious agents or recombinant DNA are expected to abide by the provisions of this manual.

The University Institutional Biosafety Committee (IBC) has adopted the CDC/NIH (4th Edition) “*Biosafety in Microbiological and Biomedical Laboratories*” as the University’s official biosafety guidelines for the use of infectious agents. A copy is available in the Office of Environmental Health and Safety (OEHS), Room 208A, Carter Hall. Recombinant DNA research is regulated by NIH guidelines “*Guidelines for Research Involving Recombinant DNA Molecules*” also available in the office of Environmental Health and Safety.

The Institutional Biosafety Committee must review research involving infectious agents or recombinant DNA. All proposals, regardless of funding source, are subject to this review. The (IBC) will determine the proper hazard classification and will recommend approval or disapproval.

PRINCIPAL INVESTIGATOR

The key person in the microbiological laboratory is the Principal investigator who is in charge of the facility. This is the individual who has been assigned in the responsibility and discretionary authority to set work practices. Others working in the facility will reflect the attitude of this person. It is the policy of the University that the Principal Investigator is responsible for complying with the Biosafety Manual, the procedures recommended in the CDC/NIH (4th Edition) handbook, and the NIH guidelines for recombinant DNA research.

Specifically, the Principal Investigator has the primary responsibility for:

- Determining the real and potential biohazards of the proposed research
- Determining the appropriate level of biological and physical containment.
- Selecting the microbiological practices and laboratory techniques for handling infection agents and recombinant DNA materials.
- Preparing procedures for dealing with accidental spills and personnel contamination.
- Determine the applicability of various precautionary medical practices, serological monitoring and immunization.
- Securing approval of the proposed research prior to initiation of work

HAZARD COMMUNICATION PROGRAM

The University requires that all employees, including students, must be made aware (by documented training) of the hazards associated with any hazardous materials and that they may encounter at their workplaces and the measures that the University is taking to minimize these risks. All current laboratory employees, all new employees at the time of employment, and all students prior to involvement in laboratory activities must be instructed about dangers associated with the specific agents involved in their work and safety procedures that have been adopted for their protection. Instruction about dangers associated with any new materials brought into the laboratory and the safety procedures that have been adopted to control these hazards must take place before employees or student being using the new material, information from this manual must be a part of the training.

CHAPTER 2 – PRUDENT PRACTICES FOR INFECTIOUS AGENTS

The control of biological hazardous in the laboratory shall be maintained by:

- Limiting access to the laboratory in general.
- Limiting access to the material in question.
- Limiting the handling of material to the minimum compatible with effective usage.
- Insuring proper disposal of material after usage.
- Insuring proper usage of appropriate safety equipment, precautions and procedures when handling the materials.
- Maintaining appropriate levels of identification, warning and security in storage of the materials. The universal biohazard warning labels shall be posted on the outside door of each laboratory. (See appendix)
- Submitting an Infectious Agent Registration Form for each infectious agent received by the laboratory (See appendix for copy of this form)
- Maintaining proper air supply to the laboratory, so that the laboratory always remains negative in relationship to the hallways and surrounding areas.
- Keeping the laboratory doors closed during operations involving the materials.
- Addition standards and special practices for Biosafety Level 1 through 4 are described in CDC-NIH (4th Edition) "*Biosafety in Microbiological and Biomedical Laboratories*".

CHAPTER 3 – EMERGENCY AND ACCIDENT PROCEDURES

Laboratory Emergency Contacts

Telephone numbers of responsible individuals to be contacted in case of emergencies shall be posted on the outside door of each laboratory and also listed with the Environmental Health and Safety and University Public Security.

Emergency Equipment

All personnel should be familiar with the location and use of all the emergency equipment in their laboratory. This includes fire extinguishers, eyewashes stations, emergency deluge showers, chemical spill kits, absorbent materials and fire alarm pull stations.

For certain hazards, respiratory protection may be required for routine and emergency operation (See CDC/NIH (4th Edition) "*Biosafety in Microbiological and Biomedical Laboratories*"). If respirators are provided, the laboratory must have a written Respiratory Protection Program and all users must be fit tested and trained in their use. Information about respirators and respiratory protection programs may be obtained from the office of Environmental Health and Safety.

Evacuation Routes

All personnel should be familiar with the primary and secondary evacuation routes from their areas to the nearest building exit. The University Fire Marshal or Campus Public Safety can assist in developing these routes. The secondary route should be used when the primary route is blocked for some reason. All personnel should be told what method is used to signal a building evacuation, either a building alarm or manually operated air horn.

Spills and Emergencies

Principal investigators are responsible for developing spill and emergency guidelines suitable for biological operations in their specific areas. These guidelines must contain the following:

- Develop procedure for containing and decontaminating any spills that may occur and any emergency action to be taken.
- Provide training on these emergencies guidelines for personnel working in the areas of operation.
- A copy of the plan should be available in the laboratory as well as in the office of Environmental Health and Safety.

Spill in a Biological Safety Cabinet

A spill that is confined to the interior of the biological safety cabinet should present little or no hazard to personnel in the area. However, chemical disinfection procedures should be initiated at once while the cabinet ventilation system continues to operate to prevent escape of contaminants from the cabinet. Spray or wipe the walls, work surfaces, and equipment with a disinfectant with a detergent. The advantage of detergent activity, which will help clean the surface by removing both dirt and microorganisms. Use appropriate commercially available germicides or 1 part household bleach (e.g., Clorox) to 9 parts of water with 0.7% nonionic detergent, prepared fresh daily.

The operator should wear gloves and eye protection during this procedure. Use sufficient disinfectant solution to ensure that the drain pans and catch basins below the work surfaces contain the disinfectant. Lift the front exhaust grill and tray and wipe all surfaces. Wipe the catch basin and drain the disinfectant into container. This disinfectant, gloves, wiping cloth and sponges should be discarded into an autoclave pan and autoclaved. NOTE: This procedure will not disinfect the filters, blower, air ducts or other interior parts of the cabinet. A contractor must perform decontamination of these parts and the biosafety cabinet will have to be recertified.

Spill in the Open Laboratory

If potentially hazardous biological materials are spilled in the laboratory, the first essential is to avoid inhaling any airborne materials by holding the breath and leaving the laboratory. Warn others in the area and go directly to a wash or change room area. If clothing is known or suspected to be contaminated, remove the clothing with care, folding the contaminated area inward. Discard the clothing into a bag or place the clothing directly in to an autoclave. Wash all potentially contaminated areas as well as the arms, face and hands. Shower if facilities are available. Reentry into the laboratory should be delayed for a period of 30 minutes to allow the reduction of the aerosol generated by the spill. Advance preparations for a spill is essential. A “spill Kit” – including leak-proof container, forceps, paper towels, sponges, disinfectant, eye protection and rubber gloves- should be readily available

If an emergency involves personal injury or biological contamination, call Campus Public Security (5555) and 911 from any campus phone and ask for an ambulance be sent to the area, Be sure to state the type of contaminant on the victim. The caller must also remain available to brief the police and emergency responders on the type of contamination and proper procedures for handling the materials. A spill report must then be filed with the office of Environmental Health and Safety

Figure 1. Generic Laboratory Safety Guidelines **Immediate Action Protocol for Spills Involving Biohazard us Material**

If you drop or spill a container of biohazard’s material or are in the same room, which this occurs, do the following:

1. Hold your breath. Leave the room. Close the door behind you.
2. Remove and containerize contaminated protective garments (including shoes) immediately at the door after exiting.
3. Warn others of the spill, and isolate the area.
4. Assure the laboratory supervisor is notified.
5. Wash hands and face or, if facilities are available, shower. Use germicidal soap.
6. When the above immediate actions are accomplished, decontamination and clean-up will be directed by the laboratory supervisor.

CHAPTER 4 –LABORATORY FACILITIES DESIGN AND EQUIPMENT

A well-designed laboratory is the first step to a safe laboratory. A micorbiological laboratory shares many of the same features of a standard chemical laboratory. It should have means of egress in conformance with fire and safety codes, and the layout should allow free movement of personnel in an emergency. It is easily cleaned and maintained. Adequate ventilation and hood exhaust are available and well maintained. Appropriate equipment for operations within the laboratory is available and maintained in good condition. Specific special safety equipment is present and located so that it is always easily accessible. Specific biosafety levels of containment and laboratory design criteria are found in CDC-NIH (4th Edition) Biosafety in “*Microbiological and Biomedical Laboratories*”.

CHAPTER 5 – INFECTIOUS WASTE GUIDELINES

The following guidelines describe the safe and appropriate handling and disposal of infectious waste. These wastes include human blood and body fluids, sharps, infectious microbiological materials, and pathological specimens.

DEFINITIONS

Blood and blood products – human blood products (such as serum, plasma and other blood components and body fluids).

Sharps - includes needles, syringes, scalpels and glass vials. These should be placed in sharps containers.

Microbiological – waste including all cultures and stocks of infectious agents. These should be collected in appropriate containers, autoclaved and discarded with regular trash (solid) or sink (liquids).

CHAPTER 6 - TRANSPORT OF BIOLOGICAL SPECIMENS

Objective

To inform transporters and receivers of biological specimens generated by Alabama A & M University of the type of specimen and the degree of potential biological hazard that may be associated with the specimen/package contents. This policy is applicable to all employees who transport, ship, or release biological specimen from any facility within the University to another institution or other facility within the University.

Policy

It is the policy of the Institutional Biosafety Committee (IBC) to inform transporters and receivers of the degree of potential hazards that may be associated with biological specimens generated at Alabama A & M University in accordance with State and Federal regulations, and appropriate guidelines. This policy is applicable to the categories of materials listed below that may contain potentially hazardous biological agents.

POTENTIALLY HAZARDOUS BIOLOGICAL SPECIMENS

Definition

A potentially hazardous biological specimen may be any one type or combination of the following types of specimens, when such a specimen consists of live, frozen or lyophilized material that may possess the potential to produce an infection or genetic alternation in humans, animals or plants.

1. Human cell line (including non-human primates)
2. Non-human cell line
3. Human or other primate sample (Fluid, tissue, etc.)
4. Non-primate sample (fluid, tissue, etc.)
5. Recombinant DNA
6. Bacteria
7. Virus
8. Fungus, parasite, or other live material

Potentially hazardous biological specimens do not include live animals that are healthy and presumed to be non-infectious, but do include unhealthy animals that are known or suspected to be infectious.

Biological specimens are not considered to be potentially hazardous when the specimens have been chemically, thermally, or otherwise treated to render the specimen or components thereof, permanently non-viable, permanently inactivated, or permanently incapable of insertion or infection into living cells.

WASTE PROCEDURES

Separation and labeling of infectious waste (which may include red bagging, universal biohazard symbol, etc.) must be done at the point of generation. During collection, storage and transportation, all waste must be managed such that the integrity of the packaging is preserved and rapid microbial growth and putrefaction is inhibited. Sharps containers should be rigid, impervious and puncture-resistant; plastic bags should be tear-resistant, leak resistant and sturdy enough to withstand handling. Whenever possible, infectious waste should be treated to rendered non-infectious and non-recognizable as to its former character.

Infectious waste – infectious waste should be properly treated to render it non-infectious. Autoclaving and chemical treatment are the most common methods. Treated waste is considered solid waste and may be safely land filled, i.e. placed in regular trash. The waste does not require a red bag. This material shall be placed in autoclave bags or other clearly identifiable containers and properly labeled with autoclave tape or other means that show that the waste is no longer hazardous. Blood and blood products may be disposed in the sanitary sewer.

Red bag waste – Red bag waste, like the universal biohazard-warning label, warns that the contents are potentially hazardous to your health. They are for waste that has not been treated to make it non-infectious. The use of a red bag says, “This bag and its contents must be incinerated”. Material that is intended to be autoclaved should **NOT** be placed in red bags. Specifically:

- **Red bags must be used for infectious waste only** and contain no other type of waste. Do not put non-infectious waste in red bags; this is an expensive and harmful practice.
- Red bags must be totally segregated from other waste.
- The University’s Contractor to pickup BIOWASTE will pick up red bag waste from the University infirmary. Designate a point in the laboratory for storage and pickup of red bags, sharps containers and other infectious waste. Contact the office of Environmental Health and Safety (4091) or Physical Plant (4275).
- Non-medical red bag waste pickup and disposal will be coordinated through the office of Environmental Health and Safety.

Transport Levels, Labels and Acceptance of Responsibility Form

Biosafety Levels

Currently only two Biosafety levels are employed at Alabama A & M University (BL 1 and BL 2). Materials that require Biosafety Level 3 and Level 4 are not allowed, nor can they currently be handled at Alabama A & M University. Non-pathogenic agents are those not known to cause disease, in humans, animals, or plants and are of minimal potential hazards to laboratory personnel and the environment. Non-pathogenic agents are usually handled at Biosafety Level 1 at the University. Pathogenic agents are usually handled at Biosafety Level 2 and 3. All potentially hazardous biological agents handled at Alabama A & N University must be registered and approved for use under the Biosafety Level requirements by the IBSC.

Labels

Biological specimens cannot be released or transported from Alabama A & M University without first attaching a signed and completed "Biological Specimen Transport Label" to the package. This label identifies the package contents for the purpose of informing the receiver of the degree of potential hazard the specimen material may possess.

Responsibility Form

If the biological specimen contains or is suspected to contain a Class III biological agent or if the biological specimen is handled at Biolevel 3, the receiver of the specimen MUST first obtain and acceptance of Responsibility of Highly Pathogenic (Class III) Materials.

The receiver must complete, sign, and return the form to the Office of Environmental Health and Safety before the specimen can be sent to the University. (See Appendix –C for this form.)

If there are any questions whether a specific biological specimen constitutes a potential biological hazard or is a potential highly pathogenic (Class III) materials, contact the University Biosafety Officer () or the Office of Environmental Health and Safety (4091).

Exceptions

Any exceptions to this policy are at the discretion of the (IBC) or the Office of Environmental Health and Safety. Once a year notification is usually allowed to laboratories that receive biological specimen shipments on a routine basis. However, all exceptions must be reviewed by the (IBC) and the (EH&S) on an annual basis.

APPENDIX -A

Biohazard Signage (Tag)



APPENDIX –B

Recombinant DNA Registration Form

**ALABAMA A & M UNIVERSITY
Institutional Biosafety Committee**

RECOMBINANT DNA REGISTRATION FORM

If you plan to use recombinant DNA at Alabama A & M University you must complete this form prior to initiating your work. Submit completed form, a project summary and a copy of the experimental protocols to the Office of Environmental Health and Safety.

Section I – General Information

Principal Investigator: _____
Department: _____
Laboratory Location (Room # & Building): _____
Telephone: _____
Project Title: _____

Section II – Project Information

The rDNA experiments described below require IBC approval prior to imitation? yes no
Will experiments involve a deliberate attempt to obtain an express of a foreign gene? yes no
If yes, what protein will be produced?

Will experiments involve more than 10 liters of culture? yes no
Containment conditions specified in the NIH Guidelines: BL1 BL2 BL3
Source(s) of the DNA:

The nature of the inserted sequences:

The host and vectors to be used:

Other comments:

Do you have a copy of the NIH "Guidelines for Research Involving Recombinant DNA Molecules"?
 yes no

Do you currently use biohazard signs? yes no
If yes, how?

Lab entrance
 Storage areas (refrigerators, freezers)
 Work areas (biosafety cabinet, incubators)
 Others (please specify) _____

Are the biohazards identified on these signs? yes no

**SECTION III – Responsibilities of the Principal Investigator
(NIH Guidelines IV-B-5)**

On behalf of the Institution, the Principal Investigator is responsible for complying fully with the NIH Guidelines in conducting any recombinant DNA research. As part of this responsibility, the Principal Investigator shall:

1. No initiate or modify any recombinant DNA research requiring approval by the University Institutional Biosafety Committee (see Sections III-A and III-B of NIH Guidelines) until that research or the proposed modification thereof has been approved by the (IBC) and has met all other requirements of the Guidelines.
2. Determine whether experiments are covered by Section III-C and follow the appropriate procedures.
3. Report within 30 days to the (IBC and (NIH-ORDA) all-significant problems with and violations of the NIH Guidelines and all significant research-related accidents and illnesses.
4. Report to the (IBC) and to the (NIH – ORDA) new information bearing on the NIH Guidelines.
5. Be adequately trained in good microbiological techniques.
6. Adhere to IBC-approved emergency plans for dealing with accidental spills and personnel communications.
7. Comply with shipping requirements for recombinant DNA molecules. (See Appendix H of NIH Guidelines for shipping requirements for technical recommendations).

Signature (Principal Investigator): _____ Date: _____

APPENDIX – C

Infectious Agent Registration Form

ALABAMA A & M UNIVERSITY
Institutional Biosafety Committee

INFECTIOUS AGENT REGISTRATION FORM

If you plan to use any infectious agent at Alabama A & M University, you must complete this form prior to initiating your work. Submit completed form, a project summary and a copy of the experimental protocols to the Office of Environmental Health and Safety, Room 208A, Carter Hall (4091).

SECTION I – GENERAL INFORMATION

Principal Investigator: _____
Department: _____
Laboratory Location (Room # & building): _____
Telephone _____ Email: _____
Project Title: _____
Do you have a copy of the CDC-NIH (4th Edition) "Biosafety in Microbiological and Biomedical Laboratories"? ____ yes ____ no
Do you currently use biohazard signs? ____ yes ____ no
If yes, how?
____ Lab entrance
____ Storage areas (refrigerators, freezers)
____ Work areas (biosafety cabinet, incubators)
____ Other (please specify) _____
Are the biohazards identified on these signs? ____ yes ____ no

On a separate page, briefly outline safety precautions taken: spill and work areas decontamination procedures; and waste disposal methods used when working with these cultures (attach page to form)

SECTION II – MICROBIOLOGICAL AGEN USE

() Check here if this section does not apply

PLEASE COMPLETE ONE PAGE FOR EACH INFECTIOUS AGENT USED (photocopy this page for additional blank pages.)

Name and strain of agent: _____
This agent is:
____ Viral ____ Rickettsial ____ Chlamydia ____ Bacterial
____ Fungal ____ Parasitic ____ Tumor Cell Line
____ Other _____

This agent is a (check all that apply):
____ Human Pathogen ____ Animal Pathogen (Not Human)
____ Plant Pathogen ____ Indigenous to Alabama
____ Not indigenous to Alabama

Host Range: _____
Route(s) of inoculation: _____
Will infectious aerosols be generated? ____ yes ____ no

This work will be conducted:

_____ on the Lab bench

_____ in a fume hood

_____ in a clean bench

_____ Other (please specify)

_____ in a biological safety cabinet

_____ in a clean box

_____ in a clean room

Biological safety cabinet certification expiration date: _____

Biosafety level for project:

_____ BL-1 _____ BL-2 _____ BL-3 _____ Unknown _____ Non of the mentioned levels

Is there any vaccination, skin test or other medical prophylactic treatment or medical surveillance necessitated by work with this (these) agent(s)? _____ yes _____ no

If yes, please identify: _____

On a separate page, briefly outline safety precautions taken; spill and work area decontamination procedures; and waste disposal methods used when working with these agents (attach page to form)

SECTION III – ANIMALS USED IN THIS PROJECT

(_____) Check here if this section does not apply

If animals are used as part of this project, please answer the following questions.

Species: _____

Source: _____

_____ purpose-bred animals (bred for research only)

_____ random source of animals (bought but not bred for research)

_____ feral animals (studied in wild or captured for research)

_____ domestic livestock used for research purposes

These animals will be used for: _____

Materials administered to animals: _____

Quantity administered: _____

Method of administration: _____

Procedure for disposing of animals: _____

SECTION IV – CELL CULTURE

(_____) Check here if these section dos not apply

Name of species: _____

Cell Type: _____

Usage: _____

On a separate page, briefly outline safety precautions taken; spill and work area decontamination procedures; and waste disposal methods used when working with these cultures (attach page to form)

SECTION V – USE OF HUMAN/BODY FLUIDS/TISSUE

() Check here if this section does not apply

The following materials from human source are used (Check all that apply)

- | | |
|--|--|
| <input type="checkbox"/> Blood <TD | <input type="checkbox"/> Tissue Type |
| <input type="checkbox"/> Semen | <input type="checkbox"/> Pleural fluid |
| <input type="checkbox"/> Vaginal Secretions | <input type="checkbox"/> Peritoneal fluid |
| <input type="checkbox"/> Cerebrospinal fluid | <input type="checkbox"/> pericardial fluid |
| <input type="checkbox"/> Synovial fluid | <input type="checkbox"/> Amniotic fluid |
| <input type="checkbox"/> Feces | <input type="checkbox"/> Nasal secretions |
| <input type="checkbox"/> Urine | <input type="checkbox"/> Sputum |
| <input type="checkbox"/> Sweat | <input type="checkbox"/> Tears |
| <input type="checkbox"/> Breast milk | <input type="checkbox"/> Others |

List all sources of the materials: _____

The materials are used for: _____

Explain any type of treatment the material has undergone prior to receipt (e.g., fixation, testing for viruses). Please list the fixative or specific tests if known:

Describe the method of disposal of the materials and any treatments (e.g., autoclaving) performed prior to disposal: _____

Non-Hazardous Wastes

As a rule persons who generate chemical wastes should not pour them down the sink or put them in the regular trash unless they are certain that the wastes are non-hazardous to humans or the environment. University personnel should consult MSDS's, the manufacturer's container labels, reference manuals, or call the OEH&S for guidance on how to dispose of these materials. In general, only non-hazardous solids should be disposed of in the regular trash. Non-hazardous free liquids that are water soluble may be disposed of down the sink. Free liquids that are not water soluble should be referred to the OEH&S for disposal. Materials that have strong or unpleasant odors should be referred to the OEH&S for disposal. Chemicals in damaged containers should be placed into appropriate secure containers. If not safe to do so, they should be referred to OEH&S for disposal.

Unknown Wastes/Chemicals

All waste materials picked up by OEH&S must be completely and accurately identified. Materials that are not identified are referred to as "unknowns." EPA permit regulations prohibit OEH&S from picking up, transporting, or storing unknown waste materials. When an unknown is discovered, an attempt must be made to identify its contents immediately. Usually the contents can be identified by consulting persons who work in the area where the material was used. If this fails to positively identify the material then some elementary analysis on the material must be performed. Elements of this analysis may include:

- pH on liquids
- Flash point
- Reactivity with water (on a very small scale)
- Specific gravity
- Flammability (on a very small scale)
- Water solubility

If the persons with the unknown cannot or choose not to perform analysis of the unknown, then the University's hazardous waste contractor will perform the analysis for a substantial fee. Maintenance of labels, periodic inspections of chemical stocks, and good chemical hygiene practices will prevent the occurrence of unknowns. The University's **Chemical Hygiene Plan** also has specific requirements for labeling chemical containers. Persons should consult the Chemical Hygiene Plan or call the OEH&S for specific information on these labels.

CHAPTER 3

HAZARDOUS WASTE HANDLING AND DISPOSAL REQUIREMENTS

Alabama A & M University is inspected annually by state and federal agencies for compliance with hazardous waste regulations. Failure to meet all of these regulations can lead to a Notice of Violation (and fines) from these agencies. **The most commonly cited violations at universities involve failure to properly label hazardous waste containers, failure to properly identify the contents of the waste containers, and failure to maintain closed containers in laboratories and work areas.**

Labeling

All hazardous waste containers must have a label that states "HAZARDOUS WASTE" and must list the constituents of the waste. This labeling must be done at the time waste is first placed into the container. When naming the waste be specific (e.g., xylene instead of non-halogenated solvents and ethanol instead of alcohol). Do not use abbreviations or chemical formulas. Hazardous waste labels are available from OEH&S, or you can use laboratory tape, etc. as long as it states "**HAZARDOUS WASTE**" and has the specific names of the waste constituents.

Proper Containers and Storage

Proper containers for accumulating and storing hazardous waste must be provided by the person who generates the waste. Generally, the best containers for hazardous waste are the ones that the materials came in. Other containers, such as 30 gal plastic drums, 5 gallon jugs, 4liter bottles, are acceptable as long as the container and any residue left inside are compatible with the waste. All containers must have tight-fitting lids. Corks, ground-glass stoppers or parafilm are not proper substitutes for a tight-fitting lid. Unacceptable containers or containers without tight-fitting lids will not be picked up by OEH&S and it will be the responsibility of the generator to transfer the material to another container or to provide a proper lid for the container. OEH&S can provide guidance in selecting proper containers.

When not actually pouring waste into or out of the container the top must be securely fastened. You must not leave a funnel sitting in the container. The only exception to this rule is for processes, such as HPLC, which run and add waste to the container continuously. However, when the process is not running the top must be on the container.

By state and federal regulations, at no time can more than 50 gallons of waste be allowed to accumulate in any lab or storage area prior to pick up by OEH&S. When the generator has a full container, a waste ticket should be filled out and sent in. The waste will be removed by OEH&S as soon as possible. Waste must not be stored over drains, in sinks, or in an area where a spill would contaminate any soils or outside areas. Waste must be stored in a **secure place** where it is always under the control of the generator. Waste stored outside of labs must be kept under lock and key at all times and inspected regularly. Waste should be stored in designated "**Waste accumulation sites**".

Incompatible materials, whether wastes or unused chemicals, should never be mixed. Incompatible materials when mixed together may cause explosions, fires or may generate flammable or toxic gases resulting in serious health hazards. If in doubt do not mix!

Caution must be exercised in any area where chemicals or wastes are stored to insure incompatible materials are segregated appropriately. Segregate by hazard class, not by alphabet. If possible do not store waste with "good" chemicals (products). Flammable waste should be kept away from heating sources and should be stored in accordance with the University's safety manual. The University Fire Marshal or OEH&S can provide information on proper storage of flammable and combustible materials. The pairs below are examples of incompatible materials:

oxidizers	and	flammables
elemental metals	and	hydrides
acids	and	cyanides
acids	and	sulfides
acids	and	bases
acids	and	flammables
acids	and	chlorine compounds
acids	and	alcohols
acids	and	elemental metals
amines	and	chlorine compounds
water or air reactives	and	anything
organic peroxides	and	anything
phenol	and	formaldehyde
sodium azide	and	aqueous lead

This list is not all inclusive. For a more detailed list, see "Incompatible Chemicals" in the Chemical Hygiene Plan. You should always consult a MSDS or other chemical information sources such as Bretherick's Handbook or the Merck Index for compatibility information.

Halogenated waste materials (those containing halogen compounds such as chlorine or fluorine) should be separated from non-halogenated compounds, unless unavoidable. This is for both economic and safety reasons. The halogenated wastes, while much less flammable, are generally more toxic than non-halogenated waste materials. The disposal cost of non-halogenated solvents is approximately one third that of halogenated solvents.

Where possible, mercury compounds should be eliminated from the laboratory. It is very important not to mix mercury with other materials due to the difficulty and cost of disposing of mercury and mercury compounds.

OEHS will not pick up containers with dangerous or incompatible materials. These situations will be handled on a case by case basis by the director of OEHS and the principle investigator.

Waste Tickets

To dispose of any hazardous waste you must completely fill out a hazardous waste ticket (see Figure 1) for each container, and a “Chemical Waste Disposal List” Tickets and Lists must be filled out by the person who generates the waste, not a staff assistant or student employee who does not have knowledge of chemicals or has not been through the hazardous waste class. Tickets should be filled out as completely as possible.

- **Do not use chemical formulas or abbreviations.**
- **Use chemical names for waste constituents.**
- **All liquids should have a pH test performed and recorded on the waste ticket.**
- **Information should be printed or typed and must be legible.**

One ticket should be filled out for each container. If you have a box of vials or small containers that are all of the same chemicals, then only one ticket is needed for the box. For different chemicals, one ticket will be needed for each container. For animal carcasses, one ticket is needed for each bag or box with the total weight listed for the container.

Email or bring the copy of the “Chemical Waste Disposal List” to the OEHS. Once the List is received it will be entered into the computer tracking system and personnel will come to your area and pick up the waste. **No waste materials will be picked up without a properly filled out hazardous waste ticket and “Chemical Waste Disposal List”.** The University is required by law to track its hazardous waste from the point it becomes a waste to its point of ultimate destruction. These tickets are our means of fulfilling this requirement.

Figure 1

Hazardous Waste Ticket

COMPLETE AND ATTACH TO CONTAINER

Container Information	
Container ID#	_____
Date put into use:	_____
Date filled:	_____
<input type="checkbox"/> HAZARDOUS WASTE	
<input type="checkbox"/> NON-HAZARDOUS WASTE	
<input type="checkbox"/> OTHER:	

Waste Composition Information	
<i>Do Not Abbreviate Do Not Use Chemical Formula</i>	
Constituents: List All	Quantity
(continue on back if needed)	Total Quantity

Generator Information	
Name	_____
Phone	_____ Dept _____
Bldg	_____ Room _____
I hereby declare that this material is fully and accurately described and contained for safe handling to the best of my knowledge and belief.	
X _____	Date _____
Signature	

Regulatory Information: EH&S Use Only	
Waste Number(s)	_____
Accumulation Start Date	_____
RCRA <input type="checkbox"/>	NON-RCRA <input type="checkbox"/>

Pharmaceuticals and Controlled Medications

Pharmaceuticals, chemotherapy agents and other controlled medications should be managed in the same manner as any other hazardous waste. When filling out the hazardous waste disposal ticket be sure to list both the common trade name and the more definitive chemical name. Any additional information available about the substance should be stapled to the waste disposal ticket.

Ethers and Peroxide-forming Materials

Some chemicals such as old ethers (not petroleum ether), picric acid, and organic peroxides tend to form unstable (explosive) compounds. Over time they can become ***extremely unstable***. These materials should be restricted to that which is necessary to perform ongoing research. If peroxide formation is suspected, the containers should be isolated and OEH&S immediately notified. ***Under no circumstances should researchers attempt to open containers if crystal formations are visible in the container or around the cap.*** Most of these substances have expiration labels attached to the container. It is recommended that researchers mark their containers with the date that the container was received and opened. **Peroxide-forming materials that will not be used up or are not needed should be disposed of six months prior to the expiration date on the containers.**

Animal Carcasses

Animals that have been contaminated with carcinogens or other highly toxic materials are considered to be hazardous waste and must be disposed of by OEH&S. Technically, animals are hazardous waste if they meet the toxic characteristic (see Table 1) or are contaminated with a listed hazardous waste. If you have any questions about the chemicals you are using, contact the OEH&S. Non-contaminated animal carcasses will be handled per instructions

CHAPTER 4

OTHER WASTE REQUIREMENTS

Biohazardous Waste

Biohazardous wastes are human, animal or plant tissue or fluids that are contaminated with pathogenic organisms.

All biohazardous wastes must be clearly marked with the universal biohazard label (see below). If biohazardous waste also contains hazardous or radioactive material, it must be identified as containing both materials; this type of waste should not be generated if at all possible. Materials that contain viable organisms and require incineration should be placed in leak-proof sealed biohazard **Red Bags**. Materials that are to be sterilized and rendered non-pathogenic are to be placed in **orange biohazard waste bags**. All **Sharps** materials (needles, syringes, scalpels, etc.) must be placed in marked biohazard sharps buckets. Biohazardous waste is picked up by OEH&S upon completion of a request form. For specific guidelines on handling and disposing of biohazardous waste, please refer to the University's **Biohazard Safety Handbook**.



UNIVERSAL BIOHAZARD SYMBOL

Mixed (Chemical and Radioactive) Wastes

Mixed waste is both a hazardous waste as defined by the Environmental Protection Agency (see Chapter 2) and a radioactive waste as defined by (Radiation Control) Alabama Department of Public Health. The most common type of mixed waste are scintillation vials that contain flammable (toluene-based) scintillation cocktail and a small amount of radioactive isotope. The creation of

mixed waste that contains toxic or corrosive materials, transuranic elements, or high levels of radioactivity is strongly discouraged.

Generators of mixed waste must follow the guidelines established for radioactive waste and hazardous waste. For pickup of mixed waste, fill out a radioactive waste disposal form (provided by the Radiation Safety Officer) (RSO). Email copy to the OEH&S where it will be reviewed by the RSO and forwarded to the OEH&S for pickup. If it is a scintillation vial container, the generator of the mixed waste must also have a completed "waste scintillation " form filled out and attached to the drum or vial container. For other types of mixed waste, the completed radioactive disposal ticket will suffice. EH&S /RSO will not provide containers for scintillation vials. Please call the RSO with questions or for a copy of the mixed waste guidelines. Please call the EH&S with questions about having waste picked up.

Radioactive Wastes

The disposal of radioactive wastes, other than those classified above as mixed radioactive, will be handled exclusively by the RSO. Any questions should be directed to the OEH&S.

Asbestos and PCB Materials

Research projects creating wastes with either of these materials will be managed by the OEH&S. Disposal of asbestos waste generated during building renovation and demolition is typically the responsibility of the Physical Plant in charge of or the University's asbestos abatement contractor. Under no circumstances should suspect asbestos containing material be disposed of in domestic waste or with construction debris.

Polychlorinated biphenyls (PCBs) are a highly regulated material and disposal is very difficult and costly. PCBs in concentrations of less than 50 parts per million will be managed by OEH&S as hazardous waste. Any waste over 50 ppm is regulated as a "PCB waste" and will require special handling and disposal; please contact OEH&S for instructions on handling this material. Any gloves or materials that are used with PCBs will also require disposal as a hazardous waste. The use of PCBs in concentrations over 50 ppm in research should be carefully reviewed. PCB disposal by the University could be restricted at any time due to changes in federal regulation. Used light ballasts from fluorescent light fixtures that were manufactured prior to 1978 or that are not clearly labeled as being non-PCB are managed by OEH&S as hazardous waste.

Gas Cylinders

Rental and return of gas cylinders to gas vendors is the recommended practice for the management of cylinders. This eliminates the creation of a hazardous

waste. The purchase of **lecture bottles** or other non-returnable pressurized gas cylinders is strongly discouraged because of the difficulty and cost of disposing of the empty containers. Disposal of empty or partially filled cylinders is handled by the OEH&S.

Waste Oils and Lubricants

Waste oils and petroleum lubricants are not classified as hazardous waste by EPA. However, the University has chosen to manage these products in an environmentally-conscious manner. For proper disposal, contact the Director , Physical Plant or the University's vender.

Broken Glassware

Broken glassware should be placed into an appropriate broken glassware container. Since they will be picked up by the custodial staff these containers should be labeled with the words "**Broken Glass.**" **Do not** place broken glassware, pipettes or other sharp-edged materials of any type into the regular trash.

Empty Containers

Containers that have held hazardous materials should have their labels defaced, should be triple rinsed with water or a suitable solvent to remove any residue, and then should be disposed of in the regular trash.

CHAPTER 5

WASTE MINIMIZATION

Alabama A & M University is committed to reducing both the amount and toxicity of hazardous wastes that are generated as a result of University operations. The University is required by law to develop strategies to reduce its hazardous waste. Listed below are a few strategies that you as a generator should consider in order to meet the goal of reducing hazardous waste.

Substitution

Replace the toxic or other hazardous materials you use with less hazardous or non-hazardous substances. This is the best way to minimize hazardous waste. Mercury thermometers can be replaced with alcohol thermometers. The debris and mercury from a thermometer must be dealt with as hazardous waste, while a broken alcohol thermometer can be disposed of as broken glassware. Chromium- and acid-based glassware cleaning solutions can be replaced with **alconox or no-chromix glassware cleaners**. Toluene-based flammable scintillation cocktails can be replaced with non-flammable cocktails. OEH&S can assist laboratories and others in finding substitutes for hazardous chemicals.

Microchemistry

Use minute quantities and small-scale chemistry instead of large amounts of chemicals in laboratory experiments. This is currently being done in some labs on campus. The use of computer modeling instead of experimentation, especially in teaching situations, should be considered as an alternative to the creation of chemical wastes.

Redistillation

Reclaim solvents for reuse by using a distillation process in the laboratory. This method will reduce the amount of replacement solvents and the volume of hazardous waste generated.

Recycling and Redistribution

Chemicals that are unused or unopened can often be redistributed to other labs or work areas for reuse, saving both disposal costs and new product costs for someone else. The University will have an on-line system utilizing e-mail for redistributing unopened and unused chemicals to other University labs and

service areas free of charge. Contact the OEH&S office for more details or to be included on the distribution list.

Laboratory Destruction

Some chemicals can be neutralized or made exempt from hazardous waste regulations by destruction in the laboratory. **This must be done as part of the experiment and must be done according to documented methods.** If you are uncertain, contact the OEH&S prior to attempting laboratory destruction to insure that the process will be safe and that the end result will meet regulatory requirements. An example of lab destruction would be neutralizing a strong acid or alkaline with a buffering solution. Note that neutralization must take place as part of an experiment. **Waste cannot be accumulated for neutralization at a later date.** Laboratory destruction is considered to be a less desirable strategy than substitution or microchemistry.

University faculty and staff with ideas or suggestions on ways to safely decrease the amount and/or toxicity of waste generated are encouraged to contact the OEH&S so that the information can be passed on to other University operations. Generators who would like assistance in reducing their waste generation should contact the OEH&S staff who will assist them with ideas and/or a review of their operations. A useful publication entitled "Less is Better" (available from the American Chemical Society) focuses specifically on the reduction of laboratory waste.

CHAPTER 6

EMERGENCY AND SPILL RESPONSE

The purpose of this section is to provide information to persons working with chemicals on the steps to take when chemicals are spilled or released. OEH&S is the lead for responding to releases and accidents involving hazardous materials.

Spill Response Procedures

Persons involved with a spill or release of any hazardous material should evaluate the potential danger to themselves, others and the environment before attempting any action (which they must then be properly trained or equipped to handle).

Minor spills of known materials should be cleaned up immediately by personnel in that area. Appropriate personal protective equipment should be used. Chemical protective gloves, safety glasses and clothing covers, such as aprons and lab coats, should be sufficient to handle minor spills of known materials.

For moderate size spills of known materials that cannot be cleaned up without assistance, call the OEH&S office. They will provide technical assistance, equipment, supplies, and guidance. All personnel not directly assisting with the cleanup should be kept away from the area involved.

Larger spills of known materials, spills of unknown materials, spills that result in fire or explosion, or spills that are immediately dangerous to life and health, should be treated as emergencies. Evacuate the immediate area of the spill and call campus emergency 5555 and 911. In larger incidents, evacuate the entire building, either personally or with the assistance of the building authority. All personnel leaving the building or area should gather upwind from the spill at a safe distance away as listed in their evacuation plans. Lab managers should verify that all persons are accounted for. Once at a safe location, call the campus emergency number (5555 from any campus phone and 911) and stay on the line until told to hang up by the dispatcher. Those persons involved with the incident are to remain in the area outside the involved building to assist the emergency response agencies. Information, such as the chemicals or biohazardous agents involved, will be needed by the various responding agencies. After relaying the vital information, lab personnel should notify the principle investigator and the department head.

If any emergency involves personal injury or chemical contamination, call 911 from any campus phone and ask for an ambulance to be sent to the area. Be

sure to state the type of contaminant on the victim. In cases where corrosive chemical exposure to the eyes or body of an individual occurs, carefully assist the injured person to an eyewash station, deluge shower or combination unit. For other chemicals consult the MSDS for that chemical and follow the recommendations in the first aid section. A copy of the MSDS should be available for the ambulance crew and should accompany the victim to the hospital. For exposures to the eyes, flushing with water for a minimum of 15 minutes is recommended. The person should be seen immediately by a physician.

Spill and Release Reporting

All spills and releases of hazardous materials in other than insignificant amounts must be reported to the OEH&S office immediately. If the spill or release also involves a radioactive material, then the Radiation Safety Officer must be notified, too.

Spill Response Equipment

Each area storing or using hazardous materials should have absorbent materials capable of at least stopping the spread of spilled chemicals to drains or other areas. Examples of absorbent materials would be towels, pads, vermiculite and sorbent booms. Most areas that have only small amounts of chemicals could use lab towels or paper towels when compatible with the spilled material. Other areas, such as chemical storerooms and maintenance shops, will require more extensive supplies of sorbent materials. Other protective equipment, such as gloves and eye protection, can be worn for spill cleanup as well as normal chemical usage.

Management of Materials from Spill Cleanup

Materials that are generated as a result of spill cleanup are considered to be hazardous waste if the original material when disposed of would be a hazardous waste. These materials must be placed into appropriate sealed containers and will be managed as any other hazardous waste, i.e. requiring proper labeling and chemical waste lists.

APPENDIX

APPENDIX-A

Definition and Terms

Generator - A person or institution that creates hazardous waste.

Hazardous Material - A material capable of causing harm to humans or the environment.

Hazardous Waste - A waste material that meets one or more of the characteristics identified in state and federal regulations and this manual.

OEHS – Environmental Health & Safety Office

EPA - Environmental Protection Agency.

RCRA - Resource Conservation and Recovery Act, federal act that regulated hazardous wastes.

RSO – Radiation Safety Officer

Satellite Accumulation Point - The place in the lab or work area where hazardous wastes are stored until they are ready for pick up. There must be less than 55 gallons of hazardous waste at any one time at the satellite accumulation point.

Container - A waste receptacle that is capable of being securely sealed, and transported. The container must be compatible with the waste stored in it.

Label - Required wording on each container of hazardous waste. It must state the words **Hazardous Waste** and the name of **all chemicals** contained within.

Mixed Waste - Waste that is both hazardous and radioactive.

APPENDIX-B

HAZARDOUS WASTE GUIDELINES

1. Label all accumulating hazardous waste containers with the words **HAZARDOUS WASTE**.
2. Each container must also have a label listing the **specific waste constituents**.
3. Keep containers **closed** except when filling.
4. When the container is full fill out a waste ticket for each container.
5. Call Office of Environmental Health & Safety (4091) if you have any questions about hazardous waste management or disposal.

Please post this page in the Hazardous Waste Accumulation Storage Areas