Western Carolina University | Safety and Risk Management

Laboratory Waste Management Plan

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As a generator of hazardous waste, the University is required to comply with Federal Standards promulgated under the Resource Conservation and Recovery Act (RCRA). These regulations cover the storage, handling, and documentation for transfer of hazardous waste from the point of generation to the final disposal.

The purpose of this Laboratory Waste Management Plan (LWMP) is to comply with the provisions of 40 CFR 262 Subpart K – Alternative Requirements for Hazardous Waste Determination and Accumulation of Unwanted Material at Laboratories Owned by Colleges and Universities and Other Eligible Academic Entities Formally Affiliated with Colleges and Universities.

The Laboratory Waste Management Plan applies only to laboratories on campus while the remaining campus non-laboratory generators (i.e. Facilities Management, Campus Recreation, Campus Activities) are required to follow the WCU Hazard Waste Program manual for the management of their waste.

Applicable university areas that meet the definition of a laboratory include the following:

- Teaching labs
- Research labs
- Art studios
- Photography studios
- Field research & teaching labs
- Diagnostic labs
- Areas that support labs such as chemical stockrooms and preparatory rooms

Hazard Waste Definition

Hazardous waste is a solid material, chemical, fuel or compressed gas which is harmful to human health or the environment. The material is no longer considered useful and is intended to be discarded. It may be identified by name in chemical lists in the Federal Code, 40 Part 261, or if not specifically listed, by the characteristic of the waste material. Current EPA regulations apply to wastes having the following characteristics:

Ignitability: Liquids with a flash point of less than 140 ^{o}F (60 ^{o}C); oxidizers; flammable gases; solids capable of burning vigorously and persistently after ignition through friction, absorption of moisture, or spontaneous chemical changes at standard temperature and pressure.

Corrosivity: Aqueous solutions with a pH less than or equal to 2 or greater than or equal to 12.5; liquids which corrode steel at a rate greater than 6.35 mm per year at a test temperature of 130 ^{o}F (55 ^{o}C).

Reactivity: Chemicals normally stable that undergo violent change, react violently with water, form potentially explosive mixtures with water, emit toxic vapors when mixed with water, capable of detonation or explosive reaction.

Toxicity: Any of the chemicals specified in 40 CFR 261 Subpart C with EPA Hazard Waste Number D004 through D043.

A second more limited category of hazardous waste is acutely hazardous waste which is all "P-listed" materials. These materials are considered to pose a significant risk to human health or the environment, even in small quantities such as residues in bottles. A list of acutely hazardous materials (P-Listed Hazardous Waste No) regulated by the Environmental Protection Agency can be found in the Code of Federal Regulations 40 CFR 261 Subpart D.

Waste Reduction

The most significant impact that individual departments can have on hazardous waste costs is to reduce the volume of waste required to be handled. Principal Investigators and laboratory supervisors are encouraged to consider ways of reducing the volume of waste or preserving the reuse of the materials through the redesign of experiments and work processes. Recyclable materials should be kept separate from other waste. Efforts should be made to decontaminate, detoxify, neutralize, or otherwise render the waste non-hazardous. Different waste materials should be kept segregated whenever possible. A flow chart showing the general waste stream guide at WCU is provided in Appendix B and a detailed Waste Minimization Plan is provided in Section 7.

Responsibilities

Safety and Risk Management Office

The Safety Office is responsible for managing the review and characterization of laboratory waste, assisting with the waste determination, as well as the approval of laboratory waste disposal requests from the laboratory PI or supervisor.

Safety and Risk Management personnel conduct the transfer of hazardous wastes from laboratory areas to the Hazardous Materials Storage Facility prior to the transport to off-site treatment and disposal facilities.

Principal Investigators or Supervisors

The Principal Investigator (PI) for each laboratory has overall responsibility for managing the process of:

- characterizing laboratory waste
- containing laboratory waste
- marking/labeling laboratory waste
- managing waste in their laboratory spaces

Laboratory Personnel (employees and students)

Laboratory personnel must follow the policies set out in this Laboratory Waste Management Plan and ensure that waste containers are correctly labeled with the contents and the start date of accumulation.

Section 1: Chemical Waste Removal

Disposal Methods

Hazardous waste materials must be handled by means of one of the following:

- Treatment by the originating laboratory to render the waste non-hazardous as a final step in the procedure (e.g. neutralization).
- Recycled for energy recovery or other uses.
- Exchanged as a useful material for another laboratory.
- Packaged for pick-up and incineration by a licensed hazardous waste firm.

If the PI plans to treat wastes by neutralization, they must submit an SOP to the Laboratory Safety Officer for approval. All neutralized chemicals should also be tracked by the PI. Volume and dates of drain-disposed neutralized chemicals should be recorded and kept in the lab.

It is unlawful to discharge any hazardous chemical product or oil into storm sewers, creeks or on the ground or to discharge hazardous chemicals such as strong corrosives, reactives, oils, varnishes, kerosene, gasoline insecticides etc. into the sanitary sewer. Hazardous chemicals must not be placed in the trash.

Inventory List

An essential step in the processing of hazardous waste materials is to develop and maintain an inventory list of stored hazardous waste materials. This list must include the chemical identity, quantity, container type and originator for each substance. The chemical identity and originator must be affixed to each container. Without this information, the material cannot be picked-up for disposal. Each inventory list should be forwarded to the Safety Office so that the current aggregate amount and type of stored waste can be determined for the University and commercial pick-up can be arranged when necessary.

Quantity Limits

The University is classified by the EPA as a small quantity generator (SQG) and as such must never generate more than 1000 kg (2200 lbs) of non-acute hazardous waste in a month and must never exceed 1 kg (2.2 lbs) of acute hazardous waste or 100 kg (220 lbs) of residues from a cleanup of acute hazardous waste. The maximum on-site accumulation limit must never exceed 6000 kg (13,200 lbs) of non-acute waste. A SQG may accumulate hazardous waste on site for no more than 180 days (about six months).

Hazard waste containers must be removed from laboratories no more than 12 months from the accumulation start date indicated on the container label. Collection limits for each laboratory are set at 55 gallons of chemical waste and 1 quart of any acute reactive hazard waste listed below:

- Aluminum Phosphide (P006)
- Ammonium Picrate (P009)
- Mercury Fulminate (P065)

- Nitroglycerine (P081)
- Tetranitromethane (P112)
- Zinc Phosphide, >10% (P122)

If these collection limits are exceeded, the date must be noted and the waste containers removed from the laboratory within 10 consecutive calendar days.

Hazard Waste Disposal Pickup

Submit a Facilities Work Order request to initiate a waste disposal pickup from the Safety Office. You will need to provide the following information:

- Location of material(s)
- Hazardous material and container size for each item (waste inventory)
- Contact information for the responsible party

Costs associated with hazardous waste disposal are the responsibility of the generating department, and as such should be factored into their operating budget. The Safety Office will provide a quote prior to pick up by the contracted waste disposal vendor. Note that the cost of hazardous waste disposal is based on the container size, not the volume or weight of the chemicals inside the container.

Section 2: Waste Container Labeling

All containers of unwanted material from a laboratory will be identified with the words Hazardous Waste.

A “Hazardous Waste” label must be affixed to all waste containers and include the following information:

- The full chemical name (no formulas, abbreviations, or structures) of each component in the waste container.
- The estimated percentage of each waste component in the container.
- The accumulation start date when waste was first added to the container.
- Indicate if the material is regular waste (used) or unused pure commercial product.
- The total volume of waste in the container. This is very important information for inventory tracking. To make disposal more cost effective, always choose an appropriate size and fill the container leaving 10% headspace to account for expansion.
- The location and generator of the waste.
- An example Hazardous Waste tag is provided in figure 1.

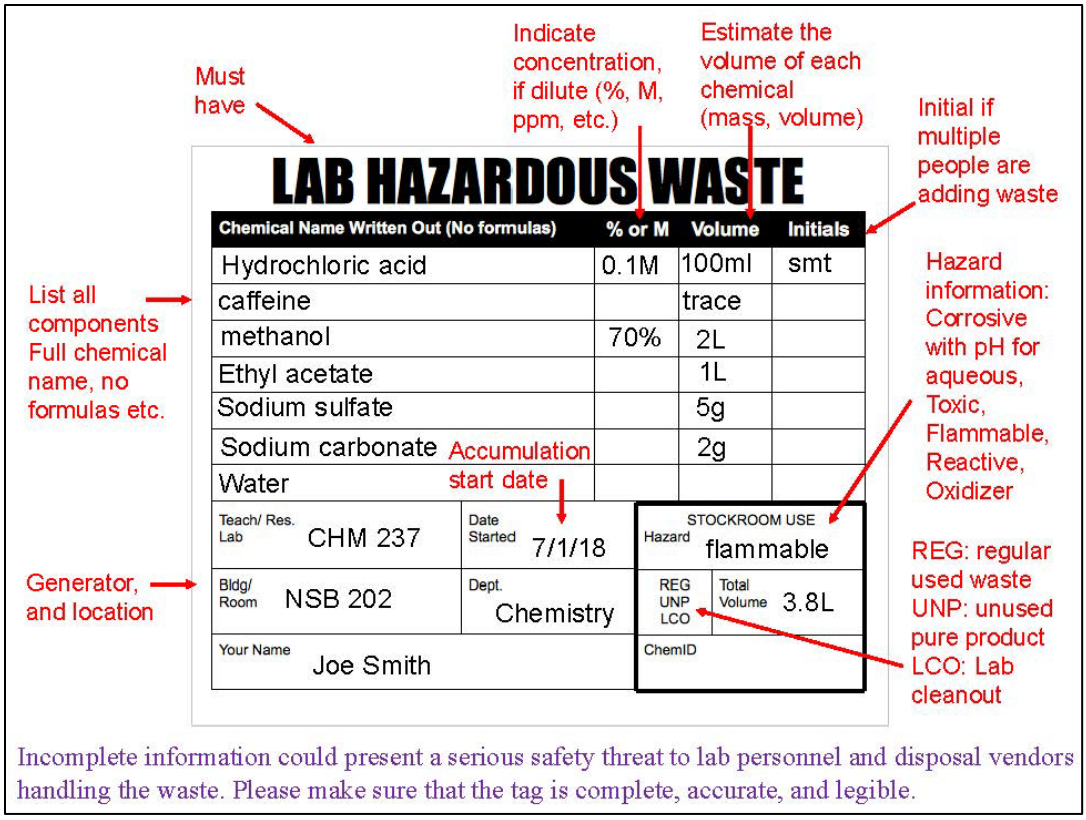

Figure 1 Hazardous Waste Tag

Section 3: Chemical Waste Management

In addition to container labeling and accumulation time limit requirements, chemical waste managed within laboratories at WCU should follow best management practices for containerization, waste segregation, and storage.

Waste Containers

- Containers and lids must be in good condition and chemically compatible with the waste inside the container. Lab beakers, flasks, household containers (i.e. milk cartons) are not acceptable as waste containers. Metal containers are not acceptable unless they are the original container for the chemical waste being managed.
- Containers must have securely fitting lids, preferably the original lid for the container. Do not use corks, stoppers, a watch glass, or parafilm as lids. Evaporation of waste is not a legal means of disposal! Do not leave the funnel in the container as this does NOT constitute a lid, even if covered with a watch glass.
- Waste containers must remain securely capped at all times, except:
  - When adding, removing, or consolidating waste materials.
  - When the waste is being temporarily collected in a working container, as described below.
  - When venting of the container is necessary for either the proper operation of laboratory equipment (such as HPLC), or to prevent the dangerous buildup of extreme pressure that may

result from a reaction between the wastes being added. In some cases, a vented container lid should be employed to prevent gas build-up. For assistance in locating a vented lid for waste storage containers, contact the Safety Office (828-227-7443).

- Containers must be the proper size. If you generate a large volume of liquid waste, consider a 5-gal pail for solvent accumulation.
- Filled containers of liquid must have at least a 10% headspace to accommodate expansion during storage and transport. **Do not completely fill the container**!
- Allow chemicals to react completely and/or cool to ambient temperature before accumulating as waste; once the reaction has completed and the reagents cooled, pour into a compatible container and secure the lid. In some cases, a vented container lid should be used.
- Hydrofluoric acid presents a special hazard and must be stored in Teflon containers or the original product container. Contact the Safety Office if you are using hydrofluoric acid.

Working Containers

A working container is a small container (two gallons or less) that is in use at a laboratory bench, hood, or other workstation, which is used to collect lab wastes from a laboratory experiment or procedure. A working container may remain open until the end of the procedure or work shift, or until full, whichever comes first, at which time it must either be closed or the contents emptied into a properly labeled waste container. Do not leave liquids in an unlabeled container.

Liquid Waste Containers

Liquid wastes may be accumulated in glass reagent bottles compatible with the waste. If you generate a large volume of liquid waste, consider a 5-gallon carboy for solvent accumulation. Filled containers of liquids must have at least ten percent headspace to accommodate thermal expansion during transport and storage. Store glass waste containers in rubber safety carriers, buckets, or similar containers to protect against breakage and spillage. All waste containers holding 4 liters or less of liquid chemical waste, and all glass containers of liquid chemical waste stored on the floor, require secondary containment.

Solid Waste Containers

Solid wastes may go into a double-lined cardboard box. Liners must be 1.5 mil or greater polypropylene bags. Do not use biohazard or radiation waste bags for solid waste accumulation, regular, labeled trash bags are preferred. Tie and seal each bag individually. Ethidium bromide-containing solid and semi-solid waste (e.g. used gels) should also be collected in double bags within cardboard boxes. Collect liquid ethidium bromide waste in a carboy or bottle and manage accordingly.

Reactive Waste Containers

Reactive chemicals must be disposed of in their original shipping containers, or in containers approved by the Safety Office.

Chemical Waste Segregation

The fewer the number of chemicals associated with a waste, the more economical is the disposal method for that waste. If this is not practical, the Safety Office should be consulted about which wastes can be combined. Always separate incompatible materials.

Procedures for individual waste streams:

- **Acids and Bases:** Segregate containers of acids and bases from one another in individual, compatible containers while accumulating as waste. Acids and bases containing heavy metals must never be disposed to the sewer system.
- **Biocides:** Chemicals which are persistent in the environment or any concentrated solutions of biocides should not be released to the sanitary sewer and should instead be collected for hazardous waste disposal.
- **Compressed Gas Cylinders:** Disposal of non-returnable (i.e. lecture bottles) cylinders that are not empty can be very expensive, especially for reactive gases. Make every effort to purchase from suppliers who have a cylinder return program. Even if a cylinder seems empty, it cannot be discarded in the trash. Always treat pressurized cylinders as waste and contact the Safety Office for disposal.
- **Oil Waste:** Used oil wastes from vacuum pumps, transformers, motors, etc., should be collected for pick-up and can be sent to a recycling service if the oil has not been mixed or contaminated with hazardous waste. Collect oil that has not been mixed or contaminated with hazardous waste in a container labeled as 'Used Oil'. Oils that are mixed with hazardous wastes must be collected and disposed of as hazardous waste.
- **Oxidizers:** Package oxidizers separately; store and accumulate away from organics including flammable materials. Oxidizers should never be stored or accumulated adjacent or proximate to any organic substances.
- **Sodium azide:** Solutions containing sodium azide, commonly used as a preservative in many in-vitro diagnostic products and with automatic blood cell counters, cannot be discharged to the sanitary sewer. The accumulation of lead and/or copper azide in the drainpipes can produce a potentially explosive situation.
- **Solvents – Non-halogenated:** Non-halogenated flammable solvents are sent to an incinerator or recycler and must be free of heavy metals and reactive materials, e.g. sodium metal.
- **Solvents – Halogenated:** Halogenated solvents should be separated from non-halogenated flammable solvents. Examples of halogenated solvents include methylene chloride, chloroform, and carbon tetrachloride. Halogenated wastes that are combined with non-halogenated wastes are considered halogenated, which results in a more costly disposal.
- **Unknowns:** Unlabeled and unidentified chemicals present a challenging, dangerous, and very costly disposal problem. Exercise every precaution to avoid generating unknowns in the laboratory and ensure that all containers are properly labeled. If you discover unknown chemicals, please contact the Safety Office.

Broken Glassware/Sharps Disposal

Place non-contaminated glassware and non-regulated sharp objects in a plastic bag within a cardboard box identified with a label indicating "Glass and Sharps Waste."

- Without compromising your own safety, clean all glassware of residual chemicals before disposal. If chemicals cannot be removed, label the box with the chemical name and contact the Safety Office for hazardous waste disposal.
- Use an approved labeled container that is puncture-proof.
- Do not overfill the box, keep box weight at or below 30 lbs. When full, tie bag, tape lid securely closed, and submit a Facilities Work Request for housekeeping to remove the boxes if necessary.

Empty Chemical Containers

To be considered empty, containers that held liquids must not have one drop of material left that can be removed by inverting the container. Containers that held solid and semi-solid materials are considered empty when no more material can be feasibly removed by scraping or chipping. Every effort should be made to remove as much of the remaining material as possible. Bottles should be rinsed with water or an appropriate solvent and the rinse waste collected for hazard waste disposal. Empty solvent containers can be air dried in a chemical fume hood.

To Recycle or Discard Containers: Glass containers that are completely empty can be put in a glass disposal box. The lid must be removed and the label completely defaced or removed, and the word "empty" written on the container. Do not place glass containers in the regular trash as they may break and become a puncture hazard for personnel managing the trash disposal.

*NOTE: If the container was used for an acutely hazardous P-listed chemical it must be collected for hazard waste disposal.

Plastic or metal containers must be thoroughly cleaned if they are to be recycled. The lid must be removed and the label completely defaced or removed, and the word "empty" written on the container.

To Reuse Containers: Empty containers can be used for waste collection but only if compatible with the waste. The container must be thoroughly cleaned of any chemical residue to eliminate the chance of chemical reactions resulting from combinations of incompatible chemicals. Make sure all original markings/labels have been removed or defaced and the current contents are clearly labeled.

Aerosol Cans

To be considered empty, an aerosol can must NOT contain any propellant or product, and must be at atmospheric pressure. When completely empty, aerosol cans can be placed in a recycling bin. For areas collecting large amounts of aerosol cans, place empty cans in a container labeled as "Empty Aerosol Cans" and when full submit a Facilities Work Order to request pickup. Do not puncture the cans.

Aerosol cans containing materials are disposed of as hazardous waste. Do not discard partially empty cans in the trash as they may contain ignitable propellants, chlorinated solvents, flammable material, or other toxic substance.

Consider phasing out the use of spray cans containing hazardous chemicals and consider using refillable containers that use compressed air as the propellant.

Drain Disposal of Chemicals

Only compounds that are water soluble to at least 3%, present a low toxicity hazard, and have a pH between 6 and 10 are suitable for drain disposal. Limited quantities (generally not more than a few hundred grams or milliliters) of these chemicals can be disposed of in the sanitary sewer, but never in a storm sewer system. The disposal should be performed by flushing with at least 100-fold excess water at the sink so that the chemicals become highly diluted. As a guideline, run the water at maximum flow for 2 minutes per 100mL of chemical. Chemicals with an offensive odor are not appropriate for drain disposal and should be collected as hazardous waste. During the disposal process, work slowly to avoid splashes and wear the proper protective equipment (lab coat, goggles, gloves). Understand the hazards and toxicity of the materials by consulting safety data sheets (SDS) and verify that the material may be safely disposed of to the sanitary sewer. Chemicals that are not appropriate for drain disposal are to be collected following the hazardous waste disposal guidelines.

The following discharges to the sanitary sewer are **prohibited** by the Clean Water Act:

- Wastes that may create a fire or explosion hazard
- Corrosive wastes with a pH less than 6.0 or greater than 10.0
- Solid or viscous wastes in quantities that would obstruct the flow or interfere with operations
- Heated waste that could either inhibit biological activities or increase wastewater treatment plant influent temperature to 104^{o}F and higher
- Waste discharges of any toxic waste material(s) in volumes or strengths to cause interference with wastewater treatment processes, or possibly contaminate waste sludge or effluent from the wastewater treatment plant so as to violate its National Pollutant Discharge Elimination System (NPDES) permit.

The following materials are NOT suitable for drain disposal:

- Acids with a pH less than 5.0
- Bases with a pH greater than 12.5
- Alcohols, ethers, esters, ketones, aldehydes, amines, amides, nitriles, ethidium bromide, carbon disulfide, phenol or phenolic materials, halogenated or non-halogenated hydrocarbons, or other chemical agents unless present as trace constituents in aqueous solution
- Sodium azide containing wastes
- Formaldehyde containing wastes
- Solutions with heavy metals
- Chemicals with an offensive odor

Contact the Safety Office for assistance with hazardous waste compliance at 828-227-7443.

Landfill Restrictions

Aside from chemical components, some common items which are not ordinarily thought of as harmful when handled are included as hazardous waste because they "leach" small quantities of toxic material when disposed of in a landfill for long periods of time. These items must not be placed in the ordinary trash, instead they must be collected for recycling. WCU has programs in place to manage these materials and are explained in more detail in Section 4: Manufactured Articles.

- Batteries
- Circuit Boards
- Computers and Monitors
- Fluorescent Lights
- Electronic Equipment
- Scrap Metal
- Thermostats
- Lamps (high-intensity discharge lamps HID, mercury vapor, sodium, metal halide)
- Articles coated with lead-based paint

Waste Container Storage

- Store waste containers in secondary containment (trays, bins) to minimize the potential for breakage and subsequent leaks of hazardous materials. If a spill occurs in secondary containment it should be cleaned up immediately.
- Store incompatible waste separately (flammable from oxidizer, acids & bases, reactives, etc.). Contact the Safety Office for guidance if you are unsure about compatibility criteria.

Satellite Waste Accumulation Area

The satellite accumulation site is an area at or near any point of generation where hazardous waste initially accumulates. Essentially, a lab generating and storing waste is referred to as a satellite waste accumulation area. The area must be under the control of the operator generating the waste. The following conditions must be met for the satellite accumulation area:

- Do not store more than 55 gallons in the accumulation area at any time.
- Do not store more than 1 quart or 2.2 lbs of acutely hazardous P-List waste at any time.
- If accumulation limits are exceeded in the lab, the excess must be removed within 10 consecutive calendar days. Notify the Safety Office if you are close to the accumulation limit.
- Do not store the waste in a location that could create a trip hazard, block the egress, or block access to emergency equipment.
- The satellite accumulation storage area must be posted with a "Hazardous Materials Storage Area" sign.

- All spills must be cleaned up immediately.
- All containers must be kept in good condition, kept closed, labeled with the words "Lab Hazardous Waste" and the contents clearly identified.

Commonly Cited Violations for Chemical Waste Management

The most commonly cited violations of hazardous waste/material regulations include:

- Open containers or lids not screwed on tightly
- Improper labeling (missing information) or lack of a label
- No secondary containment
- Waste storage accumulation area (trip hazards, blocking emergency equipment, etc.)

What may seem like a relatively minor violation can result in fines of several thousands of dollars per violation. Observing the waste guidelines detailed above and reviewing the following questions with lab personnel can keep the University in compliance:

LIDS – Are all containers closed with proper lids?
LEAKS – Are containers stored in secondary containment?
LABELS – Are the containers properly labeled?
LOCATION – Is the storage area in compliance?

Section 4: Manufactured Articles

Manufactured articles include man-made items, other than a chemical product, that may contain hazardous materials such as heavy/toxic metals (metallic mercury, leaded glass, solder, etc.), oils, refrigerants, and other environmentally toxic chemicals. Examples of articles include, but are not limited to the following:

Equipment	Batteries	Electronic circuit boards
Appliances	Thermometers	Lamps and light bulbs
Filters	PCP equipment	Cathode ray tubes

It is the responsibility of the generator to recognize these potential hazards and manage the disposal and recycling of these materials appropriately. WCU has programs in place to manage these materials.

WCU Recycling Program

The Office of Sustainability and Energy Management (OSEM) supports recycling services on campus and currently recycles the following materials:

- Mixed paper
- Cardboard
- Aluminum
- Glass
- Plastics #1-7
- Printer cartridges

- Personal electronic devices
- Batteries
- Food and oil waste from dining services
- Scrap metals

Universal Waste Program

Universal waste regulations make it easier to recycle common hazardous wastes. These rules apply to the following:

- Batteries (lead-acid, rechargeable, etc.)
- Fluorescent lamps (neon, metal halide, sodium, mercury vapor)
- Mercury-containing equipment (thermostats, mercury switches)
- Pesticides

These items are labeled as "universal waste" and can be stored for up to one year. Batteries and fluorescent lamps are managed by WCU's recycling program and the mercury waste and pesticides are managed by WCU's Safety Office.

Section 5: Personnel Training

All laboratory personnel are trained on chemical waste management procedures via an online training presentation and quiz available through Blackboard. This training is administered by the Safety Office.

In addition, the Lab Specific Chemical Hygiene Plan and applicable SOPs cover chemical waste management and must be reviewed annually. If chemical waste issues are found during laboratory inspections the lab will be asked to take a refresher training to ensure future compliance.

Section 6: Laboratory Cleanouts

All laboratories are required to inventory their chemicals at least once a year as part of their laboratory safety plan. Chemicals that are unwanted or no longer needed should be removed from the laboratory and disposed of. Each laboratory is eligible to conduct a laboratory cleanout one time per 12-month period. If the volume of unwanted material in the lab exceeds 55 gallons (or 1 quart of liquid reactive acutely hazardous material or 1 Kg of solid reactive acutely hazardous material), the materials must be removed from the laboratory within 30 calendar days from the start of the cleanout (as opposed to 10 calendar days during a non-cleanout event). Chemicals removed as part of an annual lab cleanout must be documented as such to include the laboratory location, the start date and end date of the cleanout, and the volume of hazardous waste generated during the cleanout.

Section 7: Waste Minimization Plan

The most significant impact that individual departments can have on hazardous waste costs is to reduce the volume of waste required to be handled. Faculty and supervisors are encouraged to consider ways of reducing the volume of waste or preserving the reuse of the materials through the redesign of experiments and work processes. The following describe some effective waste minimization techniques:

- **Material Purchasing** – purchase only what is needed, minimize inventories, and redistribute excess materials.
- **Material Substitution** – substitute non-hazardous or less toxic materials in chemical processes, experiments, and maintenance operations to reduce the toxicity of a waste.
- **Product Substitution** – laboratory operations, most notably teaching labs, can change their products by replacing hazardous laboratory experiments with non-hazardous. The emphasis of the lab work may be shifted toward a fundamental aspect of the course work, where classroom material is reinforced in a way that does not require hazardous materials.
- **Process Modification** – Procedures can be modified to decrease the amount of hazardous waste generated. Examples include implementing microscale techniques and recirculating materials within the system (closed loop recycling).
- **Equipment Selection**: Select equipment for not only its ability to perform the task but also for its durability to minimize having to discard faulty equipment, or equipment with hazardous components. Examples include substituting electronic, alcohol, or bimetallic thermometers for mercury thermometers and electronic vacuum or pressure gauges for mercury manometers.
- **Inventory Control**: Effective management of chemical inventories will reduce the amount of waste generated. Best practices include chemical redistribution, reviewing shelf-life requirements, testing outdated materials, and rotating stock.
- **Chemical Recycling**: Redistribute unopened and unused chemicals to other areas within the University.
- **Solvent Recovery**: Setup solvent recovery systems (i.e. distillation) provided they meet specific safety and regulatory requirements to reduce the amount of solvent waste generated.
- **Neutralization**: Simple acids and bases can be rendered non-hazardous in the laboratory by elementary neutralization as the final step in a process. Toxic metals may also be precipitated from aqueous streams as the final step in a laboratory process. Changes to the waste stream outside of the generating process is considered treatment and requires a permit, so any changes to the waste stream should be the final step of a process in the generating laboratory.
- **Waste Segregation**: Segregation of wastes simplifies the treatment, provides an alternative method for recycling and disposal, and ultimately minimizes the costs involved. Do not mix hazardous waste with non-hazardous waste and keep waste streams as simple as possible (fewer contents). Accurately label the waste containers as to their exact contents.
- **Off-Site Recycling:** WCU's recycling program is a major component of the waste minimization plan. Recycling services manages the Universal Waste program which sends items such as fluorescent bulbs, mercury containing devices, metals, and used batteries, etc., to a third-party recycler. Departments should be diligent in identifying materials that can be sent for recycling.

Mercury-Free Campus

Mercury is highly toxic and presents a significant health hazard upon exposure. Broken thermometers containing mercury present not only a sharps hazard, but the liquid can travel quickly and become lodged in tiny cracks and crevices making clean up challenging and costly. When mercury spills inside a

heat-generating device such as an oven or incubator, highly toxic mercury vapors pose a greater hazard and makes it very difficult to decontaminate the equipment.

In an effort to reduce the volume and quantity of mercury waste generated on campus, departments are strongly encouraged to eliminate sources of elemental mercury by switching to safer alternatives. Supervisors should identify sources of elemental mercury and implement a program to replace all non-essential uses with alternative sources, such as electronic digital options or alcohol filled thermometers. Contact Safety and Risk Management for assistance with selecting alternatives and to dispose of elemental mercury sources 828-227-7443.

Potential sources of mercury-containing equipment include:

- Barometers
- Blood gas analyzer reference electrodes
- Bubblers/traps
- Cathode-ray oscilloscopes
- Coulter counters with manometers
- Diffusion pumps
- Dropping Mercury Electrode (DME) technique for polarography and voltammetry
- Electron microscopes
- Hydrometers (used to measure specific gravity)
- Lamps, cold/hot cathode germicidal, fluorescent, high-intensity discharge (HID), high-pressure sodium vapor, metal halide, slimline germicidal, spectral and ultraviolet (UV)
- Lead analyzer electrodes
- Manometers for calibration
- Mercuric oxide batteries in blood analyzers, oxygen analyzers, pagers and temperature alarms
- pH meters
- Pigmented plastics, red bags and red blood tube caps
- Sequential Multiple Analyzers with Computer (SMAC)
- Sphygmomanometers
- Switches in lab equipment
- Telemetry instruments
- Thermometers for freezers, incubators, lab ovens, refrigerators and water baths
- Thermostats in incubators

Section 8: Chemical Waste Emergency Preparedness and Response

The University provides initial response services through campus Police, the Safety Office, and Facilities Management for emergency and non-emergency situations. Campus Police provides 24/7 coverage and will contact specific resources as needed. A list of contact numbers is provided in Appendix C and should be posted in a visible area of your workspace.

Chemical spill notifications should include the following information:

- Caller's name and phone number
- Location of the incident
- Location to meet the caller in the event that they have to evacuate the premises
- Identity and quantity of the material spilled, if known, and any odors present

- Any injuries

The University is required to report any “reportable quantity” releases of hazardous chemicals to the environment, such as releases of compressed gases, outdoor spills, and discharges to the sewers. The Safety Office must be notified immediately of any release to the environment to ensure that the appropriate notifications are made.

Chemical Spill Kit

Many spills are of limited hazard potential and can be safely cleaned by personnel in the vicinity. Areas storing hazardous chemicals should be equipped with a chemical spill kit to handle small, low-hazard spills. The chemical spill kit should contain the following items:

- Absorbent material (vermiculite, absorbent pads, etc.)
- Neutralizers for corrosives or toxics
- Materials to limit the flow of a spill (absorbent sock/boom)
- PPE (gloves, safety goggles)
- Container/bags to collect the hazard spill contents
- Hazard waste tag/label to identify the contents

Response Procedure

Some spills may be more hazardous and personnel should not attempt cleanup. You should evacuate the room and call the Safety Office (828-227-7443) if a spill situation involves any of the following:

- a respiratory hazard
- a threat of fire or explosion
- more than 100 mL of an OSHA regulated chemical carcinogen or a highly toxic chemical
- more than 1 liter of a volatile or flammable solvent
- more than 1 liter of a corrosive (acid or base) liquid
- elemental (liquid) mercury spills

In the event of a chemical spill, protection of personnel should be the primary concern, then protection of property. There may be little time to shut down procedures and secure activities and materials, so initial procedures should be to close containers and contain the spill if possible and initiate evacuation.

Step 1: Leave and Control Spill Area

- Evacuate personnel from the immediate spill area.
- Block off immediate spill area – close corridor doors, use carts, chairs, wastebaskets, etc.
- Eliminate any fire hazard, especially if spill is flammable or combustible- turn off burners, electrical equipment, etc.
- Post sign, “Spill Area – Keep Out”.
- Alert other personnel in adjacent areas of a chemical spill.

Step 2: Help Injured Personnel

- Take care of injured personnel - move from spill, remove contaminated clothing, flush skin with water, use eyewash and/or safety shower, etc. If there is a chemical splash to the eyes and/or there are burns or respiratory problems, seek medical attention.

Step 3: Evaluate Hazard

- Make preliminary evaluation of hazard and identification of risks and decide whether you should call the Safety Office or Emergency Responders.

Step 4: Clean Up Spill (if safe to do so)

- Contain the spill using absorbent to stop spill from spreading under refrigerators, cabinets, equipment, drains, or corridors. Then spread absorbent around the perimeter, damming the spill.
- Absorb the rest of the liquid.
- Scoop the absorbed chemical mixture into a plastic pail lined with a plastic bag.
- Seal plastic bag and containerize for disposal.
- Wash and deactivate the spill surfaces of trace amounts of the spilled chemical.
- Contact the Safety Office for disposal instructions.
- Replace used materials in the chemical spill kit.

Step 5: Review Incident

- Review incident to prevent further spills and improve response procedures.

Personnel using and storing hazardous materials are responsible for chemical safety in their work areas. Everyone must be trained on standard operating procedures, have access to chemical Safety Data Sheets (SDS), and understand the actions to take in the event of an emergency. This training should be documented by the supervisor.

Special Chemical Concerns

Peroxide Formers

Chemicals such as peroxides can become dangerous over time and have expiration dates that must be closely tracked. Never handle a container that has visible crystals in the liquid or discoloration for a solid peroxide forming material.

Reactive Chemicals

For the safety of waste pickup personnel and to ensure compliance with the Resource Conservation and Recovery Act (RCRA) regulations, exercise care to identify reactive wastes. Although the process of using reactive chemicals in laboratory experiments usually eliminates the reactivity characteristic, some reactive chemicals can exhibit dangerous, residual properties. As an example, residual metallic sodium added to a solvent to remove water could result in a fire or explosion if that solvent is mixed with aqueous wastes. Likewise, you **must label** solutions containing **sulfides** and/or **cyanides** to alert personnel not to mix these with acid wastes. This mixing could release lethal amounts of toxic hydrogen

sulfide (H_2S) and/or hydrogen cyanide (HCN) gases. Due to the cost and hazards associated with shipping and disposing of reactive materials, make every effort to use or react the entire contents of the container before disposing as hazard waste.

Mercury Spills

If your laboratory or shop uses any devices that contain liquid elemental mercury, such as thermometers, manometers, or sphygmomanometers, you must have a small mercury spill kit available to contain the spill. An example kit can be found at Fisher Scientific, catalog # 19021910. The kit should include mercury-absorbing sponges, amalgamating powder, mercury indicator powder, and containment bags.

Liquid droplets of mercury travel quickly and can become lodged in tiny cracks and crevices. It is important to contain the spread before it can contaminate a larger area.

If a mercury spill occurs, contact the Safety Office immediately after completing initial containment. Seal off the spill area so no one can walk on the spilled mercury.

Section 9: Biological Laboratory Waste

Appropriate waste handling practices at Western Carolina University are based on compliance with OSHA regulations in order to protect those employees who handle the waste, and the North Carolina Medical Waste Regulations in order to ensure appropriate disposal.

Biohazardous Waste or Biowaste is defined as any waste which is generated from biological sources or is used in the diagnosis, treatment or immunization of human beings or animals. Biowaste can consist of solids, liquids, sharps, and other wastes that are potentially infectious. The purpose of this document is to organize and track the biowaste generated at WCU in a manner that promotes the safety of employees and the community by reducing the risk and/or spread of infection through the safe handling and disposal of biowaste as required by local, state and federal regulations.

It is intended that WCU faculty and staff who generate biowaste are responsible for the appropriate disposal. To assist WCU faculty and staff, the Safety Office has established this program to manage biowaste.

Categories of Biological Waste and Acceptable Treatments

Biowaste cannot contain any hazardous chemical or radioactive waste components. If it does, then the biological component must first be decontaminated and then the material is treated as chemical or radioactive waste and collected for hazard waste disposal.

Microbiological Waste (Cultures, stocks, & biologicals):

- Agents infectious to humans (those that require Biosafety level 1 or 2 containment, including cultures and stocks from medical, pathological, or research laboratories, and their associated biologicals).

- Waste from the production of biologicals (e.g., biologicals defined as serums, vaccines, antigens, antitoxins, cell lines, and cultures).
- Materials used for cleanup of spills.
- Discarded live or attenuated vaccines, biological toxins.
- Systems used to grow and maintain infectious agents in vitro, including, but not limited to nutrient agars, gels, and broths.
- Culture dishes and devices used to transfer, inoculate, or mix cultures, including, but not limited to: plastic or glass plates, paper, gloves, growth media, gels, filters, stoppers, plugs, flasks, inoculation loops and wires, contaminated pipette tips, tubes, stirring devices, jars, etc.

Solid microbiological waste should be placed in an approved autoclave bag and autoclaved before disposal in the landfill. Do not put waste that is autoclaved in an orange or red biohazard bag, as it will not be allowed to go to the landfill. Liquid biological waste (not containing hazardous chemicals) can be autoclaved or disinfected with bleach and then disposed of down the drain.

Pathological Waste: Included in this category are human pathological waste (organs, limbs, body fluids) and animal carcasses. Pathological waste must be incinerated (*not* autoclaved) and is collected in the biowaste accumulation area and disposed of by a contracted vendor.

Blood and OPIM: Containers of blood and OPIM (Other Potentially Infectious Material) less than 20 mL must be autoclaved before disposal as autoclaved waste. Items with greater than 20 ml of blood must be placed in biohazard bags and put in the biowaste accumulation area until such time that they are sent for incineration by a contracted vendor.

Sharps: Needles, scalpels, lancets, glass slides and cover slips, razors, and broken glassware that are contaminated with biological materials should be collected in red biohazard sharps containers. Needles and syringe units must be discarded as a unit without clipping, bending, breaking, shearing, or recapping. Sharps boxes that clip off the needle are prohibited. Sharps containers must be discarded when they are ¾ full or at the fill-line. Sharps boxes should be rigid, leak proof, puncture-resistant containers that can be secured to prevent loss of contents. Each container must be prominently labeled with a universal biohazard sign or the word "Biohazard". Sharps containers are autoclaved with a test indicator before disposal to the landfill. Sharp containers with regulated waste must be placed in a red biowaste bag and then placed in the biowaste accumulation area until they are sent for incineration.

Pipettes and pipette tips are considered sharp and should be collected in a puncture proof lined container (such as a cardboard box). If contaminated with biological material, they should be autoclaved before disposal to the landfill.

*Do not enclose the cardboard boxes used for collecting sharps/glass within an autoclave bag as this will prevent steam penetration during autoclaving. Steam penetration is crucial during the decontamination process.

Non-contaminated sharps and glass: Non-contaminated glass and sharps should be discarded in a broken glass collection box. Use an appropriate labeled container that indicates box contains glass. DO NOT use boxes with "biohazard" symbols printed on them. Do not overfill the box, keep box weight at or below 30 lbs. When full, tie bag, tape lid securely closed, and submit a Facilities Work Request for housekeeping to remove the boxes if necessary.

Urine and Feces: Included in this category are urine and feces from animals and/or humans. Urine and feces must always be disposed of down a drain connected to a sanitary sewer (i.e. toilet). It must NEVER be poured into or flushed down a sink used for hand washing or disposed of in a trash can. Urine and feces contaminated animal bedding should be placed in a clear bag and tied off before placing into a dumpster.

Note: Animal bedding and materials used with animals that may be infected with biological agents or injected with hazardous chemicals or radioisotopes are collected by the Safety Office for disposal.

Biological Spill Cleanup

During spill cleanup, be especially cautious of sharps. Always remove sharps with mechanical means (pieces of cardboard, tongs, etc.) and do not pick them up with your hands.

Blood or Body Fluids

- Don all appropriate PPE. Disposable gloves are required, shoe covers and face masks may be necessary. Safety glasses or goggles are strongly recommended.
- Absorb fluids with disposable towels. Place materials in a red biohazard bag.
- Clean area of all visible fluids with soap and water.
- Decontaminate area with a freshly prepared (within 24 hours) 10% bleach solution or Tuberculocidal disinfectant.

BSL 2 Microorganism

- Alert people in immediate area of the spill and request that they leave.
- Don all appropriate PPE. Disposable gloves, a lab coat, and safety glasses or goggles are required, shoe covers and face masks may be necessary.
- Cover spill with disposable absorbent (towels or inert loose material).
- Carefully pour a freshly prepared (within 24 hours) 10% bleach solution around the edges of the spill and then into the center of the spill. Do not splash. Leave for 20 minutes.
- Using disposable paper towels, wipe up the spill, working from the outside towards the center. Dispose of materials in a red biohazard bag.
- Clean spill area with fresh towels soaked in an approved disinfectant or 10% bleach solution and allow to air dry. Place these materials in a red biohazard bag.

Labeling Biological Waste Requirements

Each package of biowaste sent for incineration must be labeled with a water-resistant universal biohazard symbol and be marked “Medical Waste” when appropriate. Each package of biowaste must be marked on the outer surface with the following information:

- The generator's name, (Department specific), address, and telephone number.
- Safety Officer name, address, and phone number.
- Treatment facility name, address and telephone number.
- Date of shipment.

Requirements for Holding Area(s)

When all biowaste is collected, it must be stored in an area that:

- Prevents leakage of the contents of the package.
- Maintains the integrity of the packaging at all times.
- Limits access to unauthorized personnel.
- Provides floor drains that discharge directly to an approved sanitary sewage system.
- Provides ventilation and discharges to the environment so as not to create nuisance odors.
- Remains clean and uncluttered.
- Controls for vermin and insects.
- Does not create a visual or odor problem.
- Provides refrigeration or freezing of animal carcasses and parts, if they are not disposed of immediately, to delay putrefaction.

Manifest Requirements

Records of biowaste shall be maintained for each shipment and shall include the information listed below.

- Weight of package
- Date shipped off-site
- Name of transporter
- Name of storage or treatment facility

A signed copy of the manifest will be provided to the Safety Office by the disposal vendor. The manifest will be in the custody of the driver hauling the Biowaste to its treatment destination at all times. The Safety Office will maintain signed copies of all tracking documents and other associated records.

Section 10: Autoclave Safety

Autoclaving, or steam sterilization, is the most dependable procedure for the destruction of all forms of microbial life. Proper temperature and exposure time are critical factors in ensuring the reliability of this method and are dependent upon steam penetration to every part of the waste load. The high pressure and high temperature required for steam sterilization poses the following hazard risks:

- Heat burns from hot materials and the autoclave chamber walls and door
- Steam burns from residual steam coming out from the autoclave and from materials on completion of the cycle
- Hot fluid scalds from boiling liquids and spillage in the autoclave
- Hand and arm injuries when closing the door
- Body injury if there is an explosion
- Inadequate decontamination poses biological hazards to personnel and environmental contamination
- Ergonomic and pinch hazards from the large heavy doors and loading carriages

Autoclave Safety Guidelines

To ensure the health and safety of personnel using the autoclave, it is important for each department to maintain autoclaves and to train personnel in their proper use by following the safety guidelines below.

- Post the name and contact information of the person responsible for the autoclave next to the unit.
- All operators must receive hands-on training on the safe operation of any autoclave that they will use prior to using the equipment. It is the supervisor's responsibility to ensure their personnel are adequately trained and understand proper packaging, loading, labeling, operating procedures, and risks associated with autoclave use.
- Training must be documented and records kept by the lab.
- Wear personal protective clothing and equipment when loading and unloading the autoclave to protect against scalds and burns, including:
  - Heat-insulating gloves that provide complete coverage of hands and forearm
  - Lab coat and splash apron
  - Long pants
  - Eye protection
  - Closed-toed footwear
- Post the operating instructions near the autoclave and have an operations manual available for review.
- Never leave biohazardous materials in hallways, next to the autoclave on the floor, or in other public spaces prior to autoclaving. Biohazard bags should remain in the laboratory until they are ready to be placed in the autoclave. Biohazardous materials should be sterilized by the end of each workday, or must be secured appropriately.
- Biohazardous materials should not be left in an autoclave overnight in anticipation of autoclaving the next day.
- Do not autoclave toxic, volatile, or radioactive materials.
- For the autoclave process to be effective in achieving sterilization, sufficient temperature, time, and direct steam contact are essential. Air must be completely removed from the sterilizer chamber and from the materials to allow proper steam penetration to every part of the waste load. If all the air is not allowed to escape from the waste during the autoclave cycle, then steam will not replace the air and proper sterilization will not be achieved. Factors that affect air removal include type and

quantity of material to be autoclaved, packaging, load density and configuration, and container type, size, and shape.

- Make sure the autoclave doors and gaskets are firmly locked into place before operating the autoclave.
- The plug screen or drainer should be removed with heat-resistant gloves, checked, and cleaned frequently to ensure that it is free of dirt, dust, or sediment which may collect and cause a clog.
- Gaskets, doors, shelves, and walls should be visually inspected on a regular basis for residue buildup and wear. Interior surfaces should be cleaned of any residues that collect over time.
- Entries must be placed in the autoclave logbook each time the autoclave is used. These records are used for maintenance/service schedules and reporting any incidents. Entries should include: operator's name, date, time, and duration. The logbook should be kept adjacent to the autoclave.
- Autoclaves must be inspected at least annually. Inspection services may be managed by your manufacturer's preventative maintenance contract. The inspection, service and repair records should be available upon request.
- No person shall operate the autoclave unless the autoclave is in good working order. Only qualified professionals are permitted to make repairs. Repairs are performed by your service contract or any other contractor you choose to hire.
- Report any possible malfunction immediately to the responsible person listed for the autoclave. Post a sign on the autoclave indicating that it is not to be used until the problem is diagnosed and corrected.

Autoclave Operating Procedures

Ensure the material is safe for autoclaving. Oils, waxes, some plastics, flammable materials, radioactive materials, and samples containing solvents or substances that may emit toxic fumes **should not be** autoclaved.

- Ensure that the correct autoclave bag is used. Do not use red biohazard bags or regular trash bags.
- Glassware should be heat-resistant (Pyrex or Kimax) and inspected for cracks prior to autoclaving.
- Plastics should be heat-resistant, for example, polycarbonate (PC), PTFE ("Teflon") and most polypropylene (PP) items.
- Loose dry materials should be wrapped or bagged in steam-penetrable paper or loosely covered with aluminum foil. Wrapping too tightly will impede steam penetration and decrease efficiency of the process.
- Never overfill the bags or sharps containers, they should be autoclaved when they are 2/3 full.
- Containers of liquid should be filled to a maximum 2/3 volume. DO NOT autoclave containers that are filled past 2/3 as this increases the likelihood of an overflow of hot liquids.
- All containers should be covered by a loosened lid or steam-penetrable bung to prevent pressure buildup and avoid having bottles shatter during pressurization.
- Do not seal the bags too tightly, as this will impede penetration of steam into the bag. Bag should be at least three fingers wide at the opening of the taped bag.
- Place liquids, bags of agar plates, or other materials that may boil over or leak in secondary containers (autoclave plastic or stainless-steel bins) to secure and contain spills. The pan must be

large enough to contain a total spill of the contents. Open, shallow metal pans are more effective in conducting heat and allowing air removal than tall, plastic tubs.

- Adding some water to the secondary pan will help to heat items more evenly. DO NOT overfill the secondary container as this poses a spill/splash risk when removed from the autoclave.
- Indicator tape should be placed in an "X" pattern over the biohazard symbol. Autoclave temperature tape must be used to keep track of autoclaved and non-autoclaved items

Loading the Autoclave:

- Ensure the drain strainer in the bottom of the autoclave is clean before loading the autoclave.
- Use a cart to transfer items to be autoclaved, particularly if fragile/breakable (e.g. glass flasks and beakers) items are being transferred. To avoid back injuries, push the cart up to the autoclave door and gently slide the load into the autoclave.
- Never place autoclave bags or glassware in direct contact with the bottom of the autoclave. Place the secondary pan containing the items to be sterilized on the shelf or rack of the autoclave.
- Do not overload the autoclave. It is important to leave sufficient room for thorough steam circulation. Do not allow material to touch the sides or top of the chamber.
- Firmly lock the autoclave door prior to starting the run to prevent sudden release of high-pressure steam. If the autoclave does not have interlocking mechanisms, take additional precautions to ensure the door is closed.

Autoclave Operating Cycle

- Choose the appropriate cycle (gravity, liquid, or dry cycle) for the material. Consult the autoclave manual for assistance in choosing a cycle. Manuals should be located near the autoclave.
- Set appropriate time and temperature if using a customized cycle.
- Start the cycle and fill out the autoclave user log with your contact information.
- Do not attempt to open the door while the autoclave is operating.
- If a problem occurs, abort the cycle and report it to the supervisor immediately.

Unloading the Autoclave

- Before opening the door, ensure that you have on all required PPE (lab coat, closed-toed shoes, long pants, eye protection, and heat-resistant gloves).
- The pressure gauge must read zero before attempting to open the door. Verify cycle conditions were met.
- Carefully crack door open to release residual steam and allow pressure within liquids and containers to normalize. Be sure to stand away from the door so as not to be exposed to steam escaping the autoclave.
- Verify that heat sensitive tape has changed color or the word "autoclaved" has appeared.
- Wait a full five minutes if the autoclave load contains only dry glassware, and no less than 10 minutes if autoclaving liquids before removing the items.
- Use caution when removing liquids, molten agar, etc. Liquids, especially large volumes, may continue to boil for some time after autoclaving.

- Do not agitate containers of super-heated liquid or remove caps before unloading to avoid getting splashed with scalding liquid.
- When removing biohazard bags, always pick up from the top, taped area of the bag. Never handle the biohazard bags by the sides or bottom.
- Slide a cart to the opening of the autoclave and pull the autoclave secondary container onto the cart for transport.
- Place the cart in a low traffic area that is clearly identified as “hot materials” while additional cooling occurs.
- Let the glassware cool for 15 minutes and liquid loads for a full hour before touching the items with ungloved hands.

NOTE: If a faulty condition exists (e.g., sterilizer did not finish the cycle, or water leaks out when the door is unlocked), contact the service company. Place a sign on the autoclave that it is out of use. Do not continue to use the autoclave until it is operating correctly.

Autoclave Incident Response and Spills

All incidents, including a spill or injury, must be reported to your supervisor. If necessary, seek medical assistance from WCU Health Services or dial 828-227-8911 for an emergency.

- If clothing is soaked in hot water/steam, remove clothing and place the injured area in cool water.
- Place a notice on the autoclave indicating it is not to be used until the cause of the incident is determined and procedures enacted to prevent future incidents.
- Spills can occur from boil-over or breakage of containers. Spills must be cleaned up as soon as the temperature has cooled and it is safe to do so.
- Contain the spilled material using paper towels. Use appropriate PPE and follow proper disposal protocols. Broken glass must be disposed of in a sharps container or glass disposal box as appropriate.
- Record the spill and clean-up procedure in the logbook.

Section 11: Laboratory Equipment Disposal and Surplus Property

All laboratory equipment and potentially contaminated furniture used in a laboratory must be cleared by the Safety Office prior to disposal through Facilities Management or surplus. The first step in the process is determining whether or not you need to have your equipment cleared by the Safety Office. For example, if the equipment was used in an office and had no potential for exposure to chemical, biological, or radioactive materials, clearance through the Safety Office is not necessary. All other equipment must be certified that it is free of contamination prior to disposal as follows.

- Any equipment that contains a radioactive source, or that potentially came in contact with radioactive materials, must be tested and cleared by the Safety Office prior to handling for disposal.
- Equipment that has been used in experiments involving biological materials must be decontaminated with either a 10% bleach solution that has been freshly prepared (within 24 hours of use) or another approved EPA disinfectant. All exposed surfaces of the equipment or potentially

contaminated furniture must be wiped down with the bleach solution or disinfectant prior to handling for disposal or surplus. In addition, a Biosafety Cabinet (BSC) that has been used with infectious agents must be decontaminated by a contracted service vendor.

- In general, most other laboratory equipment can be decontaminated with soap and water solution or mild detergent. If equipment appears too contaminated to perform decontamination safely, contact the Safety Office for guidance.
- Any equipment that contains oil must be properly drained of its contents prior to disposal. Collected oil will be retained for waste disposal. Contact the Safety Office for guidance if necessary.
- If the unit to be cleared is a refrigerator or freezer, the unit must be unplugged, defrosted, and wiped dry. DO NOT defrost freezers with Radioactive Material stickers without first obtaining Radiation Safety Clearance. When defrosting, place absorbent materials (pads, paper towels) around the unit and monitor periodically to prevent water from collecting onto the floor. Additionally, all samples should be removed prior to unplugging refrigerators or freezers to reduce the generation of offensive odors.

Next, have the equipment or furniture "cleared" by the Safety Office. Contact the Safety Office at 828-224-7443 and request an equipment clearance. A Safety Officer will verify the equipment has been decontaminated as described above and affix a "Clearance Form" to the equipment, as well as provide one to the responsible party and the surplus department for their records. This process will indicate that it is safe to handle and dispose of or surplus the equipment. A surplus guidance flow chart is provided in Appendix C.

Once items have been cleared by the Safety Office, follow normal surplus or disposal procedures, found on the Surplus website.

Section 12: Laboratory Close-Out Procedure

The Safety Office must be notified prior to a laboratory move, relocation, or vacancy for any reason in order to perform a lab check-out assessment. This procedure will ensure that all hazardous materials are properly disposed of and will prevent the next occupant from inheriting "unknown" or potentially hazardous materials. Contact the Safety Office at 828-227-7443 to begin the closeout procedure.

Appendix A: Emergency Contacts

	Phone	Hours
Safety & Risk Management Office	828-227-7443	8:00am - 5:00pm Monday-Friday
Emergency Services	911 or University Police 828-227-8911	24 hours
Non-Emergency Campus Police	828-227-7301	24 hours
Facilities Management	828-227-7224	24 hours
WCU Health Services	828-227-7640	8:00am - 5:00pm Monday-Friday
NC Poison Control Center	1-800-84 TOXIN (1-800-848-6946)	24 hours
NC Division of Environmental Quality (NC DEQ)	Hazard Waste Management 919-707-8200	

Safety Office Contacts:

Director, Safety and Risk Management: Jon Maddy 828-227-3568 jmaddy@wcu.edu

Laboratory Safety & Chemical Hygiene Officer: Amanda Lytle 828-227-3645 alafferty@wcu.edu

Fire Marshal, Safety and Risk Management: Chris Moore 828-227-2090 cmoore@wcu.edu

Appendix B: WCU Waste Stream Guide

Appendix C: WCU Surplus Lab Equipment Process Flow Chart