



Safety and Risk
Management

Hazardous Waste Program

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Forward

The Hazard Waste Program provides guidance for the proper accumulation, storage, and disposal of chemical, biological, radioactive, and other environmentally hazardous waste at Western Carolina University. As a generator of small amounts 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 program is implemented and maintained by the Safety and Risk Management Office.

Laboratory areas on campus (teaching/research labs, art studios, photo labs, field labs, diagnostic labs, and chemical stockrooms and prep areas that support labs) are subject to an alternate "Laboratory Waste Management Plan" that is required as part of the Subpart K Academic Laboratory Rules.

The remaining NON-LABORATORY areas are required to follow the guidelines outlined in this manual (WCU Hazard Waste Program):

- Chemical stockrooms that do not support laboratories
- Vehicle maintenance areas
- Machine shops
- Print shops
- Campus Activities
- Campus Recreation
- Facilities Management Trades & Housekeeping
- Other campus operations not associated with laboratories

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 °F (60 °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 °F (55 °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. 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 A](#) and a detailed [Waste Minimization Plan](#) is provided in Section 6.

Section 1: Chemical Waste Disposal

Disposal Methods

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

- Treatment by the originating laboratory or shop to render the waste non-hazardous.
- Recycled for energy recovery or other uses.
- Exchanged as a useful material for other industry or laboratories.
- Packaged for pick-up and incineration by a licensed hazardous waste firm.

It is unlawful to discharge any 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. Any neutralization procedures that result in drain disposal must be reviewed and approved by the Safety Office.

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.

Waste Streams

A waste stream generated from a procedure or shop process should not be combined with other chemical wastes. 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. Make sure to separate non-hazardous and hazardous wastes.

Procedures for specific wastes streams:

- **Absorbents:** Materials used to clean up spills of hazardous materials are collected as hazardous waste. Reduce absorbent usage by practicing good housekeeping procedures and use secondary containment to prevent spills and leaks.
- **Antifreeze:** Used antifreeze is collected separately in a labeled "Used Antifreeze" container and is recycled. Used dedicated collection equipment and keep containers closed at all times to prevent contamination.
- **Biocides:** Chemicals which are persistent in the environment or any concentrated solutions of biocides should not be released to the sanitary sewer and are collected for hazardous waste disposal.
- **Caustic Degreaser Solutions:** The spent solution from caustic tanks used for cleaning greasy parts is collected for hazardous waste disposal. Accumulate spent solvents and sludges in closed, labeled containers. Consider alternative cleaning methods such as detergent based parts washers.
- **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.
- **Freon:** Freon refrigerant must be recovered by a qualified technician using EPA approved recycling/recover equipment with a certified operator. Filters from Freon recovery equipment are collected as hazardous waste. Freon must not be released into the atmosphere.
- **Lead Solder:** Lead is highly toxic and as such any solder containing lead or materials used to wipe solder spills are collected as hazardous waste. Use solder made with less hazardous materials whenever possible.
- **Oil Waste:** Used oil wastes from vacuum pumps, transformers, motors, etc., are collected for pick-up and can be sent to a recycling service if the oil has not been mixed or contaminated with hazardous waste. Do not mix used oil with even small amounts of hazardous wastes or solvents,

such as degreasers or carburetor cleaner. Keep the used oil in a separate container, clearly labeled as "Used Oil." Keep containers closed unless adding material to prevent contamination. Oils that are mixed with hazardous wastes must be collected and disposed of as hazardous waste.

- **Oil Filters:** Used oil filters must be thoroughly drained of residual oil and collected for hazard waste disposal. Drained oil is added to the "Used Oil" container.
- **Oily rags:** Shop rags may or may not be hazardous waste depending on how they were used. Rags used for non-hazardous solvents can be placed in the trash. However, rags used with hazardous solvents or oils should be collected in a closed container labeled "Used Shop Rags" and picked up for laundry service. Rags that are laundered by a licensed launderer are not considered hazardous waste as long as they are reused. If a laundry service is not used, rags used for hazardous chemicals must be collected as hazardous waste in a closed container. Set up a system to limit rag use and use less hazardous cleaning solvents whenever possible.
- **Paint Waste:** Painting operations generate waste through solvents used in cleanup and leftover paints upon completion of a project. Oil based paints, paints containing metals, and solvents are collected for hazardous waste disposal. Water-based, non-toxic paints can be disposed of in the regular trash but only when they are completely dried. Contact the Safety Office for assistance with disposing of this type of paint waste. Use paints and solvents with the lowest VOC (volatile organic compound) content and avoid oil-based and paints containing metals.
- **Solvent Waste:** Solvents are collected for hazard waste disposal. Solvent use and waste can be reduced by eliminating unnecessary solvent cleaning requirements and extending solvent use. Understand the chemical properties and safety requirements for the solvents by reviewing the Safety Data Sheet (SDS) and substitute with safer, non-hazardous solvents when available. Use solvents with the lowest possible VOC content and install drip pans or other devices to prevent spills. Do not mix hazardous and non-hazardous solvents.
- **Solvents, chlorinated:** Brake and carburetor cleaners can contain hazardous chlorinated compounds such as chlorofluorocarbons, carbon tetrachloride, 111-trichloroethane, and chlorobenzene. Solvents containing chlorinated compounds should be kept separate from other waste streams when possible and are collected for hazardous waste disposal. Consider replacing cleaners containing chlorinated solvents with less hazardous alternatives.
- **Solvents, Spent Parts Washer:** These can be hazardous and constitute a large source of waste from vehicle repair shops. Non-hazardous solvents for parts washers are available. Switch to water-based solvents instead of hazardous petroleum-based solvents. Do not mix parts washer solvents with any other wastes, including used oil.
- **Toxic, Carcinogenic, Oxidizer, and Explosive Waste:** Are collected for hazardous waste disposal. Separate these wastes when possible to reduce the number of components in the waste stream.
- **Universal Waste:** Fluorescent bulbs (used or broken), mercury containing devices, used batteries, pesticides, computer parts, non-PCB ballast, and empty aerosol cans are sent to recycling services.
- **Unknowns:** Unlabeled and unidentified chemicals present a challenging, dangerous, and very costly disposal problem. Exercise every precaution to avoid generating unknowns 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 5 and 12.5 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. Some chemicals will also need approval by the local Water and Sewer Authority for drain disposal, and if unsure, contact the Safety and Risk Management office before drain disposing chemicals.

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°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 and
- 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 3: [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

Section 2: Chemical Waste Management Guidelines

Hazardous Waste Containers

- Containers and lids must be in good condition and chemically compatible with the waste inside the container. Beakers, flasks, plastic 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.
- Waste containers must remain securely capped at all times (other than when waste is being added). 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!
- 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.
- Collect solid wastes in a double-bag lined cardboard box to prevent leaks.

- 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.

Labelling Waste Containers

- The words “Hazardous Waste” must be on the label.
- Describe the contents of the waste container and include the following:
 - Chemical Name (in full, no formulas or abbreviations)
 - Any known hazards (flammable, corrosive, toxic, reactive, etc.)
 - Concentration or other important information (pH, molarity, % by mass)
 - Solvent type, if applicable
 - Date of accumulation
 - Location where the waste is generated
 - Generator name

Storing Waste containers

- 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, reactivities, etc.). Contact the Safety Office for guidance if you are unsure about compatibility criteria.

Satellite Waste Storage Area

The satellite accumulation area is at or near any point of generation where hazardous waste initially accumulates. Essentially, a shop generating and temporarily storing hazardous waste is a satellite accumulation area. The following conditions must be met for the satellite accumulation area:

- The area must be under the control of the operator generating the waste.
- 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, the excess must be removed within 3 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 “hazardous waste” and the contents clearly identified.

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.

Commonly Cited Violations

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 violations such as trip hazards, blocking emergency equipment, quantity greater than the allowable limit.

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 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 3: 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
- Mercury containing devices

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 and the recycling program.

Section 4: 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 B](#).

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

Section 5: Biological 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). Note: WCU is not permitted to perform research with BSL-3 or BSL-4 agents.
- 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 $\frac{3}{4}$ 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.
- 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 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 6: Waste Minimization Plan

Waste minimization is defined as any source reduction or recycling activity that results in a reduction of the total volume of hazardous waste generated and/or a reduction in the toxicity of hazardous waste being generated. An effective University waste minimization program will contribute to a safer, more cost-effective workplace. 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.
- **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 mercury thermometers and other mercury containing devices with digital electronic, alcohol, or bimetallic thermometers and electronic vacuum or pressure gauge 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 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 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 or shop. In other words, include the neutralization process in the SOP so that the chemical neutralization occurs before it becomes a hazardous waste. Contact the Safety Office with neutralization SOPs for review and approval.
- **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 sharp 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 at 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 7: Hazard Waste Spill 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 the 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.

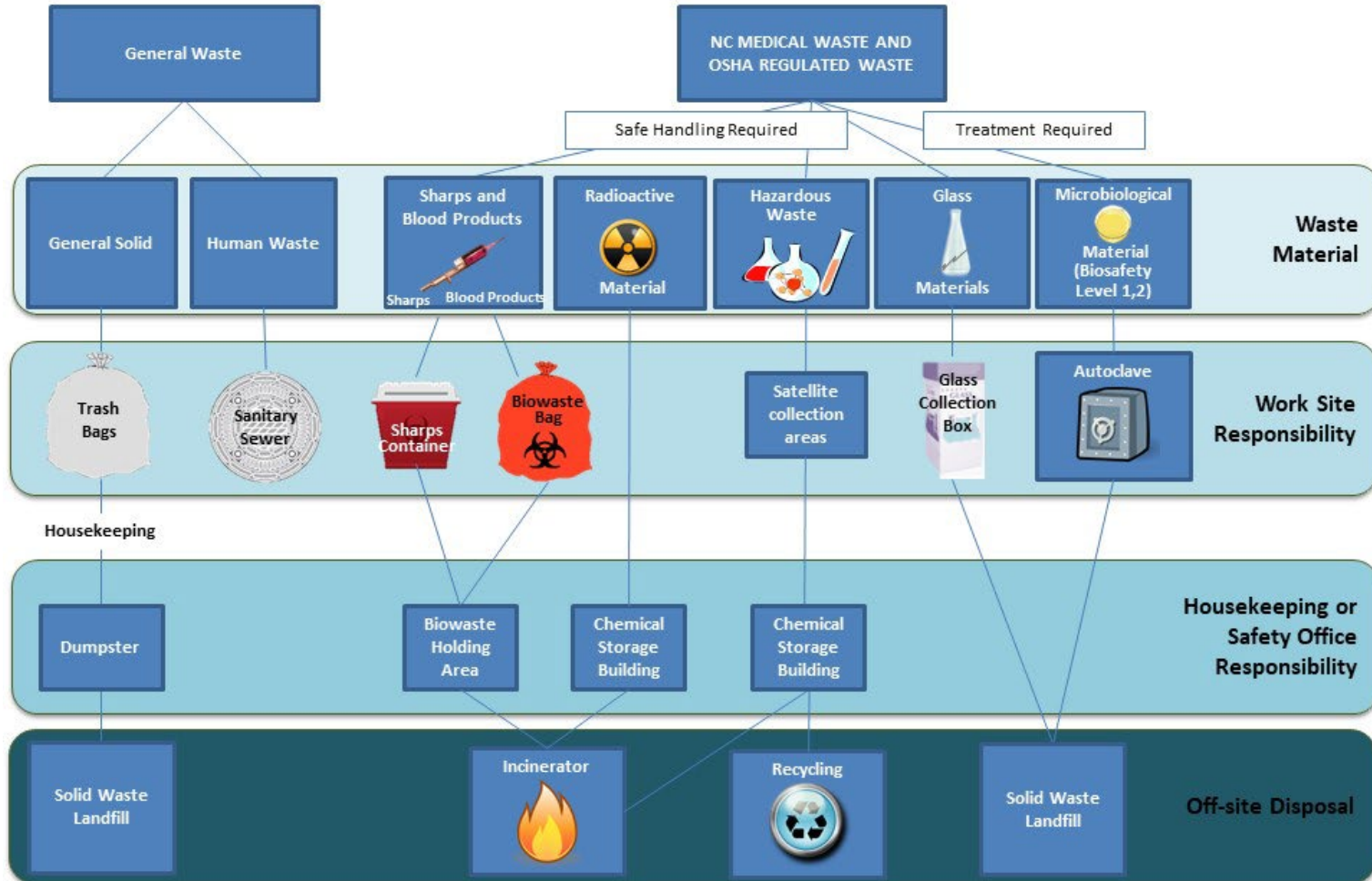
Mercury Spills

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.

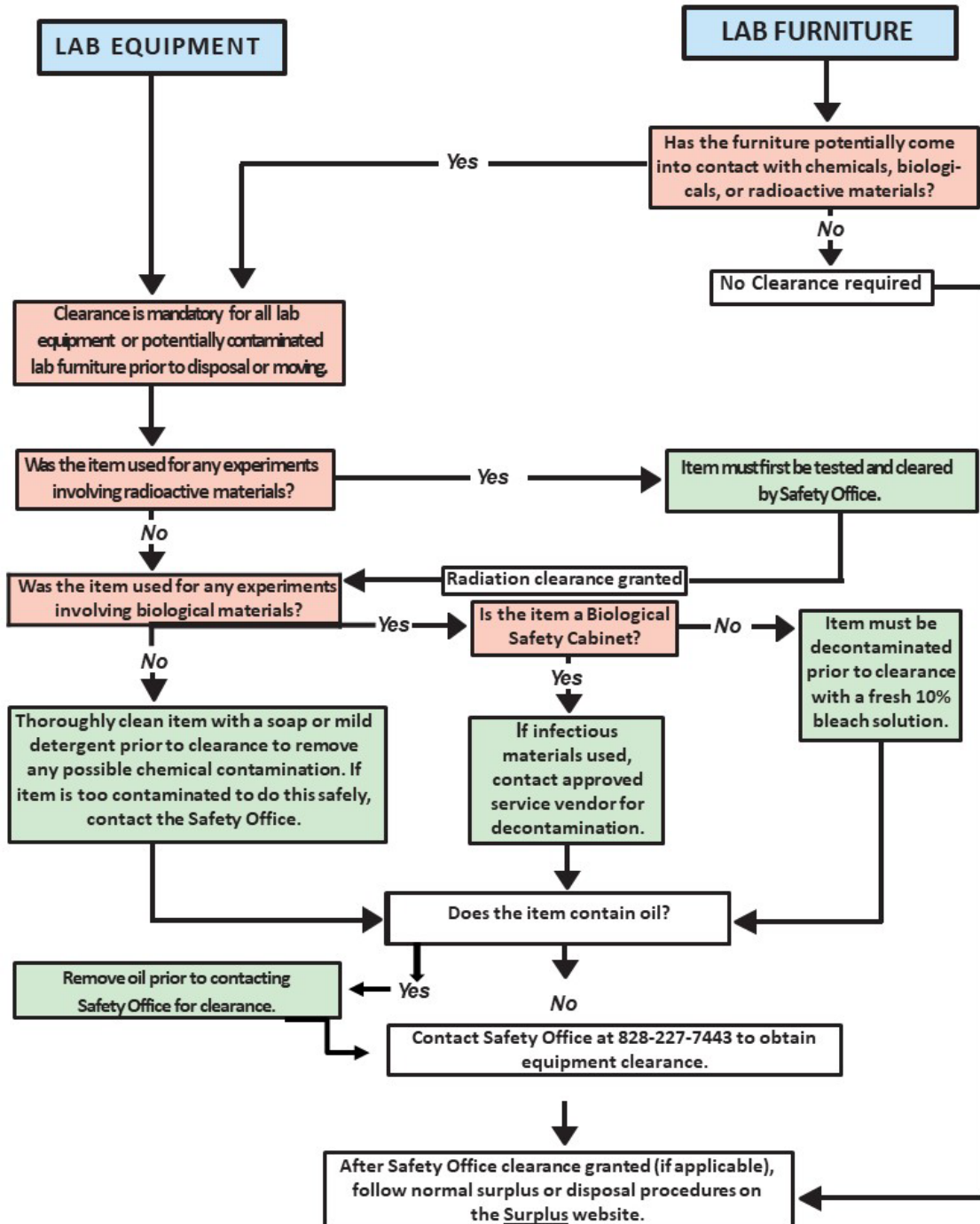
Liquid droplets of mercury travel quickly and can become lodged in tiny cracks and crevices. It is important to contain the spread before it can contaminate a larger area.

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.

Office of Safety and Risk Management Waste Streams Guide



Appendix B – Surplus Property Flow Chart



Appendix C – 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