HAZARDOUS MATERIALS PROGRAM

WEST CHESTER UNIVERSITY

Environmental Health & Safety Department

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I. PURPOSE

The purpose of this manual is to provide important hazardous material information for West Chester University of Pennsylvania (WCU). Proper hazardous waste management is important in order to provide healthy and safe working conditions for faculty, staff, and students, to protect the environment, and to ensure compliance with applicable federal, state, and local laws and regulations. If there are situations that this program does NOT address, or if there are questions regarding the procedures it contains, contact the Environmental Health and Safety Department x-3333. For emergency situations, after normal working hours, or weekends, contact Public Safety x-3311.

II. RESPONSIBILITIES

The Environmental Health & Safety Department (EHS) functions in both an advisory and consultative capability. Specific functions include:

1. Coordinate the University's comprehensive hazardous materials management program.
2. Manage appropriate disposal service contracts.
3. Provide and/or coordinate training to individuals who handle hazardous wastes.
4. Coordinate waste minimization program.

It is the responsibility of University personnel to follow the procedures in this program. Faculty, staff, and students are responsible for complying with local, state and federal regulations and University policy and/or established guidelines. Faculty and staff are responsible for ensuring employees and students engaged in programs under their direction are made familiar with the University's guidelines and requirements pertaining to the safe handling, storage and disposal of wastes. The University is subject to state and/or federal inspection at any time. The University and individuals can be cited for failure to comply with hazardous waste regulations. Conviction can result in civil or criminal penalties, depending upon the seriousness of the violation.

III. WASTE MINIMIZATION/SOURCE REDUCTION

Federal and state regulations governing hazardous waste requires that generators of hazardous waste develop and implement waste minimization procedures. In addition to benefiting the environment, waste minimization also reduces University costs associated with chemical waste disposal. West Chester University encourages the development of waste minimization processes and procedures in all departments to further the WCU goal of a "green" campus. The guidelines listed below are examples on how to minimize waste generation.

Note: All hazardous waste must be disposed of through the Environmental Health and Safety office. Please contact EHS at x-3333 to arrange for proper disposal of hazardous waste.

1.0 Guidelines for Reducing Waste

- Establish chemical use parameters before placing an order. This will minimize waste by purchasing chemicals in the container size that permits maximum consumption.

- Purchase chemicals in small quantities. The contents of small containers are most likely to be utilized than lost to contamination or degradation. Also, if disposal is required, volume and expense will be minimized if waste is in small containers.

- Reduce the scale of the experiment if protocol permits. Less chemicals used equates to less waste.

- Whenever possible, substitute less-hazardous chemicals for hazardous chemicals. Examples: Substitute Latex paints for solvent (oil-based) paints, non-mercury thermometers for mercury containing thermometers, etc.,

- Avoid stock piling of common chemicals. Stock piling involves the purchasing or accumulation of chemicals in large quantities for use longer than needed. This practice usually jeopardizes the chemicals' properties over a period of time.

- When chemicals are received, take all precautions to store them according to manufactures' recommendations such as by refrigeration or under an inert atmosphere. Following special storage requirements not only creates a safer work environment, it can increase the shelf life of chemicals.

- When chemicals are first received, date and store them in a manner that enables the older chemicals to be used first. This will develop a rotational system so that chemicals will be used before shelf life expires.

- Replace worn labels in a permanent, legible fashion. This will prevent an unknown chemical from being generated. Unknown chemicals are difficult and expensive to manage as a waste.

- Label all containers and reaction flasks that contain or will contain chemicals. DO NOT use abbreviations, trade names or chemical symbols. Only use the common chemical name or nomenclature to identify each container's contents. This will prevent an unknown chemical from being generated.

- Replace faulty or damaged caps and lids. This will safeguard against the effect of air and moisture contamination.

- It is recommended that an inventory of chemicals in each work area/department be completed every six months. During the inspection, replace worn and damaged labels. Assure that chemicals are stored by compatibility. Arrange for the proper disposal of unwanted chemicals that will no longer be needed. This practice will prevent the disposal of large volumes of chemicals at one time and reduce the potential of a chemical becoming an unknown due to the deteriorating label.

- If repeated dispensing of liquids is required, utilize a calibrated pipette or bottle top dispenser. Decanting liquids in calibrated beakers or graduated cylinders tends to generate large quantities of waste. Using bottle top dispensers and pipettes also reduces potential hazards such as spillage and personal exposure.

- Before disposing of a chemical, determine if someone else has a need for the chemical.

- Gas cylinders should be inspected on a regular basis. Ensure that the label is in good condition. Unknown gas cylinders present a serious hazard and are very expensive to manage as a waste. Utilize a gas vendor that will accept the cylinders back when they are no longer needed. Never refill a gas cylinder.

- Please call the Environmental Health and Safety Department at x-3333 if you have more ideas or suggestions to further waste minimization.

IV. HAZARDOUS MATERIALS HANDLING PROCEDURES

1.0 Asbestos

1.1 CLASS I ASBESTOS WORK PROCEDURES

In order to assure the safety of University employees, students and visitors and reduce University liability, the Environmental Health & Safety (EHS) office recommends the following practices and methods be used for the removal of Class I asbestos-containing materials or presumed asbestos-containing materials (ACM/PACM). This work shall be performed by **EPA AHERA-Certified Workers** (in-house asbestos abatement crew or outside contractor) and supervised by an **EPA AHERA-Certified Supervisor/Competent Person.**

REQUIRED PRACTICES

- All work must be performed inside a regulated (isolated) area with required signs.
- Sign text: **DANGER, ASBESTOS, CANCER AND LUNG DISEASE HAZARD, AUTHORIZED PERSONNEL ONLY, RESPIRATORS AND PROTECTIVE CLOTHING REQUIRED IN THIS AREA**
- Workers shall not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in the regulated area.
- Workers must don appropriate respiratory protection and protective clothing while performing asbestos abatement activities.
- Critical barriers must be placed over all openings, or another barrier, **or** isolation must be used and proven by perimeter visible surveillance and area air monitoring (air outside work area must be below EPA's Clean Air Standard of 0.01 f/cc).
- HVAC systems must be isolated with 6-mil plastic or equivalent.
- Impermeable drop cloths must cover all surfaces beneath removal activity.
- Objects inside regulated area must be covered with impermeable drop cloths or plastic sheeting secured by duct tape or equivalent.
- Ventilation to HEPA filtration unit (i.e. negative air machine) is required.
- Worker exposure air monitoring and general area air monitoring will be conducted for all Class I asbestos work, unless a Negative Exposure Assessment is produced.
- Anyone who must wear a negative pressure respirator or engaged in Class I, II, or III asbestos work for 30 days or more each year must receive medical clearance prior to this work..
- **Class I large scale jobs** (>25 linear feet or 10 square feet) workers must use the following hygiene facilities/procedures: Standard 3-stage decontamination unit/procedures.

- **Class I small scale jobs** (<25 linear feet or 10 square feet) workers must use the following hygiene facilities/procedures:
    1. Equipment room or area covered with impermeable drop cloth of sufficient size to allow cleaning equipment & HEPA vacuuming personal protective equipment without visible accumulations of dust outside area.
    2. All equipment and ACM/PACM containers must be HEPA vacuumed before removal from the area.
    3. All employee entry/exit must be through the equipment area.
- Use a HEPA vacuum to collect any dust or small debris present.
- High-speed abrasive saws (unless equipped with HEPA filtered exhaust air system), compressed air used to move asbestos (unless part of HEPA filtered exhaust air system) dry sweeping, shoveling or other dry cleanup is prohibited.
- Removed waste and debris shall be promptly cleaned-up and disposed as asbestos waste using properly labeled leak-tight containers.
- Label text: **DANGER CONTAINS ASBESTOS FIBERS, AVOID CREATING DUST, CANCER AND LUNG DISEASE HAZARD**

SPECIFIC CONTROL METHODS

In addition to asbestos work practices listed above, Class I asbestos work must be performed using one or more of the following control methods:

Negative Pressure Enclosure System (may be used where configuration of the work area does not make the erection of the enclosure infeasible)

- 4 air changes per hour
- Manometric measurement evidence of –0.02 column inches of water pressure differential
- Negative pressure must be maintained continuously
- Air movement away from workers toward HEPA filtration
- Before beginning work and at each shift, smoke test integrity & seal all detected leaks
- Electric inerted or protected with Ground Fault Circuit Interrupters (GFCI)

Glove Bag Systems (straight runs of piping & elbows and other connection)

- 6-mil poly construction, seamless bottom and designed to withstand pressure of ACM waste and water used without losing integrity
- Must completely seal circumference of pipe/structure
- Must be smoke tested for leaks; seal all detected leaks
- May be used only once and not moved
- Use prohibited on surfaces with temperatures above 150˚ F
- Glove bags must collapsed with HEPA vacuum
- At least 2 persons shall perform Class 1 glove bag removals

Mini-Enclosure (small walk-in, no more than 2 people, can be used if the disturbance or removal can be completely contained)

- 6-mil poly or equivalent
- Enclosure must be placed under negative pressure by means of a HEPA-filtered vacuum or similar ventilation unit
- Smoke test for leaks, seal all detected leaks
- Air movement during use away from employee breathing zone
- Reuse permitted after amended water wash down and HEPA-vacuumed

There is two other specific control methods not discussed, **Negative Pressure Glove Box Systems** (same procedures as glove bag systems) and **Water Spray Process Systems** (used for exterior pipe run removals, requires additional 40 hour training course in addition to EPA AHERA-Worker training). In addition to specific control methods, alternative control methods may be used which must be certified by a CIH or licensed professional engineer and approved by OSHA prior to start of abatement.

1.2 CLASS III ASBESTOS WORK PROCEDURES

Class III asbestos work involves repair and maintenance operations, where ACM/PACM, including thermal system insulation (TSI) and surfacing materials are likely to be disturbed. Disturbance means activities that disrupt the matrix of ACM/PACM, crumble or pulverize ACM/PACM, render ACM/PACM friable, or generate visible debris from ACM/PACM. Disturbance includes cutting away small amounts, no greater than can be contained in one standard size glove bag or asbestos waste bag, in order to access a building component. Examples of Class III asbestos work include repairing boiler, plumbing, roofing or drywall, repairing/replacing ceiling tile and repairing/adjusting ventilation/lighting.

In order to assure the safety of University employees, students and visitors and reduce University liability, the Environmental Health & Safety (EHS) office recommends the following practices and methods be used for Class III asbestos work to be performed by **EPA AHERA-Certified Workers** (in-house asbestos abatement crew or outside contractor) and supervised by **EPA AHERA-Certified Supervisor/Competent Person.**

REQUIRED PRACTICES

- All work must be performed inside a regulated (isolated) area with required signs
- Sign text**: DANGER, ASBESTOS, CANCER AND LUNG DISEASE HAZARD, AUTHORIZEDPERSONNEL ONLY, RESPIRATORS AND PROTECTIVE CLOTHING REQUIRED IN THIS AREA**
- Workers shall not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in the regulated area
- Workers must don appropriate respirator protection and protective clothing while performing asbestos abatement activities, unless a Negative Exposure Assessment is produced
- Where disturbance involves drilling, cutting, abrading, sanding, chipping, breaking, or sawing of thermal system insulation or surfacing materials, workers shall use impermeable drop cloths and shall isolate the operation using mini-enclosures or glove bags
- For all Class III jobs where a Negative Exposure Assessment is not produced, workers shall contain area and use impermeable drop cloths and plastic barriers or their equivalent, **or** isolate the operation using an approved control system
- Wet methods are required
- To extent feasible, local exhaust ventilation is required
- Worker exposure air monitoring and general area air monitoring will be conducted for all Class III asbestos work, unless a Negative Exposure Assessment is produced
- Anyone who must wear a negative pressure respirator or engaged in Class III asbestos work for 30 days or more each year must participate in the University's Medical Surveillance Program.
- Workers shall use the following hygiene facilities/procedures for all Class III jobs:
- Equipment room or area covered with impermeable drop cloth of sufficient size to allow cleaning equipment & HEPA vacuuming personal protective equipment without visible accumulations of dust outside area
- All equipment and ACM/PACM containers must be HEPA vacuumed before removal from the area

- All employee entry/exit must be through the equipment area
- Use a HEPA vacuum to collect any dust or small debris present
- High-speed abrasive saws (unless equipped with HEPA filtered exhaust air system), compressed air used to move asbestos (unless part of HEPA filtered exhaust air system) dry sweeping, shoveling or other dry cleanup is prohibited
- Removed waste and debris shall be promptly cleaned-up and disposed as asbestos waste using properly labeled leak-tight containers
- Label text: **DANGER CONTAINS ASBESTOS FIBERS, AVOID CREATING DUST, CANCER AND LUNG DISEASE HAZARD**

1.3 CLASS IV ASBESTOS WORK PROCEDURES

Class IV asbestos work involves maintenance and custodial activities during which employees contact but do not disturb ACM/PACM and activities to clean up dust, waste and debris resulting from Class I, II, or III asbestos activities. Examples of Class IV asbestos work include repairing/replacing ceiling tile, repairing/adjusting ventilation/lighting, telecommunications maintenance and cleaning up waste and debris containing ACM/PACM from TSI or surfacing materials.

In order to assure the safety of University employees, students and visitors and reduce University liability, the Environmental Health & Safety (EHS) office recommends the following practices and methods be used for Class III asbestos work to be performed by **EPA AHERA-Certified Workers** (in-house asbestos abatement crew or outside contractor) and supervised by **EPA AHERA-Certified Supervisor/Competent Person.**

REQUIRED PRACTICES

- Work **does not** have to be performed inside a regulated area
- Workers shall not eat, drink, smoke, chew tobacco or gum, or apply cosmetics while performing Class IV activities
- For all Class IV work performed within regulated areas where employees performing other work are required to wear respirators (i.e. Class I, II & III jobs), workers must don appropriate respirator protection and protective clothing while performing asbestos abatement activities, unless a Negative Exposure Assessment is produced
- Anyone who must wear a negative pressure respirator must participate in the University's Medical Surveillance Program
- Wet methods are required
- Enclosure or isolation of processes producing asbestos dust is required
- To extent feasible, local exhaust ventilation is required
- Use a HEPA vacuum to collect any dust or small debris present
- High-speed abrasive saws (unless equipped with HEPA filtered exhaust air system), compressed air used to move asbestos (unless part of HEPA filtered exhaust air system) dry sweeping, shoveling or other dry cleanup is prohibited
- Worker exposure air monitoring and general area air monitoring will be conducted for Class IV asbestos work, unless a Negative Exposure Assessment is produced

1.3 CLASS IV ASBESTOS WORK PROCEDURES (Cont.)

- Workers shall use the following hygiene facilities/procedures for Class IV jobs performed within regulated areas: Standard 3-stage decontamination unit/procedures
- Workers shall use the following hygiene facilities/procedures for Class IV jobs **not** performed within regulated areas:
- Equipment room or area covered with impermeable drop cloth of sufficient size to allow cleaning equipment & HEPA vacuuming personal protective equipment without visible accumulations of dust outside area
- All equipment and ACM/PACM containers must be HEPA vacuumed before removal from the area
- All employee entry/exit must be through the equipment area
- Removed waste and debris shall be promptly cleaned-up and disposed as asbestos waste using properly labeled leak-tight containers
- Label text: **DANGER CONTAINS ASBESTOS FIBERS, AVOID CREATING DUST, CANCER AND LUNG DISEASE HAZARD**

1.4 ASBESTOS-CONTAINING FLOOR TILE REMOVAL METHODS

In order to assure the safety of University employees, students and visitors and reduce University liability, the Environmental Health & Safety (EHS) office recommends the following removal methods be used for the removal of asbestos-containing floor tile. EPA AHERA-Certified Workers (in-house asbestos abatement crew or outside contractor) must perform the work.

- All work must be performed inside a regulated (isolated) area with required signs.
- Sign Text: **DANGER, ASBESTOS, CANCER AND LUNG DISEASE HAZARD, AUTHORIZED PERSONNEL ONLY, RESPIRATORS AND PROTECTIVE CLOTHING ARE REQUIRED IN THIS AREA**
- EPA AHERA-Certified workers must don appropriate respiratory protection and protective clothing while performing asbestos abatement activities
- Remove floor tile in an intact state, which means that the asbestos-containing materials (ACM) has not crumbled, been pulverized, or otherwise deteriorated so that it is no longer likely to be bound with its matrix.
- Mist floor tile with water at the point of removal.
- Use a HEPA vacuum to collect any dust or small debris present.
- Dry sweeping, mechanical chipping and sanding of flooring and backing is **prohibited.**
- Resilient sheeting must be cut, while wetting at the snip point; rip-up is **prohibited.**
- All scraping of residual adhesive & backing is by wet methods.
- Removed waste and debris shall be promptly cleaned-up and disposed as asbestos waste using properly labeled leak-tight containers.

1.4 ASBESTOS-CONTAINING FLOOR TILE REMOVAL METHODS (Cont.)

- Label text: **DANGER CONTAINS ASBESTOS FIBERS, AVOID CREATING DUST, CANCER AND LUNG DISEASE HAZARD**
- EPA AHERA-Certified workers must use the following hygiene facilities/ decontamination procedures:
    1. Equipment room or area covered with impermeable drop cloth of sufficient size to allow cleaning equipment & HEPA vacuuming personal protective equipment without visible accumulations of dust outside area.
    2. All equipment and ACM/PACM containers must be HEPA vacuumed before removal from the area.
    3. All employee entry/exit must be through the equipment area.

Note: The University's Environmental Health & Safety (EHS) office will demonstrate employee exposures will be below OSHA's Permissible Exposure Level (PEL) of 0.1 f/cc and EPA's Clean Air Standard of 0.01 f/cc for small scale floor tile removal projects (<160 SF) by using Negative Exposure Assessment information consisting of 1-year history of monitoring jobs which closely resemble all aspects of this current operation. For larger scale floor tile removal methods (>160 SF) EHS will continue to schedule third-party air monitoring or use Negative Exposure Assessment information if available.

1.5 ASBESTOS-CONTAINING MATERIAL CARPET REMOVAL PROCEDURES

In order to assure the safety of University employees, students and visitors and reduce University liability, the following procedures should be followed for carpet removal projects that involve asbestos floor tile.

- Inform WCU's in-house Asbestos Abatement Crew of all carpet removal projects that involve asbestos floor tile. If the services of the in-house asbestos abatement crew will be needed (i.e., if asbestos-containing floor tiles become friable), the crew should be aware prior to the start of the project that they may be called to abate the area.
- Relocate all employees/students from the effected area.
- Cover all items left in the room during the carpet project with plastic.
- Hang plastic in a manner that separates the work area from other areas in the room/building to prevent migration of nuisance dust throughout the building.
- Place a work order to shut off the air-handling units that service the construction area during the carpet/padding removal process. This may help eliminate the distribution of the nuisance dust that will be generated during the project from reaching other areas of the building.

1.5 ASBESTOS-CONTAINING MATERIAL CARPET REMOVAL PROCEDURES (Cont.)

- At a minimum, perform air monitoring/sampling on the first day of work in the work area for nuisance dust. Additional days of testing may be necessary depending on the first day's monitoring results. The nuisance dust may be a potential respiratory irritant to some employees/students present in the building. (EHS can assist in obtaining a vendor to perform this air monitoring.)
- Carpet padding that adheres to the asbestos tile should be removed by cleaning, sweeping, mopping and other non-abrasive methods.
- Asbestos tile may only be discarded with carpet refuse if it remains intact (non-friable). The contractor is responsible for keeping the tile intact if it is removed with the carpet, during transport to the landfill and during the disposal. If the tile becomes friable during any of these steps, the contractor is responsible for disposing of the friable tile in a DEP-approved asbestos landfill.
- If asbestos tile becomes friable, EPA-certified workers (in-house asbestos abatement crew or outside contractor) must abate the area in accordance with West Chester University's Asbestos-Containing Floor Tile Removal Methods.

1.6 ASBESTOS-CONTAINING MATERIAL WINDOW REPLACEMENT PROCEDURES

In order to assure the safety of University employees, students and visitors and reduce University liability, the following procedures should be followed for window replacement projects that involve asbestos-containing caulking and/or asbestos transite windowsills.

- Contractor shall submit a narrative description of means and methods to be employed in removal and replacement of the windows, emphasizing minimal disruption to surrounding materials.
- Contractor must use PA certified personnel to remove or handle asbestos-containing materials (ACM). Contractor should submit names and copies of their certification licenses to the University Project Manager prior to the start of work.
- Contractor will be responsible for PA Department of Labor and Industry, Environmental Protection Agency (EPA) and Pennsylvania Department of Environmental Protection (PADEP) notification of asbestos removal.
- At a minimum, air monitoring/sampling will be performed on the first day of work in the work area for nuisance dust. Additional days of testing may be necessary depending on the first day's monitoring results. West Chester University (WCU) will subcontract out the air monitoring. WCU's Environmental Health & Safety Department will coordinate and schedule the air-monitoring contractor to be on-site with the window replacement contractor.
- Relocate all employees/students from the effected area.
- If the area can be unoccupied, then no protective containment or negative air machines should be needed.
- Place a layer of 6 mil polyethylene under the windowsill. Cover all items left in the room during the project with plastic.
- Place a layer of 6 mil polyethylene around the perimeter of the building where work is to be done to catch any debris that may fall from the windows.
- Removal must be done in such a manner as to minimize crumbling, pulverizing, or reducing the ACM to powder.
- Contractor will have available and use as warranted amended water to minimize fiber release.
- After removal of the windows, clean the area surrounding the windowsill with a HEPA vacuum.
- Place all waste ACM into polyethylene-lined barrels or other container that are properly labeled and approved by the University Project Manager.
- The waste would not have to go to an asbestos approved landfill; however a manifest and waste shipping record documentation should be generated to minimize the University's liability. This will ensure the waste was properly packaged as it is transported to the disposal facility.
- If asbestos-containing materials become friable, EPA-certified workers (in-house asbestos abatement crew or outside contractor) must abate the area in accordance with West Chester University's asbestos abatement procedures.

1.7 ASBESTOS-CONTAINING FLOORING STRIPPING, WAXING AND BUFFING PROCEDURES FOR UNIVERSITY EMPLOYEES

The following asbestos-containing flooring stripping, waxing and buffing procedures are to be followed by University employees in conjunction with specific procedures developed by Custodial Services in order to assure the safety of University employees, students and visitors:

- Visibly deteriorated asbestos-containing flooring (small broken pieces) and dust or debris associated with damaged flooring should not be dry swept or vacuumed with a regular vacuum instead, it should be HEPA vacuumed by asbestos certified personnel (in-house or outside contractor).
- Sanding of flooring is prohibited.
- Stripping of finishes shall be conducted using low abrasion pads at speeds lower than 300 RPM and using wet methods.
- Burnishing or dry buffing may be performed only on flooring which has sufficient finish (3 layers of wax minimum) so that pad cannot contact the flooring material.
- Gather tools and equipment needed to perform the task and position "Caution-Wet Floor" signs.
- Place walk off mats where required to prevent tracking of stripping solution to other areas.
- Wear personal protective equipment (i.e., rubber gloves, splash goggles) as recommended by the stripping material's Material Safety Data Sheet (MSDS).
- Apply stripping chemical and allow to soak according to manufacturer's recommendation. Strip floor using least abrasive pad and low speed setting (175-190 rpm). Keep floor adequately wet during operation.
- Remove dirty stripping solution with wet vacuum or strip mop.
- With rinse mop, apply liberal amounts of clean water to area stripped and repeat rinse procedures.
- All dirty stripping solution and rinse water must be disposed of in the building (i.e., sinks and floor drains). **NO ILLEGAL DUMPING. DO NOT DUMP MATERIALS INTO THE STORMWATER DRAINS LOCATED OUTSIDE OF THE BUILDINGS.**
- Apply wax (3 layers minimum) and allow floor to thoroughly dry before dry buffing.
- Dry buff using low abrasion pad at speeds no higher than 300 rpm.

2.0 Batteries

There are six types of batteries found at West Chester University. These batteries are identified as follows:

Nickel Cadmium (NiCad) Batteries: rechargeable batteries typically used in beepers, two-way radios, laptop computers, cellular phones, camcorders and some medical equipment. These batteries contain cadmium, a heavy metal that is considered hazardous. They must be disposed of through the EHS department as hazardous waste.

Lead Acid Batteries: typically used in some medical equipment, motorized vehicles such as cars, golf carts. These batteries are also used in some older cellular phones and camcorders. These batteries contain lead, which is considered hazardous. They must be disposed of through the EHS department as hazardous waste.

Mercury Batteries: Typically used to power Telemetry monitoring devices and hearing aids. These batteries contain mercury, a heavy metal that is considered hazardous. They must be disposed of through the EHS department as hazardous waste.

Household (Alkaline) Batteries: The most commonly used non-rechargeable battery. Typically used to power radios, flash lights, and most office equipment. These batteries do not contain hazardous substances in sufficient amount to warrant special disposal arrangements and may be disposed of in the regular trash.

Zinc Air Batteries: Used as an "environmentally friendly" substitute to replace mercury batteries in telemetry units and some other electronic equipment. These batteries do not contain hazardous substances and may be disposed in the regular trash.

Lithium Batteries: Used in some diagnostic equipment. These batteries (if containing less than 5 grams/cell of lithium) do not contain hazardous substances in sufficient amount to warrant special disposal arrangements and may be disposed in the regular trash.

Please contact the Environmental Health & Safety Department at x-3333 to arrange for hazardous waste disposal.

3.0 Custodial/Cleaning Supplies

Many custodial/cleaning supplies are regulated as a hazardous waste (i.e., solvent based or corrosive are two examples) and **must not** be disposed of in sanitary waste systems or allowed to evaporate to the atmosphere. **Absolutely NO cleaning supplies should be disposed of in the storm water run-off system as this system drains directly into the local creeks surrounding WCU.** Consult the appropriate MSDS to determine hazard class or contact the EHS department at x-3333 for assistance.

4.0 Equipment Containing Chlorofluorocarbons (CFCs) and Hydrochlorofluorocarbons

Equipment containing Chlorofluorocarbons (CFCs) and Hydrochlorofluorocarbons (HCFCs) must be purged before proper disposal can take place. It is illegal to knowingly vent CFCs and HCFCs into the atmosphere. A work order must be submitted to arrange for your equipment to be purged. EHS must receive documentation that CFCs have been properly purged either by a certified contractor or by an in-house certified worker prior to disposing of the equipment.

5.0 Fluorescent Lamps

Electric lamps including but not limited to fluorescent, incandescent, high intensity discharge, neon, mercury vapor, low/high-pressure sodium and metal halide lamps all contain levels of mercury. Unless the Environmental Health & Safety office (EHS) or an outside consultant has performed Toxicity Characteristic Leaching Procedure (TCLP) testing on electric lamps**, university employees should assume all electric lamps listed above are universal waste lamps**.

NOTE: Although "Green Tipped Fluorescent Bulbs" are considered "Low Mercury" bulbs, WCU requires that ALL mercury containing fluorescent bulbs be recycled.

Employees assigned to re-lamping activities should comply with the following disposal procedures designed to minimize work area contamination and protect employees, students and visitors from potential chemical releases and exposures:

1. Prior to re-lamping activities, employees shall don personal protective equipment (PPE) including, at a minimum, safety goggles and protective gloves. If needed, EHS will provide assistance in the proper selection of PPE.
2. All hazardous waste lamps removed should be separated, by size (i.e., 4 ft light tubes Vs 8 ft light tubes).
3. Employees shall place lamps in boxes and/or containers in a tight, compact fashion without separators or packaging material, careful not to break lamps.
4. All used bulb boxes must have a **Universal Waste Label** applied to the outside of the box. Label must be filled out with the "accumulation start date" (**date when first used bulb is placed in box**), department name, and initials of employee.
5. Employees shall tape boxes and/or containers shut with clear packing tape and contact their supervisors or designated personnel for proper transportation and disposal.
6. Maintenance department and custodial services supervisors or designated personnel shall carefully transport sealed boxes and containers to the university storage trailer located in the parking lot area between Receiving and Logistics (receiving side) and 201 Carter Drive (facilities division side).
7. Please contact the EHS Department at x-3333 with questions on Fluorescent Lamp disposal.

5.1 Fluorescent Lamp Breakage Clean-up

The following procedures are to be followed when cleaning up a fluorescent lamp breakage.

1. Isolate area by physical boundaries (i.e. yellow caution tape) to prevent unauthorized entry of personnel.
2. Food, drink and smoking materials shall not be permitted in areas where hazardous waste lamps are handled or stored.
3. Ventilate area of breakage.
4. Hazardous waste lamp cleanup procedures for spills or leaks:
   a. Wear chemical-resistant gloves
   b. Wear splash-proof chemical safety goggles or face shields
   c. Wear work gloves over chemical resistant gloves while handling broken glass.
   d. Employees shall immediately clean up and place in a box or container any lamp that is broken and any lamp that shows evidence of breakage, leakage or damage.
   e. Employees should mark boxes/containers with broken lamp debris, "Broken Lamps for Recycling".
   f. Boxes/containers with broken lamp debris shall be transported to the university storage trailer and the box shall be placed unto the drum(s) inside the university storage trailer.
5. Contact EHS for proper disposal of metallic mercury and mercury contaminated protective clothing.

5.2 Loading of University Storage Trailer

1. Place boxes on pallets horizontally across the back of the trailer.
2. Stack the boxes up to the roof of the trailer.
3. Continue filling the trailer while working to the front.
4. Place HID, FB40, Compact and U-tube and other small lamps inside **small boxes or 5 gallon pales** provided (inside storage trailer).
5. Store small boxes inside the left door near the front of the storage trailer.
6. Place 8 foot boxes along the right side of the trailer
7. Any questions please contact Environmental Health & Safety (x-1719).

6.0 Gas Cylinder Handling Procedures

Many university departments, academic and non-academic, as well as many student organizations use compressed gas cylinders. These procedures apply to all portable gas cylinders, regardless of the size of the cylinder or the contents of the cylinder. Special agents such as oxygen, highly toxic materials, or corrosive materials, have specific handling procedures that must be followed in addition to the below procedures. Please consult the manufacturer and Material Safety Data Sheets (MSDS) for the appropriate precautions.

Compressed gases present a unique hazard. Depending on the particular gas, there is a potential for both mechanical and chemical hazards. Gases may be combustible, explosive, corrosive, poisonous, inert, or a combination of hazards. If the gas is flammable, there is a danger of fire or explosion. Additional hazards of reactivity and toxicity of the gas, as well as asphyxiation also exist with some gases. Since the gases are contained in heavy, highly pressurized metal containers, the large amount of potential energy resulting from compression of the gas makes the cylinder a potential rocket or fragmentation bomb. In summary, careful procedures are necessary for handling the various compressed gases, the cylinders containing the compressed gases, regulators or valves used to control gas flow, and the piping used to confine gases during flow.

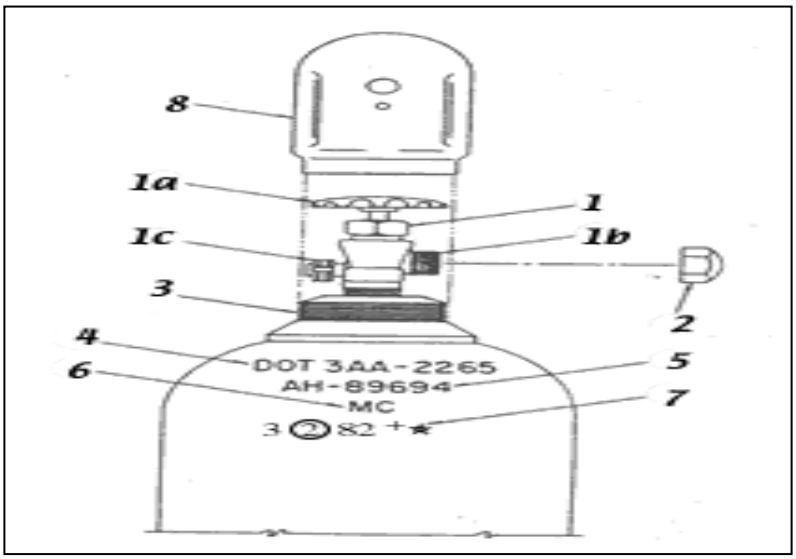
6.1 Storage and Handling of Compressed Gases

1. All cylinders must be marked as to their contents. Do not use a cylinder if the contents are not clearly identified. Do not rely on color-coding to identify the contents of a gas cylinder; color-coding is not standardized.
2. All gas cylinders must be tagged with a perforated status tag when received from a supplier. Tags can be obtained from the Environmental Health & Safety Department at x-1719 or from the Chemistry Stockroom Manager x-2274. The date of receipt of the cylinder shall be recorded on the “FULL” tab of the tag.
3. Obtain and read the Material Safety Data Sheet for the product before using.
4. To transport a cylinder, use a hand truck equipped with a chain or belt for securing the cylinder. Make sure the protective cap covers the cylinder valve. Never move a cylinder while a regulator is attached. Do not move cylinders by carrying, rolling, sliding, or dragging them across the floor. Do not transport oxygen and combustible gases at the same time.
5. Secure gas cylinders to prevent them from falling over. Chains or a clamp/strap assembly are the most common methods of keeping cylinders upright. Stands are the preferred method for lecture bottles. Make sure the chain is high enough on the cylinder to keep it from tipping over.
6. Do not store full and empty cylinders together. Do not store incompatible gases together. Store cylinders of oxygen at least 20 feet away from cylinders of hydrogen or other flammable gases.
7. Store cylinders away from heat, including steam or hot water pipes, and away from areas where they might be subjected to mechanical damage.

8. Corrosive or unstable gases should be ordered in the minimum quantities necessary and stored in a hood or other safe, dry area. Corrosive gases, if stored for long periods, will corrode the valve internally and may be impossible to open or if opened, may not close.
9. Do not wipe or touch the valve outlet of an oxygen cylinder valve in such a way that organic residues are deposited which might be subsequently ignited by exposure to high oxygen pressure.
10. Odorless toxic gases, like carbon monoxide, should be used only in areas protected by a suitable gas sensor.
11. When the gas cylinder is first used, remove and dispose of the "FULL" tab from the tag and record the date of first use on the "IN SERVICE" tab of the tag.
12. Gas regulators have fittings designed to prevent the use of a regulator with an incompatible gas. Do not use adapters. Do not exchange fittings. Do not try to drive fittings together that do not match.
13. Lubricant, pipe dope, Teflon tape, or pipe thread must NOT be used on a regulator inlet fitting.
14. Relief valves and other vents for toxic, corrosive, or flammable gases that pose a threat to health or the environment per the Material Safety Data Sheet (MSDS) must be connected to an appropriate exhaust system.
15. The gas flow should be shut off at the tank when not in use.
16. Replace outlet caps, if used.
17. All equipment for handling gas must have a provision to vent the pressure safely before the regulator is removed.
18. Any parts of a gas system that could enclose a high pressure must be protected with a suitable safety relief valve.
19. Do not mix the parts of different systems of compression fittings. Each operation should standardize on a particular brand of fitting and stock no others. Incompatible parts or fittings must be discarded, not place in drawers.

6.2 Disposal of Gas Cylinders

1. Empty cylinders shall always remain secured in accordance with the above safety guidelines.
2. When a cylinder is empty (preferably not less than 25 psi residual pressure), close the valve to prevent air and moisture from entering the tank.
3. Remove the regulator and replace the cylinder protective cap.
4. Remove and dispose of the "IN SERVICE" tab from the tag and record the date on the "EMPTY" tag.
5. If a cylinder is no longer needed and is not empty, a Hazardous Chemical Waste tag must be completed and placed on the cylinder.
6. Arrangements should be made to return cylinders to the supplier. If a cylinder cannot be returned to the supplier, arrange for removal by contacting the Environmental Health & Safety office at x-1719.



1. Valve pack nut: contains packing gland and packing around stem. Adjusted only occasionally usually tightened if leakage is observed around valve stem. Should not be tampered with for diaphragm-type valves.

1a. Valve Handwheel: used to open and close cylinder valve. Valves are occasionally not equipped with handwheels and require special wrenches to effect operation.

1b. Valve outlet connection: for connection to pressure – and/or flow-regulating equipment. Various types of connections are provided to prevent interchange of equipment for incompatible gases. Usually identified by a CGA (Compressed Gas Association) number.

1c. Safety device: to permit gas to escape if the temperture gets high enough to endanger the cylinder by increased unsafe pressures.

2. Valve outlet cap; protects valve threads from damage and keeps outlet clean; not used universally.

3. Cylinder collar: holds cylinder cap (8) at all times, except when regulating equipment is attached to cylinder valve.

4. This number signifies that the cylinder conforms to Department of Transportation specification DOT-3A governing materials of construction, capacities, and test procedures.

5. This number is the cylinder serial number

6. Manufacturer's symbol

7. This number indicates the date of initial hydrostatic testing. Thereafter, hydrostatic pressure tests are performed on cylinders; for most gases, this is done every five years to determine their fitness for further use. At this time new test dates are stamped into the shoulder of the cylinder. On this cylinder: Test date (3/82), original tester's symbol (circled 2), hydrostatic re-testing extension allowance (star) and permission to over pressurize by 10%.
   DO NOT accept or use a cylinder that has an expired test date.

8. Protective cap.

7.0 Glassware

Broken laboratory glass items (vials, flasks, beakers, etc.) must be placed in a broken glass box before disposal. The box must be closed and taped **securely** and then placed into the trash dumpster. Do not overfill the broken glass box. Failure to properly package and dispose of broken glass can cause injury to custodial services employees and/or grounds crew employees during trash removal operations. Broken glass boxes can be obtained from the stockroom manager in the chemical stock room.

Exception: Glass Mercury Thermometers (see Section 13.0 Mercury)

8.0 Infectious Waste

Procedures have been established with an infectious waste incineration company for proper disposal of all infectious wastes (including sharps).

Note: Infectious waste **MUST NOT** be disposed of as general waste, in dumpsters, or down sewer drains.

Examples of infectious waste include but are not limited to:

Biological liquid waste:
- Blood, excretions, secretions, body fluids including liquid waste from renal dialysis

Pathological waste:
- Human tissues and anatomical remains
- Culture and stocks of etiologic agents and associated biological waste including specimen cultures and stock of etiologic agents and waste from production of biologicals and serums

Laboratory waste:
- Wastes which have come in contact with pathogenic organisms or blood or body fluids
- Disposable materials, culture dishes, devices used to transfer, inoculate mixcultures, PPE, and absorbents
- Animal tissue, bedding, and other wastes from animals known or suspected to be infected with a pathogen which also causes human disease if these items may act as a vehicle of transmission to humans
- Sharps (syringes, needles, razor blades, scalpel blades, glass slides, glassware, Pasteur pipettes and pipette tips)
- Discarded biologicals: serums and vaccines for human or veterinary use
- Materials from spill clean-ups
- Human dialysis waste materials

Note: To determine disposal methods for infectious waste that has been sterilized or disinfected by autoclave or chemical means, please contact Environmental Health and Safety at x-3333.

8.1 Infectious Waste Disposal Procedures

1. Place waste inside box labeled "infectious waste" which is lined with one (1) red infectious waste bag; make sure bottom of box is securely sealed with packing tape.
2. When the box is full (not to exceed 35 pounds), seal each bag individually by twisting the bag then taping with duct tape or packaging tape, then tape box securely closed.
3. Fill out an "Infectious Biohazardous Waste" label including Principal Investigator, Department, and date (Please Print).
4. Affix the label to the top of the box.
5. Weigh box
6. Record weight on top of box next
7. Each pick-up location should record the following information on the Generator Information Sheets stored near the pick-up location.
    A. Date
    B. Principal information
    C. Course number or research information
    D. Number of boxes
    E. Contents (carcasses, bedding, etc.) and weight.
8. Take box to designated storage location in your building, preferably not more the day before a waste pick up. Contact Environmental Health and Safety at x-3333 to confirm the University's pick-up schedule or to arrange for a special pick-up.

8.2 Animal Bedding (Non-infectious)

Animal bedding that **HAS NOT** been exposed to pathogens or other infectious materials can be disposed of in the municipal waste steam (i.e. trash dumpster). The following are general guidelines for disposal. Specific information can be obtained from Environmental Health and Safety at x-3333.

1. Place bedding in plastic trash bag (do not overfill trash bag or exceed 40 pounds) and evacuate excess air out of bag. Tape bag shut.
2. Place trash bag containing bedding in designated trash can lined with a plastic bag. Seal trash bag and place for disposal by custodial department. Do not exceed 40 pounds.
3. Custodial services should dispose of trash bags in dumpster assigned to the specific building.

Note: If disposing directly into dumpster: double-bag bedding (do not overfill trash bag or exceed 40 pounds), evacuate air, tape shut, and place in dumpster assigned to specific building.

9.0 Laboratory wastewater

Chemical discharges are not permitted into the sanitary sewer system. A neutralizing sump is tied to the science building sewer drains to aid in the neutralizing of any inadvertent disposal of chemicals from reaching township water treatment systems. This neutralizing system is not designed to neutralize all chemicals and should not be used to treat chemical waste. WCU Hazardous Waste Disposal Procedures (see Section IV of this program) are to be followed when handling waste. For disposal of chemicals, contact the chemistry stockroom at x-2274 or the Environmental Health & Safety office at x-3333.

10.0 Lead-based Paint

When working on projects involving lead-based paint, WCU personnel and contractors shall implement Lead Hazard Controls. According to federal regulations the following practices are **prohibited** to use on lead-based paint:

- Burning of paint
- Use of heat gun>1100 degrees Fahrenheit
- Dry sanding
- Dry scraping
- Uncontained abrasive blasting and uncontained water blasting
- Use of power grinders, sanders, drills (including wire brushes on electric drills and rotostrippers) and other similar power tools, **except** when they are equipped with local HEPA exhaust
- Shoveling, dry or wet sweeping and brushing, **except** when HEPA vacuuming is found to be ineffective
- Use of methylene chloride paint strippers
- Transport of lead-based paint debris in open, uncovered vehicles
- Storage of lead-based paint debris prior to disposal for any period exceeding 180 days, and **after 72 hours** following waste generation such storage must include an access limitation, such as receptacle, covered dumpster, barrier, or fence.

In addition to complying with all prohibited practices listed above, the Environmental Health & Safety (EHS) Department is requiring that WCU personnel or the contractor(s)) comply with all applicable local, state and federal regulations to assure University employees, students and visitors are protected from airborne concentrations of lead dust during the renovation project.

Lead-based Paint (cont.)
The following guidelines must be followed:

- All applicable local, state and federal regulations shall be followed during lead projects.
- The work areas shall be isolated from rest of the building and HVAC system components, or use HEPA assisted power tools to **prevent airborne dust dispersal outside the work areas**.
- Perform daily cleanup and housekeeping activities to maintain surfaces inside (isolated) work areas as free as possible of accumulations of lead dust. HEPA vacuuming and wet wiping are the preferred methods of meeting this requirement, **Dry sweeping** and the use of compressed air to clean floors (without ventilation system designed to contain the dispersal of lead dust) **is prohibited.**
- Follow proper hygiene practices including, providing handwashing facilities for workers and not permitting food, beverages and tobacco products in the work area.
- The project manager will perform daily work area inspections to ensure work control methods are properly followed and there is no airborne dust dispersal inside or outside work areas, EHS will also monitor work areas (as needed) to ensure compliance.
- In the event that work control methods used by outside contractor are unacceptable, inspection personnel in conjunction with EHS will recommend issuing a stop work order and work may not resume until proper work control methods are followed.
- A final visual inspection will be performed by the project manager as well as the EHS to ensure work areas are free of visible dust and lead-based paint debris.
- Liquid waste from hand washing facilities and wet cleanup methods may be disposed via sanitary sewer systems if acceptable removal and cleaning methods are used, or collected as hazardous waste at the expense of the contractor if the contractor is utilized for the project. No wash water may be disposed of in such a manner as to allow the wash water to reach the university or surrounding community grounds or storm drain system.
- In the event that removal and cleaning methods are unacceptable and liquid waste is heavily contaminated with lead containing paint chips and/or debris, the liquid waste will be collected as hazardous waste and disposed as such at the Contractor's expense.
- West Chester University Environmental Health & Safety Department or a designated representative will collect lead dust wipe samples from the work area to determine lead dust content present on floors, window stools and window troughs before the start of the project. Samples will be sent to an EPA NLLAP certified laboratory for lead analysis by Atomic Absorption Spectrometry (AAS).
- The lead wipe sample clearance criteria at the completion of the project will be:
  a. <40 micrograms per square foot (ug/ft²) of lead on floors
  b. <250 micrograms per square foot (ug/ft²) of lead on window stools
  c. <400 micrograms per square foot (ug/ft²) of lead on window troughs.

If any clearance wipe samples fail to meet the clearance criteria, the work crew shall re-clean the work area and EHS or a designated representative will collect additional wipe samples (retest) at the contractor's expense if the work is being completed by an outside contractor.

11.0 Light Ballasts

Some fluorescent light ballast contains polychlorinated bi-phenyls (PCBs) and **CAN NOT** be disposed of as municipal waste (i.e. in normal trash receptacles). **Any** light ballast removed from service should be collected and stored for lawful disposal.

NOTE: WCU has made a conscious decision to recycle/dispose ALL light ballast. Non-PCB ballast should be collected separately from ballast containing PCB's and disposed of properly through the EHS Department.

Arrange for disposal by contacting the Environmental Health and Safety Department at x-3333.

The Toxic Substances Control Act (TSCA) required the Environmental Protection Agency (EPA) to regulate the use and disposal of Polychlorinated Biphenyls (PCBs). The EPA has established the following three categories for PCBs:

1. Non-PCB containing materials are defined as having a PCB concentration less than 50 ppm;
2. PCB contaminated materials are defined as having a PCB concentration of 50 ppm or more, but less than 500 ppm; and
3. PCB-containing materials are defined as having a PCB concentration of 500 ppm or more.

Materials with a PCB concentration above 50 ppm are regulated under TSCA and are to be disposed as regulated waste at a TSCA-approved waste facility. Materials with PCB concentrations less than 50 ppm are not regulated under TSCA, however the Commonwealth of Pennsylvania recognizes concentrations greater than 4 ppm, but less than 50 ppm as residual waste under waste management regulation 25 PA Code 287. Residual waste materials are to be disposed of at a permitted waste facility. In addition, EPA Superfund laws specifically list PCBs as hazardous substances and state that the "release" or "threat of release" of more than one pound of PCBs (approx. 16 PCB ballasts) into the environment triggers a Superfund notification and cleanup requirement.

PCBs are found in electrical transformers, capacitors, circuit breakers rated over 1000 volts, isolating switches, ballasts for fluorescent and mercury vapor lamps, lubricant for compressors and other.

According to EPA, fluorescent light ballasts manufactured before 1978 or which are not stamped "No PCBs" should be considered PCB fluorescent light ballasts (PCB ballasts). Thus, University employees **should assume all ballasts contain PCBs unless clearly stamped "No PCBs"**.

11.1 PCB Ballast Disposal Procedures

- Plan or allow time in project scheduling for proper identification of building materials containing PCBs or other hazardous materials (i.e. asbestos, lead-based paint, fluorescent lamps, etc.)
- Contact EHS prior to renovation activities involving large scale ballast removal activities to ensure proper removal, storage and disposal activities
- During change out of ballasts exercise caution when removing the ballast so as not to compromise the shell and cause leakage
- Separate light ballast removed into three groups, Non-PCB ballasts, PCB ballasts and "leakers". Non-PCB ballasts are not regulated and may be disposed as municipal waste. Leakers are ballasts in which PCBs have escaped from the interior onto the exterior surface. PCBs are clear or yellow oil and most PCB leaks are visible. If you see oil on the surface of ballast, you have a leaker and must follow removal procedure outlined below
- When removing leaking ballasts use appropriate PPE (chemical-resistant gloves, Tyvek suit, and eye and face protection) **Avoid skin contact with PCB oils** and contact EHS (x-3333) for assistance in proper PPE selection
- Double bag leaking ballasts in plastic trash bags and keep separate from other ballasts, report leaks and spills to EHS (x-3333)
- When moving (non-leaking) ballasts within a building, cardboard boxes can be used. However, the ballasts should be packed into 55 gallons steel drums as soon as possible
- For disposal of small amount of ballast (50 or less) contact EHS (x-3333) for storage of PCB ballasts at chemical storage building
- For disposal of more than 50 ballasts contact EHS to coordinate proper storage and disposal
- Prior to placing ballasts into 55-gallon drums clip off connecting wires on ballasts as close as possible to ballast shell (ballast disposal is charged by the pound)
- When packing ballasts into drums, do not crush the ballasts because this could cause leaks. A typical drum will hold 150-250 F40 ballasts from 4-foot light fixtures, or 60-100 F96 ballasts from 8-foot light fixtures. Drum weight should not exceed 1000 pounds and drum size should not be larger than 55 gallons for safety purposes
- Do not use absorbent material or plastic liners inside the drum because ballasts will be disposed at a recycling facility
- Drums containing PCB ballasts must be properly labeled, contact EHS (x-3333) for PCB Caution labels

12.0 Municipal Waste

Drains from all rest rooms, floor drains, utility closets, water fountains, and kitchen equipment are connected to the sanitary waste system and must not be used for disposal of chemicals.

Only wastes determined to be non-hazardous may be placed in normal trash receptacles. Remember that wastes going into the trash will be handled by a number of different people, and may represent an occupational hazard to waste handlers. If there is any doubt, IT IS BETTER TO ASSUME that a waste is hazardous and arrange for hazardous waste disposal by contacting the Environmental Health and Safety Department at x-3333.

The burning of municipal waste, including paper goods at the University Boiler Plant is prohibited.

13.0 Mercury

All mercury waste (mercury compounds, mercury metal, and mercury-contaminated material and spill debris) must be kept separate from all other waste streams.

13.1 Broken Mercury Thermometers

Most small spills can be cleaned up with the aid of a mercury spill kit (contact the chemistry stockroom x-2274 or EHS x-3333 for a spill kit). In the event of a spill, isolate the area. To protect yourself when cleaning up a broken mercury thermometer, avoid exposure and injury by wearing chemical-resistant gloves and safety glasses/goggles. See the mercury Material Safety Data Sheet for more details.

Collect the spilled mercury and broken thermometer or other contaminated objects in a leak-proof glass container (bags are not recommended, as they are easily punctured). **DO NOT VACUUM.** Label the container with a hazardous waste label and call for a hazardous waste pickup

13.2 Free Mercury

Follow the same procedure as for broken mercury thermometer spill and place free mercury in a glass container. The container should be no larger than necessary to hold the mercury. Use small vials if possible. **DO NOT VACUUM.** Label the container and the debris from the mercury spill kit with a hazardous waste label. Arrange for removal by contacting the Environmental Health and Safety Department at x-3333.

14.0 P-listed Waste

There are a number of both research related and industrial chemicals present, or capable of being prepared, which are listed as acute hazardous, or "RCRA P-listed," once they have been declared as waste. WCU is considered a Small Quantity Generator (SQG) and is not permitted to exceed the generation of 1 kg/month (2.2046 lbs.) for these wastes. If this would occur, a status of Large Quantity Generator (LQG) would have to be established. A chemical is defined as acutely hazardous (P-listed) in 40 CFR Subpart D, Section 261.33. A copy of this list of chemicals can be obtained from Environmental Health and Safety or at the University's library (Government Depository). Please do NOT generate a RCRA P-listed waste without FIRST contacting EHS. Other researchers on the campus may also be generating RCRA P-listed waste, and the combined total could potentially exceed the 1 kg/month (2.2046 lbs.) threshold. Please contact EHS x-3333 to answer questions concerning P-listed wastes.

15.0 Paint

Solvent based waste paint and paint thinners are regulated as hazardous wastes and must be disposed of as such. Contact Environmental Health and Safety at x-3333 for disposal instructions.

Some latex paints contain regulated materials where as others are non-regulated. Refer to MSDSs for disposal instructions on disposal of latex paints. **LIQUID latex paints CAN NOT be disposed of as municipal waste (i.e. in normal trash receptacles).** Dried latex paints which have been determined non-regulated by referring to the specific MSDS can be disposed of as municipal waste.

Solvent based paints and thinners are regulated as a hazardous waste and **must not** be disposed of in sanitary waste systems or storm water runoff drains, or allowed to evaporate to the atmosphere. These items must be collected and stored for disposal through the University's Environmental Health & Safety Department. In keeping with the desire to be a "green campus," West Chester University observes and follows a waste minimization policy (section II) to reduce the impact the university has on our environment. Waste minimization procedures such substituting latex-based paint for solvent-based paint should be implemented where possible.

16.0 Peroxidizable Compounds

Peroxidizable chemicals such as those listed below should be dated upon receipt. Storage and use should be limited to the time indicated for each class or list as shown in Table I below. Containers which show signs of iron oxide or copper oxide should be handled with extra precaution since many metal oxides promote peroxide formation.

The most hazardous compounds - those that form peroxides without being concentrated, which can accumulate a hazardous level of peroxides simply on storage after exposure to air - are in List A. Compounds forming peroxides that are hazardous only when concentrated are in List B. List C consists of vinyl monomers that may form peroxides which can initiate explosive polymerization of the monomers.

Note: Lists are illustrative but not exhaustive.

Table I
Common Compounds that Form Peroxides During Storage

List A (Three Months)	List B (Twelve Months)	List C (Twelve Months)
Peroxide Hazard On Storage	Peroxide Hazard On Concentration	Hazard Due to Peroxide Initiation Of Polymerization*
Isopropyl Ether	Ethyl Ether	Styrene
Divinyl Acetylene	Tetrahydrofuran	Butadiene
Vinylidene Chloride	Furan	Tetrafluoroethylene
Potassium Metal	Dioxane	Vinyl Acetylene
Sodium Amide	Acetal	Vinyl Acetate
Potassium Amide	Vinyl Ethers	Vinyl Chloride
Vinylidene Chloride	2-Butanol	Vinyl Pyridine
	2-Propanol	Chloroprene
	Cyclohexene	
	Cumene	
	Methylcyclopentane	
	Methyl Acetylene	
	Diacetylene	
	Ethylene Glycol Dimethyl Ether (Glyme)	
	Dicyclopentadiene	*When stored as a liquid, the peroxide-forming potential increases and certain monomers (butadiene, chloroprene, and tetrafluoroethylene) should be considered a List A compound.

a. Inventory Control

- Each person responsible for a laboratory should make and maintain an inventory listing the peroxidizable materials in the laboratory.

- The inventory should be reviewed every three months, at which time List A (Table I) samples three months or older and Lists B and C samples 12 months or older would be either tested for peroxide or discarded.

- Quantities of peroxidizable compounds should be purchased according to short-term needs to assure that peroxide buildup, which may accompany long-term storage, is minimized.

- Recording the date of receipt on the label assists in "first in-first out" usage of materials.

- Purchase in package sizes corresponding to use requirements is also recommended to minimize exposure to air from multiple openings of the container.

b. Labeling

- All materials in Lists A, B, and C of Table I, as well as any other peroxidizable compound, should have a warning label bearing the date of receipt in the laboratory and the date when the container was first opened. Example shown below.

- Discard or test within three months after opening compounds in List A or any other peroxidizable compound that represents a hazard on storage. For disposal contact the chemistry stockroom at x-2274 or the Environmental Health & Safety office at x-3333.

- Discard or test within 12 month after opening materials in Lists B and C or other similar peroxidizable materials.

PEROXIDIZABLE COMPOUND RECEIVED OPENED DATE:
DISCARD OR TEST WITHIN ___ MONTHS AFTER OPENING

c. Storage

- All peroxidizable compounds should be stored away from heat and light. Sunlight is an especially good promoter of peroxidation. Protection from physical damage and ignition sources during storage is also essential.

- All metal containers must be clean and free from metal oxides, because some metal oxides, such as iron and copper oxide, may actually promote peroxide formation.

- Particular care should be given to ensure tight closure on storage containers. Loose or leaky closures may permit evaporation of storage material, leaving a hazardous concentration of peroxides in the container.

- When handling peroxidizable compounds stored in cylinders, care must be taken to ensure that the cylinders are maintained free from air.

- Peroxidizable compounds should be stored under an inert (oxygen-free) atmosphere such as nitrogen. Vinyl monomers containing certain inhibitors are exceptions. Containers should be purged with nitrogen if opened and re-closed during storage and handling.

- The use of oxidation inhibitors is especially important in the safe handling of peroxidizable materials. Hydroquinone, alkyl phenols, aromatic amines, or similar materials are recommended by the manufacturers as being effective in preventing peroxide formation during storage of peroxidizable compounds. The selection of a proper inhibitor should be made to avoid possible conflict with use or purity requirements of the compound. A program of periodic testing and replenishing inhibitor levels should be followed during storage of peroxidizable material.

d. Disposal

- List A materials – those that can accumulate a hazardous level of peroxides simply on storage after exposure to air – should be evaluated for peroxide content at least every three months after opening and either re-dated if safe or else discarded. For disposal contact the chemistry stockroom at x-2274 or the Environmental Health & Safety office at x-3333.

- List B materials should not be stored for longer than 12 months after opening unless they are shown, by a suitable test, not to have accumulated peroxide.

- List C materials are vinyl monomers and should be stored for no longer than 12 months unless they are shown by test to be free of peroxide. Commercial vinyl monomers usually contain additives (inhibitors), which inhibit peroxidation. Generally, storage of inhibited vinyl monomers should be under air rather than nitrogen or other inert atmosphere, because customary inhibitors are phenolic compounds, which require oxygen for their action. Most vinyl monomers may be polymerized without removal of inhibitor by proper adjustment of initiator concentration; thus making the isolation of the more hazardous uninhibited material unnecessary.

- Uninhibited List C materials can be a significant hazard. Quantities of such uninhibited monomers greater than 500 grams should be stored for no longer than 24 hours. Small samples (less than 10 grams) may be stored longer than 24 hours only with discretion. Generally, storage of uninhibited vinyl monomers should be under nitrogen and at below room temperatures. For storage in excess of 24 hours, a suitable inhibitor should be added, and its name and quantity should be placed on the label.

- Methyl methacrylate, ethyl acrylate, and other common acrylic monomers are not in List C because there has been no report of their peroxidation to hazardous levels in normal use and storage. However, for good safety practice, acrylic monomers should be inhibited for storage, and work with uninhibited monomers should be limited to quantities less than 500 grams.

- Compounds that are suspected of having very high peroxide levels, because of visual observation of unusual viscosity or crystal formation or because of age, should be considered extremely dangerous. Contact Environmental Health & Safety at x-3333 before doing anything with these compounds.

17.0 Photographic Chemicals

Photographic chemicals can contain hazardous constituents and should be handled as hazardous waste. Do not dispose of by pouring chemicals down the drains. Accumulate and store photographic chemicals in the appropriate containers and arrange for removal by contacting the Environmental Health and Safety Department at x-3333.

18.0 Recyclables

Use the appropriate procedures and receptacles according to West Chester University's Threecycle system. (Information is available from the Recycling Department at x-3485).

19.0 Radioactive Waste

Contact Environmental Health and Safety at x-3333 for disposal instructions.

20.0 Waste Oil

Waste oil (including pump oil, crankcase oil, gear oil, hydraulic fluid, power steering fluid, #2 fuel oil, etc.) should be placed in an appropriate container and labeled with a hazardous waste label. Arrange for removal by contacting the Environmental Health and Safety Department at x-3333.

The burning of waste oil at the University Boiler Plant is prohibited.

V. HAZARDOUS WASTE DISPOSAL

Most campus departments utilize, handle or store some forms of hazardous materials that will produce chemical wastes requiring disposal. It is the practice of West Chester University to provide a safe and appropriate means of managing these materials once they are no longer useful.

An overview of West Chester University hazardous waste disposal procedures is presented in this section. The procedures outlined in this section are designed to promote:

1) Safe handling of wastes to prevent spills and other accidents.
2) An efficient disposal process for all concerned.
3) Compliance with all applicable regulations governing hazardous wastes. Implementation of these procedures requires the cooperation of faculty, staff, and students.

1.0 General

There are many ways to define hazardous waste but the following Department of Transportation (DOT) definition can be used as a general guide: A hazardous material/waste is a substance….which has been determined to be capable of posing an unreasonable risk to health, safety, and property, when transported in commerce (49 CFR (171.8)). In addition to the DOT, the Environmental Protection Agency (EPA), the Commonwealth of Pennsylvania and other federal agencies have their own definitions of what is hazardous.

The EPA defines three categories of hazardous waste generators based upon the quantity of hazardous waste they generate per month:

1. Conditionally exempt small quantity generators (CESQGs), which generate less than 220 lbs (100 kg) per month and/or less than 1 kilogram per month of acute hazardous waste.
2. Small quantity generators (SQGs), which generate between 220 lbs (100 kg) and 2,200 lbs (1,000 kg) per month and/or less than 1 kilogram per month of acute hazardous waste.
3. Large quantity generators (LQGs), which generate more than 2,200 lbs (1,000 kg) per month.

The EPA and the Commonwealth of Pennsylvania have developed and enforce hazardous waste regulations specific to each generator category listed above.

In order for the University to maintain our current generator category status (i.e. Small Quantity Generator) and to fully comply with the set of hazardous waste regulations that apply, the following hazardous waste disposal procedures must be followed.

2.0 Segregation of Waste

Disposal procedures of hazardous wastes are determined by several agencies such as, the Environmental Protection Agency, Pennsylvania Department of Environmental Protection, Department of Transportation, as well as cost and treatment standards. Specific waste streams

2.0 Segregation of Waste (cont.)

can be more expensive to dispose of depending on the method of treatment. For that reason, chemical waste streams should be separated whenever possible.

1. First separate waste by physical state.

Solids

A. Salts
   a. oxides, sulfides, sulfates, etc.
   b. hydroxides should be separated where possible

B. Oxidizers
   Oxidizers should be separated from other waste streams when possible. Examples of oxidizers include chromates, permanganates, nitrates.

C. Mercury-containing waste

Liquids

A. Aqueous solutions
   a. Salt solutions, acidic, basic solutions
   b. Oxidizer solutions

B. Organic/solvent solutions
   a. Halogenated solvents (i.e. chlorinated) should be separated from non-halogenated solvents
   b. Non-halogenated solvents (i.e. chlorinated)

C. Mercury containing waste

Suggestion: Add an additional step to student laboratory procedures to separate waste streams and precipitate out mercury compounds. This can reduce disposal costs significantly.

2. Segregate the chemicals by ***hazard class***; this helps to reduce the risk of a reaction between chemicals during transportation, storage and/or pick-up.

Hazard Classes

A simple method for determining if waste is hazardous is if it fits into the following hazard classes:

- Flammable
- Oxidizer
- Reactive
  - Water reactive
  - Shock sensitive
  - Light, heat reactive
- Corrosive Acid – mineral
- Corrosive Acid – organic
- Corrosive Base

- Toxic-poison/irritant/carcinogen etc.
- Gas cylinders – segregate by hazard class

Use the following resources to determine the hazard class of your waste:

- MSDS
- Original Container Label
- Manufacturers catalog
- International Chemical Safety Cards-see: http://www.ilo.org/public/english/protection/safework/cis/products/icsc/dtasht/index.htm

The following are examples of *Hazardous Waste* that need proper disposal:

- Flammable and non-flammable solvents
- Corrosives – acids and bases
- Oxidizers – nitric acid, nitrates, chlorates, peroxides
- Reactives – hydrides, azides, picryls
- Toxic – poisons, mutagens, carcinogens, controlled substances, dyes, stains, mercury, and ink sludge's containing chromium and lead, other heavy metals, etc.
- Solvent contaminated paper, rags, or other clean-up debris
- Photo-fixer, developer, x-ray film
- Computers, circuit boards, monitors etc.
- Antifreeze
- Paint, sand-blasting sand, wet paint filters, wood preserving agents, etc.
- Concentrated boiler treatment chemicals or cleaning supplies
- *Fluorescent lamps, batteries and mercury thermostats
- **Pesticides

*These types of waste are classified by EPA as Universal Waste and are subject to less stringent federal and state hazardous waste regulations.

**Certain unused, recalled and non-hazardous pesticides are classified as Universal Waste, others that are listed in EPA's 40 CFR 261 Subpart C and 261 Subpart D are considered Hazardous Waste

Problem Hazardous Waste

- Gas cylinders, lecture bottles, aerosol cans
  - Make arrangements when purchasing gas cylinders that the manufacturer or supplier will accept return of used cylinders
- Shock sensitive materials – peroxidized ethers, dry picric acid
- Naturally occurring radioactive materials – uranyl nitrate, thorium nitrate

3.0 Procedures for Disposal:

3.1 Containers

Hazardous waste must be placed in a suitable container prior to disposal by the Department of Environmental Health & Safety. The container must be compatible with the contents, be structurally sound, non-leaking, and have a tight fitting lid or cap. Departments must provide their own suitable containers for hazardous waste.

- No stirring rods, boiling chips, syringes, pipettes should be placed in any liquid waste containers.
- Lids of Parafilm, aluminum foil, rubber stoppers, or no lid at all will be refused for disposal until properly containerized.
- The containers must have headspace to allow for expansion of volatile liquids.
- Usually filling the container and leaving ≈ 1-2 inches will leave enough headspace.
- DO NOT FILL THE CONTAINER UP TO THE BRIM. Fill the container up to the "shoulder" of the container.
- All containers must be securely closed before collected for disposal.
- Container must be kept closed except when adding or removing waste
- Container must be handled and stored in a manner that will prevent rupture or leaks
- Container must be inspected weekly for leaks or deterioration
- Do not place incompatible materials in the same container or place waste into an unwashed container that contained an incompatible material

NOTE: All wastes not correctly containerized will be refused for disposal.

3.2 Empty Containers

Cleaning and Disposal of Empty Containers

A container which held chemicals or hazardous materials is considered empty and not subject to Resource Conservation and Recovery Act (RCRA) regulations if all of the contents "have been removed by standard practice and no more than 2.5 cm (1 inch) of residue, or 3 percent by weight of containers less than 110 gallons, remains".

Empty bottles, cans, 5 gallon pails, drums, or other containers which contained chemicals or hazardous materials should be rinsed and/or air-dried before reuse, recycling (if feasible) or disposal of the empty container is attempted. Examples of hazardous materials include thinners, treatment chemicals, paint cans, pest/herb/insecticides, cleaning supply bottles, and other maintenance chemicals. Science department chemicals and solvents may require special handling as noted below.

Rinsate should be handled with the same safety precautions as the original material (i.e. PPE: chemical-resistant gloves, splash proof goggles, tyveks, etc.). Rinsate may be a

RCRA hazardous waste, depending on the original contents and if the rinsate falls within the RCRA hazardous waste characteristics of ignitability, corrosivity, reactivity, or toxicity (40 CFR 261 [Code of Federal Regulations], Subpart C) or if the material in the container was listed in 40 CFR 261, Subpart D. If rinsate is determined to be a hazardous waste, or if unsure of determination, contact the Environmental Health and Safety department at x-3333 for rinsate disposal procedures. Once rinsed, remove all other identifying marks and labels, compromise container, and boldly mark the container "**RINSED**" and "**EMPTY**".

Listed below are general handling procedures for properly rinsing a container. To determine if a container is recyclable, contact the recycling department at x-3485.

General Procedures

1. Triple rinse the container
2. Air-Dry
3. Remove labels
4. Compromise container integrity (i.e. cut or punch holes in container to eliminate unauthorized reuse)
5. Mark container: "RINSED", "EMPTY"
6. Recycle or dispose of appropriately

Science department acutely hazardous (P-listed) chemicals:

A chemical is defined as acutely hazardous (P-listed) in 40 CFR Subpart D, Section 261.33. A copy of this list of chemicals can be obtained from Environmental Health and Safety or at the University's library (Government Depository). Prior to the purchase of a P-listed chemical, the principal investigator must notify the EHS department of the purchase.

If the container held a P-listed chemical, the container must be handled as follows:

1. Triple-rinse using a solvent capable of removing the chemical (ALL RINSATE MUST BE COLLECTED FOR DISPOSAL; CONTACT EHS AT x-3333)
2. Air-Dry
3. Remove labels
4. Compromise container integrity (i.e. cut or punch holes in container to eliminate unauthorized reuse)
5. Mark container: "RINSED", "EMPTY"
6. Dispose of appropriately; DO NOT REUSE CONTAINER

3.3 Labels

Complete and accurate labeling of hazardous waste containers is absolutely essential. The label serves several vital purposes:

1. Safety: The personnel who handle the waste containers collected must be able to protect themselves by taking precautions which are commensurate with the hazards of the materials being handled.
2. Prevent mixing incompatible waste together.
3. It dictates the disposal route to be followed after collection.

NOTE: Wastes not labeled will be refused for disposal.

- Labels must be securely attached to the handle of the container with wire.
- Do not tape labels to containers as they easily fall off.
- Use WCU Hazardous Waste Label
- Mark the accumulation start date for each container, the accumulation start date must be visible for inspection
- Hazardous waste generator's name or responsible person (i.e. faculty, building administrator, shop foreman, employee, etc..), building/room# and phone#
- Contents – Please write the full name of the compound(s) and the percentages of each and container size. Please do not use acronyms, chemical formulas or chemical structures.
  If known, mark the chemical family code contents fall under on back of hazardous waste label (e.g. Inorganic 1-Metal, Hydrides, Organic 8-Phenols, Cresols)
- Information written on labels should be in dark pencil, ball point pen, or an indelible lab marker that will not fade or run.

A percentage of randomly selected waste containers are periodically sampled for analysis to verify the validity of the chemical waste label attached by the generator. This verification process is required by regulation.

NOTE: For the safety of handlers, unknowns or improperly labeled chemicals/materials cannot be accepted for disposal. If an unknown is generated, the Department generating the waste will be responsible for contacting EHS to arrange for testing to identify the material and ultimately paying for the testing of the material.

3.4 Inventory

An inventory of all chemicals that are for waste disposal should accompany the material. The inventory form should contain the following minimum information:

- Chemical name
- Size of container (4oz., 8oz., 1lb., pint, 5lb., quart, gallon...)
- Quantity in container(full, 1/2 full, 1/4 full, residue)
- The # of containers

The inventory format should be done in a table or spreadsheet fashion. An example might be:

Chemical Name	Size of Container	Quantity in Container	Number of Containers

The inventory should include a principal investigator's name, room #, and/or location where the chemicals came from. This information could save in very costly analytical expenses if we have any questions in the future about the chemicals.

3.5 Scheduling of Waste Pick-up

For Schmucker Science Center Phase I & II and Boucher Hall, please contact George Zittle (x-2274) to arrange for waste pick up. For areas outside of Schmucker Science please contact EHS will to arrange for waste pick-up. Typically EHS will pick up the waste on **the last Thursday of every month of the calendar year** and transport it to the Chemical Storage Area located outside of Schmucker Science Center. Due to the potential for large quantities of hazardous waste generated, EHS recommends **requests for pick-up service be made one week before the scheduled monthly pick-up.**

Requests for special pick-ups can be made by contacting, Michelle Curley (EHS) by e-mail or at x-3333, or George Zittle (Chemistry Department Stockroom) by e-mail or x-2274.

References

National Research Council; Prudent Practices in the Laboratory, Handling and Disposal of Chemicals. National Academy Press, Wash. D.C., 1995.

Waste Disposal Procedures Handbook, Lehigh University, 1994.