

Waste Minimization Policy

Introduction

The University of North Carolina at Greensboro is committed to preserving a balance between protecting the health of people and the environment, while accommodating growth in productive research operations on campus.

As a generator of hazardous waste, UNCG is required by the U.S. Environmental Protection Program (EPA) and the North Carolina Department of Environment and Natural Resources (NCDENR) to devise and implement plans to reduce the amount of hazardous waste we generate on campus. These efforts provide the benefit of reducing the amount of hazardous and toxic chemicals we put into the environment as well as money spent on Hazardous Waste disposal. Below are some techniques we should be utilizing on our campus. Please call our office if you need any assistance in your minimization efforts.

Methods of Waste Reduction

- **Source Reduction (Pollution Prevention)**
The most desirable method of waste minimization is source reduction, which reduces the impact of chemical wastes on the environment to the greatest extent. This is an activity that reduces or eliminates the generation of chemical waste at the source.
- **Recycling**
The next most desirable approach is waste minimization through recycling. When a waste material is used for another purpose, treated and reused in the same process, or reclaimed for another process, this is called recycling.
- **Treatment**
The last minimization method is treatment. The most common treatment that can be performed in laboratories is elementary neutralization. Other kinds of treatment may involve chemical, physical or biological methods.

Substitution of hazardous chemicals with non-hazardous ones is a simple way to minimize waste. For example: use Alconox for cleaning glassware instead of chromic acid based cleaners, and avoid mercury containing equipment whenever possible. Modification of procedures,

processes or equipment can also lead to waste minimization. In laboratories where high volumes of spent solvents are generated, distillation would provide a cost effective means of re-using these solvents. Good laboratory practices such as computer modeling and small scale experiments can minimize waste, as well as purchasing only the amount and type of chemical needed for the experiment. Keeping hazardous waste separate from non-hazardous will reduce waste as will good inventory control, housekeeping, and training of personnel.

Waste Minimization Programs

Rechargeable Battery Recycling

Rechargeable batteries are found in countless electronic devices used across campus. Cordless power tools, laptop computers, cellular and cordless telephones, digital cameras, laboratory equipment, and many other hand held devices are used throughout campus facilities and departments. UNCG recycles the following types of rechargeable batteries: nickel cadmium (Ni-Cad), nickel metal hydride (Ni-MH), lithium ion, sealed lead acid, and mercury. When broken, these batteries can release heavy metals that damage the environment, so keeping them out of landfills is paramount.

Used rechargeable batteries may be classified as hazardous waste due to their heavy metal content and are thus regulated under the Resource Conservation and Recovery Act (RCRA). These regulations provide for management of hazardous wastes.

EPA created the Universal Waste Rule, and this set of regulations is designed to reduce regulatory management requirements and burdens. UNCG manages used rechargeable batteries as universal waste. The Universal Waste Rule promotes pollution prevention and waste minimization by encouraging the recycling of used rechargeable batteries instead of less desirable methods of disposal such as land filling or incineration.

The types of rechargeable batteries we recycle include:

- lithium ion
- nickel cadmium
- sealed lead
- lead acid batteries
- mercury batteries
- nickel metal hydride

Batteries shall be collected in containers, labeled properly, and kept closed unless adding batteries to the container. Containers and labels will be provided by EHS.

Sealed lead batteries must have their terminals covered with electrical tape before placing them in the collection container.

Management

Used rechargeable batteries can be picked by completing a Chemical Waste Removal Form: [Chemical Waste Removal Form Link](#)

- All rechargeable batteries must be intact.
- Leaking or damaged rechargeable batteries shall be placed in a suitable, closed container and labeled accordingly.
- Do not mix different battery types.
- Alkaline batteries are not regulated by EPA and may be recycled through the Office of Waste Reduction and Recycling 334-5192.

Any questions regarding this program, please call EHS at 334-4357.

Fluorescent Bulb and Ballast Recycling

Fluorescent lamps illuminate every classrooms, laboratories, and buildings on campus. HID lamps (mercury-vapor, metal-halide and high-pressure sodium) are used for streetlights, floodlights and shop lights. When broken, these lamps release mercury and other metals that harm the environment.

Note: Broken Fluorescent lamps must be managed as hazardous waste. Please clean up any broken lamps immediately by sweeping up the material and placing it in a sealed bag or container. Contact EHS for disposal.

UNCG manages spent fluorescent lamps as universal waste. The Universal Waste Rule is designed to reduce regulatory management requirements.

Management

Facilities Operations (FO) and Housing and Residence Life (HRL)

Requirements for Accumulating and Storing Used Lamps

All spent lamps must be handled and stored to prevent breakage.

- Please mark the containers or boxes with the words, “USED LAMPS” and write the start date on the container when the first spent lamp is first placed into it.
- We are allowed to accumulate and store used lamps on campus for up to one year, so please transfer stored lamps to EHS before the ninth month of storage to give EHS time to prep and ship.
- Pack the lamps neatly in containers. Remove fiberboard spacers if necessary. Please do not mix different lamps in same containers.
- When a container is full, securely tape the container closed.

- Please keep cardboard containers dry when storing and store out of the weather. Moisture damages the containers.

Drop off or pick up of full containers of lamps

EHS accepts bulbs on Tuesdays from 8-10am at the Chemical Safety Facility, located on the corner of Oakland Avenue and Stirling Street. Contact EHS to schedule a drop off or pickup for other days or times. Containers of lamps being dropped off must be packed neatly and properly taped before being dropped off. Otherwise, the containers may not be accepted. Also, the start date must be written on the containers.

Compact Fluorescents Lamps (CFLs)

Compact fluorescent lamps also contain mercury and are recycled through our recycling program. Employees may also drop CFLs off at EHS on Tuesdays between 8-10am or call to request a pickup. Also, since students use CFLs in dorms, EHS and HRL have placed CFL recycling stations in several buildings around campus for students to drop off their bulbs for recycling.

Locations of CFL Recycling Stations:

Chemical Safety Facility - EHS

Jackson Library – Room 63

Facility Operations – Electrical Shop

Tower Village 2 Post Office

HRL Office

Grogan Patio

*others to be listed as distributed

Broken Lamps

Broken lamps must be cleaned up and collected immediately and placed in 5 gallon pails or sealable bags such as Ziploc bags. The pails or bags should be labeled “Universal Waste – Broken Lamps”. Please use extra care when cleaning up broken lamps. Use gloves to help prevent being cut by the broken glass. Write the start date on the pail or bag and drop off to EHS or call EHS for a pickup. Pails are available through EHS.

Other Mercury Devices

Other mercury-containing devices that might be found include thermostats, thermometers, relays, gauges, and printed circuit boards. These items sometimes are abandoned within buildings. If found, please contact EHS for assistance.

PCB Ballasts

Ballasts which have missing or unreadable labels or if the label does not have the words “No PCBs” should be considered PCB containing ballasts and must be recycled. PCB ballasts may be dropped off to EHS on the same designated time as lamps.

Ballasts which are labeled “No PCBs” may be thrown in normal trash.

Used Oil

Used oil can be a valuable resource when it is properly managed to avoid release to the environment and recycled for utilization of its lubricant or fuel value.

University shops, the Facility Operations garage, and other generators from campus generate a substantial amount of recyclable used oil annually. An outside vendor recycles this material at minimal cost to the University. All faculty and staff should participate in pollution prevention and waste minimization by recycling their used oil.

Used oil is defined as any oil that has been refined from crude oil, or synthetic, and has been used and as a result of such use is contaminated by physical or chemical impurities.

Used oil for recycling:

- Lubricants
- Hydraulic Fluids
- Motor Oil
- Metalworking Oil
- Wire Drawing Solutions

Note: All containers used shall be closed at all times except to empty or fill the container. The words "Used Oil" shall appear on the outside of the container in plain view. A pickup request may be submitted to EHS.

Used oil that must be collected separately and cannot be recycled include:

- Refrigeration oil
- Heat Transfer oil
- Any oil contaminated with any quantity of the following items:
 - Fuels (gasoline, diesel, kerosene, fuel oil, jet fuels)
 - Creosote
 - Solvents (lacquer thinner, mineral spirits, turpentine, paint thinner, degreaser solvents, Stoddard solvent, varsol, white spirits, oleum, naphtha, petroleum naphtha)
- Duplicating Fluid
- Aromatic Hydrocarbons
- Petroleum Distillates

Parts Washers

A parts washer is used to remove residues such as, grease, wax, paint and oil from metal parts, assemblies, and other fabricated products. UNCG operates these sink-type parts washers in several locations in Facility Operations shops and the Art Department. Cleaning solutions used in parts washers include lower volatility solvents and aqueous cleaners. EHS has found that solvent substitutes with lower volatility and higher flash points combined with simple changes in cleaning operations reduce waste generation, improve compliance, and increase safety, while saving money at the same time.

EHS and the Art Department partnered in the effort to reduce the amount of hazardous generated in art teaching studios. This rinse water is generated from students cleaning their brushes and other equipment during and after class. The rinse water was determined to contain high amounts of heavy metals, such as cadmium, which made it regulated by the EPA. This waste was collected in 55 gallon drums, and each studio typically generated about 220 gallons of rinse water per year. UNCG installed SafetyKleen parts washers in each of the art studios for students to use to clean their equipment. These parts washers are much easier for students to use and the solvent has a longer cleaning life by design. Our waste generated from a typical studio dropped from 220 gallons per year down to 32 gallons per year. Also, the spent solvent in the parts washers is recycled by SafetyKleen and reused in their systems.

Orphan Chemical Program

Occasionally EHS receives chemicals of good enough quality that they can be redistributed to other researchers on campus. Only members of the UNCG research community are allowed to take part in this program. These chemicals will be in their original container with original labeling. The most common chemicals available for redistribution are listed below:

- Mineral acids
- Bases
- Solid oxidizers (permanganates, chlorates, chromates, nitrates)
- Organic solvents (halogenated and non-halogenated)

To inquire about the Orphan Chemical Program, please contact EHS. Researchers may request orphan chemicals by completing and submitting an [Orphan Chemical Aquisition Form](#). Also, the Orphan Chemical Inventory may be found on the EHS website at [Orphan Chemical List](#). Also, researchers are welcome to come by our facility and “window shop”.

“Unknown” Chemicals

The generation of unlabeled and unidentified chemicals results in an expensive waste disposal challenge. The number of unknown chemicals can be significantly reduced by simply making a concerted effort to **label all containers**. Unknown chemicals can cost up to ten times more to dispose of than properly labeled chemicals. Original chemical and product labels should be retained on containers until the chemicals/products are completely used and the containers no longer have any hazards related to its contents. When transferred to secondary containers chemicals/products should be labeled at a minimum with the chemical/product name and the primary hazard (i.e. flammable, poison, etc.).

- Prevent generation of unknown chemicals/products by keeping all containers labeled.
- Do not let old chemicals and products accumulate, clean out stockpiles of old chemicals and products before they become “unknowns.” Contact EHS for disposal.
- Before a laboratory researcher or graduate student leaves UNCG, all samples and chemical formulations generated by that person, must be clearly labeled as to their content.
- Chemicals must be transferred to another researcher or properly disposed of prior to the individual’s departure. Contact EHS for additional information regarding proper lab closeout procedures.

Mercury Free Campus

Mercury has been used in the measurement of atmospheric pressures and temperatures since the mid 1600’s. Laboratories are often dependent upon the ability to measure temperatures and pressures. Unfortunately, this measurement is not without hazard. Broken mercury-filled thermometers and other equipment pose a much greater hazard than merely the possibility of being cut by broken glass. Mercury, in its liquid form is incredibly mobile and will skate across horizontal surfaces, easily becoming lodged in minute cracks and crevices along the way. Mercury gives off a colorless, odorless vapor that is highly toxic. The Threshold Limit Value (TLV) for mercury is 0.05 mg/m³ of air. The nervous system is very sensitive to all forms of mercury, but is especially sensitive to mercury vapors because of its ability to reach the brain more easily. Short-term exposure to high concentrations of mercury may cause nausea, abdominal pain, vomiting, diarrhea, and headache. Long-term exposure to small amounts may cause severe nervous disturbance (hand tremors, insomnia, memory loss, irritability, and depression), loosening of the teeth, excessive salivation, and kidney damage. Harmful effects can also be passed from the mother to a developing fetus.

In addition to the toxic hazards of mercury there are also high costs for disposal and spill cleanup. One lab at the University of California at Berkeley had to pay \$25,000 for clean-up of mercury contamination from a spill. When mercury is spilled inside heat-producing devices, such as incubators and ovens, the devices are extremely difficult to decontaminate, and the hazard is magnified because heat accelerates vaporization of any remaining mercury.

EHS completed a safety project in 2000 to rid the campus of as much mercury-containing equipment as possible. One of the main parts of this project was to replace mercury thermometers with non-mercury thermometers in research and teaching laboratories. During this

project, EHS replaced 752 thermometers and monometers on campus. The total cost of this project was over \$16,000.

When purchasing thermometers or other similar equipment, please purchase NON-Mercury alternatives of the product. EHS can assist in finding the right mercury-free equipment to fit any need. If any mercury devices are found in your department, please call EHS for proper recycling of the material.

Conclusion

Waste minimization is a process of continual improvement. All University faculty, staff and students shall be encouraged to identify opportunities for waste minimization in their daily activities.

Waste prevention and minimization has positive environmental, human health and safety, and economic impacts. Therefore it is an important goal at UNCG . Implementing a "less is better" concept provides better protection of human health and safety by reducing exposures, generating less demand for disposal on the environment. Less Waste also lowers disposal cost. You can do your part helping UNCG reach this waste prevention and minimization goal by educating yourself and others about waste prevention and minimization. All faculty, staff, and students should take responsibility for educating ourselves about environmental protection as well as human health and safety.