



Hazardous Waste Minimization Program

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Waste Minimization Program

The University of North Carolina at Charlotte is committed to operating the University hazardous waste management program in a fashion that places a high priority on waste minimization and pollution prevention. As required by EPA guidelines, the University has developed a waste management program that includes the following basic elements:

1. Management Support
2. Characterization of Waste Generation
3. Periodic Waste Minimization Assessments
4. Technology Transfer
5. Program Evaluation

1.0 Management Support & Waste Minimization Statement

The University authorizes the Environmental Health and Safety (EHS) Office to develop and implement a hazardous waste management program for activities on University property under the large quantity generator designation. The primary hazardous waste generating operations are teaching/research laboratories and maintenance/facility service activities. Numerous individual laboratories generate research-related wastes.

The primary sources of hazardous waste generation are research and teaching activities, the nature of which is not easily amenable to the establishment of specific goals for reduction of waste generation. The [EHS webpage](#) contains the following information on hazardous waste management: disposal procedures, hazardous waste and spill prevention, [EHS training programs](#), [MSDS Database](#) and [fact sheets](#) containing practical tips.

The EHS office is responsible for the continued development, implementation, and recordkeeping tasks of a waste minimization program.

The EHS office submits annual recycling and minimization data to the [Recycling Office](#). This EHS information is merged with campus-wide recycling efforts and released to the public.

Pursuant to 40 CFR 264.73(b)(9) as adopted in 51A NCAC 13A .0109 and section 3005(h) of RCRA, 42 U.S.C. 6925(h), UNC Charlotte certifies, no less often than annually that:

1. The Environmental Health and Safety Office has a program in place to reduce the volume and toxicity of hazardous waste to a degree determined by the EHS Director and staff to be economically practicable; and
2. The proposed method of treatment, storage or disposal is the most practicable method available to the University, which minimizes the present and future threat to human health and the environment.

2.0 Characterization of Waste Generation

The EHS office coordinates the characterization and identification, transport, storage and disposal activities for all regulated wastes generated at UNC Charlotte under the EPA large quantity generator designation.

There are four general categories of hazardous waste generated at the University – assorted waste solvents, discarded commercial chemical products, radioactive mixed wastes, and general chemical wastes.

Approximately 80 percent of the waste generated at the University is characterized by six waste codes including: D001 (ignitable), D002 (corrosive), F002 (spent halogenated solvents), F003 (spent non-halogenated solvents), F005 (spent non-halogenated solvents) and D022 (toxicity characteristic for chloroform). The remaining 20 percent of the waste may include toxicity characteristic wastes, and discarded commercial chemical products.

3.0 Periodic Waste Minimization Assessment

The EHS Office advocates the following hierarchy of control practices in the management of hazardous wastes:

1. Chemical substitution/reduction
2. Practice inventory control
3. Good housekeeping
4. Off-site recycling

Using these four points as waste minimization targets, the identification of areas where materials can be prevented from becoming a waste or can be recycled can be determined, identification of potential waste reduction and recycling techniques applicable to each waste can be determined and other opportunities uncovered.

EHS has an active, ongoing program for the reuse and recycling of unused chemicals within University laboratories and facilities. After hazardous waste removal requests have been received by the EHS Office, they are evaluated to determine if the wastes can be reused by other departments on campus. Generally the “hazardous wastes” evaluated consist of unused liquid and solid chemical reagents. The EHS Office inventories and then sends out requests to various academic departments, such as Biology, Chemistry, Geology and Engineering to determine if there is a need for the unused chemicals. If there is a need, the EHS Office will deliver the chemical to the new user. This practice saves on the cost of purchasing new chemicals as well as the cost of disposing of the unused “hazardous waste” material.

3.1 Is Your Operation A Green Operation?

A Green Operation is one that understands its impact on the environment and tries to minimize it. Since operations differ, there is no one standard for a Green Operation. The following actions, however, are ways of pursuing sound environmental practices. A Green Operation will:

- *Train new personnel in chemical and environmental safety, including methods of pollution prevention and waste minimization used in the operation;*
- *Assess air emissions, wastewater discharges and waste generation to understand how your operations impact the environment;*
- *Buy only the chemicals and amounts needed;*
- *Use redistributed surplus chemicals whenever possible;*
- *Review the chemicals in use to understand their hazards (e.g., reading Material Safety Data Sheets) and search for safer substitutes;*
- *Keep caps on carboys and other containers of chemicals;*
- *Prepare for leaks and spills by using secondary containment and by maintaining a spill kit;*
- *Take responsibility for waste disposal by neutralizing acids and treating other chemicals as a final step of an experiment; and*
- *Remind colleagues and new personnel to keep waste types separate, and devise a system of separate waste collection that works for your operation.*

3.2 Chemical Substitution/Reduction

Generators are encouraged to substitute non-hazardous materials in their process. The chart below details some options for the substitution of a hazardous chemical or product with one less hazardous:

Chemical	Substitute	Use
Ethidium Bromide	SYBR Safe or Crystal Violet	Gel electrophoresis
Fluorescent Mercury Bulbs (Silver Tip)	Better: Green Tip Bulbs Best: LED T8 Lamps	Lighting
Formaldehyde	Ethanol	Specimen storage
Halogenated Solvents	Non-Halogenated Solvents	Extractions
Mercury Thermometers	Alcohol (red liquid), digital	Temperature
Oil Based Paint	Latex Paint	Painting operations
Organic Solvent Based Inks	Water based inks	Oil painting
Photographic chemical developing	Digital photography	Photographic film developing
Solvents (general)	Detergent and Hot Water	Parts / labware cleaner
Staining/processing solvents (benzene, xylene, toluene)	Citric Acid based Americlear	Staining, processing, removing alkanes in lab procedures
Toluene based scintillation fluid	Non-Ignitable scintillation fluid	Radioactive samples analysis

3.3 Green Chemistry

Green chemistry, also known as sustainable chemistry, is the design of chemical products and processes that reduce or eliminate the use or generation of hazardous substances. Green chemistry applies across the life cycle of a chemical product, including its design, manufacture, and use. [Read more about the concept of green chemistry.](#)

- Reduced waste, eliminating costly end-of-the-pipe treatments
- Safer products
- Reduced use of energy and resources
- Potential competitive improvement for chemical manufacturers and their customers.

3.4 Practice Inventory Control

Generators are encouraged to audit their chemical supplies and use inventory control to purchase only the quantity of material required for specific projects or tasks. During laboratory cleanouts and building renovations intradepartmental material exchanges are encouraged.

3.5 Good Housekeeping

Waste generators are instructed not to mix waste (waste segregation), properly label the wastes as to their constituents and store materials in secondary containment.

Secondary containment is used to minimize the potential for breakage and to minimize the consequences in the event of breakage. Secondary containment should be used for all liquid hazardous material glass containers stored on the floor and **all** containers with capacity less than or equal to four liters of liquid hazardous waste, regardless of storage location.” Generators are also required to store waste materials at or near the point of generation.

3.6 Off Site Recycling

This area has grown in recent years to be a major component of the waste minimization program. Alkaline, NiCd, Lead-Acid and NiMH batteries are collected from various operations around campus and recycled through the EHS Office. Fluorescent Bulbs are crushed and recycled through a combined lamp collection and handling program of the EHS Office and Facilities Management. Mercury containing items are collected and sent to a third party recycler whenever possible. Electrical ballasts are recycled whenever possible, based upon contents and condition.

Environmental Enterprises, Inc. is the main hazardous/universal waste recycling entity that handles UNC Charlotte waste production.

4.0 Technology Transfer

EHS takes a proactive role in reducing the quantity and severity of hazardous waste generated at the University. EHS is an active member of the Campus Safety, Health and Environmental Management Association (CSHEMA). Through this association and other academic and scientific/trade associations, the University has ample opportunities to seek and exchange technical information on all facets of chemical and waste management efforts and techniques.

5.0 Program Evaluation

The waste minimization program at UNC Charlotte is continually evaluated to determine if areas for improvement exist. The waste minimization program on campus continues to expand with the work of the campus Sustainability Committee and the efforts of the Recycling Office.

Here is a sample of efforts by EHS and the University to improve the waste minimization program:

- Intradepartmental chemical exchanges during laboratory clean outs and relocations.
- Hazardous & Universal waste contractor sustainability and recycling capability analysis during Request for Bids (RFB) process.
- Battery recycle (all types) collection system including the student dorms.
- Recycle light ballasts, computer equipment, photo processing and microfiche film (silver recovery), mercury containing equipment (thermometers, thermostats, pressure switches) and universal waste fluorescent bulbs.
- Bulked solvents sent for energy recovery instead of disposal.
- Lead materials recycled.
- Used oil recycling and procedures - "Don't mix with solvents", then recycle
- Replacement of ignitable, toxic scintillation fluids with non-hazardous biodegradable solutions.
- Member of the University Sustainability Committee
- Attending various department and facility services meetings to communicate waste minimization and recycling efforts.

Several venues of feedback are in place for periodic evaluation of the program such as within the various sections of EHS Office and the University Sustainability program.

As additional waste minimization opportunities arise during the major University building efforts, cooperative efforts with OWRR and building contractors will be developed to reduce/reuse/recycle materials.

6.0 Waste Minimization Guidance Websites

- **Batelle Institute - Laboratory Waste Minimization and Pollution Prevention** -- This guide explains how you can minimize the hazardous wastes and other chemical pollution generated by experiments that are performed in classroom laboratories. It is intended for middle school, high school, and college science teachers.

<http://www.p2pays.org/ref/01/text/00779/ch01.htm>

- **US EPA – Green Chemistry** -- Green chemistry, also known as sustainable chemistry, is the design of chemical products and processes that reduce or eliminate the use or generation of hazardous substances. Green chemistry applies across the life cycle of a chemical product, including its design, manufacture, and use.

<http://www.epa.gov/oppt/greenchemistry/>

- **University of Oregon – Greener Education Materials for Chemists (GEMs)** – a database that is designed as a comprehensive resource of education materials including laboratory exercises, lecture materials, course syllabi and multimedia content that illustrate chemical concepts important for green chemistry. Each entry includes a description of the item and is searchable by a variety of parameters, including chemistry concepts, laboratory techniques, green chemistry principles, and target audience. Database entries incorporate both published and unpublished materials.

<http://greenchem.uoregon.edu/Pages/Search.php#>

- **Green Chemistry Network** – The Green Chemistry Network (GCN) aims to promote awareness and facilitate education, training and practice of Green Chemistry in industry, commerce, central, regional and local government, academia and schools. The network was initially launched in 1998 with funding from the Royal Society of Chemistry and is now funded on a project-by- project basis. The GCN is a not-for-profit Company Limited by Guarantee (Registered in England and Wales, No: 6879262).

<http://www.greenchemistrynetwork.org/>

[U.S. EPA Hazardous Waste Minimization - The National Waste Minimization Program supports efforts that promote a more sustainable society, reduce the amounts of waste generated, and lower the toxicity and persistence of wastes that are generated.](#)

<http://www.epa.gov/waste/hazard/wastemin/index.htm>