THE UNIVERSITY of NEW ORLEANS
OFFICE OF RESEARCH

Hazardous Waste Minimization & Pollution Prevention (P2) Plan

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1. Purpose

The University of New Orleans (UNO) is continuously striving to promote operations and culture that align with known sustainable methods. Most of the hazardous waste produced at UNO is from laboratory operations. UNO has several goals related to sustainability, including: reducing the amount of hazardous waste generated, reducing the amount of solid waste generated, substituting toxic materials for less- or non-toxic materials, reusing materials when possible, purchasing energy-efficient equipment when possible, and more. UNO's commitment to these goals illustrates our care for students, staff, faculty, guests, and the environment.

In addition to care, UNO recognizes the cost benefit of solid and hazardous waste reduction, as listed below:

- Solid and hazardous waste disposal is expensive.
- UNO pays the Louisiana Department of Environmental Quality (DEQ) an annual hazardous waste tax as a generator of hazardous waste.
- A reduced quantity of hazardous waste involves a reduction of hazardous material on campus, therefore reducing the potential for an accident, injury, or exposure.

2. Roles and Responsibilities

Hazardous and Regulated Waste Disposal

Laboratory personnel, facilities personnel, and other generators of hazardous waste at UNO have read the UNO Regulated Waste Guidelines, which detail procedures for each regulated waste stream on campus. These procedures involve generation, storage, and disposal of all regulated material on campus.

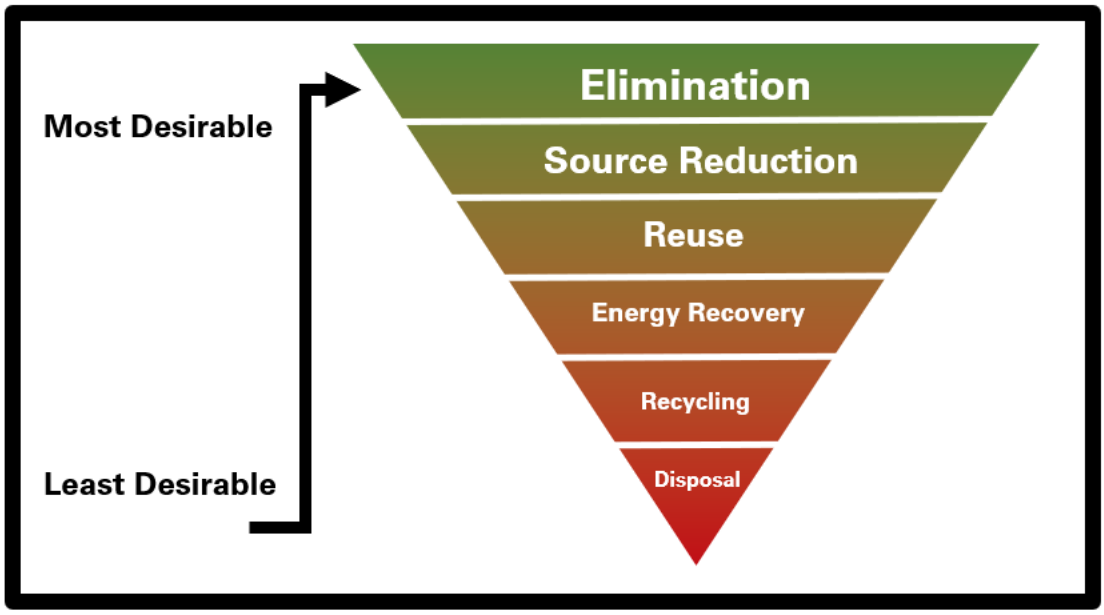
The UNO Environmental Health & Safety Office along with the UNO Laboratory Safety Officer are responsible for assisting the campus with regulatory compliance, identifying regulated and hazardous materials, and arranging for disposal of regulated waste. If a contractor, such as a construction company, generates hazardous material at UNO, the contract must contain language requiring the contractor to manage and dispose of the waste in accordance with all applicable Environmental Protection Agency (EPA) and Louisiana Department of Environmental Quality (DEQ) regulations.

Hazardous and Regulated Waste Minimization

All departments that generate waste at UNO should make waste minimization and P2 an active and ongoing component of operations. Individual laboratories and facilities must take responsibility for the byproducts of their operations and all waste generated in their areas. Because the generators of the hazardous or regulated waste are experts in their respective fields, they are the best source of alternative options for waste minimization, P2, source reduction, or product substitution.

3. Implementation and Management

In order for UNO to achieve its waste minimization and P2 goals, the following hierarchy of waste management is consulted:



Elimination

Focus on eliminating the process that produces hazardous waste first. Ask yourself and your supervisors if the process is necessary for the production of the end result or product. If it isn't, consider eliminating the process all together.

Source Reduction

If elimination is not possible, an alternative is reducing the amount of material, solvent, chemical, etc. in the process. Some methods to achieve source reduction include:

- Effective purchasing and inventorying
- Microscaling experiments
- Good housekeeping

Effective Purchasing

Effective purchasing is very important in waste minimization and P2. Excess unused chemicals are a significant source of hazardous waste. Unused chemicals eventually become less effective, useless, or unstable when they are stored past their shelf lives. These chemicals present a safety hazard and are often difficult and expensive to dispose of. The effective purchasing of chemicals includes:

- Estimating the amount of chemicals needed on a single experiment or project basis.

- Keeping an up-to-date inventory to ensure you don't already have these chemicals somewhere else in the lab (see below for more details on good housekeeping).
- Checking with nearby labs to see if they have this chemical and it is close to expiration.
- Avoid bulk purchasing. Although it may save money on the front end, the disposal costs will be much higher than the initial savings.
- Select a chemical supplier who will support waste minimization efforts and can deliver small amounts of chemicals on short notice.
- Standardize chemical purchases. If all or most experiments/projects are designed to use chemicals from an approved list, then surplus chemicals may be useful to someone else.
- **All purchasing orders should be sent to the UNO Laboratory Safety Officer (labsafety@uno.edu) to manage the UNO-wide chemical inventory**.

Microscaling

Reducing the scale of an experiment and its associated quantity of chemicals uses fewer chemicals and produces less waste, some of which may be hazardous.

Good Housekeeping

Good housekeeping is very important in managing the quantities of hazardous materials used in your lab. If someone keeps an up-to-date inventory in the lab, they can consult the inventory before purchasing more chemicals that aren't necessary. Up-to-date inventories also minimize hazardous waste production by increasing the likelihood that chemicals will be used before they expire and reducing the potential need to clean up chemical spills. Good housekeeping practices include:

- Using a "first in, first out" inventory system in which older chemicals are used before newer chemicals in order to prevent chemicals from expiring before use.
- Keeping non-hazardous waste streams separate from hazardous waste streams in order to reduce the amount of hazardous waste that must be disposed of.
- Seal and contain processes to prevent the escape of fumes or leaks to the environment.
- Take care when weighing and transferring chemicals in order to minimize spills and additional waste.

Reuse

Again, if none of the above is possible, reusing the waste materials as product instead of purchasing new materials is the next alternative. However, this should only be conducted if there is no treatment of the waste materials or increase in the risk to the individual(s) involved.

Reuse also includes giving and receiving chemicals, equipment, and other items to other labs on campus that will use them before expiration.

Energy Recovery

Energy recovery from waste means the conversion of non-recyclable waste into usable heat, electricity, or fuel through a variety of processes, including combustion, gasification, pyrolization, anaerobic digestion, and landfill gas recovery.

Energy recovery would not take place at UNO, but several types of hazardous waste can be accepted for energy recovery. Most of our hazardous waste at UNO is incinerated and the energy released is harvested and used for maintenance of the facility.

Recycling

Recycling involves breaking down a used material into raw materials for reuse. If a material cannot be reused in the lab, it may have potential to be recycled. Recycling does not ultimately take place at UNO, but certain items can be recycled as long as the receiver is a UNO-approved recycling vendor.

It is important to note that usually hazardous waste cannot be recycled, but rather they are incinerated for energy recovery as stated above. One example of a hazardous material potentially being recycled is sending used flammable solvents to offsite facilities, such as cement kilns, to be used as supplemental fuels.

Disposal

If the generation of hazardous waste is unavoidable, follow the UNO Regulated Waste Guidelines for the proper disposal protocol of hazardous waste.

Substitution

It is also important to note substitution and its role in the hierarchy of waste management. At any step along the process, if a toxic substance can be switched out for a less toxic substance, always make the switch. If the less toxic substance is more expensive to purchase, think about the reduction waste minimization has overall in university costs listed under the Purpose section above in this plan. In addition, a less toxic chemical provides a lower risk to human health and the environment.

The US Occupational Safety and Health Administration (OSHA) has put together some resources that may assist in identifying chemical substitutions.

Common examples of using less-toxic alternatives include:

- Use non-mercury thermometers instead of mercury thermometers.
- Use water or calibrated oils instead of mercury manometers, or switch to pressure transducers or electronic gauges.
- Use enzymatic cleaners, detergents, or elbow grease when cleaning glassware instead of chromium-based cleaners (ex. Chromerge).
- Use quaternary amine detergents instead of isopropyl alcohol when sterilizing equipment.

- Replace thermal distillation apparatus with dry solvent purification systems for purifying drying solvents. (This minimizes the use of energy, water, and solvents and reduces the fire risk.)
- Use alcohol as a fixative instead of formaldehyde.
- Use SYBR Safe DNA Gel Stain instead of ethidium bromide (a known mutagen).
- Use non-halogenated rather than halogenated solvents when applicable.
- Use digital photography instead of a digital X-ray machine.