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| UT Health Science Center: HM5204 - Hazardous Waste Reduction Plan | |
| Version 3 | Publication Date: 02/16/2024 |

Purpose

It shall be the policy of the University of Tennessee Health Science Center to conduct a program that will reduce the volume and risks associated with the generation of hazardous waste to the minimum levels that are economically and technically feasible. This program shall be in full compliance with the requirements of all applicable federal, state, and local regulations.

Scope

This waste minimization plan meets all of the requirements of the Tennessee Hazardous Reduction Act of 1990 (TCA 68-212-301) and encompasses all chemical waste operations conducted on the UTHSC-Memphis campus.

Applicability

The plan requires all individuals on campus who generate any type of hazardous waste to implement this plan by using resources that are economically and technically feasible to reduce or eliminate waste generation. Waste in any form represents lost money, lost resources, and lost labor.

Implementing a waste minimization program benefits everyone at UTHSC-Memphis and the community by:

- Lowering waste disposal and compliance costs
- Reducing long-term liability for disposal
- Reducing costs of chemical purchases
- Reducing health and safety hazards
- Promoting environmental awareness
- Preventing pollution and conserving resources.

Objectives

The main objective of this plan is to reduce or eliminate the generation of hazardous waste to the extent that is economically and technically feasible. In research, teaching, testing and many other operations on campus, generating chemical waste cannot be avoided. However, chemical waste can

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be managed as efficiently as possible to minimize the amount that is generated. The Campus Safety and Emergency Management department will be primarily responsible for coordinating the waste minimization plan.

The Pollution Prevention Act of 1990 requires all hazardous waste generators to reduce or eliminate the generation of hazardous waste whenever feasible. The University of Tennessee Health Science Center must report its efforts towards waste minimization to the Tennessee Department of Environment and Conservation (TDEC) on an annual basis. As a result, the university sets waste reduction goals for each waste stream. These goals are a comparison between research dollars and waste generation.

Methods to Minimize Hazardous Waste Generation

Waste reduction should be considered during all phases of a process including project/process design, purchasing, and use. The most effective location to minimize the amount of waste generated is at the point of waste generation. The policy of the University is to maintain an open-minded attitude towards application of any waste reduction option. Therefore, all faculty and staff are encouraged to constantly search for ideas that can be implemented to improve waste reduction efforts. The following methods should be considered to reduce the amount of hazardous waste produced on campus and the university will encourage use of these methods to meet its waste reduction goals.

- Process modifications: This involves the use of micro-chemistry or using reduced volumes in an experiment. Procedures to switch to micro-chemistry include:
 - Switching from conventional to fast microprocessor-based, top loading balances that are sensitive to 0.1 mg.
 - Use of chromatographic techniques, such as high performance and ion exchange that can clearly separate and purify milligram quantities of a substance.
 - Use of microscale glassware, including pipettes, burettes, syringes, reactors and stills for handling reagents and their products.
 - Switching from conventional to sensitive spectrometers that can analyze milligram quantities of substance.
- Chemical waste exchange: Laboratories should check with other researchers or departments on campus before ordering a specific chemical. It costs 20-40 times the original purchase price of a chemical to dispose of that same chemical. In fact, the American Chemical Society estimates that 40% of the chemical waste generated by labs consists of unused chemicals. This could be reduced if labs checked with other departments or their own stock before ordering chemicals. Do not accept any chemicals from another department or outside organization unless you are sure these substances will be used.

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- Product substitution with a non-hazardous or less hazardous material. Examples of product substitution include:
 - Using a biodegradable non-toxic preservative, such as ethanol, in lieu of formaldehyde-based substances (formalin).
 - Replacing flammable scintillation fluid with non-hazardous biodegradable scintillation fluid.
 - Replacing hazardous solvents or cleaning solutions in parts washers with non-hazardous solutions.
- Avoid mixing hazardous waste with non-hazardous waste. Do not mix water, or other non-hazardous substances with hazardous waste. This will generate even more hazardous waste, which increases disposal cost. In the case of flammable solvents, the more water mixed with the hazardous waste, the more expensive the disposal costs. Flammable liquids with a high BTU content are typically sent for fuel blending and water mixed with the flammables lowers the energy contents thereby requiring more expensive disposal techniques. Also, do not mix used oil with solvents or heavy metals, or the used oil cannot be recycled.
- Spill prevention: Care should be taken when weighing or transferring chemicals to minimize spills. Containers should be sealed when not in use and processes should be contained (i.e., fume hoods) to prevent the escape of fumes or leaks into the environment.
- Limiting quantities purchased. Purchase chemicals in the smallest volumes needed. Consider buying pre-weighed or pre-measured reagent packets where waste generation is high.
- Inventory management and control: Laboratories should constantly monitor their chemical inventory and dispose of any unwanted or expired chemicals through Safety Affairs. New containers should be dated when they are received so that older products will be used first.
- Good housekeeping practices: This includes properly labeling all containers with their hazardous contents and keeping an up-to-date chemical inventory.
- Training: Include waste minimization practices in student and employee training sessions. All employees and students who generate hazardous waste should take the hazardous waste management and waste minimization training online.
- Segregation: Waste should be properly segregated once they are generated and stored in chemically compatible containers. For example, acid waste should not be stored together with caustics and oxidizers should not be stored with flammables. Hydrofluoric acid waste should not be stored in glass containers. Waste should be stored in secondary containment (i.e., tubs) when appropriate to ensure proper segregation during storage.
- Eliminating unknown chemicals: Chemicals that are unlabeled cost up to 10 times more for disposal than properly labeled chemicals. At the very minimum, containers need to be labeled with the chemical/product name and primary hazard. Lab checkouts are conducted by Safety Affairs when an employee is leaving the university to ensure they are not leaving behind unlabeled chemicals.

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- Recycling. There are many good reasons to recycle. Some of these reasons include:
 - Conserves energy
 - Protects the environment.
 - Reduces the need to build new landfills and incinerators.
 - Saves money and energy.
 - Stimulates the development of green technologies.
 - Provides valuable raw materials to industry.

Examples of current recycling programs at UTHSC-Memphis are:

- Universal waste (such as rechargeable batteries, fluorescent lamps) and used oil are sent to commercial recyclers.
- Solvents with high BTU values are reclaimed and burned as fuel in incinerators.
- Old computer equipment is sent for electronics recycling.

The following methods of disposal are not acceptable and are considered a violation of state and federal environmental regulations.

- Evaporation
- Dilution
- Combustion
- Storm sewer
- Sanitary sewer
- Sharps container
- Regular trash
- Biohazard waste containers

Mixture Rule: In 1982, the EPA adopted the mixture rule 40 CFR § 261.3a) (2) (IV), which states that hazardous waste, when mixed with a non-hazardous substance remains hazardous. This rule does not apply when mixing occurs during a process, only when waste is being mixed. Combining wastes to render them nonhazardous is considered treatment. Intentional mixing of waste to change the characteristic is a direct violation of the US EPA Resource Conservation and Recovery Act (RCRA) land disposal treatment standards. A permit is generally required to treat hazardous waste. There are some exceptions to this rule, however, please call Safety Affairs before attempting any method of disposal.

Roles and Implementation

Campus Safety with assistance from the generator shall characterize the waste stream from each area that generates hazardous waste. Generators of hazardous waste will be queried about the

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availability and feasibility of waste reduction. Campus Safety shall work with all departments to implement waste reduction efforts.

Performance Goals and Annual Progress Report

The Tennessee Department of Environment and Conservation requires quantitative performance goals for hazardous waste reduction. UTHSC-Memphis has established a performance goal ratio of 0.04 for each of its waste streams. This ratio shall be calculated annually by dividing the amount of waste in kilograms by the standard production unit, which is the total amount of funded research divided by \$1000. These ratios shall be reported as part of the Annual Hazardous Waste Report and compared to previous years in an annual progress report.

Program Review

This program shall be reviewed annually and amended as necessary. When it becomes apparent that the plan is deficient, it shall be revised.

Training

Employees who generate or handle hazardous waste shall be trained to reduce hazardous waste. The hazardous waste management and waste reduction training may be presented during the annual training for hazardous waste generators.

Responsible Official

| Subject Matter | Office Name | Telephone Number | Email/Web Address |
|---|--|------------------|---------------------|
| Policy Clarification and Interpretation | Campus Safety and Emergency Management | 901-448-6114 | labsafety@uthsc.edu |
| Policy Training | Campus Safety and Emergency Management | 901-448-6114 | labsafety@uthsc.edu |
| Hazardous Waste Minimization | Campus Safety and Emergency Management | 901-448-6114 | labsafety@uthsc.edu |

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Related Policies/Guidance Documents

SA0400 - Hazardous Material Safety
HM5203 - Hazardous Waste Management Plan

Last Review Date: 02/12/2024