

UNIVERSITY OF MARYLAND, BALTIMORE COUNTY

HAZARDOUS WASTE DISPOSAL GUIDELINES

I. Introduction

The intention of these guidelines is to provide UMBC employees with an understanding of Federal and State hazardous waste disposal regulations and explain the University's program for compliance.

UMBC is a generator of hazardous waste and must comply with the State and Federal waste disposal regulations.

The Safety Officer in the Office of Environmental Safety and Health administers the Hazardous Waste Management Program at UMBC. Complying with the program is very demanding and requires full cooperation by all campus entities. These guidelines focus on the management of hazardous chemical waste. They do not include procedures for the management of radioactive, infectious and biological waste or nonhazardous waste. Once a listed chemical is declared waste, it may be stored as waste. UMBC has one Resource Conservation and Recovery Act (RCRA) approved 90 day storage area. Designated satellite accumulation areas do not fall under the 90 day rule (40 CFR 262.34). UMBC is not permitted to treat or dispose of hazardous waste locally. All hazardous waste must be transported to a permitted off-site facility for further storage, treatment and/or disposal. It is illegal to dispose of hazardous waste by dilution, evaporation or dumping into the sewer or into the local landfill. Additional information on specific responsibilities and procedures may be obtained by calling the Safety Officer, 410-455-2918, who arranges for disposal and maintains records of all disposed waste.

II. Hazardous Waste Disposal Regulations

Non-compliance with any Hazardous Waste Regulation may result in substantial fines and penalties being assessed against the University. Individual generators causing a violation may also be found personally liable. Generators may be cited or fined for numerous types of violations. Violations range from failure to properly label a container of hazardous waste to intentionally disposing of hazardous waste into the air, down the drain or in the trash.

The Solid Waste Disposal Act as amended by the Resource Conservation and Recovery Act (RCRA) passed in 1976 is administered by the U. S. Environmental Protection Agency (EPA) under Subtitle C, Hazardous Waste Management. EPA has the responsibility for regulating hazardous chemical wastes. RCRA has established a cradle to grave Hazardous Waste Management Program to protect public health and the environment from improper

disposal of hazardous waste. The law went into effect in November, 1980 and has undergone revisions on a regular basis since that date.

Hazardous waste generators may not store, process, dispose of or transport hazardous waste without having received an EPA Identification Number. Nor can they offer hazardous waste to transporters or to storage, processing or disposal facilities without these numbers. Before transporting or offering hazardous waste for transportation to an off-site facility, all requirements for packaging, labeling, marking and placarding must be met. A uniform hazardous waste manifest must accompany every shipment.

Only an EPA permitted Municipal Hazardous Waste (or Class I Industrial Hazardous Waste) Disposal Facility can dispose of hazardous waste. These limited numbers of facilities have approved incineration, neutralization, recycling or landfill operations.

III. Hazardous Waste Disposal Program

The Safety Officer will administer the program, oversee collection services and provide technical support to the various generators. Individual departments are responsible for proper identification of the hazardous waste they generate and for following University procedures in disposal of that waste. Waste Disposal Guidelines Wall Charts are available from the Office of Environmental Safety and Health.

In laboratory situations, a material is considered waste when the lab personnel determine the chemical will no longer be used and needs to be discarded. The waste regulations apply to any material that could be discarded in the trash, whether it is liquid, solid, semi-solid or compressed gas. Wastes can be hazardous in one of four ways: (1) those wastes and spent materials that are hazardous by definition and contained in specific lists, (2) a mixture containing a listed hazardous waste and a non-hazardous waste, (3) chemicals that exhibit one of four hazardous characteristics: ignitability, reactivity, corrosivity or EP toxicity, or (4) a chemical that is not excluded from regulation as a hazardous waste. The hazard characteristics are defined in 40 CFR Sections 261.21-261.24. Hazardous waste is categorized into several groups including: halogenated solvents, non-halogenated solvents, acids, bases, heavy metals, poisons and reactives.

The following approach is designed to ensure compliance with applicable Federal and State requirements for the proper handling of hazardous waste. It is also intended to reduce any potential impact on human health and the environment.

- ! Familiarize laboratory or facility employees with hazardous waste disposal procedures and requirements.

- ! UMBC is in compliance with labeling requirements contained in OSHA 29 CFR 1910.1200 which requires that hazardous chemical containers be labeled with the chemical's identity. The University is also in compliance with labeling requirements specified in Resource Conservation and Recovery Act 40 CFR 262.34 which states that hazardous waste containers are labeled "Hazardous Waste" or the specific chemicals be identified.
- ! All spent chemicals or unused chemicals that are intended to be discarded must be handled and managed as hazardous waste.
- ! Departments may be charged for the analysis of unidentified (unknown) chemical waste to determine the chemical identity necessary for proper disposal.
- ! Whenever possible, return gas cylinders to the manufacturer or distributor. If they cannot be returned, tag and store them as hazardous waste.
- ! Treatment of waste to reduce the hazard or the quantity of waste can be done in the laboratory when the treatment method is included in the experiment procedure protocol.
- ! Mixed waste must be handled as both a radioactive waste and a hazardous waste.
- ! Different categories of waste must not be co-mingled in the same waste container.
- ! Do not mix non-hazardous waste, such as water, with hazardous waste.
- ! Do not put inorganic heavy metal compounds into hazardous waste containers with waste solvents.
- ! Dry materials contaminated with chemicals (paper, rags, towels, gloves, kim wipes, etc.) must be double-bagged in heavy-duty plastic bags.
- ! Encapsulate **sharps (i.e.: needles, razor blades, etc.)** before placing in an approved container. Sharps used for animal tissues, organs, etc. should be treated as medical waste, not placed in trash.
- ! Each individual waste generator is personally responsible for ensuring that hazardous wastes are accumulated in safe, transportable containers and stored properly to prevent the possible exposure of co-workers or hazardous waste management personnel to the waste materials.
- ! All hazardous waste accumulation areas must be maintained under the control of the generator of the waste. They are responsible for the care, custody and control of the area.

- ! Individual waste generators are responsible for obtaining their own waste containers. All containers must have suitable screw caps or other secure means of closure. When special waste containers are warranted, contact the Safety Officer for assistance on selection and placement of appropriate container type and size.
- ! The original chemical label must be destroyed or defaced on empty chemical bottles used for waste accumulation. Be sure the container is in good condition, will not leak and is compatible with the contents (i.e.; do not use metal containers for corrosive waste or plastic containers for organic solvents).
- ! The container must include the generator's name, be dated and its contents fully identified on the label when the chemical waste is placed in the hazardous waste storage room. (Disposal labels are not intended for this purpose.)
- ! Containers with improper caps, leaks, outside contamination or improper labeling will not be picked up until these have been corrected by the generator.
- ! Improper disposal of hazardous chemicals include:
 1. Disposal down the drain.
 2. Intentional evaporation in a fume hood.
 3. Disposal in the regular trash.
- ! Hazardous waste should be stored apart from non-hazardous waste.
- ! Keys and access to the hazardous waste storage room must be closely controlled.
- ! Photographic chemicals containing **silver** cannot be placed in the sanitary sewer. They must be disposed of as hazardous waste.

Equally important to the Hazardous Waste Program are correctly disposing of empty containers, properly filling containers and labeling chemical waste containers.

Empty Containers

- ! EPA regulations stipulate that an empty chemical container:
 1. must not contain free liquid or solid residue,
 2. must be triple rinsed,
 3. the label defaced or removed and

4. the lid or cap removed.

- ! Metal containers must have a hole punched in the bottom before disposal in a non-hazardous landfill. Take time to make sure this is done before placing a chemical container in a trash dumpster. Chemical containers not handled in this manner must be treated as hazardous waste.

Filling Containers

Containers must not be overfilled. Containers for liquids are generally rated by volume capacity. Jugs and bottles should not be filled past the shoulder of the container. The shoulder of the container is the place where the container sides start to slope in towards the neck. Closed head cans (5 gallon or less) should be filled so as to leave approximately two inches of head space between the liquid level and the head of the container. Closed head drums (larger than 5 gallons) should be filled so as to leave approximately four inches of head space. The excess volume is designed to allow for the expansion of the contents.

Containers for solids are generally rated by their weight capacity as well as volume capacity. Depending on the density of the solid material, the weight capacity of a container could be exceeded if its internal volume were completely filled. This generally is not a problem for jars and open head cans (5 gallons or less), but is a definite consideration for open head drums (larger than 5 gallons). With due consideration to weight, containers for solids can be filled within two inches of the level of the closure. Hazardous waste containers will remain closed except when waste is being added or removed as required by Code of Maryland Regulation 26.13.05.09D.

Container Disposal

When the container is ready for disposal, complete waste labels obtained from the Safety Officer or your department and attach it to the container. **Print the information on the label legibly.**

Include the information below to properly complete your chemical waste disposal label:

A Chemical Waste Disposal Label Must Be Attached to **Each** Waste Container.

The "REQUESTOR" is the person in charge of the lab.

Chemical name/Common name. **Chemical formulas are not acceptable.**

Containers must be compatible with the chemicals inside.

Containers must be closed or sealed to prevent leakage.

Containers should be stored in a designated protected area and be accessible to waste disposal personnel.

Labels on containers of potentially explosive materials such as picric acid, silanes, nitro compounds and ethers must indicate the percent concentration of these chemicals.

Include any additional Hazard Information about container contents.

IV. Source Reduction and Hazardous Waste Minimization

Early federal regulations on disposal of hazardous waste were aimed at controlling pollution of the environment. Today, the focus is shifting from controlling pollution to preventing pollution. The Pollution Prevention Act of 1990 (Federal Regulation) made the prevention of pollution and reduction of waste generation a priority.

The cost of commercial waste disposal continues to rise and the amount of waste generated continues to increase. Although we cannot control disposal costs, the amount of waste generated can be reduced. Emphasis is placed on "Front-end Waste Minimization" (reducing the amount and toxicity of hazardous materials used) as the primary means for reducing hazardous waste. Research and teaching laboratories and other working groups (Physical Plant, etc.) should examine their purchasing practices and systems, their chemical usage and workplace activities to identify potential points of their operations where source reduction and waste minimization can be implemented.

A. SUGGESTED WASTE SOURCE REDUCTION TECHNIQUES

1. Chemical/Equipment Purchases and Inventory Control

- ! Utilize computerized tracking systems as chemical management tools for chemical purchase and inventory control. Maintain current inventories of chemical stocks to prevent the ordering of chemicals that may already be in stock and in order to monitor the shelf lives of remaining chemicals. Develop a campus-wide chemical exchange network - between labs and within labs, departments, etc. - to reduce "warehousing", promote sharing of chemicals and avoid redundant purchases.

- ! Negotiate contracts with chemical suppliers to gain volume discounts based on annual volume of chemicals purchased. In these contracts, insist on flexible delivery schedules of fewer, smaller-sized containers without

cost penalties. They may require centralized purchasing and distribution of all chemicals.

- ! Purchase reagent chemicals in quantities that are appropriate to the scale of the experiment being used. Limit acquisition of chemicals to quantities required for immediate use. Do not order quantities to obtain a special unit cost savings. This savings will normally be lost due to eventual disposal costs if the chemical is not entirely used.
- ! When possible, obtain compressed gases from vendors who will accept return of their empty or partially full cylinders.
- ! Include waste generation as a criterion in equipment selection.
- ! Rotate chemical stocks in order to use chemicals before their shelf lives expire.

2. Chemical Usage

- ! Enhance a chemical exchange program by using lab procedures that assure the integrity of chemical quality.
- ! Reduce spills and wastes generated by pre-weighing chemicals for undergraduate use.
- ! Require proper labeling of all secondary containers. Replace all deteriorating labels on primary and secondary containers.
- ! Substitute less hazardous chemicals whenever possible. Example: biodegradable scintillation cocktails instead of xylene or toluene based cocktails. Minimize the use of heavy metal (silver, chrome, mercury, barium, cadmium and lead) chemicals.
- ! Substitute alcohol or electronic thermal monitors for mercury thermometers.
- ! Use No-Chromix, detergents or enzymatic cleaners instead of sulfuric/chromic acid cleaning solutions for cleaning laboratory glassware.
- ! Minimize solvent waste by recycling or substitution.

B. SUGGESTED WASTE MINIMIZATION TECHNIQUES

- ! Establish a Faculty Task Force to review waste streams generated and recommended ways to reduce or eliminate them.
- ! Prevent the mixing of different types of waste. Do not put non-hazardous waste, such as a mixture of water, sodium bicarbonate and acetic acid, into a waste container of hazardous waste. Do not put inorganic heavy metal waste in with solvents. This increases disposal costs. Segregate halogenated waste solvents from non-halogenated waste solvents.
- ! Keep waste streams segregated by storing them in separate waste containers. Label waste containers with the full name(s) of the waste material(s) stored in them. Keep waste containers stored separately from reagent containers still in use to avoid accidental contamination of the reagent chemicals.
- ! Decontamination of empty containers prevents them from being handled as hazardous wastes.
- ! Neutralize dilute acids and bases making them non-hazardous and suitable for drain disposal.
- ! When possible, redesign experimental protocols so that harmful byproducts are detoxified or reduced in volume as a final step.
- ! Recycle chemicals via in-house purification processes or off-site vendors. Distillation or filtration of solvents, Freon and used oils for reuse in certain areas results in significant reductions in waste disposal.
- ! Hold lab employees accountable for the waste generated by experiments.

V. Emergency Procedures

Departmental personnel should be trained on the hazards associated with laboratory chemicals used. The training program should also include how to respond to spills and other emergencies. Material Safety Data Sheets are an excellent source for this information and should be compiled for all chemicals used or stored within a laboratory. Special clean-up supplies should be available and employees should be trained on how to use these supplies. Hazardous waste disposal procedures should be followed for disposal of contaminated clothing, rags, absorbent materials or other waste from clean-up of spills or leaks. All labs should know emergency numbers and develop a response scenario for emergencies. Major incident emergency procedures should be posted/available in each laboratory and chemical storage area.

Emergency Response Guide wall charts are available from the Office of Environmental Safety and Health.

A Laboratory Safety Guide has been prepared by the Environmental Safety & Health Office. It incorporates general guidelines and in-depth information about laboratory safety practices to help identify potential hazards. Areas covered include: properties of hazardous chemicals, hazardous waste procedures, classification of hazardous materials, emergency response procedures and phone numbers, safety equipment and personal safety practices.

A Hazardous Waste Disposal Guidelines Wall Chart has been printed and distributed by the Office of Environmental Safety and Health. The 7 page chart deals with: chemical, radioactive, biological, pathological, medical, multi-hazard and general laboratory waste.

APPENDIX A**DEFINITIONS**

- a. Central Accumulation Area (Hazardous Waste Storage Room) - Area designated by the Safety Officer for the storage of hazardous wastes prior to shipment to permitted disposal facilities.
- b. Disposal - The discharge, deposit, injection, dumping, spilling, or placing of any solid waste or hazardous waste (whether or not containerized) into or on any land or water so that such solid waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any water, including ground waters.
- c. EPA Identification Number - The number assigned by the Environmental Protection Agency to each generator; transporter; and processing, storage or disposal facility.
- d. Facility - Includes all contiguous land and structures, other appurtenances and improvements on the land for storing, processing and disposing of municipal hazardous waste or industrial solid waste.
- e. Generator - Any person, by site, who produces municipal hazardous waste or industrial solid waste; any person who possesses municipal hazardous waste or industrial solid waste to be shipped to any other person; or any person whose act first causes the solid waste to become subject to regulation.
- f. Hazardous Material - A substance or material, including a hazardous substance, which has been determined by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety and property when transported in commerce and which has been so designated.
- g. Hazardous Waste - Any solid waste material listed or identified in Title 40 Code of Federal Regulations, Part 261, Subpart C and D, or exhibiting the characteristics of ignitability, corrosivity, reactivity or toxicity also defined in Part 261.
- h. Manifest - A uniform hazardous waste manifest form is to accompany shipments of municipal hazardous waste or Class I industrial solid waste.
- i. Mixed Waste - A radioactive waste that is also a hazardous waste.
- j. Processing - The extraction of materials, transfer, volume reduction, conversion to energy, or other separation and preparation of solid waste for reuse or disposal.

- k. Recyclable Materials - Wastes that are recycled. Recycled material is used, reused or reclaimed.
- l. Reclaimed Material - Is processed or regenerated to recover a usable product. Examples: Recovery of lead from spent batteries and regeneration of spent solvents.
- m. Satellite Accumulation Area - An area, system or structure used for temporary accumulation of hazardous waste prior to transport to the central accumulation area.
- n. Solid Waste - Any garbage, refuse, sludge or other discarded material, including solid, liquid, semi-solid, or contained gaseous material resulting from institutional activities.
- o. Storage - The holding of solid waste for a temporary period, at the end of which the waste is processed, disposed of, recycled or stored elsewhere.
- p. Transporter - Any person who conveys or transports municipal hazardous waste or industrial solid waste by truck, ship, pipeline or other means.
- q. Waste - Any material for which there is no use and is to be discarded as valueless.

APPENDIX B**I. HAZARDOUS WASTE DISPOSAL PLAN SUMMARY**

- A. Safety Officer Responsibilities. The Safety Officer shall provide the following services:
1. Maintain EPA/State hazardous waste reference materials, definitions and a list of such wastes.
 2. Supply the requesting departments with chemical waste disposal labels (provided by waste contractor).
 3. Review the labels, prescribe methods of collection and disposal and issue collection orders, as needed.
 4. Coordinate disposal requirements with the requestor.
 5. Arrange for disposal of waste with contractor. When necessary, designated department personnel (material movers) shall:
 - A. collect the waste materials,
 - B. separate waste materials according to compatibility, and
 - C. transport the waste material(s) to the designated University storage facility where the waste material shall be segregated and stored until a qualified waste disposal service contractor is scheduled to dispose of the waste material(s). The service contractor will provide these on-site services twice a month.
 6. Maintain disposal service records. The Safety Officer shall maintain a copy of the service contractor's shipping manifest for a minimum of three years.
 7. Approve any alternative to waste disposal by a service contractor.
 8. Provide reports to Federal and State agencies as required.
- B. Department Member Responsibilities
1. Correctly identify hazardous materials (e.g.: laboratory waste materials) by using a chemical waste disposal label for each container of waste

material. The steps of completing and attaching disposal labels are listed below:

- a. List the chemical(s) on the waste disposal label using the common name of the chemical(s) or the name used under the International Union of Pure and Applied Chemistry (IUPAC) System when both names are commonly used. Chemical formulas are not acceptable.
 - b. The chemical waste disposal label must indicate the department, responsible person's name and telephone number and location of the waste material(s).
2. Ensure the containers of liquid and solid chemical waste are in good condition so that they may be handled safely. Containers must be suitable for storing chemical waste for at least 90 days. These containers will be provided by each department.
 3. Place labeled containers of liquid and solid chemical waste in designated area that is convenient for collection and provides fire protection storage. Collection can sometimes be made from individual laboratories; however, a centralized storage room is preferable. Do not store waste containers in corridors (e.g.: hallways, passageways, etc.).
 4. Improperly identified waste material will not be collected; however, unknown chemical waste material may be picked up if arrangements have been made with the Safety Officer. Departments may be charged the cost of analyzing the unidentified waste to determine its chemical identity.
 5. Those employees who use chemicals in the course of their job functions are provided chemical awareness training by their departments. Those persons who deal with hazardous waste; i.e., transporting waste from labs to storage areas must receive training required by Occupational Safety and Health Administration (OSHA) under 29 CFR 1910.120 AHazardous Waste Operations and Emergency Response@. The contractors who conduct on-site visits twice a month are trained and certified to conduct this work. They inspect, collect, package, label and transport hazardous waste to the hazardous waste storage room for removal from the campus.

C. Service Contractor Responsibilities

1. The service contractor's representative shall:
 - A. conduct on-site visits twice a month to collect hazardous waste from designated satellite accumulation areas,

- B. package the waste,
 - C. label the shipping containers, and
 - D. completes a shipping manifest in accordance with Federal and/or State requirements before removal from the campus.
- 2. The service contractor shall transport the hazardous waste to authorized disposal facilities.
 - 3. Commercial disposal shall be accomplished when the quantity of waste warrants such action; however, waste will be shipped to authorize disposal facilities before the 90 day accumulation limit expires.
- D. Disposal Costs. The University will fund the collection, storage and disposal cost for campus entities.

OFFICE OF RESPONSIBILITY:

Safety Officer, Office of Environmental Safety and Health.

AUTHORITATIVE REFERENCES:

Environmental Protection Agency
Resource Conservation and Recovery Act of 1979 (RCRA)
Hazardous and Solid Waste Amendments of 1984
Code of Federal Regulations, Title 40, Part 260 to Part 299

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