

Waste Minimization Plan

Florida Institute of Technology (Florida Tech)
Environmental Health & Safety (EH&S)
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REVISION HISTORY

Revision Number	Revision Date	Revised By	Description of Change
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INTRODUCTION

Florida Institute of Technology (Florida Tech) is classified as a large quantity generator of hazardous waste by the Florida Department of Environmental Protection and the U.S. Environmental Protection Agency. These agencies enforce the Resource Conservation and Recovery Act of 1984, which requires a "large quantity generator" to certify that it has a program in place to reduce the

- o Medical Waste (Subtitle J): Lays out a two

WASTE MINIMIZATION

It is important that every member of the University community be aware of the environmental and financial impacts related to the disposal of hazardous wastes and materials and to help minimize the volumes that are generated. Areas on campus that generate hazardous wastes include laboratories, maintenance, garages, machine shops, art studios, and restaurants. It is important that proper waste management be an integral part of all operating procedures.

This Plan has been designed to assist waste generators in operating their areas with waste minimization in mind. General examples of waste minimization activities are presented below, and further information can be obtained by contacting the Environmental Health and Safety Department at (812) 497-1033 or (812) 497-1034.

Recycling

Another method of waste minimization is recycling. Recycled materials are used for another purpose, treated and reused for the same purpose, or reclaimed for another use, rather than being discarded as waste. Some examples include:

- o Redistilling used solvents (stringent standard operating procedures should be developed for recovering solvents since solvents can be extremely flammable or explosive; recovering some solvents such as ethers should be avoided).
- o Collecting and reusing acetone or ethanol, used for drying glassware, several times before disposal.
- o Purchasing or renting gas cylinders (including lecture bottles) from manufacturers who will accept the return of the empty or partially filled cylinders.
- o Returning excess pesticides to the distributor or donating them to another organization.
(Contact EHS before return)

- o Polymerize acrylamide solutions
- o Oxidize cyanide salts and ethidium bromide solutions with bleach.
- o Convert osmium tetroxide into a less hazardous form.

Numerous reference resources are available that describe a wide variety of other, helpful in chemical treatment procedures, some of the best of which include:

Hazardous Laboratory Chemicals Disposal Guide by Margaret A. Armour, CRC Press, 2003

Destruction of Hazardous Chemicals in the Laboratory by George Lunn and Eric B. Sansone, Wiley Interscience, 1994

Prudent Practices in the Laboratory: Handling and Management of Chemical Hazards, Updated Version, National Academies Press, 2011.

MANAGING WASTE EFFICIENTLY

In many cases, waste can be minimized, but it cannot always be eliminated. Waste is a natural product of research, teaching, testing and many other operations. It is prudent to manage all wastes as efficiently as possible. The management of waste is most efficient when waste types are properly segregated, which also helps to reduce disposal costs.

- o Replace solvent based inks in printing operations with water based inks.
- o Use cleaning solutions multiple times before disposing of them.

Flammable/Corrosive Mixtures

Examples: trifluoroacetic acid & acetonitrile, phenol & chloroform, potassium hydroxide & methanol, methanol & hydrochloric acid

Flammable acids and alkaline mixtures are difficult to dispose of due to their corrosive nature. This waste can cost at least four times more to dispose of than other waste.

- o Do not mix unnecessarily with other waste streams.

Halogenated Solvents

Examples: methylene chloride, chloroform, trichloroethane, perchloroethylene, carbon tetrachloride

Formalin & Formaldehyde Solutions

Formaldehyde is a suspected human carcinogen, which is toxic; very irritating to the eyes, throat and breathing passages; and can cause dermatitis. Formaldehyde is also a sensitizer, so the more a person is exposed to it, the smaller a dose it takes to have an effect on that person.

Some suggestions for reducing disposal costs

- o Minimize the volume of waste generated by eliminating any unnecessary dilution.
- o Do not mix with any other waste streams.
- o Substitute ethanol, or commercial fixative like Carosafe® or Formalternate® in place of formaldehyde for storage of biological specimens

Aqueous Metals

Treatment and disposal of metal solutions such as barium, cadmium, lead, copper, selenium, silver, cobalt, mercury, etc. varies, depending on the type and concentration of the metal present in the waste. EHS recommends the substitution of less hazardous metals for those procedures that involve heavy metals

Some suggestions for waste minimization include:

- o Keep heavy metal solutions separate from other wastes.
- o Keep mercury free from all other waste streams including other metal waste.
- o Minimize the volume of waste by eliminating any unnecessary dilution.
- o Consider using micro-scale techniques.
- o Substitute less hazardous metals.
- o Eliminate metal catalysts in chemical procedures and allow more time for the completion

Oil-based Paints & Solvents

Unusable oil-based paints and solvents are hazardous wastes due to their flammable and/or toxic natures. These types of waste paint materials must be disposed of in accordance with EHS hazardous waste disposal procedures as outlined in the Florida Tech Hazardous Materials Manual Appendix D of the Florida Tech Chemical Hygiene Plan. Paints that are still usable and in their original containers can be recycled.

Some suggestions for waste minimization include:

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Used Oil

Used oil is not considered a hazardous waste; however, it must be collected in a container that can be closed and labeled "Used Oil." Used oil must be recycled. Recycling is simple as long as water contamination is minimal and the oil is not contaminated with PCBs or any other hazardous substances. Contact EHS at ehs@fit.edu

Unused or Excess Chemicals

Compressed Gas Cylinders

Compressed gas cylinders pose both physical and health hazards. Physical hazards include flammability (depending on the gas) and hazards associated with high pressures and cylinder ageing. Health hazards include inhalation of toxic or corrosive gases, chemical asphyxiation, or asphyxiation associated with oxygen displacement.

Some suggestions for reducing disposal costs

- o Use a supplier that recycles empty gas cylinders. This can be accomplished by renting not purchasing the cylinders.
- o Limit the purchase of specialized gas cylinders (lecture bottles) since these are hard to recycle. If lecture bottles must be purchased use a supplier that will recycle the empty or partially filled bottles.
- o Before purchasing gas cylinders check with your department or check the EHS Chemical Surplus List for existing cylinders that may be available for use.
- o Contact EHS at ehs@fit.edu if you have any questions about cylinder handling or disposal.

Batteries

Many batteries contain one or more hazardous chemical components, and therefore must be recycled. To request a pickup contact EHS or fill out the online form [on EHS website](#). The following battery types are considered hazardous and must be recycled by EHS.

1. Lead Acid
2. Mercury
3. Silver
4. Lithium
- 5.

Fluorescent Light Bulbs

The Florida Tech Facilities Department collects and recycles used fluorescent light bulbs. Laboratory personnel may also change or replace fluorescent light bulbs; in which case, EHS should be contacted for a pickup. Note: Many retailers are now offering “green” fluorescent bulbs; their claim will not be hazardous waste when disposed, many of which still contain low levels of mercury. Although more eco-friendly and preferable, “green” fluorescent bulbs must also be collected and recycled.

Ballasts

Ballasts control the starting and operating voltages and regulate the current passing through fluorescent lights. Some ballasts contain polychlorinated biphenyls (PCBs) that must be removed and disposed of as hazardous waste; others may contain DEHP (di(2-ethylhexyl) phthalate) which is classified by EPA as a hazardous substance. Ballasts must not be disposed in the trash. The Florida Tech Facilities Department is generally responsible for the collection and recycling of all ballasts.

Ink and Toner Cartridges

Ink or toner cartridges, including 3D printer cartridges, used under normal circumstances until empty, can be shipped to the vendor or manufacturer for reclamation or reuse. Whenever possible, unused or defective cartridges should be returned to the supplier for replacement or credit. This practice minimizes the amount of unused cartridges needing disposal. Contact EHS for assistance if you are uncertain of how to properly dispose of any ink or toner cartridges.

Shop Towels and Rags

Shop towels and rags can be sent to an approved laundering service for cleaning and reuse, rather than disposing them as waste. The service will reuse the towels until their useful life is reached or until they are contaminated beyond the vendor’s ability to clean them, in which case they are typically incinerated. By using a shop towel service, the number of contaminated towels that need to be shipped as waste can be greatly reduced. Contact EHS for further information.

Electronic Devices

Electronic devices (computers, monitors, TVs, etc.) may contain hazardous materials and must be recycled. These types of equipment may also contain Florida Tech property tags. Contact the Property Department at property@fit.edu for pickup and recycling.

Pharmaceuticals

Pharmaceutical waste includes expired, recalled, damaged, overstocked, unwanted, or contaminated drugs, vaccines, supplements, vitamins, and sera. Expired, recalled, damaged, or overstocked pharmaceutical products can be collected by a reverse distribution service for credit, rather than disposing them as waste. The reverse distribution service returns pharmaceuticals to their individual value directly to the manufacturer.

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