

Laboratory Operations

1.0 Purpose/Scope

The purpose of this document is to provide information on hazardous material environmental procedures for UCF affiliated laboratories.

2.0 Activities Affected

The following practices are applicable to all laboratory personnel generating laboratory chemical waste.

The laboratories covered under this procedure include those in departments and research centers in:

College of Engineering: AMPAC, CECS, EECS, FSI, IEMS, MMAE, SWMA
College of Medicine: BMSC, Health Sciences, Molecular Biology and Microbiology
College of Optics and Photonics: CREOL
College of Science: Biology, Chemistry, NCFS, Physics
Florida Solar Energy Center
Nanoscience Technology Center

3.0 Forms Used

[Form-001-01 Laboratory Identification](#)
[Form 001-02 Laboratory Audit Checklist](#)
[Form-002-01 Laboratory Close-Out Checklist](#)

4.0 References

[University Online Inventory System](#)
Material Safety Data Sheets
40 CFR Parts 260-262
City of Orlando Chapter 30 Local Pollutant Limits
[Waste Determination Flowchart](#)
[UCF Policy 3-107 Procurement, Use, and Possession of Hazardous Materials](#)

5.0 Definitions

Laboratory Functional Area Manager: person assigned as point of contact for departmental laboratory issues.

Laboratory Personnel: faculty, staff, graduate students (ie. teaching assistants, research assistants, laboratory assistants), contractors, and visitors performing duties or tasks physically situated in a UCF laboratory facility.

Shared laboratory space: A room used for multiple research or academic interests that is not under the control of one principle investigator.

RCRA hazardous waste: Waste that meets the definitions of listed or characteristic hazardous wastes.

Non-regulated laboratory waste: Wastes that do not meet the definition of RCRA waste but still are considered toxic or environmentally unfriendly.

Satellite Accumulation Areas (SAA): Areas in individual laboratories where waste is collected for removal to the main accumulation area at Building 48. Wastes must stay in the area (laboratory) where they have been generated, be under control of the operator of the process which generated the waste, and contain no more than 55-gallons of hazardous waste or 1-quart acutely hazardous waste.

In line Waste Collection: Any system that accumulates laboratory wastes automatically, periodically or continuously, and is associated with a chemical or instrumental operation in a laboratory.

6.0 Exclusions

Materials excluded from this plan include: radiological waste, biological waste and equipment containing hazardous materials.

7.0 Procedures

7.1 Identification of Laboratory Activities

Each area covered under section 2.0 of this document is responsible for submitting Form-001 Laboratory Identification to Environmental Health & Safety (EH&S). Updates should occur whenever activities assigned to a laboratory change.

Information included in Form-001: department name, name of chair or director, name of laboratory functional area manager, name of central purchasing agent, lab number, assigned principle investigator(s), and type of activities.

7.2 Laboratory Close-Out

Each area is responsible for following guidelines in Form-002 Lab Close-Out whenever a lab worker permanently leaves an assigned lab as a result of graduation, resignation, termination or transfer or in the event of a lab move or renovation.

7.3 Hazardous Material Procurement

7.3.1 Procurement Methods

Each department should identify a centralized purchasing agent. This centralized agent will notify EHS of all chemical purchases. The name of this individual should be listed on Form-001-01 Laboratory Identification

Procurement cards are not to be used for hazardous material purchases per university policy 3-107.

7.3.2 Quantity

To reduce waste disposal costs and minimize storage in overcrowded labs, chemicals should be ordered in the *smallest possible quantities*.

7.3.3 Environmental Management System Material Reduction Objectives

Purchases should conform to the following objectives:

Thermometers, sphygmomanometers, manometers, and barometers must be non-mercury containing.

Mercury compound should be purchased only when a substitute compound cannot be identified.

7.3.4 Container Labels

No container shall be accepted without an adequate identifying label. Labels on chemical containers must state the chemical name, the manufacturer name, and hazard information.

7.3.5 Material Safety Data Sheets (MSDS's)

Chemical manufacturers are required to send a Material Safety Data Sheet when a chemical shipment is ordered. Most of the major chemical companies send the MSDS's to EHS. EHS will forward the MSDS to the ordering department, when identifiable. Departments should have a system for routing incoming MSDS's to the chemical users or departmental files.

7.4 Inventory

All laboratories are required to:

1. Maintain chemical inventory on the university online chemical inventory database. New containers must be bar coded and entered into the system upon delivery to the

lab. Empty containers must have barcodes defaced and be marked empty in the online system. Containers transferred to another location must be relocated in the online system.

2. Perform a review for expired/unwanted/unlabeled chemicals at least annually. Unknowns and expired chemicals must be disposed through EHS and unwanted but usable chemical should be processed through the chemical redistribution system.

7.5 Waste Determination

Initial waste determinations should be performed on all waste streams to determine whether need to be managed as regulated hazardous waste or not using Material Safety Data Sheets, Waste Determination Flowchart or other reference materials. EHS recommends documentation of this waste determination.

A chemical becomes a laboratory waste when:

It has gone through an experimental process, or
It is a virgin chemical no longer needed, or
It is clean up material from a chemical spill.

Several individuals may determine when a chemical becomes a laboratory waste to include:

Laboratory personnel- responsible for performing initial waste determination
EH&S personnel-responsible for verifying waste determinations for segregation purposes
Hazardous waste contractor-verifies waste determinations for transportation purposes

7.6 Satellite Accumulation Area Requirements

7.6.1 Waste Accumulation Limits

Each lab may temporarily hold:

Total of 208 liters (55 gallons) of laboratory waste of which up to 1 liter (one quart) can be acutely hazardous (p list) waste.

EHS should be notified when the quantity of waste stored in one laboratory exceed these limits.

7.6.2 Container Management

7.6.2.1 Labeling Requirements

All laboratory waste must be labeled with:

1. A hazardous waste or non-regulated waste label.
2. Chemical name(s) of all hazardous components.
3. Date the container begins to collect waste or when unused chemical is determined to be waste.

If the container is too small to hold a label, then the label shall be placed on a larger secondary container. Printed labels can be obtained from the Department of EH&S

7.6.2.2 Container Requirements.

1. Chemical waste must be in a sealed container that shows no sign of leakage or damage.
2. Broken caps or stoppers are not allowed.
3. Corrosives and halogenated solvents must be in glass or plastic containers.
4. Halogenated solvent waste must be collected and stored in separate containers from other solvent waste.
5. Containers of waste must be securely closed at all times except when wastes are being added to (including during in-line waste collection) or removed from the container
6. Use chemically resistant secondary containment trays for hazard class segregation.

It is the individual department or research unit's responsibility to provide waste collection containers. EHS does not stock empty containers for SAA waste collection.

Most containers, with the exception of 5-gallon carboys that contain solvents that can be consolidated into 55-gallon drums, will not be returned to you.

7.6.2.3 In-line waste collection:

1. The collection system must be constructed to prevent the release of laboratory waste into the environment.
2. Fail-safe mechanisms should be put in place by the laboratory.
3. The researcher responsible for the activity must be present in the lab, at all times, during in-line waste collection if the collection of waste is manual.
4. If the collection is through an automatic system, secondary containment and or periodic inspections are required to ensure issues such as leakage or full containers are identified and addressed.

5. Any failures of in-line waste collection procedures that results in an environmental release must be immediately reported to EH&S.
6. Corrective actions to remediate the failure must be taken immediately.

7.7 Disposal of Waste from the Laboratory

Waste is ready to be removed from the laboratory if the containers are full; the lab has reached its waste accumulation limits as described in Section 7.6 of this plan; or the laboratory requests removal.

7.7.1 Disposal Procedures

1. Attach a laboratory waste sticker to a container when first adding in waste or when a container of hazardous material is no longer wanted.
2. Fill out label as indicated.
3. Store all waste containers in the designated SAA using poly trays to separate incompatibles.
4. Complete the online or fax-back form found at <http://www.ehs.ucf.edu/wastag>
5. If your laboratory has a large amount of waste due to a clean out, contact the EH&S Office for disposal procedures.
6. If your laboratory is located in an off-campus location not approved by FDEP for UCF EH&S collection, the current UCF hazardous waste contractor will perform collection directly from your lab on at least an annual basis.

7.7.2 Disposal of Unknowns

Containers with unidentified contents present potential hazards and are expensive to dispose. Departments should not allow students/staff to vacate a laboratory without first identifying all containers. Follow Practice-002 Close-Out to avoid future accumulation of unknown materials.

EH&S will accept unknowns only during scheduled campus pick ups by our hazardous waste contractors. If unknowns are listed on the online request or a fax back form, you will be notified when the contractor will be on campus. When labeling unknowns for disposal list as much information about the chemical as possible.

7.7.3 Empty Containers

A container is considered empty and not a RCRA hazardous waste if:

All wastes have been removed that can be removed using conventional methods (pouring, scraping, e.g.) and

No more than 2.5 centimeters remain on the bottom of the container or

No more than 3 percent of the capacity of a container equal to or less than 110 gallons remain or

No more than 0.3 percent of the capacities of a container greater than 110 gallons remain

UNLESS it has contained acutely hazardous (p list) waste containers

Containers with p listed residues must be labeled with a hazardous waste label reading "Container contaminated with _____" (state name of highly toxic residue) and follow the disposal procedures listed in Section 7.7.1.

If an empty container has not contained a p-listed chemical, rinse, mark with the words "EMPTY" or "MT" and place in the gray waste receptacles located outside your building. Call Building Services at 823-2721 for the location in your area.

7.7.4 Drain Disposal

Drain disposal of laboratory chemicals is restricted in the followings cases:

More than de minimus (residual) amounts of RCRA characteristic or listed hazardous waste or

Those that exceed the local pollutant limits set by the City of Orlando (Chapter 30 Pretreatment of Waste)

Local Pollutant Limits:

| Constituent | Maximum Uniform Concentration Limit (mg/l) |
|------------------|--|
| Antimony | 1.25 |
| Arsenic | 0.25 |
| Beryllium | 0.25 |
| Boron | 2.50 |
| Cadmium | 0.20 |
| Chlorides | 225 |
| Chromium (Total) | 0.50 |
| Cobalt | 0.65 |
| Copper | 0.66 |
| Cyanide | 0.35 |
| Lead | 0.25 |

| Constituent | Maximum Uniform Concentration Limit (mg/l) |
|-----------------|--|
| Lithium | 0.5 |
| Manganese | 2.5 |
| Mercury | 0.005 |
| Molybdenum | 0.25 |
| Nickel | 1.1 |
| PH | 5.5 to 9.5 |
| Phenols (Total) | 3.0 |
| Selenium | 0.20 |
| Silver | 0.12/BMP |
| Sodium | 300 |
| Zinc | 1.40 |

7.7.5 Transportation

EH&S will remove hazardous waste within 5 business days upon notification from laboratories. No laboratory workers can take laboratory waste to the main accumulation area, unless authorized by EH&S.

Hazardous wastes must stay in the SAA where generated.

Reactive wastes unsuitable for transport will stay in the lab until the hazardous waste disposal vendor is on campus for a scheduled pick up.

Off-campus departments not approved by FDEP for UCF EH&S collection will have the opportunity to have waste collected by UCF hazardous waste contractor on at least an annual basis.

7.7.6 Chemical waste mixed with biomedical waste or radioactive wastes

Do NOT use Biohazard, Biomedical, Sharps or Radiation waste containers for chemical waste unless the waste displays both chemically hazardous and infectious or radioactive properties.

In the event the wastes types are mixed, label the biohazard or radiation container with a laboratory hazardous waste label. Keep the mixed waste separate from other biohazardous or radioactive materials and contact EHS for disposal information.

7.8 Emergency Preparedness and Response Procedures

In general, spills will be handled in accordance with the current UCF Emergency Management Plan.

7.8.1 Incidental Spills

All laboratories are supplied with a spill kit to control small spills (4L or less) of known substances that are not acutely hazardous.

Lab Personnel are expected to respond to small (4L or less) spills of chemicals as long as:

He/she has knowledge of the chemical's physical and health hazards.

The spill does not involve highly toxic, reactive or multiple chemicals where the reaction by-products are unknown

The clean up procedures are known and appropriate materials are readily available.

Waste generated from spill response should be disposed in accordance of section 7.7 of this document.

7.8.2 Larger Spills

Contact your supervisor or lab manager and evacuate the area if the spill:

Is Larger than 4 L or

Involves multiple chemicals where the reaction by-products are unknown or

Involves mercury or

The clean up procedures are not known or appropriate materials are not readily available.

Call 911 and evacuate the area if the spill:

Involves injured personnel or

Involves a highly toxic or reactive material or

May endanger the environment

Call Environmental Health & Safety at 823-0071 after contacting appropriate emergency responders. All spills that result in injury, damage to property, release to the environment must be reported to EH&S.

8.0 General Rules

8.1 Training

All laboratory personnel receive initial and annual training commiserate with their job responsibilities

Anyone working with hazardous materials must attend, within 6 months of hire, a Chemical Safety/Environmental Management for Laboratories and

Complete the online Environmental Management for Laboratories module annually

Laboratory managers must attend the annual advanced hazardous materials course.

Lecture based classes will be offered at the beginning of each semester. Online class will be continuously available.

8.2 Laboratory Audits

Annual laboratory audits will be performed by EH&S using Form 001-02. Periodic inspections will be performed by EH&S during routine laboratory or SAA visits.

8.3 Non-Conformance and Corrective Action

EH&S will notify the departmental functional area manager and assigned principle investigator of non-conformances. The department will provide corrective actions. Any non-conformance involving regulatory non-compliance not resolved within 30 days will be submitted to the department chair/director and/or college administrators.

8.4 Functional Area Manager Appointment

Each department shall assign a Functional Area Manager (FAM)

The name of the departmental FAM(s) will be recorded on Form-001-01 Laboratory Identification.

The FAM will serve as point of contact for laboratory issues and attend the annual advanced hazardous material class.