

University of Chicago

Laboratory Safety Reference Guide

University of Chicago Reporting & Resources



CONFIRMED FIRE

Emergencies and Injuries

An emergency is a significant disruption to operations or damage to University buildings or research labs in UCM. Or injuries which require medical attention or a confirmed exposure.

Step #1: Emergency Dispatch
773.702.8181

This one call will trigger notifications to the appropriate on-call maintenance and safety staff. Notifications are also made to additional groups with on-call responsibilities depending on the emergency type and parties involved.

Step #2: Safety Evaluation
University of Chicago Accident and Incident Report



**PROPERTY/
WATER DAMAGE**



OIL SPILL



CHEMICAL SPILL



**RADIATION/
LASER**



**INJURY, ILLNESS,
EXPOSURE**



UCAIR
(ucair.uchicago.edu)

Non-Emergency Facility Issues

Facilities Services (FS)
773.834.1414 (Urgent request, non-emergency)

 **Maximo Service Request** (Routine requests use QR Code)
Repair and maintenance requests such as HVAC, plumbing, refrigeration, electrical, lighting, carpentry, painting, pest control, elevators, and recycling/waste management in University managed locations.

Physical Plant (Plant)
773.702.6295 (Urgent request, non-emergency)

 **Client Management Service (CMS)** (Routine requests use QR Code)
Repair and maintenance requests such as HVAC, plumbing, electrical, nurse call system, lighting, carpentry, painting, signage, tube systems, and elevators in all medical center properties and University BSD buildings (KCBD, BSLC-Donnelly, BSLC-Knapp, Cummings, Kovler Lab, and CLSC-MRS.)

Please note, for the Charles M. Harper Center or Gleacher Center, contact Booth Operations. For leased space, contact your third party building manager or commercial real estate contact.

Non-emergency Safety Issues

University Environmental Health and Safety (EHS)
safety@uchicago.edu **773.702.9999**

 Safety concerns from faculty, staff, students, or other academic appointees associated with the University that are not conducting and supporting lab-based activities (i.e., research and teaching labs). Minor injuries or near-misses, or an incident that could have escalated to an emergency event.

Office of Research Safety (ORS)
researchsafety@uchicago.edu **773.834.2707**

 Safety for the Biological Sciences Division (BSD), Physical Sciences Division (PSD), Social Sciences Division (SSD), and Pritzker Molecular Engineering Division (PME) in all areas conducting and supporting teaching and research lab-based activities.

Injury Support and Potential Compensation

Needlestick Hotline

Needlestick, sharps injury, or exposed to chemical or infectious material

1. Immediately call UCOM pager: **773.753.1880** 2. Enter pager ID#: **9990#** 3. Enter <full call back number>

University Employee injuries

Workers' Compensation—First time signing into O365? Enter full UChicago email address

Employee Form **Supervisor Form**




wclaim@uchicago.edu

Lab Student Injuries

Out-of-pocket medical expenses for enrolled undergrad and grad students injured while performing assigned tasks in labs.

Treatment must occur at
UC Occupational Medicine (UCOM) Rubloff D-136 (702.6757) or Adult ED 5656 S. Maryland Avenue.

Be sure to identify yourself as a student injured during lab activities.

risk@uchicago.edu

Safety Partners & Resources

EHSA (safety management system)
Online training: ehsa.uchicago.edu/training
In-person training: ehsa.uchicago.edu/trainingregistration

Animal Resources Center: 773.702.1342
(<https://voices.uchicago.edu/animalresources/>)

IBC/IACUC: 773.834.5850 (<https://ibc.uchicago.edu>)

Cylinder Gas Operations: 773.702.7353



Overview of EHSA Modules
(ehsa.uchicago.edu)

Do **NOT** follow these emergency reporting procedures if you are a hospital employee or a BSD employee performing hospital operations or your day-to-day activities are managed by a hospital employee. Emergencies, contact UCM Public Safety at **773.702.6262**. Routine safety requests, contact UC Medicine EHS at **773.795.7233**. Facility issues, contact Physical Plant at **773.702.6295**.

Responsibilities

Safety is everyone's responsibility, however we want to highlight some additional safety responsibilities for certain groups as well as some of your rights as a researcher!

Research Safety Policy Council (RSPC)

- Deans, ORS, EHS, General Counsel, and Associate Provost for Research Safety
- Approves policies for the campus
- Meets quarterly

Deans

- Serves on RSPC
- Oversees LSS
- Monitor compliance across division

Lab Safety Specialist (LSS)

- Reports to the Dean and ORS
- Serves as single point of contact for labs

Office of Research Safety (ORS)

- Develops and presents general safety trainings
- Works with LSS, Deans, Department Chairs, PIs, and LSC on development of lab-specific training
- Provides subject matter expertise in:
 - Biological Safety
 - Chemical Safety
 - Laser Safety
 - Radiation Safety

Environmental Health & Safety (EHS)

Subject Matter Experts

- Fire & Life Safety
- Environmental Health
- Hazardous Waste
- Occupational Health & Safety

Department Chairs

- Monitor departmental compliance
- Address non-compliance within department
- May enforce rules that are more strict than campus policy
- Collaborates with LSS and ORS to develop and implement safety training

Principal Investigators (PI)

- Directs researchers to complete projects safely
- Ensures lab specific training
- Ensures proper protocols and safety manuals are lab-specific
- Review procedures and ensure proper controls are available
- Ultimately responsible for all research activity being conducted by lab personnel

Lab Safety Contact (LSC)

- Works for PI(s) and assists PI(s) in monitoring lab's compliance
- May conduct lab specific training
- Uses EHSA to update personnel, lab placards, and chemical inventory
- Serves as lab contact for LSS, ORS, and/or EHS

Researchers

Rights

- Understand the hazards in the lab
- Safe work environment
- Relevant safety training
- To adequate controls including personal protective equipment (PPE)
- Medical consultations if:
 - Develop signs/symptoms associated with hazard in the lab
 - Event (eg. leak or spill) resulting in likelihood of exposure to hazard
 - monitoring reveals exposure greater than regulatory permitted
- File a complaint if these rights aren't met

Responsibilities

- Follow all policies and rules
- Obtain all the required general safety training
- Obtain all the required lab-specific training
- Maintain safe work environment
- Notify supervisor of any new hazards being brought into the lab
- Notify supervisor of any unsafe work condition
- Notify supervisor or University Police of suspicious activity
- Report all accidents and incidents (UCAIR)

Hazards in Research Labs

Slips, Trips, and Falls

Best Practices:

- Good housekeeping
- Proper storage
- Keeping aisles clear
- Cleaning up spills
- Using stepstools or ladders instead of chairs or benchtops



Gas Cylinders

Best Practices:

- Secure and store upright
- Use the correct regulator
- Keep protection cap on when not in use
- Use a transportation cart to move



Pressure Extremes

High pressure or Vacuum

Best Practices:

- Ensure container is rated for the pressures anticipated
- Check seals for leaks
- Properly shield to protect from explosion/implosion

Shop Tools

Best Practices:

- Use the right tool for the job
- Ensure proper guarding
- Wear eye protection and any additional PPE
- Talk to supervisor about additional training or safety concerns.

Cryogenics

Extremely cold and asphyxiant

Best Practices:

- Use cryogen gloves and face shield
- Wrap dewars in case of implosion
- Store in well ventilated area

Chemical Hazards

Best Practices:

Assess the hazards and risks before handling chemicals using RAMP up paradigm.

Prepare for any emergencies.



High Temperature

Can cause burns

Can be an ignition source

Best Practices:

- Do not leave unattended
- Unplug items when not in use
- Wear heat protective gloves



Electrical Hazards

Best Practices:

- Keep away from water
- Do not overload circuits
- Inspect cords before each use
- Keep electrical boxes accessible



Lasers

All Class 3b and 4 lasers must be registered.

Best Practices:

- Enclose beam, if possible
- Proper signage
- Lasers not at eye level
- Laser glasses with specific OD



Radiation

Radioactive isotopes and ionizing radiation

ALARA- As Low As

Reasonably Achievable

Time, Distance, and Shielding



Sharps

Best Practices:

- Properly store
- Dispose in appropriate containers
- Do not recap needles



Biological Hazards

Hazardous material derived from living things (e.g. bacteria & viruses) Institutional Biosafety Committee (IBC) and additional trainings maybe required. Contact IBC and Biosafety Office.



Research Animals

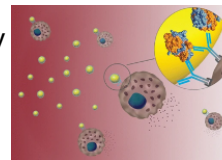
Animal Resource Center (ARC)

- 773.702.6756
- <https://animalresources.uchicago.edu/>



Best Practices:

- Assess the risks before handling
- Use double nitrile gloves.
- Always work inside chemical fume hood.
- Wash your hands thoroughly



Hazard Communication

Comparison of NFPA 704 and HazCom 2012 Labeling System

OSHA Standard GHS Pictograms

Health Hazard  • Carcinogen • Mutagenicity • Reproductive Toxicity • Respiratory Sensitizer • Target Organ Toxicity • Aspiration Toxicity	Flame  • Flammables • Pyrophorics • Self-Heating • Emits Flammable Gas • Self-Reactives • Organic Peroxides • Desensitized Explosives	Exclamation Mark  • Irritant (skin and eye) • Skin Sensitizer • Acute Toxicity (harmful) • Narcotic Effects • Respiratory Tract Irritant • Hazard Not Otherwise Classified (non-mandatory) • Hazardous to Ozone Layer (non-mandatory)
Gas Cylinder  • Gases Under Pressure • Chemicals Under Pressure	Corrosion  • Skin Corrosion/Burns • Eye Damage • Corrosive to Metals	Exploding Bomb  • Explosives • Self-Reactives • Organic Peroxides
Flame Over Circle  • Oxidizers	Environment (non-mandatory)  • Aquatic Toxicity	Skull and Crossbones  • Acute Toxicity (fatal or toxic)

	 NFPA 704	 HazCom 2012
Purpose	Provides basic information for emergency personnel responding to a fire or spill and those planning for emergency response.	Informs workers about the hazards of chemicals in workplace under normal conditions of use and foreseeable emergencies.
Number System: NFPA Rating and OSHA's Classification System	0-4 0-least hazardous 4-most hazardous	1-4 1-most severe hazard 4-least severe hazard • The Hazard category numbers are NOT required to be on labels but are required on SDSs in Section 2. • Numbers are used to CLASSIFY hazards to determine what label information is required.
Information Provided on Label	• Health-Blue • Flammability-Red • Instability-Yellow • Special Hazards*-White * OX Oxidizers W Water Reactives SA Simple Asphyxiants	• Product Identifier • Signal Word • Hazard Statement(s) • Pictogram(s) • Precautionary statement(s); and • Name address and phone number of the vendor

Six GHS Required Label Elements

product identifier

signal word

hazard statement

precautionary statements

supplier information

AMMONIA

DANGER

GHS Label Components

TOXIC IF INGESTED

Wash hands thoroughly after handling. Keep container tightly closed when not in use. Keep away from heat, sparks and open flames - may explode when exposed to high heat. Use in an open area that is well-ventilated. Breathing in ammonia is irritating and corrosive. Wear protective gloves and safety goggles to prevent burns and irritation.

If swallowed: Immediately call Poison Control or doctor/physician. Drink water or milk to dilute ammonia.

ABC Chemicals - 123 Main Street - Cincinnati, OH - www.abccchem.com - 800-733-5252

pictograms



See Safety Data Sheet (SDS) for further details regarding safe use of this product.

16 Sections of Safety Data Sheet (SDS)

- | | |
|---------------------------|-------------------------------------|
| 1. Identification | 9. Physical and chemical properties |
| 2. Hazard identification | 10. Stability and reactivity |
| 3. Composition | 11. Toxicological information |
| 4. First-aid measures | 12. Ecological Information |
| 5. Fire-fighting measures | 13. Disposal Considerations |
| 6. Accidental release | 14. Transport information |
| 7. Handling and storage | 15. Regulatory Information |
| 8. Exposure controls | 16. Other information |

RAMP UP FOR SAFETY



R

RECOGNIZE Hazards

Hazard — any source of potential damage or harm to a person's health.

- Use labels on bottles and containers to identify the most important hazards of the contents. Use Safety Data Sheets (SDSs) to identify Globally Harmonized System (GHS) hazards of the chemicals you will be using. These include physical, health, and environmental hazards. The main hazard categories are flammables, explosives, corrosives, oxidizers, irritants, and toxicants.
- Understand the nature of the hazard (its chemistry and/or toxicological/biological effects).
- Identify the most important physical hazards from equipment, conditions, and procedures. These include electrical and mechanical hazards and high or low temperature or pressure.



A

ASSESS Risks from Hazards

Risk — the probability of harm or damage from a hazard.

- Assess the risks presented by the most important hazards.
- Use SDSs and the GHS Hazard Categories and Statements to determine the relative risk of the hazards.
- Check to be sure all glassware and equipment are in good shape and working condition.



M

MINIMIZE Risks of the Hazards

- Identify methods and safe practices to minimize the risks from exposures to chemicals and from physical hazards.
- Understand the nature and limitations of personal protective equipment, chemical hoods, and other safety equipment.
- Locate online and printed materials to identify safe practices, and consult with more experienced chemists.
- Wear personal protective equipment such as splash goggles, lab coats or aprons, and appropriate gloves. The dress code in a lab should be such that there should be no exposed skin below chest level.
- Use appropriate waste containers when discarding chemicals.

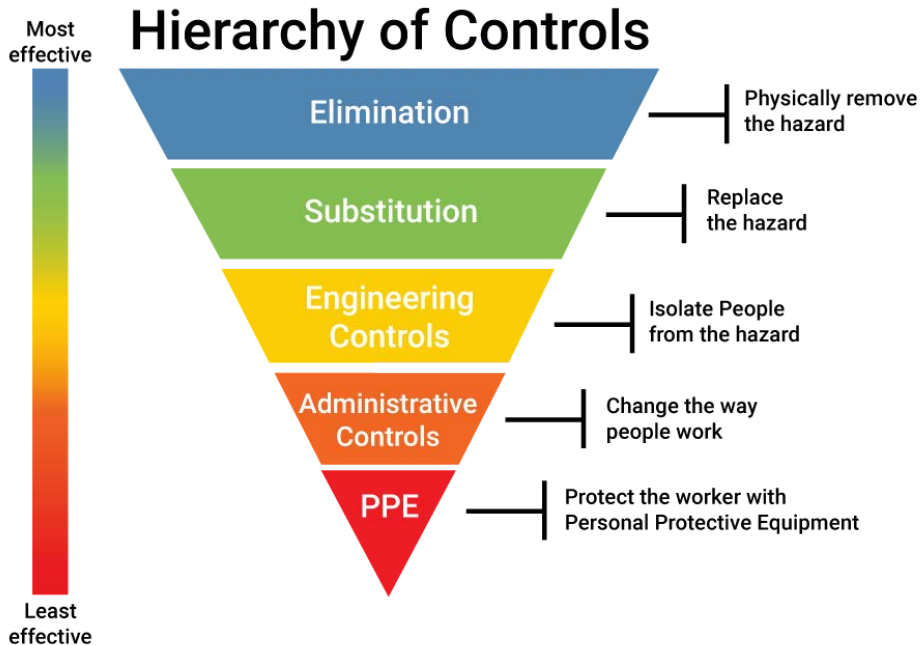


P

PREPARE for Emergencies

- Know and practice the procedures for handling common emergencies such as spills, cuts, burns, exposures, and fires.
- Discuss emergency procedures with students, both in a general way and with regard to each experiment.
- Ensure that all safety equipment, such as eyewash, fire extinguisher, first aid kit, and safety shower, is present and in working order.

Minimizing Risks through Controls



Engineering Controls

Biological Safety Cabinets (BSC)

Are designed to protect the users, samples, and environment from biological agents with the use of high efficiency particulate air (HEPA) filter.



Fume hoods

Are designed to protect the user from exposure and dilutes chemicals before release into the environment.



Always:

- Keep sash at the right height
- Work should be done at least 6" inside
- Elevate equipment on platforms **Never:**
- Use fume hoods that are alarming or not functioning
- Use it as storage

Lab ventilation

Labs are designed to be negative pressure to common areas and have 6-10 air exchanges an hour.

Administrative Controls

Emergency Procedures

Chemical Storage Always wash your hands after working with hazardous materials

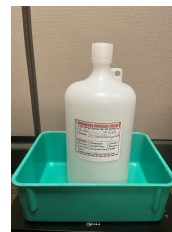
Hazardous Chemical Waste

Use rigid, closable, chemically inert container
Labels on containers must include:
The word "Hazardous Waste", location of the storage, chemical contents, and the hazard(s)

Labels and scheduling pick up done on EHSA
Store containers in secondary containers.
Segregate incompatibles.
Do not use the fume hood as a permanent storage location for regular hazardous waste.

Chemical Storage

Update the chemical inventory annually.
Segregate oxidizers from flammables.
Use secondary containers to store corrosive chemicals



Know the location and how to use the following:

Hand washing Sink
First Aid Kit
Fire Blanket
Spill Kit
Emergency Eyewash and Shower
Fire Extinguisher
Emergency exits



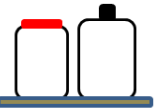
Flammable cabinets Flammable approved refrigerators



⚠ Domestic fridges are not suited for flammables

General Storage

On benches, shelves, and in cabinets



Corrosive Cabinet



Separate from other hazards



Personal Protective Equipment (PPE)

7

The Research Safety Policy Council approve the Personal Protective Equipment (PPE) for research and Instructional Laboratories Policies in which adequate PPE is provided to researchers, utilized and maintained whenever deemed necessary by reason of hazards, processes, or environment. Adequate PPE is determined by a thorough Risk Assessment. The main categories of PPE that the researcher should consider is eye/face protection, body protection, and hand protection.

Eye/Face Protection



Safety Glasses
Minimal protection for direct splashes to the eyes



Safety Goggles
Seals all around the eye for increase splash protection



Face Shield
To be worn with safety glasses or goggles

Hand Protection



Chemical Resistant Gloves
Needs to be selected based on chemicals and type of contact

Other Type of Gloves



Temperature resistant and cut-proof gloves

Full PPE for Handling Cryogenic liq.



Body Protection



Lab Coat
Minimal protection



FR/CP Lab Coat
Additional protection against flash fires and chemical splashes



Splash Apron
Chemical resistant and nonabsorbent.

Limitations of PPE

- Last line of defense
- Must be worn and fit properly
- Must be worn with lab appropriate clothing (long pants and closed toe shoes)
- Must be inspected prior to each use
- Must be appropriate for the tasks

Prevent cross-contamination

- Remove PPE (and wash hands) when exiting the lab
- Properly remove gloves
- Don't touch surfaces that people not wearing PPE will also touch
- One glove rule when transporting between adjacent labs

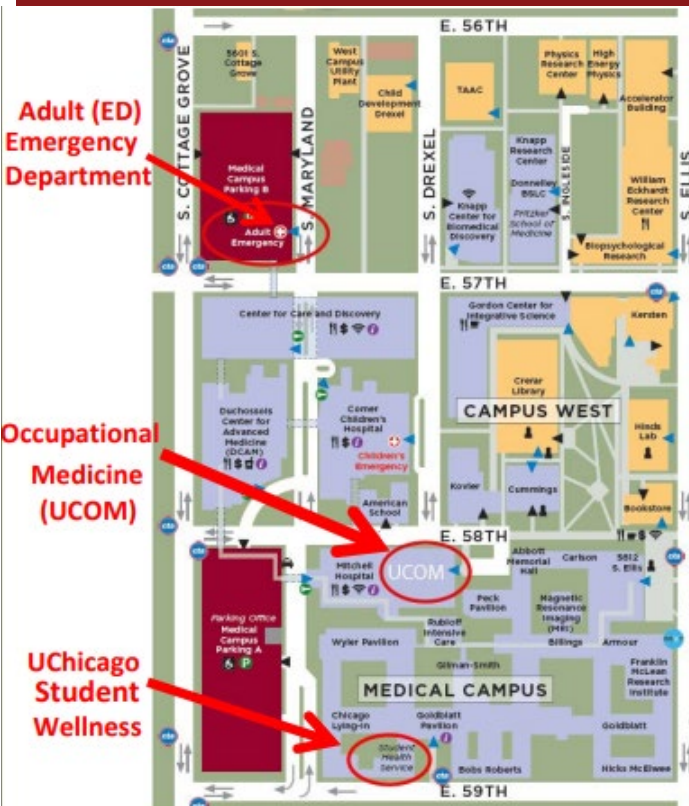
Conduct an adequate PPE assessment before starting work!



One Glove Rule

When transporting hazardous materials between labs through common corridors you may wear one glove whereas the ungloved hand is used for touching common use items like elevator buttons and door handles.

Medical Campus



The UCAIR System (ucair.uchicago.edu)



University of Chicago Accident and Incident Reporting

- ✓ Online reporting system
- ✓ Simple reporting form
- ✓ Anonymous reporting available if medical attention not needed
- ✓ Fast response
- ✓ Standard root-cause analysis report

Chemical Spill Procedure



How to clean up a spill

1. Identify the spilled chemical and refer to the chemical container label and Safety Data Sheet (SDS) for guidance
2. Don the appropriate Personal Protective Equipment (PPE)
3. Pick up any broken glassware with tongs or brush and dustpan
4. For **powder** spills, avoid creating dust – if the chemical is compatible with water, dampen the area and use wet-wiping methods
5. For **liquid** spills, choose an appropriate neutralizer or absorbent – chemical spill kits include acid, caustic, and solvent cleanup supplies
6. Start from the outside and work towards the center of the spill
7. Sweep up the material and dispose all the material into a leak proof bag or container
8. Label and dispose of bags and containers as hazardous waste
9. Labs can contact Chemical Safety 773.834.2707 or the Divisional Lab Safety Specialist if they have questions about spills, or to have the content replaced.

Fire Procedures

RACER

- R**escue and make people aware of the fire
- A**larm by pulling fire alarm pull station
- C**ontain the fire by closing windows and doors
- E**xtinguish the fire only if safe
- R**elocate to the designated area for your specific building

When Extinguishing a Fire use PASS

- P**ull the pin
- A**im at the base of the fire
- S**queeze the handle
- S**weep side to side

Not all fires are the same, and they are classified according to the type of fuel that is burning. If you use the wrong type of fire extinguisher on a fire, you can make matters worse.

- Class A - Wood, paper, plastics** Solid combustible materials that are not metals. (Class **A** fires generally leave **Ash**.)
- Class B - Flammable liquids: gasoline, oil, acetone** Any non-metal in a liquid state, on fire. This classification also includes flammable gases. (Class **B** fires generally involve materials that **Boil** or **Bubble**.)
- Class C - Electrical: energized electrical equipment** (Class **C** fires generally deal with electrical **Current**)
- Class D - Metals: aluminum, magnesium, zinc**
- Class K - Cooking oils, greases, and fats** (Wet chemical agent)



ABC Extinguisher:
Dry Chemical



BC Extinguisher:
Carbon dioxide



D Extinguisher:
Dry powder

When NOT to clean up a chemical spill 8

1. More than one chemical spilled;
2. The quantity is greater than one liter;
3. The chemical is highly toxic, extremely flammable, or explosive;
4. The substance or hazards are unknown;
5. You are not comfortable with the cleaning procedure.

If you cannot clean up a chemical spill:

CALL 123 from a campus phone or 773.702.8181

ALERT OTHERS

**IF POSSIBLE, CONTAIN THE SPILL
EVACUATE THE AREA**

COMMUNICATE CONDITIONS TO FIRST RESPONDERS

Spill on body/clothes

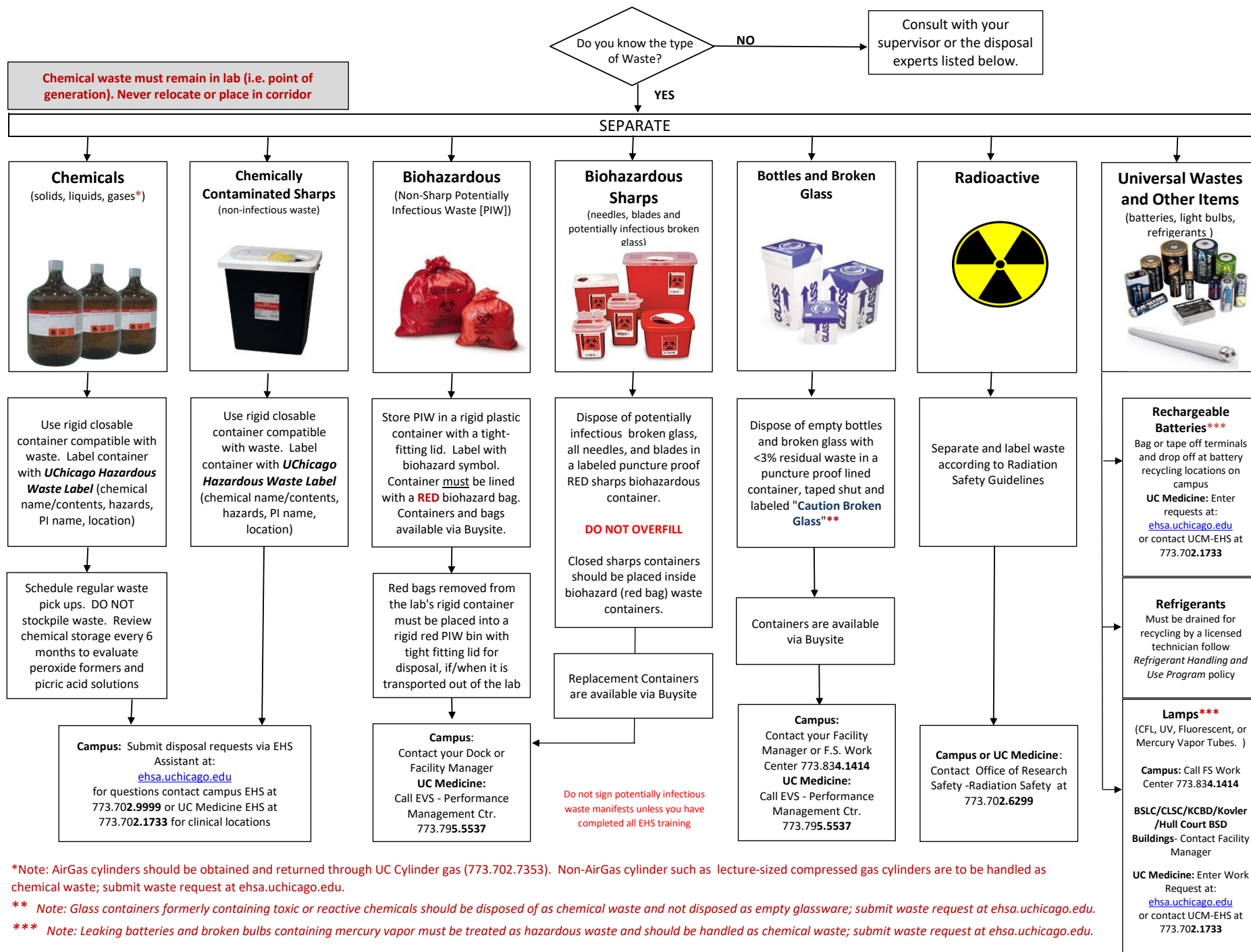
1. Alert others around you
2. Remove contaminated clothing
3. Rinse with water for at least 15 minutes
4. Seek appropriate medical attention (123) and notify your supervisor

Spill in eyes

1. Alert others around you
2. Proceed to the nearest emergency eyewash
3. Rinse eyes for a minimum of 15 minutes
4. Seek appropriate medical attention (123) and notify your supervisor



Hazardous Waste Disposal Flow Chart



*Note: AirGas cylinders should be obtained and returned through UC Cylinder gas (773.702.7353). Non-AirGas cylinder such as lecture-sized compressed gas cylinders are to be handled as chemical waste; submit waste request at ehsa.uchicago.edu.

** Note: Glass containers formerly containing toxic or reactive chemicals should be disposed of as chemical waste and not disposed as empty glassware; submit waste request at ehsa.uchicago.edu.

*** Note: Leaking batteries and broken bulbs containing mercury vapor must be treated as hazardous waste and should be handled as chemical waste; submit waste request at ehsa.uchicago.edu.