Emergency Response and Safety Plan
for the FIU CEE Environmental & Water Resources Engineering Unit
Laboratories (Rooms EC 3625, EC 3630, EC 3760, EC 3765)

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INTRODUCTION

Purpose

To establish an Emergency Response and Safety Plan for the FIU CEE Environmental & Water Resources Engineering Unit Laboratories that will enable constituents to effectively respond to emergencies falling under two distinct types of situations:

I) Those which may be anticipated to be associated to the types of activities taking place in the laboratories EC 3625, EC 3630, EC 3760 and EC3765

II) Those which are associated to University-wide emergencies: severe weather and bomb threats.

Authority

Florida International University Emergency Management and Continuity of Operations Plan (EMCOP) Policy Statement (March 2010)

"*Assuring the continuity of Florida International University is implicit in our mission and requires the cooperation and involvement of all University personnel. The FIU Emergency Management and Continuity of Operations Plan are based on the requirements of Florida Statue 252 and are wholly and fully supported by all members of the FIU Executive Committee and the Executive Council*."

Responsibilities

Deans, Directors & Department Heads: Shall, at minimum, develop and implement the following procedures: Designate the individual and alternate(s), i.e. department safety wardens, who will be responsible for maintenance and implementation of their unit's emergency management plan.

Employees, Students & Facility Occupants: Shall familiarize themselves with the University's, and their unit's, emergency response procedures.

Revisions:

This emergency response and Safety Plan document shall be reviewed every year for necessary updates which may be driven by, but not limited to, changes in the utilization of the spaces or modifications of the University guideline documents which support the content presented here.

Definitions

Emergency: A situation or incident that constitutes an immediate or imminent risk to life, health, property or environment.

In preparation for such occurrences, the FIU EMCOP outlines minimum emergency procedures that are intended to accomplish the following:

- Where possible, prevent disasters
- When disasters cannot be prevented, mitigate the impact on the University community resulting from such occurrences
- Provide a safe environment for University faculty, staff, students and all those to whom we provide services
- Provide for continuity of operations for essential functions

Constituents: In the context of this document, the term refers to personnel and visitors.

Personnel: Laboratory coordinator, faculty in charge, instructor and students (undergraduate and graduate) who are directly engaged in instructional or research activities in laboratories EC 3625, EC 3630, EC 3760 and EC3765.

Visitors: A person visiting laboratories EC 3625, EC 3630, EC 3760 and EC3765; this includes any member of the University community or the public at large who come to the labs either to see the building, one of its occupants, or a lab-sponsored event.

Mitigation: Comprises any activities that prevent an emergency, reduce the chance of an emergency happening, or reduce the damaging effects of unavoidable emergencies. Mitigation activities take place before and after emergencies.

Preparedness: Comprises plans or preparations made to help respond to the emergency. Preparedness activities take place before an emergency occurs.

Response: Comprises actions taken to manage the emergency situation and to prevent further damage or loss to life and property. Response is putting the preparedness plans into action. Response activities take place during an emergency.

Recovery: Comprises actions taken to return to a normal or an even safer situation following an emergency. Recovery activities take place after an emergency.

Description of the Facilities

Common features of the four laboratory rooms, EC 3625, EC 3630, EC 3760 and EC3765, include:

Rooms are located on the third floor of the southeast (SE) quadrant of the Engineering Center and Computer building (Figure 1). Each room has an approximate area of 32’ x 32’, and is equipped with one chemical fume hood and three safety mechanisms including one each eye wash, emergency shower, and fire extinguisher. Each room is also equipped with a Cisco Systems telephone: the campus telephone system is the FIU communication platform available in the lab for emergency notification (a short text message will be displayed on the phone itself as well as broadcasting an audible message). Figures 2 to 5 show the layout of these rooms displaying the location of University safety equipment.

EC 3625

This room is furnished with laboratory glassware and apparatuses used for traditional environmental wet analysis. Approximately 60 distinct chemicals, about 15 of which are liquids, are kept in this lab (See Appendix Table A.1 and Table A.2. Note that these quantities refer to the number of unique chemical compounds; that is, the individual containers count is larger as multiple containers of some of the chemicals are available). The room is equipped with a chemical fume hood which shares one common exhaust blower with that installed in EC 3630.

EC 3625 is primarily used as an instructional laboratory for the courses Environmental Engineering Lab I (ENV 3001 L) and Environmental Engineering Lab II (ENV 4005 L). These curriculums serve approximately 100 students per year from the undergraduate populations of both the civil and the environmental engineering degree programs. Additionally, less than ten (10) graduate, undergraduate and high school students may use the laboratory during the summer conducting research under the mentoring of Dr. Walter Z. Tang or Dr. Anna R. Bricker.

EC 3630

This room primarily contains equipment used for soil hydraulics research; in addition it also contains higher education engineering instructional equipment. The latter can be used for engineering education demonstration or miniature scale research and development projects in soil hydraulics and water treatment. EC 3630 is mainly used by students (10 or less) engaged in undergraduate and graduate research under the mentoring of Dr. Hector R. Fuentes. The chemical fume hood installed in this room shares one common exhaust blower with that in EC 3625.

EC 3760

This room contains both traditional environmental wet analysis and high voltage equipment. Approximately 200 chemicals, about 25 of which are liquids are kept in this laboratory (See Appendix Table A.3, Table A.4 and Table A.5. Note that these quantities refer to the number of unique chemical compounds; that is, the individual containers count is larger as multiple containers of some of the chemicals are available). The room is equipped with a chemical fume hood which shares one common exhaust blower with that installed in EC 3765.

EC 3760 is used as a research laboratory by students working mostly under the mentoring of Dr. Berrin Tansel. A maximum of ten (10) graduate and undergraduate students may be working in the laboratory.

EC 3765

This room is furnished with commercial equipment intended for higher education engineering instruction/demonstrations. The chemicals kept in this room include glycerin and motor oil. The room is equipped with a chemical fume hood which shares one common exhaust blower with that installed in EC 3760. EC 3765 is exclusively used as an instructional laboratory for the course Fluid Mechanics Lab (CWR 3201 L). This curriculum serves approximately 100 students per year from the undergraduate populations of both the civil and the environmental engineering degree programs.

Emergency Contact Information

EC 3625	Lab Supervisor: Anna Bernardo-Bricker, Instructor (office: 305-348-3825, cell: 305-632-3548) Research Faculty: Walter Z. Tang, Associate Professor (office: 305-348-3046) Coordinator of Administrative Services: Carlton Ng (office: 305-348-6875) Environmental Health & Safety (EH&S): 305-348-2621 Police (FIUPD): 305-348-2626
EC 3630	Research Faculty: Hector H. Fuentes, Professor (office: 305-348-2837) Coordinator of Administrative Services: Carlton Ng (office: 305-348-6875) Environmental Health & Safety (EH&S): 305-348-2621 Police (FIUPD): 305-348-2626
EC 3760	Lab Supervisor: Anna Bernardo-Bricker, Instructor (office: 305-348-3825, cell: 305-632-3548) Research Faculty: Berrin Tansel, Professor (office:305-348-2928), Shonali Laha, Associate Professor (office 305-348-1092) Coordinator of Administrative Services: Carlton Ng (office: 305-348-6875) Environmental Health & Safety (EH&S): 305-348-2621 Police (FIUPD): 305-348-2626
EC 3765	Lab Supervisor: Edgar Polo, Lab Manager II (office: 305-348-3815, cell: 305-338-5223) Coordinator of Administrative Services: Carlton Ng (office: 305-348-6875) Environmental Health & Safety (EH&S): 305-348-2621 Police (FIUPD): 305-348-2626

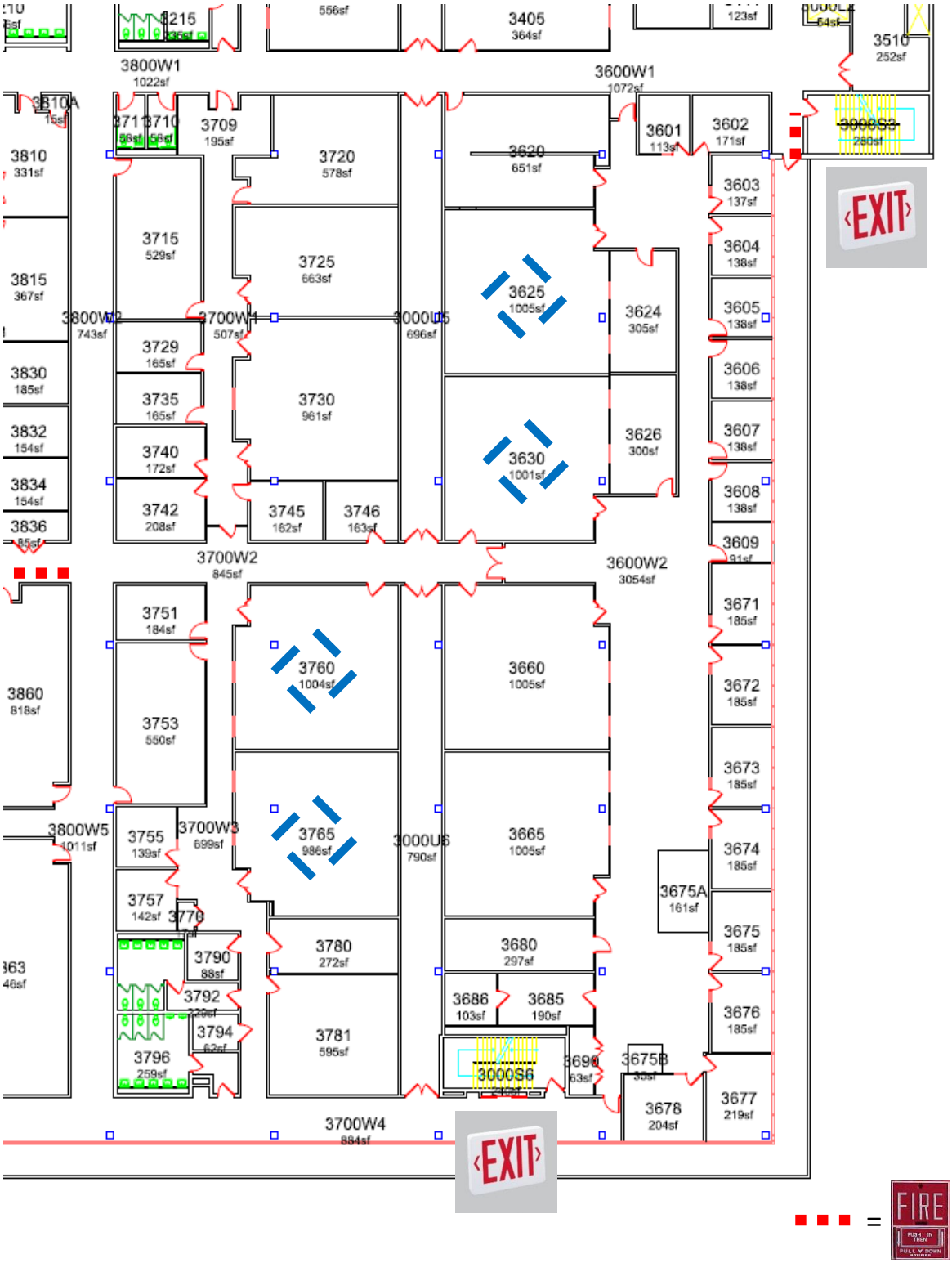

Figure 1. Southeast (SE) quadrant of the Engineering Center and Computer building, Florida International University (FIU), third floor. Layout shows the location of the four laboratory rooms that comprise the FIU CEE Environmental & Water Resources Engineering Laboratories and their nearest emergency exits. (source: Office of Academic Space Management at http://asm.fiu.edu/otherbuildingplans.htm)

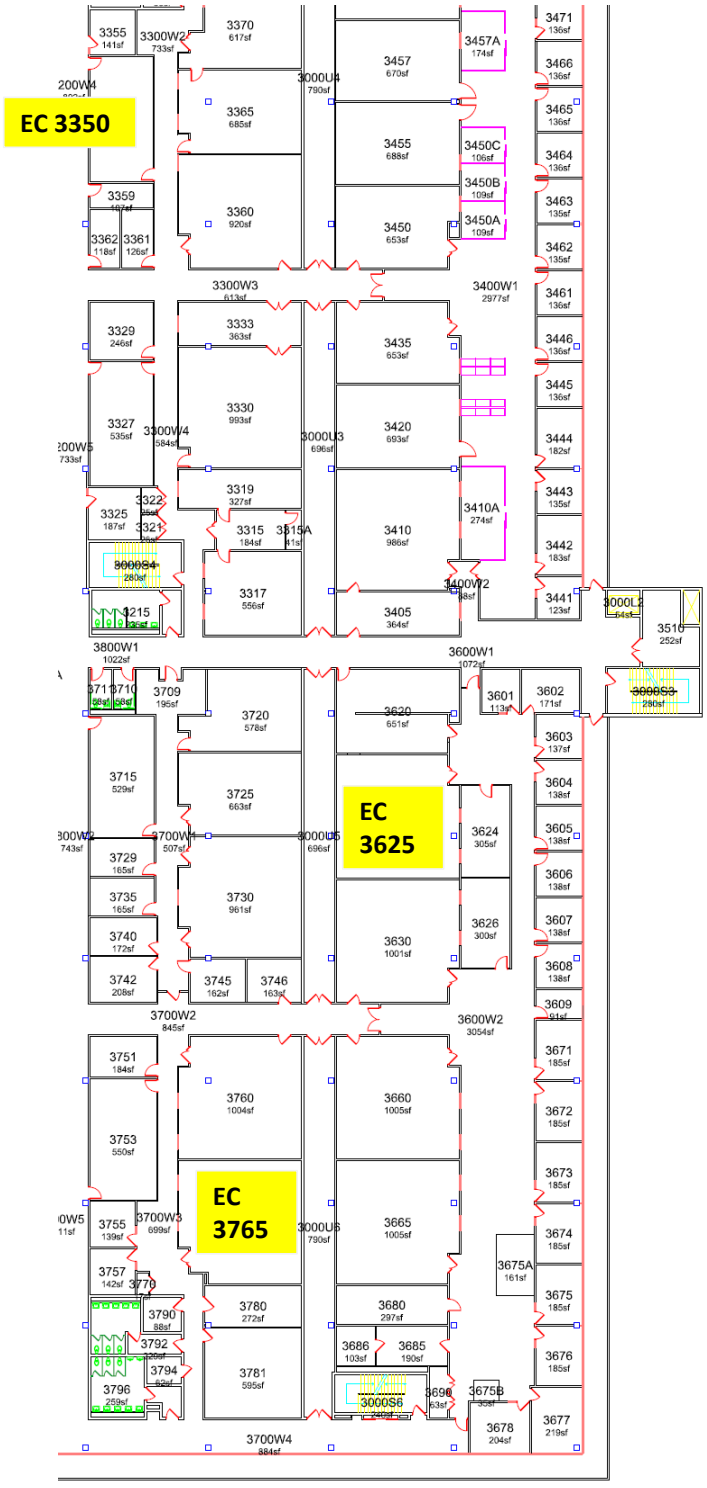

Figure 2. Layout of the third floor of the Engineering Center and Computer building, Florida International University (FIU) showing the relative location of the instructional laboratories rooms EC 3625 and EC 3675 versus the large CEE-Conference room EC 3350, the possible shelter room in case of Tornado Warning. (source: Office of Academic Space Management at http://asm.fiu.edu/otherbuildingplans.htm)

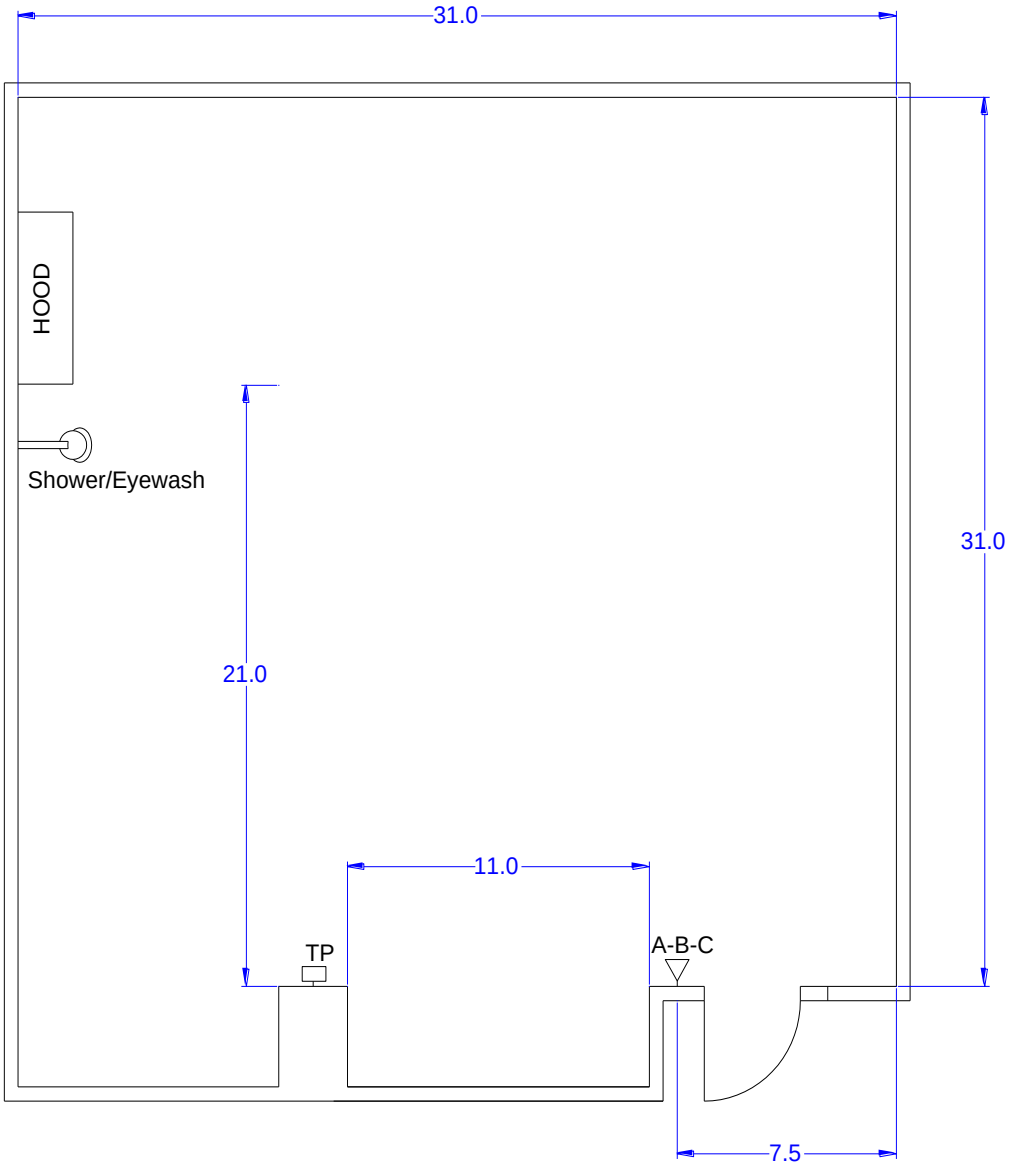

Figure 3. Layout of rooms EC 3625 showing location of University safety equipment.

A-B-C = Fire Extinguisher; that is, suitable for Class A fires (organic solids), Class B fires (flammable or combustible liquids) and Class C fires (flammable gases).

T P= Cysco Systems Phone 

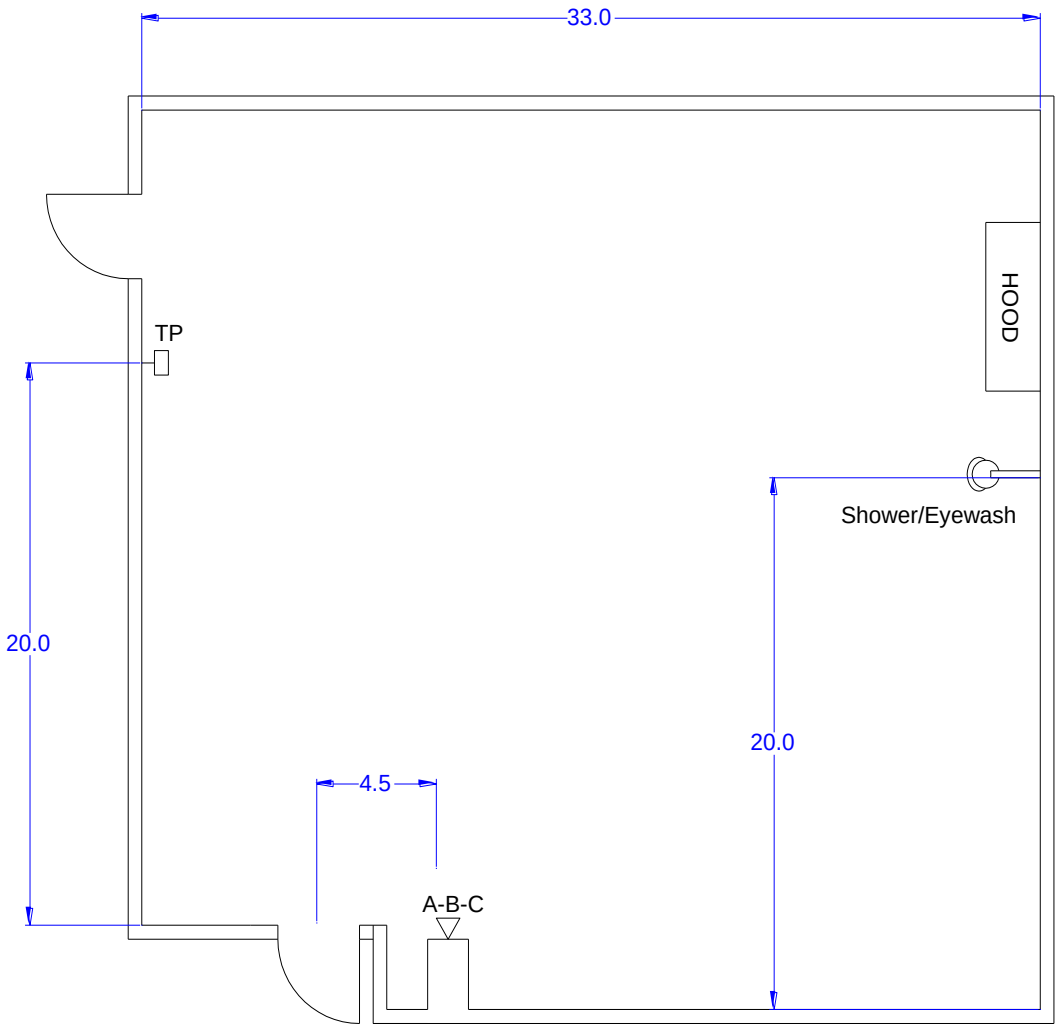

Figure 4. Layout of rooms EC 3630 showing location of University safety equipment.

A-B-C = Fire Extinguisher; that is, suitable for Class A fires (organic solids), Class B fires (flammable or combustible liquids) and Class C fires (flammable gases).

T P= Cysco Systems Phone 

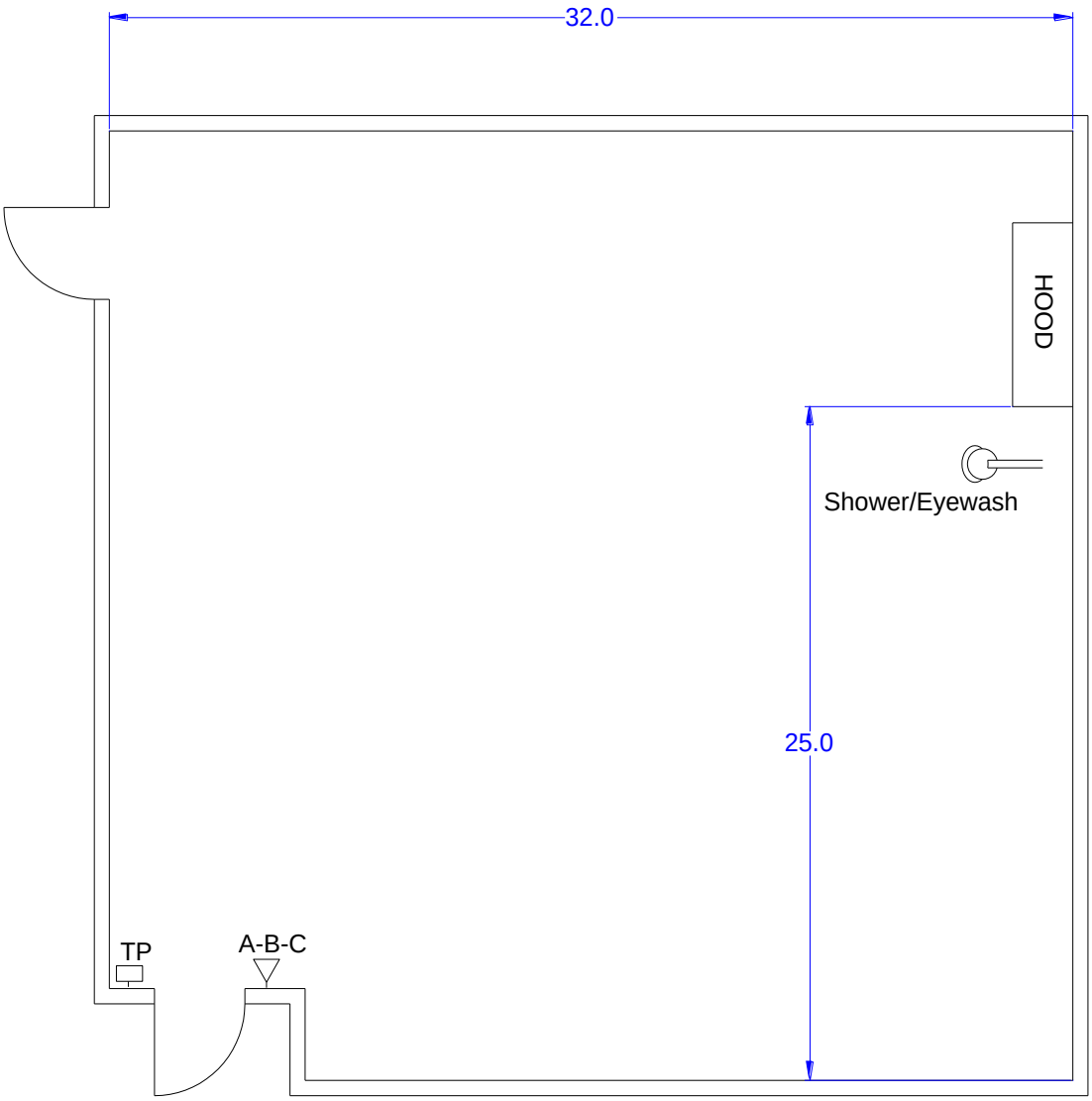

Figure 5. Layout of rooms EC 3760 showing location of University safety equipment.

A-B-C = Fire Extinguisher; that is, suitable for Class A fires (organic solids), Class B fires (flammable or combustible liquids) and Class C fires (flammable gases).

T P= Cysco Systems Phone 

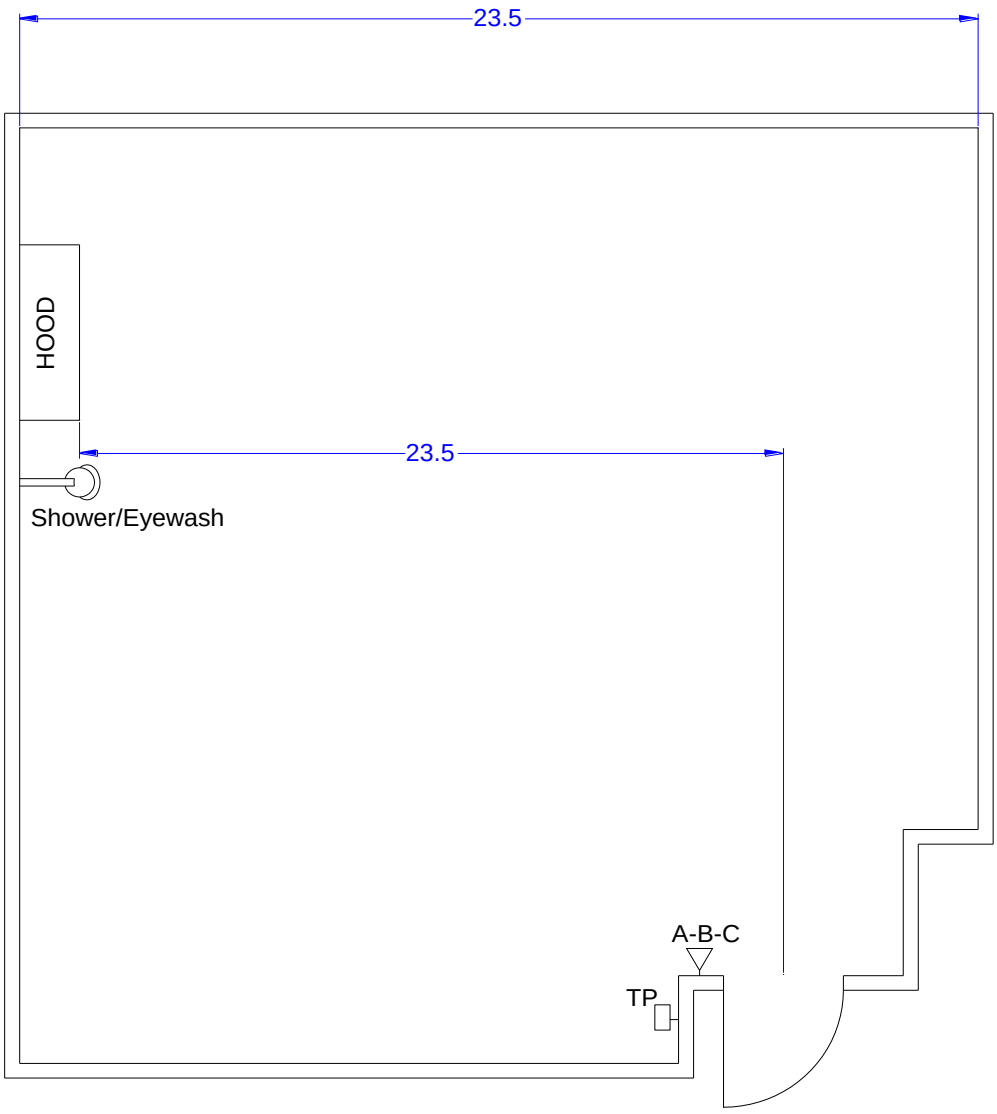

Figure 6. Layout of rooms EC 3765 showing location of University safety equipment.

A-B-C = Fire Extinguisher; that is, suitable for Class A fires (organic solids), Class B fires (flammable or combustible liquids) and Class C fires (flammable gases).

T P= Cysco Systems Phone 

I. Emergencies Associated to the Routine Activities Conducted in the FIU CEE Environmental & Water Resources Engineering Laboratories

I.1 Purpose

To inform personnel how to recognize emergency situations which may be anticipated to be associated to the activities typically taking place in the laboratories EC 3625, EC 3630, EC 3760 and EC 3765 and to establish standard procedures for the immediate course of action to achieve a safe, timely and properly response to these type of events.

I.2 Background Information

In the context of the Occupational Safety and Health Administration (OSHA) laws and regulations affecting Florida International University, our Department of Environmental Health and Safety (FIU-EH&S) has in place a systematic approach to managing waste, complying with environmental regulations and comprehensively addressing aspects of workplace safety that could affect the health and well-being of the constituents. The general regulations associated to the purpose specified above are established in the University Safety Compliance Guides (USCG) documents. Specifically, Section 100: General Safety, 300: Hazardous Waste, and Section 600: Laboratory Safety. The emergency procedures that are outlined in this Emergency Response document are aligned with those prescribed within the University's compliance guides.

There are many potential hazards in environmental/water resources laboratories including toxic chemicals and fumes, broken glassware, high voltage equipment, etc., etc. That is, these places can certainly be considered emergency-prone areas; however, it is now well established that **safety education** and **training** are the two fundamental pillars in the prevention of accidents and emergency situations. Safety education refers to the practice of awareness -learning to recognize and avoid hazards- while safety training is a term intended to refer to learning, preferably hands-on, the proper and safe use of each piece of laboratory equipment and chemicals as well as appropriate personal protection equipment.

Safety education and training are the means by which FIU ensures that employees have the knowledge and skills they need to do their jobs safely. The FIU-EH&S department in its responsibility to OSHA has established a list of "Required Training by Profession" (Table I.1) and offers the cost effective means by which FIU employees and researcher will be able to satisfy safety training requirements associated with their job tasks by providing access to classroom and online training resources (http://ehs.fiu.edu/Training/Pages/default.aspx).

In order to achieve the goals set in the purpose, it is necessary to evaluate concrete and realistic scenarios. That is, recognize the actual potential sources of these situations: the set of things (items, instruments, tools, substances and materials) and processes and practices. Consequently, a good first step is to identify the specific hazards. Hazard understood as any source of potential damage, harm or adverse health effects. This point is addressed ahead in **Section I.3**.

Additionally, a series of short video clips have been prepared as part of this training Emergency Response document in order to enhance and facilitate training of Teaching Assistants (TAs), students and any other

constituents by providing a visual example of how to perform the emergency response procedures for the most likely real-life situations (actions to be taken in case of broken glass and chemical spills accidents; **Section I.4**).

Table I.1. List of required training for personnel involved in "General Labs (Teaching, etc.)" as identified by FIU Risk Management & Department of Environmental Health & Safety

Course name	**Currently Certified Personnel in CEE department**
Chemical Handling Safety: Basic Principles (online)	Anna Bricker ☑
Compressed Gases & Liquids (online)	Anna Bricker ☑
Environmental Awareness, Part II :Waste and Chemical: Only required for the person(s) who is in charge of the areas hazardous waste management practices and will be signing off on the EH&S Hazardous Waste Pick-Up Form. (online)	Anna Bricker ☑
Fire Extinguishers: Your pass to safety (General-online)	Anna Bricker ☑
Fire Safety: Hands on/Classroom: only required for one person per Lab or Shop (classroom)	**Anna Bricker (pending)**
First-Aid / CPR / AED: At least one person in each lab or shop must have this training. Individuals not working in OSRA funded labs or areas will be charged for the training and must have written permission submitted to EH&S from their supervisors before approval is granted. (classroom)	**Anna Bricker (pending)**
Hazard Communication (online)	Anna Bricker ☑
Hazardous Waste Awareness and Handling : Required for all persons who generate, handle hazardous wastes or work in areas where hazardous waste is generated (online)	Anna Bricker ☑
Laboratory Safety (online)	Anna Bricker ☑
Laboratory Risk Assessment (online)	Anna Bricker ☑
Personal Protective Equipment (online)	Anna Bricker ☑ Edgar Polo ☑
Safe use of Fumehoods (online)	Anna Bricker ☑
Small Spills and Leaks (online)	Anna Bricker ☑

- Beginning Fall 2012 all students registered in the laboratory courses ENV 3001L and ENV 4005L are being required by Instructor (Anna Bricker, Ph. D.) to master <u>either one</u> of the following two courses: Chemical Handling Safety: Basic Principles or Laboratory Safety.
- Graduate students are being required to master <u>the following three</u> courses:
  a) Chemical Handling Safety: Basic Principles or Laboratory Safety
  b) Personal Protective Equipment
  c) Safe Use of Fumehoods

I.3 Hazard Identification: Evaluation of Chemical Hazards

Following is a list of the hazards that have been heuristically identified, over a period of two years, in order of likelihood of occurrence:

- **A.** Broken glassware (all rooms)
- **B.** Chemical spill (mainly EC 3625 and EC 3760, to a minor extent EC 3765)
- **C.** Mercury spill (a special case of hazardous chemical spill; affects rooms EC 3630 and EC 3765, and to a minor extent EC 3760)
- **D.** Electrical (all rooms)
- **E.** Compressed gases (EC 3760)
- **F.** Vacuum operations (EC 3760: equipment not currently in operation)
- **G.** Pressure operations (EC 3630)

Chemical hazards are typically subdivided in two categories, physical and health hazards. The physical hazards of a chemical include its flammability and reactivity; these can manifest as a risk of fire or explosion.

In order for a chemical to become hazardous to a person's health, it must first contact or enter the body and the chemical must have some biological effect on the body. There are three major routes of hazardous exposure:

- Inhalation (through the nose)
- Absorption (through the skin and, especially, eyes)
- Ingestion (through the mouth)

Once toxic chemicals enter the body, they can cause a variety of harmful effects, including immediate (acute) effects or long-term (chronic) effects which may not show up for a number of years after the exposure occurred. Toxic chemicals can also produce local and systemic effects, depending on the nature of the chemical and the route of exposure.

The Material Safety Data Sheets (MSDS) are known as the cornerstone of chemical hazard communication and these are central to the safe handling of hazardous substances. They provide all the important information about a chemical's safe handling procedures and immediate hazards, necessary first aid procedures and clean up and disposal procedures. In order to be prepared for an emergency, all personnel must read the information for every chemical he/she works with. (see also USCG-100#119, Appendix B)

In the EC 3625 and EC 3760 laboratories the MSDS sheets for all the chemicals available in these rooms are kept in an organized fashion in a binder on an easily accessible bench location for quick reference. In addition, all personnel should be responsible to acquire the MSDS for any special-order chemical.

OSHA Mandated MSDS Information includes the following ten (10) items:

1) Chemical Identity and a list of all hazardous ingredients
2) Physical Data: vapor pressure, flash point, density, boiling point, etc.
3) Physical Hazards: Fire and explosion data, and reactivity data if applicable.

4) Health Hazards: Signs and symptoms of exposure, and any medical conditions generally recognized as being aggravated by exposure to the material.
5) Primary Route(s) of Entry: inhalation, ingestion,
6) Exposure Limits: Legal exposure limits (OSHA and other recommended limits).
7) Known carcinogenic risk
8) Precautions for Safe Handling and Use: including appropriate hygienic practices, protective measures required during handling of contaminated equipment, and procedures for clean-up of spills and leaks.
9) Control Measures: Any control measures known to the party preparing the MSDS, such as engineering controls, work practices, or personal protective equipment.
10) Emergency and First-Aid Measures

Table I.2. National Fire Protection Association (NFPA) rating system definitions

Health (Blue)

4 Danger- May be fatal on short exposure. Specialized protective equipment required.
3 Warning - Corrosive or toxic. Avoid skin contact or inhalation
2 Warning – May be harmful if inhaled or absorbed.
1 Caution – May be irritating
0 No unusual hazard

Flammability (Red)

4 Danger – Flammable gas or extremely flammable liquid
3 Warning – Flammable liquid flash point below 100° F
2 Caution – Combustible liquid flash point of 100° F to 200° F
1 Combustible if heated
0 Not combustible

Instability (Yellow) (Reactivity)

4 Danger- Explosive material at room temperature.
3 Danger – May be explosive if shocked, heated under confinement, or mixed with water
2 Warning – Unstable or may react violently if mixed with water
1 Caution – May react if heated or mixed with water but not violently
0 Stable – Not reactive when mixed with water

Special Notice Key (White)

W Water reactive
OX Oxidizing Agent

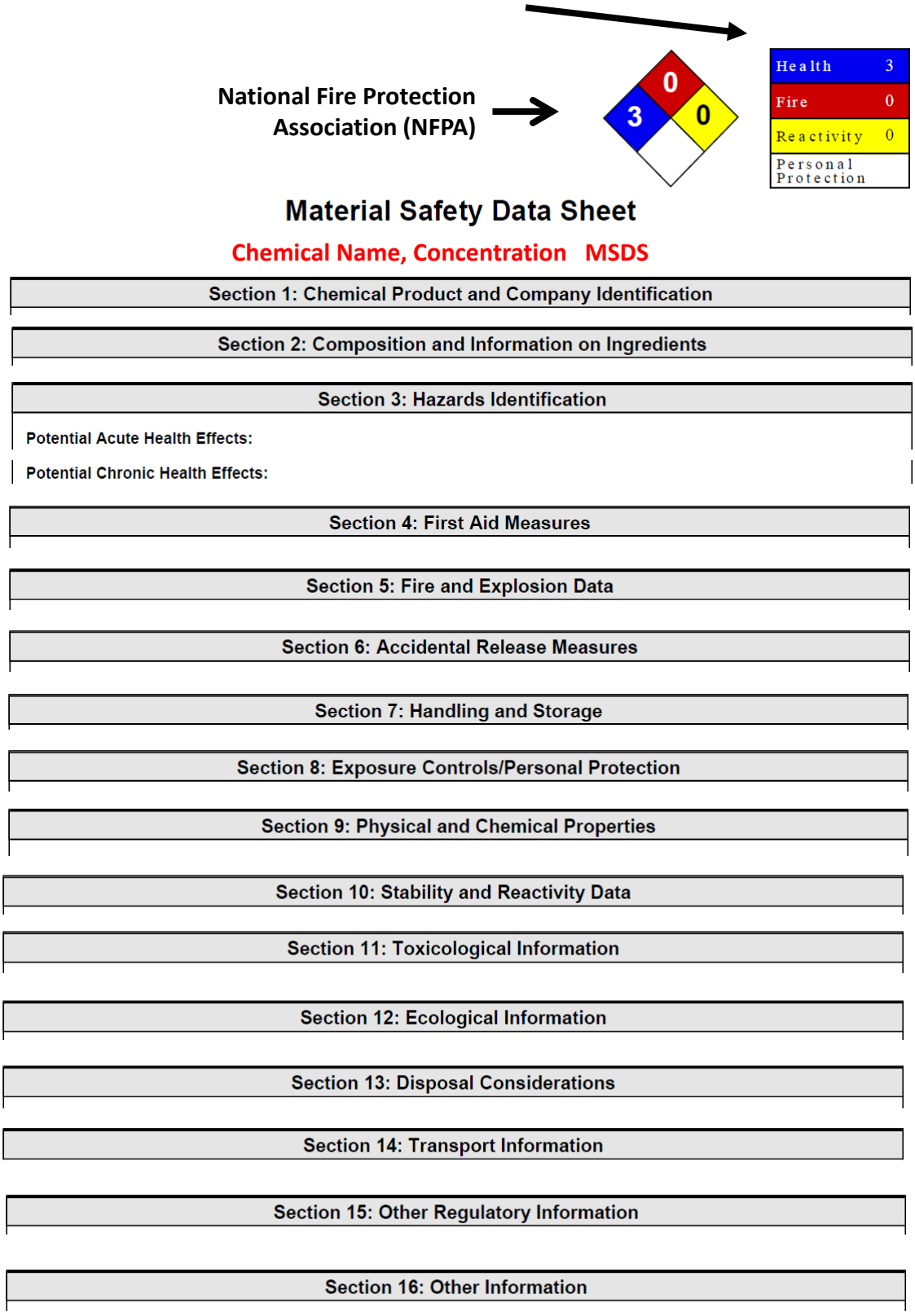

Figure I.1. Example of the Information provided in a typical Material Safety Data Sheet (MSDS)

Figure I.1 shows the typical sections of information found in a MSDS. The National Fire Protection Association (NFPA) has developed a diamond label system for indicating the health (blue), flammability (red) and reactivity (yellow) hazards of chemicals. In addition, a special precaution symbol (in white section) may be used where necessary. The rating numbers for each category range from 0 (no risk) to 4 (may be fatal), and are described as indicated in Table I.2. Appendix Tables A.1 to A.5 show the ratings for each of the chemicals listed; it can be seen that 70% of the chemicals fall within the health risk category 1 or higher and 20% within the health risk categories 3 and 4. In addition, 61% of the solvents kept in EC 3760 are considered flammables (NFPA "red" rating of 3or 4).

I.4 Emergency response procedures

This section provides step by step response procedures for each of the hazards identified, as well as for the immediate possible effects of those hazards.

All items necessary to carry out the clean up are stocked in a specific location of the laboratory rooms EC 3625 and EC 3760 labeled "Broken Glassware and Chemical Spills Cleanup Supplies" and "Corrosive/Organic Solvent Cleanup Supplies"

A. Broken glassware

Before beginning cleanup, students working as research assistants should inspect themselves for cuts and embedded glass. In case of minor cuts, they should administer any necessary first aid from the First Aid kit available in the laboratories. In instructional laboratory sessions, students should be inspected by the Instructor or Teaching Assistant (TA) who should carry out any required first aid help. Further information on Florida International University safety procedures guidelines to respond to minor injuries and use of First Aid Kits can be found in the USCG-100#110 and #110A (see Appendix B).

After cleanups notify the Laboratory coordinator so that she may evaluate the emergency situation and consider future preventative options, and so that materials used for the cleanup are promptly replaced to respond to future events.

Florida International University directive to disposal of clean broken glassware is established in USCG-600#601 (see Appendix B). In order to protect custodians from injury, broken glass is not to be disposed in the regular trash. Laboratories must be equipped with broken glass containers for the disposal and removal of uncontaminated broken glass. Once the box is full, it must be properly sealed and directly disposed into an outside trash dumpster.

Undergraduate and graduate students engaged in research work in the laboratories must follow the broken glassware cleanup procedure detailed below.

In the case of Instructional Laboratories, students shall be informed to report any incidence of broken glassware to the Instructor or TA in charge of the lab. Given the type of glassware used in the instructional laboratories (EC 3625 and EC 3765), decontaminated glassware breakages are very likely to be minor accidents. In these cases, Instructor or TA shall always first inspect the student for cuts and assist him/her

in administering any necessary first aid from the First Aid kit available in the labs. Meanwhile, Instructor/TA should redirect other students away from the area of the broken glass. The student should be able to clean up his/her own broken glassware accident under the direction of the Instructor or TA. If deemed necessary, the Instructor or TA may decide to carry out the clean-up.

Most broken glassware accidents involve up to 500-mL capacity size container/device and occur on the bench. A kit has been organized containing all items required to respond to this emergency, including a small size broom and dustpan. In the event that the broken glass is on the floor, the upright duo pan/dustpan shall be used for the cleanup.

Procedure to cleanup broken glass:

1. Wear goggles and puncture-resistant gloves.
2. Use the appropriate size broom to sweep up as much as possible of the glass pieces into the dustpan. On a second sweeping it may help to dust the area lightly with talco powder to keep the smallest fragments from sticking to the floor/bench or the broom's bristles.
3. Use a piece of damp paper towel to collect the last smallest pieces that might otherwise get away from the broom, and to wipe the dustpan clean before placing back into the "Broken Glassware and Chemical Spills Cleanup Supplies" cart.
4. Dispose of all broken glass in the specific container designated for clean broken glassware.
5. Shake the broom lightly into the container designated for broken glassware. Use best judgment to decide whether the broom is clear from all glass pieces and can be placed back in the kit for reuse, or if the broom head should be discarded.
6. Notify the Lab Coordinator of the accident as soon as possible after the cleanup.

B. Chemical Spills

This section will start with one fundamental admonition: in order to be prepared for a specific chemical spill emergency, all personnel must study the MSDS information for every chemical he/she works with. Specific Instructions for cleanup of accidental spills appear under the label "Accidental Release" as illustrated here in Figure I.1 (see "Section 6" in the Figure, page 16).

The cleanup procedures described here comply with the Florida International University directive for chemical spill cleanup outlined in USCG-600#607 (see Appendix B), as well as with the Spill Response Plan portion of the Florida International University Environmental Compliance Documents. The latter outlines recommendations to determining the response plan based on the size of the spill, as shown here in Table I.3.

Appropriate cleanup responses should aim at protecting personnel's health and, whenever possible, reducing the toxicity of the spill in order to be able to discard it and the absorbing materials as regular waste rather than "hazardous waste". The vast majority of spills that are likely to occur in our instructional

laboratory settings (room EC 3625) can be categorized as "small" in size according to the guidelines in Table I.3. Furthermore, the most likely scenario involves spills of acids or bases with a

Table I.3. Categorization and Response Guidelines to Chemical Spills based on Spill Size

Category	Size	Response	Treatment materials
Small	Up to 300 mL	Chemical treatment or absorption	Neutralization or absorption spill kit
Medium	300 mL to 5 L	Absorption	Absorption spill kit
Large	More than 5 L	Call public safety	Outside help

concentration strength equal to or lesser than 1M. In these cases the proper neutralizing agents consist of sodium bicarbonate (Na_2CO_3, commercial baking soda) if the spilled liquid is an acid, and either diluted acetic acid (CH_3COOH, commercial white vinegar is approximately 6% acetic acid) or sodium bisulfate ($NaHSO_4$) if the spilled liquid is a base. In addition, undergraduate and graduate students, and any other personnel engaged in research work in rooms EC 3625 or EC 3760 may be handling concentrated corrosive acids and bases as well as organic solvents (room EC 3760).

Cleanup instructions for each spill-case scenario are provided here. All items needed to clean up a spill can be found in the "Broken Glassware and Chemical Spills Cleanup Supplies" cart, and the "Corrosive/Organic Chemical Cleanup Supplies" buckets in EC 3625 and EC 3765. In case of a minor chemical spill during an instructional laboratory session, the Instructor or TA in charge shall firstly move students away from spill and attend to any minor cuts by using the items in the First Aid Kit. **Marked with an asterisk (*) are the chemical spills more likely to occur in the settings of the instructional laboratory courses.**

Spill Cleanup Supplies:

- ✓ Goggles
- ✓ Chemical Resistant Gloves
- ✓ Neutralizing agents for acids and bases (baking soda or garden lime, white vinegar or sodium bisulfate)
- ✓ Absorbents (Yellow mats/pads, Zep™ commercial spill absorber, Vermiculite)
- ✓ Scraper and Scoop for collecting absorbed materials
- ✓ Plastic bags to contain solid waste which may be disposed in the regular trash
- ✓ Buckets with lids for collecting solid waste for proper disposal as "Hazardous Waste" (corrosive and organic solvents)

Procedure to cleanup spilled ACID solutions **Concentration strength ≤ 1M** **Spilled volume ≤ 300 mL ("Small")**	**GOAL:** **NEUTRALIZE spill** **and discard liquid waste in sink**

1. Wear goggles and chemical resistant gloves.

2. Contain spill from spreading by placing absorbent paper or yellow mats over it

   High absorbency paper towel (blue)... Up to 10 mL spill
   Yellow absorbent mats……..... One 10x10 mat will hold up to 150 ml of liquid

3. Sprinkle baking soda over the mats until fizzing completely stops. (1)

4. Mop up the spill and place the mats in a small bucket.

5. Take bucket with mats to the nearest sink and rinse the mats with plenty of water.

6. Wring the mats completely. (2)

7. Use pH paper to confirm neutralization of the spill surface area. Sprinkle baking soda if still needed and wipe the surface using paper towel, which may then be discarded in the regular trash.

8. Notify the Lab Coordinator of the accident as soon as possible after the cleanup.

(1) Approximate grams of baking soda required to neutralize acid (markings found on the dispensing container)

	Concentration of Acid Spill (M)		
Volume of Acid Spill (ml)	**0.1**	**0.5**	**1**
10	1	1	2
25	1	2	3
50	1	3	6
100	2	6	11
300	4	16	32

(2) Yellow mats may be dried and reused or discarded in the regular trash, as considered appropriate

Procedure to cleanup spilled ACID solution **Concentration strength ≤ 1M** **300mL < Spilled volume < 5 L ("Medium")**	**GOAL:** **NEUTRALIZE and ABSORB spill and discard solid waste in trash**

1. Wear goggles and chemical resistant gloves.
2. Contain spill from spreading by sprinkling a line of absorbent material, then continue to sprinkle absorbent towards the center of the spill until it is immobilized but soft and pulpy.
3. Sprinkle baking soda and thoroughly blend using the scraper provided.(1) Wait until fizzing completely stops.
4. Add more absorbent material until spill is completely absorbed and surface feels dry.
5. Sweep/scoop neutralized solid waste into the plastic bag.
6. Use pH paper to confirm neutralization of the spill surface area. Sprinkle baking soda if still needed and wipe the surface using paper towel, which may then be discarded in the regular trash.
7. Notify the Lab Coordinator of the accident as soon as possible after the cleanup.

(1) Approximate grams of baking soda required to neutralize acid (markings found on the dispensing container)

	Concentration of Acid Spill (M)		
Volume of Acid Spill (ml)	**0.1**	**0.5**	**1**
500	6	27	53
1000	11	53	106
2000	22	106	211
3000	32	158	316
5000	53	263	526

Procedure to cleanup spilled CAUSTIC (base) solution **Concentration strength ≤ 1M.** **Spilled volume ≤ 300 mL ("Small")**	**GOAL:** **NEUTRALIZE spill** **and discard liquid waste in sink**

1. Wear goggles and chemical resistant gloves.
2. Contain spill from spreading by placing yellow pads over it

   Yellow absorbent mats…….... Use one 10x10 mat for each 75 ml of liquid
3. Spray white vinegar over the mats until fizzing completely stops. (1) If necessary, use an additional yellow mat to absorb the liquids.
4. Mop up the spill and place the mats in a small bucket.
5. Take bucket with mats to the nearest sink and rinse the mats with plenty of water.
6. Wring the mats completely. (2)
7. Use pH paper to confirm neutralization of the spill surface area. Spray some white vinegar if needed and wipe the surface using paper towel.
8. Notify the Lab Coordinator of the accident as soon as possible after the cleanup.

(1) Approximate volume (mL) of white vinegar required to neutralize base

	Concentration of Caustic Spill (M)		
Volume of Caustic Spill (ml)	**0.1**	**0.5**	**1**
10	2	8	16
25	4	19	38
50	8	38	76
100	16	76	151
300	46	226	451

(2) Yellow mats may be dried and reused or discarded in the regular trash, as considered appropriate

Procedure to cleanup spilled CAUSTIC (base) solution **1 M < Concentration strength < 20 M (~2.5% to ~50%)** **Spilled volume ≤ 300 mL ("Small")**	**GOAL:** **NEUTRALIZE spill** **and discard liquid waste in sink**

1. Wear goggles and chemical resistant gloves.
2. Absorb the spill by placing yellow pads over it

   Yellow absorbent mats……..... One 10x10 mat will hold up to 150 ml of liquid
3. Mop up the spill and place the mats in a small bucket.
4. Add Sodium Bisulfate ($NaHSO_4$) [(1)] and a volume of tap water equal to the size of the spill (i.e. if spill is 300 mL, then add ~300 mL of tap water). Mix thoroughly.
5. Use pH paper to confirm neutralization, and wring the mats completely. [(2)]
6. Use pH paper to confirm neutralization of the spill surface area. Spray some white vinegar if needed and wipe the surface using paper towel.
7. Notify the Lab Coordinator of the accident as soon as possible after the cleanup.

[(1)] Approximate grams of $NaHSO_4$ required to neutralize the caustic spill

	Concentration of Caustic Spill (M)		
Volume of Caustic Spill (ml)	**5**	**10**	**20**
10	5	10	20
25	13	25	50
50	25	50	100
100	50	100	200
300	150	300	599

[(2)] Yellow mats may be dried and reused or discarded in the regular trash, as considered appropriate

Procedure to cleanup CONCENTRATED ACID solutions **Spilled volume is UP to a MAXIMUM of 50 mL**	**GOAL:** **NEUTRALIZE spill** **and discard liquid waste in sink**

1. Wear goggles and chemical resistant gloves.
2. Wear fumes mask, if spill happened outside the chemical hood.
3. Contain spill from spreading by sprinkling a line of absorbent material to encircle the spill.
4. Add garden lime over the spill gradually, alternating with small portions of water from the dispensing bottle and blending in using the scraper.
   A total of approximately 150 grams of garden lime are needed to neutralize 50 mL of sulfuric acid (see Appendix Table A.2 for other corrosive acids concentrations). Neutralization is complete when fizzing ceases.

   CAUTION: Neutralization of such concentrated acid generates fumes and heat.

5. Use pH paper to confirm neutralization of the mound.
6. Sprinkle enough absorbent material until the mixture feels crumbly/dry.
7. Scoop neutralized solid waste into a plastic bag.
8. Use pH paper to confirm neutralization of the spill surface area. Sprinkle baking soda if still needed and wipe the surface clean using paper towel.
9. Place paper towels into the plastic bag together with the neutralized solid waste and fasten the bag.
10. Dispose of bag into general waste; it is no longer a hazard because it has been neutralized.
11. Notify the Lab Coordinator of the accident as soon as possible after the cleanup.

⚠ CAUTION *Neutralizers can help make corrosive liquids safer to clean up and handle and generate a non-hazardous waste. However, because the process of neutralizing acids and bases generates fumes and heat, attempting to neutralize corrosive acid spills larger than 50 mL in our laboratories is not only impractical but may also be potentially dangerous.*

Procedure to cleanup CONCENTRATED ACID solutions Spilled volume > 50 mL	**GOAL: ABSORB spill and discard as solid "Hazardous Waste"**

1. Wear goggles and chemical resistant gloves.
2. Cover the spill with vermiculite, blending in using the scraper until the surface of the spill feels dry.
3. Sweep or scoop the solid waste into bucket and seal it.
4. Attach a properly filled "Hazardous Waste" label on the bucket.
5. Use pH paper to confirm neutralization of the spill surface area. Sprinkle baking soda if needed and wipe the surface clean using paper towel.
6. Dispose of paper towels into general waste.
7. Contact F.I.U.-Environmental Health and Safety at 7-2621 to schedule a pick-up of the corrosive solid waste in the bucket.
8. Notify the Lab Coordinator of the accident as soon as possible after the cleanup.

Procedure to cleanup any size spills of ORGANIC SOLVENTS	**GOAL: ABSORB spill and discard as solid "Hazardous Waste"**

1. Wear goggles and chemical resistant gloves.
2. Cover the spill with vermiculite, blending in using the scraper until the surface of the spill feels dry.
3. Sweep the solid waste into bucket and seal it.
4. Attach a properly filled "Hazardous Waste" label on the bucket.
5. Contact F.I.U.-Environmental Health and Safety at 7-2621 to schedule a pick-up of the solid waste in the bucket.
6. Notify the Lab Coordinator of the accident as soon as possible after the cleanup.

C. Mercury Spills

Elemental mercury (Hg) is a heavy, silvery metal element that is a liquid at room temperature. Liquid mercury has a density of 13.534 g/cm^3 and a vapor pressure of and the vapor pressure 0.2729 mmHg at normal room temperatures; therefore, it easily evaporates. Mercury vapors are invisible, odorless, and, at high levels, are very toxic. Inhalation of mercury vapors can harm the nervous system, cardiovascular system, digestive tract, kidneys, and the development of young children. For these reasons, prompt and proper cleanup and disposal of even minor spills is always taken very seriously.

In our laboratories metallic mercury is found in the following rooms/equipment/amounts:

- EC 3630/Armfield W3 Permeability-Fluidisation Studies Apparatus equipped with a mercury manometer containing 36 ml of mercury (equivalent to approximately 487 g)
- EC 3765/Armfield Fluid Friction Apparatus equipped with a mercury manometer containing 77 ml of mercury (equivalent to approximately 1042 g)
- EC 3760/thermometers, about 0.5 mL (equivalent to approximately 5 to 7 g)

What to do in the event of mercury spill in one of our laboratories?

The first decision to be made immediately after a mercury spill is who should clean it up. According to our EH&S department cleanups involving spills of 1 lb (454 g) of mercury or less should be handled by the person who caused it; furthermore, only one or two persons should remain in the room to clean the spill. If only one person stays inside for the cleanup, then one person shall remain immediately outside the room's door. Before starting the cleanup, place the sign "mercury spill, do not enter "outside the door

Additionally, <u>three important considerations prior to beginning the cleanup include</u>:

1) Avoid spreading spilled mercury. All persons near the spill shall check their clothing and shoe soles for residues of mercury. If these are found, the person shall take clothing and shoes off and wear the disposable coverall and shoe covers from the cleanup kit before leaving the room. Clothing that has come in contact with mercury should be discarded. Shoes' soles may be decontaminated by following the decontamination procedure described ahead (page 27).

2) Keep the mercury from spreading into cracks, crevices, floor drains or onto sloped or porous surfaces which are difficult to clean. If necessary, masking tape or duct tape should be used to make a "fence" around the mercury droplets and confine them to a limited area for cleanup.

3) Remove all jewelry from hands and wrists. These can be permanently damaged by amalgamation with mercury.

A mercury spill involving about 3 mL of mercury is considered small, otherwise is medium to large. The three labs are equipped with Mercury Spill Kits. Following are the step-by-step cleanup procedure for each of these two cases.

Procedure to cleanup MAXIMUM 1 mL of mercury (approximately 13.5 g)	**GOAL: ABSORB spill and discard as solid "Hazardous Waste"**

1. Wear nitrile gloves and face mask. If spill spread over an area larger than 3x3 feet, cover shoes with disposable covers.
2. Pick up any broken pieces of glass or sharp materials. Place on a paper towel. Fold the towel and place in the waste disposing bag.
3. Begin the mercury cleanup by consolidating large droplets using an index card provided in the cleanup kit. To maintain control, use slow sweeping motions. The larger globules can be carefully collected onto an index card.
4. Use the Mercury Sponge to amalgamate the droplets (each sponge is able to amalgamate 5 grams of mercury).
5. Use the Mercury Cleanup Wipers to wipe off the area of the spill.
6. Place all mercury contaminated items in the disposing bag and label as Hazardous Waste.
7. Contact F.I.U.-Environmental Health and Safety at 7-2621 to schedule a pick-up of the solid waste.
8. Notify the Lab Coordinator of the accident as soon as possible after the cleanup.

1 mL Mercury

1 mL < Volume of Mercury < 30 mL

Procedure to cleanup a medium-size mercury spill: up to 25-30 mL (approximately 1 pound) INSTRUCTIONAL VIDEO AVAILABLE

Use the SPILYFTER Mercury Spill Kit

Closely follow the Kit's instruction. In essence, the cleanup Kit is based on a two-step system: Vapor suppression, followed by amalgamation.

Prior to the amalgamation step described in the procedure for Small spill in the previous paragraph, the outer surface of the elemental mercury beads is first "stabilized" in order to prevent vaporization of the mercury. This first step is referred to as mercury vapor suppression; it consists on applying a proprietary formula product that works by immediately oxidizing the outer surface of the elemental mercury. Typically, the chemical change consists in converting the elemental mercury to the more stable non-vapor-producing mercuric sulphide.

1. Wear nitrile gloves and face mask, cover shoes with disposable covers.
2. Follow step-by-step the Kit's instruction to 1st stabilize and 2nd amalgamate the spilled mercury
3. Use the Mercury Cleanup Wipers to wipe off the area of the spill.
4. Place all mercury contaminated items in the disposing bag and label as Hazardous Waste.
5. Contact F.I.U.-Environmental Health and Safety at 7-2621 to schedule a pick-up of the solid waste.
6. Notify the Lab Coordinator of the accident as soon as possible after the cleanup.

Procedure for decontamination of mercury from shoes' soles

1. Wear nitrile gloves and face mask, cover shoes with disposable covers.
2. Use the Mercury Sponge to amalgamate all visible droplets.
3. Use the Mercury Cleanup Wipers to wipe off the shoes' soles.
4. At the sink, wash shoes' soles with warm soapy water. Then dry with paper towel.
5. Place all mercury contaminated items in the disposing bag and label as Hazardous Waste.
6. Contact F.I.U.-Environmental Health and Safety at 7-2621 to schedule a pick-up of the solid waste.
7. Notify the Lab Coordinator of the accident as soon as possible after the cleanup.

D. Electrical Fires

The general hazards associated with the use of electricity include electrical shock and electrical fires caused by shorts and overloaded circuits or wiring. Our laboratories use electrical equipment; therefore, they are not exempt from the possibility of these hazards. It is fundamental to keep in mind that most incidents are a result of unsafe work practices, improper equipment use, and faulty equipment. Consequently, adherence to simple guidelines which can be found in the USCG-100#111, and USCG 600 #605 documents (see Appendix B), can significantly reduce the electrical hazards one might encounter in the laboratories and ensure compliance with OSHA regulations.

Emergency Procedure in Case of Electric Shock	**EMERGENCY: 7-5911**

1. If someone suffers serious electrical shock, call the FIU emergency number (305) 348-5911, extension 7-5911 from the emergency phone in the laboratories.

2. If the victim is still in contact with the electrical current, do not touch the person* and immediately turn off the electrical power source. If you cannot disconnect the power source, try to separate the victim from the power source with a nonconductive object.

* Do not touch a victim that is still in contact with a power source; you could electrocute yourself.

Emergency Procedure in Case of Fire	**EVACUATION (USCG-200#210)**

1. Instructor or TA:
   If possible and safe, disconnect the electrical power source.
   If trained to use the fire extinguisher, he/she **may decide** to use it to mitigate a small fire.
   PRIOR to doing this, the Instructor must lead students to the area immediately outside the laboratories. (USCG-200#201)

2. If the Instructor feels unable to handle the fire extinguisher, he/she must immediately call the FIU emergency number (305) 348-5911, extension 7-5911 from the emergency phone in the laboratories.

3. Pull the Fire Alarm nearest to the laboratory (see Figure 1, page 7).

4. Lead the students out of the laboratory and walk LEFTWARD toward the nearest EXIT stairs.

   - Stay on the right (emergency response personnel needs clear access along the left side).
   - Allow evacuees from 2nd floor to enter the stairwell.
   - Proceed to the first floor street level.
   - Gather in the evacuation assembly area in the grassy and parking area immediately outside the stairs emergency exits and away from the doors.

*** If evacuation becomes difficult via a chosen route, continue via the nearest safe exit route ***

E. Compressed Gases

The most important policy regarding compressed gases cylinders is prevention. This specifically refers to proper and responsible handling as established (Appendix B, USCG-100#102- Safe Use and Storage of Compressed Gas Cylinders and their duplicate listing in the USCG-600 due to their pivotal role in laboratory safety).

Compressed gases cylinders are kept in laboratory EC-3760 as these are required by the Gas Chromatography systems; these systems are not continuously used. The cylinders comprise gases of two nature: Non-flammable (Helium (He), Nitrogen (N_2) and Air), and Flammable (Hydrogen (H_2)).

It is imperative that personnel that work with the above mentioned compressed gases or any other gas cylinders knows and understand:

- the gas properties, by studying the MSDSs
- the functioning of the two fundamental parts of a compressed gas containment: the cylinder and the cylinder valve
- the need to secure face and breathing personal protection equipment as needed, and
- the emergency procedures detailed in this document.

Fortunately, emergencies involving compressed gases are unlikely, provided the recommendations are followed for their correct storage, handling, and use. The most foreseeable cause of emergency situations associated to gas cylinders is leaks:

<table>
<tr><th colspan="2">Cause</th><th>Hazard</th><th>Response: EVACUATION (USCG-200#210)</th></tr>
<tr><td rowspan="3">Leaks</td><td>Inert gas leak (This is the case of He, N_2, and Air)</td><td>Asphyxiation: Inert gases are colorless and odorless; consequently, they can escape into the atmosphere undetected and rapidly reduce the concentration of oxygen. This is usually harmless; however, if in a confined space, asphyxiation of unprotected personnel can occur.</td><td rowspan="3">Unless training and knowledge of safe gas handling procedures has been demonstrated, personnel should not attempt to fix any type of leak in a compressed gas cylinder. If a leak is detected, particularly in the case of a leak from the H_2 cylinder, the response procedure should consist of:
• contact EH&S: 305-348-2621 and the police 305-348-59115911
• alert everyone: activating the pull fire alarm and
• evacuate the building: exit the laboratory via the door near the fire extinguisher (Figure 5) and veer left towards the nearest exit (Figure 1)</td></tr>
<tr><td>Flammable gas leak (This is the case of H_2)</td><td>Fire and Explosion: All flammable gases will form explosive mixtures with air</td></tr>
<tr><td>Toxic gas leak</td><td>no toxic gases are kept in the CEE laboratories</td></tr>
</table>

*** If evacuation becomes difficult via a chosen route, continue via the nearest safe exit route ***

II. Emergency Response Plan to University-Wide Emergencies

II.1 Purpose

To inform personnel of standard emergency response procedures to activate in the event of disastrous situations of University-wide impact, such as severe weather and criminal threats. Emphasis on the safe, timely and properly evacuation from EC 3625, EC 3630, EC 3760 and EC 3765 in accordance to the guidelines provided in the Florida International University (FIU) Emergency Management and Continuity of Operations Plan (EMCOP).

II.2 Background Information

The central aspects dealt in the FIU-EMCOP are associated to the management and response of two types of University-wide emergency occurrences: severe weather (hurricane, tornado and flood) and bomb threats, fires and explosions.

It is a fact that the Atlantic hurricane season runs from June 1st through November 30th each year, consequently South Florida cities such as Miami are likely in every given year of being affected to some degree by the approaching of a hurricane or tropical storm. Therefore, it is our responsibility as a department unit in a Disaster Resistant University (Federal Emergency Management Agency (FEMA) denomination for FIU since 2007) to be appropriately prepared in order to minimize the effects of a possible event and to return to normal operation as fast as possible after its occurrence. For hurricane and storms the focus of this document is in describing the steps that must be taken for both preparedness and recovery (see definitions in **INTRODUCTION**, page 4).

Under the agreement set forth in the FIU-EMCOP, response procedures must be in place even for events which may be deemed to be unlikely, such as tornados (natural disasters) and bomb threats (intentional human actions). These events require very specific response procedures; therefore, these must be established and practiced regularly.

II.3 Unit-Level Standard Emergency Response Procedures

A. Tropical Storms and Hurricanes

Staff Responsible: Environmental and Water Resources Laboratories Supervisor or P.I.
Primary Alternate: Civil Engineering Laboratories Manager
Second Alternate: Coordinator of Administrative Services

PREPAREDNESS

Recent experience with storms and hurricanes have prompted roof leaks and, albeit minor, water intrusion in the laboratory rooms. Electrical power surges are common as a storm approaches and while it's happening; small to medium laboratory electrical equipment may be affected by these brusque fluctuations. Power outages may occur after a storm, and it may take from hours to days to restore electrical power,

depending on the severity of the situation. In general, a power failure in a building can result in hazardous conditions in laboratories; in specific cases, students/researchers may need to be aware of specific chemicals or control of chemical reactions that require cooling, in general, it is necessary to control the possibility of accumulation of vapors from liquid organic compounds which are volatile and may be hazardous or flammable.

The following two steps have been assessed to be key actions to be taken in preparation of our laboratories for the impending approach of a storm:

1) At the beginning of hurricane season contact F.I.U.-Environmental Health and Safety at 7-2621 to schedule a pick-up of the hazardous wastes gathered in the Satellite Hazardous Waste Accumulation Area. This is located in the hood's lower left cabinet in room EC 3760.

2) As soon as the FIU community is formally placed on "alert" and advised to commence preparations, as appropriate, the responsible staff or its alternates shall conduct the following check and complete activities as indicated. (Note: A Hurricane **Task Preparation Checklist** is provided in Appendix D):

1. Move all glassware to appropriate storage locations.
2. Move all chemicals to appropriate storage locations.
3. Remove all chemicals from fume hoods and secure in appropriate storage areas. If the building experiences a complete loss of power, fume hoods may become inoperable.
4. Close fume hood sashes completely.
5. Cap gas cylinders and secure to a permanent fixture using a cylinder strap or chain.
6. Unplug all small electrical equipment (hotplates, magnetic stirrers, pH meters, etc.)
7. Use surge protectors to protect sensitive equipment in the event of a power surge.
8. Turn refrigerators/freezers to coldest setting.
9. Remove equipment, chemicals, wastes and supplies from the floor in areas that may flood.
10. Cover exposed equipment with plastic covers/sheeting.
11. Move valuable files, papers, and other documents to cabinets or cover them with plastic sheeting.
12. Empty trash receptacles.
13. Document pre-event conditions/settings with photographs (Image database)

RECOVERY

As soon as it is safe, enter the laboratories and inspect the facilities and equipment for any damages.
Report damages to facilities by completing the "Post-Occurrence Damage Assessment Form -Facilities" (Appendix C).
Use a wet-vacuum to remove water from flooded areas
Power up equipment

B. Tornados

Tornadoes often accompany hurricanes; however, dozens of tornadoes unassociated with hurricanes occur each year. Tornadoes are characterized by:

- Generally following an unpredictable path and causing tremendous destruction in their wake, and
- Giving very little warning

Therefore, all personnel are required to become familiar with the appropriate response procedure before it is time to apply them.

<table>
<tr><td colspan="2"> 

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Tornado Watch: University-Wide Notification
"The National Weather Service has issued a tornado watch for this area. Please notify Personnel to be on alert for a possible tornado and to take the appropriate response actions."</td></tr>
<tr><td>What does it mean?</td><td>Response Action:</td></tr>
<tr><td>Chance of dangerous weather, with dangerous winds. The following weather conditions are characteristic of tornadoes and may be observed as the tornado approaches or passes:
• Severe thunderstorms - heavy rains, strong winds and lighting
• Hail - pellets of ice from dark clouded skies
• Roaring noises - crashing, thunderous sounds
• Funnel - dark, spinning column from sky to the ground</td><td>All personnel must remain on alert and be prepared to immediately undertake culminating arrangements and move to a safe location.</td></tr>
</table>

<table>
<tr><td colspan="2"> 

,


Tornado Warning: University-Wide Notification
“The National Weather Service has issued a Tornado Warning for this area. Please notify your staff to take immediate cover and to remain protected until further notice.”</td></tr>
<tr><td>What does it mean?</td><td>Response Action:</td></tr>
<tr><td>A tornado has been sighted nearby and everyone should seek shelter at once.</td><td>• Turn off all electrical equipment and secure all chemicals.

• Personnel working in Laboratory rooms EC 3630 and EC 3760 should move to room EC 3626 (small conference room, see Figure 2)

• Instructor or TA in charge of laboratory session in rooms EC 3625 or EC 3760 should calmly and swiftly move students to room EC 3350 (large conference room, see Figure 2).

• Stay away from all windows, doors and stairways.

• If a tornado strikes and spaces permit it, personnel should kneel on the ground, face down, knees drawn up under the body and cover back of head and neck with hands.</td></tr>
</table>

C. Bomb Threat

According to a recent report by the Center for Problem Oriented Policing [(1)], data shows that for the most part "it is probably reasonable to conclude that bomb incidents involving real bombs in schools are relatively rare." However, in the aftermath of school-related incidents, school administrators have been encouraged to conduct comprehensive security initiatives within their universities. One of the components of the FIU-EMCOP is the Bomb Threat Plan. The document explains that a bomb is any device that when detonated is capable of producing damage to material, and injury or death to personnel. These devices are recognized to come in three forms: "incendiary" cause fire-producing heat but little explosion, "explosive" cause damage by fragmentation, heat and blast wave, and "dirty" cause a release of radiological material. Additionally, homemade bombs are commonly referred to as "improvised explosive devices" (IED).

The FIU-EMCOP states that all bomb threats will be taken seriously, though not all bomb threats are legitimate, and evacuation is not always required. The Police Department together with the Emergency Management team will determine the appropriate course of action. The response procedures presented in this document is created in alignment with the preventive measure defined in the EMCOP. In this sense, it aims at informing personnel **two key aspects of the response plan**:

1) Gathering information from bomb threats delivered by phone in a systematic way:

Review the "Bomb Threat Checklist" given in Appendix C and have a copy of the checklist under the phone as prescribed in the FIU-EMCOP.

2) Activate evacuation procedure (USCG-200#210) in the event that a bomb threat is found to be real and a bomb search is initiated by the Police (.: the official decision is "real threat"). Instructor/TA must:

1. Conclude laboratory activities immediately.

2. Turn off all electrical equipment and secure all chemicals.

3. Turn off cellular phones and other radio transmitting equipment and instruct students to do the same.

4. Collect all personal belongings (book bags, car keys, etc) and instruct students to do the same.

5. Lead the students out of the laboratory and walk LEFTWARD toward the nearest EXIT stairs.
   - Leave the room's doors open.
   - Stay on the right (emergency response personnel needs clear access along the left side).
   - Allow evacuees from 2nd floor to enter the stairwell.
   - Proceed to the first floor street level.
   - Gather in the evacuation assembly area in the grassy and parking area immediately outside the stairs emergency exits and away from the doors.

*** If evacuation becomes difficult via a chosen route, continue via the nearest safe exit route ***

(1) Newman, Graeme R. , August 20122, "Problem-Specific Guide Series: Bomb Threats in Schools". Community Oriented Policing Services, U.S. Department of Justice.

Appendix A:

Chemical Inventory

Table A.1 (page 1 of 2): Chemicals Stored in the Standing Cabinet in room EC 3625 (List ordered by descending value of NFPA Health rating)

		NFP Safety Ratings*		
Chemical Name	**CAS Number**	**Health**	**Fire**	**Reactivity**
Potassium Dichromate	7778-50-9	4	0	3
Arsenic Trioxide	1327-53-3	3	0	0
Lime	1305-78-8	3	0	0
Potassium Hydroxide Pellets	1310-58-3	3	0	1
Potassium Perchlorate	7727-21-1	3	0	3
Sodium Hydroxyde, Molecular Biology Grade	1310-73-2	3	0	2
1,10 Phenanthroline Monohydrate	5144-89-8	2	0	0
Aluminum Sulfate	7784-31-8	2	0	0
Aluminum Sulfate Hydrate	57292-32-7	2	0	0
Calcium Chloride, Anhydrous	10043-52-4	2	0	0
Cyclohexanone	108-94-1	2	2	0
Ferrous Sulfate, Crystals	7782-623-0	2	0	0
Immersion Oil	n/a	2	0	0
Iodoform	75-47-8	2	0	0
Lithium Carbonate	554-13-2	2	0	0
Magnesium Perchlorate	10034-81-8	2	0	2
P-Nitrophenol (Peptide Synthesis Grade)	100-02-7	2	1	0
Potassium Bromate Granular	7758-01-2	2	0	2
Potassium Chlorate	3811-04-9	2	0	2
Potassium Chromate, Crystals	7789-00-6	2	0	0
Potassium Iodate	7758-05-6	2	0	2
Sodium Carbonate	497-19-8	2	0	0
Titanium Dioxide P25	13463-67-7	2	0	0
Potassium Permanganate Crystals	7722-64-7	1	0	2
Sodium Nitrate, Granular	7631-99-4	1	0	1
Aluminum Oxide	19,997-4	0	0	0
Calcium Carbonate	471-34-1	0	0	0
Formazin Turbidity Standard 400 NTU	n/a	0	0	0
Iron Powder	7439-89-6	0	0	0
Kaolin	1332-58-7	0	0	0
Magnesium Carbonate	39409-82-0	0	0	0
Magnesium Chloride Hexahydrate, Reagent	7791-18-6	0	0	0
Manganese Sulfate-monohydrate	10034-96-5	0	0	0

continued

Table A.1 (page 2 of 2): Chemicals Stored in the Standing Cabinet in room EC 3625 (List ordered by descending value of NFPA Health rating)

		NFP Safety Ratings*		
Chemical Name	**CAS Number**	**Health**	**Fire**	**Reactivity**
Potassium Chloride	7447-40-7	0	0	0
Potassium Nitrate, Crystals	7757-79-1	0	0	0
Silicon Oil	n/a	0	1	0
Sodium Bicarbonate	144-55-8	0	0	0
Sodium Borate 10-Hydrate Crystals	1303-96-4	0	0	0
Zinc Oxide	1314-13-2	0	0	0

27 Basic yellow, Basic Orange and Basic Blue compounds for which NFP toxicity has not yet been reported are excluded from this Table

NOTE: All chemicals listed in Table A.4 are in solid state physical form

* The National Fire Protection Association (NFPA) rates the hazard of a chemical on a scale of 0 to 4 (0 is no hazard and 4 is severe hazard). The source for the ratings reported here is "Sigma-Aldrich" Material Safety Data Sheets (MSDSs) online database.

Even those substances with an NFPA risk rating of "0"warn that exposure may cause potential health effects:

- Inhalation: May be harmful if inhaled. May cause respiratory tract irritation.
- Skin: May be harmful if absorbed through skin. May cause skin irritation.
- Eyes: May cause eye irritation.
- Ingestion: May be harmful if swallowed.

Table A.2: Acids and Bases (liquids) stored in the cabinet under the hood at EC 3625 (List ordered by descending value of NFPA Health rating)

		NFP Safety Ratings*			
Chemical Name	**CAS Number**	**Health**	**Fire**	**Reactivity**	**Special Hazard**
Acetic Acid, glacial, ~17 Molar	64-19-7	3	2	0	
Sulfuric Acid, 93-98%, ~18 Molar	7664-93-9	3	0	2	W
Nitric Acid, 70%, ~16 Molar	7697-37-2	3	0	2	OX
Sodium Hidroxide, 0.02N	N/A	3	0	0	
Sodium Hydroxide Solution N/2	Several	3	0	0	
Sodium Hydroxide Solution, 50% w/w Certified	1310-73-2	3	0	0	
Hydrochloric Acid, 37%, ~12 Molar	7647-01-0	3	0	0	
Ammonium hydroxide solution, ~14 Molar	1336-21-6	3	0	0	
Ammonium Chloride/Hydroxide Buffer, pH10	Several	3	0	0	
Carbon Tetrachloride	56-23-5	2	0	0	
Acetic Acid 3% Aqueous Solution	Several	1	0	0	
EDTA Titrant 0.01M	6381-92-5	0	0	0	
Phosphate Buffer, Ph 7.2	Several	0	0	0	

Several 2.5 L standard shatter proof bottles of the first three concentrated acids are kept in stock, totaling proximately 25 L.

* The National Fire Protection Association (NFPA) rates the hazard of a chemical on a scale of 0 to 4 (0 is no hazard and 4 is severe hazard). The source for the ratings reported here is "Sigma-Aldrich" Material Safety Data Sheets (MSDSs) online database.

Even those substances with an NFPA risk rating of "0"warn that exposure may cause potential health effects:

- Inhalation: May be harmful if inhaled. May cause respiratory tract irritation.
- Skin: May be harmful if absorbed through skin. May cause skin irritation.
- Eyes: May cause eye irritation.
- Ingestion: May be harmful if swallowed.

Standardized solutions of hydrochloric acid (HCl), sulfuric acid (H_2SO_4) and sodium hydroxide (NaOH) with concentrations ranging from 0.01M to 0.5M are also kept in the lab. The NFP Health safety rating for these has been reported varyingly ranging from "0" to "2".

Table A.3 (page 1 of 3): Chemicals Stored in the Wall Cabinets Marked "1" and "2" (left side cabinets) in room EC 3760 (List ordered by descending value of NFPA Health rating)

			NFP Safety Ratings*			
Chemical Type	**Chemical Name**	**CAS Number**	**Health**	**Fire**	**Reactivity**	**Special Hazard**
INORGANIC_other	Potassium Dichromate, crystals	7778-50-9	4	0	3	OX
Metal	Cadmium, Granular	7440-43-9	4	0	0	
Sulfate (ORGANIC)	Brucine Sulfate	5787-00-8	4	0	0	
Metal Oxide	Mercuric Oxide, Red	21908-53-2	4	0	0	
INORGANIC_other	Amonium Vanadate	7803-55-6	4	0	0	
Sulfate	Hydrazine Sulfate	10034-93-2	4	0	0	
Nitrate	Mercuric Nitrate	7783-34-8	4	0	0	
INORGANIC_other	Potassium Cyanide	151-50-8	4	0	0	
Sulfate	Cadmium Sulfate Octahydrate	7790-84-3	4	0	0	
Sulfate	Mercuric Sulfate	7783-35-9	4	0	0	
Persulfate	Potassium Persulfate	7727-21-1	3	0	3	
Hydroxide	Sodium Hydroxide, Pellets	1310-73-2	3	0	2	W
Nitrate	Silver Nitrate	7761-88-8	3	0	2	OX
Hydroxide	Potassium Hydroxide, Pellets	1310-58-3	3	0	1	
Chloride	Zinc Chloride	7646-85-7	3	0	0	
Fluoride	Sodium Fluoride, Powder	7681-49-4	3	0	0	
Carbonate	Nickel(II) Carbonate	3333-67-3	3	0	0	
Metal Oxide	Calcium Oxide	1305-78-8	3	0	0	
DYE	Phenolphthalein Solution, 1%	Mixture	2	3	0	
Nitrate	Lead Nitrate	10099-74-8	2	0	2	OX
Nitrate	Lanthanum(III) nitrate hydrate	100587-94-8	2	0	2	OX
Nitrite	Sodium Nitrite	7632-00-0	2	0	1	OX
Chloride	Cupric Chloride, Crystals	10125-13-0	2	0	0	
Chloride	Ferric Chloride	10025-77-1	2	0	0	
Sulfate	Silver Sulfate	10294-26-5	2	0	0	
Bisulfite	Sodium bisulfate	7681-38-1	2	0	0	
Carbonate	Sodium Carbonate Anhydrous	497-19-8	2	0	0	
Borate	Sodium Borate, Powder	1303-96-4	2	0	0	
Chloride	Ammonium Chloride	12125-02-9	2	0	0	
Chloride	Barium Chloride, Crystals	10361-37-2	2	0	0	
Chloride	Calcium Chloride	10035-04-8	2	0	0	
Chloride	Manganese Chloride, Crystals	7773-01-5	2	0	0	
Phosphate	Ammonium Phosphate Dibasic	7783-28-0	2	0	0	

continued

Table A.3 (page 2 of 3): Chemicals Stored in the Wall Cabinets Marked "1" and "2" (left side cabinets) in room EC 3760 (List ordered by descending value of NFPA Health rating)

			NFP Safety Ratings*			
Chemical Type	**Chemical Name**	**CAS Number**	**Health**	**Fire**	**Reactivity**	**Special Hazard**
Sulfate	Cupric Sulfate	7758-98-7	2	0	0	
Sulfate	Lead (II) Sulfate, 99%	7446-14-2	2	0	0	
Sulfate	Nickel Sulfate, Crystals	7786-81-4	2	0	0	
Sulfate	Ceric Ammonium Sulfate	10378-47-9	2	0	0	
Bisulfite	Sodium Meta-Bisulfite, Powder	7681-57-4	2	0	0	
INORGANIC_other	Ammonium Molibdate	12027-67-7	2	0	0	
DYE	Methyl Orange, Powder	547-58-0	2	0	0	
DYE	Methylene Blue	61-73-4	2	0	0	
DYE	Phenolphthalein, Powder	14815-59-9	2	0	0	
Iodide	Potassium Iodide	7681-11-0	2	0	0	
Sulfate	Ferrous Sulfate, Crystals	7782-63-0	2	0	0	
Sulfate	Zinc Sulfate Heptahydrate	7446-20-0	2	0	0	
Sulfate	Ferrous Ammonium Sulfate	10045-89-3	2	0	0	
DYE	Acid Blue 161, Dye Content ~40%	12392-64-2	2	0	0	
Nitrite	Potassium Nitrite	7758-09-0	1	0	2	OX
DYE	Potassium Permanganate, Crystals	7722-64-7	1	0	2	OX
Chloride	Sodium Chloride, Certified ACS	7647-14-5	1	0	0	
Metal	Lead Metal	7439-92-1	1	0	0	
Metal	Zinc Metal	7440-66-6	1	0	0	
Metal	Iron Metal, Powder	7439-89-6	0	0	0	
Sulfate	Ammonium Sulfate	7783-20-2	0	0	0	
DYE	Methyl Red, Crystals	493-57-7	0	0	0	
Chloride	Magnesium Chloride	7791-18-6	0	0	0	
INORGANIC_other	Potassium Ferricyanide	13746-66-2	0	0	0	
Phosphate	Potassium Phosphate Dibasic Anhydrous	7758-11-4	0	0	0	
Sulfate	Manganese Sulfate Monohydrate	10034-96-5	0	0	0	
Thiosulfate	Sodium Thiosulfate	7772-98-7	0	0	0	
Bicarbonate	Sodium Bicarbonate, Certified ACS	144-55-8	0	0	0	
Carbonate	Strontium Carbonate,Powder	1633-05-2	0	0	0	
Phosphate	Potassium Phosphate Monobasic	7778-77-0	0	0	0	
Sulfate	Calcium Sulfate	7778-18-9	0	0	0	
Sulfate	Potassium Sulfate	7778-80-5	0	0	0	
Sulfate	Sodium Sulfate, Anhydrous	7757-82-6	0	0	0	
Metal Oxide	Magnesium Oxide, Powder	1309-48-4	0	0	0	

continued

Table A.3 (page 3 of 3): Chemicals Stored in the Wall Cabinets Marked "1" and "2" (left side cabinets) in room EC 3760 (List ordered by descending value of NFPA Health rating)

			NFP Safety Ratings*			
Chemical Type	**Chemical Name**	**CAS Number**	**Health**	**Fire**	**Reactivity**	**Special Hazard**
DYE	Eriochrome Black-T	1787-61-7	0	0	0	
Phosphate	Sodium Phosphate Dibasic Heptahydrate	7782-85-6	0	0	0	
DYE	Acid Violet 5, Dye Content 50%	10130-48-0	0	0	0	
DYE	Basic Blue 41, Dye Content ~40%	12270-13-2	0	0	0	
DYE	Basic Blue 66, Dye Content ~20%	94233-04-2	0	0	0	
DYE	Direct Violet 51, Dye Content 50%	5489-77-0	0	0	0	
DYE	Rose Bengal, Dye Content 82%	632-69-9	0	0	0	

NOTE: All chemicals listed in this table are in solid state physical form

* The National Fire Protection Association (NFPA) rates the hazard of a chemical on a scale of 0 to 4 (0 is no hazard and 4 is severe hazard). The source for the ratings reported here is "Sigma-Aldrich" Material Safety Data Sheets (MSDSs) online database.

Even those substances with an NFPA risk rating of "0" warn that exposure may cause potential health effects:

- Inhalation: May be harmful if inhaled. May cause respiratory tract irritation.
- Skin: May be harmful if absorbed through skin. May cause skin irritation.
- Eyes: May cause eye irritation.
- Ingestion: May be harmful if swallowed.

Table A.4 (page 1 of 2): Chemicals Stored in the Wall Cabinets Marked "3" and "4" (right side cabinets) in room EC 3760 (List ordered by descending value of NFPA Health rating)

			NFP Safety Ratings*		
Chemical Type	**Chemical Name**	**CAS Number**	**Health**	**Fire**	**Reactivity**
Organic_compound	Naphthalene, Crystals	91-20-3	4	2	2
Organic_compound	Hexamethylene Tetraamine	100-97-0	3	2	1
Organic_compound	Formaldehyde Reagent	50-00-0	3	2	0
Organic_compound	Phenol	108-95-2	3	2	0
Inorganic_other	Hydroxylamine Hydrochloride	5470-11-1	3	0	1
Acid_ORGANIC	Sulfamic Acid	5329-14-6	3	0	0
Organic_compound	Ammonium Oxalate, Crystals	6009-70-7	3	0	0
Inorganic_other	Asbestos Medium Fiber, Acid Washed	67-56-1	2	3	0
Acid_ORGANIC	L-Tartaric Acid	87-69-4	2	1	0
Organic_compound	1,2,4,5-Tetrachlorobenzene	95-94-3	2	1	0
Organic_compound	Dichloroisocyanuric Acid, Sodium Salt	2893-78-9	2	0	2
Diethylthiocarbamate	Silver Diethylthiocarbamate	1470-61-7	2	0	1
Organic_compound	Ammonium Pyrrolidine Dithiocarbamate	5108-96-3	2	0	1
Acid_Inorganic	Boric Acid	10043-35-3	2	0	0
Acid_ORGANIC	Citric Acid, Anhydrous	77-92-9	2	0	0
Acid_ORGANIC	Cyanuric Acid	108-80-5	2	0	0
Acid_ORGANIC	Oxalic Acid, Powder	144-62-7	2	0	0
Acid_ORGANIC	Salicilic Acid	69-72-7	2	0	0
Acid_Organic	Sulfanilic Acid	121-57-3	2	0	0
Inorganic_other	Hydrazine Dihydrochloride	5341-61-7	2	0	0
Inorganic_other	Sodium Hexa Metaphosphate, Powder	10124-56-8	2	0	0
Inorganic_other	Sodium Nitroprusside	13755-38-9	2	0	0
Organic_compound	1,10-Phenanthroline Monohydrate	5144-89-8	2	0	0
Organic_compound	4-Aminoantipyrine	83-07-8	2	0	0
Organic_compound	Amonium Citrate Dibasic, Granular	3012-65-5	2	0	0
Organic_compound	Chloral Hydrate	302-17-0	2	0	0
Organic_compound	Ferric Ammonium Citrate, Green-Granular	1185-57-5	2	0	0
Organic_compound	Folin-Ciocalteus Phenol Reagent, 2N	Mixture	2	0	0
Organic_compound	Phenanthrene	85-01-8	2	0	0
Organic_compound	Silver Acetate	563-63-3	2	0	0
Organic_compound	Zincon Monosodium salt	62625-23-3	2	0	0
Organic_compound	Sodium Acetate, Granular	127-09-3	1	1	0
Agar	Nutrient Agar	Mixture	1	0	0
Broth	Lauryl Sulfate Broth	Mixture	1	0	0
Broth	M-Endo Broth	Mixture	1	0	0
Organic_compound	Glycine	56-40-6	1	0	0
Acid_ORGANIC	Barbituric Acid	67-52-7	0	1	0
Organic_compound	Anthracene	120-12-7	0	1	0
Organic_compound	Disodium Ethylenediamine Tetraacetate	6381-92-6	0	1	0
Acid_ORGANIC	Ascorbic Acid	50-81-7	0	0	0
Acid_ORGANIC	L(+)-Glutamic Acid	56-86-0	0	0	0

continued

Table A.4 (page 2 of 2): Chemicals Stored in the Wall Cabinets Marked "3" and "4" (right side cabinets) in room EC 3760 (List ordered by descending value of NFPA Health rating)

			NFP Safety Ratings*		
Chemical Type	**Chemical Name**	**CAS Number**	**Health**	**Fire**	**Reactivity**
Agar	Agar	9002-18-0	0	0	0
Organic_compound	(+)-Sodium L-ascorbate	134-03-2	0	0	0
Organic_compound	1-Naphthylamine hydrochloride	49800-23-9	0	0	0
Organic_compound	Amonium Acetate, Crystals	631-61-8	0	0	0
Organic_compound	Antimonium Potassium Tartrate	868-14-4	0	0	0
Organic_compound	Bathocuproinedisulfonic acid, disodium salt hydrate, 97%	52698-84-7	0	0	0
Organic_compound	N-Z-Soy Peptone	73049-73-7	0	0	0
Organic_compound	Potassium Hydrogen Phthalate	877-24-7	0	0	0
Organic_compound	Potassium Sodium Tartrate, Crystals	6381-59-5	0	0	0
Organic_compound	Sodium Citrate	6132-04-3	0	0	0
Organic_compound	Sodium Tartrate Dihydrate, Acs Reagent Grade	6106-24-7	0	0	0
Organic_compound	Starch Soluble, Powder	9005-25-8	0	0	0
Organic_compound	Uranine	518-47-8	0	0	0
Organic_compound	Urea	57-13-6	0	0	0
other_Sugar	Cellulose, powder ~20 microns	900-34-9	0	0	0
other_Sugar	D(+)-Glucose Reagent, Acs Anhydrous	50-99-7	0	0	0
other_Sugar	Dextrose Anhydrous, ACS	50-99-7	0	0	0
other_Sugar	Sucrose, Crystals	57-50-1	0	0	0

NOTE: All chemicals listed in this table are in solid state physical form

* The National Fire Protection Association (NFPA) rates the hazard of a chemical on a scale of 0 to 4 (0 is no hazard and 4 is severe hazard). The source for the ratings reported here is "Sigma-Aldrich" Material Safety Data Sheets (MSDSs) online database.

Even those substances with an NFPA risk rating of "0" warn that exposure may cause potential health effects:

- Inhalation: May be harmful if inhaled. May cause respiratory tract irritation.
- Skin: May be harmful if absorbed through skin. May cause skin irritation.
- Eyes: May cause eye irritation.
- Ingestion: May be harmful if swallowed.

Table A.5: Solvents stored in safety cabinet or cabinet under hood in room EC 3760 (List ordered by descending value of NFPA Health rating)

			NFP Safety Ratings			
Location	**Chemical Name**	**CAS Number**	**Health**	**Fire**	**Reactivity**	**Special Hazard**
Safety_Cabinet_bottom	Chromic Acid, 10% W/V	1333-82-0	4	0	2	OX
Safety_Cabinet_bottom	Ethylbenzene	100-41-4	3	3	0	
hood_right	Sulfuric Acid, fumic	7664-93-9	3	0	2	W
Safety_Cabinet_top	2-Propanol	67-63-0	2	3	1	
hood_right	Acetone	67-64-1	2	3	0	
Safety_Cabinet_bottom	Acetonitrile	75-05-8	2	3	0	
Safety_Cabinet_bottom	Benzene	71-43-2	2	3	0	
Safety_Cabinet_top	Cyclohexane	110-82-7	2	3	0	
Safety_Cabinet_top	Ethyl Acetate	141-78-6	2	3	0	
Safety_Cabinet_bottom	Hexane, 95% HPLC Grade	110-54-3	2	3	0	
Safety_Cabinet_bottom	Hexanes	Several	2	3	0	
Safety_Cabinet_top	Methanol	67-56-1	2	3	0	
Safety_Cabinet_top	m-Xylene	108-38-3	2	3	0	
hood_right	n-Hexane	110-54-3	2	3	0	
Safety_Cabinet_top	Toluene Optima	108-88-3	2	3	0	
Safety_Cabinet_bottom	2-Chlorotoluene	95-49-8	2	2	0	
Safety_Cabinet_top	Hexadecane	544-76-3	2	1	0	
Safety_Cabinet_bottom	Carbon Tetrachloride	56-23-5	2	0	0	
Safety_Cabinet_bottom	Ethyl Alcohol	Several	2	0	0	
hood_right	Oxalic Acid	144-62-7	2	0	0	
Safety_Cabinet_bottom	n-Pentane	109-66-0	0	4	0	
Safety_Cabinet_top	Decane	124-18-5	0	2	0	
Safety_Cabinet_bottom	Tetradecane	629-59-4	0	1	0	

NOTE: All chemicals listed in this table are in liquid state physical form

* The National Fire Protection Association (NFPA) rates the hazard of a chemical on a scale of 0 to 4 (0 is no hazard and 4 is severe hazard). The source for the ratings reported here is "Sigma-Aldrich" Material Safety Data Sheets (MSDSs) online database.

Even those substances with an NFPA risk rating of "0"warn that exposure may cause potential health effects:

- Inhalation: May be harmful if inhaled. May cause respiratory tract irritation.
- Skin: May be harmful if absorbed through skin. May cause skin irritation.
- Eyes: May cause eye irritation.
- Ingestion: May be harmful if swallowed.

Appendix B:

Florida International University

University Safety Compliance Guide (USCG)

-Extract of Relevant Referenced Sections-

USCG 102 - Safe Use and Storage of Compressed Gas Cylinders

Last Update: 06/26/02

PURPOSE

To establish a standard for the safe use and storage of compressed gas cylinders.

GUIDELINES

To implement safety guidelines for the safe use and storage of compressed gas cylinders and to ensure the safe handling and storage of compressed gas cylinders at the University premises.

1. General Use of Gas Cylinders

a. Know the contents of a cylinder and be familiar with the properties of that gas.
b. Never use a cylinder that cannot be positively identified. Do not depend on color coding for gas identification.
c. All cylinders must bear an identification tag stating the name of the gas or mixture and illustrating one of three conditions: full, in service, or empty.
d. Handle cylinders carefully and fasten them in a secure manner at all times, in an upright position.
e. Transport larger cylinders only on a wheeled cart specifically designed for gas cylinders. This applies to all cylinders of size 2 or larger. Remove regulators and attach safety caps before transport.
f. Never tamper with any part of a valve, such as the safety or packing nuts.
g. Do not strike an electric arc on cylinders.
h. Use cylinders only with matched connectors and proper Compressed Gas Association regulators. Never install cylinder adaptors on a regulator. A regulator registration and periodic inspection program should be initiated by the gas users.
i. Leak test all connections to a cylinder with a soap solution. Caution: Any gas, regardless of its health hazard, may cause asphyxiation by displacing oxygen.
j. Close cylinder valves when not in use, then bleed pressure from the regulator.
k. Close valves on empty cylinders and mark "empty."
l. Never attempt to refill a cylinder.

This guideline adopts as recommended practice all applicable National Fire Protection Association (NFPA) codes when applied to the design and construction of all new facilities where compressed gas cylinders will be used and stored.

m. Cylinders of compressed gases must be handled as high energy sources and therefore as potential explosives.
n. When storing or moving a cylinder, have the cap in place to protect the valve stem.
o. Do not expose cylinders to temperatures higher than 50° C (122° F).
p. When classifying a gas mixture for use in the laboratory, base the classification on the most hazardous component.
q. Never bleed a cylinder completely empty. Leave a slight pressure to keep contaminants out. Notify the vendor with a note if draw down occurs.
r. Always wear safety glasses when handling and using compressed gases.

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s. Ground all cylinders containing flammable gases.
t. When using gases with cryogenic properties, allow adequate ventilation and wear personal protection equipment including heavy gloves and safety goggles. (Gloves must be loose fitting to facilitate rapid removal in case of a spill).
u. The number of cylinders of flammable gases and oxygen is limited to a maximum of three per laboratory (refer to appendix).
v. Cylinders which are not necessary for current operations shall be stored safely outside the laboratory.
w. Cylinders of all gases having a health hazard rating of 3 or 4 and cylinders of gases having a health hazard rating of 2 with no physiological warning properties shall be kept in a continuously mechanically ventilated enclosure. There will be no more than three cylinders of these hazard ratings per hood or other continuously mechanically ventilated enclosure per laboratory (refer to Laboratory Safety Manual).
x. When transporting cylinders on elevators, passengers should be prohibited from entering until the cylinders have been unloaded at their destination. Signs should accompany the cylinder-in-transit warning passengers not to enter.

2. Storage of Gas Cylinders

a. Store cylinders in a ventilated area away from heat or ignition sources.
b. Fasten cylinders securely at all times in an upright position.
c. Cylinders in storage must be protected from weather extremes and direct sunlight. Protect the base of cylinders from dampness.
d. Store flammable gases away from all other gases. This will be accomplished by a separation of at least 20 feet of open space or by a wall having a fire rating of at least one hour (refer to appendix).
e. Safety caps shall be in place at all times during storage and transport of cylinders. Cylinders of all gases having a health hazard rating of 3 or 4 and cylinders of gases having a health hazard rating of 2 with no physiological warning properties shall be stored in a continuously mechanically ventilated enclosure if inside a building. If stored outside, the gases must be kept under lock and key and located away from populated areas and air intakes to buildings (refer to appendix).
f. Cylinders will not be stored or left unattended in hallways, corridors, stairways, or other areas of access and/or egress.
g. When classifying a gas mixture for storage, base the classification on the most hazardous component.
h. Always separate empty and full cylinder storage.

3. **Transportation (excluding in building transport)**

a. Cylinders shall not be transported in a motor vehicle by University personnel on a routine basis. This transport should be handled by a licensed outside vendor.
b. If transport by University personnel is absolutely necessary, contact the Department of Environmental Health and Safety at 348-2621 for approval prior to transport.

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USCG 104 - EYE PROTECTION

Last Update: 02/07/06

PURPOSE

To establish a university eye protection standard.

SCOPE AND APPLICATION

This guideline applies to all University personnel including students in a research or instructional setting or visitors to high hazard areas.

STANDARD

1. Deans, directors, chairpersons, principal investigators, laboratory instructors, and line supervisors should assure compliance with this guide. Individuals responsible for assuring compliance with this USCG shall correct infractions upon detection. Disciplinary actions shall be taken as needed.

2. Each college, school, department or unit shall provide or otherwise make available to each employee required to wear eye protection the devices commensurate with the activity and hazard involved. Students may be required to purchase their own eye protection devices. For recommendations regarding a purchase agreement for safety glasses, contact the Department of Environmental Health & Safety at 348-2621.

3. All eye protection devices used must be American National Standards Institute Z87.1 approved. This can be determined by checking for an ANSI Z87 or Z87 stamped on the frame of the glasses or goggles.

4. Departments are responsible to develop reinforcement programs to encourage employees to comply with the established eye protection equipment requirements.

EYE PROTECTION AREAS

1. Eye protection shall be utilized by all individuals, working under direct control of the University or University faculty, in University facilities and/or operations in which activities take place involving:
   a. Gas or electric arc welding.
   b. Hot molten metals.
   c. Heat treating, tampering or kiln firing of any metal or other material.
   d. Corrosive, toxic or explosive material.
   e. Compressed gases.
   f. UV lights and lasers unless exempted by the Department of Environmental Health and Safety, Laser Safety Officer.
   g. Chemicals: liquid and/or solid.
   h. Unsealed sources of radioactive material.
   i. Infectious and potentially infectious materials.
   j. Milling, sawing, turning, shaping, cutting, grinding or stamping of any solid material.

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k. Repair or servicing of mechanical equipment which is reasonably anticipated as hazardous to the eye.
l. Custodial, grounds-keeping or other service activity reasonably anticipated as hazardous to the eye.
m. Sports related activities which place the eye at risk to impact. Appropriate nationally recognized sporting associations can serve as a source of generally accepted standards for eye protection equipment.
n. Any other operation involving mechanical or physical activities that are reasonably anticipated as hazardous to the eye.

2. Every person shall wear eye protection devices when entering, participating in, observing or performing any function in connection with, any course or activity taking place in eye protection areas as defined above. Persons covered include, administrators, faculty, staff, students, contractors, other employees and visitors.
3. University personnel shall follow this guideline when conducting University sponsored activities at other locations.
4. Chemical goggles shall be utilized when there is a liquid splash, spray or mist hazard. Exceptions to this requirement must be approved by the Department of Environmental Health and Safety.
5. Safety glasses shall be worn at all times in those University laboratories where eye hazards exist.
6. Locations identified above shall post signage indicating, "eye protection required."

PERSONAL PROTECTIVE EQUIPMENT CHARTS

Eye and Face Protection Selection Chart

Source	Assessment of Hazard	Protection
Impact - Chipping, grinding, machining, masonry work, working, sawing, drilling, chiseling, powered fastening, riveting, sanding	• Flying fragments, objects, large chips, particles of sand, dirt, etc.	• Spectacles with side protection, goggles, face shields. See notes 1, 3, 5, 6, and 10. • For severe exposure use face shield.
Heat - Furnace operations, pouring, casting, hot dipping, and welding.	• Hot sparks. • Splash from molten metals. • High temperature exposure.	• Face shields, goggles, spectacles with side protection. • For severe exposure use face shield. See notes 1, 2, and 3. • Face shield worn over goggles. • Screen face shields, reflective face shields. See notes 1, 2, and 3.

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Chemicals - All chemical handling	• Splash • Irritating Mists	• Goggles, eyecup and cover types. • For severe exposure use face shield. • See notes 3 and 11. • Special purpose goggles.
Dust - Woodworking, buffing, general dusty conditions	• Nuisance dust	• Goggles, eyecup and cover types. See note 8.
Light Radiation Welding: Electric arc	• Optical radiation	• Welding helmets or welding shields. • Typical shades: 1 0-14. See notes (9), (12).
Welding: Gas	• Optical radiation	• Welding goggles or welding face shield. • Typical shades: o Gas welding 4 - 8, o Cutting 3 - 6, o Brazing 3 - 4. o See note 9.
Cutting, torch brazing, torch soldering	• Optical radiation	• Spectacles or welding face shield. • Typical shades 1.5 - 3. • See notes 3 and 9.

Notes:

Care shall be taken to recognize the possibility of multiple and simultaneous exposure to a variety of hazards. Adequate protection against the highest level of each of the hazards shall be provided. Protective devices do not provide unlimited protection.

1. Operations involving heat may also involve light radiation. Protection from both hazards must be provided.
2. Face shields shall only be worn over primary eye protection (spectacles or goggles).
3. Filter lenses must meet the requirements for shade designations in 29 CFR 1910.133(a)(5). Tinted and shaded lenses are not filter lenses unless they are marked or identified as such.
4. Persons whose vision requires the use of prescription (Rx) lenses must wear either protection devices fitted with prescription (Rx) lenses or protective devices designed to be worn over regular prescription (Rx) eyewear.
5. Wearers of contact lenses must also wear appropriate eye and face protection devices in a hazardous environment. It shall be recognized that dusty and/or chemical environments may represent an additional hazard to contact lens wearers.
6. Caution shall be exercised in the use of metal frame protective devices in electrical hazard areas.

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7. Atmospheric conditions and the restricted ventilation of the protector can cause lenses to fog. Frequent cleansing may be necessary.
8. Welding helmets of face shields shall be used only over primary eye protection (spectacles or goggles).
9. All safety glasses must have side shields in place. This is minimum protection.
10. Ventilation shall be adequate, but well protected from splash entry. Eye and face protection shall be designed and used so that it provides both adequate ventilation and protects the wearer from splash entry (per ANSI Z87-1.1989).
11. Protection from light radiation is directly related to filter lens density. See note (4). Select the darkest shade that allows task performance.

For more information regarding this guideline, contact the Department of Environmental Health and Safety at (305) 348-2621.

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USCG 105 - PERSONAL PROTECTIVE EQUIPMENT

Last Update: 02/07/06

PURPOSE
To establish personal protective equipment requirements for the University

SCOPE AND APPLICATION
This standard applies to all University personnel

GUIDELINES
Deans, directors, chairpersons, principal investigators, laboratory instructors, and supervisors should assure compliance with this standard. Individuals responsible for assuring compliance with this standard shall correct infractions upon detection. Disciplinary actions shall be taken as appropriate.

Each college, school, department or unit shall provide, or otherwise make available to each employee required to wear personal protective equipment, the devices commensurate with the activity and hazard involved. Students may be required to purchase their own personal protective equipment.

Personal protective equipment requirements shall be established by conducting a Job Hazard Analysis for activities performed. Supervisors may conduct evaluation or they may contact the Department of Environmental Health and Safety to perform this evaluation. Additional information is available from the Department of Environmental Health and Safety.

Personal protective equipment requirements must meet or exceed requirements specifically established by the Occupational Safety and Health Administration.

Departments should develop positive reinforcement programs to encourage employees to comply with the established personal protective equipment requirements or execute disciplinary procedures as necessary.

Initial training shall be provided to personnel regarding selection, use and maintenance of personal protective equipment requirements before employees are assigned to perform any activity requiring use of personal protective equipment.

PROTECTIVE EQUIPMENT CHART
Hand Protection Selection Chart
Gloves are often relied upon to prevent cuts, abrasions, burns, and skin contact with chemicals that are capable of causing local or systemic effects following dermal exposure. There are no gloves available that provide protection against all potential hand hazards, and commonly available glove materials provide only limited protection against many chemicals. Therefore, it is important to select the most appropriate glove for a particular application and to determine how

long it can be worn, and whether it can be reused. Hypoallergenic gloves must be provided if necessary.

The following chart can be used as a guide in determining the correct chemical protective clothing material for the chemical hazard. For the best protection, check with the manufacturer for degradation and permeation information.

Chemical	Excellent	Good	Do Not Use
Acetaldehyde	• None	• Natural Rubber • Neoprene	• Nitrile • PVA • PVC
Acetic Acid, Glacial	• Neoprene	• Natural Rubber • Nitrile	• PVA • PVC
Acetone	• None	• Natural Rubber • Neoprene	• Nitrile • PVA • PVC
Benzene	• None	• PVA	• Natural Rubber • Neoprene • Nitrile
Butanol	• Natural Rubber • Neoprene • Nitrile	• PVC	• PVA
Butyl Cellosolve (2-ethoxyethanol)	• Neoprene • Nitrile	• Natural Rubber	• PVA • PVC
Butyl Acetate	• PVA	• Nitrile	• Natural Rubber • Neoprene • PVC
Cellosolve (2-ethoxyethanol)	• Neoprene	• Nitrile	• Natural Rubber • Neoprene • PVC
Chloroform	• PVA	• None	• Natural Rubber • Neoprene • Nitrile • PVC
Ethyl Acetate	• None	• Natural Rubber • Neoprene • PVA	• Nitrile • PVC
Ethylene Glycol	• Natural Rubber • Neoprene • Nitrile • PVC	• None	• PVA

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Formaldehyde (>10%)	• Nitrile	• Natural Rubber • Neoprene • PVC	• PVA
Hexane	• Neoprene, Viton	• PVA	• Natural Rubber • PVC
Isoproponal	• Natural Rubber • Nitrile • Viton	• PVC	• PVA
Methanol	• Natural Rubber, Neoprene	• PVC	• PVA
Methylene Chloride	• None	• PVA • Viton	• Natural Rubber • Neoprene • PVC
Methyl Ethyl Ketone	• None	• Natural Rubber • PVA	• Neoprene • Nitrile • PVC
Methyl Isobutyl Ketone	• None	• Natural Rubber • PVA	• Neoprene • Nitrile • PVC
Mineral Spirits	• Nitrile • PVA	• Neoprene	• Natural Rubber • PVC
Nitric Acid (70%)	• Neoprene	• PVC	• Natural Rubber • Nitrile • PVA
Perchlorethylene	• PVA • Viton	• None	• Natural Rubber • Neoprene • PVC
Sodium Hydroxide	• Natural Rubber • Neoprene • Nitrile	• PVC	• PVA
Sulfuric Acid (95%)	• PVC	• Neoprene	• Natural Rubber • Nitrile • PVA
Toluene	• Viton	• PVA	• Natural Rubber • Neoprene • PVC
1,1,1-Tirchloroethane	• PVA	• None	• Natural Rubber • Neoprene • PVC
Xylene	• PVA • Viton	• None	• Natural Rubber • Neoprene • PVC

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Notes:
1. PVC = Polyvinyl Chloride
2. PVA = Polyvinyl Alcohol
3. None implies that there is no protection for this quality, NOT that no protection is best.

For more information regarding this guideline, contact the Department of Environmental Health and Safety at (305) 348-2621.

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USCG 110 - FIRST AID

Last Update: 07/01/03

SCOPE

These guidelines apply to all University personnel, employees, students and visitors, who are, or may be required to provide first aid while on University premises or involved in University sponsored activities.

BACKGROUND

The Department of Environmental Health & Safety (EH&S) recommends that all university departments maintain adequately stocked first aid kits in convenient and accessible locations. The Occupational Safety and Health Administration (OSHA) Standard 29 CFR 1910.151, Appendix A states that first aid kits that meet American National Standards Institute (ANSI) Standard Z308.1 must be readily available (see Attachment 1). In addition, training of employees in basic first aid and cardiopulmonary resuscitation (CPR) is encouraged. Such training, and certification as appropriate, is available through the EH&S Department. It is important to note that the delivery of first aid and CPR may present the potential for exposure to bloodborne diseases, such as AIDS and Hepatitis B and anyone who might give first aid and/or CPR should be aware of the hazards that contact with human blood and certain human body fluids may present.

Please bear in mind the for most employees, providing first aid to someone in need is a personal choice, however for other employees such as our Public Safety Officers and medical professionals at the University Health Services (Health Care and Wellness Center) providing first aid is a requirement of their job position and part of their assigned duties. EH&S maintains a Bloodborne Pathogens Exposure Control Plan which describes the procedures required to assure the protection of employees from disease-causing organisms found in human blood and certain human body fluids (see the *Bloodborne Pathogens Exposure Control Manual*).

Each University department, which performs tasks likely to create exposures for their employees, is required to maintain a department specific exposure control program and to keep this program current. OSHA requires that whenever employees are assigned to provide first aid or perform tasks that create the potential for exposure requires that specific training, personal protective equipment and vaccinations are provided, and that specific record keeping and procedures are implemented. Therefore, the purpose of this University Safety Compliance Guide (USCG) is to define the types of first aid providers at FIU, to explain basic exposure control procedures and to identify the minimum first aid kit supplies that should be available according, to ANSI Standard Z308.1.

DEFINITIONS

Good Samaritan

Within the context of this USCG, a "Good Samaritan" is a person who volunteers assistance, as a personal choice, to a person in medical need. This assistance may or may not involve potential contact with human blood or body fluids. EH&S highly recommends that all individuals who register for First Aid and CPR courses also complete the "*online anytime*" Bloodborne Pathogens

Exposure Control Training Program, which is available at *www.fiu.edu/~ehs/onltrain/home.htm*. This online training program provides information regarding the hazards involved in exposure and contact with human blood and certain body fluids, and how to protect oneself from such bloodborne diseases.

First Responder

A "First Responder" is an employee who, as a requirement of his/her job position and assigned duties, is required to provide first aid and/or CPR to persons in medical need. The First Responder is certified in first aid and CPR or other medical field of practice and provides medical assistance until professional medical care can be provided. First responders include University athletic training staff, Public Safety Officers, medical care providers at University Health Services, Environmental Health & Safety personnel and select Facilities Maintenance personnel whose job tasks require them to service or maintain locations that may be contaminated with blood or body fluids. First Responders are required to participate in the blood borne pathogens program required by the OSHA Blood borne Pathogens regulations (OSHA Standard 29 CFR 1910.1030). Note that if broken skin, eyes or the mouth makes contact with human blood or potentially infectious body fluids you must immediately wash contaminated skin with soap and water and flush eyes and mouth. Then, notify your supervisor and the Department of Human Resources at 348-3273 to arrange a post-exposure evaluation.

GUIDELINES

First Aid Kit Requirements

The content for industrial first aid kits must comply with the standards set by the Occupational Safety and Health Administration (OSHA) Bloodborne Pathogens regulations (OSHA Standard 29 CFR 1910.1030) and the American National Standards Institute (ANSI) Standard Z308.1. The "First Responder" kit contains items that will provide blood exposure protection and is intended for use by employees who have first aid responsibilities under the bloodborne pathogens regulations. The "Good Samaritan" first aid kits do not contain blood exposure protection items, and are intended for self-use and for use by individuals who make a personal choice to volunteer assistance.

First aid kits are available from the University Central Stores Department at 348-2171.

Selecting the Appropriate Kit

Determine whether your operations include any activities that are hazardous, contain hazardous materials, sharp objects, or obvious things that could produce cuts, punctures, or any other need for first aid. Based on this evaluation, obtain the appropriate first aid kit and locate it in a site accessible and known to all employees. Provide appropriate training and information to employees so they can successfully utilize the first aid kit.

If your evaluation leads you to provide a "Good Samaritan" first aid kit, simple instructions will be sufficient. However, if your evaluation leads you to provide the "First Responder" first aid kit, more information and instruction are indicated and include the following:

- Instructions for one or more persons in the fundamentals of basic first aid.
- Instructions for one or more persons in CPR and accident management.

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- Instructions for one or more persons in the protective measures required to prevent bloodborne pathogens exposure.

Further information and assistance can be obtained from the Department of Environmental Health & Safety at (305) 348-2621.

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USCG 110A - First Aid Kit Contents

Last Update: 07/01/03

Kit Contents:

All university departments should maintain adequate first aid kits in convenient and accessible locations. First aid kits and refill items can be purchased from University Central Stores. Kits may contain additional supplies. Individual items should be replenished as they soon as they become depleted. Supervisors should provide a log for use of first kits in order to track the types of injuries that are most common.

MINIMUM CONTENTS	SMALL GOOD SAMARITAN KIT	LARGE GOOD SAMARITAN KIT	FIRST RESPONDER KIT
Absorbent Compress	**1**	**1**	**1**
Adhesive Bandages (1" x 3")	**16**	**20**	**20**
Adhesive Tape (3/8" x 5 yd.)	**2 rolls** (½" x 2½ yd.)	1 roll (½" x 5 yd.)	1 roll (½" x 5 yd.)
Antiseptic (0.5 g applications)	10 wipes	10 wipes	10 wipes
Burn Treatment (0.5 g applications)	**6**	**6**	**6**
Sterile Pads (3" x 3")	**4**	**10**	**10**
Triangular Bandage (40"x40"x56")	**1**	**1**	**1**
Medical Exam Gloves (large)	2 pair	2 pair	3 pair
Waste Bag (6" x 8" plastic Ziploc)	---	---	**1**
Biohazard Label (1" x 3")	---	---	**1**
CPR Microshield-Plus Mask	---	---	**1**
Ice Pack	**2**	**2**	**6**

Some operations may require more extensive first aid kits than recommended here. In those cases, please contact Environmental Health and Safety at (305) 348-2621 and request the **COMPREHENSIVE FIRST AID KIT CONTENT SHEET** prepared by the Medical Director of University Health Services, Dr. Robert Dollinger.

Please remember that "first aid" is just that and should not be substituted for appropriate medical care by a medical care practitioner.

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9. Spills

- Spills of unknown liquids that are greater than 6 inches in diameter should be reported to FIU, Public Safety
- If the spill is food and cannot be cleaned up immediately, mark spill with cones and Call Work Management at x74600 for UP & EAS and x65565 for BBC for assistance.
- All food and beverages must be placed in covered containers.

10. Wires

- Keep wires and cords out of pathways and away from feet.
- Do not route electrical, phone or computer lines across aisles or passageways.

11. Electrical

- Do not overload plugs.
- Do not unplug equipment by pulling on the electrical cord; unplug it from the outlet.
- DO NOT USE any frayed cords, broken plugs or equipment containing these defects. Remove these items from service and immediately report these to Work Management at x74600 for UP & EAS and x65565 for BBC for assistance for repair.
- Avoid the use of extension cords. Use multi-plug power strips (with circuit breaker) for multiple plugs.
- Do not connect extension cords or power strips together (daisy-chain).
- Personal heaters, coffee makers, toasters, hot plates or other electrical appliances are not allowed.
- Never interfere with lockout/tagout tags on equipment or power supplies. For questions, contact the person listed on lockout/tagout tag or Work Management at x74600 for UP & EAS and x65565 for BBC.

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USCG 119 – HAZARD COMMUNICATION (HAZCOM)

Last Update: 02/07/06

PURPOSE

To assure that all students and employees of Florida International University are afforded the opportunity to learn about chemical hazards in their work environment.

SCOPE

University-Wide

GUIDELINES

FIU employees who is or may be exposed to a hazardous chemical should be provided with information regarding the requirements of the OSHA Hazard Communication Standard.

Such information should at minimum include the names of hazardous chemicals, and the locations where additional information, including but not limited to MSDS's, schedule or resource for training and the locations of any written procedure involving the use of these chemicals.

Additionally, each such employee should be trained as to detection methods, physical and health hazards of, protection methods for, as well as labeling and MSDS provisions for such hazardous chemicals.

Every employee should be informed of the Hazard Communication Compliance requirements and should be provided with the appropriate training.

New employees are required to receive information and training at the time they are assigned to work in an area which may expose them to a hazardous chemical.

Whenever a new hazard is introduced into the workplace, all affected employees should be trained as to that hazard.

Employees who may be exposed to hazardous chemicals when conducting non-routine tasks should be informed of the risks. This also applies to employees who may be exposed to construction related activity such as painting, varnishing, roof repairs, etc.

Information and training provided to employees for non-routine tasks should include instructions on administrative as well as engineering controls and contact numbers of emergency notification. Where appropriate, the use of personal protective equipment should be considered, but only as a last option.

Supervisors who provide training to their own team may consult with EH&S, request EH&S staff participation, request use of any materials in the "Free Audio-visual library, or copies or any hard copy documents. Where time permits, EH&S will develop customized PowerPoint presentations, up to 15 slides for use by departments University-wide.

Written records must be maintained for all departmental HAZCOM training. Such records should include the names of persons trained, their signatures, the dates of the training, and an outline of the training. Persons who are trained must place their signatures on these records to indicate that they have received the training. Each department is responsible for maintaining records and having them available for review as needed.

Employee information and training should include, as a minimum, the following elements:

1. Information of the requirements of the OSHA Hazard Communication Standard, which includes availability of information, exemptions form the standard, interpretation of key definitions, and how a chemical is deemed hazardous.
2. The details of the FIU Written Hazard Communication Program including an explanation of labeling systems and Material Safety Data Sheets and where on campus employees can obtain and use the appropriate hazard information.
3. Information as to the hazardous chemicals within the work area and where they are located.
4. Information as to the hazards of specific chemicals to which employees are exposed. This may be done either individually or by class of chemical hazard. Information on such hazards, both health and physical, should be taken from the MSDS for that chemical or class of chemicals.
5. Information as to how employees should detect the presence of or release of a hazardous chemical routinely used in the workplace and how they can protect themselves from exposure. This must include a discussion of all safety supplies and equipment recommended on MSDS and when such equipment is to be used. At the conclusion of any information and training session, an opportunity for questions must be provided. All pertinent questions must be answered.
6. If an answer is not known, the trainer should obtain the answer either from other knowledgeable individuals in the department, laboratory, or work area, the EH&S office (305) 348-2621 or the chemical manufacturer. Once the answer is obtained, it should immediately be conveyed to the employee who expressed interest and a note made to file that the response was provided and when.

For more information regarding these guidelines, contact the Department of Environmental Health and Safety at (305) 348-2621

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USCG 201 - FIRE EXTINGUISHER

Last Update: 05/01/01

PURPOSE
To establish a portable fire extinguisher management program

SCOPE
All University Premises

GUIDELINES
Portable fire extinguishers are installed on the basis of hazard classification of occupancy, and the nature of the contents of facility.

- The number and location of extinguishers is determined by the Fire Safety Compliance Officer.
- Departments with special needs may request additional fire extinguishers by calling the Department of Environmental Health & Safety at (305) 348-2621.
- Portable fire extinguishers are provided by the Department of Environmental Health & Safety, Insurance & Emergency Management Services for University facilities, on the basis of fire hazards encountered.
- Portable fire extinguishers may be used by those trained in their use, on fires of limited size.
- Fires are classified into groups according to the nature of the material subject to fire. Fire extinguisher classification corresponds to these groups:

  Class A:
  Fires consisting of ordinary combustibles, such as wood, paper, some plastics, and textiles, where a quenching and cooling action of the extinguishing agent is required.
  Class B:
  Fires consisting of flammable liquid and gas, such as oil, gasoline, paint, acetone, and grease, where oxygen exclusion or a flame-interrupting effect of the extinguishing agent is required.
  Class C:
  Fire involving electrical wiring and electrical equipment where a dielectric, nonconductive extinguishing agent is required.
  Class D:
  Fires consisting of combustible metals, such as magnesium, potassium, powdered aluminum, zinc, sodium, titanium, zirconium, and lithium, where a material specific extinguishing agent is required.

Fire Safety and Fire Extinguisher use training are available through the Department of Environmental Health & Safety.

If you observe portable fire extinguishers that have been tampered with, rendered nonfunctional, or missing from its cabinet or bracket, report it to the Department of Environmental Health & Safety by calling (302) 348-2621.

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USCG 210 - EMERGENCY EVACUATIONS

Last Update: 05/01/01

PURPOSE

To establish a uniform standard regarding Emergency Evacuations on University premises

SCOPE

University Premises

GUIDELINES

The continuous ringing of the fire alarm is **the** evacuation signal for all types of emergencies. All building occupants must respond to the sound of the alarm by immediately initiating evacuation procedures, as follows:

1. Complete internal departmental or class evacuation procedures
2. Follow EXIT signs to the nearest safe exit. **Do not use the elevators!** All types of footwear that may hamper descent, such as high heels and clogs, should be removed.
3. The Safety Warden must assure that everyone, including individuals with mobility impairments, have evacuated the area.
   Note: Evacuation plans for persons with disabilities must be made part of each department's documented emergency evacuation procedures.
4. Walk down stairs. **Do Not Run!**
5. As you approach the landing of each floor allow evacuees from that level to enter the stairwell.
6. If evacuation becomes difficult because of smoke, flames or blockage, re-enter the building, **but first**, assure that the floor on which you re-enter is safe. Continue evacuation via the nearest safe stairwell.
7. Once you have exited the building proceed to your designated Evacuation Assembly Area.
8. Do not re-enter the building unless authorized by a Public Safety Officer, fire department personnel, or until a recognized University authority broadcasts the "All Clear" directive

For more information regarding this guideline, contact the Department of Environmental Health and Safety at (305) 348-2621.

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USCG 601 – LABORATORY GLASSWARE DISPOSAL GUIDELINES

Last Update: 06/01/01

PURPOSE

To provide a standard procedure for proper disposal of laboratory glassware

GUIDELINES

- Broken laboratory glassware must be fully decontaminated, thoroughly rinsed and air dried before being placed in broken glass containers. Extreme care must be exercised when handling broken glassware. Always wear necessary personal protection.

- Laboratory glassware must be allowed to air dry before being placed in broken glass containers. Cardboard containers will not hold its integrity when wet.

- Disposal responsibilities remain with the generator of broken glassware. It is the generator's responsibility to remove the broken glass containers from the laboratory and placed them in the solid waste dumpsters located at the loading docks. Always wear eye protection while disposing of broken glassware containers.

- Broken glassware containers are not to be placed in hallways or means of egress. Broken glassware containers are to remain in the laboratory until the time of disposal. Custodial personnel will not remove nor dispose of broken glass containers.

- Broken glass containers are for the exclusive disposal of broken glassware. Do not mix broken glassware with laboratory equipment manufactured from any other material of construction.

- Unbroken glass containers must be fully decontaminated and thoroughly rinsed before being placed in the dumpsters. Do not place empty glass containers in hallways or means of egress. Exercise extreme caution when placing glass containers in metal dumpsters. Glass may cause injuries due to shattering at the time of contact with the hard metal surface. Always wear eye protection while placing glass containers in the dumpsters.

For more information regarding these guidelines, contact the Department of Environmental Health and Safety at (305) 348-2621.

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USCG 607 – CHEMICAL SPILL CLEANUP AND REPORTING

Last Update: 02/07/06

PURPOSE

To set safety standards for the cleanup and reporting of chemical spills.

SCOPE

University-wide.

GUIDELINES

Incidental Chemical Spills

Incidental spills are defined as hazardous material releases in quantities that do not exceed the Reportable Quantity (RQ) per state law and which take places in an enclosed space. The guideline for this policy is 100 milliliters (mL) or less.

1. These spills can be cleaned up by trained laboratory personnel.
   If no person has been contaminated by the spill and the spill is localized, do the following:
   A. Do not re-enter the laboratory alone. Use proper personnel protection equipment (PPE) such as gloves, eye protection, and body protection, e.g., lab coat.
   B. Notify all other personnel in the affected room to evacuate including yourself. Have someone notify the laboratory supervisor or Principal Investigator. Keep other people out of the laboratory.
   C. Determine if the spill can be cleaned up by using spill pillows, towels, sand, etc.
   D. Clean up the spill and place the spill clean up items into a labeled hazardous waste container and place it into the Satellite Accumulation Area.
   E. Remove any contaminated PPE and immediately wash hands, etc. Dispose of the contaminated PPE as any contaminated item used in the spill clean up has been handled.
   F. The incident should be reported to the Environmental Compliance Officer at Environmental Health & Safety by the person responsible for the room, laboratory, etc.

   If any person has been contaminated by the spill, especially eyes and skin, take immediate responsive actions using the eye wash, safety shower and appropriate first aid techniques. Please notify Public Safety that personnel were exposed and request further assistance as needed.
   A. Notify all other personnel in the affected room to evacuate, exit the room and close the doors to the room.
   B. Assist the contaminated person(s) to a safe eyewash or drench shower station to wash the contamination away.
   C. Notify the Campus Police Department, ext. 2626. Give the name of the chemical and that a small spill has occurred. The Campus Police will notify the Department of Environmental Health & Safety at ext. 2621 or the Environmental Compliance Officer at ext. 6971.
   D. Ask the Campus Police for medical assistance for the person(s) affected by the spill.

   If assistance and additional support is required from first responders:

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A. Remain at the door of the room to explain to the First Responders the quantity and location of the spill.
B. The First Responders should evaluate the spill quantity and location for feasibility of complete Remediation.
C. The First Responders should clean up the spill using approved spill clean up kits, personal protection equipment, etc.
D. The incident should be reported to the Department of Environmental Health & Safety by the person responsible for the room, laboratory, etc and the First Responders.

2. Handling of the Hazardous Waste
   A. All items used in the spill clean up should be placed into a suitable container and labeled with the appropriate hazardous waste information.
   B. The container should be placed into a Satellite Accumulation Area for safekeeping and handled in accordance with USCG 303 –Hazardous Waste Disposal.

Reportable Spills

Incidental spills are defined as hazardous material releases in quantities that do not exceed the Reportable Quantity (RQ) per state law and which take places in an enclosed space. The guideline for this policy is 100 milliliters (mL) or greater.

1. Spill Response
   A. Notify all other personnel in the affected room.
   B. All personnel must exit the room and close the doors to the room.
   C. Prevent others from entering the room.
   D. Notify the Department of Public Safety at ext. 2626 that a large spill has occurred. Tell the Campus Police the name of the chemical spilled. The Campus Police will notify Facilities Management and the Department of Environmental Health and safety at ext. 2621, and emergency contact numbers on record.
   E. Remain at a designated point to await arrival of the First Responder
2. Spill Remediation
   As appropriate, upon notification, the department of Environmental Health & Safety will determine the need to activate the FIU EMCOP.
3. Handling of the Hazardous Waste
   Handling of the hazardous waste should be accomplished in accordance with the Amherst College Emergency Contingency Plan and the Hazardous Waste Management Policy, 8.0.

For more information regarding this guideline, contact the Department of Environmental Health and Safety at (305) 348-2621.

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Appendix C:

Florida International University.

Emergency Management and

Continuity of Operations Plan (EMCOP)

-Extract of Relevant Forms-

BOMB THREAT CHECKLIST

Please keep a copy of this checklist under your phone.

- It is extremely important that you remain as calm and professional as you possibly can during the call.
- Ask the following questions and document the answers.

1. When is the bomb going to explode (A.M./P.M.)? _____
2. Where is the bomb located right now? (Bldg., Floor, Room#) _____
3. What kind of bomb is it? _____
4. What will cause it to explode? _____
5. What does it look like? _____
6. Why did you place the bomb? _____
7. Who are you? _____
8. Are you with an organization or group? □ Yes □ No | Name ? _____
7. Other statements - write any and everything you recall: _____

_____

_____

Immediately after the caller hangs up, record the following:

1. Time and duration of call: _____
2. Apparent age and sex of caller: Age ____ Years □ Male □ Female □Undetermined
3. Speech pattern, accent, possible nationality, etc: _____
4. Background noises (e.g. traffic noises, chimes, ringing phones etc): _____

_____

5. Did the caller appear to be familiar with the premises? □ Yes □ No

POST-OCCURRENCE DAMAGE ASSESSMENT FORM - FACILITIES

Fax to: 348-4604 (MMC) Building / Room #: _____

Fax to: 919-5578 (BBC)

In the aftermath of a disaster, evaluating and reporting damages in your areas is everybody's responsibility.

REMEMBER, YOUR SAFETY COMES FIRST!

Ceiling tiles (e.g., wet, sagging, missing): _____

_____

Walls (e.g., cracks, watermarks, soot): _____

_____

Floor/Carpet (e.g., wet, burnt, torn, mildew): _____

_____

Water leaks (e.g., from roofs, through walls, windows): _____

_____

Doors & Windows (e.g. broken locks, hinges, awnings): _____

_____

Utilities and fixtures (e.g., electrical outlets): _____

_____

Other: _____

_____

Contact Person: _____ Telephone _____

Department: _____ Fax Number: _____

Duplicate as required

EMCOP	POST-OCCURANCE DAMAGE ASSESMENT FORM-FACILITIES (create a list in Excel following format, fax to numbers on previous page)

INITIAL DAMAGE ASSESSMENT - LABS

Building _____ Lab # _____
Condition Verified By: _____ Phone: _____
Alternate: _____ Phone: _____

Category	Condition*
Animals	
Cultures	
Compressed Gasses	
Controlled Substances	
Flammable Materials	
Laser Equipment	
Radioactive Materials	
Temperature Sensitive Materials	
Other	
Other	
Other	

Locations with hazardous materials, where such materials have been identified to be in poor condition, must be immediately reported to the Public Safety Department.

* Please use your best judgment for assigning condition assessment ranking based on the following:

Good	No Visible Damage/Leakage
Fair	Damage appears superficial/No Leakage
Poor	Damage appears moderate/Possible Leakage
Unknown	Inaccessible, due to facility condition or contamination

Appendix D:

Hurricane Preparedness Checklist

for Laboratories EC 3625, EC 3630, EC 3760, and EC 3765

Copy as needed

Hurricane Task Preparation Checklist

Laboratory Room # _____

Date: _____

Action	Completed by	Concerns/Remarks
Move all glassware to appropriate storage locations		
Move all chemicals to appropriate storage locations		
Remove all chemicals from fume hoods and secure in appropriate storage areas		
Close fume hood sashes completely		
Cap gas cylinders and secure to a permanent fixture using a cylinder strap or chain		
Unplug all small electrical equipment (hotplates, magnetic stirrers, pH meters, etc.)		
Use surge protectors to protect sensitive equipment in the event of a power surge		
Turn refrigerators/freezers to coldest setting		
Remove equipment, chemicals, wastes and supplies from the floor in areas that may flood		
Cover exposed equipment with plastic covers/sheeting		
Move valuable files, papers, and other documents to cabinets or cover them with plastic sheeting		
Empty trash receptacles		
Document pre-event conditions/settings with photographs (Image database)		

Additional Concerns/Remarks:

Appendix E:

C&EE Safety Videos
and
FIU-EH&S Training Courses

Training is critical to the ongoing safe operation of any laboratory facility. All constituents to which the contents of this manual apply (please see page 4) must be cooperatively engaged in working to reduce the likelihood of accidents, injuries and the associated potential legal implication.

FIU Environmental Health & Safety (EH&S) offers a varied set of safety training classes to meet the diverse demands of FIU operations. Information about EH&S class offerings can be found at http://ehs.fiu.edu/Training/Pages/default.aspx.

As part of the completion of this Emergency Response manual six (6) videos have been produced to illustrate the application of some of the cleanup procedures described herein and applicable to the activities that mainly take place in the laboratory room EC 3625 and EC 3760. Efforts were made to ensure that these videos are relevant and engaging; they range in length from about one (1) minute to seven (7) minutes and can be viewed from the courses' (i.e., ENV 3001L, ENV 405L) supporting Blackbaord pages. Additionally, students who may be working with the apparatuses that contain mercury and which are currently located in rooms EC 3630, and EC 3760 (described in page 27), must also view the video "SPILFYTER GRAB _ GO MERCURY SPILL KIT 520250" before using those devices.

DVD containing copies of all seven (7) videos mentioned above are available for loan from Dr. Anna R. Bernardo-Bricker (abernard@fiu.edu). If possible, these videos shall also be made available on our departmental website under: http://www.cee.fiu.edu/research/facilities/.

The six (6) videos produced to illustrate the most commonly anticipated six cleanup cases are:

1- Small broken glass accident: a graduated cylinder breaks on a bench
2- Medium broken glass accident: a glass 1-L bottle containing a non-toxic chemical slips out of a student's hand. Contents are spilled and bottle breaks on the floor.
3- A spill of ~10 mL HCl ~1M on a bench
4- A spill of ~100 mL HCl ~1M on a bench
5- A spill of ~50 mL NaOH ~0.5M on a bench
6- A spill of ~50 mL fumic H_2SO_4 in the hood

Two of these videos, numbered as **1** and **3**, were shown to all 60 students registered in the 2013Summer A sections of the ENV 3001L course. Students were asked to rate the videos content and presentation using the scale "Strongly Disagree (1) to "Strongly Agree (10)" on the following three statements:

(a) The Content of the Video was Relevant
(b) The Video was visually appealing
(c) The Content was Presented in a Simple and understandable manner

The results of the survey expressed that 100% of the students thought that the content of the videos was relevant with some explicit annotations that the contents are specifically associated to real-life situations which are probable to occur in the laboratory course. About 80% of the respondents rated the visual appeal and presentation of the videos as a "10", while the remaining 20% rated these statements using a "7", "8", or "9" in the scale.