



CHEMICAL HYGIENE PLAN

**Prepared By:
Triumvirate Environmental**

Initially Developed: October 2016

Program Approval

Chemical Hygiene Officer

Date

Environmental Health and Safety Manager

(or) Direct Report (if CHO is also EHS Manager)

Date



CHEMICAL HYGIENE PLAN

**Prepared By:
Triumvirate Environmental**

Initially Developed: October 2016

Most Recent Update: May 17, 2018

Table of Contents

<i>Page Intentionally Left Blank</i>	5
1.0 Flagler College Commitment to Safety	6
1.1 Purpose.....	6
1.2 Scope.....	6
2.0 Roles and Responsibilities	7
2.1 Science and Art Department Heads	7
2.2 Environmental Health and Safety Office	7
2.3 Chemical Hygiene Officer (CHO) or Designee.....	7
3.0 Standard Operating Procedures	8
3.1 Laboratory General Safety Procedures	8
3.2 Accident and Incident Reporting	8
3.3 Chemical Storage	9
3.4 Hazardous Waste Management and Disposal.....	9
3.5 Chemical Procurement.....	11
3.6 Chemical Inventory Control.....	12
3.7 Housekeeping	12
3.8 Emergency Procedures	12
3.9 Hazard Assessment	13
3.10 Bonding and Grounding.....	13
3.11 Procedures for Prior Approval	14
3.12 Procedures for Particularly Hazardous Substances (Select Highly Toxic Chemicals, and Chemicals of Unknown Toxicity)	14
3.13 Chemical Substances Developed in the Laboratory.....	15
4.0 Special Procedures for Handling Hazardous Chemicals	16
4.1 Allergens and Sensitizers.....	16
4.2 Asphyxiants.....	16
4.3 Compressed Gas	16
4.4 Corrosive Chemicals	17
4.5 Cryogenic Liquids	17
4.6 Flammable and Combustible Chemicals.....	18
4.7 Irritants.....	18
4.8 Organic Peroxides.....	19
4.9 Oxidizers	19

4.10 Toxic Chemicals	19
4.11 Unknown Chemicals	20
5.0 Control Measures.....	21
5.1 Substitution.....	21
5.2 Administrative Controls	21
5.3 Engineering Controls	22
5.4 Personal Protective Equipment.....	23
6.0 Equipment, Maintenance, and Inspections	26
6.1 Fume Hoods	26
6.2 Safety Showers and Eyewash Stations.....	26
6.3 Inspections	27
7.0 Information and Training	28
7.1 Information.....	28
7.2 Training.....	28
7.3 Frequency of Training.....	28
7.4 Recordkeeping	28
8.0 Medical Examinations and Consultations.....	28
8.1 Medical Surveillance	29
8.2 Information Provided to the Physician.....	29
8.3 Physician's Written Opinion	29
PROCEDURES	35
Laboratory Chemical Fume Hoods	35

Page Intentionally Left Blank

1.0 Flagler College Commitment to Safety

Flagler College provides a safe and healthy work environment in accordance with the Occupational Safety and Health Act (OSHA) 29 CFR 1910.1450 "Occupational Exposure to Hazardous Chemicals in Laboratories" also known as the Laboratory Standard. Commitment to health and safety is the responsibility of individuals at all levels to protect the safety and health of all faculty and students at the campus and the environment.

1.1 Purpose

The purpose of the Chemical Hygiene Plan (CHP) is to provide guidance to Flagler College laboratory and/or Art Department personnel for working safely in the laboratory environment. The CHP complies with the requirements of OSHA's Laboratory Standard and describes proper laboratory practices, procedures, protective equipment, and hazard identification. A copy of the CHP will be maintained with or in the Safety Data Sheet (SDS) binder and be readily available to all personnel in the laboratory.

1.2 Scope

The provisions of the CHP apply to all Flagler College laboratory and art department personnel, other faculty who routinely visit or occasionally work in the laboratory, and all contractors who might be exposed to laboratory hazards while at Flagler College. All laboratory and art department personnel are encouraged to contribute their skills and knowledge to the CHP such as routine activities, chemical safety, hazardous material handling, or procedures to minimize chemical exposures.

The Environmental Health and Safety Office and the Science and Art Department heads will annually review the CHP for effectiveness and amend as necessary. All new laboratory and art department personnel will be required to review and understand the CHP as part of their New Faculty Orientation and all laboratory and art department personnel will receive annual CHP training.

2.0 Roles and Responsibilities

2.1 Science and Art Department Heads

- Responsible for the implementation of the CHP within laboratories under their control.
- Provide laboratory specific training to faculty.
- Faculty/staff is inclusive of students, volunteers, minors and researchers.
- Implement safe laboratory practices and engineering controls to minimize the potential exposure to hazardous chemicals.
- Ensure that equipment and protective devices are available and in working order, and that appropriate training has been provided.
- Responsible for performing operations within the provisions of the CHP and other safety and health related procedures.
- Practice good chemical hygiene.
- Attend necessary trainings.
- Review and understand the CHP and applicable laboratory specific procedures in their entirety before beginning work in the laboratory or with hazardous chemicals.
- Review the CHP for effectiveness and amend as necessary at least annually.

2.2 Environmental Health and Safety Manger

- Responsible for training the Department heads, faculty and facilities staff.
- Responsible for assuring safe practices are implemented and practiced within the laboratory setting.
- Review the CHP for effectiveness and amend as necessary at least annually.

2.3 Chemical Hygiene Officer (CHO) or Designee

- The acting chemical hygiene officer or designee
- Responsible for providing guidance in the development and the implementation of the CHP.
- Collaborate with departments and laboratory personnel to develop and implement chemical hygiene policies.
- Review the CHP with appropriate committees as necessary.
- Assist laboratory and art department personnel in the development of laboratory-specific safety procedures and the selection of engineering controls and personal protective equipment.
- Investigate accidents, spills and near misses in the laboratory.

3.0 Standard Operating Procedures

Flagler College supports the implementation of prudent laboratory practices when working with chemicals in a laboratory. These include general and laboratory-specific procedures for work with hazardous chemicals, emergency procedures, and laboratory waste procedures. Procedures have been put in place to protect laboratory and art department personnel from health hazards and physical hazards in the Flagler College laboratories.

3.1 Laboratory General Safety Procedures

Flagler College has established general lab procedures to ensure that laboratory personnel maintain healthy and safe work practices in the laboratory. All laboratory personnel working in laboratories must adhere to the following policies when laboratory work involves the use of hazardous chemicals. Failure to do so will be reported to the Chemical Hygiene Officer.

- Always read and understand the Material Safety Data Sheet (SDS) for the chemicals you work with before handling.
- Do not use broken or chipped glassware, and dispose of it in a designated marked container (e.g., "broken glass only").
- Never pipette by mouth; always use a pipette aid or suction bulb.
- Do not apply cosmetics in the laboratory.
- Wash hands and arms thoroughly before leaving the laboratory, even if gloves have been worn.
- Food, drink, and chewing gum are forbidden in the laboratory.
- All chemical containers such as test tubes, beakers, and flasks must be labeled with the full chemical name.
- Do not work alone in the laboratory if the procedures being conducted are hazardous.

3.2 Accident and Incident Reporting

All accidents, incidents, and near misses that result in personal injury or illness, damage and or a potential for significant injury or property loss to Flagler College property shall be properly reported to the CHO and/or EHS and investigated. All accidents or near misses should be carefully investigated by the CHO with the results distributed to all who might benefit.

If emergency care is needed, Flagler College Department of Health Services has licensed a nursing staff and physician on campus Monday-Friday to handle the College's emergency medical needs. The Health Services Department works in tandem with the St. Augustine Police Department and the City of St.

Augustine Fire Department. The Flagler Emergency Line can be reached at (904) 819-6200 by reaching a Blue Phone on campus grounds which connect instantly, 24/7 to the campus Security Office.

3.3 Chemical Storage

- All chemicals in the laboratory should have a designated storage area and should be returned after each use or at the end of each class, whichever occurs first.
 - Avoid storing chemicals on bench tops and floors.
 - Storage trays or secondary containers should be used to minimize spillage of material if a container breaks or leaks.
 - Avoid storing virgin chemicals in the fume hood because containers and equipment can interfere with airflow, clutter the work space, and increase the amount of material that could become involved in a hood fire.
 - Avoid storing chemicals in direct sunlight or near a heat source.
 - Physically separate incompatible chemicals using a secondary containment bin or tray, and or store at another designated location.
 - All chemical containers must be properly labeled and stored in labeled storage areas.
 - Avoid storing chemicals above eye level.
 - Refrigerators used for storage of flammable chemicals must be explosion-proof, laboratory-safe units.

3.4 Hazardous Waste Management and Disposal

Flagler College will collect and dispose of hazardous waste in accordance with local, state and federal hazardous waste regulations.

EHS will periodically monitor and arrange for pick-up/clean out of both the satellite accumulation area and main accumulation area.

3.4.1 Management

Hazardous waste chemicals regulated by the Environmental Protection Agency must be collected, labeled, packaged, and disposed of according to federal and state hazardous waste regulations.

Hazardous waste is any solid, liquid, sludge, or containerized gas that is discarded, has served its intended use, or is manufacturing by-product, and exhibits any of the characteristics identified below:

- Flammable
- Corrosive
- Reactive

- Toxic

It is the responsibility of the waste generator to adhere to proper waste management and disposal policies. Hazardous waste shall be collected in an appropriate container pending transfer to the Flagler College Main Accumulation Area (MAA) or Satellite Accumulation Area (SAA) for chemical waste handling or pickup by an outside disposal agency.

3.4.2 General Procedures for Disposal

- Any material that meets the criteria of a hazardous waste shall not be treated or otherwise changed to alter its characteristics as a hazardous waste.
- Empty containers of hazardous materials shall be rinsed three times before disposal. All three rinses shall be collected as hazardous waste.
- Dispose of all waste in designated, labeled containers. Any questions about proper disposal methods should be directed to the EHS office, (904) 819-6422
- Do not combine different waste streams (i.e. bio-hazardous and hazardous or incompatible hazardous materials).
- Do not overfill containers.
- Manage common laboratory waste (uncontaminated gloves, paper towels, etc.) in the general trash.

3.4.3 Storage and Handling for Hazardous Waste

- All hazardous waste generated at Flagler College must be accumulated and stored in a Satellite Accumulation Area before being transferred to the Main Accumulation Area.
- The SAA's are marked by a sign defining the SAA. The area is used for the accumulation of waste generated at the point of generation.
- All SAA waste containers must be labeled with SAA labels or the words "Hazardous Waste" with the full chemical name and hazard class (e.g. flammable).
- When an SAA waste container becomes full, date the container with the 'full date' and inform the EHS office, (904) 819-6422.
- SAA containers can remain in the SAA indefinitely or until they become full. Full containers must be moved into the MAA within three days of the full date.
- All containers must be closed and sealed when not in use.
- Waste must be stored in containers compatible with the constituents of the waste.
- The MAA is located in a separate storage building north of the campus Business Services building.

- Secondary containment bins must be used to prevent mixing of incompatible waste streams.

3.4.4 Lab-Pack Chemicals

Expired or unwanted chemicals should not remain in chemical stock areas; they should be appropriately labeled with hazardous waste labels and put in a SAA to await pickup. All expired and unwanted chemicals must be moved to the MAA within three days of the full date.

3.4.5 Biological Waste

Biological waste is characterized as any waste, liquid or solid, that is potentially infectious to humans. Biological waste consists of contaminated animal carcasses, needles and syringes, cell culture wastes, and any biologically contaminated laboratory debris. All biohazardous waste must meet the following criteria prior to disposal:

- Waste shall be placed in red bio-waste bags marked with the universal biohazard symbol;
- Do not place leaking or liquid waste into the bags;
- All biohazardous sharps should be disposed of in a red sharps container labeled with the universal biohazard symbol;
- Do not overfill bags; and
- Do not leave or dispose of red bio-waste bags near the general trash.

3.4.6 Broken Glass Disposal

Broken glass and sharp objects shall never be disposed in general trash receptacles or recycling bins.

- Glass bottles (not eligible for recycling) shall be triple rinsed with water and their labels defaced before discarding.
- Glass bottles or broken glass must be disposed of in cardboard “Deposit Glass Here” boxes. These boxes are available in all of the academic laboratory areas.
- Seal the top of the box closed with tape when it is full and label it ‘trash’.

3.4.7 Universal Waste Management

- Fluorescent lamps, LED bulbs, cathode ray tube (CRT) screens, Lithium Ion (Li), Nickel Cadmium (NiCad) or other rechargeable batteries, and mercury containing devices such as thermostats are classified as Universal Waste in Florida and cannot be disposed in the general trash. Flagler College also collects and properly recycles Electronics Scrap, ballasts, and smoke detectors. **For disposal contact EHS, (904) 819-6422.**

3.5 Chemical Procurement

Before a chemical is received, information on proper handling, storage, and disposal shall be reviewed by consulting the SDS. No container should be accepted without an adequate label. Preferably, all chemicals should be received in one central location.

3.6 Chemical Inventory Control

The Science and Art staff will maintain an accurate chemical inventory for each classroom, lab and main chemical storage area. Inventory lists will be kept in each classroom, lab and main chemical storage area and will be made available upon request. Currently, the Science department utilizes “Quartzzy”, an online chemical and lab products supply software. This tracks all orders, maintains an online inventory and provides Safety Data Sheets (SDS) for all chemicals ordered and present onsite.

EHS will annually review all chemical inventories.

3.7 Housekeeping

- Laboratory fume hoods and work areas should be kept clean and free of debris at all times.
- Do not allow trash to accumulate in any area. It can be a fire hazard and or obstruct emergency equipment and egress.
- Do not store food or drink in any chemical laboratory.
- Access to exits, emergency equipment and utility controls should never be blocked.

3.8 Emergency Procedures

In the event of a hazardous materials spill or incident in which assistance is needed, the following steps must be followed.

- If the incident is indoors, close all doors in order to isolate the area if it safe to do so.
- If the substance is known to be extremely hazardous or acutely toxic and volatile (A Poison Inhalation Hazard Zone A or B, Compressed Gas or highly reactive substance), evacuate the building.
- Call the EHS Department at (904) 819-6422 or Travis Nierendorf (EHS Coordinator), 860-803-6914, and notify of the spill and the type of chemical spilled. Depending on the severity of the hazard, a variety of response actions can take place.
- From a safe area call the Security/Security Office provide them with the following information:
 - Name of the spilt material;
 - Quantity of the material spilt;

- Time of the incident;
 - Location of the incident;
 - If anyone has been injured or exposed to the spilt material;
 - If a fire or explosion is involved with the incident; and
 - Your name, phone number and location.
- Follow instructions provided by the emergency responders
 - Depending on the type of chemical and the quantity, the Fire department may or may not have to be involved. NEVER directly call the Florida DEP or LEPC, this is a decision for qualified individuals.
 - If necessary, evacuate the area

3.9 Hazard Assessment

A hazardous chemical means a chemical for which there is statistically significant evidence that acute or chronic health effects may occur in exposed laboratory and/or art department personnel. An acute health effect is an adverse health effect characterized by severe symptoms that develop rapidly. A chronic health effect is an adverse health effect with symptoms that develop slowly over a relatively long period of time.

A hazard assessment must be completed to identify the physical and health hazards of chemicals used in the laboratory and determine the risk of exposure to the body. A physical chemical hazard is a chemical that is proven to be a combustible liquid, flammable, a compressed gas, explosive, an organic peroxide, an oxidizer. A health hazard means a chemical for which there is statistically significant evidence that acute or chronic health effects may occur in exposed faculty members.

A hazard assessment should include: identifying the hazard type (s), selection of appropriate PPE, training laboratory and art department personnel, storage and handling requirements, control measures, signs and symptoms of an exposure and spill and decontamination procedures.

3.10 Bonding and Grounding

Bonding and grounding of flammables is extremely important to reduce the risk of explosion and fire due to static electricity that builds up during the transfer of flammable liquids. Bonding prevents the generation of static electricity by minimizing the electrical potential between two objects, such as a dispensing drum and a safety can. Grounding minimizes the electrical potential between the containers

and the ground. Bonding and grounding shall be used when transferring Class I flammable liquids, those with a flash point below 100 F (isopropyl alcohol and acetone) in metal equipment in order to avoid static generated sparks.

3.11 Procedures for Prior Approval

Whenever there is a significant change in chemical amounts, new equipment, a situation where one must work alone, or highly hazardous chemicals or procedures, approval must be given by the Science or Art Department Heads prior to starting procedures. Notification and revision by the EHS Coordinator is also preferred.

General safety considerations include:

- Experimental design
- Equipment design
- Work space adequacy
- Development of an SOP
- Work preparedness
- Hazard assessment

3.12 Procedures for Particularly Hazardous Substances (Select Highly Toxic Chemicals, and Chemicals of Unknown Toxicity)

The following procedures must be followed when performing laboratory work with particularly hazardous substances.

- These substances must be used and stored only in areas with restricted access.
- Designate an area that may be used for work with these materials. This area may be the entire laboratory, an area of a laboratory or a device such as a chemical fume hood. The designated area must be clearly posted with signs that;
 - Identify the hazards;
 - When the hazardous material is in use;
 - No untrained personnel allowed in the work area; and
 - Clearly define the designated area.
- Only the smallest amount of a chemical required by the procedure shall be used or stored.
- When possible only order the required amounts to avoid unnecessary decanting or weighing out the material.

- Specific spill procedures for the hazardous materials must be developed and posted in the designated area.
- All laboratory and art department personnel working with these chemicals shall be familiar with the hazards and proper procedures for accidental release.
- General PPE to be worn at all times when working with this materials are safety glasses, gloves, long sleeve laboratory coats and no open toed shoes.
- The designated work area shall always be decontaminated after each process, experiment or when the work has been completed.
- All waste products from the process shall be managed in a compatible container.

3.13 Chemical Substances Developed in the Laboratory

If the composition of the chemical substance produced for the laboratory's use is known, the Chemical Hygiene Officer or their designee shall determine if it is a hazardous chemical. If the chemical is determined to be hazardous, the EHS or Science or Art department shall provide appropriate training. If the chemical produced is a byproduct whose composition is not known, the Science and Art department shall assume that the substance is hazardous. If the chemical substance is produced for another user outside of the laboratory, the researcher shall comply with the Hazard Communication Standard (29 CFR 1910.1200) including the requirements for preparation of SDS's and labeling.

4.0 Special Procedures for Handling Hazardous Chemicals

The Science and Art Department Heads shall ensure that all lab personnel are aware of the locations, hazards and appropriate control measures for work involving hazardous chemicals. In some cases, laboratory-specific procedures may be required for working with highly hazardous materials. Review the SDS for specific handling and storage requirements of hazardous chemicals. Some specific hazards that may be present in various laboratories at Flagler College are listed below.

4.1 Allergens and Sensitizers

A chemical allergy is an adverse reaction by the immune system to a chemical. Allergic reactions result from previous sensitization to a chemical or a structurally similar chemical. Once sensitization occurs, allergic reactions can result from exposure to extremely low doses of the chemical. Allergic reactions can be immediate, occurring a few minutes after an exposure. Anaphylactic shock is a severe immediate allergic reaction that can result in death if not treated quickly. Allergic reactions can also be delayed, taking hours or even days to develop. It is important to recognize that a delayed chemical allergy can occur even some time after the chemical has been removed. An example of a substance that may cause an allergic reaction is phenol.

4.2 Asphyxiants

Asphyxiants are substances that interfere with the transport of an adequate supply of oxygen to the vital organs of the body. Simple asphyxiants are substances that displace oxygen from the air being breathed to such an extent that adverse effects result. Acetylene, carbon dioxide, argon, helium, ethane, nitrogen and methane are common asphyxiants. It is important to recognize that even chemically inert and biologically benign substances can be extremely dangerous under certain circumstances such as carbon monoxide.

4.3 Compressed Gas

Gas cylinders contain either compressed liquids or gases. Gas cylinders represent the most insidious hazard, as puncture, heat, faulty valves, pressure or regulators may result in a rapid release of the entire contents. The following safety considerations should be implemented where applicable:

- The cylinder contents must be clearly identifiable.
- Handle cylinders carefully and do not roll, slide or drop. Use a cart or hand truck to transport.
- Do not lift a cylinder by its cap.
- Secure all cylinders while in storage, transport or use.

- Never tamper with cylinder valves, force connections or use homemade adapters. Use only approved equipment. Never repair or alter cylinders, valves or safety relief devices.
- Only use a regulator compatible with the cylinder contents.
- Close the cylinder valve when not in use.
- When empty, turn off the cylinder valve and label the cylinder as empty. Store separately from full cylinders.
- Store cylinders in a well ventilated area away from ignition sources, heat, flames and flammable chemicals.
- Keep the protective caps on the cylinders at all times except when the cylinders are in active use.
- Check for gas leaks using soapy water around the connections.
- Do not store flammable gas cylinders with oxidizers such as nitrous oxide or oxygen. They must be separated by a minimum of 20 feet or a 5 foot fire wall.

4.4 Corrosive Chemicals

The Resource Conservation and Recovery Act (RCRA) defines a corrosive chemical as a liquid with a pH ≤ 2 or >12.5 . Acids and bases can cause severe tissue damage depending on the corrosivity of the chemical. The primary means of protection from corrosive chemicals is the use of gloves, goggles, face shields, aprons, lab coats and other chemical resistant clothing. Exercise extreme caution when handling corrosive chemicals. The following safety considerations should be implemented where applicable:

- Transport acids and bases in a bottle carrier or cart. Do not handle by the neck alone; support the weight of the bottle from the bottom when handling or pouring.
- Do not store acid and bases with flammable liquids or oxidizing chemicals. Store hydrofluoric acid by itself.
- Isolate corrosive chemicals from incompatible chemicals.
- Reference the chemical's SDS for proper handling, PPE and storage requirements.
- If an acid or base comes in contact with your skin or clothing, thoroughly wash the affected areas utilizing the safety showers or eyewash units.

4.5 Cryogenic Liquids

Cryogenic liquids are liquefied gases that are kept in their liquid state at very low temperatures and are associated with various hazards including: extreme cold, asphyxiation, explosion, cold contact burns and toxicity. The most common cryogenic liquids at Flagler College include oxygen and nitrogen. Laboratory personnel should be thoroughly trained on the hazards and the proper steps to avoid them. Training should include emergency procedures, operation of equipment, safety devices, appropriate engineering

controls, knowledge of the properties of the materials used and personal protective equipment required. Insulated gloves should always be worn when handling anything that comes into contact with cryogenic liquids or the vapors. Considerations must be made to prevent cryogenic material from contacting skin. Clothing such as a lab coat, pants, closed toed shoes, safety glasses, goggles and face shields should be worn.

4.6 Flammable and Combustible Chemicals

Flammable chemicals are considered to be liquids with a flashpoint below 100 °F and solid materials that readily sustain combustion. Liquids with a flashpoint between 100 °F and 200 °F are generally classified as combustible; the same basic procedures should be applied when handling combustible liquids.

- Do not allow smoking or other sources of open flames in areas where flammable chemicals are used.
- Know the location of fire extinguishers, fire alarms and emergency exits in the laboratory.
- Do not store flammable liquids in domestic-type refrigerators. Use only refrigerators rated for flammables.
- Do not store flammables with oxidizing agents (e.g., nitric, hydrofluoric, and sulfuric acids).
- Do not expose flammable liquids to potential sources of ignition such as electrical equipment, heat, burners or open flames.
- To prevent accidental electrical charge, the use of bonding and grounding equipment should be used whenever applicable. The use of non-sparking tools can prevent an ignition source.
- Store flammable liquids in an approved fire rated flammable storage cabinet.
- Do not store flammable liquids on the floor, unless protected by secondary containment.
- Minimize the amount of flammable liquids that are in use, being stored and that are generated as wastes.
- Storage of flammable liquids greater than 10 gallons within a laboratory fire area must be in an approved and labeled flammable storage cabinet.
- The SDS shall be reviewed by the owner/user of the materials for additional safety requirements and precautions.

4.7 Irritants

An irritant is a chemical, which is not corrosive, but which causes a reversible inflammatory effect on living tissue by chemical action at the site of contact. A wide variety of organic and inorganic chemicals are irritants; thus, skin contact with all laboratory chemicals should be avoided. Use a properly functioning chemical fume hood when handling irritants that can be inhaled. At a minimum, safety glasses, lab coat, long pants, protective gloves and closed toed shoes should be worn.

4.8 Organic Peroxides

Organic peroxides are hazardous because of their extreme sensitivity to shock, sparks, heat, light, strong oxidizing and reducing agents and other forms of detonation. Organic peroxides may cause fire, create explosion hazards and may be toxic or corrosive. Some organic peroxides are dangerously reactive, decomposing very rapidly or explosively if they are exposed to only slight heat, friction, mechanical shock or contamination with incompatible materials. Precautions for handling peroxides should include the following:

- Limit the quantity of peroxides.
- Do not return unused peroxides to the container.
- Clean up all spills immediately. Solutions of peroxides can be absorbed using vermiculite or other absorbing material.
- Smoking, open flames and other sources of heat near peroxides is prohibited. Areas should be labeled that contain peroxides so that this hazard is evident.
- Avoid friction, grinding and other forms of impact near peroxides, especially solid peroxides. Glass containers that have screw-cap lids or glass stoppers should not be used. Polyethylene bottles that have screw-cap lids may be used.
- Isolate from incompatible materials such as strong acids and bases, flammable and combustible liquids and reducing agents.

4.9 Oxidizers

Oxidizers are chemicals other than a blasting agent or explosive as defined in § 1910.109(a), that initiates or promotes combustion in other materials, causing fire either of itself or through the release of oxygen or other gases. Precautions for handling oxidizers should include the following:

- Minimize the amount of oxidizers used and stored.
- Isolate from incompatible chemicals (e.g., organics, flammable, dehydrating, or reducing agents).
- Do not store oxidizers in wooden cabinets or on wooden shelves.
- Do not return unused material to the original container.
- Store in a tightly closed container and in a cool, dry, ventilated area.

4.10 Toxic Chemicals

Toxic is defined by OSHA 29 CFR 1910.1200 as a chemical which falls in any of these three categories:

- A chemical that has a median lethal dose (LD50) of more than 50 milligrams per kilogram but not more than 500 milligrams per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each.

- A chemical that has a median lethal dose (LD50) of more than 200 milligrams per kilogram but not more than 1,000 milligrams per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between two and three kilograms each.
- A chemical that has a median lethal concentration (LC50) in air of more than 200 parts per million but not more than 2,000 parts per million by volume of gas or vapor, or more than two milligrams per liter but not more than 20 milligrams per liter of mist, fume or dust, when administered by continuous inhalation for one hour (or less if death occurs within one hour) to albino rats weighing between 200 and 300 grams each.

4.11 Unknown Chemicals

Unknown chemicals, or those for which complete physical and chemical hazards are not known, must be assumed to be hazardous and highly toxic. Appropriate PPE and engineering controls should be utilized. In the event an unknown chemical is identified at Flagler College, the EHS office shall be notified immediately at (904) 819-6422. A third party vendor shall be brought in to test the unknown and properly dispose of the contents.

5.0 Control Measures

For the laboratory use of OSHA regulated substances, Flagler College shall assure that laboratory and art department personnel's exposure to such substances do not exceed the permissible exposure limits specified in 29 CFR 1910, subpart Z. To minimize laboratory and art department personnel's exposure to hazardous chemicals the following control measures for reducing chemical exposure should be implemented:

- Substitution of less hazardous chemical or processes
- Engineering controls
- Administrative controls
- Personal protective equipment

Substitution, engineering controls, administrative controls and PPE are basic principles used to control hazards and exposures. Before the proper control(s) can be selected, a hazard assessment of the process, activity or material should be conducted.

5.1 Substitution

Every hazard assessment should first determine if the hazardous conditions can be prevented, e.g., substituting with a less hazardous chemical or process. Substitution is one of the most effective ways to eliminate or reduce exposures because it removes the hazard at the source.

5.2 Administrative Controls

Administrative controls are changes in work procedures such as written safety guidelines, rules, supervision, schedules, signs, labels, SDS's and training to reduce faculty exposure to hazardous chemicals.

5.2.1 Safety Data Sheets

SDS's are documents created by the chemical manufacturer that describe the substance. Some information found on an SDS includes: chemical and physical characteristics, handling requirements, storage and disposal information and signs and symptoms of exposure. SDS's are required for all chemicals used at Flagler College and must remain on file for 30 years after employment. OSHA requires up-to-date SDS's that are readily available for each chemical. The EHS Coordinator/Facilities Department is responsible for obtaining SDS's for chemicals used and stored within the Facilities department and the CHO or designee is responsible for obtaining SDS's within the lab areas at Flagler

College. SDSs shall be maintained in the main chemical storage area within the MAA and within the facilities workshop accessible to all personnel and regulatory inspectors as needed. An SDS binder is located in the science and art buildings along with other areas where chemicals might be stored, they are readily available to all emergency response personnel, regulatory inspectors, and everyone working with the hazardous chemicals. Faculty/laboratory personnel have a right to access any or all SDSs. If an SDS is not included in the shipment, the person receiving the shipment shall contact the chemical manufacturer in order to obtain the SDS.

5.2.2 Signs and Labels

All hazardous materials, hazardous waste and chemical storage areas shall be appropriately labeled indicating the hazards present and any other relevant regulatory requirements. All chemical containers at Flagler College must be labeled regardless of size and whether or not they are hazardous. Labeling of all chemical containers assists emergency personnel and others in identifying what is and what is not hazardous should a spill occur or other emergency situation arise. Original labels on chemical containers must not be removed or defaced. Labels must be in English and they must contain the complete name of the chemical and be traceable or easily linked to the appropriate SDS (chemical formulas are not allowed). The manufacturer's label is generally sufficient to meet OSHA labeling requirements and should be replaced only if it becomes damaged or illegible. All containers into which chemicals are transferred also need to be legibly labeled in English and include the name of the chemical and appropriate hazard warnings (chemical formulas are not allowed). The National Fire Protection Association (NFPA) 704 diamond should be utilized to ensure uniform labeling. The NFPA system requires the chemical name to be listed along with health, flammability, reactivity and specific hazard ratings. Refrigerators or freezers containing either chemicals or food should be appropriately labeled, e.g., chemicals only, no food or drink, or food and drink only.

All laboratories shall be posted with signage addressing the hazards of the materials contained in the lab. A NFPA 704 diamond can be used for hazard notification.

5.3 Engineering Controls

Engineering controls eliminate or reduce exposure to a chemical or physical hazard through the use or substitution of engineered machinery or equipment. Engineering controls include process change, substitution, isolation, ventilation and source modification.

- **Process change** consists of changing a process to make it less hazardous (e.g., paint dipping in place of paint spraying).

- **Substitution** consists of substituting for a less hazardous material, equipment, or process (e.g., use of soap and water in place of solvents, use of automated instead of manually operating equipment).
- **Isolation** is applied when a barrier is inserted between a hazard and those who might be affected by that hazard. Separating personnel from hazardous operations, processes, equipment or environments using a physical barrier or distance may provide the necessary isolation.
- **Ventilation** can be either local (direct air movement) or general (dilution of air contaminants) that exhausts or supplies air properly.
- **Source modification** consists of changing a hazard source to make it less hazardous (e.g., wetting dust particles or lowering the temperature of liquids to reduce off-gassing and vaporization).

5.4 Personal Protective Equipment

Flagler College is required to determine if PPE should be used to protect faculty, art department, and laboratory personnel. PPE should be used in conjunction with guards, engineering controls and administrative controls. PPE may be required to reduce faculty and laboratory personnel exposure to hazards when engineering and administrative controls are not feasible or effective in reducing these exposures to acceptable levels. PPE should always be worn if there is a possibility that personal clothing could become contaminated with hazardous materials. Examples include: laboratory coats, aprons, jumpsuits, boots, shoe covers and gloves. Review SDS's to determine the necessary PPE to limit exposure. The kind of PPE needed depends on how the chemical enters the body. This is called route of exposure and is listed on the SDS. The four major routes of exposures are skin absorption, inhalation, ingestions and injection.

5.4.1 Eye and Face Protection

Safety glasses with side shields that conform to ANSI standard Z87.1-1989 are required for work with hazardous chemicals. Ordinary prescription glasses with hardened lenses do not serve as safety glasses. If prescription safety glasses are needed, please contact the Flagler College EHS Coordinator or Human Resources. Although safety glasses can provide protection from injury from flying particles, they offer little protection against chemical splashes. Splash goggles must be worn if there is a splash hazard in any operation involving hazardous chemicals. Full face shields are worn in conjunction with either safety glasses or splash goggles. When there is a possibility of liquid splashes, both a face shield and splash goggles should be worn; this is especially important for work with highly corrosive liquids. Full-face shields with throat protection and safety glasses with side shields must be used when handling highly hazardous chemicals. If work in the laboratory could involve exposure to lasers, ultraviolet light,

infrared light or intense visible light, specialized eye protection should be worn. Safety glasses need to be provided for visitors in the laboratory.

5.4.2 Hand Protection

When handling hazardous chemicals, laboratory personnel shall select and wear the appropriate gloves. No single glove can provide appropriate protection in every work situation. It is important to assess the hazards with each task and select a glove that provides the required protection. Below are general recommendations for glove selection and use:

- Similar gloves supplied by different manufacturers may not offer the same level of protection; therefore, the manufacturer's glove selection chart may need to be reviewed.
- Select gloves which are resistant to the chemicals you may be exposed to. Consult the relevant SDS which may recommend a particular glove material.
- Select gloves of the correct size and fitting; gloves that are too small are uncomfortable and may tear whereas larger gloves may interfere with dexterity.
- Before use, check gloves (even new ones) for physical damage such as tears and pin holes.
- When removing gloves, do so in a way that avoids the contaminated exterior contacting the skin.
- Wash hands after removing gloves.

Many factors affect the breakthrough time of gloves including: thickness of glove material, chemical concentration, amount of chemical that comes into contact with the glove, length of time the glove is exposed to the chemical, temperature at which the work is done and possibility of abrasion or puncture. Glove selection guides are available from most manufacturers. For additional information on glove selection, contact the EHS office at (904) 819-6422.

If chemicals do penetrate the glove material, they could be held in prolonged contact with the hand and cause more serious damage than in the absence of a proper glove. Gloves should be replaced immediately if they are contaminated or torn. The use of double gloves may be appropriate in situations involving chemicals of high or multiple hazards. Leather gloves are appropriate for handling broken glassware and inserting tubing into stoppers, where protection from chemicals is not needed. Non-disposable gloves should be decontaminated or washed appropriately before they are taken off and should be left in the laboratory and not be allowed to touch any uncontaminated objects in the laboratory or any other area. Single use gloves should be disposed of after each use. Gloves should be replaced periodically, depending on the frequency of use.

5.4.3 Laboratory Attire

When performing work with hazardous materials, laboratory personnel should cover all exposed parts of their body to prevent unnecessary chemical exposure. Tie long hair back, avoid loose clothing such as neckties and flowing sleeves.

5.4.4 Foot Protection

Closed toed shoes must be worn in areas where hazardous chemicals are in use or mechanical work is being done. Clogs, perforated shoes, bare feet, sandals and cloth shoes do not provide protection against chemicals. Shoe covers may be required for work with especially hazardous materials.

6.0 Equipment, Maintenance, and Inspections

6.1 Fume Hoods

The laboratory fume hood is the most common local exhaust method used in laboratories. When working with hazardous chemicals, the use of the fume hood is required at Flagler College. A properly operating and correctly used fume hood will control vapors, dusts, and mists released from volatile liquids. Fume hoods can also protect from accidental spills. Fume hoods are inspected and certified annually by an outside vendor. However, all Flagler Science and Art Department Staff are responsible for ensuring that their fume hood(s) has an updated certification label and is functioning properly. Except when adjustments to the apparatus are being made, the hood should be kept closed, with vertical sashes down and horizontal sashes closed, to help prevent the spread of a fire, spill or other hazards into the laboratory. Basic guidelines for operating a fume hood include the following:

- Confirm that the fume hood has been certified within the last year (label with date).
- Confirm that the chemical can be used in the fume hood.
- Conduct procedure at least six inches behind the plane of the sash.
- Never put your head inside a fume hood to check an experiment.
- Work with the sash at the lowest position possible to protect your face and body.
- Do not clutter the fume hood with bottles, chemicals or equipment as it restricts airflow and work space.
- Immediately report any suspected fume hood malfunctions to the Facilities Department.
- Limit foot traffic behind while performing operations in the hood.

6.2 Safety Showers and Eyewash Stations

In case of an exposure to hazardous substances, a reliable, clean source of water must be available to rinse contaminants from the body. Safety showers and eye wash stations are located in each of the laboratories. Flagler Science and Art Department staff must ensure that safety showers and eyewash stations are free from obstruction. Flagler Science and Art Department staff are responsible for ensuring all students are aware of the nearest safety shower and eyewash station location and how to use the device. The EHS Coordinator is responsible for performing or scheduling monthly inspecting and testing of the eyewash stations. The safety showers will be tested at least annually by the EHS Coordinator/Facilities Department.

6.3 Inspections

The EHS Coordinator will coordinate and conduct annual laboratory safety inspections. Inspections will include a walk-through of the selected area(s) and will cover lab safety, PPE, waste management and related topics. Area representatives should use the results as a guide to identify and correct similar and/or other environmental, health and safety issues in their area(s).

7.0 Information and Training

7.1 Information

The Science and Art Departments will provide the following information to faculty, staff and students prior to working with any chemical:

- The availability and location of the CHP.
- SDS's for all hazardous chemicals the faculty will use.
- Standard Operating Flagler College labeling system.
- Additional information on the hazards, safe handling, storage and disposal of hazardous chemicals can be obtained from the EHS Office, Prudent Practices in the Laboratory, OSHA website, NIOSH website and the chemical manufacturers.

7.2 Training

All faculty and laboratory personnel working in a laboratory shall be trained to the contents of the CHP and all applicable SOP's that are pertinent to a procedure, experiment or task. Training shall include but is not limited to:

- Provisions of the CHP.
- Hazards in the laboratory.
- OSHA regulated substances or recommended exposure limits.
- Signs and symptoms associated with exposures to hazardous chemicals.
- Safe handling, storage, and disposal of hazardous chemicals.
- How to read an SDS.
- The selection and use of PPE.

7.3 Frequency of Training

Training shall be provided for all faculty and laboratory personnel prior to starting work in the laboratory; before each new possible hazard exposure; before use on new or altered equipment; and on changes to SOP's or the CHP. Refresher training is required annually.

7.4 Recordkeeping

The EHS Coordinator is responsible for establishing and maintaining records for faculty training, faculty environmental monitoring and compliance records.

8.0 Medical Examinations and Consultations

Flagler College shall provide all laboratory and art department personnel who work with hazardous chemicals the opportunity for medical attention and follow-up by a competent physician if they show signs and symptoms of exposure.

8.1 Medical Surveillance

All laboratory and art department personnel shall be provided an opportunity to receive an appropriate medical examination performed by a licensed physician at a reasonable time and free of cost under the following circumstances.

- At any time laboratory personnel believe they have been significantly exposed to hazardous materials.
- Whenever laboratory personnel develop signs or symptoms associated with a hazardous chemical to which they may have been exposed in the laboratory
- If an event takes place in the work area such as a spill, leak, explosion or other occurrence resulting in the likelihood of a hazardous exposure.
- Where exposure monitoring reveals an exposure level routinely above the action level for an OSHA regulated substance.

8.2 Information Provided to the Physician

Flagler College will provide the following information to the physician:

- The identity of the hazardous chemical(s) to which laboratory personnel may have been exposed and the SDS;
- A description of the conditions under which the exposure occurred including quantitative exposure data, if available; and
- A description of the signs and symptoms of exposure that laboratory personnel are experiencing, if any.

8.3 Physician's Written Opinion

Flagler College shall obtain a written opinion from the examining physician which shall include the following:

- Recommendation for further medical follow-up.
- The results of the medical examination and any associated tests.
- Any medical condition which may be revealed in the course of the examination which may place laboratory and/or art department personnel at increased risk as a result of exposure to a hazardous workplace.

- A statement that the laboratory and/or art department personnel have been informed by the physician of the results of the consultation or medical examination and any medical condition that may require further examination or treatment.
- The written opinion shall not reveal specific findings of diagnoses unrelated to occupational exposure.

APPENDIX A

Safety Precautions for Working with Hydrofluoric Acid

Policy

In the event that hydrofluoric acid is used on the Flagler College campus, all Flagler College faculty and students who work with Hydrofluoric Acid (HF) shall adhere to the work practices identified in this policy. If HF is to be used, this guide must be strictly followed.

Information and Training

Faculty and students who handle hydrofluoric acid shall be trained on the hazards of HF and what to do in the event of an exposure or a spill. A Safety Data Sheet (SDS) on HF shall always be kept in the immediate work area where HF is used. Safety Data Sheets are readily available within the HF lab and also in the main chemical storage area. If more information is needed, information may be obtained using the following methods:

- Contacting the chemical manufacturer; or
- Contacting Environmental Health and Safety at (904) 819-6422 (information provided within 24 hours of the request).

The SDS together with this policy shall be used to train faculty, staff and students on the hazards of HF.

Personal Protective Equipment

Eye Protection

Chemical goggles together with a face shield shall be used when handling concentrated HF. Eye wash stations and drench showers are located within the immediate area in the event of a chemical exposure.

Body Protection

Wear a buttoned laboratory coat with a chemical splash apron made out of natural rubber, neoprene or polyvinyl chloride (PVC). Shorts or open-toed shoes shall never be worn when handling HF or other corrosive chemicals.

Gloves

Only medium or heavyweight PVC, nitrile or natural rubber gloves may be worn when working with HF. Always consult the manufacturer's glove selection guide when selecting a glove for HF. A second pair of disposable nitrile gloves shall be worn under the gloves for protection against leaks.

Gloves that have not been contaminated with HF may be disposed of in the common trash. If gloves become contaminated with HF, remove them immediately, thoroughly wash your hands with soap and water for 15 minutes, and check your hands for any sign of contamination. Gloves contaminated with any amount of HF shall be disposed of as HF waste. Contact Environmental Health and Safety at (904) 819-6422 for a waste pick-up.

Ventilation

All work with HF shall be done in a chemical fume hood in accordance with the Flagler College Chemical Fume Hood Policy, outlined in Appendix B.

Storage

Hydrofluoric acid, both unused and used, must be stored in a labeled, chemically compatible container (e.g., polyethylene or Teflon). Glass, metal, and ceramic containers are not compatible with Hydrofluoric acid. Hydrofluoric acid should never be stored with incompatible chemicals such as ammonia or other alkaline materials. While working with Hydrofluoric acid, always place on a low protected shelf or other location where it will not be accidentally spilled or knocked over. When Hydrofluoric acid is not in use, it shall be stored within secondary containment under the fume hood in the Hydrofluoric acid labeled cabinet.

Safe Work Practices

Avoid working alone and after hours when you are using HF. Do not eat, smoke, drink or apply cosmetics where HF is handled. Wash hands thoroughly with soap and water after handling HF.

Chemical Spills

In the event of a spill of HF outside the hood, evacuate the area, close the doors, post the area with a sign to prevent others from entering and notify the Department of Safety and Security at (904) 819-6200 or the CHO or the EHS Coordinator. Laboratory staff can clean up spills less than one liter of HF inside a

chemical fume hood by containing the spillage and carefully neutralizing the spill with Spill-X-C caustic neutralizer found on campus-provided spill stations, or other provided neutralizers. A spill kit specifically designed as a commercial HF spill kit should be used to neutralize all HF spills. All spills shall be cleaned in accordance with the Chemical Spill Response procedure.

Chemical Waste

HF waste shall be placed in a chemically compatible container (e.g. polyethylene or Teflon) with a sealed lid and clearly labeled. Do not store HF waste in glass or metal containers. Waste shall be disposed of in accordance with the Flagler College Hazardous Materials Management policy.

Contact Environmental Health and Safety at (904) 819-6422 for a hazardous waste pick-up.

Emergency Procedures

All exposure to, or contact with HF shall receive immediate first aid and medical evaluation even if the injury appears minor or there is no sense of pain. HF can produce delayed effects and serious tissue damage without necessarily producing pain.

In the event of an HF exposure, immediately start the first aid procedures described below to avoid HF burns or other permanent damage. Once first aid has been started, contact the Department of Safety and Security at (904) 819-6200 and Environmental Health and Safety at (904) 819-6422.

First Aid for Skin Contact

The following first aid procedures shall be initiated for skin contact:

- Immediately proceed to the nearest emergency shower and flush affected area for at least 15 minutes;
- Remove all contaminated clothing while in the shower; and
- Contact the Department of Safety and Security at (904) 819-6200 or Health Services (904) 819-6211 for medical assistance.

Note: Those who assist HF victims shall be careful not to contaminate themselves and wear proper PPE while assisting after an HF exposure.

First Aid for Eye Contact

The following first aid procedures shall be initiated for eye contact:

- Immediately proceed to the nearest eyewash or sink and while holding the eyelids open, flush the eyes for at least 15 minutes with large amounts of water; and
- Contact the Department of Safety and Security at (904) 819-6200 or Health Services (904) 819-6211 for medical assistance.

First Aid for Ingestion

The following first aid procedures shall be initiated for ingestion:

- First, dilute the acid by drinking large quantities of water;
- Give several glasses of milk or several ounces of milk of magnesia or eight to twelve Tums or Rolaids;
- Contact the Department of Safety and Security at (904) 819-6200 or Health Services (904) 819-6211 for medical assistance;
- Do *not* induce vomiting; and
- Never give anything by mouth to an unconscious or convulsing person.

First Aid for Inhalation

The following first aid procedures shall be initiated for inhalation:

- Remove victim to fresh air; and
- Contact the Department of Safety and Security at (904) 819-6200 or Health Services (904) 819-6211 for medical assistance.

Appendix B

Chemical Fume Hood Policy

PURPOSE

To establish a protocol for the safe use of chemical fume hoods. This includes performance testing, reporting and responding to equipment failure, scheduled maintenance, appropriate steps necessary to safeguard workers who perform repairs, and the responsibility for implementation of this policy.

SCOPE

This policy covers all chemical fume hoods in the Flagler College Science and Art Department areas.

DEFINITIONS:

-Face Velocity: Average linear air velocity into the exhaust system (i.e. fume hood) measured at the opening into the hood.

-Capture Velocity: Air velocity at any point in front of the hood necessary to overcome opposing air currents and to capture the contaminated air into the exhaust hood.

PROCEDURES

Laboratory Chemical Fume Hoods

Engineering controls are the first line of defense against workplace hazards, removing the hazard from the worker's environment. This includes local exhaust ventilation (i.e., chemical fume hoods) to prevent exposure to gases, chemical vapors and aerosols. There are two basic categories of laboratory hoods: chemical fume hoods and biological safety cabinets. This policy outlines the design face velocity requirements and test procedures for chemical fume hoods.

NOTE: The use of perchloric acid is not utilized at Flagler College.

Please contact EH&S at (904) 819-6422 with any questions.

Location - Fume hoods shall be located within a lab in such a way that their performance is not adversely affected by cross drafts. Cross currents, drafts and air currents from open windows, doorways and personnel traffic flow directly influence hood containment ability

Face Velocity

The measurement of hood face velocity is important for quantitatively determining the effectiveness of a chemical fume hood in capturing and removing materials emitted within it. The average face velocity (V , in ft/min or fpm) is the volumetric flow rate of the hood (Q , in ft³/minute or cfm) divided by the area of the hood face (A , in ft²). Adequate face velocity ranges from 80-120 linear fpm. Minimum face velocity is the minimum acceptable velocity at any point on the operating opening, for example 80 fpm. This should not be less than 95 percent of the as-designed average face velocity. Maximum face velocity is the maximum acceptable velocity at any point of the operating opening. Maximum face velocity should not be greater than 120 fpm to prevent creation of turbulent air currents within the fume hood.

Fume Hood Testing Responsibilities and Procedures

The Flagler College EH&S department shall contract a third party to perform chemical fume hood testing and certification annually. Average face velocity is determined by measuring velocity at evenly distributed points in the plane of the hood face in the following manner:

- The sash is placed at the lowest working height, usually twelve inches. The plane of the hood face is divided into (at least) three equal in area sections. Face velocity is measured at the center of each section. The hood face velocity is the average velocity of these measurements.
- The tester will place a certification sticker on the front of the hood, recording the test date, face velocity at a 12" sash height, and initials the sticker. The sash height at which the average face velocity is 100 fpm is also indicated.
- Fume hood testing information is recorded in the database/ record binder maintained at the EH&S Office. It should include department, building, room number, hood ID #, date, velocity (fpm) and tester initials.

Fume Hood Certification Ratings Interpretation

Fume hood certification is characterized as follows:

- **Certified:** A hood is considered certified when the average face velocity at 12" working sash height is between 80 – 120 fpm.
- **Not Certified:** If the face velocity at 12" working sash height is below 80 fpm or above 120 fpm the hood is considered not certified. A DO NOT USE sticker is placed on the sash and the PI is advised not to use the hood.

Fume Hood Failure Procedures

User Responsibility

If it is suspected that a fume hood is not working properly, work inside the hood must stop immediately and the problem reported to:

- Facilities Department at Flagler College (904)-819-6213
- EH&S at Flagler College (904) 819-6422.
- Notify others in the area that the fume hood is not operating and cannot be used, and post a "Do Not Use" sign on the hood. **The lab manager must strictly enforce this.**

- Close/cover any opened/exposed chemical containers. It may be necessary to remove all chemicals and equipment from a hood to allow access for repair.
- Although rare, hood repair may require extended downtime if major parts (e.g. fan motor) needs replacement. Procedures that must be conducted within a hood must be relocated to another working hood during this time.
- When repair is completed, the hood will be recertified for use by a third party contractor. EH&S will schedule this recertification.

Department of Environmental Health & Safety (EH&S)

- Assists in the communication between Facilities and laboratory staff on status of hood inspection or repair.
- Provides necessary clearance to Facilities for repair.
- Will schedule with third party contractor the recertification of fume hood when repair is complete.
- Gives clearance for use after retesting/recertification.

Facilities Staff

- Lockout and tagout individual hoods prior to conducting investigations. Ensure that all non-Flagler contractors follow fume hood lockout/tagout procedures.
- Investigates hood failure through a review of the entire system (e.g., motor, belts, fan unit and electrical connections).
- Notifies laboratory staff of the affected lab and EH&S of the hood problem and gives an estimated time necessary for repair. Posts affected hood with "Do Not Use" sign (if not already posted by EH&S).
- Removes lockout of hoods when the hood is returned to service and informs relevant individuals.

Fume Hood Scheduled Maintenance

- Facilities shall provide advance notification to relevant laboratory staff and EH&S of the planned interruption of fume hood service and tag the affected fume hoods with "Do Not Use" signs. During this time, no procedures shall be conducted inside the affected fume hoods. If procedures cannot be interrupted or relocated to another fume hood during this time, the laboratory staff shall inform the Facilities department of this conflict and schedule a mutually convenient time for preventive maintenance to be conducted.
- Fume hood service interruption notices shall include:
 - Date/time of shutdown
 - Fan Motor # to be shutdown
 - Reactivation date/time
 - Number to call for further information
- Once scheduled, the laboratory staff shall make necessary arrangements to conduct procedures requiring local exhaust ventilation elsewhere, or suspend these activities until service is restored.
- Facilities shall lockout and tagout affected hoods so that they cannot be used during this time. All hazardous materials inside the hoods must be in closed containers or removed.

- Once Facilities has completed the maintenance on the fume hood, the lockout device(s) shall be removed and EH&S notified.
- EH&S shall reevaluate such hoods and give clearance for use when maintenance is complete.

Roof Work

Fume hood exhaust ducts terminate just above the roofline in many cases. Working near these outlets could potentially expose workers to hazardous chemicals, albeit in extremely dilute concentrations. If maintenance/repair work must be done on the roof of any building containing hood exhaust(s), Facilities must first notify the laboratory staff and EH&S to provide them with information regarding chemicals used in their fume hoods.

Fume Hood Flow Monitoring Devices

New and reconditioned hoods should be equipped with an airflow-monitoring device that provides an indication of the face velocity. For uniformity the selection must be reviewed by EH&S. The device should be checked and recalibrated by a third party contractor annually at the time of recertification, this will be scheduled by EH&S. For any damaged devices Facilities should be contacted for repair or replacement.

Fume Hood Safe Work Practices

Lab personnel shall employ proper work practices that minimize/eliminate their exposures when working with hazardous materials in fume hoods:

- Lab personnel should not place their upper body in the fume hood except during initial setup of equipment inside the hood, before any hazardous materials have been placed inside the hood.
- Hazardous materials should be placed > 6" inside the hood for proper containment of chemical vapors.
- Hoods should not be used for permanent storage of hazardous materials.
- Equipment inside the hood should be placed so as to not block airflow through slots in the baffle.
- Equipment that could be sources of emission (including in case of breakage) should be placed > 6" inside the hood.
- The hood sash or panels should be lowered to the lowest (comfortable) working height, usually 12". Fully opening the sash lowers the face velocity to the point of ineffectiveness.
- The hood sash or panels shall not be removed except for initial experimental setup and before hazardous chemicals are placed in the hood.
- Each hood shall be posted with a sticker showing the date of last certification. If the hood failed the performance test, it shall be taken out of service until repaired, or posted with a restricted use notice.

Removing Hoods from Service

When a chemical fume hood is to be removed from service, the laboratory staff must ensure that all hazardous materials have been removed and the hood has been properly decontaminated. After decontamination and final survey, clearance for removal is given by EH&S.

See Fume hood operation, repair and other responsibilities on the next page

RESPONSIBILITIES

Flagler Laboratory Staff

- Inform all lab personnel if hood is not working.
- Place a "Do Not Use" sticker on the hood if it is not working properly. Contact EH&S about any issues with fume hood operation
- Contact Facilities for repair or air flow adjustment.

Lab Staff representative(s) _____

Date: ____/____/____

Signature(s) _____

Facilities:

- Provide adequate preventive maintenance of all the chemical fume hoods in conjunction with HVAC
- Ensure personnel safety when repairing chemical fume hoods.
- Contact EH&S to schedule re-certification after repair or adjustment of the chemical fume hoods.
- Notify the lab manager, EH&S and Security if roof work around exhaust vents for chemical fume hoods is to be performed

Facilities representative(s) _____

Date: ____/____/____

Signature(s) _____

EH&S

- Hire Contractor for repair and adjust adequate flow rate of the chemical fume hoods.
- Schedule certification of all the chemical fume hoods annually.
- Issue clearance before chemical fume hood repairs.
- Inform laboratory staff and Facilities if a chemical fume hood fails certification.
- Schedule re-certification of the chemical fume hood after repairs or adjustment.

EH&S representative(s) _____

Date: ____/____/____

Signature(s) _____



REFERENCES:

- ANSI/AIHA Z9.5-2003, American National Standard for Laboratory Ventilation.
- ACGIH's Industrial Ventilation: A Manual for Recommended Practice.
- ANSI/ASHRAE 110-1995 Method of Testing Performance of Laboratory Fume Hoods.

ATTACHMENTS:

- A. Testing Procedure
- B. Sample Placard
- C. Certification Sticker

ATTACHMENT - A**Face Velocity Measurement Procedure**

Average face velocity will be determined by measuring air velocity at evenly distributed points in the plane of the hood face in the following manner:

- a. The sash is placed at the lowest working height, usually twelve inches. The plane of the hood face is divided into (at least) three sections equal in area. Face velocity is measured at the center of each section. The hood face velocity is the average velocity of these measurements.
- b. If an accepted working sash height is higher than 12", that height shall be tested and recorded too.
- c. The tester will place certification sticker on the front of the hood, recording the test date, face velocity at a 12" sash height, working sash height and initials the sticker. The sash height at which the average face velocity is 100 fpm is also indicated.
- d. Fume hood testing information is recorded in the database maintained at the EH&S Office. It should include laboratory staff, department, building, room number, hood ID #, velocity (fpm) and tester.
- e. If fume hood is not working according to the specifications, the laboratory staff or Laboratory Manager are to be instructed to clear the fume hood so that EH&S can provide *Clearance* for Facilities repair or adjustment.
- f. Upon adjustment or repair, and notification by Facilities, EH&S will contact 3rd party contractor is to verify the fume hood velocity (minimum average 100 FPM @12 inches) and provide certification.
- g. Monitoring results are to be entered into the database.

ATTACHMENT - B

Sample Sticker to be Placed When Hood is Not Working

DANGER

**HOOD
IS NOT WORKING
DO NOT USE**

CALL FACILITIES AT

(904) 819-6213

CALL EH&S Department

(904) 819-6422

ATTACHMENT - C

Sample Fume Hood Inspection Form

Monthly Fume Hood Inspection

Hood ID#: _____

Year: _____

Last Date Calibrated: _____

Report to: ___ **EHS Manager** _____

Date	Inspector Intials	Avg Face Velocity at Working Height	Avg Face Velocity at 12" Sash Height	Height at which 100 FPM	Instrument Used
					EXTECH 407123
					EXTECH 407123
					EXTECH 407123
					EXTECH 407123
					EXTECH 407123
					EXTECH 407123
					EXTECH 407123
					EXTECH 407123
					EXTECH 407123
					EXTECH 407123
					EXTECH 407123
					EXTECH 407123
					EXTECH 407123

Hood should be certified annually. For all questions, call EH&S (904) 819-6422

This sticker must be placed on each fume hood and completed at the time of certification

END OF DOCUMENT