



**Framingham**  
State University

# Chemical Hygiene Plan

## AY 2019-20

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## 1. Introduction and Scope

Framingham State University (FSU) encourages and supports all programs that promote safety, good health, and well-being of University employees, students, and visitors. The University is committed to providing a safe and healthful environment for all members of the FSU community and to reducing injuries and illness to the lowest possible level. To assist academic institutions and businesses in enhancing the safety of Laboratory Personnel, the Occupational Safety and Health Administration (OSHA) published 29 CFR 1910.1450, "Occupational Exposure to Hazardous Chemicals in Laboratories." This regulation, known as the "Lab Standard," is designed to protect Laboratory Personnel from potential hazards associated with the use of laboratory chemicals. This includes ensuring that Laboratory Personnel are apprised of the hazards of the chemicals in their work area and that appropriate work practices and procedures are in place to protect Laboratory Personnel from chemical health and safety hazards.

A key component of the Lab Standard is a Chemical Hygiene Plan (CHP). A chemical hygiene plan is a written program developed and implemented by an employer that sets forth procedures, equipment, personal protective equipment, and work practices that are capable of protecting employees from the health hazards presented by hazardous chemicals used in that particular workplace. All FSU Laboratory Personnel are required to follow the provisions set forth in this CHP. For the purposes of this CHP, the following definitions have been adopted:

- Laboratory Personnel - any employee compensated by Framingham State University who works in a Laboratory and may be exposed to Hazardous Chemicals in the course of the work assignment
- Laboratory Setting (Laboratory) - any facility, including art studios and dark rooms, where hazardous chemicals are used in relatively small quantities on a non-production basis (see Appendix 15.2 for a complete list of all locations currently designated as a Laboratory Setting at FSU)
- Hazardous Chemical - any chemical that is classified as a health hazard or simple asphyxiant in accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200)

## 2. Roles and Responsibilities

The responsibility for chemical safety rests at all levels, from the highest administrative level to individual Laboratory Personnel. The specific aspects of this responsibility are assigned to those employees best suited to carry them out.

### 2.1. University President

The University President has the ultimate responsibility for the safety, good health, and well-being of FSU employees, students, and visitors. As part of this responsibility, the University President shall ensure compliance with all applicable federal, state, and municipal laws and statutes, as well as all regulations set forth in this CHP. Additionally, the University President shall appoint a Chemical Hygiene Officer.

### 2.2. Vice President of Administration, Finance, and Technology (VPAFT)

The VPAFT is responsible for providing the Chemical Hygiene Officer with the support necessary to implement and maintain the CHP. As part of this responsibility, the VPAFT shall ensure that all employees under their supervision who are classified as Laboratory Personnel comply with the CHP. Additionally, the VPAFT shall make budgetary arrangements to ensure the health and safety of employees, students, and visitors.

### 2.3. Vice President of Academic Affairs (VPAA)

The VPAA is responsible for providing the Chemical Hygiene Officer with the support necessary to implement and maintain the CHP. As part of this responsibility, the VPAA shall ensure all employees under their supervision who are classified as Laboratory Personnel comply with the CHP. Additionally,

the VPAA shall make budgetary arrangements to ensure the health and safety of employees, students, and visitors.

#### 2.4. The Director of Environmental Health and Safety (Director of EH&S)

The Director of EH&S is responsible for promoting and maintaining a safe, healthful, and environmentally responsible workplace. The Director of EH&S shall:

- Keep current with requirements set forth by OSHA and other regulatory bodies
- Provide support to the Chemical Hygiene Officer to ensure that the CHP is in accordance with applicable regulations set forth by OSHA and FSU's own requirements
- Periodically communicate the status of the CHP and its effectiveness to the FSU community
- Identify which employees meet the requirements to be classified as Laboratory Personnel
- Provide training to ensure Laboratory Personnel are familiar with the CHP and its policies
- Assist academic departments in developing and maintaining adequate facilities

#### 2.5. Chemical Hygiene Officer (CHO)

The CHO is appointed by the University President and is responsible for maintaining, revising, and administering the CHP. The CHO shall:

- Create and revise safety rules and regulations related to the CHP as necessary (see §14)
- Assist in the development and implementation of Standard Operating Procedures for working with specific Hazardous Chemicals as necessary
- Serve as Chair of the Chemical Hygiene Committee
- Monitor the procurement, use, storage, and disposal of chemicals (see §10 and §11)
- Conduct regular inspections of the laboratories, preparation rooms, and chemical storage rooms (see §9.4)
- Oversee training programs to ensure that Laboratory Personnel and other individuals requiring access to Laboratories have access to the CHP and are knowledgeable of its contents (see §4.1)
- Maintain records of inspections, training, and incident reports (see §14.4)
- Communicate matters of compliance with individual Laboratory Personnel and/or Designated Laboratory Proctors as deemed necessary
- Report unresolved matters of compliance and health safety concerns with the VPAA and VPAFT
- Address safety concerns in exigent circumstances

#### 2.6. Chemical Hygiene Committee (CHC)

The CHC works in an advisory capacity to assist the CHO in maintaining and revising the CHP. The CHC shall meet at least annually to review the CHP and incorporate regulatory changes and information from incident reports, and make other revisions as deemed prudent. The CHC shall be comprised of: the CHO, the University President or his/her designee, the Director of EH&S, one member of the University Police Department, one member of the FSU Facilities Department, and at least one faculty representative or designee from each Academic Department that operates a Laboratory. The CHO shall serve as the Chair of the CHC. At the discretion of the CHO, current members of the CHC may also administer the CHO's official training program (see §4.1.2).

#### 2.7. Assistant Vice President of Facilities Operations

The Assistant Vice President of Facilities Operations is responsible for providing the CHO with the support necessary to implement and maintain the CHP with regard to FSU Facilities Operations. As part of this responsibility, the Assistant Vice President of Facilities Operations shall ensure that all employees under their supervision who are classified as Laboratory Personnel comply with the CHP. This includes ensuring that all Laboratory Personnel under their supervision receive CHP training both before commencing their work assignment and as an annual refresher. Additionally, the Assistant Vice President of Facilities Operations shall ensure that FSU facilities are adequately maintained (see §8 and §9).

### 2.8. Academic Deans of Colleges that Operate Laboratories (Academic Deans)

Academic Deans are responsible for providing the CHO with the support necessary to implement and maintain the CHP at the College level. As part of this responsibility, Academic Deans shall ensure that all employees under their supervision who are classified as Laboratory Personnel comply with the CHP. A complete list of Lab Proctors, including on- and off-campus contact information, shall be maintained by Academic Deans and made available to the University Police Department at the start of each semester.

### 2.9. Chairpersons of Academic Departments that Operate Laboratories (Department Chairs)

Department Chairs are responsible for providing the CHO with the support necessary to implement and maintain the CHP at the Academic Department level. As part of this responsibility, Department Chairs shall ensure that all employees under their supervision who are classified as Laboratory Personnel comply with the CHP. This includes ensuring that all Laboratory Personnel under their supervision receive CHP training both before commencing their work assignment and as an annual refresher. Department Chairs, or their designee, are responsible for maintaining records of signed acknowledgement forms for students enrolled in laboratory courses. Department Chairs are responsible for providing chemical spill kits for all laboratories operated by their department.

### 2.10. Designated Laboratory Proctors (Lab Proctors)

Two Lab Proctors, one primary and one secondary, shall be assigned by the Department Chair to each Laboratory operated by their department. During this period of time, the Primary Lab Proctor is responsible for ensuring that operations performed within the assigned Laboratory are conducted in accordance with the CHP. The secondary Lab Proctor shall keep up-to-date on all laboratory operations to be able to assist emergency personnel in the event that the Primary Lab Proctor is not available. For each Laboratory, the names of assigned Lab Proctors shall be identified on that Laboratory's posted signage (see §5.2.1). A complete list of Lab Proctors, including on- and off-campus contact information, shall be maintained by Academic Deans and made available to the University Police Department at the start of each semester. Lab Proctors shall:

- Comply with the procedures and requirements set forth in the CHP
- Ensure that their assigned Laboratory is kept clean and well-maintained
- Promptly submit maintenance requests through Facilities Operations when Laboratory maintenance is required
- Promptly report any possibly unsafe Laboratory conditions to the CHO
- Report violations of the CHP to the CHO
- Ensure that all Hazardous Chemical Information is appropriately maintained and displayed in their assigned Laboratory (see §5)
- Provide assistance to Facilities Personnel who, as part of their work assignment must handle, modify, or otherwise disturb Hazardous Chemicals or equipment for working with Hazardous Chemicals present in the Laboratory

### 2.11. Faculty and Graduate Students Who Work in Laboratories

Any FSU Faculty member or Graduate Student who, as part of a work or course assignment, performs work in a Laboratory is responsible for complying with the CHP. Such Faculty and Graduate Students include, but are not limited to, those assigned to teach in a Laboratory or who use a Laboratory for the purposes of scholarly work. When using Hazardous Chemicals, Faculty and Graduate Students shall plan and conduct each operation in accordance with the CHP. When supervising or working in the presence of Guests (including students who are not compensated by FSU), Faculty and Graduate Students are responsible for the safety of the Guests and for ensuring that the Guests comply with the CHP.



### 2.12. Faculty Who Teach Courses in Laboratory Settings

In addition to the responsibilities described in §2.11, faculty who serve as laboratory instructors are required to provide a minimum amount of safety training to students enrolled in their courses. Following such training, faculty must have students sign an acknowledgement of this training. Signed acknowledgement forms must be submitted to the affiliated Department Chair for record keeping.

### 2.13. Laboratory Technicians

Laboratory Technicians shall work with the Chair and Faculty of their Academic Department to provide any support necessary for implementing the CHP. Laboratory Technicians shall:

- Oversee the procurement, distribution, and storage of Hazardous Chemicals for their Academic Department (see §10)
- Keep track of all Hazardous Chemical Information accompanying shipments to their Academic Department
- Work with departmental Faculty and Student Lab Workers to properly manage chemical waste (see §11)
- Report violations of the CHP to the CHO

### 2.14. Student Lab Workers

Student Lab Workers are defined as current FSU students who meet the criteria to be considered Laboratory Personnel as defined in §1, which includes students performing compensated work as part of a work study assignment. Student Lab Workers are responsible for complying with the CHP. Student workers may only conduct work under the supervision of a Laboratory Technician or a Faculty member who has received up-to-date CHP training. Student workers shall notify their supervising Laboratory Technician or Faculty member if they encounter unsafe conditions in the Laboratory.

### 2.15. Facilities Personnel

Facilities Personnel who perform work in Laboratories are responsible for complying with the CHP. While performing work in a Laboratory, Facilities Personnel must not handle, modify, or otherwise disturb Hazardous Chemicals or equipment for working with Hazardous Chemicals present in the Laboratory without first consulting the Designated Laboratory Proctor for the Laboratory. Additionally, Facilities Personnel shall report violations of the CHP to the CHO.

### 2.16. University Police

University Police serve as first responders in emergency situations. University Police are responsible for keeping an up-to-date list of all Designated Laboratory Proctors and their contact information as maintained by Academic Deans (see §2.8).

### 2.17. Guests

For the purposes of this CHP, Guests are defined as any person who is not considered Laboratory Personnel as defined in §1. Guests include, but are not limited to, students who are not compensated by FSU, outside contractors, and visitors. Guests are only permitted in Laboratories when supervised by Laboratory Personnel who have received up-to-date CHP training. The Laboratory Personnel supervising the Guest(s) are responsible for the safety of the Guest(s) and for ensuring that the Guest(s) comply with the CHP. The University recognizes that independent access to Laboratories may be necessary for students enrolled in laboratory courses. In such cases, students may be authorized for independent access to a Laboratory. Prior to authorization, students must first receive appropriate lab safety training and acknowledge said training by signing a laboratory safety agreement.

### 3. General Principles of Laboratory Work

Some of the best ways to ensure safety in a Laboratory are to foster a culture of safety and to continually employ a safety mindset. As part of fostering a positive culture of safety, all individuals who enter a Laboratory should continually advocate for their own safety and the safety of others. Employing a safety mindset involves continually approaching and performing work through the lens of safety. Rather than considering safety as an afterthought, safety should be considered at the start of and throughout all work.

#### 3.1. Laboratory Conduct

Adequate preparation and appropriate behavior are essential to maintain a safe working environment. The following rules apply to all individuals who enter a Laboratory:

- Individuals who are under the influence of any substance, legal or illegal that might impair their judgment, reflexes or other requisite physical and cognitive requirements will not be permitted to participate in laboratory activities regardless of their prior training and authorization.
- Appropriate clothing (including shoes) must be worn at all times when working in a Laboratory. Detailed information on how to dress appropriately can be found in §7.1 and §7.3.
- Eye protection is to be worn in every Laboratory, as required. Detailed information on choosing appropriate eye protection can be found in §7.2.
- Personal protective equipment (PPE) should be used when necessary. Detailed information on various types of PPE can be found in §7.
- Handling of contact lenses and applying medication or cosmetics are prohibited.
- Eating, drinking, smoking, gum-chewing, and other actions that may lead to the accidental ingestion or inhalation of hazardous chemicals are prohibited.
- Any items ordinarily considered for human consumption (e.g. food items, medications, etc.) brought into a Laboratory for use as a sample must never be used for human consumption.
- All individuals who work with Hazardous Chemicals must wash their hands prior to exiting the laboratory.
- Organic solvents should never be used to wash hands or skin.
- Workspaces must be clean and well-organized. Details on housekeeping and maintenance can be found in §9.
- Moving about the workspace should be performed purposefully and with an awareness of the surroundings.
- Horseplay, including any behavior that might confuse, startle, or distract another individual is prohibited.
- Mouth pipetting of any substance is prohibited.

All waste must be disposed of properly. Detailed information on procedures for disposing of various types of waste can be found in §11.

#### 3.2. Working in the Presence of Hazards

A hazard is any source of potential damage, harm, or adverse effect to the health of an individual or to property. To help Laboratory Personnel remember important guiding principles for working in the presence of hazards, FSU has adopted the RAMP acronym,<sup>1</sup> which stands for

- **R**ecognize Hazards
- **A**ssess the Risks of Hazards
- **M**inimize the Risks of Hazards
- **P**repare for Emergencies

Any time that work of any kind is performed in a Laboratory, the RAMP acronym should be used to ensure that safety is always the highest priority.

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<sup>1</sup> Adapted from: Hill and Finster. *Laboratory Safety for Chemistry Students*. 2<sup>nd</sup> ed. Wiley, 2016.

### 3.2.1. *Recognize Hazards:*

Laboratory Personnel should be aware of and continually on the lookout for hazards. Such hazards include, but are not limited to: physical hazards, chemical hazards, and health hazards. Part of this responsibility involves referring to pertinent safety information (see §5) including posted signage, container labels, and safety data sheets (SDS), as well as standard operating procedures (SOPs) for working with specific chemicals or classes of chemicals (see §12). Laboratory Personnel are expected to be familiar with hazard rating systems such as the Globally Harmonized System (GHS) and the National Fire Protection Association (NFPA) placard system (see §5).

### 3.2.2. *Assess the Risks of Hazards:*

A risk is the likelihood that damage, harm, or an adverse effect will occur due to a specific kind of exposure to a hazard. Prior to working in the presence of a hazard, a risk assessment should be performed to determine the various ways in which exposure to the hazard may occur and the probability that exposure will result in damage, harm, or an adverse effect. Throughout work, the level of risk should be periodically reassessed to account for any changes in circumstance. Care should be taken to never underestimate the level of risk.

### 3.2.3. *Minimize the Risks of Hazards:*

Following risk assessment, steps should be taken to minimize the risk of hazard to the lowest feasible level. Such steps may include:

- Eliminating hazards, if possible
- Substituting a material for another that is less hazardous, if possible
- Using smaller quantities of hazardous materials, if possible
- Performing work in an appropriate location within adequate facilities
- Incorporating engineering controls, where appropriate
- Using appropriate tools and equipment, including chemically-compatible containers
- Utilizing appropriate lab safety equipment (see §8)
- Working in a clean and well-organized space
- Following established standard operating procedures (see §12)
- Utilizing appropriate personal protective equipment (see §7)
- Observing standards for permissible exposure limits (PELs) and threshold limit values (TLVs) as established by OSHA and OSHA-recognized organizations
- Properly disposing of waste (see §11)

### 3.2.4. *Prepare for Emergencies:*

Even when work is performed safely, emergency situations may occur. Prior to working in the presence of a hazard, a plan of action should be developed that can be followed should an emergency occur. Campus-wide emergency plans for more-common emergencies are discussed in §13. When developing supplementary emergency plans for working with specific hazards, the following guidelines should be considered:

- Prior to commencing work, inform your supervisor and/or other trained Laboratory Personnel of the work that you will be conducting and ensure that they are easily accessible so that they can assist with an emergency response if one is necessary.
- Always be prepared to assist another individual in the event of an emergency.
- Know the location of and how to use all laboratory safety equipment including: fire alarms, safety phones, first aid kits, safety showers, and eye washes. It is good practice to know how to reach all safety equipment without the use of sight in the event that vision is lost.
- Always have at least two escape routes from the laboratory and the building.
- Know who to notify in the event of an emergency.

- Minimize exposure to substances for which no hazard has been reported. Such substances should be treated as though they are hazardous since potential hazards may not yet be known.
- Always assume that a mixture is more hazardous than its most hazardous component.

#### 4. Training

In its mission to encourage and support the good health and well-being of its community members, FSU provides several opportunities for safety training.

##### 4.1. CHP Training

FSU provides all Laboratory Personnel with information and training to ensure that they are apprised of the hazards of chemicals present in their work area. Additionally, training includes information on how to access the CHP and on the contents of the CHP. The following aspects of the CHP must be given special emphasis during training:

- General principles of working in a Laboratory, including appropriate conduct and working in the presence of hazards (see §3)
- How to access relevant information on chemical hazards (see §5)
- Ways of minimizing exposure to hazards, including the use of PPE, safety equipment, and engineering controls (see §7 and §8)
- Emergency procedures (see §13)

##### *4.1.1. Individuals Who Must Receive CHP Training*

The following individuals must receive CHP training:

- All individuals classified as Laboratory Personnel according to § 1
- Academic Deans of Colleges that Operate Laboratories
- Chairpersons of Academic Departments that Operate Laboratories
- Designated Laboratory Proctors
- Faculty and Graduate Students Who Work in a Laboratory
- Faculty Who Teach Courses in a Laboratory
- Laboratory Technicians
- Student Lab Workers, as defined in §2.14
- Facilities Personnel
- University Police Officers

##### *4.1.2. Individuals Who May Provide CHP Training*

It is the role of the CHO to develop an official CHP training program. The CHO is responsible for administering this program. At the discretion of the CHO, current members of the CHC may also administer the CHO's official training program.

##### *4.1.3. Frequency of Training*

All individuals mentioned in §4.1.1 must receive official CHP training at the time of initial employment, and annually thereafter. Initial training must include attendance at an official training session and successful completion of a safety quiz. Annual re-training may be performed by successfully completing an on-line quiz or attending an official training session.

##### *4.1.4. Records of CHP Training*

Training records must include: sign in sheets, the name of the person conducting the training, and all presentation materials. All records must be forwarded to and maintained by the CHO in accordance with details provided in §14.4.

#### 4.2. Safety Training for Students Enrolled in Laboratory Courses

Prior to performing work in a Laboratory, students enrolled in laboratory courses must first receive safety training specific to the coursework and to the individual laboratory in which the work will be performed. Acknowledgement of safety training must be signed at the time of training. Copies of signed acknowledgement forms must be submitted to the affiliated Department Chair, and kept on file for a minimum of three years. This training is provided by the laboratory instructor for the course and must include:

- General principles of working in a Laboratory, including appropriate conduct and working in the presence of hazards
- How to access relevant information on chemical hazards
- Ways of minimizing exposure to hazards, including the use of PPE, safety equipment, and engineering controls
- Emergency procedures

### 5. **Hazardous Chemical Information**

In its effort to ensure that Laboratory Personnel are apprised of the hazards of the chemicals in their work area, FSU communicates information using a variety of means, including: signage, labeling, safety data sheets, and chemical inventory systems. This information is distributed across several locations so that Laboratory Personnel can readily access important information as needed. Hazardous chemical information includes statements regarding the type(s) of hazard posed by a particular chemical. Hazardous chemicals, as defined in §1, may be categorized as either posing a health or physical hazard.

A chemical is considered a health hazard if it is classified as posing one of the following hazardous effects: acute toxicity (any route of exposure); skin corrosion or irritation; serious eye damage or eye irritation; respiratory or skin sensitization; germ cell mutagenicity; carcinogenicity; reproductive toxicity; specific target organ toxicity (single or repeated exposure); or aspiration hazard.

A chemical is considered a physical hazard if it is classified as posing one of the following hazardous effects: explosive; flammable (gases, aerosols, liquids, or solids); oxidizer (liquid, solid or gas); self-reactive; pyrophoric (liquid or solid); self-heating; organic peroxide; corrosive to metal; gas under pressure; or in contact with water emits flammable gas.

#### 5.1. Hazard Communication Standards in Use at FSU

##### 5.1.1. *National Fire Protection Association (NFPA) Standard 704 (Fire Diamond System)*

The National Fire Protection Association (NFPA) has developed a hazard identification system to be used by emergency responders. The central feature of the NFPA system is the NFPA fire diamond, which is made up of four colors (blue, red, yellow, white) and a numbering system from 0 to 4. The color blue represents a health hazard, red represents a fire hazard, yellow represents a reactivity hazard, and white indicates a special hazard. Examples of some classes of special hazards include, "ACID" for acids, "COR" for corrosives, and "OXY" for oxidizers. In this system, the higher the number, the greater the severity of the hazard. It is important to note that this numbering scheme is the opposite of that which is used in the GHS system (see §5.1.2).

##### 5.1.2. *Globally Harmonized System (GHS) of Classification and Labelling of Chemicals*

The Globally Harmonized System (GHS) is an internationally-adopted system that defines and classifies the hazards of chemicals, and communicates health and safety information on labels and in safety data sheets. The GHS includes four components: a *hazard class with associated pictogram*, a *signal word*, a *hazard statement*, and *precautionary statements*.

GHS Hazard Classes and Pictograms:

Currently, GHS categories chemicals according to nine hazard classes, each of which is identified using an associated pictogram. Pictograms are made up of a symbol contained within a red-bordered diamond. Current hazard classes include:

- Flammable
- Corrosive
- Explosive
- Oxidizing
- Toxic
- Health Hazard
- Harmful/Irritant
- Compressed Gas
- Dangerous for the Environment

All chemicals in a particular hazard class are further categorized, which includes either a number or a letter to indicate the severity of the hazard. In this system, the *lower* the number (or letter), the *greater* the severity of the hazard. It is important to note that this numbering scheme is the opposite of that which is used in the NFPA system (see §5.1.1).

#### GHS Signal Word:

A signal word is a word that typically appears near the top of a warning, and is generally understood to both alert the user to a hazard and indicate the relative level of severity of that hazard. Currently, GHS utilizes only two signal words: “danger” and “warning.” The signal word “danger” is used for the more severe hazard categories, while “warning” denotes a less serious hazard.

#### Hazard Statements:

Hazard statements are standard phrases assigned to hazard classes that describe in simple language the nature of the hazards associated with a chemical. Examples of such statements are “extremely flammable gas” and “may be harmful in contact with skin.”

#### Precautionary Statements:

Precautionary statements describe recommended measures that should be taken to protect against hazardous exposures, or improper storage or handling of a chemical. Examples of such statements are “wash face, hands and any exposed skin thoroughly after handling” and “use only outdoors or in a well-ventilated area.”

#### 5.1.3. *Older Systems Being Phased Out*

Although the NFPA and GHS systems are the only two communications standards officially recognized by FSU, many hazardous chemicals present in Laboratories may have been manufactured prior to the widespread adoption of these systems. It is thus prudent practice for Laboratory Personnel to familiarize themselves with such older systems as needed.

#### 5.2. Laboratory Signs

Signs are used to alert Laboratory Personnel to potential hazards and the location of safety equipment. At FSU, signs required to be placed outside of each laboratory and within each laboratory as described below.

##### 5.2.1. *Entrance Signs*

At the entrance of all Laboratories, a sign must be posted indicating major hazards within and pertinent safety response information. These signs should be updated by the Primary Designated Laboratory Proctor at the beginning of every semester. The following information must be included on all entrance signs:

- An NFPA label (see §5.1.1) with numbers corresponding to the most potent reagent in the room for each classification
- The words “no food or drink permitted”
- The words “no open-toe shoes permitted”
- A list of required PPE (e.g. “eye protection required”)
- An indication of any special or unusual hazards (e.g. biohazards, strong magnetic field, microwave radiation, etc.)
- The phone number for FSU University Police
- The names and campus contact information for both the Primary and Secondary Designated Laboratory Proctors

#### 5.2.2. *Campus Emergency Plans*

A sign indicating FSU emergency plans must be posted in every Laboratory. Copies of the most up-to-date emergency plan signage can be found on the FSU University Police website.

#### 5.2.3. *Safety Equipment*

Signage must be posted at the locations of all safety equipment present in a Laboratory. Such safety equipment includes eye wash stations, safety showers, and fire extinguishers.

#### 5.2.4. *Hazardous Waste Satellite Accumulation Areas*

Near every point of hazardous waste generation should be a Satellite Accumulation Area (SAA). A sign must be posted indicating the area to be an SAA. This sign must be labeled with the words “Satellite Accumulation Area.” In addition, a sign indicating instructions for using the SAA must also be posted. More information on SAAs can be found in §11.2.2.

#### 5.2.5. *Equipment-Specific Signage*

Any time equipment located within a Laboratory poses its own, unique hazards, a sign must be prominently posted next to the equipment indicating the nature of the hazard. Examples of equipment hazards include “high voltage,” “strong magnetic fields,” and “hearing protection required.”

#### 5.2.6. *Unattended Experiments*

In the event that an experiment or operation must continue without direct supervision, signage must be posted to inform other Laboratory Personnel of the associated potential hazards. Two signs must be prominently posted, one at the entry to the laboratory and the other at the specific location where the experiment or operation is being conducted. These signs must include the following information:

- A notice indicating that the experiment/operation is currently in progress and should not be disturbed
- The contact name of the person responsible for conducting the experiment/operation
- A brief and general description of the experiment/operation
- A list of specific hazards posed by the experiment/operation
- The start and anticipated end date (and time) of the experiment/operation

### 5.3. Safety Data Sheets

A Safety Data Sheet (SDS), formerly known as Material Safety Data Sheet, is a document containing chemical hazard information and safe handling information prepared by manufacturers in accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200). Chemical manufacturers and distributors must provide an SDS the first time a hazardous chemical is shipped to a facility. Additionally, most chemical manufacturers maintain a repository of up-to-date SDSs for their products. The information in an SDS is always presented in a uniform manner using the same 16 sections:

- 1 - Identification, including alternate names for a chemical

- 2 - Hazard(s) identification, including GHS information
- 3 - Chemical composition, if a mixture
- 4 - First-aid measures
- 5 - Fire-fighting measures
- 6 - Accidental release measures
- 7 - Handling and storage
- 8 - Exposure controls / personal protection
- 9 - Physical and chemical properties
- 10 - Stability and reactivity
- 11 - Toxicological information
- 12 - Ecological information
- 13 - Disposal considerations
- 14 - Transport information
- 15 - Regulatory information
- 16 - Other information

All Laboratory Personnel should be familiar with SDSs, their format, and how to use them to locate important safety information about hazardous chemicals. Prior to working with a hazardous chemical, the SDS for that chemical should be consulted as part of a risk assessment (see §3.2).

All laboratories must contain copies of SDSs for all hazardous chemicals present in the laboratory. All of the SDSs for a laboratory must be placed in a binder or set of binders labeled with the words “Safety Data Sheets” and “SDS”. The binders must be placed in a prominent and easily-accessible location within the laboratory.

Any time a new hazardous chemical is brought into a laboratory (including prep rooms and stockrooms), the Laboratory Personnel bringing in the chemical must notify the Primary Designated Laboratory Proctor for the laboratory, print out an SDS for that chemical, and place the SDS into the laboratory’s SDS binder. The Primary Designated Laboratory Proctor for the laboratory is responsible for ensuring that the SDS binder is complete and up to date.

#### 5.4. Container Labeling

Container labels are an important source of information regarding a chemical and its associated hazards.

##### 5.4.1. *Chemicals Stored in Original Containers Provided by the Chemical Manufacturer*

According to the OSHA Hazard Communication Standard (29 CFR 1910.1200), all chemical manufacturers must include on container labels a product identifier (i.e. the name or names of the compound) as well as GHS pictograms, signal words, hazard statements, and precautionary statements. As a consequence, FSU does not knowingly procure, distribute, or store commercial products that do not have labels that are compliant (see §10.1). In the event that a commercial product arrives on campus with insufficient information on the label, either the product must be immediately transferred to an appropriately-labeled container or the product must immediately be given an appropriate label. All laboratory personnel must ensure that manufacturers’ container labels for hazardous chemicals are not removed or manipulated, and remain readable.

##### 5.4.2. *Chemicals Stored in Other Containers not Provided by the Chemical Manufacturer*

Chemicals transferred from stock containers to other containers must be immediately labeled and dated. The label must include the identity of all contents--using *full chemical names in English*--of all chemicals present within the container. Other recommended information includes the GHS hazard classes, pictograms, signal words, hazard statements, and precautionary statements. Chemical abbreviations are



never an acceptable substitute for a chemical name unless the container is in immediate use by laboratory personnel.

#### 5.4.3. *Labeling of Unknowns Developed as Part of a Laboratory Courses*

Unknowns developed for students in laboratory courses do not require a chemical name but must be in active or imminent use and labeled with an identifying mark that includes the course, experiment, and an identifier. It is recommended that GHS hazard classes also be included on the labels of unknowns. Identifying information for the contents of all unknowns must be kept in the laboratory at all times while the unknowns are present. As soon as the unknowns are no longer in use for the purposes of the laboratory work, the container must be labeled following the guidelines in §5.4.2. Stored unknowns and their identity must be included in the chemical inventory system (see §5.5).

#### 5.4.4. *Labeling of Unknowns Chemical Waste*

Containers that contain chemical waste shall be labeled according to the guidelines in §11.3.

### 5.5. Chemical Inventory

Each academic department in which hazardous chemicals are purchased, stored, or used is responsible for maintaining its own chemical inventory. Departmental inventories must include an entry for each hazardous chemical present in the laboratories operated by that department. Entries must include the identity of the chemical, the location (including building name and room number), the approximate amount stored in the location, and the name of the original manufacturer and lot number (if applicable).

Any time a new chemical is brought into a laboratory, the departmental chemical inventory must be updated. When an item listed in the inventory is either completely used or is disposed of, it should be removed from the inventory. Departmental inventories must be updated annually in consultation with Designated Laboratory Proctors. Departments must be able to provide the CHO with access to the inventory at any time. More information on Chemical Inventories can be found in §10.2.

## 6. **Medical Program**

### 6.1. Individual Rights and Reporting

All individuals classified as Laboratory Personnel according to §1 must have an opportunity to receive medical attention if they develop signs or symptoms associated with exposure to a hazardous chemical. Medical attention is also encouraged in the following situations:

- Whenever exposure monitoring reveals that a hazardous chemical is present at a level above the OSHA-specified action level (AL)
- Whenever exposure monitoring reveals that an OSHA-specified permissible exposure level (PEL) has been exceeded
- Whenever there is a spill, leak, explosion, or other occurrence that results in an exposure to a hazard

All medical examinations and consultations must be performed by, or under the direct supervision of, a licensed physician. This must be provided without cost to the person, without loss of pay, and at a reasonable time and place. The physician must be told the identity of the hazardous chemical(s) to which the employee may have been exposed, if known, a description of the conditions under which the exposure occurred, if available, and a description of the signs and symptoms that the employee is experiencing, if any. The CHO must be provided a statement from the examining physician that the individual has been informed of the results of the medical examination and of any medical condition that may require further examination or treatment. Additionally, the CHO must obtain a written statement from the examining physician concerning any work related restrictions or situations that could put the employee at an increased risk as a result of the safety incident. The CHO must submit all relevant materials to the FSU Human Resources Department (HRD), who will follow up with employee and the HRD Worker's Compensation Unit regarding medical return to work clearance, leave time, and compensation.

In addition to the Medical Program protocol, an employee who suffers injury relating to a work-related incident involving a hazardous chemical has rights and responsibilities under the M.G.L. c. 152 Workers Compensation Act. An employee may obtain further details pertaining to their rights and obtain assistance in filing a workers compensation claim by contacting FSU Human Resources Generalist at [humanresources@framingham.edu](mailto:humanresources@framingham.edu) or 508-626-4860. After receiving a report of a work related injury, FSU's HR Generalist will submit an injury report to the Commonwealth of MA, Human Resources Division, Workers Compensation Section, the insurer, as well as the Utilization Review agent for industrial accident. Employees or their medical providers must contact the HRD regarding treatment for a work-related injury so that they may perform utilization review and determine medical necessity of health care services at 1-800-266-7991. See attached Injured Workers' Guide to Treatment.

In cases when a student enrolled in a laboratory course develops signs or symptoms associated with exposure to a hazardous chemical, the student shall be directed to seek medical attention.

In all cases where medical attention is sought or necessary due to exposure to a hazardous chemical, an incident report must be completed and submitted as soon as possible (see §13.6), and the Lab Proctor should be informed of the incident.

When exposure monitoring is performed, the CHO must notify the employee of the results individually in writing or by posting in an appropriate location that is accessible to personnel. This notification must be done within fifteen working days after receipt of the monitoring results.

#### 6.2. Exposure Monitoring

Regular environmental or worker exposure monitoring of airborne contaminants is not usually warranted or practical in laboratories, since chemicals are typically used for a relatively short period of time and in small quantities; however, exposure monitoring will be conducted if:

- There is reason to believe that exposure levels for a hazardous chemical routinely exceed either the OSHA-specified action level (AL) or permissible exposure level (PEL)
- Personnel report that they have been over-exposed to a hazardous chemical
- An acutely-toxic chemical is used on a regular basis (several times per week) for an extended period of time (3-4 hours at a time) or in large quantities

Monitoring will be conducted in accordance with established sample collection and analytical methodology for the chemical exposure being evaluated. If initial monitoring indicates that worker exposure is above the AL or PEL, the periodic monitoring provisions of the relevant OSHA standard will be met.

#### 6.3. Records

In addition to the records kept as discussed in §14.4, additional records must be kept by the CHO for the following medically related information: employee exposure complaints, and suspected exposures, air concentration monitoring results, exposure assessments, medical consultations and examinations. The records must be maintained for at least the duration of employment plus thirty years, and made available to personnel upon request.

### **7. Personal Protective Equipment**

FSU provides a variety of personal protective equipment (PPE) for its employees, students, and guests. A description of the different kinds of PPE used on campus are described in this section of the CHP. The equipment used when working with hazardous chemicals includes, but is not limited to the following: clothing, eye protection, gloves, and respirators.

### 7.1. Clothing

Appropriate clothing must be worn when working with hazardous chemicals. Ideally, no skin should be visible from the neck down. Shorts and skirts are not allowed in a laboratory when hazardous chemicals are being used. Clothing made out of cotton or wool blends are preferable over clothing made out of polyester fibers or cotton/polyester blends. Personal laboratory coats are suggested, but not required. It is preferable that hats with brims are not be worn in a Laboratory where hazardous chemicals are being used; however, a hat may be worn for the purpose of restraining long hair. If a baseball cap is used for this purpose, it should be worn backwards.

### 7.2. Eye Protection

Any time that hazardous chemicals, heat, chemical glassware, or equipment under vacuum are employed, appropriate eye protection must be employed. Appropriate eye protection includes safety goggles, which provide a seal around the eyes, and safety glasses that have side shields and conform to the American National Standard Institute (ANSI) Standard Z87.1-1989. In situations where splash or aerosol hazards exist, safety goggles are preferred. Face-shields with an appropriate blast rating are also considered appropriate; however, it is preferred that safety glasses or goggles be used in conjunction with face shields, as long as visibility is not inhibited. Prescription eye glasses without side shields are not appropriate.

### 7.3. Foot Protection

Adequate footwear is required to be worn when working with hazardous chemicals. Ideally, no skin on the feet or ankles should be observable. Closed-toe leather boots or shoes are preferable, but are not required over other types of shoes. A closed-toe shoe must be worn when working with hazardous chemicals. Sandals, flip-flops, and low-cut soft or canvas shoes are considered inappropriate. Closed-toe shoes that are low-cut may be worn in the lab provided that socks are being worn. Nylon socks or stockings may not be worn with low-cut shoes. Safety-toe shoes must be work when working with or moving 55-gallon drums.

### 7.4. Respirators

The use of respirators at FSU is infrequent and limited to faculty and a few students under close faculty supervision. Respirators are used to protect against the hazards associated with fine dust particles that may become airborne while mixing large quantities of fine solids. Respirators should not be used to protect against chemical vapors. Instead, alternative engineering controls should be implemented to prevent exposure to chemical vapors. When respirator use is required, the FSU Respiratory Protection Program must be followed. The key features of this program include the following:

- Selection of the appropriate respirator type and respirator cartridge type is made in consultation with the Director of EH&S.
- A medical clearance is required for each employee before a respirator is issued and worn.
- Fit-testing and training will be performed by the Director of EH&S prior to the use of any negative-pressure respirator.
- Annual fit-testing and training from the Director of EH&S is required for continued use of negative-pressure respirators.

### 7.5. Gloves

Gloves are the primary PPE used to prevent the absorption of hazardous materials through the skin of the hands. A variety of different kinds of gloves exist to guard against different hazards. There is no glove that is able to protect against all chemicals for all tasks, and the use of the wrong kind of glove can make a hazard worse. Prior to commencing work that requires gloves, a glove compatibility chart or the Director of EH&S should be consulted. If a glove becomes torn or contaminated with a hazardous

substance it should be removed immediately. A contaminated glove can trap hazardous materials next to the skin. Gloves should be changed often to ensure that they are fully functional.

Gloves should be removed prior to leaving a work space to prevent the contamination of public spaces. Doors should not be opened using gloved hands. There should never be any reason to wear gloves in a hallway or any other public place.

Latex is a known sensitizer, and as a general practice the use of latex gloves is strongly discouraged. A nitrile-based glove is a good substitute for latex gloves in most situations; however, nitrile gloves are not appropriate for use in all situations. A glove compatibility chart or the Director of EH&S should be consulted before work begins.

## **8. Lab Safety Equipment**

Various pieces of safety equipment have been installed in the laboratories at FSU. This equipment is used to address ventilation, for storage and disposal of hazardous chemicals, and in emergency situations.

### 8.1. Equipment for use to address ventilation issues

There are three main aspects of ventilation systems for laboratories:

- Comfort ventilation to supply and remove air for breathing and to maintain building design temperature and humidity
- Replacement air to compensate for air discharged to the atmosphere through the health and safety exhaust ventilation systems
- Exhaust ventilation that is designed specifically for health and safety protection

The first two issues are addressed by engineering controls that have been incorporated into the design of the building (HVAC systems). The third is accomplished with the use of chemical fume hoods, snorkels, and ventilated tables.

#### *8.1.1. Chemical Fume Hoods*

Chemical fume hoods provide protection from chemical exposure to the user. All fume hoods on campus can be broadly classified as either a ducted hood or a ductless hood. Ducted hoods have a ventilation system that moves contaminated air to the outside environment. Ductless hoods are designed to move contaminated air from within the hood through a series filters before being returned to the room. Because of the differences in design and intended uses, flow rates at the face of the sash when it is opened to the proper height must be at least 70 FPM (feet per minute) for ducted hoods and between 60 and 70 FPM for ductless fume hoods. All chemical fume hoods, regardless of design, must be inspected annually by an outside vendor, and an inspection sticker must be affixed to each hood. The report generated by the outside vendor must be kept by the Director EH&S. If the report indicates an issue, then the Director of EH&S must contact facilities and make arrangements for repairs. The facilities department is responsible for all maintenance and repairs of all fume hoods. More information on how to properly use a chemical fume hood is provided in Appendix 15.3.

#### *8.1.2. Snorkels and Ventilated Tables*

Snorkels and ventilated tables are variations of a ducted fume hood. Snorkels are movable air ducts that can be easily positioned over a piece of equipment. Ventilated tables are tables that have ducted vents for drawing chemical vapors away from the table top.

### 8.2. Equipment for used for storage and disposal of hazardous chemicals

A variety of storage containers exist on campus to store materials before and after use. FSU provides safety storage cabinets for flammable and corrosive materials. FSU also provides storage containers for waste materials (see §11.3).

### 8.2.1. *Safety Storage Cabinets*

All flammable and corrosive chemicals shall be stored in safety storage cabinets that are in good working condition. Damaged storage cabinets must be repaired or removed from service immediately. As a guiding principle, flammable liquids should be stored in a steel safety cabinet that is connected to a ventilation system. Corrosive acids should be stored in non-metal cabinets. Alkaline materials can be stored in steel safety cabinets and do not require ventilation.

### 8.2.2. *Broken Glass Disposal*

Specially-designed cardboard boxes with an internal plastic bag are used for use for containing non-chemically contaminated broken glassware. These broken glass containers are found in all laboratories that employ glass equipment. These containers are NOT to be used for the disposal of needles, syringe bodies, or mercury-containing items. The Laboratory Proctors and laboratory technicians are responsible for inspection and replacement as necessary. When full, the lid of the cardboard box must be taped shut prior to disposal as municipal waste.

## 8.3. Equipment for use during emergency situations

In the event that any of the below emergency safety equipment is used, an incident report must be completed and submitted, as specified in §13.6.

### 8.3.1. *Eye Wash Stations*

All laboratories where hazardous chemicals are used shall be equipped with a properly functioning eye wash station with a sign stating, "Eye Wash Station". A member of the Facilities Department shall inspect all eye wash stations monthly and record the inspection date on a card attached to each station. Annually, an outside vendor shall inspect the eye wash stations for water flow rates and temperature. It is the responsibility of all laboratory personnel to ensure that access to eye wash stations is never blocked. Additionally, it is the responsibility of all laboratory personnel to immediately notify the facilities department of any issues with an eye-wash station.

### 8.3.2. *Safety Showers*

All laboratories where hazardous chemicals are used shall be equipped with a proper functioning safety shower station with a sign stating "Safety Shower". A member of the Facilities Department shall inspect all safety showers monthly and record the inspection date on a card attached to each shower. Annually, an outside vendor shall inspect the safety showers for water flow rates and temperature. It is the responsibility of all laboratory personnel to ensure that access to safety showers is never blocked. Additionally, it is the responsibility of all laboratory personnel to immediately notify the facilities department of any issues with a safety shower.

### 8.3.3. *Fire Extinguishers*

All laboratories where hazardous chemicals are used shall be equipped with a proper-functioning fire extinguisher. A member of the Facilities Department shall inspect all fire extinguishers monthly and record the inspection date on a card attached to each extinguisher. Annually, an outside vendor shall inspect the fire extinguishers. It is the responsibility of all laboratory personnel to ensure that access to fire extinguishers is never blocked. Additionally, it is the responsibility of all laboratory personnel to immediately notify the facilities department of any issues with a fire extinguisher.

### 8.3.4. *First Aid Kits*

All laboratories where hazardous materials are used shall be equipped with a first aid kit. The laboratory proctor shall inspect the first aid kit at the beginning of each semester.

### 8.3.5. *Chemical Spill Kits*

All laboratories where hazardous chemicals are used shall be equipped with a spill kit at or near the area where the materials are being used. As different chemicals require different kinds of clean-up equipment, it is the responsibility of the department operating the laboratory to assemble and maintain an appropriate chemical spill kit. If needed, the CHO can provide technical advice on assembling the spill kit.

Information pertaining to the clean-up of a hazardous chemical can also be found in the Section 6 of the chemical's SDS. More information on cleaning up chemical spills can be found in §13.4.

### 8.3.6. *Emergency Buttons/Phones*

Many of the newer labs are equipped with either a red phone or a red button that can be used to directly contact FSU University Police. University Police may also be contacted by dialing x4911 from any campus phone (or by dialing 508-626-4911 on any other phone).

## **9. Housekeeping, Maintenance, and Inspection**

Framingham State University Facilities and Capital Planning Department employees are responsible for the maintenance of all campus laboratories.

### 9.1. Housekeeping

All chemical laboratories are cleaned at least weekly, with high use laboratories being cleaned daily. This cleaning primarily focuses on removal of municipal waste, collecting recyclables, and cleaning the floors and windows. Facilities is not responsible for setting up or breaking down laboratory exercises or experiments, or providing paper-towels or other consumables (e.g. waste containers).

### 9.2. General Maintenance

The facilities department is responsible for maintaining building equipment (e.g. lights, plumbing, in-house vacuum lines, gas lines, ventilation, heating and cooling, elevators, doors, and electrical), and certain safety equipment located within laboratories. Within the laboratories, facilities is responsible for maintenance of chemical fume hoods, eye-wash fountains, safety showers, and fire extinguishers (see §8). A record of all maintenance shall be kept by the facilities department, as described in §14. Facilities is not responsible for the maintenance of the scientific equipment nor the reverse osmosis units in the laboratories. Facilities is also not responsible for the emergency spill kits or first-aid kits required in each of the laboratories.

### 9.3. Requests for Repairs for Maintenance

Any laboratory personnel may place a work order to facilities to address a building issue. Such requests may be submitted through myFramingham under the Maintenance and Facilities submenu-bar.

### 9.4. Inspections

#### 9.4.1. *Inspections of Safety Equipment*

The Facilities department is responsible for regular inspection of safety equipment and building equipment as described in §8.

#### 9.4.2. *Laboratory Safety Inspections*

The CHO shall conduct weekly inspections of the laboratories. This walkthrough is intended to make sure that proper housekeeping, maintenance, and inspection of safety equipment is being carried out in the manor described above. Additionally, these walkthroughs are performed to ensure that all aspects of the CHP are being followed.

## 10. Chemical Procurement, Distribution, and Storage

A variety of hazardous chemicals are acquired by FSU for the purpose of education and scholarly work. Although chemical procurement, distribution, and storage practices differ slightly from department to department, all departments must adhere to the guidelines set forth in this section.

### 10.1. Procurement

The following principles must be observed when procuring hazardous chemicals:

- Prior to receiving a hazardous chemical, information on proper handling, storage, and disposal should be known to all individuals who will work with the chemical.
- Before a substance is received, proper PPE should be available and proper handling and storage procedures should be in place.
- FSU does not knowingly procure, distribute, or store commercial products that do not have labels that comply with OSHA regulations. In the event that a commercial product arrives on campus with insufficient information on the label, either the product must be immediately transferred to an appropriately-labeled container or the product must immediately be given an appropriate label (see §5.4).
- Shipments with breakage or leakage should be refused; however, it is permissible to accept a material provided that it is opened in a chemical fume hood or in an otherwise appropriately-controlled environment.
- The amounts of material acquired should be the minimum amount necessary to accomplish the task at hand. Acquiring the minimum amounts of materials also helps with issues related to storage (see §10.5).
- Acquiring chemicals of high toxicity and/or of explosive/reactive nature is allowable provided that the material and its intended use first be reviewed and approved by the CHO and the Chairperson of the department in which the chemicals are to be used.
- The date of receipt for the chemical shipment should be placed on the container holding the material upon receiving the material.
- Prior to bringing a new chemical into a laboratory (including prep rooms and stock rooms), the Primary Designated Laboratory User must be consulted to ensure that the SDS binder and Chemical Inventory are appropriately updated.

### 10.2. Chemical Inventory

Each academic department in which hazardous chemicals are purchased, stored, or used is responsible for maintaining its own chemical inventory. Any time a new chemical is brought into a laboratory, the departmental chemical inventory must be updated. When an item listed in the inventory is either completely used or is disposed of, it should be removed from the inventory. Departments must be able to provide the CHO with access to the inventory at any time. See §5.5 for details on the information that must be included in the Chemical Inventory.

### 10.3. Handling

Any time that a hazardous chemical is used, the following guidelines must be observed:

- A risk assessment should be conducted prior to beginning work with any chemical for the first time (see §3.2).
- As part of a risk assessment, all relevant SDSs and container label information should be reviewed.
- Using chemicals of high toxicity and/or of explosive/reactive nature is allowable provided that the material and its intended use first be reviewed and approved by CHO and the Chairperson of the department in which the chemicals are to be used.
- All Laboratory Personnel must receive CHP training prior to the use of hazardous chemicals.

- To reduce the risk that Laboratory Personnel become exposed to hazardous chemicals, all work with hazardous chemicals should be performed in an area with proper engineering controls suitable for the work at hand.
- When new hazardous chemicals or a new process that employs hazardous chemicals are to be used, a plan must first be made with at least one other trained Laboratory Personnel who is equally knowledgeable/skilled in assessing the risk of the proposed work.

#### 10.4. Transport

Any time that a hazardous chemical is transported on the FSU campus, the following guidelines must be observed:

- High-traffic areas should be avoided when transporting hazardous chemicals, compressed gas cylinders, or hazardous waste.
- Break-resistant or secondary containers must be used when transporting chemicals outside of a laboratory or between a laboratory and a stockroom.
- A secondary containment device must be used when transporting flammable materials between laboratories. A chemical cart may be used to transport a hazardous chemical provided that the weight limit of the cart is taken into consideration prior to use. An over-weighted cart can be more hazardous than the item it is transporting.

When transporting liquids with a chemical cart, the cart must have sides to serve as secondary containment in the event of a spill.

#### 10.5. Storage

All hazardous chemicals must be stored according to the following guidelines:

- Chemicals should be separated and stored according to hazard category and compatibility. For example, oxidants should be stored away from reductants and flammable materials, and acids should be stored away from bases. The SDS for the material will provide information regarding appropriate storage procedures (Section 7 of the SDS).
- The original label should be maintained on all chemical containers. When transferring material or a portion of material to a second container, identifying information (e.g. the manufacturer name, product code, and lot number) must be affixed to the container so that its contents can be tracked to its place of origin.
- Containers used for storing hazardous chemicals must be labeled with appropriate chemical identification and hazard warnings (see §5.4).
- The first time a container is opened, the date of opening should be written on the container.
- Chemical stock should be rotated so that older chemicals are used before newer materials are acquired or used.
- If a chemical becomes unsuitable for use and cannot be recovered, it must be disposed of immediately.
- Hazardous chemicals that are no longer in use must be either returned to storage or disposed of through the chemical waste management system.
- Substances known to form peroxides upon exposure to air and/or over time (e.g. ethers and alkenes) must be stored away from heat and light and in non-metal containers.
- Long-term storage of chemicals in chemical fume hoods is prohibited at FSU. Chemical substances may be stored in a chemical fume hoods for the duration of the experiment being conducted.
- Flammable chemicals must be stored in approved flammable-liquid containers and flammable storage cabinets.
- Grounding and bonding must be used when transferring organic solvents to, from, or between metal containers.



- Laboratory-grade, flammable-rated refrigerators and freezers should be used to store sealed containers of flammable liquids that require cool storage. Food and/or beverages may never be stored in a laboratory refrigerator.
- Rooms and laboratories that are used to store and handle hazardous chemicals should be controlled-access areas. They should have proper ventilation, appropriate signage, and where appropriate diked floors and fire suppression systems.
- Highly hazardous chemicals should be stored in a well-ventilated and secure area designated for that purpose.

#### *10.5.1. Stockrooms and Prep-rooms*

The following guidelines must be observed in all stockrooms and prep-rooms:

- Only authorized personnel may enter a stockroom or prep-room. Guests may be allowed to enter the room, but only when accompanied by a person authorized to be in the room.
- All stockrooms and prep-rooms are to be kept locked when not in use.
- Stockrooms and prep-rooms must:
  - Be clearly marked as either a stockroom or a prep-room
  - Be marked with appropriate signage (see §5.2)
  - Be clean, free of clutter, and well-organized
  - Have appropriate ventilation if flammable liquids are stored within
  - Have adequate lighting

#### 10.6. Gas Cylinders

The following special considerations must be observed when storing, handling, and/or transporting compressed gas cylinders:

- Compressed gas cylinders must be secured to a wall or immovable bench at all times using either a chain or a strap. This rule holds regardless of whether the tank is full or empty.
- Under no circumstance should a compressed gas cylinder be secured to a movable table.
- Under no circumstance should a compressed gas cylinder be stored on a compressed gas cylinder cart.
- All compressed gas cylinders must be stored with a tag to indicate whether the tank is full, partially full, or empty.
- If a gas cylinder is not in use and is not hooked up to a piece of laboratory equipment, then it should be stored with the cap on.
- Compressed gas cylinders must never be transported with a chemical cart.
- A compressed gas regulator must never be attached to a compressed gas cylinder while the tank is being moved, no matter how far the tank is to be moved.
- Before moving a compressed gas cylinder, the regulator must be removed and the tank capped.
- A compressed gas cylinder cart must be employed if the gas cylinder is to be moved more than 5 feet in distance.
- All compressed gas hookups must be made using appropriate connections. Note that PTFE tape should only be used when connecting tapered pipe threads (e.g. NPT fittings).

### **11. Hazardous Waste Management**

Framingham State University generates a small amount of hazardous waste for educational purposes. FSU is classified as a small generator of hazardous waste, meaning less than 2,200 pounds of waste is generated per month. The chemical waste management system at FSU is designed to meet all federal standards (RCRA) and state regulations (MWRA), and as such, every effort is made to prevent the release of hazardous chemicals into the municipal waste water system (i.e. nothing goes down the sink or storm drains). Additionally, every effort is made to reduce the quantity of waste produced prior to the

commencement of work. Each academic department that operates a Laboratory develops its own waste management plan to achieve the above-stated goals.

### 11.1. Waste Management Plan

Each academic department develops its own specific waste management plans. Waste management plans are developed prior to the commencement of work and must consider:

- Possible reductions of waste at the source
- Substituting for less hazardous materials when possible.
- Using surplus materials to minimize inventory and waste disposal costs
- Whether or not non-hazardous materials from the process can be recycled or re-used
- Proper methods for disposing of hazardous chemicals, as specified by SDSs and/or the CHO
- A review of the Resource Conservation & Recovery Act (RCRA)
- The location of and access to satellite accumulation areas (SAAs)
- The chemical compatibility of waste containers
- The chemical compatibility of different kinds of waste streams (e.g. oxidants should be kept separate from flammables)
- The expected volume of the waste stream

### 11.2. Hazardous Waste Accumulations Areas

All hazardous waste must be kept in an appropriately designated accumulation area. At FSU, there are two types of accumulation areas, one main accumulation area for the entire campus and smaller, satellite accumulation areas that serve a lab or group of labs near a point of hazardous waste generation.

#### *11.2.1. Main Accumulation Area (MAA)*

The main accumulation area for hazardous waste is Hemenway Annex 135C. This room is located on the lowest floor of the Hemenway complex and is seated on a concrete foundation. There are no floor drains in this room. The walls and ceiling are made of fireproof materials. The room is equipped with a light and an electric fan for ventilation. It is equipped with emergency power to run the light and the fan. This room is kept locked at all times and access to this room is extremely limited. The room is located near the loading dock to facilitate removal by a licensed hazardous waste handler and away from high foot-traffic areas. The waste in the MAA is disposed of semi-annually by a licensed hazardous waste handler.

#### *11.2.2. Satellite Accumulation Area (SAA)*

There are a number of SAAs on campus, each near a point of hazardous waste generation. A sign must be posted indicating the area to be an SAA. This sign must be labeled with the words "Satellite Accumulation Area." In addition, a sign indicating instructions for using the SAA must also be posted. The SAA does not need to be in a ducted fume hood; however, the SAA should be in a well-ventilated area. All containers must be appropriately identified and maintained as described in §11.3. Only one container of each 'kind' of waste may be kept in a SAA. Different 'kinds' of waste streams can be kept together in an SAA provided that the waste materials are compatible. The use of a SAA is required for both liquid and solid waste streams. Once a container in an SAA is filled, the departmental laboratory technician should be notified to ensure that the container is transferred to the MAA within three days.

### 11.3. Waste Containers

A wide variety of containers may be used to hold hazardous materials. The sizes range from glass bottles of a few ounces to 55-gallon drums, and may be of varying construction and material. The following rules apply to all hazardous waste containers:

- All containers must have the following:
  - The words "HAZARDOUS WASTE"
  - The identity of all contents, using full chemical names in English

- Approximate composition of each component, expressed as a percentage, if more than one material is present
- All hazard classes associated with the waste material, as defined by the Environmental Protection Agency (i.e. toxic, acute hazardous, ignitable, corrosive, reactive, toxicity characteristic)
- The approximate pH of the solution, for water-based or aqueous waste streams
- Every container present in an SAA with a drain must be placed in a secondary container or on a spill-control pallet; however, it is good practice to use secondary containment for all containers.
- Hazardous waste containers are to be kept covered at all times to minimize evaporation. Immediately following addition of new material to a hazardous waste container, caps should remain loose to avoid possible pressure build up in the bottle. Caps should then be kept tight for long-term storage. Parafilm is never considered to be an acceptable cover.
- The container chosen to hold hazardous waste must be chemically compatible with the contents and of sufficient volume to contain the anticipated waste. The volume of a waste container must never exceed 55 gallons.

The types of containers typically used at FSU are indicated below along with a description of the kinds of waste they may hold.

- 55-gallon steel drums: This type of container is used to contain oil-based solvents that are routinely used to clean painting equipment. Water- or aqueous-based waste streams must never be stored in a metal container. Oxidants must never be stored in a metal container.
- 55-gallon plastic (e.g. Nalgene) or fiber-based drums: These drums are used to contain large volumes of water-based or aqueous waste streams (e.g. water-based glaze solutions or estrogen-contaminated water)
- 30-gallon plastic (e.g. Nalgene) or fiber-based drums: These drums are used to hold chemically-contaminated solids (e.g. cloth rags contaminated with oil-based solvents). Oxidants (e.g. bleach or Oxy-clean) are never to be added to this kind of drum.
- 5-gallon plastic (e.g. polyethylene) bucket with lids: These are typically employed in an SAA to contain cloth rags contaminated with oil-based solvents. Oxidants (e.g. bleach or Oxy-clean) are never to be added to this kind of drum.
- 3-gallon steel safety cans. These are typically employed in an SAA to contain oil-based solvents that are routinely used to clean painting equipment.
- 1-gallon amber glass bottles: These containers are typically employed in chemistry laboratories as the material of construction is compatible with most waste streams. Oxidants and waste streams containing oxidants can be stored using amber glass bottles providing that they are kept away from incompatible materials (e.g. flammables).
- Sharps Containers: A hard plastic container used to safely dispose of items such as needles, syringes, scalpels, razor blades, and other sharp instruments that have been contaminated. Sharps containers are not to be used for non-chemically contaminated broken glass.
- Red and Orange Biological Bags: These bags are used to hold different types of biological waste, as described in Appendix 15.4.7.
- Broken glass containers: Many labs have special containers for disposing of broken glass. Under no circumstances should chemically-contaminated glass be disposed of in these containers. These containers must be made of a rigid material that cannot be punctured by broken glass.

#### 11.4. Acutely-Hazardous Waste (i.e. p-listed materials - 40 CFR 261.33)

All compounds designated as a p-listed substance according to RCRA 40 CFR 261.33 are considered acutely-hazardous and must receive special dispensation from the Chemical Hygiene Officer prior to acquisition, use, and disposal (see §10 and §11). All p-listed substances must be given their own waste

stream, and not combined with any other material, except for materials that have been contaminated by exposure to or direct contact with the p-listed material.

### 11.5. Biohazardous Waste

Biohazardous waste includes solid biomedical waste (e.g., plasticware, tubing, pipette tips, gloves), sharps waste (e.g., needles, glass, scalpels, razor blades), liquid biomedical waste (e.g., cultures, stocks, vaccines), and pathological and animal wastes (e.g., body fluids, carcasses, tissues, bedding). Items considered biohazardous waste must be disposed of using an appropriate container (see §11.3) in accordance with Appendix 15.4.7.

### 11.6. Sharps

All sharps waste (e.g. needles, syringes, glass, scalpels, razor blades) must be disposed of in a sharps container (see §11.3), which must then be disposed of in the same manner as biohazardous waste (see §11.5).

## 12. **Standard Operating Procedures**

Any time that hazardous chemicals are used, individuals must follow the general guidelines described in §3, §5, §7, §8, §10, §11, and §13. When working with particularly hazardous chemicals, however, these general guidelines may not be enough to sufficiently reduce the risk of exposure to the hazard. When working with such chemicals, individuals must follow additional procedures as stated in a Standard Operating Procedure (SOP), which describes special considerations for working with a particular chemical or class of chemicals. Prior to implementation, all SOPs must be approved by the CHO in consultation with the CHC.

### 12.1. Hazardous Chemicals that Require an SOP

At FSU, an SOP must be developed prior to acquiring or using any chemical that meets any of the following criteria:

- An OSHA Standard exists for the chemical (e.g. methylene chloride - OSHA 29 CFR 1910.1052, formaldehyde - OSHA 29 CFR 1910.1048)
- The chemical is designated as a p-listed substance according to RCRA 40 CFR 261.33
- Exhibits any of the following hazard classes:
  - Carcinogens
  - Reproductive toxins
  - Acutely toxic materials
  - Mutagens
  - Neurotoxins
  - Embryotoxins
  - Biohazardous materials
  - Allergens
  - Explosives

### 12.2. Required Components of an SOP

At a minimum, SOPs must contain the following information:

- The name of the chemical or class of chemicals
- A description of the chemical or class of chemicals, including any specific hazards
- Storage procedures
- Establishment of a designated work area
- PPE requirements
- Engineering control requirements, such as containment devices, fume hoods, glove boxes, etc.

- Procedures for safe removal of the chemical(s) and any other waste that has been contaminated with the chemical(s)
- Decontamination procedures (to be followed in the event of exposure)

### 12.3. List of Current SOPs

Full SOPs are included in this CHP as appendices. Currently, SOPs have been developed for the following compounds or classes of compounds:

- Specific chemicals:
  - Methylene chloride
  - Formaldehyde
- Classes of chemicals:
  - Carcinogens
  - Reproductive Toxins
  - Acutely Toxic Materials
  - Mutagens
  - Neurotoxins
  - Embryotoxins
  - Biohazardous materials
  - Allergens
  - Explosives

## 13. **Emergency Procedures**

Emergencies that may occur in a laboratory include fire, explosion, chemical spill or release, or medical or other health-threatening accidents. In the event of an emergency:

- Assist person(s) involved. Remove person(s) from exposure to further injury or a life-threatening situation, if it can be done safely.
- Notify nearby persons who may be affected and call University Police to report the emergency and seek assistance.
- Evacuate the area in accordance with established evacuation procedures.

### 13.1. Injury or General Medical Emergency

A medical emergency can occur anywhere on campus. The reaction of the victim or those around him/her can ensure quick arrival of trained emergency personnel. If someone is injured or becomes ill:

- Stay calm.
- Dial x4911 from a campus phone (or 508-626-4911 from another phone) and explain the type of emergency, the location of the victim, and the condition of the victim. Let the dispatcher know of any safety hazards – chemical spill, fire, fumes, etc. Be sure to tell the dispatcher if the person is unconscious, not breathing, is bleeding profusely, or has chest pain. These all cause the dispatcher to summon an ambulance.
- Do not hang up unless told to do so by the dispatcher.
- Do not move the victim unless there is danger of further injury if he/she is not moved.
- Do not give the victim anything to eat or drink.
- University Police officers are trained as Massachusetts First Responders. All officers receive annual re-certification in First Aid and CPR and use of the department's Automatic External Defibrillators (AED).

### 13.2. Fire

Fire and the associated dangers of smoke, structural damage, or toxic releases can pose serious threats of injury and death to faculty, students, staff, visitors and emergency personnel. **DO NOT TRY TO FIGHT**

A FIRE UNLESS YOU HAVE RECEIVED TRAINING IN HOW TO SAFELY DO SO. In order to control a fire and minimize its damage, the following steps should be taken immediately:

- Leave the area at once.
- Pull the fire alarm.
- Alert other people in the area and instruct them to leave the building.
- Close, DO NOT LOCK, all doors and windows if you can safely do so to help contain the fire.
- Stay as low as possible to avoid smoke and heat.
- Evacuate the building calmly, but quickly, following evacuation and assembly procedures posted in the building.
- Do not use elevators.
- Go directly to the designated assembly area and await additional instructions.
- Report anyone who is missing and who was in the classroom or area when the evacuation began to the University Police or Residence Life staff.
- Remain at the assembly area until you are instructed how to proceed by the University Police or Framingham Fire Department official.

If trapped:

- Alert emergency responders of your location by whistling, shouting, or using an object to beat on walls or floor in a rhythmic manner.
- If a telephone is available, call x4911 from a campus phone (or 508-626-4911 from any other phone), and notify University Police of your location. You may also place an article of clothing or other device to use as a signal in a window, if a window is available.
- Stuff material in door cracks to minimize smoke and try to stay low near the floor where heat, smoke, and contaminants may be less.
- If you are injured, tend to injuries.

### 13.3. Personal Chemical Exposure

In the event that personal chemical exposure occurs, medical assistance may be required. Additional measures can be taken to minimize the adverse effects of exposure while waiting for emergency or medical personnel to arrive. In all instances of personal chemical exposure, an incident report must be submitted as described in §13.6.

#### *13.3.1. Eye Contact*

In the event that chemical exposure occurs to the eyes, the exposed individual should be immediately led to an eye-wash station so that the eyes can be washed for a minimum of fifteen (15) minutes. While rinsing the eyes, it is critical to make sure that the eyelids remain open and that the eyeballs be continually moved in all directions. While the eyes are being rinsed, another person must remain present to assist the exposed individual, contact University Police by dialing x4911 from a campus phone (or 508-626-4911 from any other phone), and obtain the SDS for the chemical.

#### *13.3.2. Skin Contact*

In the event that significant chemical exposure occurs to the skin, the exposed individual should be immediately led to a sink or safety shower so that the skin can be washed for a minimum of fifteen (15) minutes. Any contaminated clothing must be removed immediately. While the skin is being rinsed, another person must remain present to assist the exposed individual, contact University Police by dialing x4911 from a campus phone (or 508-626-4911 from any other phone), and obtain the SDS for the chemical.

### 13.3.3. *Inhalation or Ingestion*

In the event that a hazardous chemical is either inhaled or ingested, medical assistance should be immediately sought by contacting University Police by dialing x4911 from a campus phone (or 508-626-4911 from any other phone). While waiting for emergency personnel to arrive, another person must remain present to assist the exposed individual, obtain the SDS for the chemical, and contact the Poison Control Center at 1-800-222-1222.

## 13.4. Spills

Spills can be categorized into two types, depending on the amount of material released and the nature of the hazard posed by the material.

### 13.4.1. *Major Spills*

A major spill is defined as an accidental release of material that poses a significant threat to individual safety or to the environment. **NO ATTEMPT SHOULD EVER BE MADE TO CLEAN UP A MAJOR SPILL.** Framingham State University has a contract with an outside company responsible for the clean-up of major spills of hazardous materials and waste.

A spill is considered to be major if it involves any of the following:

- A large quantity of a moderately-hazardous substance
- A small quantity of a highly-toxic substance
- A flammable material that presents a significant fire hazard
- Release of material that cannot be contained before being released to the environment
- A spill that occurs when no appropriately-trained laboratory personnel are immediately available

In the event of a major spill:

- Evacuate the area at once.
- Alert other people in the area and instruct them to evacuate the area.
- Contact University Police by dialing x4911 from a campus phone (or 508-626-4911 from any other phone)
- Remain available for University Police and first responders to provide them with information regarding the nature of the spill.
- Fill out an incident report as described in §13.6.

### 13.4.2. *Minor Spills*

A major spill is defined as an accidental release of material that does not pose a significant threat to individual safety or to the environment. Spills that are not considered major as specified in §13.4.1 can be cleaned up by appropriately-trained Laboratory Personnel. Maintainers are not permitted to clean up hazardous chemicals from a spill. When cleaning up a minor spill, appropriate PPE must be worn at all times. The SDS for the chemical should be consulted to determine the type of PPE that should be used and specific accidental release measures that should be taken, if applicable. After the spill is cleaned, the chemical and any contaminated materials must be disposed of as hazardous waste (see §11). If a minor spill involves a flammable substance, any equipment that may cause the substance to ignite should either be turned off or removed, if possible. Chemical spill kits are available in many labs on campus. These kits are specifically designed for each laboratory based on commonly-used chemicals in that laboratory (see §8.3.5).

## 13.5. Power failure

If there is a large-scale power failure, you should do the following:

- Contact University Police by dialing x4911 from a campus phone (or 508-626-4911 from any other phone) and give your name, telephone number, location, and nature of the emergency.

- University Police will notify appropriate university officials.
- Representatives of the Facilities Management Department will verify the failure and its cause.
- In cases where power failures will affect classes, residence halls, or other university activities for extended periods, the University Emergency Operations Committee will be notified to respond to campus.

### 13.6. Incident Reporting

An incident report is a document used to record an event (incident) in written form for the purposes of analysis of the event and to learn how to avoid the event in the future. There are several types of events for which submitting an incident report are mandatory. These events are:

- Any event in which emergency personnel are involved
- Any event that results in a medical referral (see §6)
- Any event in which any of the emergency equipment listed in §8.3 is used, except when first aid kits are used to tend to minor cuts and scrapes in situations where no exposure to a hazardous chemical has occurred
- Any event that results in injury to person or property

In addition, laboratory personnel are encouraged to submit an incident report to raise awareness about situations or events that, although they do not meet the criteria for mandatory reporting, could be used to inform how existing procedures and policies can be improved.

Copies of incident reports must be submitted to the CHO, the Department Chair of the department operating the laboratory in which the incident occurred, and the Academic Dean of the college in which the incident occurred.

All incident reports generated for incidents involving hazardous chemicals must be analyzed at the next convening of the CHC.

## **14. Oversight, Review, Recordkeeping, Compliance, and Enforcement**

The CHC will maintain oversight for the ongoing development and revision of the CHP. The CHO will be tasked with convening the group on a regular basis and requesting input from the group regarding changes or developments. At least annually, the CHP will be published to the University community with required training on specific changes and revisions.

### 14.1. Publication of the CHP

The CHP must be published in an accessible, digital format and posted to the FSU Environmental Health and Safety webpage, which can be accessed via [www.framingham.edu](http://www.framingham.edu). It is recommended that hyperlinks be made to this page from the webpages for departments that operate laboratory settings.

### 14.2. Maintaining and Reviewing the CHP

The CHO coordinates the preparation of the CHP and specific SOPs, if required, for the laboratories in concert with the specific laboratory personnel. The CHO is responsible per OSHA regulations for ensuring that the CHP meets the requirements set forth in 29 CFR 1910.1450 and is fully implemented. The CHO is responsible for ensuring that the CHP is reviewed on an annual basis and updated as necessary to accommodate changes in OSHA standard 29 CFR 1910.1450, departmental procedures, and University personnel policies. In addition, the CHO shall ensure that CHP updates include procedures regarding new chemical hazards and new processes as they are introduced.

### 14.3. Compliance

Once the CHP is operationalized, the CHO and all individuals authorized to work in a laboratory setting will strive to maintain all aspects of the CHP's requirements. In the event of a breach of protocol or



practice or the inoperability of critical equipment, the CHO shall be notified to begin to take corrective action. Where personnel are involved, the CHO will work directly with personnel and with the appropriate administrative personnel as necessary to maintain the CHP's requirements. When equipment is involved, the CHO will work on both interim and permanent solutions to maintain the CHP's requirements or deem the laboratory setting closed until such corrections can be made. When students are involved, the CHO shall work with the instructional personnel responsible for the authorization of the student or as needed with administrative personnel to address student behavior.

#### 14.4. Record Keeping

The CHO will ensure that the CHP and updates are distributed or made available to those affected by the changes. Additionally, the CHO is responsible for maintaining copies of incident reports, medical records, training records, compliance records, laboratory safety inspection records, and maintenance and repair records.

- Records of all filed incident reports (§13.6) are held by the CHO.
- Medical documentation submitted by the employee to the Office of Human Resources as described in §6 will be kept in a separate medical file and/or will be maintained by the Commonwealth of MA, Human Resources Division, Workers' Compensation Section. Medical documentation will be maintained in accordance with the Commonwealth of MA Records Retention Guidelines.
- Training records must include: sign-in sheets, the name of the person conducting the training, and all presentation materials. Records must be submitted by the person conducting the training to the CHO. All training records will be held by the CHO.
- Records of laboratory safety inspections will be held by the Facilities Operations department.
- Maintenance and repair records should include any repair work to equipment and any check made to safety equipment. These records will be held by the Facilities Operations department. Records for inspections of selected safety equipment will also be kept on individual safety equipment, as described in §8.

**15. Appendix**



<b>Section 4: Description of Incident</b>	
Describe the incident, including what was being done, how it was being done, what tools and/or chemicals were being used, and under what conditions the incident occurred. Attach drawings, maps, or any additional sheets if necessary.	
<b>Section 5: Signature of Person Filing Report (Last, First, MI):</b>	
Printed Name:	Signature:
<b>Section 6: Follow-up (to be filled out by Chemical Hygiene Committee)</b>	
Measures taken to prevent further incidents:	
<b>Copies of incident reports must be submitted to the CHO, the Department Chair of the department operating the laboratory in which the incident occurred, and the Academic Dean of the college in which the incident occurred.</b>	

15.2. Locations Classified as Laboratory Settings (updated annually)

The following locations are currently designated as a Laboratory Setting:

<b>Building</b>	<b>Room #</b>	<b>Department</b>	<b>Comments</b>
Hemenway Hall	HH 301	Chemistry	Laboratory
	HH 408	Biology	Laboratory
	HH 408A	Biology	Prep Room
	HH 409	Biology	Laboratory
	HH 410	Biology	Laboratory
	HH 416A	Biology	Animal room
Hemenway Annex	HA 125	Physics	Research Lab
	HA 133A	All	Chemical storage
	HA 227	Chemistry	Food Lab prep
	HA 235	Chemistry	Food Research
	HA 237	Chemistry	Food Lab
	HA 339	Physics	Laboratory
	HA 339A	Physics	Storage
	HA 358	Physics	Storage
	HA 360	Physics	Laboratory
	HA 362	Physics	Laboratory
	HA 431	Chemistry	Laboratory
	HA 432	Chemistry	Laboratory
	HA 433	Chemistry	NMR Room
	HA 435	Biology	Laboratory
	HA 435A	Chemistry	Prep Room
	HA 436G		Research Lab
	HA 436I		Research Lab
	HA 437	Chemistry	Laboratory
	HA 437A	Chemistry	Prep Room
	HA 438	Chemistry	Laboratory
	HA 442	Chemistry	Laboratory
	HA 444	Chemistry	Laboratory
	HA 444A	Chemistry	Prep Room
	HA 446	Chemistry	Laboratory
	HA 507	Biology	Tissue Culture
	HA 507A	Biology	Prep Room
	HA 509	Biology	Laboratory
	HA 509A	Biology	Prep Room
	HA 511	Biology	Laboratory
	HA 513	Biology	Animal Room
	HA 513A	Biology	Feed Room
	HA 513B	Biology	Cage Room
	HA 513C	Biology	Cage Room

<b>Building</b>	<b>Room #</b>	<b>Department</b>	<b>Comments</b>
Hemenway Annex	HA 513D	Biology	Cage Room
	HA 528	Biology	Aquarium
	HA 530	Biology	Laboratory
	HA 530A	Biology	Perp Room
	HA 532	Biology	Laboratory
	HA 532A	Biology	Museum room
	HA 532B	Biology	Cold room
	HA 532C	Biology	Cold room
	HA 609	Biology	Laboratory
	HA 611	Biology	Laboratory
	HA 613	Biology	Laboratory
	HA 630	Biology	Laboratory
	HA 632	Biology	Research Lab
	HA 634	Biology	Potting shed
	HA 634B	Biology	Greenhouse B
Hemenway Laboratories	HL 367	Chemistry	Food Analysis
	HL 367A	Chemistry	Prep room
	HL 370	Chemistry	Inorganic Lab
	HL 371	Chemistry	Principles of Chemistry Lab
	HL 371A	Chemistry	Instrument room
	HL 372A	Chemistry	Prep room
	HL 372	Chemistry	Principles of Chemistry Lab
	HL 465	Chemistry	Instrument Lab
	HL 465A	Chemistry	Prep Room
	HL 468	Chemistry	Physical Chemistry
	HL 469	Chemistry	Organic Chemistry
	HL 470A	Chemistry	Prep Room
	HL 469A	Chemistry	Storage/Prep
	HL 470	Chemistry	Organic Chemistry Comparative Vertebrate
	HL 565	Biology	Anatomy
	HL 565A	Biology	Prep Room
	HL 566	I.T.S.	storage
	HL 568	Biology	Ecology
	HL 569	Biology	Prep Room
	HL 570	Biology	BioMarine
	HL 573A	Biology	Prep Room
	HL 571	Biology	Instrument Room
	HL 572	Biology	Microscope Room
	HL 573	Biology	Laboratory
	HL 665	Biology	Human Anatomy
	HL 665A	Biology	Prep Room

<b>Building</b>	<b>Room #</b>	<b>Department</b>	<b>Comments</b>
Hemenway Laboratories	HL 668	Biology	MicroBiology
	HL 669	Biology	Bioconcepts
	HL 670	Biology	Autoclave
	HL 671	Biology	PrepRoom
	HL 672A	Biology	Prep Room
	HL 672	Biology	Intro to Human biology
May Hall	MA G06	Art	ceramics
	MA G08	Art	storage
	MA G09	Art	woodworking
	MA G10	Art	woodworking
		Art	metal working
	MA G11	Art	clay mixing
	MA G13	Art	kiln room
	MA G13A	Art	closet
	MA G14	Art	kiln room
	MA 323	Art	office/storage
	MA 403	Art	design studio
	MA 405	Art	storage
	MA 406	Art	studio
	MA 407	Art	studio
		Art	sink area
	MA 408	Art	printmaking
	MA 409	Art	computers?
MA 410	Art	storage	
MA 412	Art	painting	
Whittemore Library	WL 215A	Comm Arts	Dark Room

### 15.3. Fume Hood Safety

- To maximize fume hood effectiveness and minimize personal exposure to toxic vapors or gases, use fume hood(s) in accordance with these operational guidelines.
- Operate the hood at the proper sash height, as indicated on the ATTENTION sticker located on the front of the hood.
- Reduce pedestrian traffic in front of hoods. Also minimize nearby disturbances, such as doors opening and closing, and any quick motion in order to prevent cross drafts.
- Do not position fans or air conditioners so as to direct air flow across the face of the hood. This can interfere with airflow and containment of hazardous chemicals.
- Do not block airfoil. The airfoil provides airflow across the base of the hood. If you use absorbent paper in the hood, do not block the airfoil.
- Side panels must not be removed. Doing so will interfere with airflow and containment, as air can be brought into the hood from these openings.
- Place bulky equipment away from sidewalls to allow airflow around the equipment.
- Place bulky equipment towards the rear of the hood and raise it about 2 inches off the surface of the hood, but do not place it against the rear wall.
- Work with your hands as far inside the hood as possible, at least 4 to 6 inches from the front edge with the sash face between you and the task at hand. All equipment should be a minimum of 9 to 12 inches away from the hood face.
- Keep your head outside of the hood
- Keep sash face free and clear. To encourage use of sash as an added protection against splashes, sprays, etc., keep the sash face clean. If sash face must be blocked with paper for a certain experiment, please take it down after the experiment is completed.
- Do not use the hood as a storage cabinet for chemicals or equipment. Materials stored in the fume hood should be kept to a minimum and stored in a manner that will not interfere with airflow.
- Place any heat-generating equipment in the rear of the hood, but not against the back wall. Heating devices in the hood produce convection currents that can disrupt air flow.
- Do not use a hood for any function it was not intended for, such as perchloric acids, radioisotopes, etc.
- Wear protective clothing as necessary. Fume hoods do not prevent accidents or chemical splashes.
- Close sash when finished with hood work or when leaving experiments or chemicals unattended. This simple procedure could contain a fire or explosion within the hood.
- Monitor fume hoods during the required inspections. Report any malfunctions to the Facilities Department.
- Do not block the baffles with equipment or bottles.



15.4. Standard Operating Procedures

#### 15.4.1. Carcinogens

##### Description

- A carcinogen commonly describes any substance that can cause cancer. Some common carcinogens include: acrylonitrile, benzene, chromium (VI) and its salts, and formaldehyde. Refer to a chemical's SDS to identify specific if it is classified as a carcinogen.

##### Chemical Storage

- Store according to hazard classification.
- Minimize quantities stored.
- Should be disposed of whenever no longer required for current work.

##### Establishment of a designated area

- Any laboratory space where appropriate controls, personal protective equipment, and waste disposal receptacles are available.

##### Personal Protective Equipment

- Eye and Face Protection
  - Glasses or chemical splash proof goggles must be worn. Face shield if particularly dangerous.
- Gloves - Appropriate gloves must be worn.
- Protective Clothing
- Foot wear that cover top of feet.
- Additional protective clothing may be necessary - such as long sleeves, lab coats, or aprons.

##### Controls

- Fume Hoods and Glove Boxes
  - Fume hoods & glove boxes are preferred method of control with sash in lowest possible position.
  - Safety shielding is required if risk of explosion, splash hazard or a highly exothermic reaction.
  - Portable blast shields are acceptable.
- Eye Wash
  - Flush eyes for at least 15 minutes, holding eyes open.
  - Seek medical attention for further evaluation.
- Safety Showers/Handwashing Sinks
  - Rinse for minimum of 15 minutes.
  - Seek medical attention for further evaluation.
- Fire Extinguishers
  - Personnel should not use the fire extinguishers.

##### Emergency Procedures

- Notification
- Refer to the Incident Response and Reporting Protocol Form (we need to create one)
  - First responders are Public Safety: 508-626-4911 or 911.
  - Major Spill, Fire, Explosion, Injury Response
  - Alert others. Small spill can be cleaned by lab, studio or theater personnel, if trained. Read SDS.
  - No attempt should be made to clean large spill or put out fire.
  - Contact Public Safety 508-626-4911 or 911, for assistance.

- Remain on scene, but at safe distance, to help direct and discuss the situation with Public Safety.

Cleaning and Waste Disposal

- Cleaning
  - Wash hands and arms with soap and water.
  - The work area must be cleaned after use.
  - Disposable paper, gloves, paper towels, etc. must be labeled, and disposed of in the SAA.
- Waste Disposal
  - Materials must be disposed of as hazardous waste.

#### 15.4.2. Reproductive Toxins

##### Description

- Reproductive toxins are substances that affect the reproductive capabilities including chromosomal damage (mutagens) and effects on the fetus (teratogens). Some reproductive toxins include: aniline, benzene, chloroform, dimethylformamide, dimethylsulfoxide, formaldehyde, formamide, lead compounds, mercury compounds, phenol, toluene, and xylene. Refer to a chemical's SDS to identify specific if it is classified as a reproductive toxin.

##### Chemical Storage

- Store according to hazard classification.
- Minimize quantities stored.
- Should be disposed of whenever no longer required for current work.

##### Establishment of a designated area

- Any laboratory space where appropriate controls, personal protective equipment, and waste disposal receptacles are available.

##### Personal Protective Equipment

- Eye and Face Protection
  - Glasses or chemical splash proof goggles must be worn. Face shield if particularly dangerous.
- Gloves - Appropriate gloves must be worn.
- Protective Clothing
- Foot wear that cover top of feet.
- Additional protective clothing may be necessary - such as long sleeves, lab coats, or aprons.

##### Controls

- Fume Hoods and Glove Boxes
  - Fume hoods & glove boxes are preferred method of control with sash in lowest possible position.
  - Safety shielding is required if risk of explosion, splash hazard or a highly exothermic reaction.
  - Portable blast shields are acceptable.
- Eye Wash
  - Flush eyes for at least 15 minutes, holding eyes open.
  - Seek medical attention for further evaluation.
- Safety Showers/Handwashing Sinks
  - Rinse for minimum of 15 minutes.
  - Seek medical attention for further evaluation.
- Fire Extinguishers
  - Personnel should not use the fire extinguishers.

##### Emergency Procedures

- Notification
- Refer to the Incident Response and Reporting Protocol Form (we need to create one)
  - First responders are Public Safety: 508-626-4911 or 911.
  - Major Spill, Fire, Explosion, Injury Response
  - Alert others. Small spill can be cleaned by lab, studio or theater personnel, if trained. Read SDS.
  - No attempt should be made to clean large spill or put out fire.

- Contact Public Safety 508-626-4911 or 911, for assistance.
- Remain on scene, but at safe distance, to help direct and discuss the situation with Public Safety.

#### Cleaning and Waste Disposal

- Cleaning
  - Wash hands and arms with soap and water.
  - The work area must be cleaned after use.
  - Disposable paper, gloves, paper towels, etc. must be labeled, and disposed of in the SAA.
- Waste Disposal
  - Materials must be disposed of as hazardous waste.

### 15.4.3. Acutely Toxic Materials

#### Description

- Acutely toxic chemicals are substances that cause adverse effects from a single exposure. Some of these substances include, but are not limited to: bromine, iodine, carbon monoxide, unstable organic peroxides, heavy metal azides, and benzyl chloride. Refer to a chemical's SDS to identify specific if it is classified as an acutely toxic material. Use of acutely-hazardous materials must receive special dispensation from the Chemical Hygiene Officer prior to acquisition, use, and disposal.

#### Chemical Storage

- Store according to hazard classification.
- Minimize quantities stored.
- Should be disposed of whenever no longer required for current work.

#### Establishment of a designated area

- Any laboratory space where appropriate controls, personal protective equipment, and waste disposal receptacles are available.

#### Personal Protective Equipment

- Eye and Face Protection
  - Glasses or chemical splash proof goggles must be worn. Face shield if particularly dangerous.
- Gloves - Appropriate gloves must be worn.
- Protective Clothing
- Foot wear that cover top of feet.
- Additional protective clothing may be necessary - such as long sleeves, lab coats, or aprons.

#### Controls

- Fume Hoods and Glove Boxes
  - Fume hoods & glove boxes are preferred method of control with sash in lowest possible position.
  - Safety shielding is required if risk of explosion, splash hazard or a highly exothermic reaction.
  - Portable blast shields are acceptable.
- Eye Wash
  - Flush eyes for at least 15 minutes, holding eyes open.
  - Seek medical attention for further evaluation.
- Safety Showers/Handwashing Sinks
  - Rinse for minimum of 15 minutes.
  - Seek medical attention for further evaluation.
- Fire Extinguishers
  - Personnel should not use the fire extinguishers.

#### Emergency Procedures

- Notification
- Refer to the Incident Response and Reporting Protocol Form (we need to create one)
  - First responders are Public Safety: 508-626-4911 or 911.
  - Major Spill, Fire, Explosion, Injury Response
  - Alert others. Small spill can be cleaned by lab, studio or theater personnel, if trained. Read SDS.

- No attempt should be made to clean large spill or put out fire.
- Contact Public Safety 508-626-4911 or 911, for assistance.
- Remain on scene, but at safe distance, to help direct and discuss the situation with Public Safety.

#### Cleaning and Waste Disposal

- Cleaning
  - Wash hands and arms with soap and water.
  - The work area must be cleaned after use.
  - Disposable paper, gloves, paper towels, etc. must be labeled, and disposed of in the SAA.
- Waste Disposal
  - Materials must be disposed of as hazardous waste.

#### 15.4.4. Mutagens

##### Description

- Mutagens are chemicals that cause permanent changes in the amount or structure of the genetic material in a cell. Refer to a chemical's SDS to identify specific if it is classified as a mutagen.

##### Chemical Storage

- Store according to hazard classification.
- Minimize quantities stored.
- Should be disposed of whenever no longer required for current work.

##### Establishment of a designated area

- Any laboratory space where appropriate controls, personal protective equipment, and waste disposal receptacles are available.

##### Personal Protective Equipment

- Eye and Face Protection
  - Glasses or chemical splash proof goggles must be worn. Face shield if particularly dangerous.
- Gloves - Appropriate gloves must be worn.
- Protective Clothing
- Foot wear that cover top of feet.
- Additional protective clothing may be necessary - such as long sleeves, lab coats, or aprons.

##### Controls

- Fume Hoods and Glove Boxes
  - Fume hoods & glove boxes are preferred method of control with sash in lowest possible position.
  - Safety shielding is required if risk of explosion, splash hazard or a highly exothermic reaction.
  - Portable blast shields are acceptable.
- Eye Wash
  - Flush eyes for at least 15 minutes, holding eyes open.
  - Seek medical attention for further evaluation.
- Safety Showers/Handwashing Sinks
  - Rinse for minimum of 15 minutes.
  - Seek medical attention for further evaluation.
- Fire Extinguishers
  - Personnel should not use the fire extinguishers.

##### Emergency Procedures

- Notification
- Refer to the Incident Response and Reporting Protocol Form (we need to create one)
  - First responders are Public Safety: 508-626-4911 or 911.
  - Major Spill, Fire, Explosion, Injury Response
  - Alert others. Small spill can be cleaned by lab, studio or theater personnel, if trained. Read SDS.
  - No attempt should be made to clean large spill or put out fire.
  - Contact Public Safety 508-626-4911 or 911, for assistance.
  - Remain on scene, but at safe distance, to help direct and discuss the situation with Public Safety.



Cleaning and Waste Disposal

- Cleaning
  - Wash hands and arms with soap and water.
  - The work area must be cleaned after use.
  - Disposable paper, gloves, paper towels, etc. must be labeled, and disposed of in the SAA.
- Waste Disposal
  - Materials must be disposed of as hazardous waste.

#### 15.4.5. Neurotoxins

##### Description

- Chemicals which produce their primary toxic effects on the nervous system. Some of these chemicals include, but are not limited to mercury and carbon disulfide. Refer to a chemical's SDS to identify specific if it is classified as a neurotoxin.

##### Chemical Storage

- Store according to hazard classification.
- Minimize quantities stored.
- Should be disposed of whenever no longer required for current work.

##### Establishment of a designated area

- Any laboratory space where appropriate controls, personal protective equipment, and waste disposal receptacles are available.

##### Personal Protective Equipment

- Eye and Face Protection
  - Glasses or chemical splash proof goggles must be worn. Face shield if particularly dangerous.
- Gloves - Appropriate gloves must be worn.
- Protective Clothing
- Foot wear that cover top of feet.
- Additional protective clothing may be necessary - such as long sleeves, lab coats, or aprons.

##### Controls

- Fume Hoods and Glove Boxes
  - Fume hoods & glove boxes are preferred method of control with sash in lowest possible position.
  - Safety shielding is required if risk of explosion, splash hazard or a highly exothermic reaction.
  - Portable blast shields are acceptable.
- Eye Wash
  - Flush eyes for at least 15 minutes, holding eyes open.
  - Seek medical attention for further evaluation.
- Safety Showers/Handwashing Sinks
  - Rinse for minimum of 15 minutes.
  - Seek medical attention for further evaluation.
- Fire Extinguishers
  - Personnel should not use the fire extinguishers.

##### Emergency Procedures

- Notification
- Refer to the Incident Response and Reporting Protocol Form (we need to create one)
  - First responders are Public Safety: 508-626-4911 or 911.
  - Major Spill, Fire, Explosion, Injury Response
  - Alert others. Small spill can be cleaned by lab, studio or theater personnel, if trained. Read SDS.
  - No attempt should be made to clean large spill or put out fire.
  - Contact Public Safety 508-626-4911 or 911, for assistance.

- Remain on scene, but at safe distance, to help direct and discuss the situation with Public Safety.

Cleaning and Waste Disposal

- Cleaning
  - Wash hands and arms with soap and water.
  - The work area must be cleaned after use.
  - Disposable paper, gloves, paper towels, etc. must be labeled, and disposed of in the SAA.
- Waste Disposal
  - Materials must be disposed of as hazardous waste.

#### 15.4.6. Embryotoxins

##### Description

- Embryotoxins are chemicals that are toxic to embryos. Embryotoxins are agents that may kill, deform, retard the growth, or adversely affect the development of specific functions in the unborn child and cause postnatal functional problems. Embryotoxins include mercury compounds, lead compounds and other heavy metals, and organic compounds such as formamide. Refer to a chemical's SDS to identify specific if it is classified as an embryotoxin.

##### Chemical Storage

- Store according to hazard classification.
- Minimize quantities stored.
- Should be disposed of whenever no longer required for current work.

##### Establishment of a designated area

- Any laboratory space where appropriate controls, personal protective equipment, and waste disposal receptacles are available.

##### Personal Protective Equipment

- Eye and Face Protection
  - Glasses or chemical splash proof goggles must be worn. Face shield if particularly dangerous.
- Gloves - Appropriate gloves must be worn.
- Protective Clothing
- Foot wear that cover top of feet.
- Additional protective clothing may be necessary - such as long sleeves, lab coats, or aprons.

##### Controls

- Fume Hoods and Glove Boxes
  - Fume hoods & glove boxes are preferred method of control with sash in lowest possible position.
  - Safety shielding is required if risk of explosion, splash hazard or a highly exothermic reaction.
  - Portable blast shields are acceptable.
- Eye Wash
  - Flush eyes for at least 15 minutes, holding eyes open.
  - Seek medical attention for further evaluation.
- Safety Showers/Handwashing Sinks
  - Rinse for minimum of 15 minutes.
  - Seek medical attention for further evaluation.
- Fire Extinguishers
  - Personnel should not use the fire extinguishers.

##### Emergency Procedures

- Notification
- Refer to the Incident Response and Reporting Protocol Form (we need to create one)
  - First responders are Public Safety: 508-626-4911 or 911.
  - Major Spill, Fire, Explosion, Injury Response
  - Alert others. Small spill can be cleaned by lab, studio or theater personnel, if trained. Read SDS.
  - No attempt should be made to clean large spill or put out fire.

- Contact Public Safety 508-626-4911 or 911, for assistance.
- Remain on scene, but at safe distance, to help direct and discuss the situation with Public Safety.

#### Cleaning and Waste Disposal

- Cleaning
  - Wash hands and arms with soap and water.
  - The work area must be cleaned after use.
  - Disposable paper, gloves, paper towels, etc. must be labeled, and disposed of in the SAA.
- Waste Disposal
  - Materials must be disposed of as hazardous waste.

#### 15.4.7. Biohazardous Materials

##### Description:

- Biohazardous wastes may include solid biomedical waste (e.g., plasticware, tubing, pipette tips, gloves), sharps waste (e.g., needles, glass, scalpels, razor blades), liquid biomedical waste (e.g., cultures, stocks, vaccines), and pathological and animal wastes (e.g., body fluids, carcasses, tissues, bedding).

##### Personal Protective Equipment:

- Observe laboratory hygiene practices appropriate to and commensurate with any hazards posed by the given waste, particularly if the wastes are mixed and/or contaminated with other hazardous chemicals/materials for which a separate SOP exists.

##### Controls:

- Work in laboratory spaces where adequate controls are in place that are appropriate to and commensurate with any hazards posed by the given waste, particularly if the wastes are mixed and/or contaminated with other hazardous chemicals/materials for which a separate SOP exists.

##### Emergency Procedures:

- Notification
- Refer to the Incident Response and Reporting Protocol Form (we need to create one)
  - First responders are Public Safety: 508-626-4911 or 911.

##### Storage, Cleaning and Waste Disposal:

- “Red Bag” Waste Stream
  - *Solid biomedical or biological (i.e., pathological and animal) wastes:* These wastes shall be collected, stored, and packaged in designated waste accumulation boxes lined with red medical waste bags. Both the boxes and bags are provided by the vendor of choice that handles the pickup and disposal of such wastes.
  - *Liquids or soggy materials:* These wastes should not be placed inside red bag-lined boxes.
  - *Loose sharp items:* These should not be placed inside red bag-lined boxes as they could puncture the red bags.
  - *Materials of a higher hazard:* In the event that a material poses a higher hazard, it should be decontaminated prior to placement in red bag-lined containers.
  - The laboratory technician shall manage this waste stream, ensuring that extra boxes and red bags are available in the designated accumulation areas and that a fully-assembled and lined box is provided for use. The technician shall also ensure that an appropriate cover is placed over the open box during accumulation and that the box is ultimately tape-sealed for disposal. The technician shall then notify EH&S when boxes have become full and need to be disposed of.
- “Orange Bag” Waste Stream
  - *Biomedical or biological wastes that require sterilization in an autoclave (i.e., cultures on solid media):* These wastes shall be accumulated in orange biohazardous waste bags, which are designed specifically for this purpose.
  - *Liquids:* Liquid materials should not be placed in these bags. Instead, liquids may be discarded down the sanitary drain once either sterilized by autoclaving or decontaminated with bleach, so long as there is no risk of clogging the drain.
  - *Loose sharp items:* These should not be placed inside orange bag-lined boxes as they could puncture the orange bags

- The laboratory technician shall manage this waste stream, including its packaging and storage in designated accumulation areas. When applicable, the technician shall sterilize the materials prior to final disposal.

#### 15.4.8. Allergens

##### Description

- An allergen (sensitizer) is a substance that causes exposed people to develop an allergic reaction in normal tissue after repeated exposure to the substance. Examples of allergens include diazomethane, chromium, nickel, formaldehyde, isocyanates, arylhydrazines, benzylic and allylic halides, and many phenol derivatives. Refer to a chemical's SDS to identify specific if it is classified as an allergen or sensitizer.

##### Chemical Storage

- Store according to hazard classification.
- Minimize quantities stored.
- Should be disposed of whenever no longer required for current work.

##### Establishment of a designated area

- Any laboratory space where appropriate controls, personal protective equipment, and waste disposal receptacles are available.

##### Personal Protective Equipment

- Eye and Face Protection
  - Glasses or chemical splash proof goggles must be worn. Face shield if particularly dangerous.
- Gloves - Appropriate gloves must be worn.
- Protective Clothing
- Foot wear that cover top of feet.
- Additional protective clothing may be necessary - such as long sleeves, lab coats, or aprons.

##### Controls

- Fume Hoods and Glove Boxes
  - Fume hoods & glove boxes are preferred method of control with sash in lowest possible position.
  - Safety shielding is required if risk of explosion, splash hazard or a highly exothermic reaction.
  - Portable blast shields are acceptable.
- Eye Wash
  - Flush eyes for at least 15 minutes, holding eyes open.
  - Seek medical attention for further evaluation.
- Safety Showers/Handwashing Sinks
  - Rinse for minimum of 15 minutes.
  - Seek medical attention for further evaluation.
- Fire Extinguishers
  - Personnel should not use the fire extinguishers.

##### Emergency Procedures

- Notification
- Refer to the Incident Response and Reporting Protocol Form (we need to create one)
  - First responders are Public Safety: 508-626-4911 or 911.
  - Major Spill, Fire, Explosion, Injury Response
  - Alert others. Small spill can be cleaned by lab, studio or theater personnel, if trained. Read SDS.
  - No attempt should be made to clean large spill or put out fire.



- Contact Public Safety 508-626-4911 or 911, for assistance.
- Remain on scene, but at safe distance, to help direct and discuss the situation with Public Safety.

#### Cleaning and Waste Disposal

- Cleaning
  - Wash hands and arms with soap and water.
  - The work area must be cleaned after use.
  - Disposable paper, gloves, paper towels, etc. must be labeled, and disposed of in the SAA.
- Waste Disposal
  - Materials must be disposed of as hazardous waste.

#### 15.4.9. Explosives

##### Description

- Explosive substances are materials that decompose under conditions of mechanical shock, elevated temperature, or chemical action, with the release of large volumes of gases and heat. Organic peroxides are among the most hazardous explosive substances. Refer to a chemical's SDS to identify specific if it is classified as an explosive.

##### Chemical Storage

- Store in a cool, dry location.
- Segregate from other chemicals.
- Minimize quantities stored.
- Storage containers should be checked frequently.
- Should be disposed of whenever no longer required for current work.

##### Establishment of a designated area

- Any laboratory space where appropriate controls, personal protective equipment, and waste disposal receptacles are available.

##### Personal Protective Equipment

- Eye and Face Protection
  - Glasses or chemical splash proof goggles must be worn. Face shield if particularly dangerous.
- Gloves - Appropriate gloves must be worn.
- Protective Clothing
- Foot wear that cover top of feet.
- Additional protective clothing may be necessary - such as long sleeves, lab coats, or aprons.

##### Controls

- Fume Hoods and Glove Boxes
  - Fume hoods & glove boxes are preferred method of control with sash in lowest possible position.
  - Safety shielding is required if risk of explosion, splash hazard or a highly exothermic reaction.
  - Portable blast shields are acceptable.
- Eye Wash
  - Flush eyes for at least 15 minutes, holding eyes open.
  - Seek medical attention for further evaluation.
- Safety Showers/Handwashing Sinks
  - Rinse for minimum of 15 minutes.
  - Seek medical attention for further evaluation.
- Fire Extinguishers
  - Personnel should not use the fire extinguishers.

##### Emergency Procedures

- Notification
- Refer to the Incident Response and Reporting Protocol Form (we need to create one)
  - First responders are Public Safety: 508-626-4911 or 911.
  - Major Spill, Fire, Explosion, Injury Response
  - Alert others. Small spill can be cleaned by lab, studio or theater personnel, if trained. Read SDS.

- No attempt should be made to clean large spill or put out fire.
- Contact Public Safety 508-626-4911 or 911, for assistance.
- Remain on scene, but at safe distance, to help direct and discuss the situation with Public Safety.

#### Cleaning and Waste Disposal

- Cleaning
  - Wash hands and arms with soap and water.
  - The work area must be cleaned after use.
  - Disposable paper, gloves, paper towels, etc. must be labeled, and disposed of in the SAA.
- Waste Disposal
  - Materials must be disposed of as hazardous waste.
  - Waste explosives should be disposed of immediately; they should not be allowed to accumulate.

#### 15.4.10. Formaldehyde and Related Substances

##### Description

- Formalin and paraformaldehyde solutions can emit formaldehyde gas, a known human carcinogen and mutagen, and can irritate the eyes, respiratory tract, and skin. Working with paraformaldehyde powder (and, to a lesser extent, flakes or granules), can expose employees to paraformaldehyde dust, which is a strong irritant/sensitizer. Contact with these solutions or paraformaldehyde solids may also cause drying of the skin and/or allergic dermatitis. They are also flammable. The OSHA Permissible Exposure Limit for formaldehyde is 0.75 ppm for 8 hours or 2 ppm for 15 minutes. There is a substance-specific OSHA standard for formaldehyde, and an action limit of 0.5 ppm. Use in the smallest practical quantities for the work being performed. Labs handling moderate to large quantities of formaldehyde-containing solutions on a regular basis should contact EH&S at 508-626-4590 for assessment of exposure. Areas that handle only small (100 mL or less) pre-filled specimen containers, or that work with formaldehyde-containing solutions exclusively in a functioning chemical fume hood, have low potential for overexposure but should contact EH&S if there are concerns.

##### Chemical Storage

- Keep containers tightly closed and sealed as much as possible or until ready for use.
- Keep containers in a cool, well-ventilated area.
- Store in secondary containment with flammables, away from oxidizers, reducing agents, metals, and acids.
- Keep containers of PFA solid away from water.
- Avoid storing on the floor.
- Avoid ignition sources.

##### Establishment of a designated area

- Any laboratory space where appropriate controls, personal protective equipment, and waste disposal receptacles are available.

##### Personal Protective Equipment

- Eye and Face Protection
  - Glasses or chemical splash proof goggles must be worn. Face shield if particularly dangerous.
- Gloves - Appropriate gloves must be worn.
- Protective Clothing
- Foot wear that cover top of feet.
- Additional protective clothing may be necessary - such as long sleeves, lab coats, or aprons.
- Respiratory protection is generally not required for lab research, provided the appropriate controls are employed.

##### Controls

- Fume Hoods and Glove Boxes
  - Work with concentrated (>4% formaldehyde/paraformaldehyde) solutions only in a chemical fume hood.
  - Handle paraformaldehyde powder (and, preferably, granules or flakes) only in a chemical fume hood.
- Dilute solutions (<4% formaldehyde) may be used on the benchtop in small quantities.
- Eye Wash
  - Flush eyes for at least 15 minutes, holding eyes open.
  - Seek medical attention for further evaluation.

- Safety Showers/Handwashing Sinks
  - Rinse skin splashes containing  $\geq 1\%$  formaldehyde for minimum of 15 minutes.
  - Seek medical attention for further evaluation.

#### Emergency Procedures

- Notification
- Refer to the Incident Response and Reporting Protocol Form (we need to create one)
  - First responders are Public Safety: 508-626-4911 or 911.
  - Major Spill, Fire, Explosion, Injury Response
  - Alert others. Small spill can be cleaned by lab, studio or theater personnel, if trained. Read SDS.
  - No attempt should be made to clean large spill or put out fire.
  - Contact Public Safety 508-626-4911 or 911, for assistance.
  - Remain on scene, but at safe distance, to help direct and discuss the situation with Public Safety.

#### Cleaning and Waste Disposal

- Cleaning
  - Employees in the area should be prepared to clean up minor spills (leaking specimen containers up to 100 mL of 10% formalin or containers of 35% formalin  $> 100$  mL in a fume hood), including most spills confined to the chemical fume hood. Wearing double nitrile gloves, splash goggles, face shield and lab coat (and impermeable apron, if available), use absorbent pads to absorb spilled material. (For small spills of solid PFA, dampen the absorbent pad with methanol before placing over the spilled material and allow to sit for a few minutes before wiping up.) After spill has been completely absorbed, wash down contaminated area with soap and water at least two times.
  - Wash hands and arms with soap and water.
  - The work area must be cleaned after use.
  - Disposable paper, gloves, paper towels, etc. must be labeled, and disposed of in the SAA.
- Waste Disposal
  - Materials must be disposed of as hazardous waste.

#### 15.4.11. Methylene Chloride

##### Description

- Methylene chloride (i.e. dichloromethane) is a substance recognized by OSHA (29 CFR 1910.1052) to pose a particular hazard because exposure can cause central nervous system, liver, and cardiovascular effects. Exposure may not exceed 25 parts methylene chloride per million parts of air (25 ppm) as an eight-hour time-weighted average (8-hour TWA PEL) or 125 parts of methylene chloride per million parts of air (125 ppm) averaged over a 15-minute period (STEL). Its use is limited to small quantities or used in mixtures such that if it were released into a laboratory setting, its concentration in the laboratory air would not exceed 25 ppm as an eight-hour time-weighted average. It is a very volatile liquid that penetrates readily through standard nitrile laboratory gloves.

##### Chemical Storage

- Keep containers tightly closed and sealed as much as possible or until ready for use.
- Keep containers in a cool, well-ventilated area.
- Store in secondary containment with flammables, away from oxidizers, reducing agents, metals, and acids.
- Avoid storing on the floor.
- Avoid ignition sources.

##### Establishment of a designated area

- Any laboratory space where appropriate controls, personal protective equipment, and waste disposal receptacles are available.

##### Personal Protective Equipment

- Eye and Face Protection
  - Glasses or chemical splash proof goggles must be worn. Face shield if particularly dangerous.
- Gloves - Appropriate gloves must be worn. Fluorinated rubber gloves are the best. Nitrile gloves are not acceptable.
- Protective clothing (e.g. Long sleeve shirt or laboratory coat) must be worn when working with methylene chloride.
- Foot wear that cover top of feet. Skin must be protected from exposure.
- Additional protective clothing may be necessary - such as long sleeves, lab coats, or aprons.
- Respiratory protection is generally not required for lab research, provided the appropriate controls are employed.

##### Controls

- Fume Hoods
  - Work with methylene chloride and solutions containing methylene chloride only in a chemical fume hood.
- Eye Wash
  - Flush eyes for at least 15 minutes, holding eyes open.
  - Seek medical attention for further evaluation.
- Safety Showers/Handwashing Sinks
  - Rinse skin splashes for minimum of 15 minutes. Use soap and water.
  - Remove clothing that has been splashed and place the clothing in a well ventilated area.
  - Seek medical attention for further evaluation.
- Emergency Procedures
  - Notification

- Refer to the Incident Response and Reporting Protocol Form (we need to create one)
- First responders are Public Safety: 508-626-4911 or 911.
- Alert others. Small spill can be cleaned by lab, studio or theater personnel, by the application of a chemical absorbent (e.g. kitty litter)
- No attempt should be made to clean large spill of 4 liters or more. Evacuate the area and allow the laboratory ventilation system to change out the laboratory air.
- Remain on scene preferably outside the lab and discuss and help public safety with the situation,

#### Cleaning and Waste Disposal

- Cleaning
  - Employees in the area should be prepared to clean up minor spills Wearing double nitrile gloves, splash goggles, face shield and lab coat (and impermeable apron, if available), use absorbent pads or materials (e.g. kitty litter) to absorb spilled material.
  - Wash hands and arms with soap and water.
  - Disposable paper, gloves, paper towels, etc. must be placed in a plastic bag, labeled, and disposed of as a chemically contaminated solid and stored in the SAA.
- Waste Disposal
  - Contact the EH&S to make arrangements for the dispose of the chemically contaminated solids.