

FAIRFIELD UNIVERSITY

LABORATORY CHEMICAL HYGIENE PLAN

CHP
August 30, 2018

OSHA's Occupational Exposure to Hazardous Chemicals in Laboratories standard (29 CFR 1910.1450), referred to as the Laboratory standard, specifies the mandatory requirements of a Chemical Hygiene Plan (CHP) to protect laboratory workers from harm due to hazardous chemicals. The CHP is a written program stating the policies, procedures and responsibilities that protect workers from the health hazards associated with the hazardous chemicals used in that particular workplace.

**FAIRFIELD UNIVERSITY
LABORATORY CHEMICAL HYGIENE PLAN**

Plan last updated: August 30, 2018

Purpose: This Laboratory Chemical Hygiene Plan (known hereafter as the “Plan”) outlines the workplace safety and health measures for the safe use, storage, and disposal of hazardous chemicals in the laboratory. It is written to meet the specific safety and health requirements outlined in the federal regulation 29 CFR 1910.1450, Occupational Exposure to Hazardous Chemicals in Laboratories.

Scope: This Plan applies to all personnel of Fairfield University who use hazardous chemicals in a laboratory.

Fairfield University 2018

LABORATORY CHEMICAL HYGIENE PLAN
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PLAN ADMINISTRATION

Plan Administrator. The Plan Administrator (hereafter known as the “Administrator”) is qualified by training or experience and designated by Fairfield University to provide technical guidance in the Plan’s development and is authorized to implement and enforce the provisions of the Plan. The Administrator or a person or persons designated by the Administrator will provide all other personnel that work in the laboratory with health and safety information about the specific hazards found in the laboratory and assist laboratory workers in matters relating to chemical safety.

The Administrator may designate the chemical hygiene officer(s), laboratory manager(s), or project director(s) to implement any of the provisions of this Plan.

Chemical hygiene officer. The chemical hygiene officer will:

- Work with administrators and other employees to develop and implement appropriate chemical hygiene policies and practices.
- Monitor procurement, use, and disposal of chemicals used in the laboratory.
- See that appropriate audits are maintained including inventory control.
- Help project managers develop precautions, plan review and adequate facilities.
- Know the current legal requirements concerning regulated substances.
- Determine the required levels of protective apparel and equipment, this includes mandated PPE
- Ensure that facilities and training for use of any material being ordered are adequate

Laboratory Managers. The laboratory manager has overall responsibility for ensuring that workers comply with chemical hygiene requirements in the laboratory, including responsibility to:

- Ensure that workers know and follow the chemical hygiene rules that protective equipment is available and in working order, and that appropriate training has been provided.
- Provide regular, documented, formal chemical hygiene and housekeeping inspections including routine inspections of emergency equipment and eye washes.
- Know the current legal requirements concerning regulated substances and controlled substances

Project director. The project director has primary responsibility for chemical hygiene procedures for a particular operation or project, such as the Microbiology Program.

For a more details on the Microbiology Program, please refer to the Biology Department Safety Manual and the *Guidelines for Biosafety in Teaching Laboratories*, American Society for Microbiology.

Laboratory worker: Work study program, volunteer or employee. The laboratory worker will:

- Plan and conduct each operation in accordance with the chemical hygiene procedures in this Plan.
- Develop good personal chemical hygiene habits in accordance with departmental policy.

Plan evaluation

The Department of Environmental Health and Safety will annually review and evaluate the effectiveness of the Plan and update it as necessary to maintain its effectiveness.

Definitions — (From OSHA [1910.1450\(b\)](#))

Action level means a concentration designated in 29 CFR part 1910 for a specific substance, calculated as an eight (8)-hour time-weighted average, which initiates certain required activities such as exposure monitoring and medical surveillance.

Chemical Hygiene Officer means an employee who is designated by the employer, and who is qualified by training or experience, to provide technical guidance in the development and implementation of the provisions of the Chemical Hygiene Plan. This definition is not intended to place limitations on the position description or job classification that the designated individual shall hold within the employer's organizational structure.

Chemical Hygiene Plan means a written program developed and implemented by the employer which sets forth procedures, equipment, personal protective equipment and work practices that (i) are capable of protecting employees from the health hazards presented by hazardous chemicals used in that particular workplace and (ii) meets the requirements of paragraph (e) of this section.

Emergency means any occurrence such as, but not limited to, equipment failure, rupture of containers or failure of control equipment which results in an uncontrolled release of a hazardous chemical into the workplace.

Employee means an individual employed in a laboratory workplace who may be exposed to hazardous chemicals in the course of his or her assignments.

Hazardous chemical means any chemical which is classified as health hazard or simple asphyxiant in accordance with the Hazard Communication Standard (§1910.1200).

Health hazard means a chemical that 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); aspiration hazard. The criteria for determining whether a chemical is classified as a health hazard are detailed in appendix A of the Hazard Communication Standard (§1910.1200) and §1910.1200(c) (definition of "simple asphyxiant").

Laboratory means a facility where the "laboratory use of hazardous chemicals" occurs. It is a workplace where relatively small quantities of hazardous chemicals are used on a non-production basis.

Laboratory scale means work with substances in which the containers used for reactions, transfers, and other handling of substances are designed to be easily and safely manipulated by one person. "Laboratory scale" excludes those workplaces whose function is to produce commercial quantities of materials.

Laboratory-type hood means a device located in a laboratory, enclosure on five sides with a moveable sash or fixed partial enclosed on the remaining side; constructed and maintained to draw air from the laboratory and to prevent or minimize the escape of air contaminants into the laboratory; and allows chemical manipulations to be conducted in the enclosure without insertion of any portion of the employee's body other than hands and arms.

Laboratory use of hazardous chemicals means handling or use of such chemicals in which all of the following conditions are met:

(i) Chemical manipulations are carried out on a "laboratory scale;"

(ii) Multiple chemical procedures or chemicals are used;
(iii) The procedures involved are not part of a production process, nor in any way simulate a production process; and

(iv) "Protective laboratory practices and equipment" are available and in common use to minimize the potential for employee exposure to hazardous chemicals.

Mutagen means chemicals that cause permanent changes in the amount or structure of the genetic material in a cell. Chemicals classified as mutagens in accordance with the Hazard Communication Standard (§1910.1200) shall be considered mutagens for purposes of this section.

Physical hazard means a chemical that 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 (gas, liquid or solid); self-heating; organic peroxide; corrosive to metal; gas under pressure; in contact with water emits flammable gas; or combustible dust. The criteria for determining whether a chemical is classified as a physical hazard are in appendix B of the Hazard Communication Standard (§1910.1200) and §1910.1200(c) (definitions of "combustible dust" and "pyrophoric gas").

Protective laboratory practices and equipment means those laboratory procedures, practices and equipment accepted by laboratory health and safety experts as effective, or that the employer can show to be effective, in minimizing the potential for employee exposure to hazardous chemicals.

Reproductive toxins mean chemicals that affect the reproductive capabilities including adverse effects on sexual function and fertility in adult males and females, as well as adverse effects on the development of the offspring. Chemicals classified as reproductive toxins in accordance with the Hazard Communication Standard (§1910.1200) shall be considered reproductive toxins for purposes of this section.

Select carcinogen means any substance which meets one of the following criteria:

- (i) It is regulated by OSHA as a carcinogen; or
- (ii) It is listed under the category, "known to be carcinogens," in the Annual Report on Carcinogens published by the National Toxicology Program (NTP) (latest edition); or
- (iii) It is listed under Group 1 ("carcinogenic to humans") by the International Agency for Research on Cancer Monographs (IARC) (latest editions); or
- (iv) It is listed in either Group 2A or 2B by IARC or under the category, "reasonably anticipated to be carcinogens" by NTP, and causes statistically significant tumor incidence in experimental animals in accordance with any of the following criteria:
 - (A) After inhalation exposure of 6–7 hours per day, 5 days per week, for a significant portion of a lifetime to dosages of less than 10 mg/m³;
 - (B) After repeated skin application of less than 300 (mg/kg of body weight) per week; or
 - (C) After oral dosages of less than 50 mg/kg of body weight per day.

Hazard Identification

Hazard Assessment

Fairfield University laboratory employees may encounter various types of hazards, including chemical, biological, radioactive, and fire within their working environment. Individual properly trained in handling hazardous chemicals are better equipped to minimize the risk of exposure to themselves and other employees. They should assume an active role in maintaining a safe workplace and reporting an unsafe conditions or noncompliance with standard operating procedures to the laboratory manager or Department of Environmental Health and Safety. Each department must provide laboratory employees with information and training at the time of an employee's initial assignment to a work area where hazardous chemicals are present, and prior to assignments involving exposure to chemicals not previously encountered.

Employees must be informed of:

- The location and availability of this Chemical Hygiene Plan.
- The location and availability of any other safety manual distributed by the particular department, as well as other reference material on the hazards, safe handling, storage, disposal of hazardous chemicals found in the laboratory. This would include any SDS for the chemicals.
- The permissible exposure limits for OSHA-regulated substances (also available through EH&S), and signs and symptoms associated with exposures to hazardous chemicals used in the laboratory.
- Methods, observations and monitoring that may be used to detect the presence of a hazardous chemical.
- The measures they can take to protect themselves from these hazards, including specific procedures such as appropriate work practices, emergency procedures, and personal protective equipment (PPE) to be used. EH&S is available to consult with department heads or laboratory managers.

Exposure monitoring

Initial monitoring

This facility will monitor employee exposure to any substance that requires monitoring if there is reason to believe that exposure levels for that substance routinely exceed the action level, or in the absence of an action level, the PEL.

Periodic monitoring

If the initial monitoring discloses employee exposure to a substance over the action level or PEL, the Administrator or designee will immediately comply with the continued monitoring procedures prescribed by the regulation for such substance.

Employee notification

The Administrator or designee will, within 15 working days after the receipt of any monitoring results, notify the employee of these results in writing either individually or by posting results in an appropriate location that is accessible to employees.

Termination of monitoring

Monitoring may be terminated in accordance with the relevant regulation for the substance.

The need for regular monitoring of airborne contaminants in the laboratory is not usually justified or practical assuming that fume hoods and other appropriate methods of containment are used properly, safe work practices are followed judiciously, and all laboratory and support personnel practice good personal hygiene.

Contact the Laboratory Manager, Department Chairperson or the Director of Environmental Health and Safety for assistance when a concern arises over potential exposure to a chemical.

Chemical inventory

The Laboratory Manager will perform an **annual** chemical inventory that lists all hazardous chemicals in the laboratory. This list will be maintained by the laboratory manager in each department. The inventory will be updated whenever new chemicals are introduced in the laboratory or when a new chemical hazard is identified, the label will also be updated at this time. The list includes the name of the chemical, the manufacturer, the work area in which the chemical is used and housed, dates of use, and quantity used and the product identifier. The inventory will list chemicals that are classified as hazardous by:

- The Hazard Communication Standard (29 CFR 1910.1200), Appendices A and B (includes the Department of Transportation and the Environmental Protection Agency classifications); or
- A rating of 2 or greater on the National Fire Protection Association 704 System (NFPA) chemical hazard label.
- The hazard classification of the Global Harmonized System (GHS) section 2 of the Safety Data Sheet.

Safety data sheets (SDSs) for chemicals used or stored at the facility will be used to assist with the chemical identification and communicate hazards of the hazardous chemical.

The chemical list is located in each department and on: www.msdsonline.com

Username: fairfield

Password: safety

Department of Environmental Health and Safety will have access to chemical inventories in various departments on campus.

Container labeling

Each container of a hazardous chemical delivered to, used at, or shipped from the laboratory must be labeled with the following:

- Name, address, and telephone number of chemical supplier
- Product identifier
- Signal word
- Hazard statement(s)
- Precautionary statement(s)
- Pictogram(s)-Global Harmonized System
- In-house labels will be generated and printed off from our Safety Dashboard with MSDSOnline

All laboratory workers must be trained on the elements of the container labels of hazardous chemicals.

Container labels must be maintained by the Laboratory Manager. They must be legible, reflect the information on the SDS and updated as needed or during the annual inventory. Manufacturers' labels must not be defaced or removed unless the container is immediately labeled with the same required information. Any container without a label or with an illegible label must be reported to the lab manager immediately.

The Laboratory Manager will ensure that all chemical containers in the laboratory are labeled with the following information:

- The name of the chemical or stock solution
- The date of preparation
- Concentration
- The user's initials
- The appropriate pictogram as stated on the SDS

Secondary or temporary storage containers must be labeled with the same information as the original container chemical label.

SDS

A current SDS will be maintained for each chemical used in the laboratory and will be readily available for laboratory workers' review. If an SDS (MSDS) is not received at the time of initial shipment or if the SDS is not current, please contact the supplier, in writing, to request the SDS (MSDS). If an SDS (MSDS) is not received from the supplier in 15 days, notify **The Environmental Health & Safety and Fire Marshal's Office**. All new SDS's should be sent to the Office of Environmental Health and Safety.

All laboratory workers must be trained on the standard 16-section SDS format and to meet the new Hazard Communication 2012/Global Harmonized System requirements. The training will be conducted by the Department of Environmental Health and Safety via MSDSOnline.

Fairfield University complies with the OSHA Hazard Communication-GHS standard. All new SDS's should be sent to the Office of Environmental health and Safety.

SDSs are available in each department and online at www.msdsonline.com

Username: fairfield

Password: safety.

Backup System

The backup system for accessing SDS's (MSDS's) should the primary system fail is located in a folder in the individual laboratories and/or department files.

The steps for accessing the SDS's (MSDS) backup system are:

1. **Contact** the individual responsible for a specific science lab and/or department.

SAFE WORK PRACTICES

General practices

Laboratory Managers must ensure that all personnel under their direction possess the requisite knowledge, training, and education to safely handle hazardous chemicals in the laboratory. All laboratory personnel are responsible for following appropriate work practices when using hazardous chemicals.

Following are the general safe work practices that must be followed in all laboratory areas:

- Minimize all chemical exposures and do not underestimate the risk of exposure, remember most chemicals are toxic.
- Avoid unnecessary exposure to chemicals by any route (such as inhalation, skin, eyes, or needle stick).
- Keep food, beverages, cosmetics, and medication outside the lab.
- Protect your clothes and exposed skin by wearing laboratory coats that adequately cover your arms, legs and torso.
- Open-toed shoes, sandals, shorts, and other apparel that leave skin exposed are not appropriate when handling potentially hazardous chemicals. Therefore, are not allowed in the lab.
- Laboratory coats must **not** be worn outside the laboratory.
- Wear the appropriate gloves and eye/face protection whenever handling hazardous chemicals; these items should not be worn outside the laboratory.
- Ensure unimpeded access to safety showers and eyewash stations.
- Emergency eyewash and shower stations must be installed and tested in accordance to the ANSI Z358.1 compliance standard. This must be documented and easily accessible.
- Remove gloves carefully and use the proper disposal procedure.
- Thoroughly wash hands and forearms after finishing work and before leaving the laboratory.
- Use only an approved chemical fume hood when opening, pouring, or handling hazardous chemicals. Do not vent chemicals bottles on a regular basis in the fume hood.
- Keep all doors to the laboratory closed; open laboratory doors can degrade hood performance and appropriate air flow through the building. Do not prop laboratory doors open.

- Do not use or store chemicals or compressed gas in cold rooms or warm rooms since they have contained, recirculated atmospheres. Keep chemicals stored safely and away from the general public.
- Never pipette by mouth.
- Transport laboratory chemicals using bottle carriers and suitable carts.
- Follow the established procedures for the decontamination and safe movement of scientific and medical equipment.
- Maintain proper oversight of inexperienced personnel working with potentially hazardous chemicals.
- Do not work alone in a laboratory. Do not enter laboratory after hours.
- Laboratory work must be performed during established hours unless written permission is obtained in advance and proctoring or supervisory issues are worked out.
- Contact the Laboratory Manager for clearance of the workspace when personnel must enter laboratories to perform required services such as maintenance.
- Those who have access to restricted areas, including laboratories, are responsible for the behavior and safety of anyone they admit into the area, and leaving the area safe when work is completed.
- Remove hazardous materials from equipment or facilities to be serviced and forewarn service personnel of the need for PPE or work practices.
- Decontaminate or disinfect equipment when possible; notify a supervisor if the equipment could not be properly decontaminated.
- Follow the hazardous material spill procedure immediately in the event of a hazardous chemical spill.

Chemical fume hood safe practices

The chemical fume hood will provide adequate containment for most chemical operations.

Workers will comply with the following safety procedures when using fume hoods:

- Conduct all work within the chemical fume hood at a distance of at least 6 inches behind the face opening, and position the vertical sliding sash at the height specified on the certification sticker.
- Avoid blocking the airfoil, baffles, and rear ventilation slot.
- Support large items with legs to minimize airflow disruption across the work surface.
- Minimize foot traffic around the hood during use, since passing in front of the hood during operation disrupts the airflow and may pull contaminants out of the hood.
- Do not use the fume hood for storage.

Respirator use

See the *Personal protective equipment (PPE)* section of this Plan for more information.

PURCHASE OF HAZARDOUS CHEMICALS

Following are the guidelines for purchasing hazardous chemicals for laboratory use:

- Purchase only what you can reasonably expect to use during the next 6 months.
- Buy what you specifically need. It is often possible to buy premade molar and normal solutions, thereby reducing the likelihood of waste.
- Purchase containers in the smallest practical size. Although the cost may be slightly greater, significant savings are realized in reduced disposal cost and safer storage.
- Purchase chemicals in plastic containers and avoid glass containers; if this is not possible, purchase shatter-resistant plastic-coated bottles.
- Follow all Purchasing Department requisition procedures.
- Read container labels; most of the information that you will need to handle and store the chemical is found on the manufacturer's label.
- Obtain and read the SDS for each of the chemicals that you use.
- Rotate the chemical inventory. Indicate the date received, the date opened, and pay particular attention to the expiration date. Stored chemicals should be inspected periodically for deterioration and container integrity. For example, ether must be dated twice: once when it is received and again when it is opened.

STORAGE OF HAZARDOUS CHEMICALS

The procedures below must be followed when storing hazardous chemicals in the laboratory:

- Temperature-sensitive, volatile, or flammable chemicals must be kept in explosion-safe or explosion-proof refrigerators.
- All flammable chemicals must be stored in an approved flammable storage cabinet. Contact the Laboratory Manager for information about storage cabinets.
- All poisonous chemicals must be locked in an approved poisonous cabinet.
- All hazardous laboratory chemicals must be stored below eye level. This procedure greatly reduces the likelihood of something falling from above, breaking, and contaminating the laboratory or causing eye or other injuries.
- Avoid placing any chemical container in direct sunlight, underneath a sink, or near heat sources.
- Store hazardous chemicals in cabinets with doors rather than on open shelves.
- Do not store chemicals on laboratory bench tops or in chemical fume hoods.
- Keep all chemical containers off floors, carts, and electrical equipment.
- Segregate chemicals into their respective hazard categories: corrosive, flammable, reactive, or toxic. Physically separate incompatible chemicals. Nitric Acid should be isolated.
- Keep chemicals stored safely and away from the general public. Locked if possible.
- Hazardous substances must be kept in an area designated for their storage and use.

Fume hood storage

Do not store chemicals or equipment in the hood since these items can block the air slots and compromise the operation of the hood. Shelving units specifically designed to be used in chemical fume hoods are available when authorized for such use.

DISPOSAL OF HAZARDOUS CHEMICALS

Following are the procedures for disposing of hazardous chemicals:

- Most chemicals are too toxic to be disposed of in the sink or trash. Obtain a waste container from the laboratory manager for proper disposal.
- Do not dispose of chemicals by evaporation.
- Do not store hazardous waste in the fume hood.
- Properly collect, tag, and date waste.
- Waste containers should be transported in a secondary container and a proper cart with sides.
- Once a hazard is determined to be waste, the lab manager will move item to the back room of BNW GR48 and log it in.
- No student's workers should transport waste down to GR48.
- Once a chemical is logged into the waste room, do not remove it.
- Keep chemical waste containers closed and sealed with proper caps.
- Use drip pans under waste collection containers to prevent spills.
- Do not place open containers in the waste room.

Contact the laboratory manager or Department of Environmental Health and Safety if there are any questions regarding what may be approved to discard down the drain or proper disposal. Hazardous Chemical waste will be removed from the University as needed. The University quantified by the DEEP and EPA as an except small quantity generator.

Exposure Control

This facility will ensure that any employee exposures to airborne contaminants in the laboratory do not exceed the Permissible Exposure Limits (PELs) or the recommended Threshold Limit Values (TLVs) when there is no PEL.

Hazardous chemicals may be used only in laboratory facilities specifically designed and engineered for such work. They may not be used in areas where their use is prohibited, including offices, storage rooms, shared equipment areas, cold rooms, and other areas lacking the appropriate hazard control facilities and a proper means of ventilation.

Ventilation systems

Local exhaust ventilation systems such as fume hoods and slot hoods are the primary method of controlling airborne exposure to hazardous chemicals in the laboratory.

All fume hoods must meet the fume hood design specifications authorized by the Administrator or designee. All fume hoods must be properly maintained and serviced.

Any alteration affecting a local exhaust ventilation system or associated ductwork must be approved by the Department of Environmental Health and Safety *before* the system's modification. Ductless chemical fume hoods are not to be used in laboratories. Captured organic vapors begin to desorb from ductless chemical fume hood charcoal filters shortly after adsorption

occurs, and some degree of breakthrough or failure to capture occurs during introduction of vapor into the hood.

Chemical-sensitive personnel

Personnel who are pregnant or considering becoming pregnant may have special concerns about working with chemicals that have potential reproductive hazards. Such concerns can be discussed with the department supervisor, manager or Chairperson.

PPE

PPE is an essential means of worker protection and will be used in combination with physical containment devices such as fume hoods at our laboratory.

See the **Hazard assessment** section of this Plan for more information about the hazard identification and PPE selection process. Information on the selection and use of PPE is also presented in the departmental training procedures. ***Always*** refer back to the SDS to ensure proper PPE is being used.

All types of PPE, including chemical resistant gloves, aprons, and lab coats, eye and face protection, are available to all employees at no cost to the employee.

General PPE practices

Laboratory workers must:

- Wear gloves whenever there is a potential for direct skin contact with blood, hazardous chemicals, or infectious materials.
- Wear lab coats only in the laboratory area and button them to protect clothing. Contact laboratory manager to obtain a lab coat.
- Wear an impervious apron in areas where there is a high risk for chemical splashes.
- Remove all PPE immediately after leaving the work areas (or as soon as possible) and put clothing in the laundry hamper located in the laboratory.
- Wear masks and eye protection or chin-length face shields to prevent contamination from splashes or sprays of blood, infectious materials, or hazardous chemicals whenever there is a potential for eye, nose, or mouth contamination.
- Wear all appropriate PPE in accordance to section 8 of the SDS.
- Follow all project- or area-specific PPE requirements.

Gloves

Disposable gloves are one of the most commonly used types of PPE. The proper use of disposable gloves provides protection to the wearer by providing a barrier to potential hazards and product protection. All laboratory personnel are responsible for following the appropriate work practices when using disposable gloves. All workers must follow safe work practices when using gloves. Example practices include:

- Remove gloves carefully and use the proper disposal procedure.
- Thoroughly wash hands and forearms upon completion of work and before leaving the laboratory.

- Do not reuse disposable gloves.
- Disposable gloves that become visibly contaminated or are suspected of being contaminated with hazardous materials must be replaced as soon as possible.
- Gloves contaminated with hazardous materials must be disposed of in accordance with laboratory waste disposal rules and policies.
- All used disposable gloves must be treated as potentially contaminated and disposed of appropriately.
- Gloves must not be worn in common-use areas except in emergency situations or in rare situations when conditions warrant their use.

Safety glasses

Safety glasses that provide protection from flying objects are available from the laboratory manager. Goggles and face shields are available and must be worn if there is a potential for a chemical splash. All safety goggles/glasses must meet the ANSI Standard Z87.1.

Respirators

This facility will provide, at no cost to the employee, respiratory protection when:

- The best available engineering controls fail to adequately reduce employee exposure to respiratory hazards.
- Substitution of respiratory hazards with less hazardous elements is not feasible.
- Modifications in hazardous operations fail to reduce exposures to below regulated or acceptable levels.

Respirators must not be used in the laboratory without prior approval by the Department of Environmental Health and Safety. Laboratory managers are not authorized to select or recommend the use of respiratory protection, regardless of the type.

Laboratory workers must contact the Department of Environmental Health and Safety if they feel that they may need respiratory protection.

EMERGENCY RESPONSE

Emergency Action Plan

This facility has developed an emergency action plan and evacuation procedures for this facility.

See the attached *Emergency Services Personnel Contact Information* form for information about whom to contact in an emergency.

Spill response

This facility has developed procedures for responding to chemical spills in the laboratory.

Spill

The following procedure must be followed by all employees when a spill that involving chemicals occurs:

1. Notify Department of Public Safety 203-254-4000 campus extension 4090

2. Notify Department of Environmental Health and Safety 203-254-4000 campus extension 2546
3. Immediately notify the laboratory manager.
4. Contain the spill with available equipment (e.g., pads, booms, and absorbent).
5. Secure the area and alert other site personnel.
6. Do not attempt to clean the spill unless trained to do so.
7. Attend to injured personnel and call the medical emergency number, if required.
8. Evacuate the building as necessary.
9. Emergency response 24 hours call CleanHarbors: 1-800-645-8265

See Appendix II:

Trifecta Environmental Associates Management, Inc.

Jill Tuchmann Peckham

PO Box 1281

Cromwell, CT 06416

(860) 810-3395

Email: m_management@sbcglobal.net

Chase Environmental Group, Inc

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500 Four Rod Rd., Suite 108

Berlin, CT 06037

Office (860) 505-8109

Mobile (860) 306-0195

www.chaseenv.com

scannata@chaseenv.com

CleanHarbors

Emergency Spill Response

770 Derby Ave.

Seymour, CT 06483

1-800-OIL-TANK

1-800-645-8265

www.cleanharbors.com

First aid

This facility will provide prompt emergency medical services and first-aid support to all personnel at the workplace who are injured or become ill.

Department of Public Safety (DPS) will provide prompt medical attention in case of injury or illness to employees. The proper equipment for transportation of the injured person to a physician or hospital is available. For emergencies contact:

DPS 203-254-4090 or campus extension 4090

Fairfield Emergency Dispatch 911

MEDICAL EXAMINATION AND INFORMATION

The Office of Human Resources will identify a licensed physician or a medical professional under the direct supervision of a licensed physician to perform medical examinations and consultations for laboratory workers who are or may be exposed to hazardous chemicals. The examinations and consultations will be performed at no cost to the employee, without loss of pay, and at a time and place reasonable to the employee.

Evaluation criteria

An employee will be sent for medical examination when either:

- The employee develops signs or symptoms associated with a hazardous chemical exposure;
- Exposure monitoring reveals an exposure level routinely above the action level; *or*
- An event takes place in the work area, such as a spill, leak, or an explosion, resulting in hazardous chemical exposure.

Exposure information

The Laboratory Manager will provide the following information to the attending physician:

- The identity of the hazardous chemicals to which the employee may have been exposed;
- A description of the conditions under which the exposure occurred, including quantitative exposure data, when available;
- A description of the signs and symptoms of the exposure; *and*
- Copies of SDSs for the chemicals to which the employee was potentially exposed.

Physician responsibilities

The physician will provide to the Office of Human Resources a written opinion that includes:

- Any recommendations for further medical follow-up
- Results of the medical examination and any associated tests
- Any medical conditions that may be revealed in the course of the examination that may place the employee at increased risk as a result of the exposure to a hazardous chemical found in the workplace
- A statement by the physician that the employee has been informed of the consultation and examination results and any medical condition that may require further examination or treatment

The physician will not reveal to the Office of Human Resources any findings unrelated to the exposure.

TRAINING AND INFORMATION

Employees will be provided with information and training to ensure that they understand the hazards of chemicals present in their work area and know how to control or avoid such hazards. The information and training will be provided at the time of an employee's initial assignment to a work area where hazardous chemicals are present and before assignments involving new exposure situations.

Information

The following information will be provided to laboratory employees:

- The contents of the Occupational Exposure to Hazardous Chemicals in Laboratories regulation.
- The location and availability of this Plan.
- The PELs for regulated substances or recommended exposure limits for other hazardous chemicals where there is no applicable PEL.
- Signs and symptoms associated with exposures to hazardous chemicals used in the laboratory.
- The location and availability of known reference material on the hazards, safe handling, storage, and disposal of hazardous chemicals found in the laboratory, including SDSs received from the chemical supplier.
- The ability to look up any SDS on: www.msdsonline.com
Username: fairfield
Password: safety

Training

Training on the following topics will be provided to laboratory employees through a combination of computer, classroom, and hands-on instruction:

- Methods and observations used to detect the presence or release of a hazardous chemical, such as monitoring conducted by the employer, continuous monitoring devices, and the visual appearance or odor of hazardous chemicals when being released.
- The physical and health hazards of chemicals in the work area.
- The measures employees can take to protect themselves from these hazards, including the appropriate work practices, emergency procedures, and PPE needed to protect themselves from exposure to hazardous chemicals.
- Individual laboratory managers will be responsible for training specific to their departments.
- Training is available through the Department of Environmental Health and Safety at www.msdsonline.com
- The Department of Environmental Health and Safety will maintain all training records.
- The applicable details of the Plan.

Refresher training

Refresher information and training will be provided to employees whenever laboratory processes or chemicals change or whenever an employee demonstrates lack of knowledge or proficiency in carrying out the requirements of this Plan. Annual training of Hazard Communication-GHS 2012 will be conducted by the Department of Environmental Health and Safety at www.msdsonline.com

PARTICULARLY HAZARDOUS CHEMICALS

This facility has adopted special rules and safe work practices for laboratory workers who handle or use particularly hazardous chemicals. Such chemicals include select carcinogens, reproductive toxins, and chemicals that have a high degree of acute toxicity.

Specific information about particularly hazardous chemicals is contained in SDSs and is also available on www.msdsonline.com

Username: fairfield

Password: safety

The Laboratory Manager is responsible for ensuring that appropriate precautions are taken when working with particularly hazardous chemicals. If assistance is needed, contact the Department of Environmental Health and Safety.

Safe work practices

The Laboratory Manager will implement the following safe work practices for particularly hazardous chemicals used, handled, or stored at the laboratory:

- Control access to the laboratory through the use of appropriate signs that warn of the hazards and indicate the precautions or approvals necessary for entry.
- Provide keys or card reader access to essential personnel only, and deny access when they no longer require it. This should be reviewed every semester.
- Contact the department Chairperson to determine if medical surveillance may be warranted if toxicologically significant quantities of a particularly hazardous substance are used on a routine or frequent basis.
- Maintain an accurate record of the workers who use these substances and the amounts used and stored in the laboratory.
- Contact the Department of Environmental Health and Safety for assistance with specialized waste disposal.
- Protect work surfaces from contamination through the use of disposable, absorbent, plastic-backed paper. Replace paper when contaminated (plastic side down) and handle as hazardous waste.
- Properly disinfect work areas daily, as needed.
- Use additional containment devices, such as shielding or protective filters, to safely handle, store, or protect equipment and workers when using these chemicals.

Secondary containers

- Keep particularly hazardous substances in a secondary container to help prevent breaks and spills.
- The secondary container should be opened only inside a chemical fume hood.

- Attach an appropriate hazard warning label to this secondary container to alert others of the chemical contained therein and the need for special precautions: for example, “Warning—Cancer Hazard” or “Highly Toxic” with the appropriate GHS pictogram.

PPE

- Wear appropriate PPE, including gloves, eye/face protection, and other protective apparel or equipment, as needed. Apparel includes impervious gowns, aprons, or gauntlets.
- Remove all protective apparel and thoroughly wash hands, forearms, face, and neck upon completion of work and before leaving the laboratory.

Prior approval for work with particularly hazardous chemicals

Prior approval is required when working with particularly hazardous chemicals and when there is a significant risk of exposure. Prior approval is obtained through the Department Chair and Department of Health and Safety.

Criteria for prior approval

This oversight process is followed when the proposed work involves hazardous chemicals that meet one or more of the following criteria:

- Capable of causing severe, acute, or lethal effects upon exposure by any route in quantities of 50 micrograms/kilogram or less.
- Highly unstable or, when combined with other compounds in the procedure, explosive.
- May undergo chemical or physical changes during routine use and generate by-products that may overcome standard control measures or may penetrate available PPE to cause severe, acute, or lethal injuries.
- Present a unique hazard or are used in an operation that requires approval above the level of the laboratory supervisor.

Safety protocol

When one or more of the criteria above are met, the Administrator or designee must develop a specific written safety protocol and submit it to the Department of Environmental Health and Safety, Department Chairperson for review before beginning work.

The safety protocol should include:

- A thorough description of the chemical(s) to be used, including the potential physical and health effects.
- A step-by-step review of the work to be performed.
- A list of the available engineering controls and PPE.
- Provisions for proper labeling, storage, and waste disposal.
- Decontamination procedures.
- Expected actions in the event of an emergency.

Training

Evidence of employee training on the established safety protocol must be documented and kept on file with this Plan. Training documentation must include the date the training was provided and the names of personnel trained.

This training is provided by the Department of Environmental Health and Safety.

Training is available through www.msdsonline.com

RECORDKEEPING

The Department of Environmental Health and Safety will maintain and oversee all of the following records:

- Chemical inventories
- SDSs
- Hazardous waste inventories
- Waste disposal manifests and records
- Accurate records for each employee who undergoes environmental exposure monitoring, medical consultations, and examinations, including all tests and the written opinions of physicians.
- Employee and supervisor training records.
- Exposure monitoring records that are not related to specific employees.
- Records of safe work practices, safety protocols, and prior approvals related to particularly hazardous chemicals.

Appendix I:

Standard Operating Procedures (SOP) for Pyrophoric Chemicals:

- a. Pyrophoric products are chemicals that will ignite in air below 130F. No Added heat, shock or friction is necessary for combustion. Common solids are sodium, phosphorous, lithium hydride etc.
- b. Special Care should be taken to store these products under an inert atmosphere or solvents as deemed appropriate. Flammable safety cabinets should always be used. Excess product should be handled in ways to avoid impurities, mixtures. Storage should not occur near sources of ignition, high heat areas or open flames.
- c. All appropriate Personal protective Equipment (PPE) should be in place prior to any work being performed. All engineered controlled protective devices (safety showers, fume hoods, etc.) should be in good working order, clear and useable, upon need.
- d. Please refer to the Safety Data Sheets (SDS's) prior to work for any specific procedures. Note and take all necessary fire, explosion, precautions. Have the proper fire extinguishing agent available and in proper order.
- e. If an accident occurs remain calm, turn off all ignition sources, and vacate the laboratory immediately. Notify the proper authority of any accidents in any labs. Call DPS at x4090, 203

254 4090. Remain on the scene but in a safe environment, re-lay all information to the responding agencies.

- f. Note: at all times the proper SDS information shall be present for emergencies.

Specific Chemical Incompatibilities and Instabilities

These reagents should be dated, handled according to prescribed storage conditions, and disposed of after use:

Chemical	Chemicals Incompatible with*
Acetic Acid	Nitric acid, peroxides, permanganates, ethylene glycol, hydroxyl compounds, perchloric acid, or chromic acid
Acetone	Concentrated sulfuric and nitric acid
Acetylene	Bromine, chlorine, fluorine, copper, silver, mercury and their compounds
Alkali Metals	Carbon tetrachloride, carbon dioxide, water, halogens
Alkaline Metals (powdered aluminum or magnesium)	Carbon tetrachloride, or other chlorinated hydrocarbons, halogens, carbon dioxide
Ammonia, Anhydrous	Mercury, hydrogen fluoride, calcium hypochlorite, chlorine, bromine
Ammonium Nitrate	Acids, flammable liquids, metal powders, sulfur, chlorates, any finely divided organic or combustible substance
Aniline	Nitric acid and hydrogen peroxide
Bromine, Chlorine	Ammonia, petroleum gases, hydrogen, sodium, benzene, finely divided metals
Carbon, activated	Calcium hypochlorite and all oxidizing agents
Chlorates	Ammonium salts, acids, metal powders, sulfur, and finely divided organic or combustible substances
Chlorine dioxide	Ammonia, methane, phosphine, hydrogen sulphide
Chromic acid	Glacial acetic acid, camphor, glycerin, naphthalene, turpentine, lower molecular weight alcohols, and many flammable liquids
Copper	Acetylene and hydrogen peroxide
Cyanides	Acids and alkalines

Flammable liquids	Ammonium nitrate, chromic acid, hydrogen peroxide, sodium peroxide, nitric acid and the halogens
Hydrocarbons (propane, benzene, gasoline)	Fluorine, chlorine, bromine, sodium peroxide and chromic acid
Hydrofluoric Acid	Ammonia(aqueous or anhydrous)
Hydrogen Peroxide	Most metals and their salts, alcohols, organic substances, any flammable substances
Hydrogen Sulfide	Oxidizing gases, fuming nitric acid
Iodine	Acetylene, ammonia, hydrogen
Mercury	Acetylene, ammonia
Nitric Acid	Acetic acid, hydrogen sulfide, flammable (concentrated) liquids and gases, chromic acid, aniline
Oxygen	Oils, grease, hydrogen, flammable liquids, solids and gases
Oxalic acid	Silver, mercury
Perchloric Acid	Acetic anhydride, bismuth and its alloys, alcohols, paper, wood, and other organic materials
Phosphorus Pentoxide	Water
Potassium Chlorate	Sulfuric and other acids, any organic material
Potassium Permanganate	Sulfuric acid, glycerine, ethylene glycol
Silver	Acetylene, ammonia compounds, oxalic acid, tartaric acid
Sodium Peroxide	Ethyl or methyl alcohol, glacial acetic acid, carbon disulfide, glycerine, ethylene glycol, ethyl acetate
Sulfuric Acid	Potassium chlorate, potassium perchlorate, potassium permanganate

* Taken from 'School Science Laboratories -- A Guide" to Some Hazardous Substances' with Technical support from the U.S. Product Safety Commission and the National Institute for Occupational Safety and Health (NIOSH).

APPENDIX II:
Emergency Services Personnel Contact Information

Hazardous Waste Management Company:
Trifecta Environmental Associates Management, Inc.
Jill Tuchmann Peckham
PO Box 1281
Cromwell, CT 06416
(860) 810-3395
Email: m_management@sbcglobal.net

Chase Environmental Group, Inc
Seb Cannata
Northeast Regional Manager
500 Four Rod Rd., Suite 108
Berlin, CT 06037
Office (860) 505-8109
Mobile (860) 306-0195
www.chaseenv.com
scannata@chaseenv.com

CleanHarbors
Emergency Spill Response
770 Derby Ave.
Seymour, CT 06483
1-800-OIL-TANK
1-800-645-8265
www.cleanharbors.com

Department of Environmental Health and Safety	Joseph M. Bouchard	Work: 203 254 4000 Ext: 2546 Mobile: 203 395 5403
University Safety Officer Academic Safety Officer Fire Marshall	Joseph M Bouchard	Work: Same as above

Academic Safety Assistant	Lisa Sikora	Work: 203-254-4000 Ext: 3223
Human Resources	Mark Guglielmoni	Work: 203 254 4000 Ext: 2277
Studio Arts	Patricia Frattaroli	Work: 203 254 4000 Ext: 3216
Biology Lab Managers	Christopher Hetherington Lenka Biardi Liz Szabo	Work: 203 254 4000 Ext: 2929 Ext: 3196 Ext: 2015
Chemistry Lab Manager	Dorothy Sobczynski	Work: 203 254 4000 Ext: 2126
Physics Lab Manager	Victor Podrasky	Work: 203 254 4000 Ext: 2380
Psychology Lab Manager	Contact: C. Hetherington- Biology Lab Manager Michelle Pagnotta	Work: 203 254 4000 Ext: 2929 Ext: 2195
School of Engineering	Dominic Figueiredo James Cavallo	Work: 203 254 4000 Ext: 4147

*MOBILE NUMBERS ARE AVAILABLE AT DPS

Safety Inspections

- Routine laboratory inspections will be conducted by the Environmental Health and Safety Department.
- A safety inspection form will be provided

New laboratory construction/renovation:

- Some of the details and issues, such as those dictated by Environmental Health and Safety (EH&S) regulations, are highly specialized and should be left to the experts
- Throughout the planning, design, and construction phases of a laboratory renovation or construction project, careful attention to EH&S issues is essential
- Therefore, the Department of Environmental Health and Safety will need to review and sign off of on all laboratory projects. Especially ones having to do with laboratory ventilation.

APPENDIX III:

LABORATORY CHEMICAL HYGIENE PLAN TIPS AND CONSIDERATIONS

Applicability: This Chemical Hygiene Plan (Plan) applies to laboratories or facilities with laboratories where employees routinely work with hazardous chemicals (that is, any chemical that is a physical or a health hazard) and are regulated under OSHA's Occupational Exposure to Hazardous Chemicals in Laboratories rule (29 CFR 1910.1450). OSHA requires such facilities to have a written chemical hygiene plan, and it must be made accessible to employees for review and include specific measures for protecting employees against chemical hazards.

The Plan must be capable of protecting employees from health hazards associated with hazardous chemicals in that laboratory and keeping exposures below the permissible exposure limits (PELs) established by OSHA.

This Plan focuses only on worker chemical safety and does not cover bloodborne pathogens requirements in detail. Also, it does not cover any environmental rules related to solid or hazardous waste management, medical waste disposal, or discharges to the environment. It also does not apply to uses of hazardous chemicals or substances that do not meet the definition of laboratory use (for example, benzene, cadmium, and formaldehyde). In such cases, the employer must comply with the relevant rule for toxic substances (see 29 CFR 1910, subpart Z) even if such use occurs in a laboratory. It also does not apply to laboratory uses of hazardous chemicals that provide no potential for employee exposure, such as procedures using chemically impregnated test media such as Dip-and-Read tests and commercially prepared kits such as those used in performing pregnancy tests in which all of the reagents needed to conduct the test are contained in the kit.

Related rules. The following workplace safety rules generally apply to laboratories, and the applicable components of each rule related to hazardous chemical safety should be incorporated into the Plan:

- 29 CFR 1910.132—Personal Protective Equipment (requirement for a hazard assessment)
- 29 CFR 1910.134—Respiratory Protection
- 29 CFR 1910.1200—Hazard Communication (especially labels and hazard warnings)
- 29 CFR 1910.1000—Air Contaminants
- 29 CFR 1910.1030—Bloodborne Pathogens

Elements of a Chemical Hygiene Plan. According to the federal *Occupational Exposure to Hazardous Chemicals in Laboratories* rule, the written Plan must contain the following elements:

- Standard operating procedures for lab work using hazardous substances
- Ways the employer will determine or measure employee exposure to hazardous substances
- Engineering controls, personal protective equipment (PPE), and hygiene practices that will be used to reduce employee exposure
- Specific measures to ensure that fume hoods and other protective equipment function properly
- Procedures to train employees to recognize hazards and protect themselves against them
- Criteria for requiring preapproval of a particular operation, procedure, or activity
- Explanations of when and how medical consultations and examinations will be provided to employees
- Additional protections for employees working with particularly hazardous substances, such as carcinogens or reproductive toxins

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