Chapter 53: Chemical Safety

Quick Start Summary

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1 Who needs to know about these requirements

The requirements of Chemical Safety apply to workers (including users and collaborators) who use potentially hazardous chemicals or work in areas where they may be exposed to them, supervisors, ESH coordinators, and building and area managers; and the SLAC Occupational Health Center.

2 Why

The handling and use of chemicals and other hazardous materials may pose a risk to the health and safety of workers and the environment. These hazards must be communicated to all potentially exposed persons and adequately mitigated. This chapter satisfies requirements for written hazard communication (29 CFR 1910.1200) and chemical hygiene programs (29 CFR 1910.1450).

3 What do I need to know

- Supervisors of workers who may be exposed to chemicals and other hazardous materials must communicate the hazards to affected workers through safety data sheets (SDSs), inventories, labeling, and training.
- Each chemical laboratory must develop a chemical hygiene plan or experiment-specific standard operating procedure (SOP) that addresses chemical hazards and mechanisms used to control exposure to those hazards. Each directorate has the discretion to develop these documents in a way that is appropriate for its operations.
- Workers must complete chemical worker training, know the location and proper use of hazard control and emergency equipment in their work areas, and comply with all hazard controls, including standard operating procedures.

4 When

The requirements of this chapter take effect 20 May 2013.

5 Where do I find more information

SLAC Environment, Safety, and Health Manual (SLAC-I-720-0A29Z-001)  
- Chapter 53, “Chemical Safety”

Or contact the program manager.
1 Purpose

The purpose of this program is to protect workers from the hazards associated with handling and using chemicals and other hazardous materials. It covers hazard communication and mitigation in all chemical use and storage areas within SLAC. It applies to workers (including users and collaborators) who use potentially hazardous chemicals or work in areas where they may be exposed to them, supervisors, ESH coordinators, building and area managers, and the SLAC Occupational Health Center.

This chapter satisfies requirements for written hazard communication (29 CFR 1910.1200) and chemical hygiene programs (29 CFR 1910.1450).

Procurement, storage, handling, and use of chemicals and other hazardous materials are covered in Chapter 40, “Chemical Lifecycle Management”. Transportation, on-site and off, is covered in Chapter 52, “Hazardous Materials and Waste Transportation”.

1.1 Exemptions

Materials containing hazardous chemicals that are inextricably bound in a product and cannot be released and consumer products used for the purpose intended by the manufacturer, in quantities not greater than those purchased by the average consumer, are exempt from these requirements.

2 Roles and Responsibilities

Functional roles and general responsibilities for each are listed below. More detailed responsibilities and their application are provided in the procedures and requirements.

The roles may be performed by one or more individuals and one individual may play more than one role, depending on the structure of the organizations involved. Responsibilities may be delegated.

2.1 Worker

- Complies with the requirements of this program
- Complies with all hazard controls
- Uses personal protective equipment (PPE) properly
- Knows the location and proper use of hazard control and emergency equipment in work area
Completes chemical worker training as specified in this chapter

2.2 Supervisor

- Selects, implements, and maintains appropriate measures for controlling work area hazards associated with chemicals
- Provides applicable PPE to workers
- Ensures chemicals are properly labeled
- Ensures workers on all shifts have access to relevant safety datasheets (SDSs)

Note Subcontractors are responsible for maintaining SDSs for chemicals they bring to SLAC and for making these available to supervisors of SLAC workers who may be exposed to those chemicals. For hazards located in SLAC areas where subcontractors will be working, the project manager or field construction/service manager must provide hazard communication information.

- Provides an accurate and complete hazard communication inventory in each work area where chemicals are stored or used
- Ensures that, if required, appropriate emergency eyewash and shower equipment is available in the work area and that local exhaust ventilation is properly operating
- Knows the location of hazard control and emergency equipment, inspects the equipment, provides for equipment maintenance, and notifies appropriate workers to repair or replace the equipment if it is missing, defective, or inoperative
- Ensures workers complete both formal and site-specific on-the-job training, including providing training to laboratory workers on non-routine tasks involving chemicals
- Ensures workers comply with all safety controls
- Sponsors safety meetings, including review of training and non-routine tasks involving chemicals
- Reports chemical overexposure, unsafe conditions, and near misses (see Chapter 28, “Incident Investigation”)

2.3 Chemical Laboratory Supervisor

In addition to the responsibilities of supervisor, a chemical laboratory supervisor (that is, a supervisor responsible for operations in a chemical laboratory, a laboratory subject to the chemical hygiene program [CHP])

- Develops chemical hygiene plan or experiment-specific standard operating procedure (SOP) that addresses chemical hazards and mechanisms used to control exposure to those hazards
- Reviews and approves procedures proposed by laboratory users
- Monitors laboratory work practices on a daily basis to ensure approved procedures and controls are in place and followed or updated to reflect changed conditions
2.4 ESH Coordinator

- Supports the implementation of this program by communicating requirements, supporting management walkthroughs, disseminating guidance documents, and assisting staff.
- For chemical laboratories, determines if formal approval is needed for an experiment.

2.5 SLAC Occupational Health Center

- Provides medical consultations and examinations for workers when the following conditions are met:
  1. Baseline medical surveillance is required based on worker potential or actual exposure to certain chemicals.
  2. Worker exposure levels to chemicals are found to be in excess of legal or action limits.
  3. Worker shows symptoms of overexposure.
  4. A spill or other event is likely to have resulted in overexposure.

2.6 Chemical Hygiene Officer

- Works with the Environment, Safety, Health, and Quality (ESHQ) Division to develop and implement the chemical hygiene program for SLAC, including training.
- Identifies chemical laboratories (laboratories subject to the chemical hygiene program).
- Provides technical assistance to laboratories.
- Conducts program assessments of the implementation of safe laboratory practices annually and updates procedures and plans as necessary.
- Communicates program needs to line and ESHQ Division management.

2.7 Hazard Communication Program Manager

- Develops and implements the hazard communication program.
- Maintains the SDS files.
- Develops and updates general hazard communication training.
- Designs and provides secondary labels.

3 Procedures, Processes, and Requirements

These documents list the core requirements for this program and describe how to implement them:

- **Chemical Safety: Hazard Communication Requirements** (SLAC-I-730-0A09S-042). Describes requirements for hazard communication, including safety data sheets, inventories, labeling, and training.
- **Chemical Safety: Personal Protective Equipment Requirements** (SLAC-I-730-0A09S-017). Describes minimum required personal protective equipment for working in chemical work areas.
4 Training

4.1 Chemical Worker

If the worker is a chemical worker or supervises chemical workers, he or she is required to take the following courses:

- ESH Course 103, Hazard Communication ([ESH Course 103](#)). This course is taken when worker is first assigned to a chemical worker job.

Following completion of ESH Course 103, all chemical workers are required to take the PPE course:

- ESH Course 255, Personal Protective Equipment (PPE) ([ESH Course 255](#))

In addition, chemical workers must receive on-the-job training, provided by their supervisor. This training is to familiarize chemical workers with the hazards, controls, and procedures specific to their work area. Workers will complete both types of training before working in areas containing hazardous chemicals. Supervisors are responsible for performing on-the-job training when either the hazards change (for example, new chemicals are introduced), the worker’s job tasks change, or if the supervisor becomes aware of new hazards (for example, new information about the chemicals, results of an accident investigation).

Supervisors must ensure that the on-the-job training includes, at a minimum, the following topics:

1. How to access the SDSs for materials in that particular work area
2. Physical and health hazards of the specific chemicals in the work area
3. Measures staff can take to protect themselves from relevant chemical hazards, including the use and limitations of PPE

4. Methods used to detect the presence or release of hazardous chemicals in the work area

Note  User and subcontractor personnel are expected to receive hazard communication training provided by their home institution or employer before starting work at SLAC.

### 4.2 Chemical Hygiene Worker

All workers in chemical laboratories must take the following course:

- ESH Course 199, Laboratory User CHP Training ([ESH Course 199](#)) or equivalent as identified in STA by supervisor

In addition, they must receive specific training in accordance with the laboratory’s chemical hygiene documentation. This includes:

- Methods and observations used to determine the presence or release of a hazardous chemical, such as monitoring conducted by ESH, continuous monitoring devices, and the visual appearance or odor of hazardous chemicals being used
- Measures that laboratory workers can take to protect themselves from hazards, including appropriate engineering and administrative controls and PPE
- Physical and health hazards and environmental aspects in the work area, including flammable and reactive materials, irritants and corrosives, acute poisons, chronic organic toxins, allergens, and genetic toxins
- Applicable details of the chemical hygiene documentation (that is, the individual elements and its availability), including experiment-specific operating procedures and protocols

The frequency for refresher training is not stipulated in the regulations ([29 CFR 1910.1450](#)), therefore, organizational units are encouraged to evaluate the need for such training on a case-by-case basis and in accordance with other ESH training in the individual’s training plan. User and subcontractor personnel who work in chemical laboratories must review and sign those laboratories’ specific procedures.

### 5 Definitions

**Area, work.** A contiguous area controlled and used by one work group

**Chemical.** Any element, chemical compound, or mixture of elements and/or compounds

**Container.** Any bag, barrel, bottle, box, can, cylinder, drum, reaction vessel, storage tank, or the like that contains a hazardous chemical

**Label.** Any written, printed, or graphic material displayed on or affixed to containers of chemicals

**Laboratory, chemical.** A laboratory in which laboratory use of chemicals takes place
Material, hazardous. Any chemical or material that, due to its physical or chemical properties, poses a risk to the health or safety of humans, environment, or the physical plant

Nanomaterial. Material with at least one dimension between one and 100 nanometers

Scale, laboratory. Work with substances in which the containers used for reactions, transfers, and other handling of substances is designed to be easily and safety manipulated by one person

Sheet, material safety data (MSDS). See safety data sheet (SDS)

Sheet, safety data (SDS). A document produced by chemical manufacturers and importers to relay chemical, physical, and hazard information about specific substances

Supervisor, chemical laboratory. Supervisory personnel responsible for the operations in a chemical laboratory

Tank. Container larger than 60 gallons (227 liters)

Use, laboratory. Of hazardous chemicals means handling or use of such chemicals in which all of the following conditions are met: 1) chemical manipulations are carried out on a laboratory scale; 2) multiple chemical procedures or chemicals are used; 3) the procedures involved are not part of a production process, nor in any way simulate a production process; and 4) protective laboratory practices and equipment are available and in common use to minimize the potential for employee exposure to hazardous chemicals (29 CFR 1910.1450)

Worker, chemical. Person whose job responsibilities or tasks include the transportation, dispensing, disposal, or other handling of hazardous materials, or whose work environment provides for a reasonable probability of exposure to a hazardous material, other than those materials that meet the definition of a consumer product

6 References

6.1 External Requirements

The following are the external requirements that apply to this program:

  - Subpart I, “Personal Protective Equipment”
    - Section 133, “Eye and Face Protection” (29 CFR 1910.133)
  - Subpart Z, “Toxic and Hazardous Substances”
    - Section 1450, “Occupational Exposure to Hazardous Chemicals in Laboratories” (29 CFR 1910.1450)
    - Table Z-1, “Limits for Air Contaminants” (29 CFR 1910.1000 Table Z-1)
6.2 Related Documents

SLAC Environment, Safety, and Health Manual (SLAC-I-720-0A29Z-001)
- Chapter 5, “Industrial Hygiene”
- Chapter 16, “Spills”
- Chapter 17, “Hazardous Waste”
- Chapter 28, “Incident Investigation”
- Chapter 40, “Chemical Lifecycle Management”
- Chapter 52, “Hazardous Materials and Waste Transportation”

Other SLAC Documents
- Hazard Communication and MSDS References
- SLAC Occupational Health Center

Other
- Stanford University, Department of Environmental Health and Safety. Research and Laboratory Safety: Chemical Safety
Chapter 53: Chemical Safety

Hazard Communication Requirements

1 Purpose

The purpose of these requirements is to ensure workers are properly informed of chemical hazards they may encounter. They cover hazard communication for workers who may be exposed to chemicals and other hazardous materials in their work area. They apply to workers and supervisors.

2 Requirements

Supervisors of workers who may be exposed to chemicals must communicate the hazards to affected workers. Hazard communication will include

1. Maintaining a safety data sheet (SDS) on each chemical used or stored at SLAC
2. Providing an accurate and complete hazard communication inventory in each work area where chemicals are stored or used. This can be accomplished through local inventories and/or SLAC-wide inventory maintained in the chemical management services (CMS) system.
3. Labeling all chemicals properly
4. Providing appropriate training for all affected workers

2.1 Safety Data Sheets

A current safety data sheet (SDS) for each chemical used or stored will be maintained and made available to all SLAC employees, users, guests, and subcontractors, 24 hours a day. Supervisors will ensure all workers in areas where chemicals are used or stored have ready access to the MSDS viewer or make available a hard copy of the SDS for each chemical in their work area. SDSs specific to an area will be backed-up in the area by download to a battery-run device or hard copy.

Note Subcontractors are responsible for maintaining SDSs for chemicals they bring to SLAC and making these available to supervisors of SLAC workers who may be exposed to those chemicals. For hazards located in SLAC areas where subcontractors will be working, the project manager or field construction/service manager must provide hazard communication information.

2.2 Inventories

A hazard communication inventory is a list of all chemicals present in a work area and is used to ensure that an SDS is available for each. They can be generated using the CMS system or manually. Contact the
chemical lifecycle management program manager for more information on how to create and maintain an inventory. (See Chapter 40, “Chemical Lifecycle Management”.)

Note The inventory is particularly important if hazardous chemicals are moved from the storage area indicated at the time of delivery or if the area has materials not purchased through the current CMS system, such as legacy materials obtained before 2006 or research samples.

2.3 Container Labeling

Chemical containers will be labeled meeting the following requirements:

- Every container will be clearly labeled with the material name and appropriate hazard information. Required label elements on shipped containers (per the federal Occupational Safety and Health Administration hazard communication standard [29 CFR 1910.1200]) include the following:
  - Name and address of the chemical manufacturer, importer, or other responsible party
  - Product identifier
  - Identity of the hazardous chemical(s) contained therein
  - Appropriate hazard warnings using signal words, hazard statements, pictograms and precautionary statements
- Manufacturer-affixed labels will not be removed or defaced on the primary chemical container if it still contains the chemical. If a container label is missing or illegible, or if the chemical is transferred into a secondary container, a secondary label must be affixed. These are available through the chemical lifecycle management program manager and CMS representative.
- Supervisors and managers will be immediately notified when unlabeled chemical containers are discovered. Unlabeled containers that may contain chemicals should be assumed to be hazardous. An attempt should be made to determine the contents of the container and a correct label should be affixed to the container. If a determination cannot be made about the contents, the chemical lifecycle management program manager should be contacted.
- All piping containing chemicals must be labeled. All new installations of hazardous material pipes and tubes will be labeled in accordance with ASME A13.1 requirements.

Chemical storage asset custodians responsible for tanks will ensure the tanks are appropriately labeled with the following elements:

1. Name and concentration of the materials contained within the tank
2. NFPA 704 hazard diamond indicating the health, flammability, reactivity, and any special hazards of the material

2.4 Training

For training requirements, see Chapter 53, “Chemical Safety”, Section 4, “Training”.
3 Forms

The following are forms required by these requirements:

- None

4 Recordkeeping

The following recordkeeping requirements apply for these requirements:

- A current safety data sheet (SDS) for each chemical used or stored will be maintained and made available to all SLAC employees, users, guests, and subcontractors, 24 hours a day. SDSs specific to an area will be backed-up in the area by download to a battery-run device or hard copy.
- A hazard communication inventory listing all the chemicals present in an area will be maintained, either through the CMS system or locally.

5 References

SLAC Environment, Safety, and Health Manual (SLAC-I-720-0A29Z-001)

- Chapter 53, “Chemical Safety”
- Chapter 40, “Chemical Lifecycle Management”

Other SLAC Documents

- Hazard Communication and MSDS References
  - MSDS Viewer
- CMS system

Other Documents

- American Society of Mechanical Engineers (ASME) A13.1, “Scheme for the Identification of Piping Systems” (ASME A13.1)
Chapter 53: Chemical Safety

Personal Protective Equipment Requirements

1 Purpose

The purpose of these requirements is to ensure the proper selection and use of personal protective equipment (PPE). They cover determining, acquiring, using, inspecting, and maintaining chemical safety PPE. (For general PPE requirements, see Chapter 19, “Personal Protective Equipment.” For chemical-specific information, see chemical-specific Chemical Safety: Safe Handling Guidelines.) They apply to workers and supervisors.

2 Requirements

In addition to specific requirements below, follow these general precautions in the work area:

- Do not use or wear excessively loose or torn clothing.
- Wear shoes at all times.
- Do not wear perforated shoes, sandals, or cloth sneakers. Steel-toed shoes are recommended for use with compressed gas cylinders (CGCs).

2.1 Protective Apparel

Protective apparel includes coats, aprons, jump suits, special types of boots, shoe covers and gauntlets. Appropriate protective apparel is recommended for most laboratory work; for some tasks it is required. Laboratory apparel should protect against physical hazards yet enable easy execution of physical tasks. Check the safety data sheet (SDS), safe handling guidelines, and standard operating procedures for PPE recommendations.

2.2 Eye and Face Protection

Eye and face protection is required in areas where chemicals used could cause injury to the eyes or face upon contact from splashing or pouring. PPE for eye and face protection must be selected in accordance with 29 CFR 1910.133 and must meet the requirements specified in ANSI Z87.1-2003.

Laboratory supervisors should contact the equipment manufacturers or the chemical safety program manager for proper equipment selection.

- Safety glasses with permanently attached side shields are required whenever there is a potential for projectile objects in the work area. Safety goggles are required when handling any chemical or process that can create fine dust, fumes, mists, and sprays.
- Face shields are required to protect against the hazards identified above.
- Face shields must not be used as a substitute for eye protection. When both face and eye protection is needed, both types of protective equipment must be used.
- Eye and face protection is required when radiant energy sources are present in the work area.

### 2.3 Hand Protection

Skin contact is a potential source of exposure to toxic materials. For substances that can create a significant exposure to individuals through skin contact, see [29 CFR 1910.1000 Table Z-1, “Limits for Air Contaminants”](#) (see those marked with “skin designation”). Appropriate gloves can be selected from safety supply catalogs.

- Gloves are required whenever there is potential for contact with corrosive or toxic materials, or materials of unknown toxicity.
- Select glove material based on chemical resistance, as not all gloves are equally effective in preventing skin exposure to certain chemicals.
- Know the time exposure limitations of glove use. Gloves eventually become permeated by chemicals. However, gloves can be used safely for limited time periods if you know specific use and glove characteristics (for example, glove thickness and permeation rate).
- Wash gloves after you complete a procedure but before removing them from your hands.
- Replace gloves periodically, depending on frequency of use and permeability of the substances.
- Ensure gloves are air-tight: fill the gloves with air, roll the cuff, and check for leaks.

A good summary reference is Stanford University’s “[Laboratory Chemical Glove Selection](#)”.  

### 2.4 Respiratory Protection

Respiratory protection prevents the inhalation of hazardous vapors or fumes into the lungs. Chemical fume hoods will prevent most exposures. However, when procedures cannot be performed in a fume hood or ventilation is not adequate to provide protection against inhalation hazards, respiratory protection equipment is required.

Respirators may be used at SLAC only after medical evaluation, training, fit-testing, and specific approval of the operation by an ESH industrial hygienist. Respirators are the last resort for control of exposures and are only to be used when engineering controls, process modification, and other measures are not practical or have proved inadequate. (See [Chapter 29, “Respiratory Protection”](#).)

### 3 Forms

The following are forms required by these requirements:

- None
4 Recordkeeping

The following recordkeeping requirements apply for these requirements:

- None

5 References

SLAC Environment, Safety, and Health Manual (SLAC-I-720-0A29Z-001)

- Chapter 53, “Chemical Safety”
  - Chemical Safety: Safe Handling Guidelines
- Chapter 19, “Personal Protective Equipment”
- Chapter 29, “Respiratory Protection”

Other Documents

- Stanford University, Department of Environmental Health and Safety. Laboratory Chemical Glove Selection
Chapter 53: Chemical Safety

Emergency Eyewash/Shower Requirements

1 Purpose

The purpose of these requirements is to ensure eyewash and shower stations are available to help protect workers after an eye or skin exposure to injurious corrosive chemicals. They cover selecting, installing, inspecting, and maintaining emergency eyewash and shower stations. They apply to workers, supervisors, building managers, and ESH coordinators.

2 Requirements

Note Emergency eyewashes, showers, and drench hoses are not substitutes for proper eye and face protection such as chemical splash goggles, face shields, and protective clothing. (See Chemical Safety: Personal Protective Equipment Requirements.)

Eyewash and shower stations are required in areas where workers can come into contact with injurious corrosive chemicals. Supervisors responsible for such areas must

- Know where the equipment is located.
- Ensure that workers who use corrosive chemicals are aware of the location and use of eyewash/shower stations.
- Make sure Chemical Safety: Emergency Eyewash/Shower Use Procedure is available at each station.
- Provide for maintenance, including keeping the stations clean.

2.1 Installation

2.1.1 All Installations

The following requirements apply to all emergency eyewash and shower installations.

1. Sole purpose must be as an eyewash or shower.
2. Travel time must be no greater than 10 seconds from the hazard. Passages/access to the unit must be unobstructed.
3. A single door may be in the path as long as it does not have a lock and opens toward the eyewash or shower.
4. The installation must be designed and positioned in such a way as to pose no hazard to the user.
5. The installation must be marked with a highly visible sign. The sign and unit must be well lit.
6. For outdoor installations, the unit will be protected from freezing or freeze-protected equipment must be installed. (Freeze-protected equipment is equipment designed to operate under freezing conditions.)

7. If shutoff valves are installed in the supply line for maintenance purposes, provisions must be made to prevent unauthorized shutoff.

8. The actuation valve must be simple to operate, activate the water source within one second of operation, and remain open until intentionally closed.

9. The manufacturer’s instructions covering installation, operation, inspection, and maintenance requirements must be provided with the eyewash or shower.

Note Hand-held drench hoses may be installed to supplement an eyewashes or showers, but may not replace them.

2.1.2 Emergency Eyewash Installations
1. The eyewash nozzles must be positioned 33 to 45 inches from floor and 6 inches from the wall or nearest obstruction.

2. The water supply must be plumbed unless access to water is not feasible.

3. The water supply must provide 0.4 gallons per minute for at least 15 minutes.

4. For indoor installations, the eyewash drainpipes must be plumbed to a sink or directly to the sewer line.

5. Self-contained eyewash units may be used in areas where it is not feasible to install plumbed units.

2.1.3 Emergency Shower Installations
1. The shower will provide flushing from a height of at least 82 inches and not more than 96 inches from the surface on which the user stands.

2. The spray pattern will be a minimum of 20 inches wide at 60 inches above the floor.

3. The shower will provide a minimum flow of 20 gallons a minute for 15 minutes.

4. The installation of a floor drain is optional. If a floor drain is installed, it must be fitted with a temporary plug to protect the floor drains from chemical hazards (unless protected from spills by a covered sump or berm system).

5. The valve actuator must not be more than 69 inches above the floor, be simple to operate, and must activate the shower.

2.2 Inspection and Activation

The Environment, Safety, Health, and Quality (ESHQ) Division will inspect eyewash and shower stations annually and provide a written report to the owner. The owner is assumed to be the building manager but may be an ESH coordinator.

Plumbed eyewashes will be activated weekly by the owner to verify proper operation and run until the flushing fluid is clear. Self-contained eyewashes do not need to be activated but must be checked visually to determine if the flushing fluid needs to be changed or supplemented.
Showers will be activated and flushed monthly by the owner to verify proper operation and run until the flushing fluid is clear.

If the station fails to activate, the owner must remove it from service and notify ESHQ immediately.

3  Forms

The following are forms required by these requirements:

- Chemical Safety: Emergency Eyewash/Shower Activation Log Form (SLAC-I-730-0A09J-003)

4  Recordkeeping

The following recordkeeping requirements apply for these requirements:

- The results of the required activations or visual checks must be logged on a tag attached to the station, including the name of the person and the date.
- The results of annual inspections by the ESHQ Division must be provided in writing to the owner.

5  References

SLAC Environment, Safety, and Health Manual (SLAC-I-720-0A29Z-001)

- Chapter 53, “Chemical Safety”
  - Chemical Safety: Emergency Eyewash/Shower Use Procedure (SLAC-I-730-0A09C-008)
  - Chemical Safety: Accidental Exposure Requirements (SLAC-I-730-0A09S-041)
  - Chemical Safety: Personal Protective Equipment Requirements (SLAC-I-730-0A09S-017)
- Chapter 40, “Chemical Lifecycle Management”

Other SLAC Documents

- Hazard Communication and MSDS References

Other Documents

Emergency eyewash and shower stations are required in areas where workers can come into contact with injurious corrosive chemicals. All eyewash and shower stations must be activated and the results logged on a tag attached to the station (see Chemical Safety: Emergency Eyewash/Shower Requirements [SLAC-I-730-0A09S-043]). Print this form, cut out the tag, and attach it to the station.

### Emergency Eyewash/Shower Activation Log

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If this device passes, indicate the date and the initials of the inspector. If the device fails, remove it from service/red tag it and notify ESH.

DO NOT REMOVE THIS TAG
Chapter 53: Chemical Safety

Emergency Eyewash/Shower Use Procedure

The purpose of this procedure is to minimize harm to workers from accidental exposures to chemicals and other hazardous materials. It covers the use of emergency eyewash and shower stations. It applies to workers and supervisors. (This document is to be attached to each emergency eyewash/shower station. See Chemical Safety: Emergency Eyewash/Shower Requirements [SLAC-I-730-0A09S-043].)

In the event of a chemical splash or spill, follow these steps:
1. Do not panic.
2. Shout for help to allow co-workers to assist.
3. Flush the affected area of the body immediately for a minimum of 15 minutes.
4. For chemical spills to the eyes, hold eyes open as wide as possible to permit the water to reach all areas around the eye.

Warning Recognize that both eyes move together, so do not leave the uninjured eye open or uncovered. If a protective dressing is used, do not apply pressure over the eyes.

Warning Eyewash stations should not be used following injury with a known metal or similarly rigid solid fragment. In this event, seek immediate medical attention.

5. If clothing is contaminated, remove while under the shower.
6. Shut off water:
   – For eyewashes, pull push plate or foot plate back.
   – For showers, push valve actuator back.
7. Call 911, then call SLAC Site Security (ext. 5555 or 650-926-5555 from a cell phone), and your supervisor.
8. Arrange to be examined and treated by a doctor or other trained medical specialist as soon as possible. If you are not transported directly to an emergency room from the scene of the exposure, report immediately to the SLAC Occupational Health Center.
Chapter 53: Chemical Safety

Accidental Exposure Requirements

1 Purpose

The purpose of these requirements is to minimize harm to workers from accidental exposures to chemicals and other hazardous materials and to ensure such exposures are properly reported. They cover general response and reporting for accidental chemical exposures. (For chemical-specific information, see chemical-specific safe handling requirements.) They apply to workers and supervisors.

2 Requirements

2.1 Inhalation

Many chemicals can become airborne as gases, mists, vapors, or dusts. Exposure through the respiratory system can be very dangerous because absorption into the blood stream through the lungs occurs quickly. In addition, many materials can damage the nose, throat, and lungs directly.

Persons over-exposed to chemicals must be relocated immediately to fresh air and provided with medical attention. This may include the administration of oxygen as well as other medical treatment.

2.2 Eye Contact

If a chemical contacts the eyes,

1. Immediately flush the eyes with copious amounts of water, preferably at the nearest eyewash station (see Chemical Safety: Emergency Eyewash/Shower Use Procedure).

2. Do not stop flushing the eyes until emergency personnel inform you to stop, or for a minimum of 15 minutes.

2.3 Skin Contact

If a chemical comes into contact with the skin,

1. Immediately rinse the affected area with large amounts of running water. This may be done in a sink if the hands are the only portion of the body contacted or under a safety shower if the exposure area is more extensive (see Chemical Safety: Emergency Eyewash/Shower Use Procedure).
2. Notify emergency response as soon as possible if the chemical is a corrosive or could have been absorbed through the skin.

3. Remove contaminated clothing while under the shower.

4. Remain under the shower until emergency personnel inform you to stop, or for a minimum of 15 minutes.

2.4 Emergency Notification

In the event of an accidental chemical exposure, emergency response must be notified as soon as possible:

- If life-threatening, call 911, then SLAC Site Security (ext. 5555 or 650-926-5555 from a cell phone), then supervisor. If evacuation is necessary:
  - Follow evacuation path as demonstrated during evacuation drills and/or as illustrated on a posted building evacuation map. These are located near exits, fire extinguishers, or stairwells.
  - Go directly to the assigned emergency assembly point (EAP).
  - Notify the person in charge of taking roll. (Generally, the building manager is the designated roll taker.)
  - Report any additional information with regard to the safety of co-workers and condition of the area evacuated.
- If non-life-threatening, notify supervisor, then SLAC Site Security (ext. 5555 or 650-926-5555 from a cell phone).

Be prepared to provide information on the location, number of people affected, injury types, if any, and incident description. Also describe the chemicals involved and quantities and have the safety data sheet (SDS) available. (See Emergency Management: Emergency Notification, Response, and Reporting Procedures and Spills: Response, Cleanup, and Reporting Procedure for details).

2.5 Medical Examination and Treatment

Arrange to be examined and treated by a doctor or other trained medical specialist as soon as possible. If you are not transported directly to an emergency room from the scene of the exposure, report immediately to the SLAC Occupational Health Center.

3 Forms

The following are forms required by these requirements:
- None

4 Recordkeeping

The following recordkeeping requirements apply for these requirements:
- None
5 References

SLAC Environment, Safety, and Health Manual (SLAC-I-720-0A29Z-001)

- Chapter 53, “Chemical Safety”
  - Chemical Safety: Emergency Eyewash/Shower Use Procedure (SLAC-I-730-0A09C-008)
  - Chemical Safety: Safe Handling Guidelines

- Chapter 16, “Spills”
  - Spills: Response, Cleanup, and Reporting Procedure (SLAC-I-750-0A16C-006)

- Chapter 37, “Emergency Management”
  - Emergency Management: Emergency Notification, Response, and Reporting Procedures (SLAC-I-730-0A14C-002)

Other SLAC Documents

- SLAC Occupational Health Center
Chapter 53: Chemical Safety

Chemical Hygiene Plan Requirements

Product ID: 638 | Revision ID: 1495 | Date published: 20 May 2013 | Date effective: 20 May 2013
URL: http://www-group.slac.stanford.edu/esh/eshmanual/references/chemsafetyReqCHP.pdf

1 Purpose

The purpose of these requirements is to ensure workers in chemical laboratories are properly informed of chemical hazards they may encounter. They cover the preparation of chemical hygiene plans and standard operating procedures. They apply to principal investigators, chemical laboratory supervisors, laboratory personnel, and visiting researchers (users) working in chemical laboratories.

Note A chemical laboratory is defined as one in which hazardous chemicals are handled or used meeting all of the following conditions: 1) chemical manipulations are carried out on a laboratory scale; 2) multiple chemical procedures or chemicals are used; 3) the procedures involved are not part of a production process, nor in any way simulate a production process; and 4) protective laboratory practices and equipment are available and in common use to minimize the potential for employee exposure to hazardous chemicals (29 CFR 1910.1450).

2 Requirements

To meet federal chemical hygiene requirements (29 CFR 1910.1450), each chemical laboratory must develop a chemical hygiene plan or experiment-specific standard operating procedure (SOP) that addresses chemical hazards and mechanisms used to control exposure to those hazards. Each directorate has the discretion to develop these documents in a way that is appropriate for its operations.

Using this documentation, along with training, principle investigators/laboratory supervisors must communicate any hazards to affected laboratory personnel, and the affected personnel must provide written acknowledgement that they are familiar with this documentation before beginning work.

The documentation used must include the elements and requirements below and must be available in the laboratory, reviewed annually, and made available upon request.

2.1 Designation of Responsibility for Implementation

- Principal investigators/laboratory supervisors are responsible for the health and safety of laboratory personnel working in their laboratories.
- SLAC has designated a chemical hygiene officer (CHO) reporting to the Environment, Safety, Health, and Quality Division to administer and oversee the institutional implementation of the chemical hygiene program.
- Provisions for personnel working autonomously must be described in the relevant standard operating procedures.
2.2 Information and Training

- Laboratory personnel are to receive chemical safety information and training, both general and laboratory-specific, at the time of initial assignment to the laboratory, and before assignments involving exposure situations, work with particularly hazardous substances, and hazardous operations. This training must include emergency procedures. (See Section 4, “Training”, of Chapter 53, “Chemical Safety”.)

2.3 Standard Operating Procedures

- Principal investigators/laboratory supervisors are responsible for establishing standard operating procedures (SOPs) relevant to health and safety for laboratory activities they direct involving hazardous substances.
- SOPs should be written using the SOP template (Chemical Safety: Laboratory Standard Operating Procedure Template).

2.4 Control Measures

- Methods used to minimize exposures to hazardous chemicals, organized in a hierarchy of control elements including substitution, engineering controls, work practices, and personal protective equipment (see Chemical Safety: Personal Protective Equipment Requirements and Chemical Lifecycle Management: Planning Requirements).

2.5 Prior Approval and Consultation

- All experiments that will be performed in a chemical laboratory must be discussed with the ESH coordinator and chemical laboratory supervisor before starting work. In certain cases, written approval is required. The ESH coordinator makes the decision for situations where formal approval is needed. This will take the form of a written standard operating procedure outlining steps and mitigations of the experimental process.

Note: If an experiment is determined by the principal investigator and ESH coordinator to be a work activity it is reviewed within the line organization; if a project activity, it is subject to ESHQ project review. (For the process and thresholds used, see ESH: Project Review Procedure).

- Prior approval by the principal investigator/laboratory supervisor is required for chemical usage involving Drug Enforcement Agency (DEA)-listed substances or precursors and highly toxic chemicals of concern as defined in the chemical screening criteria (see Chemical Lifecycle Management: Planning Requirements).
- Laboratory personnel should consult with the principal investigator/laboratory supervisor on higher risk chemical usage and operations so that special safety precautions can be taken where appropriate.

2.6 Fume Hood Operations

Information on the certification, application, and safe use of laboratory fume hoods can be found in Industrial Hygiene: Hazard Control Ventilation Requirements.
2.7 Medical Consultations, Examinations, and Surveillance

- Laboratory personnel who work with hazardous chemicals will be provided the opportunity to receive medical attention/consultation, through the SLAC Occupational Health Center, when
  1. Symptoms or signs of exposure to a hazardous chemical develop
  2. Exposure monitoring reveals an overexposure
  3. A spill, leak, explosion, or other occurrence results in a hazardous exposure (potential overexposure)
  4. A regulatory standard triggers medical surveillance

2.8 Additional Protections

- Principle investigators/laboratory supervisors will provide for additional protection to laboratory personnel for work with particularly hazardous substances (such as select carcinogens, reproductive toxins, and substances that have a high degree of acute toxicity).
- Before the purchase, use, synthesis, or storage of nanomaterials, the Nanomaterial Safety Plan must be reviewed and incorporated into laboratory procedures.

3 Forms

The following are forms required by these requirements:

- Chemical Safety: Laboratory Standard Operating Procedure Template (SLAC-I-730-0A09J-009).
  Recommended template for the development of standard operating procedures

4 Recordkeeping

The following recordkeeping requirements apply for these requirements:

- Principle investigators/laboratory supervisors will ensure the documentation used to meet these requirements is available in the laboratory, reviewed annually, and made available upon request.

5 References

SLAC Environment, Safety, and Health Manual (SLAC-I-720-0A29Z-001)

- Chapter 53, “Chemical Safety”
  - Chemical Safety: Personal Protective Equipment Requirements (SLAC-I-730-0A09S-017)
  - Nanomaterial Safety Plan (SLAC-I-730-0A09M-008)
- Chapter 1, “General Policy and Responsibilities”
  - ESH: Project Review Procedure (SLAC-I-720-0A24C-001)
- Chapter 5, “Industrial Hygiene”

20 May 2013 SLAC-I-730-0A09S-040-R000 3 of 4
Other SLAC Documents

- Hazard Communication and MSDS References
- SLAC Occupational Health Center

Other Documents


All experiments that will be performed in a chemical laboratory must be discussed with the ESH coordinator and chemical laboratory supervisor before starting work. In certain cases, written approval is required. The ESH coordinator makes the decision for situations where formal approval is needed. This will take the form of a written standard operating procedure (SOP) outlining steps and mitigations of the experimental process. This template is recommended for SOPs. (See Chemical Safety: Chemical Hygiene Plan Requirements [SLAC-I-730-0A09S-040].)

<table>
<thead>
<tr>
<th>Procedure title</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Procedure author</td>
<td></td>
</tr>
<tr>
<td>Date of creation / revision</td>
<td></td>
</tr>
<tr>
<td>Name of responsible person</td>
<td>Principal investigator, laboratory supervisor, or autonomous researcher</td>
</tr>
<tr>
<td>Location to be performed</td>
<td>Building or lab number, beam line</td>
</tr>
<tr>
<td>Proposal number(s):</td>
<td></td>
</tr>
</tbody>
</table>

1. This standard operating procedure (SOP) is for a
   - Specific laboratory procedure or experiment
     Examples: synthesis of chemiluminescent esters, folate functionalization of polymeric micelles
   - Generic laboratory procedure that covers several chemicals
     Examples: distillation, chromatography
   - Generic use of specific chemical or class of chemicals with similar hazards
     Examples: organic azides, mineral acids

2. Process or experiment description
   Briefly summarize the process or experiment, including an estimate of how long the process takes and how frequently it will be conducted. Include total quantities (volume, mass) of the materials you to expect to use.
### 3. Risk assessment

Identify potential safety hazards. For chemical hazards, be specific (for example, flammability, corrosivity, reactivity/explosion, acute toxicity, or carcinogenicity). List OSHA hazards, NPFA ratings, and occupational exposure limits.

**References:**
- SLAC Safety Data Sheets (http://www-group.slac.stanford.edu/esh/groups/fsd/hmaq/hazmat/hazcom.htm)
- Stanford University, Department of Environmental Health and Safety. Stanford Lab Safety Sheets (http://www.stanford.edu/dept/EHS/prod/researchlab/lab/lab_safety_sheets.html)
- Stanford University, Department of Environmental Health and Safety. General Principles and Practices for Working Safely with Engineered Nanomaterials (http://www.stanford.edu/dept/EHS/prod/researchlab/IH/nano/)
- Canadian Centre for Occupational Health and Safety. Web Information Service (http://ccinfoweb.ccohs.ca)
- Hall, Stephen K. *Chemical Safety in the Laboratory*. Available from Stanford University, Swain Chemistry and Chemical Engineering Library (https://lib.stanford.edu/swain)

### 4. Safety equipment

Specify all equipment needed to perform research or experiment safely.

#### 4.a. Engineering / ventilation controls

Examples: fume hood use, explosion shielding, equipment interlocks

#### 4.b. Personal protective equipment and other safety equipment

Examples: safety glasses, nitrile gloves, cryo gloves, absorbent bench paper
### Location of nearest emergency safety equipment

<table>
<thead>
<tr>
<th>Item</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eyewash / safety shower</td>
<td></td>
</tr>
<tr>
<td>First aid kit</td>
<td></td>
</tr>
<tr>
<td>Chemical spill kit</td>
<td></td>
</tr>
<tr>
<td>Fire extinguisher</td>
<td></td>
</tr>
<tr>
<td>Telephone</td>
<td>Telephone are located near the entrance to laboratories.</td>
</tr>
<tr>
<td>Fire alarm manual pull station</td>
<td></td>
</tr>
<tr>
<td>Safety stations</td>
<td></td>
</tr>
</tbody>
</table>

### Shipping and receiving requirements

Describe shipping or receiving requirements, especially for highly toxic, highly reactive/unstable, highly flammable, and corrosive materials.

### Designated area

Where highly toxic, highly reactive/unstable, highly flammable, and corrosive or nanomaterials are used, identify the designated work area(s) and the necessary personnel decontamination after completion of work.

### Step-by-step operating procedure

Provide a sequential description of work, including details such as chemical concentrations and when special safety equipment is to be utilized. Include temperature, pressure, and other experimental conditions. Schematics or pictures are suggested for complex setups.

1. Step
2. Step
8. **Special handling procedures, transport, and storage requirements**  
*Describe special handling and storage requirements for hazardous chemicals in your laboratory, especially for highly reactive/unstable and highly flammable materials and corrosives. Describe transport and secondary containment requirements, between the laboratory and beam lines or between facilities.*

9. **Beam line handling and storage requirements**  
*Describe sample handling procedures and sampling set up at the beam lines. Are samples sealed or open? Is ventilation required? Are heating, cooling, or gas distribution systems present?*
10. **Emergency procedures**

*Indicate how spills, personnel exposure/injury, and other accidents should be handled and by whom. List emergency contact numbers.*

### Life-threatening emergencies (for example, fire, explosion, large-scale spill or release, compressed gas leak, valve failure)

1. **Call 911.**
2. Alert people in the vicinity and activate the local alarm systems.
3. Evacuate the area and go to emergency assembly point (EAP). *Indicate EAP here.*
4. Remain nearby to advise emergency responders.
5. Once personal safety is established, call ext. 5555 to activate internal response.
6. Provide local notifications.

*Identify the area management staff that must be contacted and include their work and home numbers. This must include the PI and may include the safety coordinator and facilities manager.*

### If personnel exposed or injured

1. Remove the injured/exposed individual from the area, unless it is unsafe to do so because of the medical condition of the victim or the potential hazard to rescuers.
2. Administer first aid as appropriate.
3. Flush contamination from eyes/skin using the nearest emergency eyewash/shower for a minimum of 15 minutes. Remove any contaminated clothing.
4. Bring to the hospital copies of safety data sheets (SDSs) for all chemicals to which the victim was exposed.

### Non-life-threatening emergencies

1. Call ext. 5555 to activate internal response.
2. Provide local notifications.

*Identify the area management staff that must be contacted and include their work and home numbers. This must include the PI and may include the safety coordinator and facilities manager.*

### If personnel exposed or injured

1. Call the SLAC Occupational Health Center at ext. 2281 for more information and to schedule an appointment.

### For small spills / local cleanup

In the event of a minor spill or release that can be cleaned up by local personnel (personnel are authorized via work planning and control to handle spilled material, appropriate PPE is available, compatible spill response material is readily available in sufficient quantity, and cleanup is safe):

1. Notify personnel in the area and restrict access. Eliminate all sources of ignition.
2. Review the SDS for the spilled material, or use your knowledge of the hazards of the material to determine the appropriate level of protection.
3. Wearing appropriate personal protective equipment, clean up spill. Collect spill cleanup materials in a tightly closed container. Manage spill cleanup debris as hazardous waste.

### Building maintenance emergencies (for example, power outages, plumbing leaks)

Submit a Facilities service request ([https://famis.slac.stanford.edu/famis_fss/fweb.home](https://famis.slac.stanford.edu/famis_fss/fweb.home)) or call appropriate building manager.


### Additional emergency procedures

*Describe additional, local emergency procedures.*
### Waste disposal

Identify amounts of waste anticipated and appropriate disposal procedures. Segregate waste by hazard class (for example, flammable, corrosive) and state (solid, liquid), label appropriately, and place in the laboratory's hazardous waste cabinet.

### Additional waste guidelines

Describe additional, local waste guidelines.

### Training requirements

List the general and laboratory-specific training required

- User laboratory training
- Laboratory User CHP Training ([ESH Course 199](#))
- Hazard Communication ([ESH Course 103](#))
- Hazardous Waste Management ([ESH Course 105](#))
- Cryogenic and Oxygen Deficiency Safety Training ([ESH Course 170](#))
- Hazardous Materials Transportation General Awareness and Safety Training ([ESH Course 123](#))
- Nanomaterials Laboratory Safety Training ([ESH Course 161](#))
- Other: ____________________________________________

### Additional training requirements

List additional, local training requirements.

1. Additional training requirement
2. Additional training requirement

### Approval

Standard operating procedures must be approved by the laboratory manager and directorate safety coordinator.

Laboratory manager (name, signature, date): __________________________________________

Directorate safety coordinator (name, signature, date): __________________________________________

### Additional approvals

List subject matter experts consulted for approval:

1. Person consulted
2. Person consulted

### Additional prior approvals required

List any tasks that require prior approval by the principal investigator or laboratory manager (for example, use of restricted chemicals and other higher hazard chemicals and running of higher hazard operations):

1. Task requiring prior approval
2. Task requiring prior approval
Chapter 53: Chemical Safety

Non-hazardous Waste Sink Disposal Procedure

1 Purpose

The purpose of this procedure is to
- Reduce the hazardous waste burden
- Reduce storage of non-hazardous waste in hazardous waste storage areas
- Improve segregation of hazardous laboratory wastes

By allowing laboratory materials to be disposed of in sinks where it is safe to do so, based on an objective determination of hazards. It covers authorizing, implementing, and verifying the disposal of laboratory materials in sinks. It applies to workers, chemical laboratory supervisors, ESH coordinators, and the chemical hygiene officer, water program manager, and Waste Management Group.

2 Procedure

<table>
<thead>
<tr>
<th>Step</th>
<th>Person</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Authorization</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 1. | Requester | Submits request for sink disposal to ESH coordinator / laboratory supervisor. The request must include the following information:  
- Chemical name of the candidate  
- Potential volume that needs to be disposed  
- Use concentration of the candidate solution  
- Safety data sheet (SDS), if available |
| 2. | ESH coordinator / laboratory supervisor | Reviews request, adds to the laboratory materials toxicity spreadsheet (LMTS), and submits to the review team (contact the chemical hygiene officer) |
| 3. | Review team | Reviews request against the list of previously approved sink-disposed materials (in the LMTS) and the conditions of SLAC’s wastewater discharge permit. If approved, adds material, at concentration and volume specified, to the list, with any other conditions of disposal. If the frequency of need is high, the approval will specify the allowed recurrence of disposal, and the allowed volume and concentration.  
The review team consists of representatives from the directorates, chemical laboratories and ESHQ representatives, including the water program manager and a representative from the Waste Management Group, who are responsible for ensuring that SLAC does not violate the conditions of the permit. |

Implementation
<table>
<thead>
<tr>
<th>Step</th>
<th>Person</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.</td>
<td>ESH coordinator / laboratory supervisor</td>
<td>Ensures laboratory workers understand the conditions of disposal: volume, concentration, approved material</td>
</tr>
<tr>
<td>5.</td>
<td>Worker</td>
<td>Notifies laboratory supervisor of each disposal</td>
</tr>
<tr>
<td>6.</td>
<td>Laboratory supervisor</td>
<td>Add information for each disposal to LMTS record</td>
</tr>
<tr>
<td></td>
<td>Verification</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Water program manager</td>
<td>Initiates an annual program verification to ensure that conditions of the wastewater discharge permit are being met, that is, that more material than authorized is not being discharged</td>
</tr>
<tr>
<td>8.</td>
<td>Chemical hygiene officer</td>
<td>Initiates an annual audit in conjunction with laboratory supervisors and principal investigators to ensure that the agreed implementation steps are being followed</td>
</tr>
</tbody>
</table>
Figure 1  Non-hazardous Waste Sink Disposal Process

3  Forms

The following forms are required by this procedure:

- Laboratory Materials Toxicity Spreadsheet (contact the chemical hygiene officer)
4 Recordkeeping

The following recordkeeping requirements apply for this procedure:

- The chemical hygiene officer maintains the Laboratory Materials Toxicity Spreadsheet

5 References

SLAC Environment, Safety, and Health Manual (SLAC-I-720-0A29Z-001)

- Chapter 53, “Chemical Safety”
  - Chemical Safety: Chemical Hygiene Plan Requirements (SLAC-I-730-0A09S-040)
- Chapter 16, “Spills”
- Chapter 17, “Hazardous Waste”
- Chapter 40, “Chemical Lifecycle Management”

Other SLAC Documents

- Hazard Communication and MSDS References

Other Documents

- None