

CHEMICAL HYGIENE PLAN – FACILITY SERVICES

In accordance with the
Occupational Safety & Health Administration
Laboratory Standard, 29 CFR 1910.1450

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1. Introduction

The Pueblo Community College Chemical Hygiene Plan (CHP) for Facility Services is a document that establishes protocols, in accordance with the Occupational Safety & Health Administration (OSHA) Laboratory Standard, 29 CFR 1910, to ensure employees are protected from exposure to chemical hazards in the workplace. Each Department Head is to maintain a copy of the CHP, which contains general requirements implemented by the Chemical Hygiene Committee and laboratory-specific documents such as hazard assessments, Standard Operating Procedures (SOP), accident and spill reports.

The CHP applies to any PCC facility services employee that engages in the use of hazardous chemicals.

The CHP must be made readily available to all employees and regulatory officials. All facility services employees are expected to use and comply with the CHP.

2. Regulations and Standards

Listed below is summary description of significant Federal regulations and industry standards, related to chemical safety.

29 CFR 1910.1450, “Occupational Exposures to Hazardous Chemicals in the Workplace”

The Standard dictates that employers limit worker exposure to hazardous chemicals. The Standard requires that employees be apprised of the hazard of chemicals present in their work area through information and training.

29 CFR 1910.1200, “Hazard Communication”

The Standard provides employees with hazard information based on the concept that employees have both a need and a right to know the hazards and identities of the chemicals they are exposed to when working.

29 CFR 1910.132, “Personal Protection”

The Standard requires the use of personal protective equipment (PPE) to reduce employees’ exposure to hazards when engineering and administrative controls are not feasible or effective in reducing these exposures to acceptable levels. Employers are required to determine all exposures to hazard in their workplace and determine if PPE should be used to protect their workers.

29 CFR 1910.151, “Medical Services and First Aid”

The Standard states that where the eyes or body of any person may be exposed to injurious corrosive material, suitable facilities for quick drenching or flushing of the eyes and body shall be provided within the work area for immediate emergency use.

29 CFR 1910.133, “Eye and Face Protection”

The Standard states the employer shall ensure that each affected employee uses appropriate eye or face protection where there are exposure to eye or face hazards caused by liquid chemicals, acid or caustic liquids, chemical gases or vapors, or potentially injurious light radiation.

ANSIZ258.1, “Emergency Eyewash and Shower Equipment”

This standard establishes minimum performance and use requirements for eyewash and shower equipment for emergency treatment of the eyes or body of a person who has been exposed to injurious materials.

ANSIZ87.1, “Occupational and Educational Eye and Face Protection”

This standard establishes minimum requirements for eye and face protective devices and guidance for the selection, use, and maintenance of these devices.

3. Definitions

Chemical Hygiene Officer (CHO) - 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.

Hazard – any existing or potential condition in the workplace that can result in death, injury, or property damage.

Hazard assessment -- determination of the health hazards associated with a process or task and the appropriate controls to implement to reduce the hazards.

Hazardous chemical - a chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. The term "health hazard" includes chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic systems and agents which damage the lungs, skin, eyes, or mucous membranes.

MSDS/SDS- Material Safety Data Sheets/ Safety Data Sheets

4. Responsibilities

Department Head/Director of Facilities is responsible for:

- Ensuring the department remains in compliance with the CHP.
- Providing the CHO with the support necessary to implement and maintain the CHP.

- Assist as needed with required training and the development of all SOP's required for specific facility services task and duties.

The Chemical Hygiene Officer (CHO) for Facility Services is responsible for controlling hazards in his/her department. These responsibilities include:

- Provide training and direction to the lead chemical safety personnel in facility services.
- Instructing facility service personnel on potential hazards.
- Work with the lead chemical safety personnel to develop written Standard Operating Procedures (SOP) for activities involving hazardous chemicals.
- Ensuring employees have received required training.
- Training employees and student employees in safe practices, on SOP's, and on the specific hazards within the workplace.
- Training employees and student employees on appropriate spill response measures and the use of the spill kit.
- Work with department supervisors and lead chemical safety personnel to correct work errors and dangerous conditions.
- Investigating accidents or spills to determine cause and implement corrective action, as appropriate.
- Work with the Facilities Director and the lead chemical safety personnel to select and provide the proper personal protective equipment (PPE) for all hazards associated with the job duties for every facility service staff members to include student, hourly and temporary employees.
- Facilities Director will support CHO to ensure all personnel wear appropriate attire and proper PPE.
- Providing technical guidance in the establishment of hazard assessments and SOP's
- Presenting Hazard Communication training applicable to laboratory personnel
- Work with lead safety personnel to inspect workplace environments annually to identify any deficiencies and to verify compliance with the CHP.

Lead Chemical Safety Personnel are responsible for working with the Director of Facilities and the CHO to maintain compliance with the CHP. Other duties will be to work with the CHO to complete the required hazard inspections in their assigned work areas in grounds, maintenance and housekeeping, attend other training sessions and meetings associated with the CHP, and provide guidance and direction with chemical safety and compliance to team members in the facility service department. The Director of Facilities will assign a Lead Chemical Safety person in grounds, maintenance and housekeeping.

Individual facility services workers are responsible for:

- Complying with the SOP's, working with the lead chemical safety personnel and CHO, and adhering to all requirements of the CHP.
- Ensuring that hazards are minimized and controlled.
- Wearing appropriate attire and proper PPE.
- Caring for their PPE.
- Appropriately responding to and reporting any chemical spills.
- Complete all required safety training.

5. General Chemical Safety Recommendations

1. **BEFORE** performing any task or job duty involving chemicals, read product labels, MSDS/SDS documents.
2. Follow the recommended instructions for the safe use of the chemical or product, and never mix chemicals.
3. Ensure that every chemical used in the workplace is clearly marked with the appropriate and approved label.
4. Always wear the proper Personal Protective Equipment (PPE)- **Note: Safety glasses are not designed to protect against chemical splash, only flying fragments, objects, particles, etc. Proper eye protection, i.e., goggles, shall be used when the potential hazard of the splashing of hazardous liquids, including acids, exists.**
5. Employees shall be aware of the location and proper operation of workplace safety equipment including: fire extinguishers; safety showers, and eyewash fountains.
6. Keep your work area clean, neat and uncluttered, and ensure all chemicals and equipment are properly labeled and stored.
7. All employees shall avoid unnecessary exposure to chemicals.
8. The Department Head/Director must approve work in which a worker will be performing alone, such as during the weekend or late at night. The approval of such work will be based on the associated hazard, i.e. the toxicity of the material and the potential for exposure.
9. The Administrative Assistant to facility services will keep a documented record of when facility chemicals are received on campus to prevent exceeding the manufacturer's recommended shelf life limitation. All containers containing chemicals shall be properly labeled.

10. The contents of waste containers must be identified on the container to preclude mixing of incompatible chemicals and to facilitate disposal. Disposal of any chemical waste in sanitary drains is prohibited. Unknown waste may be refused or billed for laboratory analysis of constituents. Refer to the Hazardous Materials Management Policy for guidance on hazardous waste.
11. Facility service staff must maintain all chemical distribution equipment and any other equipment that is used to spray or apply chemicals. Any malfunctioning equipment must be reported to the Director of Facilities and properly tagged with an "out of service" tag until proper and safe repairs have been performed.
12. Warning signs shall be posted at areas or on equipment where special or unusual hazards exist.
13. Laboratory and non-laboratory areas shall be sufficiently segregated to minimize the potential for chemical exposures in office areas.
14. Designated areas for eating or drinking shall be clearly identified and separated from work areas.
15. Refrigerators or ice machines that are currently or have been used for storage of chemicals shall not be used for food or beverage storage and must be labeled appropriately.
16. Flammables shall not be stored in refrigerators or freezers not designed for such storage.
17. All paints, varnishes and other chemicals used to paint or stain must only be used in a work area that has a separate ventilation system that is not tied to the building HVAC system. Fumes and odors from these types of products are unsafe for building occupants and must never be distributed into the building HVAC system.
18. Any spills or accumulations of chemicals on work surfaces shall be removed as soon as possible using techniques that minimize residual surface contamination.
19. Floors shall be cleaned regularly, and the **required "Wet-Floor" sign must be used.**

6. Hazard Identification – postings, labels, signs

Signage

Laboratories and other potentially hazardous work areas will have signage at all doors leading into the workspace. These signs shall have completed and current posting that identifies the general hazards within the room and lists the phone numbers of persons to be contacted in case of an emergency. **Specific hazards, such as laser and ionizing radiation, should be identified on the piece of equipment or at the source and, also, at the entrance to the room.**

Labels

Chemical containers shall be labeled with the full chemical or trade name of the contents. The manufacturer's label will provide personnel with specific information regarding the physical and health hazards of the substance. Directions found on the label shall be followed. Substances transferred from an original container to a secondary container shall be labeled with the full trade or chemical name of the contents, any dilution of the chemical, the date of the transfer, appropriate physical and health hazards. An exception is made to the secondary labeling requirements in cases where one worker, during a process or task, completely uses the chemical in the secondary container. No abbreviations or codes of the chemical name are acceptable, unless they are prominently displayed in the work area.

Chemical Inventory

Each facility services workshop, custodial closet, or chemical storage room shall maintain an inventory of their stored chemicals including approximate quantities. The Director of Facilities will provide the CHO with a detailed chemical inventory list that shall be maintained in the CHP and updated annually.

Material Safety Data Sheets (MSDS)/SDS

The MSDS/SDS provides valuable information regarding hazardous characteristics, incompatible materials, and recommendations for storage and spill response. As required by the Hazard Communications Standard and Right-to-Know Laws, an MSDS/SDS must be available for each chemical used in the workplace. These must be available in the workplace for staff review. The MSDS/SDS for all hazardous chemicals should be used during the SOP training of lab staff. The Facility Director will ensure that all MSDS-SDS documents used for facilities chemical inventory are reviewed and updated annually.

7. Hazard Assessment

The CHO is responsible for assessing the hazardous situations, chemicals, biological materials, and energy sources. The Hazard Assessment (Appendix A), which is a requirement of OSHA for PPE selection, is to be used to develop the SOP's. The purpose of the Hazard Assessment is to identify the potential hazards and then implement applicable measures to control such hazards. See Appendix B for an example of a Hazard Assessment.

Determining hazards is a subjective activity that is made clearer when looking at the two components of workplace hazards: the health effect potential and the frequency potential. The health effects could range from a trivial outcome such as irritation or a minor cut to the more serious result of a catastrophic injury or death. The frequency potential is the likelihood of an occurrence.

8. Standard Operating Procedures for Hazardous Work

OSHA mandates the development of the SOP for the use of hazardous chemicals. The SOP is a simple document that identifies a process or the use of a chemical, the associated hazards and hazard controls, special handling and storage requirements, and proper contingency response. There are two types of SOPs: a task or activity specific SOP (Appendix C) and an SOP that relates to a specific chemical. Either type of SOP can be selected and written. If a particular chemical is used in the same manner for multiple tasks then one SOP is sufficient for all work involving that chemical. If a more complicated activity involves multiple chemicals or other types of hazards the task specific SOP would be appropriate. The SOP must include the following elements:

- General Description and/or name of the process
- Required steps to complete the process
- List of chemicals during the process
- Hazard information on the label or MSDS
- Required engineering controls and/or special precautions.
- Transportation/storage requirements
- Accident/spill response procedures

These facility services specific SOPs must be included in the Chemical Hygiene Plan, as a separate section. The CHO will review these SOPs. The Director of Facilities must ensure that facility services personnel are trained on the safe and proper use of the SOPs applicable to their activities.

9. Personal Protective Equipment

PPE must be worn whenever required as determined by posted areas, hazard assessments, the SOP, MSDS-SDS, or the Department Head/Director. PPE is not a substitute for engineering controls, but should be used in conjunction with engineering controls and safe practices. Refer to ANSI Z87.1, “Occupational and Educational Eye and Face Protection” for guidance in selecting proper PPE for eye and face protection. All eyewear must meet the requirements of ANSI Z87.1.

- Facility services personnel are responsible for the care and cleaning of assigned PPE, such as eyewear, and for the proper disposal of PPE, as appropriate.
- Chemical goggles must be worn when a splash hazard exists. Such hazards include pouring of, or filling bottles from a chemical command or distribution center, using corrosive materials or processes where component failure may release hazardous chemicals with velocity. The additional use of a face shield may be necessary based on the hazard assessment.
- The appropriate gloves, laboratory coats, aprons, shoes or chemical resistant suits shall be used during work where a dermal exposure potential exists, as determined by the hazard assessment, MSDS-SDS, and during any chemical spill clean-up.
- If workplace procedure requires respiratory protection, employees must have, prior to use, (1) respiratory protection training, (2) medical certification, and (3) documentation of fit testing. Contact the CHO for assistance. Any facility services employee who use dust protection masks

for painting and/or cleaning must receive annual training on the safe and proper use of the cleaning and/or dust masks. Please refer to Section 5 for specific health hazards and regulations regarding the use of paints and varnish types of products.

10. Chemical Storage

1. Both the storage amounts and working amounts of toxic, flammable or hazardous chemicals in a building shall be kept to a minimum? As soon as a chemical is out of date or unnecessary, it shall be eliminated in the appropriate manner for the type of chemical.
2. Chemicals shall only be stored in a cool, dry, well-ventilated location and in containers with which they are chemically compatible.
3. No chemicals shall be brought into or stored in staff offices, equipment storage rooms or other locations not specifically intended for chemical storage. A staff member can store and use an approved ready-to-use sanitizer or disinfectant, glass cleaner in their office or work space so as long as the chemical is in the approved and labeled container. This is limited to a single spray bottle or ready-to-use container that the product was shipped in.
4. Each custodial, grounds and maintenance storage cabinets or closets shall maintain adequate control of known or suspected carcinogens and highly toxic materials. Each designated chemical storage area shall post a warning sign, which is highly visible, that depict the carcinogens and highly toxic materials that are used within the work environment or building on campus.
5. Larger capacity storage containers shall be stored on lower shelves.
6. Use of laboratory hoods as permanent storage devices is not permitted.
7. Where under-hood cabinets are used for chemical storage, venting of the cabinet to the fume hood is desirable.
8. Metal containers involved in the transfer of a flammable or combustible liquid shall be grounded and bonded together to minimize potential for ignition by a static electricity discharge.
9. Flammable materials shall not be stored with water reactive, explosive or self-igniting materials or next to strong oxidizing agents.
10. Flammable liquids shall be stored in approved flammable liquid storage cabinets, in accordance with NFPA, Standard on Fire Protection for flammable liquids (see Appendix H). The cabinet shall have the port hole closed or be vented directly into an exhaust system.
11. Concentrated reagents and other chemicals which could be harmful on skin contact shall be stored below eye-level, well back on properly constructed shelves where they are not likely to be knocked off.

12. Chemical reagents shall be kept in closed containers when not in use.

Below is a concise guide to the storage of most custodial and grounds chemicals.

- Highly acidic chemicals are separated from all other materials.
- Concentrated nitric acid is separated from all other materials.
- Inorganic acids (except bulleted items above) are stored separately.
- Highly toxic materials (LD₅₀ of 50 mg/kg or less) are stored separately.
- Carcinogenic chemicals are stored separately.
- Bases are stored separately.
- Strong oxidizing agents are stored separately.
- Strong reducing agents are stored separately.
- Water reactive, pyrophoric and explosive materials are stored separately
- Flammable organic materials (solvents, organic acids, and organic reagents) are stored separately.

The easiest and most efficient way to separate chemicals by compatibility group is to use secondary containments. Place the chemicals to be stored separately in a heavy gauge Nalgene (or similar plastic) tub. Plastic secondary containers must be compatible with the material being stored. Strong acids, especially perchloric, nitric and hydrofluoric are best stored in plastic containers designed to store strong mineral acids.

11. Eyewash Stations, Emergency Showers, and Other Safety Equipment Installation and Operability

All campus buildings that serve the purpose of a primary location when working with concentrated hazardous chemicals must be equipped with eyewashes and safety showers wherever chemicals have the possibility of damaging the skin or eyes. ANSI Z358.1, "Emergency Eyewash and Shower Equipment" provides for minimum performance requirements (see below).

- The units should be marked with a highly visible sign.
- The units should be located in areas that will be immediately accessible (reachable within 10 seconds).
- The units should be free of obstructions at all times.

- The eyewash units should be checked weekly by a designated lab worker, by flushing for 60 seconds. Emergency showers should be tested every six months, by Facilities Maintenance, to be certain that water flows through it and to clear the lines of stale water and debris.
- Water flow should be 1.5 liters per minute (lpm) for 15 minutes for eyewash stations and 20 gallons per minute for safety showers.
- Safety equipment, including fire extinguishers, fire blankets, emergency respiratory protection, and spill cleanup equipment should also be inspected monthly. Inspections shall be documented on the monthly inspection sheet (see below).

12. Inspections

The CHO will perform a quarterly review that will cover general safety, safety equipment checks, housekeeping, condition and availability of PPE, chemical waste and fire safety of facilities. Stored chemicals shall be examined periodically for replacement, deterioration, and container integrity. Any problems noted in regard to general safety, environmental health, or equipment safety shall be reported to the Director of Facilities. Unneeded items shall be discarded or returned to the control storage location.

Additionally, the CHO will perform an annual worksite inspection, to ensure compliance with the Standard. The annual inspection report will be submitted to the Director of Facilities, and the Director of Public Safety to review and plan for correcting identified deficiencies.

13. Training

The CHO or another qualified safety person will provide annual safety training to all facility services employees on the Chemical Hygiene Plan, the safe and proper use of chemicals in the workplace, MSDS/SDS, Spill Containment and Cleanup, and SOP's directly related to facility services tasks and duties involving chemicals, and other applicable regulatory and industry standards. Facility Services personnel should take this training within 30 days of date of hire. Listed in the appendix is a table indicating required training per OSHA. The required frequency that is denoted may be increased at the discretion of the Department Supervisor or CHO. Additionally, the Department Head/Facilities Director will provide specific training to their employees on the associated hazards in their assigned work areas. This training shall include:

- Recommended safety practices and procedures when working in their assigned work areas.
- Instruction on SOP's.

14. Accidents and Spills

All facility services personnel are responsible for implementing measures to prevent accidents and spills and to appropriately respond to any spill that occurs. Spills should be treated as potentially dangerous until it is cleaned up or evidence exists indicating no hazard is present. In the event of a large or uncontrolled spill activation of the Pueblo City Fire Hazardous Material response team shall be considered. Requirements for facility services employees include the following:

- Written accident and spill response procedures shall be implemented for tasks or processes involving hazardous chemicals.
- Each campus building shall have a spill response kit available to adequately mitigate or control the spill.
- Personnel shall be trained by the Department Supervisor or CHO on spill procedures and the use of the spill kit

In the event of a spill of hazardous or unknown material or accident, the following steps should be taken:

1. Remain calm and DO NOT touch the material. If it is safe to do so, stop the source of the spill and turn off any ignition sources.
2. If possible, isolate the area by cordoning it off or closing the doors.
3. Contact the PCC Department of Public Safety (DPS) at 719-549-3355 or 719-821-6563. Provide the DPS with the following information:
 - Where did the spill occur-Provide the building name and room number.
 - What was spilled and how much was spilled or leaking?
 - Are there any injuries?
4. If the spill occurs inside a campus building, leave the immediate area and wait for further instructions from emergency personnel or PCC Department of Public Safety (DPS) staff. If necessary, an entire building may have to be evacuated. If the spill occurs outside a building, evacuate the area around the spill.
5. Before attempting to clean up a spill, personnel must confirm the identity of the material, the appropriate mitigation procedures and material, i.e. appropriate absorbent to use, and the appropriate PPE to use. If feasible, read and follow the chemical's MSDS recommendation for spill cleanup procedures.
6. Spills, accidents, and near accidents should be investigated by the PI for the purpose of determining corrective actions and preventing like instances in the future. The CHO should be contacted for all investigations. Written findings and any recommendations should be distributed to all relevant departments as a safety to reduce future mishaps.

7. All employee-related injuries or exposures must be reported immediately or within 24 hours to human resources. Refer to the Employee Workers Compensation Policy.

15. Hazardous Waste

Labeling:

All hazardous waste must be properly labeled. The label must be completely filled out and include:

1. Accumulations start date reflecting when accumulation begins, not before or after. Full dates must be used on this label (DD/MM/YY).
2. Full chemical names must be used; acronyms and chemical formulas are not acceptable
3. Concentrations

Segregation of Chemical Waste:

All chemical waste should be segregated by hazard class using appropriate secondary containment.

Secondary Containment:

Proper secondary containment must be used when incompatible chemicals are stored in the same area. The secondary containers must be of sufficient capacity to contain the contents of the primary container in case of breakage and must be chemically compatible.

Chemical waste Containers securely capped or sealed:

Securely capped means if the bottle is tipped, no leakage occurs. Aluminum foil and parafilm do not constitute a secure cap. If zip-top bags are used to contain contaminated pipette tips, the bag must be securely closed. Chemical waste containers should only be open during filling. Evaporating waste is never allowed.

Container Less than 1 Year Old:

Chemical waste containers must be removed by within one year of the start date on the waste label.

Removal:

Do not put hazardous waste down the sink or in the trash. If you are not sure if a chemical is hazardous, call the chemical hygiene officer. The following information must be provided on the waste disposal label:

16. Exposure Monitoring

Personal exposure monitoring will be performed if the staff has reason to believe that the exposure level of any chemical may exceed the action level or PEL.

17. Medical Consultation and Examination

The employer must provide all employees who work with hazardous chemicals an opportunity to receive medical attention, under the following circumstances.

- Whenever an employee develops signs or symptoms associated with a hazardous chemical to which the employee may have been exposed in the workplace, the employee shall be provided an opportunity to receive an appropriate medical examination.
- Where exposure monitoring reveals an exposure level routinely above the action level (or in the absence of an action level, the PEL) for an OSHA regulated substance for which there are exposure monitoring and medical surveillance requirements, medical surveillance shall be established for the affected employee as prescribed by the particular standard.
- Whenever an event takes place in the work area such as a spill, leak, explosion or other occurrence resulting in the likelihood of a hazardous exposure, the affected employee shall be provided an opportunity for a medical consultation. Such consultation shall be for the purpose of determining the need for a medical examination.
- The college Human Resources staff will provide employees with further information and guidance when there is a need for medical consultation and/or examination.

18. Recordkeeping

The employer shall establish and maintain for each employee an accurate record of any measurements taken to monitor employee exposures and any medical consultation and examinations including tests or written opinions required by this standard.

CHEMICAL HYGIENE PLAN – ACADEMIC

In accordance with the
Occupational Safety & Health Administration
Laboratory Standard, 24 CFR 1910-1450
Updated: August 2016

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1. Introduction

The Pueblo Community College Chemical Hygiene Plan (CHP) is a document that establishes protocols, in accordance with the Occupational Safety & Health Administration (OSHA) Laboratory Standard, 29 CFR 1910.1450, to ensure employees are protected from exposure to chemical hazards in the laboratory. Each Department Head is to maintain a copy of the CHP, which contains general requirements implemented by the Chemical Hygiene Committee and laboratory-specific documents such as hazard assessments, Standard Operating Procedures (SOP), accident and spill reports.

The CHP applies to any PCC laboratory, clinic, shop, or other learning environment that engages in the use of hazardous chemicals. The CHP must be made readily available to all employees and regulatory officials.

All college employees who use hazardous chemicals must comply with the CHP. Non-laboratory academic learning environments will follow all stated, recommended and best safety and chemical practices as outlined in the Academic or Facility Services CHP.

2. Regulations and Standards

Listed below is summary description of significant Federal regulations and industry standards, related to laboratory safety.

29 CFR 1910.1450, “Occupational Exposures to Hazardous Chemicals in Laboratories”

The Standard dictates that employers limit worker exposure to hazardous chemicals. The Standard requires that employees be apprised of the hazard of chemicals present in their work area through information and training.

29 CFR 1910.1200, “Hazard Communication”

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The Standard states that where the eyes or body of any person may be exposed to injurious corrosive material, suitable facilities for quick drenching or flushing of the eyes and body shall be provided within the work area for immediate emergency use.

29 CFR 1910.133, “Eye and Face Protection”

The Standard states the employer shall ensure that each affected employee uses appropriate eye or face protection where there are exposure to eye or face hazards caused by liquid chemicals, acid or caustic liquids, chemical gases or vapors, or potentially injurious light radiation.

ANSI Z9.5, “Laboratory Ventilation Guidelines”

The American National Standard Institute (ANSI) in this Standard establishes minimum requirements and best practices for laboratory ventilation systems to protect personnel from overexposure to harmful or potentially harmful airborne contaminants generated within the laboratory.

ANSI Z358.1, “Emergency Eyewash and Shower Equipment”

This standard establishes minimum performance and use requirements for eyewash and shower equipment for emergency treatment of the eyes or body of a person who has been exposed to injurious materials.

ANSI Z87.1, “Occupational and Educational Eye and Face Protection”

This standard establishes minimum requirements for eye and face protective devices and guidance for the selection, use, and maintenance of these devices.

3. Definitions

Chemical Hygiene Officer (CHO) - 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.

Hazard – any existing or potential condition in the workplace that can result in death, injury, or property damage.

Hazard assessment -- determination of the health hazards associated with a process or task and the appropriate controls to implement to reduce the hazards.

Hazardous chemical - a chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. The term "health hazard" includes chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic systems and agents which damage the lungs, skin, eyes, or mucous membranes.

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

- Chemical manipulations are carried out on a "laboratory scale;"
- Multiple chemical procedures or chemicals are used.
- The procedures involved are not part of a production process.

4. Responsibilities

Department Head is responsible for:

- ensuring the department remains in compliance with the CHP
- providing the CHO with the support necessary to implement and maintain the CHP

The Laboratory Coordinator (LC) and/or Faculty Member (FM) is responsible for controlling hazards in his/her laboratory(ies). These responsibilities include:

- performing a hazard assessment for hazardous procedure
- instructing laboratory personnel on potential hazards
- providing written Standard Operating Procedures (SOP) for laboratory activities involving hazardous chemicals
- ensuring employees have received required training
- training employees and students in safe practices, on SOP's, and on the specific hazards within the lab or learning environment
- training employees and students on appropriate spill response measures and the use of the spill kit
- correcting work errors and dangerous conditions
- investigating accidents or spills to determine cause and implement corrective action, as appropriate
- selecting and providing the proper personal protective equipment (PPE) for the hazard
- ensuring personnel wear appropriate attire and proper PPE.

The Chemical Hygiene Officer is responsible for:

- providing technical guidance in the establishment of hazard assessments and SOP's
- presenting Hazard Communication training applicable to laboratory personnel
- inspecting laboratories annually to identify any deficiencies and to verify compliance with the CHP.

Faculty and/or students are responsible for:

- complying with the SOP's and the CHP
- ensuring that hazards are minimized and controlled
- wearing appropriate attire and proper PPE
- caring for their PPE
- appropriately responding to and reporting any chemical spills.

5. General Laboratory Rules

1. Laboratories shall be outfitted with safety equipment including safety showers, eyewash fountains, fire extinguishers, fire blanket, and access to emergency alarms and telephones.
2. Laboratories shall be provided with sufficient general ventilation for input to laboratory hoods to ensure that laboratory air is continually replaced and to prevent the increase of air concentrations of toxic substances. The exhaust air must pass directly to the exterior of the buildings
3. Personnel, whether working in or visiting the lab, shall wear appropriate attire and personal protective equipment relevant to potential hazards in the work area. **Note: Safety glasses are not designed to protect against chemical splash, only flying fragments, objects, particles, etc. Proper eye protection, i.e., goggles, shall be used when the potential hazard of the splashing of hazardous liquids, including acids, exists.**
4. Employees shall be aware of the location and proper operation of laboratory safety equipment including: fire extinguishers; safety showers; eyewash fountains; and, fire blankets in the laboratory.
5. Work areas shall be maintained clean and uncluttered with chemicals and equipment properly labeled and stored.
6. All employees shall avoid unnecessary exposure to chemicals.
7. The LC/FM must approve laboratory work in which a worker will be performing alone, such as during the weekend or late at night. The approval of such work will be based on the associated hazard, i.e. the toxicity of the material and the potential for exposure.
8. Chemicals shall be dated when received and also when opened to prevent exceeding the manufacturer's recommended shelf life limitation. All containers containing chemicals shall be properly labeled.
9. The contents of waste containers must be identified on the container to preclude mixing of incompatible chemicals and to facilitate disposal. Disposal of certain chemical waste in sanitary drains is allowed, if the chemical is not considered hazardous by local authorities. Unknown waste may be refused or billed for laboratory analysis of constituents. Refer to the Flinn Scientific catalog and local authorities (Waste Management / Board of Water Works) for guidance on hazardous waste treatment and disposal.
10. Malfunctioning laboratory equipment shall be labeled or tagged "out of service" and shall not be used until repairs have been performed.
11. Warning signs shall be posted at areas or on equipment where special or unusual hazards exist.
12. Laboratory and non-laboratory areas shall be sufficiently segregated to minimize the potential for chemical exposures in office areas.
13. Designated areas for eating or drinking shall be clearly identified and separated from work areas.
14. Refrigerators or ice machines that are currently or have been used for storage of chemicals shall not be used for food or beverage storage and must be labeled appropriately.
15. Flammables shall not be stored in refrigerators or freezers not designed for such storage.
16. Any spills or accumulations of chemicals on work surfaces shall be removed as soon as possible using techniques that minimize residual surface contamination.

17. Floors shall be cleaned regularly.

6. Hazard Identification – postings, labels, signs, signage

Signs, Signage

Laboratories and other potentially hazardous work areas will have signage at all doors leading into the workspace. These signs shall have completed and current posting that identifies the general hazards within the room and lists the phone numbers of persons to be contacted in case of an emergency. Specific hazards, such as laser and ionizing radiation, should be identified on the piece of equipment or at the source and, also, at the entrance to the room.

Labels

Chemical containers shall be labeled with the full chemical or trade name of the contents. The manufacturer's label will provide personnel with specific information regarding the physical and health hazards of the substance. Directions found on the label shall be followed.

Substances transferred from an original container to a secondary container for use in the classrooms shall be labeled with the full trade or chemical name, or a known abbreviation or code of the chemical name, of the contents, any dilution of the chemical, appropriate physical and health hazards.

Chemical Inventory

Each laboratory shall maintain an inventory of their stored chemicals including approximate quantities. The inventory shall be maintained by the LC and updated annually.

Safety Data Sheets (SDS)

The SDS provides valuable information regarding hazardous characteristics, incompatible materials, and recommendations for storage and spill response. As required by the Hazard Communications Standard and Right-to-Know Laws, an SDS must be available for each chemical used in the laboratory. These must be available in the workplace for laboratory staff review. The SDS for all hazardous chemicals should be used during the SOP training of lab staff.

7. Hazard Assessment

Each LC/FM is responsible for assessing the hazardous situations, chemicals, biological materials, and energy sources. The Hazard Assessment (Appendix A), which is a requirement of OSHA for PPE selection, is to be used to develop the SOPs. The purpose of the Hazard Assessment is to identify the potential hazards and then implement applicable measures to control such hazards. See Appendix B for an example of a Hazard Assessment.

Determining hazards is a subjective activity that is made clearer when looking at the two components of workplace hazards: the health effect potential and the frequency potential. The health effects could range from a trivial outcome such as irritation or a minor cut to the more serious result of a catastrophic injury or death. The frequency potential is the likelihood of an occurrence.

8. Standard Operating Procedures for Hazardous Work

OSHA mandates the development of the SOP for the lab scale use of hazardous chemicals. The SOP is a simple document that identifies a process or the use of a chemical, the associated hazards and hazard controls, special handling and storage requirements, and proper contingency response. There are two types of SOPs: a task or activity specific SOP (Appendix C) and an SOP that relates to a specific chemical. Either type of SOP can be selected and written. If a particular chemical is used in the same manner for multiple tasks then one SOP is sufficient for all work involving that chemical. If a more complicated activity involves multiple chemicals or other types of hazards the task specific SOP would be appropriate. The SOP must include the following elements:

- **General identification**, including name of PI and location
- **Job or process identification or name of specific chemical**
- **Hazard information**, as identified on the Hazards Assessment
- **Required engineering controls and/or special precautions**
- **Required PPE** to be worn during the process
- **Transportation/storage requirements**
- **Accident/spill response**

These laboratory-specific SOPs must be included in the Chemical Hygiene Plan, as a separate section. The CHO will review these SOPs. The LC/FM must ensure that laboratory personnel are trained on the use of the SOPs applicable to their activities.

General laboratory procedures are written in the student lab manuals. These serve as SOPs for the classroom. It is the responsibility of the individual Faculty Member to assure that all general safety procedures, as well as the specific laboratory procedures outlined in the lab manuals, are followed during laboratory classes.

9. Personal Protection Equipment

PPE must be worn whenever required as determined by posted areas, hazard assessments, the SOP, SDS or the LC/FM/Laboratory Supervisor. PPE is not a substitute for engineering controls, but should be used in conjunction with engineering controls and safe practices. Refer to ANSI Z87.1,

“Occupational and Educational Eye and Face Protection” for guidance in selecting proper PPE for eye and face protection. All eyewear must meet the requirements of ANSI Z87.1.

- Laboratory personnel are responsible for the care and cleaning of assigned PPE, such as eyewear and for the proper disposal of PPE, as appropriate.
- Chemical goggles shall be worn when a splash hazard exists. Such hazards include pouring of corrosive materials or processes where component failure may release hazardous chemicals with velocity. The additional use of a face shield may be necessary based on the hazard assessment.
- The appropriate gloves, laboratory coats, aprons, shoes or chemical resistant suits shall be used during work where a dermal exposure potential exists, as determined by the hazard assessment and during any chemical spill cleanup.
- If a laboratory procedure requires respiratory protection, employees must have, prior to use, (1) respiratory protection training, (2) medical certification, and (3) documentation of fit testing. Contact the CHO for assistance.

10. Laboratory Hood Operation

Every laboratory fume hood used for the control of air contaminants shall be tested annually to assure that adequate airflow is being maintained to provide continued protection against employee exposure. The hood shall be tested using a calibrated airflow anemometer and/or indicator smoke. The ANSI guideline of 80 to 120 feet per minute (fpm) as an average face velocity, at the working sash height, will be used as acceptance criteria. A sticker will be affixed to the side of the hood indicating the hood has adequate airflow. Any hood that does not meet the acceptable airflow criteria shall be removed from service until repairs can be completed. Signs shall be posted indicating the hood is "Out of Service".

11. Use of Laboratory Hoods

1. Laboratory equipment that may discharge hazardous chemicals shall be vented to local exhaust devices.
2. Laboratory fume hoods shall be used when working with any material that might release hazardous chemical vapors or dust. Work activities that would require the use of a fume hood would include:
 - handling chemicals with significant inhalation hazard, i.e. a chemical with an OSHA permissible exposure limit (PEL) of 100 parts per million (ppm) or less which has appreciable volatility
 - performing procedures with chances of splatter or splash of hazardous chemicals
 - operating processes where component failure may release hazardous chemicals with velocity
 - handling of heated chemicals

- handling of corrosive materials
 - carrying out reactions with strong exothermic reaction
 - handling chemicals with significant vapor pressure
 - where monitoring shows significant exposure
3. Personnel using a fume hood shall confirm that it is operating properly prior to use. For hoods without static pressure or airflow gauges, an airflow indicator (telltale) such as an eight-inch strip of light material dangling from the sash can be used to verify airflow into the hood.
 4. Equipment in fume hoods shall be kept to a minimum to avoid blockage of airflow or hood face turbulence effects.
 5. Laboratory hood sashes shall be kept in the down or closed position when not in use. Hood sashes should be kept as low as practicable during actual use to utilize the barrier capabilities of the sash.

12. Chemical Storage

1. Both the storage amounts and working amounts of toxic, flammable or hazardous chemicals in a laboratory shall be kept to a minimum.
2. Chemicals shall only be stored in a cool, dry, well-ventilated location and in containers with which they are chemically compatible.
3. No chemicals shall be brought into or stored in laboratory offices, equipment storage rooms or other locations not specifically intended for chemical storage.
4. Each lab shall maintained adequate control of known or suspected carcinogens and highly toxic materials. The lab shall post a warning sign, which is highly visible, that depict the carcinogens and highly toxic materials that are used within the lab.
5. Larger capacity storage containers shall be stored on lower shelves.
6. Use of laboratory hoods as permanent storage devices is not permitted.
7. Where under-hood cabinets are used for chemical storage, venting of the cabinet to the fume hood is desirable.
8. Metal containers involved in the transfer of a flammable or combustible liquid shall be grounded and bonded together to minimize potential for ignition by a static electricity discharge.
9. Flammable materials shall not be stored with water reactive, explosive or self-igniting materials or next to strong oxidizing agents.
10. Flammable liquids shall be stored in approved flammable liquid storage cabinets, in accordance with NFPA 45, Standard on Fire Protection for Laboratories Using Chemicals, (see Appendix H). Flammable storage cabinets shall **not** be vented to the laboratory. The cabinet shall have the port hole closed or be vented directly into an exhaust system.
11. Concentrated reagents and other chemicals which could be harmful on skin contact shall be stored below eye-level, well back on properly constructed shelves where they are not likely to be knocked off.
12. Chemical reagents shall be kept in closed containers when not in use. Below is a concise guide to the storage of most lab scale chemicals.

- perchloric acid is separated from all other materials
- hydrofluoric acid is separated from all other materials
- concentrated nitric acid is separated from all other materials. It may be kept in the acid cabinet with other acids as long as it is separated in a liquid-tight compartment
- inorganic acids (except bulleted items above) are stored separately
- highly toxic materials (LD50 of 50 mg/kg or less) are stored separately
- carcinogenic chemicals are stored separately.
- bases are stored separately
- strong oxidizing agents are stored separately
- strong reducing agents are stored separately
- water reactive, pyrophoric and explosive materials are stored separately
- flammable organic materials (solvents, organic acids, organic reagents) are stored separately.

The easiest and most efficient way to separate chemicals by compatibility group is to use secondary containments. Place the chemicals to be stored separately in a heavy gauge Nalgene (or similar plastic) tub. Plastic secondary containers must be compatible with the material being stored. Strong acids, especially perchloric, nitric and hydrofluoric are best stored in plastic containers designed to store strong mineral acids. Small containers of compatible chemicals may be stored in a desiccator or other secure container. This is especially useful for highly toxic materials and carcinogens.

13. Eyewash Stations, Emergency Showers, and Other Safety Equipment Installation and Operability

All laboratories must be equipped with eyewashes and safety showers wherever chemicals have the possibility of damaging the skin or eyes. ANSI Z358.1, "Emergency Eyewash and Shower Equipment" provides for minimum performance requirements (see below).

- The units should be marked with a highly visible sign.
- The units should be located in areas that will be immediately accessible (reachable within 10 seconds).
- The units should be free of obstructions at all times.
- The eyewash units should be checked monthly by Facilities Maintenance, by flushing for 60 seconds. Emergency showers should be tested monthly, by Facilities Maintenance, to be certain that water flows through it and to clear the lines of stale water and debris.
- Water flow should be 1.5 liters per minute (lpm) for 15 minutes for eyewash stations and 20 gallons per minute for safety showers.
- Safety equipment, including fire extinguishers, fire blankets, emergency respiratory protection, and spill cleanup equipment should also be inspected monthly. Inspections shall be documented on the monthly inspection sheet (see below).

14. Inspections

Each laboratory will perform a pre-semester inspection that will cover general safety, safety equipment checks, housekeeping, condition and availability of PPE, chemical waste and fire safety. Stored chemicals shall be examined periodically for replacement, deterioration, and container integrity. Any problems noted with regard to any laboratory safety equipment shall be reported to the laboratory coordinator. Unneeded items shall be discarded or returned to the control storage location. The pre-semester inspection will be signed and dated and should be appended to the CHP. The signed inspection checklist will be maintained by the LC.

Additionally, the CHO will perform an annual laboratory inspection, to ensure compliance with the Standard. The inspection report will be submitted to the LC/FM who is responsible for correcting identified deficiencies.

15. Training

The LC will provide generic laboratory safety training to all laboratory employees on the contents of the OSHA Laboratory Standard, the Chemical Hygiene Plan, and other applicable regulatory and industry standards. Laboratory personnel should take this training within 30 days of initial assignment to a laboratory. Listed in the appendix is a table indicating required training per OSHA. The required frequency that is denoted may be increased at the discretion of the LC/FM. Additionally, the LC/FM will provide specific training to their employees on the associated hazards in their laboratory. This training shall include:

- health information on all hazardous chemicals used in the laboratory
- instruction on all Hazard Assessments
- instruction on SOP's

16. Accidents and Spills

Each lab is responsible for implementing measures to prevent accidents and spills and to appropriately respond to any spill that occurs. Spills should be treated as potentially dangerous until it is cleaned up or evidence exists indicating no hazard is present. In the event of a large or uncontrolled spill activation of the Pueblo City Fire Hazardous Material response team shall be considered.

Requirements for the lab include the following:

- Written accident and spill response procedures shall be implemented for tasks or processes involving hazardous chemicals
- Laboratories shall have a spill response kit available in the laboratory to adequately mitigate or control the spill
- Personnel shall be trained by the LC/FM on spill procedures and the use of the spill kit In the

event of a spill or accident the following steps should be taken:

1. Alert associated laboratory personnel of the event. If it is safe to do so, stop the source of the spill and turn off any ignition sources. If spill is uncontrolled the room or building may need to be evacuated.
2. Assist individuals who may have been injured. If someone has been splashed with a chemical take him or her to an eye wash station or shower, as appropriate. Flush exposed tissue continuously for 15 minutes. Remove any clothing that may potentially be contaminated.
3. Call emergency services at 911 and Campus Safety if an individual is injured or if the spill is too hazardous to abate locally.
4. Before attempting to clean up a spill, personnel must confirm the identity of the material, the appropriate mitigation procedures and material, i.e. appropriate absorbent to use, and the appropriate PPE to use. If feasible, read and follow the chemical's SDS recommendation for spill cleanup procedures.
5. Spills, accidents, and near accidents should be investigated by the LC/FM for the purpose of determining corrective actions and preventing like instances in the future. The CHO should be contacted for all investigations. Written findings and any recommendations should be distributed to all relevant departments as a safety to reduce future mishaps.
6. All employee-related injuries or exposures must be reported immediately or within 24 hours to human resources. Refer to the Employee Workers Compensation Policy.

17. Hazardous Waste

Labeling:

All hazardous waste must be properly labeled and logged. The log must be completely filled out and include:

1. Accumulations start date reflecting when accumulation begins, not before or after. Full dates must be used on this label (DD/MM/YY).
2. Full chemical names must be used; acronyms and chemical formulas are not acceptable
3. Concentrations

Segregation of Chemical Waste:

All chemical waste should be segregated by hazard class using appropriate secondary containment.

Secondary Containment:

Proper secondary containment must be used when incompatible chemicals are stored in the same area. The secondary containers must be of sufficient capacity to contain the contents of the primary container in case of breakage and must be chemically compatible.

Chemical waste Containers securely capped or sealed:

Securely capped means if the bottle is tipped, no leakage occurs. Aluminum foil and parafilm do not constitute a secure cap. If zip-top bags are used to contain contaminated pipette tips,

the bag must be securely closed. Chemical waste containers should only be open during filling. Evaporating waste is allowed only if proper disposal procedures are followed for ultimate disposal.

Container Less than 1 Year Old:

Chemical waste containers should be removed within one year of the start date on the waste label, but no later than 18 months.

Treatment:

Certain chemicals may be treated per recommended procedures for neutralization, reduction, or other methods that will render the chemical harmless. Once rendered harmless, the chemical may be disposed of in the usual manner. The Flinn Scientific catalog is an excellent reference for treatment and disposal of chemical waste.

Removal:

Do not put hazardous waste down the sink or in the trash. If you are not sure if a chemical is hazardous, call the chemical hygiene officer. The following information must be provided on the waste disposal label: Name, concentration, hazard information.

18. Exposure Monitoring

Personal exposure monitoring will be performed if the lab staff has reason to believe that the exposure level of any chemical may exceed the action level or PEL.

19. Medical Consultation and Examination

The employer must provide all employees who work with hazardous chemicals an opportunity to receive medical attention, under the following circumstances.

- Whenever an employee develops signs or symptoms associated with a hazardous chemical to which the employee may have been exposed in the laboratory, the employee shall be provided an opportunity to receive an appropriate medical examination.
- Where exposure monitoring reveals an exposure level routinely above the action level (or in the absence of an action level, the PEL) for an OSHA regulated substance for which there are exposure monitoring and medical surveillance requirements, medical surveillance shall be established for the affected employee as prescribed by the particular standard.
- Whenever an event takes place in the work area such as a spill, leak, explosion or other occurrence resulting in the likelihood of a hazardous exposure, the affected employee shall be provided an opportunity for a medical consultation. Such consultation shall be for the purpose of determining the need for a medical

examination.

20. Recording

The employer shall establish and maintain for each employee an accurate record of any measurements taken to monitor employee exposures and any medical consultation and examinations including tests or written opinions required by this standard.