



**MINNESOTA STATE**  
Northeast Higher Education District

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# **CHP**

## **CHEMICAL HYGIENE PLAN**

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# Chemical Hygiene Plan (CHP)

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## Section 1. Introduction

The OSHA standard for Occupational Exposure to Hazardous Chemicals in Laboratories, 29 CFR 1910.1450, often referred to as the Laboratory standard, specifies the mandatory requirements of a Chemical Hygiene Plan (CHP) to protect employees from harm due to hazardous chemicals.

## Section 2. Purpose and Application

This CHP specifies policies, procedures, responsibilities, and safe work practices capable of preventing injury and/or illness associated with the use of hazardous chemicals in campus laboratories. In addition, this plan is also intended to safely limit employee exposures to OSHA regulated substances specified in 29 CFR 1910, Subpart Z.

This plan applies to those engaged in the laboratory use of hazardous chemicals. Laboratory use of hazardous chemicals means the handling or use of such chemicals in which all of the following conditions are met:

- I. The handling or use of chemicals occurs on a laboratory scale, that is, the work involves containers which can easily and safely be manipulated by one person.
- II. Multiple chemical procedures or chemical substances are used.
- III. Protective laboratory practices and equipment are available and in common use to minimize the potential for employee exposure to hazardous chemicals.

This standard does not apply to laboratories whose function is to produce commercial quantities of material. Also, where the use of hazardous chemicals provides no potential for employee exposure, such as in procedures using chemically impregnated test media and commercially prepared test kits.

## Section 3. Definitions

A list of definitions is provided below. A more comprehensive list can be found in the OSHA standard for Occupational Exposure to Hazardous Chemicals in Laboratories, 29 CFR 1910.1450.

**Chemicals:** Refers to hazardous substances, samples, and hazardous wastes.

**Chemical Hygiene Officer:** An employee designated by the employer, who is qualified by training or experience, to provide technical guidance in the development and implementation of the provisions of the CHP.

**Corrosive:** A chemical that has a pH greater than 12 or less than 2. Corrosive chemicals can irritate or burn the skin, eyes, and respiratory tract. Severe exposure can cause permanent damage.

**Flammable Liquids:** Liquids which produce flammable vapors which are both a fire and explosion hazard. It is important to understand that it is the vapor, not the liquid, which can burn.

**Flash Point:** The temperature at which enough vapor is given off to form an ignitable mixture with air. Chemicals with a flash point of less than 100°F are classified as flammable.

**Hazardous Chemical:** Any chemical which is classified as a health hazard or simple asphyxiant in accordance with the Hazard Communication standard, 29 CFR 1910.1200.

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

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

**Reactive Chemicals:** Any chemical that is inherently unstable and susceptible to rapid decomposition, as well as chemicals that act alone or with other substances in a violent uncontrolled manner liberating heat, toxic gases, or leading to an explosion. Reaction rates almost always increase rapidly as the temperature increases. If the heat generated in a reaction is not dissipated, the reaction rate can increase until an explosion results.

**Toxic chemicals:** Any chemical that is poisonous or destructive to the body's internal systems. The toxicity of a chemical is the degree of injury and/or illness that can be caused by it. Primary entry of these chemicals into the body is by inhalation, skin absorption, or ingestion.

#### **Section 4. Roles and Responsibilities**

Specific responsibilities for carrying out this program are identified by position below.

Provosts:

- Support and provide resources for the overall plan.

Campus Chemical Hygiene Officers:

- Review the plan annually and recommend necessary updates.

- Evaluate the plan for effectiveness.
- Ensure that any changes or additions to the plan and related documents are reviewed prior to implementation.
- Research and document replacements for chemicals with high chronic toxicity and evaluate them prior to use.
- Ensure that weekly and annual emergency eyewash/shower inspections are conducted.
- Ensure required fume hood testing is completed.
- Ensure that weekly hazardous waste storage area inspections are completed.
- Ensure affected departments provide up to date Safety Data Sheets (SDS) for all required hazardous chemicals and substances.
- Ensure laboratory security measures are established and followed.
- Assist the NHED Safety Administrator in ensuring plan elements are implemented across the campus.

#### Campus Safety Officers:

- Review the plan annually and recommend necessary updates.
- Assist the Chemical Hygiene Officer in evaluating the plan for effectiveness.
- Ensure that weekly and annual emergency eyewash/shower inspections are conducted.
- Ensure required fume hood testing is completed.
- Ensure that weekly hazardous waste storage area inspections are completed.
- Assist the NHED Safety Administrator in ensuring plan elements are implemented across the campus.

#### NHED Safety Administrator:

- Ensure annual review, evaluation, and necessary updates to the plan.
- Ensure that employee training records and non-medical related required records are maintained.
- Ensure annual emergency eyewash/shower and fume hood testing is completed.

#### Deans/Supervisors:

- Oversee the plan for their departments/work areas and ensure plan elements are implemented as required.
- Evaluate and review the plan for effectiveness.
- Oversee employee training.
- Oversee employee use of and training on laboratory protective equipment.
- Supervise staff to ensure that the plan is followed.
- Provide resources for equipment to protect employees when using hazardous laboratory chemicals.
- Provide and make available appropriate personal protective equipment (PPE).
- Ensure that Safety Data Sheets (SDS) are up to date and available for all required hazardous chemicals and substances.
- Oversee and ensure laboratory security measures are established and followed.

NHED Human Resources Department:

- Maintain medical records based on regulatory requirements.
- Provide access to records based on regulatory requirements.

Employees:

- Comply with the requirements of this plan and follow all procedures.
- Understand the physical and chemical hazards associated with their respective laboratory and follow all safe work practices.
- Understand the signs and symptoms associated with hazardous chemicals used in their respective laboratory.
- Promote good housekeeping practices in the laboratory or work area.
- Immediately notify the supervisor, Chemical Hygiene Officer, or Safety Officer of any hazardous conditions or unsafe work practices in the work area.
- Wear all necessary PPE to perform tasks safely.
- Maintain a secure laboratory work environment.
- Attend required training sessions.

## **Section 5. Laboratory Standard Operating Procedures**

The CHP identifies techniques for the safe handling, use, and storage of hazardous substances and includes standard practices to be followed when laboratory work involves the use of hazardous chemicals.

**Note:** When working with hazardous chemicals, it is important to understand the potential physical and health hazards associated with the materials. This information can be found by reviewing the SDS.

It is essential to be prepared and understand what actions to take in the event of a hazardous material emergency. Know the location of safety equipment including the emergency eyewash/shower, fire extinguishers, and fire alarm pull stations. Be certain that necessary supplies are available for handling small spills of hazardous materials. Always be aware of laboratory activity and ensure a secure work environment.

General guidelines for the safe use of hazardous chemicals are listed below.

### General Safety Guidelines for the Proper Handling, Use, and Storage of Chemicals

1. Use common sense when working with or around any area where chemicals are being used or stored.
2. Limit access to areas where chemicals are used or stored by posting signs and/or locking doors when areas are unattended.
3. Working alone in a laboratory is dangerous and is to be strictly avoided.
4. Know the location of safety equipment such as an emergency eyewash/shower, fire extinguishers, and fire alarm pull stations.
5. Review SDS.
6. Labels on in-coming hazardous chemicals are not to be defaced or removed. All containers must be properly labeled with their identity and a hazard warnings.

7. Only the minimum amount of hazardous chemicals should be kept at workstations.
8. Use chemicals in a laboratory hood when necessary.
9. Store all chemicals and samples in appropriate closed containers.
10. Store chemicals and samples in their proper place.
11. When applicable, ensure chemicals are segregated for storage and returned accordingly.
12. Use appropriate PPE when working with hazardous chemicals.
13. Chemicals are to be kept off desks and out of non-laboratory areas.
14. Spilled chemicals must be cleaned up immediately and disposed of properly.
15. No eating or drinking is allowed where chemicals are being used or stored.
16. Smell chemicals only when absolutely necessary and safe to do so by wafting a small amount of vapor toward the nose.
17. Cover all open cuts and sores before working with chemicals.
18. Wash hands after working with chemicals.
19. Rinse all equipment before leaving it for final cleaning.

#### General Safety Guidelines for the Proper Handling, Use, and Storage of Acids and Bases

1. Always add acids or bases to water (*A to W*). **Never add water to acids or bases.**
2. Acids are to be poured slowly to avoid splashing or super heating.
3. In case of an emergency when working with corrosive chemicals, make sure that there is a source of water and a functioning emergency eyewash and/or shower in the immediate area.
4. Flush acid or base containers with water after becoming empty.
5. Wipe surface areas after using acids or bases and dispose of wipes properly.

#### General Safety Guidelines for the Proper Handling, Use, and Storage of Flammable Liquids

1. Open flames and smoking are prohibited in all areas where flammable liquids are stored, handled, or used.
2. Avoid prolonged or repeated skin contact.
3. Use only non-sparking electrical equipment.
4. Only store flammable liquids in tightly closed containers.
5. Store flammables in a designated flammable storage room or cabinet.
6. Liquid petroleum must always be stored outside in a secure, low traffic, and well ventilated area.

#### General Safety Guidelines for the Proper Handling, Use, and Storage of Toxic Materials

1. Protect hands and forearms to prevent skin contact with toxic materials.
2. Use and store these substances only in designated areas with restricted access.
3. Procedures involving volatile toxic substances and those involving solid or liquid toxic substances that may result in the generation of aerosols are to be conducted in a fume hood.
4. Wash hands thoroughly after working with toxic materials.
5. Dispose of contaminated clothing or shoes properly.

**Note:** Research for replacement of chemicals with high chronic toxicity is essential. Approval for change and usage is to be made by the Chemical Hygiene Officer.

### General Safety Guidelines for the Proper Handling, Use, and Storage of Reactive Chemicals

Highly reactive chemicals include those which are inherently unstable and susceptible to rapid decomposition as well as chemicals that can react alone under certain conditions. Reactive chemicals may respond in a violent, uncontrolled manner and release heat and toxic gases or lead to an explosion.

**Water reactives** react violently with water and often produce flammable hydrogen gas that can ignite when mixed with air. Examples include alkali metals, organometallic compounds, and some hydrides. Others give off large amounts of heat when mixed with water, resulting in a violent reaction if the heat produced is not dissipated.

**Pyrophoric materials** ignite spontaneously when exposed to oxygen and/or moisture in air at/or below 130° F. These must be stored under water, mineral oil, or an inert dry atmosphere depending on the substance. Examples include phosphorous, titanium, dichloride, tributylaluminum, sodium, and lithium hydride.

**Explosives** are a substance or mixture of substances that, when initiated by heat, light, friction, impact, or detonation, undergo a rapid chemical reaction giving off large volumes of hot gases. Fire typically accompanies an explosion.

**Oxidizing agents**, in addition to their corrosive properties, present fire and explosion hazards on contact with organic compounds and other oxidizable substances.

A common class of compounds found in the laboratory are **peroxides**. Peroxides have unusual stability issues, being both a fuel and oxidizer in one, making them the most hazardous substances normally handled in laboratories. All organic peroxides are flammable.

### General Safety Guidelines for the Proper Handling of Peroxidizable Chemicals

Peroxidizables are substances or mixtures which react with oxygen to form peroxides. Some peroxides can explode with impact, heat, or friction that is caused by removing a lid. Peroxides may form inside the containers of some materials even if they have not been opened. Examples include ethyl ether, tetrahydrofuran, liquid paraffins (*alkanes*), and olefins (*alkenes*). General safety guidelines are as follows:

1. Date all peroxidizables upon receipt and upon opening. Always refer to the SDS to determine when opened or unopened peroxidizable materials should be properly disposed of. Once peroxides have been opened they should normally be used very quickly.

2. Do not open any container having obvious crystal formation around the lid. Crystallized peroxides can only be disposed of by professionals trained in their disposal.
3. The quantity of peroxide dispensed should be limited to the minimum amount required. Unused peroxides are not to be returned to the container.
4. Spills must be cleaned up immediately.
5. The sensitivity of most peroxides to shock and heat can be reduced by dilution with inert solvents, such as aliphatic hydrocarbons.
6. Solutions of peroxides in volatile solvents are not to be used under conditions in which the solvent might be vaporized as this may increase the peroxide concentration of the solution.
7. Open flames and other sources of heat are not permitted near peroxides.

#### General Safety Guidelines for the Proper Storage of Incompatible Chemicals

Certain chemicals are not to be stored with or mixed with other chemicals due to the potential for severe reactions or result of a toxic product. In the event of unexpected breakage or fire, the storage of incompatible chemicals could be fatal to employees, fire fighters, and other emergency responders. Always consult a current SDS to ensure that the storage of incompatible chemicals together is prevented. Accidental contact of incompatible chemicals can result in:

1. Generation of heat (*acids and bases*).
2. Violent reactions (*acrolein and acids or other catalyst*).
3. Formation of toxic vapors or gases (*cyanide salt and acid*).
4. Formation of a flammable gas (*alkali metal and water*).
5. Fire or explosion (*perchloric acid and acetic anhydride*).

#### General Safety Guidelines for the Proper Handling, Use, and Storage of Compressed Gas Cylinders

1. Be extremely careful when handling compressed gas cylinders. Do not drop, jar, or expose them to temperature extremes.
2. Except when in use, the valve cap or valve protection device must always be in place.
3. Be sure that all valves are closed before moving cylinders, when work is finished, and when the cylinder is empty.
4. Never use the valve or valve cap to lift or move cylinders.
5. Contents must be properly marked on all cylinders.
6. All uncapped cylinders must be secured independently to a solid element of the lab structure when uncapped in use or in storage.

### **Section 6. Laboratory Protective Equipment Information**

#### Laboratory Fume Hoods

Laboratory Fume Hoods have been installed to control exposure to airborne contaminants. They are to be tested annually or as needed and the results documented. The proper

sash height is to be indicated for optimum hood performance. Most fume hoods are not intended to be used with the sash fully open. The following guidelines are to be followed:

1. The sash is to be set at a level where the operator is shielded from explosions or violent actions which could occur.
2. Only devices and chemicals essential to the specific procedure are to be placed in the hood.
3. Hoods used for experimental work are not to be used for chemical storage.
4. Hoods used for chemical storage are to be dedicated for chemical storage only.

#### Emergency Eyewashes/Showers

Emergency eyewashes/showers are required by regulation wherever corrosive materials are present, which includes laboratories. They must be fully functioning and accessible at all times. Weekly and annual emergency eyewash/shower inspections are to be conducted and documented to ensure proper operation.

#### Respirators

Campus laboratories have been evaluated and the use of respiratory protection is not necessary.

#### Refrigerators for Sample Storage

Refrigerators used for the storage of chemical or biological samples are to be labeled and used only for that purpose. They are not to be used to store or keep food, drink, and other such related items. Flammable chemicals are also not to be stored in refrigerators.

### **Section 7. Personal Protective Equipment (PPE)**

PPE is to be provided, used, and maintained in a sanitary and reliable condition where there is a chemical hazard that may cause injury and/or illness. SDS provide information on the PPE recommended for use with specific chemicals. General recommendations for PPE use is as follows:

1. Splash-proof goggles are to be the primary choice for eye protection. They provide superior protection and are to be used where dust, flying objects, spray, mist, and splash hazards exist.
2. Safety glasses with side shields may be used against dust and flying objects and are to be worn under face shields when worn to protect the head from potential hazards.
3. Gloves are to be worn when handling unknown samples.
4. Chemical resistant gloves must be worn when working with corrosives. If there is a splash potential when working with corrosives, chemical goggles and/or a face shield and additional protective clothing must be worn, depending on the extent of possible exposure.
5. Wear chemical resistant gloves to prevent prolonged or repeated skin contact when working with solvents. If there is a splash potential, chemical goggles and/or a face shield are to be worn.

6. Chemical resistant gloves must be worn if chemicals can be absorbed through the skin. If there is a splash potential, chemical goggles and/or a face shield are to be worn.

## **Section 8. Medical Consultations and Examinations**

Employees who work with hazardous chemicals are to be given the opportunity to receive medical attention, including any follow-up examinations which the examining physician determines to be necessary, for the following circumstances:

1. Whenever an employee develops signs or symptoms associated with a hazardous chemical to which the employee may have been exposed, the employee is provided the opportunity to have an appropriate medical exam. The employee is to promptly contact their supervisor and Chemical Hygiene Officer.
2. Where exposure monitoring reveals an exposure routinely above the action level, or in the absence of an action level, above the permissible exposure limit (PEL), for an OSHA regulated substance for which there are exposure monitoring and medical surveillance requirements. Medical surveillance is to be established for the affected employee as identified in the particular OSHA standard Medical Surveillance and Exposure Requirements, 29 CFR 1910.1001 through 29 CFR 1910.1052.
3. 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 chemical exposure, the affected employee is provided an opportunity for a medical consultation. This consultation is for the purpose of determining the need for a medical examination. An appropriate medical examination is provided, if necessary.

All medical examinations and consultations are performed by or under the direct supervision of a licensed physician, are provided at no cost to the employee without loss of pay, and at a reasonable time and place.

The following information is to be provided to the physician by the affected employee, the supervisor, or the Chemical Hygiene Officer:

1. The identity of the hazardous chemical to which the employee may have been exposed.
2. A description of the conditions under which the exposure occurred.
3. A description of the any signs and symptoms of exposure that the employee may be experiencing.

A written opinion is to be provided from the examining physician to the NHED Human Resources Department which includes:

1. Any recommendation for further follow-up.
2. The results of the examination and any associated tests.

3. Any medical condition, which may be revealed in the course of the examination, which may place the employee at increased risk as a result of the exposure to a hazardous chemical.
4. A statement that the employee has been informed by the physician of the results of the consultation or medical examination and any medical condition that may require further examination or treatment.

The written opinion is not to include any findings or diagnoses which are not related to the occupational exposure.

## **Section 9. Hazard Identification**

Labels are required on all in-coming containers of hazardous chemicals and not to be removed or defaced in any way. SDS are to be received, maintained, updated, and accessible to employees.

The following procedures have been developed for chemical substances produced in the laboratory:

1. For known composition of chemical substances produced, appropriate training is to be provided. If a SDS is available, it is to be made available to employees.
2. For unknown composition of chemical substances produced, the substance is assumed to be hazardous and procedures identified within the CHP are to be used.
3. For production of chemical substances for someone outside the laboratory, the Hazard Communication standard, 29 CFR 1910.1200, must be complied with, including the preparation of SDS and labeling requirements.

## **Section 10. Training**

All employees covered under this plan are to receive appropriate training in regard to the CHP and the OSHA standard 29 CFR 1910.1450 and its appendices. Employees are to be provided training to ensure that they understand the hazards of chemicals present in their work area. Such training is to be provided at the time of an employee's assignment to a work area where hazardous chemicals are present and prior to assignments involving new exposure situations.

In addition, the training is to include:

1. Location of the CHP and 29 CFR 1910.1450 and its appendices.
2. The signs and symptoms associated with exposures to hazardous chemicals being used in the laboratory.
3. Information on OSHA permissible exposure limits (PELs), where they exist, and other recommended exposure limits.
4. Methods and observations that may be used to detect the presence or release of a hazardous chemical.
5. The physical and health hazards of chemicals in the work area.

6. The measures employees can take to protect themselves from these hazards.
7. The location of plan information and training materials.

Records of training are to be documented and retained for a minimum of 3 years. Training documentation includes:

1. Date and location of training.
2. Names of employees attending and their signatures.
3. Name and title of person conducting the training.
4. Brief summary of material covered.

Medical records are to be maintained based on regulatory requirements.

### **Section 11. Program Review**

Annual reviews of the CHP are to be conducted and documented, including any changes or additions to the plan or other related documents.