NORTH CENTRAL COLLEGE

CHEMICAL HYGIENE PLAN

Revised
November 1st, 2013

30 N. Brainard St. ✧ Naperville, IL 60540-4607

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Appendices

Chemical Hygiene Plan

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PURPOSE

North Central College has a fundamental obligation to preserve the health and safety of students, staff personnel and visitors. It is the policy of the College to provide and maintain a safe and healthful campus environment.

The purpose of this Chemical Hygiene Plan (CHP) is to provide a framework for recognizing, evaluating and controlling hazards associated with chemical procedures as spelled out by 29 CFR 1910.1450(b). Implementation of the plan relies upon the cooperation of many, including: Department Chairs, faculty, laboratory staff, students, and Facilities Maintenance personnel.

The purpose of the CHP is to minimize exposure to, and enhance communications about, hazardous chemicals to the employees and students of North Central College.

SCOPE

It is the intent of the policy and the procedures that follow to prevent accidents and injuries and to comply with the OSHA 29 CFR 1910.1450 "Occupational Exposure to Hazardous Chemicals in Laboratories" and to promote a comprehensive safety program based on applicable health and safety standards, as well as published standards of nationally recognized professional health and safety groups.

This CHP applies to laboratory operations, which is defined as the use of hazardous chemicals in relatively small quantities and chemical procedures. The term laboratory, in reference to this document, describes any and all locations where activities defined by 29 CFR 1910.1450(b) occur. This includes but is not limited to: chemical laboratories, biology laboratories, ceramics workshops, print laboratories, paint studios, theatre workshops, and maintenance facilities. In addition to the provisions of this plan, all applicable sections of the North Central College Hazard Communication Plan shall also apply.

OBJECTIVE

The objective of this plan is to promote the health and safety of the North Central College personnel (faculty, staff, students and visitors). This objective will be accomplished by establishing proper handling and experimental procedures via hazardous communications training (HAZCOM), a written chemical hygiene plan in compliance with 29 CFR 1910.1450, "Occupational Exposure to Hazardous Chemicals in Laboratories" (OSHA Laboratory Standard), as well as the identification of other applicable regulations the College is required to follow.

The NCC CHP is a *general* set of policies and procedures that provide the framework for working safely and in compliance with environmental health and safety regulations and NCC policy. It is recognized that the faculty are the working scientists who have the expertise and primary responsibility to determine what is appropriate for the protection of staff, students and visitors in a particular situation.

1.0 GENERAL PRINCIPLES

The intent of the Chemical Hygiene Plan is to provide guidelines for handling and using chemicals without causing harm to self, other employees, students or to the College environment. North Central College will:

1.1 Minimize exposure to chemicals both with and without known hazards. Wear appropriate clothing in the laboratory that minimizes skin exposure. Wear proper personal protective equipment and know the limitations of all protective equipment. If pregnancy is known or suspected, seek medical advice prior to working in a laboratory.

1.2 Avoid underestimation of risk by treating all chemical compounds of unknown toxicity as toxic.

1.3 Provide exposure assessment by furnishing appropriate signs to indicate storage of and/or usage of hazard materials; and furnishing proper instruction regarding storage of chemicals; furnishing general instruction on fundamental rules to be followed when working with hazardous substances.

1.4 Provide engineering control methods such as the use of enclosures, laboratory fume hoods, glove boxes, and local exhaust ventilation. Various other means may be applied in addition to but not necessarily in place of personal protective equipment. Personal protective equipment may consist of eyewear, gloves, chemical aprons, respirators, etc.

2.0 LEVELS OF RESPONSIBILITY

2.1 PRESIDENT OF THE COLLEGE

The President has the ultimate responsibility of chemical hygiene within the College and must, with other administrators, provide continuing support for chemical hygiene. The Chemical Hygiene Plan is primarily supported from this role through appropriate financial support and implementation.

2.3 COLLEGE CHEMICAL HYGIENE OFFICER (CHO)

A technically qualified individual designated by the College whose responsibilities include:

- Maintaining and updating the CHP, in consultation with stake holders and Risk Management Coordinator.
- Monitoring and coordinating chemical use in all laboratories and other campus facilities under this program where chemicals are used.
- Monitoring and reviewing chemical inventories.
- Monitoring and administering access to both chemical inventories and chemical stockrooms.
- Monitoring and coordinating maintenance of Material Safety Data Sheets (MSDS) file system.
- Conducting inspections of equipment, protective clothing, and procedures as necessary to support the CHP.
- Making recommendations to various departments for the safe handling of hazardous chemicals and materials.
- Assisting laboratory professors and laboratory workers and students with the development and implementation of adequate procedures and use of protective equipment and engineering controls.
- Reviewing laboratory door signs at least annually or in the event that information on the posting needs to be updated.
- Conducting or arranging for environmental monitoring when necessary.
- Testing eyewash equipment by flushing for 3 minutes monthly and activation of safety showers monthly.
- Conducting or arranging for laboratory-safety and related training to support the CHP.
- Conducting audits to ensure compliance and CHP effectiveness (See Form F-3).
- Taking immediate actions as necessary in the event of observing a dangerous situation.

- Inform appropriate professors of situations observed of students not following directions under the basic requirements of this plan (non-urgent).
- Address small scale spills only with appropriate response materials.

2.4 CHAIR OF THE DEPARTMENT

Has responsibility for chemical hygiene in the department and enforces chemical hygiene via recommendations made by the faculty and Chemical Hygiene Officer (CHO).

2.5 LABORATORY FACULTY/SUPERVISOR

The laboratory supervisor and faculty members will, with the help of the CHO, have the responsibilities of:

- Informing all laboratory staff and students of the potential hazards associated with laboratory operations and procedures for dealing with accidents.
  - Providing students with practical, understandable department specific and in some cases course-specific safety rules consistent with the NCC CHP. Students are provided this information on the first day of labs and are expected to acknowledge receipt via sign-off. Students are provided a link to the NCC CHP and encouraged to read it.
- Supervising the laboratory to ensure that safe practices and engineering controls are employed.
- Providing technical guidance on matters of laboratory safety and assist with remediation of safety issues.
- Developing and incorporating appropriate laboratory practices within laboratory manuals and protocols and ensure information is conveyed to students and other affected persons.
- Training students as necessary to address any unique hazards associated with their activities.
- Ensuring that protective equipment is available and in working order, and that training and information on work rules for that particular laboratory have been provided.
- Monitoring the use and disposal of the chemicals used in the laboratory.
- Obtaining sufficient information about the hazards of the available chemicals to allow safe handling.
- Properly labeling all containers including any containers to which a chemical is transferred other than the original container. In compliance with the Globally Harmonized System of Classification and Labeling of Chemicals or henceforth identified as the GHS.(Additional information on the GHS can be found at http://www.unece.org/trans/danger/publi/ghs/ghs_rev02/02files_e.html)
- Informing the CHO of the introduction of new chemicals or hazards to the laboratory.
- Addressing small scale spills only with appropriate response materials.

2.6 STUDENT LABORATORY WORKER

The student worker has the responsibility to:

- Comply with all guide lines as established by the *Lab Safety Rules*.
- Develop good personal chemical hygiene habits
- Follow all safety, health and waste management procedures provided by the faculty and CHO.
- Report accidents, unhealthy and unsafe conditions to the faculty supervisor or the CHO.
- Notify the faculty supervisor or CHO of any health conditions that could lead to serious health situations in the laboratory.

2.7 FACILITIES AND OPERATIONS

The Business Operations and Maintenance Departments have the responsibility to:

- Maintain the general and local exhaust ventilation systems as well as the eyewash stations and

showers in accordance with this plan.
- Assist in the coordination of disposal of chemical waste.
- Maintain all Hazardous Waste manifest records.

3.0 GENERAL PROCEDURES FOR LABORATORY CHEMICAL HYGIENE AND SAFETY

Faculty/Staff/Students need be familiar with the following fundamental safety precautions and will adhere to them at all times:

- Wear appropriate personal protective equipment (PPE) as defined by the faculty member in charge of the laboratory activity.
- Appropriate eyewear (i.e.: safety glasses or goggles) shall be used when necessary, based on a hazard assessment conducted by the faculty member in charge of the laboratory operation.
- Safety glasses are required in all chemistry labs during laboratory activities with the exception of teaching labs before any experiments begin, unless directed so by the faculty conducting the session.
- Open-toed shoes, sandals, flip-flops, etc. are prohibited within the laboratories.
- Minimize chemical waste whenever feasible.
- Dispose of all chemicals and materials according to prescribed procedures.
- Know the hazards of each chemical being used and employ recommended safeguards when using it (i.e., fume hoods, glove box, chemical resistant gloves, lab coats, etc.).
- Do not use hazardous chemicals in areas where ventilation is inadequate or air is recirculated.
- Know the proper use, maintenance, and limitations of personal protective equipment (PPE).
- Know the location and proper use of appropriate emergency equipment.
- Know how to properly store the chemical when not in use.
- Clean up all spills and follow proper disposal procedures.
- Do not place or leave chemicals in unlabeled containers.
- Know and adhere to the proper method of transporting chemicals within the facility.
- Apply proper personal hygiene practices; wash hands, no food or drink in lab, wear appropriate PPE, etc.
- Never work alone in a laboratory if the procedure involves hazardous materials or processes.
- Never leave an experiment unattended unless it has been reviewed with the faculty member or CHO. The CHO will determine if labeling of the area is necessary.
- The faculty member in charge shall assess the risk of specific activities and define those tasks that may be done after hours and potentially alone. "Alone" is defined as that is beyond the visual or auditory range of any other individual for more than a few minutes at a time. Faculty routinely defines activities that can and can't be done alone (such as is explicitly done for the very independent BCM 465 Lab).
- Know how to safely operate all equipment and instrumentation before its operation.
- Anyone planning to work with infectious agents classified as biohazards at BSL-2 or above should consult with a Biology faculty member trained in the handling of such materials for review of appropriate safety procedures.
- The following apply to general good practice for compressed gas cylinders:
    - Use only regulators, pressure relief devices, valves, hoses, and other auxiliary equipment designed for the specific container and compressed gas/cryogenic liquid to be used.
    - Valve protection caps shall be in place and secured when compressed gas cylinders are transported, moved or stored.
    - Cylinder valves shall be closed when work is finished and when cylinders are empty or are moved.
    - Compressed gas cylinders shall be secured in an upright position at all times, except if necessary for short periods of time when cylinders are actually being hoisted or carried.

- Cylinders shall be kept far enough away from any flame or heat source and located so that they cannot become part of an electrical circuit.
- Cylinders shall only be transported under the direct supervision of professors and/or lab manager.

4.0 SPECIFIC LABORATORY SAFETY PROCEDURES

4.1. PERSONAL HYGIENE OF ALL NORTH CENTRAL COLLEGE PERSONNEL

- Avoid unnecessary exposure to chemicals by any route. Do not deliberately smell or taste chemicals.
- Do not pipette by mouth.
- Do not eat, drink, smoke, chew gum, or use other food in the laboratories, chemical storage areas, or work areas where chemicals are present. (Chemical vapors can be absorbed by food).
- Do not store food or beverages in refrigerators labeled for laboratory operations or chemical use.
- Wash your hands after handling chemicals or leaving the laboratory.
- Change clothing as soon as possible after leaving the laboratory and launder often.
- Wear a lab coat, launder or replace the lab coat at regular intervals, remove lab coat prior to exiting the laboratory.

4.2. HOUSEKEEPING

A clean work area is much safer than a cluttered and/or dirty one. Appropriate housekeeping measures include:

- Keep all aisles, hallways, and stairs clear of all chemicals and hazardous materials.
- Keep all work areas clear of clutter and obstructions.
- Clean work surfaces regularly.
- Do not block access to emergency equipment, showers, eyewashes and exits.
- Dispose of waste chemicals as instructed and label all containers properly, in accordance with the GHS.

4.2.1 Because the custodial and maintenance staff of the College may not be familiar with chemicals and other hazardous materials, faculty and/or laboratory assistants should be sure that:

- Chemicals are placed in proper storage areas at the end of the day.
- Containers are adequately labeled with both the identity of the material and its hazards.
- No chemicals or materials are stored in aisles, stairwells, on desks, workbenches, floors, or in hallways.

4.3. PRECAUTIONS/RISK ASSESSMENT

Before beginning any experiment, use available resources to assess risks, appropriate protection and emergency procedures for the chemicals you are using or producing. These resources include labels on chemical bottles, Material Safety Data Sheets (MSDSs), guides such as (e.g., CLIP and NAS/HHMI), your laboratory manual or protocols in use in your research lab, and your laboratory instructor or research mentor.

A station with hard copies of MSDSs is located on the lower level hallway of the Kroehler Science Center, the Ceramics Lab of Meiley-Swallow Hall, and 999 E. Chicago Ave. Business Operations Office.

4.4. WHEN NOT TO PROCEED

Under some conditions, a routine task might contain hazards not fully recognized by the faculty/staff/student. **DO NOT CONTINUE** -- ask for assistance if:

- The procedure is new to you.
- There is a change or substitution in any of the ingredient chemicals in a procedure.
- You encounter failure of any equipment used in the procedure (especially fume hoods or clamp apparatus).
- There are unexpected results from a procedure.
- Members of the class become ill, suspect exposure, smell unusual odors, or otherwise suspect a failure of engineered safeguards.

The occurrence of any of these conditions should result in **AN IMMDEIATE WORK STOPPAGE** and investigation by the laboratory or research professor. The results of the investigation should be reported as soon as possible to the CHO who must decide whether to continue investigation, institute any additional corrective actions beyond those of the laboratory/research professor, or allow work to continue.

4.5. SPILLS, ACCIDENTS, AND EMERGENCIES

Spills of toxic substances or accidents involving any hazardous chemicals should be addressed and reported immediately, according to North Central College's emergency and contingency plan. Report all accidents, regardless of their severity, and emergencies to the following:

Campus Safety – 630-637-5911
The Dyson Wellness Center – 630-637-5550
Risk Management Coordinator – 630-637-5656

- ***IF CALLING FROM A CAMPUS PHONE, YOU MUST DIAL 9 FIRST***
- If spilled chemical is flammable, extinguish all nearby sources of ignition.
- Check the MSDS and other available sources for proper emergency procedures.
- If a person has been splashed with a chemical or other hazardous material, wash the area immediately with water for at least 15 minutes, remove all contaminated clothing, and **GET MEDICAL ATTENTION**.
- If a person has been overexposed by inhalation, **GET MEDICAL ATTENTION** and, if fumes are present in the area, move victim to fresh air.
- Please note, any medical costs incurred are the obligation of the affected individual.

There are some fundamental actions that must **NOT** be taken when handling emergencies. Some of them include:

- **DO NOT** force any liquids into the mouth of an unconscious person.
- **DO NOT** handle emergencies alone. Always notify someone that an accident has occurred.
- **DO NOT** apply medical aid procedures without some training in that area (except to wash with WATER for 15 minutes). If you are not trained in fundamental first aid, get MEDICAL direction before inducing vomiting, giving antidotes or applying a "neutralizer" to the skin or eyes of the victim.
- **DO NOT** linger at the accident scene if you are not one of the emergency responders.

Chemical Spills

Incidental Spills versus Major Spills

Laboratory workers are qualified to clean-up spills that are "incidental." OSHA defines an incidental spill as a spill that does not pose a significant safety or health hazard to employees in the immediate vicinity nor does it have the potential to become an emergency within a short time frame.

Spills requiring outside assistance are those where the quantity of material spilled exceeds the amount of material typically used during the normal course of work. Spills in this category are those that have truly become emergency situations in that laboratory workers are overwhelmed beyond their level of training. Their response capability is compromised by the magnitude of the incident.

Factors that clearly indicate a major spill are:

- the identity of spilled material is unknown
- the need to evacuate employees/students in the area
- the need for response from outside the immediate release area
- the release poses, or has potential to pose, conditions that are immediately dangerous to life and health
- the release poses a serious threat of fire or explosion
- the release requires immediate attention due to imminent danger
- the release may cause high levels of exposure to toxic substances
- there is uncertainty that the worker can handle the severity of the hazard with the PPE and equipment that has been provided and the exposure limit could be easily exceeded
- the situation is unclear or data is lacking regarding important factors.

Incidental Spills Procedure for Small, Low-Toxicity Chemical Spills

The following steps shall be followed for incidental spills:

1. Alert persons in the area that a spill has occurred.
2. Evaluate the toxicity, flammability, and other hazardous properties of the chemical as well as the size and location of the spill (for example, chemical fume hood or floor) to determine whether evacuation or additional assistance is necessary. Large or toxic spills are beyond the scope of this procedure.
3. Contain any volatile material within a room by keeping doors closed.
4. If necessary, consult your product/chemical safety resources, the procedures in this document, or call the CHO for assistance in appropriate cleaning procedures.
5. Wear protective equipment such as goggles, apron, laboratory coat, gloves, or shoe covers. Base the selection of the equipment on the hazard.
6. First cordon off the spill area to prevent inadvertently spreading the contamination over a much larger area.
7. Absorb liquid spills using paper towels, spill pillows, vermiculite, or sand or appropriate media for the spilled material. If available, place the spill pillow over the spill and draw the free liquid into the pillow. Sprinkle vermiculite, sand or other absorbent material over the surface of the free liquid.
8. Place the used pillows or absorbent materials in plastic bags for disposal along with contaminated disposable gear, such as gloves.
9. Neutralize spills of corrosives and absorb, if appropriate. Sweep up waste and place in plastic bags for disposal.
10. Provide details of the incident to the CHO.

Basic chemical spill response kits/materials should be located in each laboratory, easily accessible and clearly labeled for emergency use.

Procedures for Major Spills of Volatile, Toxic, or Flammable Materials

In the event of an incident involving chemicals (large or dangerous spill, smoke, fire, extreme pressure, violent reaction, toxic mist or fumes, explosion) department personnel MUST immediately trigger the fire alarm system by using the red pull boxes located throughout the building. The activation of the fire alarm will automatically: a) signal building evacuation and b) notify Fire Department and Public Safety.

In the event of a Major chemical spill inside the building, the following steps should be taken:

1. Evacuate
   - Alert others in the area and direct/assist them in leaving.
   - Without endangering yourself: remove any injured persons to fresh air, remove contaminated clothing and flush contaminated skin and eyes with water for 15 minutes. If anyone has been injured or exposed to toxic chemicals or vapors, call Campus Safety at 630-637-5911 and seek medical attention immediately.
2. Confine
   - Close all doors and isolate the area.
   - Prevent people from entering the spill area.
3. Report
   - From a safe place, call **Campus Safety at 630-637-5911**
   - Report the emergency, Give the following information:
     - Your name, location and phone number.
     - Location of the spill.
     - The name and amount of the material spilled.
     - The extent of the injuries.
     - The safest route to the spill, if known.
     - Keep the phone line open if possible, and stay in location given if possible.
     - Emergency services will respond to stabilize spills or clean up and provide medical attention.
4. Secure
   - Until emergency response personnel arrive, inform others not to enter areas leading to the spill, if possible.
   - Post personnel near commonly used entrances to the area to direct people to use other routes.
   - Notify supervisor or faculty member in charge of laboratory.

   At the time the emergency is over (eliminated or under control), Facility Management will provide for treating, storing, and/or disposing of waste, contaminated soil, and/or surface water or any other material that results from a release, fire, or other incident at the facility.

4.6 CHEMICAL STORAGE

The number and amounts of chemicals that need to be stored should be reduced to a minimum. Chemicals must be stored based on their chemical compatibility. Acids, flammable liquids, oxidizers, and highly reactive chemicals should all be separated and stored properly to avoid unwanted chemical reactions.

Incompatible Chemicals

Some examples of commonly encountered incompatible chemicals are given below.

Chemical	Incompatible with
Acetaldehyde	Acetic Anhydride, Ethanol, Acetone, Acetic Acid, Sulfuric Acid
Acetic Acid	Acetaldehyde, Peroxides, Chromic Acid, Nitric Acid, Perchloric Acid, Glycols
Acetone	Nitric/Sulfuric Acids Mixed, Hydrogen Peroxide
Acetonitrile	Nitric Acid, Perchloric Acid

Aniline	Nitric Acid, Chromic Acid, Peroxides
Bromines	Acetone, Acrylonitrile, Ethyl Ether, Hydrogen, Rubber
Carbon Tetrachloride	Diborane, Fluorine
Carbon Monoxide	Oxygen, Fluorine
Chlorine	Ammonia, Acetylene, Propane, Hydrogen, Benzene
Dimethyl Sulfoxide	Perchloric Acid, Acetyl Chloride, Benzenesulfonyl Chloride, Acetic Anhydride
Flammable Liquids	Chromic Acid, Peroxide, Nitric Acid, Bromine, Fluorine, Chlorine
Perchloric Acid	Acetic Anhydride, Ethanol, Sulfuric Acid, Paper Sodium Acid, All Acids
Sulfuric Acid	Any Perchlorate, Permanganate, Cyanide, or Chlorate

Source: Prudent Practices for Handling Hazardous Chemicals in Laboratories

The following are general storage guidelines:

- Large containers of reagents and chemical waste should be stored on low shelving, preferably in trays to contain leaks and spills.
- Chemicals should not be stored on the floor, on bench tops or inside fume hoods.
- Inventories of storage areas, including those within labs, should be conducted periodically and at least annually and made available to staff.
- Chemical storage cabinets for flammables, acids and bases are provided in various strategic locations in the building. The CHO shall conduct periodic reviews of the chemical storage.
- Odiferous chemicals should be stored inside vented cabinets or fume hoods, or stored within refrigerators if the refrigerator temperature is low enough to minimize odors.
- Flammables requiring refrigeration shall be stored in flammable safe refrigerators.

5.0 WASTE CHEMICAL DISPOSAL

The Environmental Protection Agency (EPA) under the Resource Conservation and Recovery Act (RCRA) and its amendments regulates chemical wastes. The CHO will instruct faculty/staff/students on the proper procedure for collecting, identifying, and storing waste materials. When a sufficient quantity of hazardous waste has been collected, in coordination with the Risk Management Coordinator, it will be picked up by a chemical waste handler and transported to an approved site for disposal. North Central College is considered a small quantities waste generator and under RCRA, the College can store no more than 55 gallons of waste at any given time.

6.0 ENGINEERING CONTROLS

Chemical safety is accomplished by awareness of the chemical hazards and by keeping the chemical under control through a variety of engineered safeguards. Laboratory personnel should be familiar with the proper use of those safeguards. All engineered controls must be properly maintained, inspected on a regular basis, and never overloaded beyond their design limits.

6.1. LABORATORY FUME HOODS

Chemical fume hoods at North Central College are <u>not equipped</u> with a continual display of airflow or alarm systems to indicate insufficient airflow. Therefore, extra care in observation of verification of general hood operation needs to be employed. (Check for annual inspection sticker in place, hear the fan in operation, good flow indicated by 'paper towel testing', etc.). The Facilities Maintenance department will conduct annual fume hood inspections, performance testing, and equipment calibration. Fume hoods should provide 60 to 100 linear feet per minute of airflow and be tested annually.

The following summarizes standard good practice with regard to lab hood use:

- Fume hood shields should be lowered at all times except when adjusting the apparatus inside.
- The apparatus inside the hood should be kept towards the rear of the hood to prevent vapors from escaping.
- **HOODS ARE NOT STORAGE AREAS!** Do not store materials in hoods.
- The vent ducts and fans must be kept clean and clear of obstructions.
- The hood must remain in operation at all times when a chemical is inside the hood, regardless whether any work is being done in the hood.
- Conduct work at least six inches from the edge of the hood.
- Be aware that drafts from open windows, open doors, fans, air conditioners, or high traffic walkways may interfere with normal hood exhaust.
- Before using the hood, make sure air is entering the hood and the hood is functioning properly. Report any problems to Facility Management immediately via e-mail at *maintenance@noctrl.edu*.

6.2. SAFETY CANS

Flammable liquids should be kept in cans specifically designed for them. The cans should be used according to manufacturer instructions. Common safety practices include:

- The can must be kept closed except when adding or removing liquid.
- The flame arrestor screen must be kept in place at all times and replaced if punctured or damaged.
- As with all chemicals, materials in safety cans must be stored in storage areas and not in laboratory work areas or hallways.
- All flammables must be protected against sources of ignition.

6.3. FLAMMABLE STORAGE CABINETS

Flammable materials should be kept in storage cabinets specifically designed for them. The cabinets should be according to manufacturer instructions and common safety practices, including:

- Materials stored inside of the flammable storage cabinet should be compatible with the cabinets design. Capacities and weight limits of shelving is not to be exceeded.
- Do not store paper or cardboard inside cabinets with the chemicals.
- Do not overload the cabinet. Flammable storage cabinets should not be located near exits, electrical panels, or sources of heat or ignition.
- The cabinet must be clearly labeled "Flammable – Keep Fire Away".
- Acids should not be stored in a flammable storage cabinet due to possible corrosion of the cabinet and incompatibility with organic solvents.

6.4. EYEWASHES AND SAFETY SHOWERS

Whenever chemicals have the possibility of damaging the skin or eyes, an emergency supply of water must be available. All laboratories are equipped with eyewashes and safety showers. As with any safety equipment, these can only be useful if they can be used, therefore:

- Keep all passageways to the eyewash and shower clear of any movable obstacle (even a temporarily parked chemical cart). At least 3 feet of space of movable objects in each direction is required beneath the shower.
- Showers should be checked routinely to be assured that access is not restricted and the start chain is within reach.
- The best treatment for chemical splashes to the eye and face is immediate flushing with copious amounts of water for 15 minutes.
- Drench showers and other emergency wash systems are used in an emergency to flush chemicals that have accidentally come in contact with laboratory personnel. In order to wash the body properly, clothing should be removed as water is applied. The drench shower can be used to extinguish a clothing fire but this is not recommended if the shower is more than a couple of feet away. The best method of extinguishing a clothing fire is to "Stop, Drop, and Roll," and then remove clothing.

- All plumbed eye and face washes are to be flushed by the Chemical Hygiene Officer on a monthly basis by allowing the water to flow for approximately 3 minutes to remove stagnant water from the pipes.
- The CHO has the responsibility to inspect drench showers monthly for proper flow and operation.
- It is recommended that a record be kept of such tests. See attached Form 2 – Eye Wash/Safety Shower Inspection Form. A "DO NOT USE" notice must be placed on the unit if the shower is not properly functioning.

6.5. PROTECTIVE APPAREL

When using chemicals, consult chemical compatibility charts, material safety data sheets, and protective equipment manufacturers to aid in the selection of proper gloves and other protective clothing.

- Gloves - must be of a material compatible with the chemical used. Where necessary, gloves should be inflated (by whipping them in air, not by mouth inflation) to check their integrity before each use. Gloves should be replaced immediately if they are contaminated or torn. Gloves should be carefully selected for their degradation and permeation characteristics to provide proper protection.

The following provides additional general information about use of protective gloves:

Glove material	***Intended use***	***Advantages and disadvantages***
Latex (natural rubber)	Incidental contact	• Good for biological and water-based materials. • Poor for organic solvents. • Little chemical protection. • Hard to detect puncture holes. • Can cause or trigger latex allergies
Nitrile	Incidental contact (disposable exam glove) Extended contact (thicker reusable glove)	• Excellent general use glove. Good for solvents, oils, greases, and some acids and bases. • Clear indication of tears and breaks. *Good alternative for those with latex allergies.
Butyl rubber	Extended contact	• Good for ketones and esters. Poor for gasoline and aliphatic, aromatic, and halogenated hydrocarbons.
Neoprene	Extended contact	• Good for acids, bases, alcohols, fuels, peroxides, hydrocarbons, and phenols. • Poor for halogenated and aromatic hydrocarbons. • Good for most hazardous chemicals.
Norfoil	Extended contact	• Good for most hazardous chemicals. • Poor fit (Note: Dexterity can be partially regained by using a heavier weight Nitrile glove over the Norfoil/Silver Shield glove.
Viton	Extended contact	• Good for chlorinated and aromatic solvents. • Good resistance to cuts and abrasions. • Poor for ketones. • Expensive.

Glove material	***Intended use***	***Advantages and disadvantages***
Polyvinyl chloride (PVC)	Specific use	• Good for acids, bases, oils, fats, peroxides, and amines. • Good resistance to abrasions. • Poor for most organic solvents.
Polyvinyl alcohol (PVA)	Specific use	• Good for aromatic and chlorinated solvents. • Poor for water-based solutions.
Stainless steel **Kevlar** **Leather**	Specific use	**Cut-resistant gloves.** Sleeves are also available to provide protection to wrists and forearms. (If potential for biological or chemical contamination: wear appropriate disposable gloves on top of your cut-resistant gloves and discard after use).
Cryogenic Resistant Material **Leather**	Specific use	For use with cryogenic materials. Designed to prevent frostbite. Note: Never dip gloves directly into liquid nitrogen.
Nomex	Specific use	For use with pyrophoric materials. Consider wearing a flame-resistant glove such as a Nomex 'flight' glove with a thin nitrile exam glove underneath.

- Safety Glasses - should be used when working with solid material. They provide a minimum of protection when using liquids.

  Safety glasses with clear side shields are adequate protection for general laboratory use. Goggles are recommended to be worn when there is a danger of splashing chemicals or flying particles, such as when chemicals are poured or glassware is used under elevated or reduced pressure. A face shield with goggles offers maximum protection.

  The type of protection needed depends on the hazard (e.g. chemical, ultraviolet light, impact). For instance, when laboratory chemicals are used, approved eye protection is mandatory and chemical splash goggles are recommended. When chemicals are used and splashing is a potential, goggles are recommended. Goggles should be worn over eyeglasses or prescription safety glasses. Ordinary prescription glasses do not meet these standards. Face shields should be worn when working with an agent that may adversely affect the skin on the face.

- Goggles - form the liquid proof seal around eyes necessary when working with liquid chemicals.

- Safety Eyewear with Face Shield – In addition to safety eyewear, an ANSIZ87.1 face shield is to be worn when working with highly corrosive chemicals (e.g., large quantities of concentrated acids or bases or smaller quantities of heated corrosives) where there is any likelihood for chemical splash/spray, or where flying fragments/particles are generated. Lab coats are available in each lab.

- Laboratory Coat - long sleeved coats offer the wearer minimal skin protection against minor splashes, allowing the chemical something to react with before the skin, and offering the victim time to remove the coat and shower. Lab coats are available through the CHO.

- Laboratory Coat and Apron - adding a rubberized apron provides more time to react to the splash than just a coat alone. Arm guards should be worn when using an apron.

Open-toed shoes, sandals, flip-flops, etc. are prohibited at all times. Do not wear gloves, lab coats or protective clothing outside the laboratory except when transporting hazardous materials; in that event, ensure that surfaces that will be contacted by others are not contaminated.

6.6. RESPIRATORS

For most of the laboratory work anticipated, respirators are not needed. Regular environmental or employee exposure monitoring of airborne concentrations is also not warranted because the chemicals are used for relatively short periods of time and in small quantities. All laboratory procedures are designed to minimize possible exposures. An exposure assessment may be conducted if there is a particular situation outside of the norm or a particular potential airborne exposure concern. Laboratory employees or students who suspect that they have been overexposed to a toxic chemical should report to CHO. The CHO shall conduct a review to determine if air monitoring or respirators are required. Any air sampling that may be necessary would be performed by an outside consultant.

If it is determined that airborne concentrations cannot be kept below regulated levels, then the NCC Risk Management Coordinator will implement the written respirator program as found in the Campus Maintenance Safety Plan. Additionally, see OSHA Standard 29 CFR 1910.134. The written respirator program will discuss such issues as respirator selection criteria, inspection, and maintenance. All personnel using respirators will be fitted and trained in their proper use and care.

6.7. VAPOR DETECTION

Odors are not to be used as the primary methods of vapor detection because odor thresholds can be greater than the Threshold Level Values (TLVs) – occupational exposure limits. If suspicious odors are noticed, the investigators should notify facility management and/or the CHO and if necessary consult with outside industrial hygiene professional to conduct appropriate sampling to determine the hazard potential.

7.0 SPECIAL PROCEDURES FOR CARCINOGENS, REPRODUCTIVE TOXINS, AND CHEMICALS WITH A HIGH DEGREE OF ACUTE OR UNKNOWN TOXICITY

For some laboratory operations, work with small amounts of carcinogens, reproductive toxins or chemicals with a high degree of acute or unknown toxicity are conducted. Additional caution and appropriate PPE are typically all that is necessary to handle these materials within the modest hazard level that work is conducted at NCC. The faculty shall incorporate appropriate safety measures when working with such materials in greater than negligible quantities. The following general guidance on controls and handling techniques are provided:

- Review the task and ensure appropriate facilities are available to conduct the work (i.e.: fume hood and/or other control resources).
- Conduct procedure in a designated area (e.g., fume hood, glove box, etc.).
- Wear appropriate personal protection equipment including gloves, eye protection, and a lab coat at a minimum.
- Care should be taken when working with salts or powders to avoid creation of a dust aerosol of the material.
- Use the smallest amount of chemical that is consistent with the requirements of the work to be done.
- Decontaminate the area when work is completed and dispose of waste materials appropriately.
- Use of acute toxins and reactive chemicals requires a written protocol in place prior to use. This protocol is to include the experimental procedures, protective equipment to be used, a description of chemical and physical hazards of the acute toxin, and emergency procedures. This protocol is to be reviewed by the CHO and given to students and other workers using the chemical, as applicable.

Formaldehyde Use

The OSHA Formaldehyde Standard requires annual training for all users of formaldehyde containing products containing greater than 0.1 percent formaldehyde or capable of releasing in excess of 0.1 ppm. That training is the responsibility of the faculty member supervising the use of formaldehyde containing products. The training must include:

- a discussion of the contents of the regulation (required for employees only) and the MSDS,
- a description of the potential health effects of symptoms of exposure,
- reporting requirements for symptoms of exposure,
- description of safe work practices and engineering controls (e.g., fume hoods),
- the purpose of personal protective equipment (e.g., goggles and gloves), and
- instructions for handling emergencies.

This information should be distributed or posted in all laboratories using formaldehyde in concentrations greater than 0.1 percent.

8.0 RECORD KEEPING

Records of information including: chemical acquisitions, program audits, incident investigations and training provided under this plan must be provided to the CHO.

A listing of the chemicals, Material Safety Data Sheets (MSDS), and chemical products used in the laboratories is available from the CHO.

The Occupational Safety and Health Administration (OSHA) requires that laboratory employees, who's actions are described under the aforementioned scope, be made aware of the Chemical Hygiene Plan at their place of employment (29 CFR 1910.1450). It is the policy of North Central College that all faculty and staff involved in laboratory operations are required to review this program and sign off in acknowledge of the review (Form 1).

9.0 TRAINING

Each employee, who's actions are described under the aforementioned scope, is required to have initial CHP training and periodic retraining every 5 years. Any changes in the program must also be communicated to the staff on an on-going basis. The Chair of the respective departments are responsible for ensuring that training and retraining are being conducted in accordance with this document.

Staff will acknowledge training on Form F-1.

10.0 HAZARD IDENTIFICATION

10.1 Labels on incoming containers of hazardous chemicals must remain intact and not be defaced, hidden or covered.

10.2 MSDS sheets are available in hard copy in the lower level hallway of the Science Center, the Ceramics Lab of Meiley-Swallow Hall, and the Business Operations Office.

10.3 Instructors and/or the CHO shall provide training for students who could be exposed to hazardous chemicals that are produced for exclusive use in laboratories.

10.4 Chemical by-products of unknown composition produced in the laboratory are assumed hazardous and are covered by this CHP.

10.5 No chemicals may be purchased or produced for a user outside of North Central College's lab unless under contracted agreement.

10.6 When a chemical is transferred to another container for storage (not immediate use), the new container should be labeled with the name of the product, the chemical constituents and hazard warnings. If new containers are needed, then the chemical should be brought to the CHO and have it re-contained and labeled appropriately by the CHO or chemical inventory workers prior to being placed in the inventory stock. These labels should also be in accordance with GHS standards.

Laboratory Safety Inspections

Laboratories are audited formally for compliance with this plan at least once a year. The Chemical Hygiene Officer has responsibility for conducting these inspections. The form for conducting these inspections entitled "Laboratory Safety Inspection" is included in this plan (Form F-3). The safety inspection includes: chemical labeling, fume hood operation, laboratory safety techniques, emergency and safety equipment, chemical storage, electrical safety, and general housekeeping.

Following the laboratory safety inspection, a report listing the hazard(s) will be prepared for appropriate follow-up actions. Facility Management is responsible for correcting all infrastructure deficiencies identified. Follow-up surveys must be conducted in laboratories with extremely hazardous conditions and/or numerous violations.

In addition to these annual laboratory safety surveys, a weekly informal safety walk-through is performed by the CHO. These are not formally documented, unless significant deficiencies are identified.

Implementation of the standards and procedures contained in this document is authorized by North Central College and signifies compliance with the current OSHA regulations. All employees are required to abide faithfully by its direction and intent for their health and welfare and those of their fellow employees.

APPROVALS:

Vice President for Business Affairs — Date: 11/5/13

Vice President for Academic Affairs — Date: Jan. 21, '14

Risk Management Coordinator — Date: 1/7/13

College Chemical Hygiene Officer — Date: 12/20/13

Chemistry Department Chair — Date: 1/1/14

Art Department Chair — Date: 11/8/13

Biology Department Chair — Date: 1/6/14

NORTH CENTRAL COLLEGE

CHEMICAL HYGIENE PLAN

Form F-1
STAFF – CHEMICAL HYGIENE PLAN
AWARENESS CERTIFICATION

The Occupational Safety and Health Administration (OSHA) requires that laboratory employees be made aware of the Chemical Hygiene Plan at their place of employment (29 CFR 1910.1450).

After reading the "North Central College Chemical Hygiene Plan," complete and return a copy of this form to the CHO. By signing below you acknowledge that you are aware of the Chemical Hygiene Plan and the policies and procedures applicable to the OSHA standard (29 CFR 1910.1450).

Please type or print legibly.

Name:_____ Phone Contact:_____

Staff ID number:_____

Department :_____

Job Classification:_____

Signature:_____ Date:_____

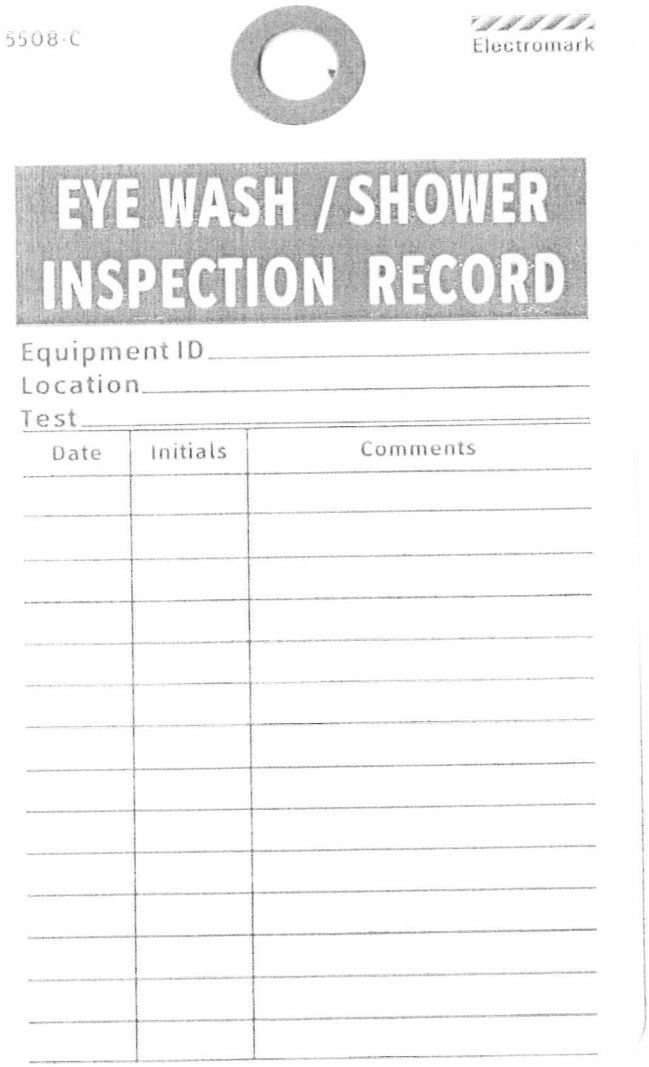
Completed Awareness Certifications are to be filed in a central administrative location by the CHO. These and all safety training records should be organized in a way that allows original records to be retrieved quickly and efficiently on request by an OSHA inspector or staff member.

NORTH CENTRAL COLLEGE

CHEMICAL HYGIENE PLAN

Form F-2: Laboratory Eye Wash and Safety Shower Monthly Testing Form

(to be posted near eye wash/safety shower)



Indicate successful tests. If problems identified, immediately contact Facilities and Operations.

NORTH CENTRAL COLLEGE

CHEMICAL HYGIENE PLAN

Form F-3
LABORATORY INSPECTION TEMPLATE

Chemical Hygiene Annual Audit				
Date:				
Building:				
Hazard Recognition & Avoidance				
DESCRIPTION	**NOTES**	**Yes**	**No**	**NA**
A review is conducted before the use of chemicals to determine the appropriate protective measures.				
Workers/students follow appropriate protective measures established.				
Hoods, vents or other engineering controls are used as necessary.				
Gloves, respirators, protective clothing, and other PPE are used as necessary.				
PPE is cleaned and stored properly.				
Workers/management can demonstrate an appropriate criterion for PPE selection. [For example, how a particular type of glove is chosen. Appropriate sources of information include the MSDS, the CMS chemical hazard reference section (www.esh.bnl.gov/cms). Glove selection is based on the chemical resistance of the glove elastomer to a specific chemical.]				
Yearly quantitative flow evaluations are done on laboratory fume hoods.				
Documentation of worker/student CHP training is in place?				
Lab hoods are used only with the sash height within posted limits?				

Chemical Management				
DESCRIPTION	**NOTES**	**Yes**	**No**	**NA**
Chemicals are evaluated for hazards prior to procurement?				
Original labels are retained on containers and are not altered or removed.				
Secondary containers (bottles, boxes, vessels, tanks, etc.) are labeled with the identity and hazard warnings of compound(s).				
Entrances to work areas that contain hazardous chemicals are posted.				
The number and amount of chemicals stored in the laboratory are kept to a minimum.				
Unneeded chemicals are periodically identified and sent for disposal.				
All chemical containers have been inventoried and a chemical inventory is available.				
All chemicals have an MSDS that is available for review.				
Is chemical compatibility storage routinely reviewed?				
Is working alone in a laboratory avoided ? If not, is security notified when a lone worker is in the laboratory and again when she or he leaves.				
Is the prohibition of using laboratory glassware for food storage, as well as eating, drinking, smoking, chewing gum, and applying cosmetics followed in the laboratory?				
Peroxides and peroxidizable chemical solvents bear the dates when the containers were first received and opened or the dates when retested.				

Lab Facility				
DESCRIPTION	**NOTES**	**Yes**	**No**	**NA**
Does the lab have an appropriate general ventilation system with > 4 air changes/hour?				
Does the lab general ventilation system have appropriate intakes and exhausts to avoid intake of contaminated air?				
Does the lab have eyewash fountains and drench showers?				
Are the eyewash fountains and drench showers tested and serviced properly? Documented?				
Do lab hoods have an appropriate sash markings present and annual testing data available?				
Are spill cleanup kits readily available and appropriate for anticipated spills?				

Waste				
DESCRIPTION	**NOTES**	**Yes**	**No**	**NA**
Are there procedures for safe removal of contaminated waste?				
Are tanks or containers containing hazardous waste labeled with the words "Hazardous Waste" and the date accumulation began?				
Are contaminated sharps and regulated waste placed in properly labeled containers?				
Are drums and containers used in clean-up labeled appropriately?				
Are drums and containers identified and classified prior to packaging for shipping?				
Are all waste streams categorized, labeled, covered and disposed of with established methods?				

Storage				
DESCRIPTION	**NOTES**	**Yes**	**No**	**NA**
Are storerooms used for storage only?				
Are storerooms protected from heat, cold or direct sunlight?				
Do shelves have retaining lips if open shelf storage is used?				
Are chemicals stored in the appropriate chemically resistant secondary containment (carcinogens, acids, bases)?				
Are flammable liquids stored in approved flammable liquid storage cabinets?				
Are chemicals stored in storage cabinets/shelves (not on bench tops or hoods)?				
Are compressed gas cylinders stored and used properly?				

Additional Information				
DESCRIPTION	**NOTES**	**Yes**	**No**	**NA**
Is there PPE available for cleaning up spills? Where is it located?				
Are there specific written procedures for using lab equipment (drying oven, shaker tables, centrifuges, vacuum pumps, etc)? What are the procedures?				
Is there specific written documentation (for students/staff) on lab procedures?				
Is there documentation of training on these procedures?				
Is the chemical inventory and MSDS file updated?				
Have any exposure assessments been conducted in response to any concerns?				
Are incident reports available for review?				