NORFOLK STATE UNIVERSITY

CHEMICAL HYGIENE PLAN

NORFOLK STATE UNIVERSITY

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Norfolk State University

CHEMICAL HYGIENE PLAN

PURPOSE:

a. The Chemical Hygiene Plan (CHP) requirements have been developed in accordance with OSHA 29 CFR 1910.1450. The CHP outlines specific workplace practices and procedures to ensure that all employees are protected from health hazards associated with the use of chemicals with which they work.

b. These CHP requirements have been prepared expressly for Norfolk State University Cleanroom and Laboratories. The purpose of the CHP is to inform personnel (especially new employees, co-ops, grantees, contractors, and technicians) of the facility's safety organization, its requirements, resources, and particular hazards that a worker can expect to find. It is not a substitute for existing safety handbooks, regulations, or operating procedures - but rather a summary or a supplement, relevant to Norfolk State University Cleanroom and Laboratories.

c. It is important for all personnel to read this plan and a number of other required safety-related documents. No one is expected to retain all of this material. Everyone is expected to know:

(1) Who to contact concerning safety related matters, and
(2) Where to find safety-related documentation and reference materials.

DEFINITIONS AND TERMINOLOGY

Acute Exposure - Short duration contact, typically minutes or hours.

Asphxiatory - Capable of causing injury by depriving the body of oxygen. Substances producing this effect by dilution of atmospheric oxygen are referred to as simple asphyxiants.

Autoignition Temperature - The temperature at which a material will self-ignite and sustain combustion in absence of a spark or flame.

Carcinogenic - Capable of causing cancer. (NOTE: SDS' are required to list any carcinogens

present.)

Chronic Exposure - Long duration contact, typically days, months, or years.

Cryogenic - Maintained at extremely low temperatures.

Explosive Range - Range of concentration of a gas or vapor in air above and below which the mixture will not burn. Usually described as Lower and Upper Explosive Limits (LEL and UEL) and expressed in percentage.

Flash Point - Lowest temperature at which a liquid will give off enough flammable vapor at or near its surface so that it will ignite upon introduction at an ignition source.

IDLH - Immediately Dangerous to Life or Health Concentration. Concentration at which serious health impairments, or irreversible biological effects possibly leading to death in a period of seconds or several days later, could occur.

Narcotic - Capable of causing depression of the central nervous system; drowsiness, stupor, loss of coordination, unconsciousness.

PEL (Permissible Exposure Level) - Airborne concentration exposure standards are specified by Federal Law (OSHA, 29 CFR). Concentrations may be for 8-hour workdays, or shorter periods (usually 15 minutes). (See also Threshold Limit Values.)

TLV (Threshold Limit Value) - Airborne concentration at or below which it is believed nearly all workers may be repeatedly exposed day after day with no adverse effect. Usually expressed in parts per million (ppm) for gases or vapors and milligrams per cubic meter (mg/m3) for dusts, fumes, and mists. Threshold Limit Values are specified by the American Conference of Governmental Industrial Hygienists and several have been adopted for use by OSHA.
Ratio of the specific gravity of a vapor to that of air. Materials having a vapor density greater than one are heavier than air.

Vapor Density - The measure of tendency for a liquid to go into a gaseous state. Usually expressed in millimeters of mercury (mm Hg). More volatile materials have higher vapor pressures.

Vapor Pressure - The measure of tendency for a liquid to go into a gaseous state. Usually expressed in millimeters of mercury (mm Hg). More volatile materials have higher vapor pressures.

I. INTRODUCTION:

Norfolk State University encourages and supports all programs which promote safety, good health, and well being of NSU faculty, staff, students; participants in NSU sponsored programs and visitors. It is the policy of NSU to provide safe and healthful conditions and to reduce injuries and illnesses to the lowest possible level. No task is so important and no service is so urgent that it cannot be done safely. In keeping with this commitment, this Chemical Hygiene Plan was developed as part of the Laboratory Safety Program.

The Chemical Hygiene Plan (CHP) is designed to protect personnel from potential hazards associated with the use of chemicals. Compliance is mandatory for all employees working in campus laboratories due to requirements of the Occupational Safety and Health Administration (OSHA) standard on "Hazardous Chemicals in the Laboratories". While these regulations pertain specifically to employees, provisions of the CHP may apply to students and visitors depending on their activities.

A variety of hazardous chemicals are used in small quantities in research and teaching laboratories creating a unique environment with a number of risks. These chemicals may cause injury or damage because they are toxic, flammable, corrosive, or reactive with other materials. Usage, handling and storing of these chemicals determines the degree of risk.

The Objective of this CHP is to provide uniform requirements for safe use of potentially hazardous substances in NSU laboratories. General standard operating procedures are outlined, including work with select carcinogens, reproductive toxins and highly acute substances.

Specific operating procedures must be developed by each laboratory for operations that present special hazards (e.g. heating perchloric acid, working with Pyrophorics, working with lasers, working with piranha solution, etc.).

CONTACTS:
The Environmental Health, Safety and Risk Management Office officially interprets this plan. Lab Managers in MCAR and Woods Science Building may also assist in interpretations for departments. EHS&RM is responsible for obtaining approval for any revisions as required by BOV Policy #01 (2014) Creating and Maintaining Policies through the appropriate governance structures. Questions regarding this plan should be directed to the EHS&RM Office.

STAKEHOLDERS

Personnel procuring, handling, storing and using chemicals on the Norfolk State University campus for cleaning, education and research purposes.

POLICY CONTENTS

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II. Responsibility

a. The CHP is a part of Norfolk State University's overall safety program. The following is an outline of individual responsibilities.

Director, Environmental Health, Safety and Risk Management:

(1) Responsible for the development or review of safety programs and procedural requirements, including overall responsibility for CHP.
(2) Monitor the procurement, use and disposal of chemicals used.
(3) Approve all safety permits and chemical worker certifications.
(4) Ensure training of Lab Managers and Safety Officers
(5) Coordinate periodic ventilation measurements to assure proper functioning of biological safety cabinets, fume hoods and other local exhaust ventilation equipment.

Lab Manager/Safety Officer:

(1) Conduct regular chemical hygiene and housekeeping inspections, including routine inspections of emergency equipment. Ensure appropriate audits are conducted.
(2) Know the current legal requirements concerning regulated substances.
(3) Determine the required levels of administrative, engineering and personal protective equipment.
(4) Coordinate necessary training in accordance with the CHP.
(5) Establish and review normal and emergency operating procedures. Seek ways to improve the chemical hygiene program.
(6) Consult with staff and management concerning chemical control measures including purchasing, storing, usage and ventilation.

Laboratory Supervisors/Faculty:

(1) Ensure that workers know and follow chemical hygiene rules.
(2) Instruct workers in the use of laboratory equipment, administrative controls, engineering controls and personal protective equipment
(3) Plan each operation in accordance with the facility's chemical hygiene procedures.

(4) Review SDS for changes or updates and ensure information is current.
(5) Know the current legal requirements concerning regulated substances.

Laboratory Personnel:
(1) Each individual shall be required to read and understand this CHP and supplemental information applicable to their work areas.
(2) Shall conduct each operation in accordance with the facility's chemical hygiene procedures.
(3) Shall know the hazards associated with each chemical used by reviewing MSDS information prior to use and periodically as deemed appropriate.
(4) Know and use required personal protective equipment for each operation.
(5) Develop good personal hygiene habits.

III. General Safe Laboratory Practices

To achieve safe conditions for the laboratory and laboratory workers the following safety procedures shall be followed:

A. Dress Code
(1) Clothing worn by laboratory personnel will protect the body from chemical exposure or burns. Shorts, cut-off sleeves, fish net shirts and tank tops shall not be permitted at any time.
(2) No employees shall be permitted to work bareback or barefoot.
(3) Personnel are not permitted to wear sandals in the laboratory.
(4) Donning laboratory coats over street clothing is recommended to prevent the transfer of hazardous materials from work to home environment.

B. Eating
(1) Consumption of food and/or beverages shall not be permitted in the laboratory and process areas.
(2) Glassware or utensils that have been used for laboratory operations shall never be used for food or beverages.
(3) Laboratory refrigerators and ice machines shall not be used for food storage.

(4) Crushed ice from these machines shall not be used in beverages.
(5) Labels shall be posted on all refrigerators and ice machines indicating whether or not they are safe for food use.

C. Emergency Reporting
All emergencies shall be reported by dialing 823-9000 (CAMPUS POLICE) from any telephone.

1. First-Aid

The location of all safety showers and eye wash stations are indicated in the laboratory specific supplement.

Basic first aid procedures to be used are as follows:
a. Eye Contact - Promptly flush eyes at an eyewash station for at least 15 minutes.
Be sure to open lids while flushing.
b. Skin Contact - Promptly flush and wash the affected area with soap and water.
If only the face is involved, the eye/face wash fountains can be used to flush the area with water.
Remove all contaminated clothing in a manner that will not cause further contact with the skin.
c. Inhalation - Immediately remove from the exposure area to fresh air.

2. Accidents
a. In the event of a serious accident or illness, act immediately, keep calm and assist the injured persons by removing them from the hazard if necessary.
b. All accidents, close calls, health related incidents or spills that could cause serious health hazards shall be reported and documented as soon as possible to CAMPUS POLICE 829-9000.
c. Do not move seriously injured personnel unless they are in danger of further injury.
d. Have individuals apply their own bandages when tending to minor injuries, if possible.
When this is not possible, first responders must don gloves prior to assisting bleeding wounded.
e. In the event of a medical emergency, Fire Department personnel will respond.

3. Chemical Spills
a. In the event of a small-scale spill (less than 1 liter) or airborne release of a non-toxic chemical, notify the Lab Supervisor/Faculty, his/her designee or alternate immediately.
b. The location of all spill kits shall be indicated on the facility diagrams in the laboratory specific supplement.
c. All laboratory personnel working with chemicals shall be familiar with the proper use of these spill kits and their location.
d. Determine the severity of the spill and possible means of temporarily containing the spill with spill pads, absorbent booms or socks. If the spill is too large to handle on an individually, notify personnel in the immediate area to evacuate the facility.
e. Contact emergency personnel, including the Lab Supervisor/Faculty, his/her designee or alternate. Keep the area clear and await further instructions.
f. In addition to notifying the Lab Supervisor/Faculty, his/her designee or alternate, the Lab Manager/Safety Officer and the Director, Environmental Health, Safety and Risk Management shall be notified in the event of a toxic chemical or oil spill which may end up contaminating the sewer system or, which represents a serious health hazard.

D. Hygiene/Housekeeping
a. Do not use mouth suction to pipette chemicals or to start a siphon; a pipette bulb or an

aspirator shall be used to provide vacuum.
b. Always wash hands and exposed skin with soap before leaving the laboratory area and before and after glove use.
c. Use protective gloves and clothing to keep chemicals off skin. Do not use solvents for washing skin. Solvents remove the natural protective oils from the skin and can cause irritation and inflammation. In some cases, washing with a solvent might facilitate absorption of toxic chemicals.
d. Laboratory areas shall be kept clean and free from obstructions. Access to exits, emergency equipment and/or controls shall never be blocked
e. Clean up shall follow the completion of any operation at the end of the day.
f. All chemicals and containers shall be properly identified and labeled with inventory numbers, hazard warning labels and GHS/HMIS/NFPA labels. The GHS/HMIS/NFPA labels with the material name or trade name shall be placed on transfer containers (beakers, flasks, etc.) whenever possible.
g. Unlabeled containers shall not be permitted in the laboratory.
h. SDS shall accompany all laboratory chemicals when entering or exiting the facility.
i. Wastes shall be labeled properly and deposited in appropriate containers.
j. Waste labels are available from Lab Managers.

E. Laboratory Hoods
a. Operations involving toxic gases, vapors, aerosols, and dusts shall be performed in a hood.
b. Laboratory hoods offer significant employee protection.
c. They prevent toxic, offensive or flammable vapors from entering the general laboratory atmosphere, they place a physical barrier between the workers and the chemical environment, and they provide an effective containment device for accidental spills of chemicals.
d. Laboratory hoods shall remain on at all times and the sash shall be lowered when not in use or when physical protection is needed.

F. Safety Data Sheets (MSDS)
a. OSHA requires all employers to maintain a complete and accurate SDS for each hazardous chemical that is used at their worksite.
Manufacturers/ suppliers shall supply this information when a material is purchased.
These SDS' shall be updated whenever new and significant information becomes available concerning a product's hazards or ways to protect against these hazards.
All chemicals entering a facility shall be accompanied by an SDS, whether the material was purchased or obtained as a complimentary sample.
If the SDS' are missing, it shall be the individual's responsibility to obtain these from the manufacturer and supply copies to the Lab Manager/Safety Officer or his/her designee.

b. These SDS' provide an excellent source of specific information about chemicals, which

employees handle. SDS' shall be readily available in designated binders.

c. It shall be each employee's responsibility to review the hazards associated with all chemicals they use.

d. An SDS shall accompany all chemical substances leaving or entering this facility.

G. Medical Consultation/Examination

a. Personnel at NSU Cleanroom and Laboratories are entitled to medical attention because of their potential exposure to hazardous materials in accordance with various NORFOLK STATE UNIVERSITY health and safety requirements.

These medical requirements are generally outlined as follows:

1) When an employee develops signs or symptoms associated with a hazardous chemical that he or she may have been exposed to in a laboratory.

2) When an occurrence, such as a spill, leak, explosion, or other type of emergency occurs in a laboratory resulting in the likelihood of hazardous exposure.

(3) When monitoring indicates an exposure level exceeding the Action Level or Permissible Exposure Limit for a chemical as cited by OSHA, ACGIH or NIOSH.

b. Consultation with a medical professional shall be provided free to the employee, as is any examination or other attention recommended by the consulting physician, at a reasonable time and place.

This laboratory standard also requires the keeping of records of medical consultations and exposure evaluations.

H. Personal Protective Equipment

Personal protective equipment that shall be worn in laboratories includes, but is not limited to:

1. Gloves - When handling any chemical, gloves shall be worn.

The specific chemical characteristics shall determine the glove type to be worn.

Contact LAB MANAGER/SAFETY OFFICER at 823-0001, for glove selection guidelines and chemical incompatibilities.

2. Hearing Protection - Whenever employee noise exposure exceeds the 8-hour time weighted average of 85 decibels, the employee shall wear hearing protection.

All high noise areas and equipment generating high noise levels shall be posted.

Hearing protection shall be worn if operating any posted equipment or if you are working in a high noise area.

3. Respirators - When exposures to dust, fumes, mist, radionuclides, gases and vapors exceed

established limits of exposure, respiratory protection shall be required.

4. Safety Glasses - To protect eyes from laboratory hazards, personnel shall wear safety glasses with side shields at all times in laboratories, any laboratory with a fume hood and when working with hazardous materials.
5. Protective Clothing – Protective clothing is recommended for most types of chemical work in the laboratory.

- Protective clothing is required for work with highly toxic chemicals, biological hazards, and carcinogens.
- Protective clothing is designed to prevent vapors, dust, toxic or corrosive spills from coming in contact with the skin of the worker
- Protective clothing should have appropriate resistance factors, be relatively comfortable, and allow free movement for the execution of tasks.

To select protective clothing, determine the hazards of the chemicals being used evaluate the potential for body exposure and determine the degree of protection desired.

The effects of skin contact can range from relatively minor diseases like dermatitis, to systemic poisoning, to cancer risk and death.

Operations that require improved protection against impact, liquid splash and other eye hazards shall require safety goggles and/or face shields.

Safety glasses can be obtained from the LABORATORY SUPERVISOR.
All visitors entering laboratories shall be required to wear safety glasses.

I. Routes of Exposure

Exposure to hazardous chemicals can be minimized by understanding the common routes of exposure.

1. Inhalation - Inhalation of toxic vapors, mists, gases or dusts can produce poisoning by absorption through the mucous membrane of the mouth, throat and lungs and can seriously damage these tissues by local action.
The degree of injury resulting from inhalation exposure depends upon the toxicity of the material and its solubility in tissue fluids, the depth of respiration and the amount of blood circulation. To prevent inhalation exposure, adequate ventilation shall be provided.
The American Conference of Governmental Industrial Hygienists (ACGIH) produces annual lists of Threshold Limit Values (TLVs) and Short Term Exposure Limits (STELs) for common chemicals used in laboratories.

The National Institute of Occupational safety and Health (NIOSH) has developed recommended exposure standards.
OSHA has also developed regulatory standards (PELs) for employee exposure.
These standards represent conditions, which nearly all workers can be exposed without adverse health effects.

2. Ingestion - Many chemicals used in the laboratory are extremely dangerous if they enter the mouth and are swallowed.
To prevent entry of toxic chemicals into the mouth, laboratory workers shall wash their hands before eating, smoking, or applying cosmetics, immediately after use of any toxic substance, and before leaving the laboratory.
Chemicals shall not be tasted and pipetting shall never be done by mouth.
Eating, drinking and the application of cosmetics shall not be allowed in a laboratory or process areas of a facility.

3. Skin and Eye Absorption - Contact with the skin is a common mode of chemical injury.
Chemicals enter the skin through hair follicles, sweat glands, and cuts or abrasions on outer layers of the skin.
Some chemicals can be absorbed directly through the skin into the bloodstream.
Skin can also be damaged by corrosives, which then allows chemicals to enter the body.
Skin contact can be prevented by use of appropriate protective equipment.

4. Injection - Exposure to chemicals through injection is the least common exposure route.
However, it is possible through mechanical injury from glass or sharp metal, (such as needles or razor blades) contaminated with chemicals.
Safe work practices are the best preventive measure for avoiding exposure through injection.
Broken glass shall be carefully placed appropriately marked containers for proper disposal.
Used razor blades shall be disposed of in special containers marked for sharps located in each laboratory and not thrown in the trash.
All types of sharps containers shall be turned in for proper disposal when almost full. Never overfill the container as this increases the possibility for accidental injury.

J. Smoking
Smoking is prohibited in all laboratories.

K. Training
a. NORFOLK STATE UNIVERSITY AND MVMCAR have made provisions for informing and training employees about potential health hazards and measures they can take to protect themselves when working with chemicals in a laboratory environment.
Training is in accordance with OSHA 29 CFR 1910.1450, as well as OSHA 29 CFR 1910.1200.

Training requirements of all the standards are similar.

b. All new personnel shall receive instruction, utilizing both audiovisual material and classroom training.
All employees shall be required to be familiar with the Chemical Hygiene Plan for their facility.
Supervisors and safety heads shall be trained regarding hazards and appropriate protective measures so they can be available to answer questions from employees and provide daily monitoring of safe work practices.
As new hazards are introduced additional training shall be provided.

c. Laboratory personnel shall be required to attend a chemical hygiene training class, as required by and in accordance with OSHA 29 CFR 1910.1200 and OSHA 29 CFR 1910.1450, provided by the Lab Manager/Safety Officer and to attend regular safety meetings.
In addition, all workers in the laboratory and process areas shall be required to attend a PPE training class as required by and in accordance with OSHA 29 CFR 1910.132, "Personal Protective Equipment.
Laboratory and process area workers shall also be required to attend glove use training and any additional training as necessary.
Contact the Lab Manager/Safety Officer for the schedule of training classes offered.

d. The training program shall emphasize the following:
(1) Summary of OSHA 29 CFR 1910.1200, "Hazard Communication." All employees shall be required to watch a video explaining the purpose of a CHP.
(2) Chemical and physical properties of potentially hazardous materials (e.g., flash point, reactivity, and potential for fire or explosion).
(3) Health hazards, including signs and symptoms of exposure, associated with exposure to chemicals and any medical condition known to be aggravated by exposure to chemicals.
(4) Procedures to protect against hazards (e.g., personal protective equipment required, proper use and maintenance, work practices or methods to ensure proper use and handling of chemicals, and procedures for emergency response).
(5) Work procedures to follow to ensure protection when cleaning hazardous chemical spills and leaks, including location and proper use of spill kits.
(6) Where SDS' are located, how to read and interpret the information on both labels and MSDS' and how employees may obtain additional hazard information.
(7) OSHA's Permissible Exposure Levels (PELs) and American Conference of Governmental Industrial Hygienists' Threshold Limit Values (TLVs).

L. Waste Handling and Disposal

The laboratory shall be required by federal and state regulations to manage all hazardous waste

in a specific manner.
This hazardous waste handling shall be the responsibility of the ENVIRONMENTAL HEALTH, SAFETY and RISK MANAGEMENT OFFICE (823-9142).

1. General
a. All containers, which contain materials, designated as hazardous waste shall be marked with the words "Hazardous Waste" and the identity of the waste.
The originator's name shall be listed on each container.
Only chemically compatible containers of sufficient strength shall be used for waste.
The containers shall be kept closed at all times except to add waste.
The containers shall be arranged so that easy access exists.
This will ensure that containers will not be damaged during handling.
Care shall be taken during all handling to maintain the integrity of the container. Containers used for accumulation of waste shall be labeled from the outset so that anyone working in the area will be aware of the contents.
It is best to keep waste separated based on particular operations as much as possible, (i.e. do not mix all solvents from different operations or chemical syntheses together).
Containers shall not be filled completely to allow for expansion of contents.

b. A spill plan shall be posted at each of the locations.

c. The ENVIRONMENTAL HEALTH, SAFETY and RISK MANAGEMENT OFFICE (823-9142) shall be contacted whenever questions occur about the proper disposal methods of an item.

IV. RULES FOR WORKING WITH SPECIFIC CHEMICAL CLASSES:

A corrosive is defined as a chemical with a pH greater than 12 or less than 2.5.

1. Acids
a. General Information - An acid is a substance that yields hydrogen ions when dissolved in water. Acids commonly encountered in laboratory environments include:

Name	Formula	Gloves
Hydrochloric acid	HCl	neoprene or butyl rubber
Nitric acid	HNO_3	neoprene or butyl rubber
Hydrofluoric acid	HF	nitrile or butyl rubber
Sulfuric acid	H_2SO_4	natural rubber
Acetic acid	CH_3CO_2H	neoprene or butyl rubber

b. Safety Precautions - Use acids under well-ventilated conditions.
Prevent all contact of vapor or liquid with skin, eyes, or mucous membranes.
PPE shall include safety glasses, goggles, or a face shield.
Contact lenses shall NOT be worn.
Full-length sleeves and the appropriate gloves shall be worn. Wear aprons shall be made of acid resistant material. Respirators shall be used when required.
When diluting acids with water be sure to add the acid to the water, not the water to the acid.
Be aware of the nearest safety shower and eye wash station before beginning work.

c. Accident Response –
In case of a medical emergency exposure, dial CAMPUS POLICE 823-9000.
Have an appropriate spill plan for large (> 1L) and small (< 1L) quantities.
Anticipate potential spills and use spill pads to make clean up easier.
Have appropriate containment materials on hand in case of large spills. Notify the Lab Supervisor/Faculty or his/her designee immediately.

d. Transfer and Transport - Use the appropriate PPE as mentioned above and check chemical compatibility of transfer pumps and receiving vessels.
When transporting small quantities use bottle carriers to prevent breakage and to act as a containment vessel should breakage occur.

e. Storage - Acids shall be segregated, preferably in separate cabinets, from active metals, oxidizing acids, organic acids, flammables and combustibles, bases and chemicals which react with acids to form toxic gases.

2. Bases/Caustics
a. General Information - Bases are substances, which yield hydroxyl ions when dissolved in water. Bases typically encountered under laboratory conditions include:

Name	Formula	Gloves
Potassium hydroxide	KOH	nitrile or neoprene
Sodium hydroxide	NaOH	neoprene, natural rubber
Ammonia	NH3	nitrile, neoprene, natural rubber

b. Safety Precautions - Bases are extremely corrosive and shall be handled in a similar way to acids with chemical specific changes.
Prevent all contact of vapor or liquid with skin, eyes, or mucous membranes.
PPE shall include safety glasses, goggles, and/or a face shield.
Full-length sleeves and appropriate gloves shall be worn.

Wear aprons made of base resistant material.
Respirators shall be worn if necessary.
Be aware of the nearest safety shower and eye wash station before beginning work.

c. Accident Response - In case of a medical emergency exposure CAMPUS POLICE 823-9000 from any telephone. Have an appropriate spill plan for large (> 1L) and small (< 1L) quantities. Anticipate potential spills and use chemically resistant tray and spill pads to make clean up easier.
Have appropriate containment materials on hand in case of large spills.
Notify the Lab Manager/Safety Officer or his/her designee immediately.

d. Transfer and Transport - Use the appropriate PPE as mentioned above, determine chemical compatibility of transfer pumps and receiving vessels.
When transporting small quantities use bottle carriers to prevent breakage and to act as a containment vessel should breakage occur.

E. Storage - Don't store bases with acids. The reaction between the two will generate large quantities of heat.
As most bases are non-volatile, special storage cabinets are not necessary.

3. Oxidizers
a. General Information - These compounds will react violently with flammables and combustibles, and shall be separated from these substances as well as reducing agents. Oxidizers often seen in laboratories include:

Name	Formula	Gloves
Perchloric acid	$HClO_4$	nitrile, neoprene, PVC
Chromic acid	CrO_3	butyl rubber
Nitric acid	HNO_3	neoprene, butyl rubber
30% hydrogen peroxide	H_2O_2	butyl rubber

b. Safety Precautions - Unintentional contact with organic and other oxidizable substances shall be avoided.
Reaction vessels containing significant quantities of these reagents shall be heated using fiberglass mantles or sand baths rather than oil baths.
Prevent all contact of vapor or liquid with skin, eyes, or mucous membranes.
PPE shall include safety glasses, goggles, and/or a face shield.
Full-length sleeves and the appropriate gloves (see above or contact the MVCAR staff, 823-0001) shall be worn.
Wear aprons of the appropriate resistant material. Respirators shall be used when required.

Be aware of the nearest safety shower and eye wash station before beginning work.

c. Accident Response - In case of a medical emergency exposure dial CAMPUS POLICE 823-9000.
Have an appropriate spill plan for large (> 1L) and small (< 1L) quantities.
Anticipate potential spills and use chemically resistant trays and spill pads to make clean up easier. Stock amounts reflective of quantities likely to be encountered in spill situations.
Have appropriate containment materials on hand in case of larger spills.
Notify the Lab Manager/Safety Officer or designee immediately.

d. Transfer and Transport - Use the appropriate PPE as mentioned above, check chemical compatibility of transfer pumps and receiving vessels.
When transporting small quantities use bottle carriers to prevent breakage and to act as a containment vessel should breakage occur.

e. Storage - Oxidizers shall not be stored with organics or other oxidizable compounds as they present fire and explosion hazards. They shall be stored in glass or unbreakable, inert containers. Corks and rubber stoppers shall NOT be used.

4. Toxics
Always handle these compounds with adequate ventilation.
Store in properly labeled and unbreakable containers.
These substances have been divided into a number of categories.

1. Reproductive Hazards
a. General Information - Exposure of both male and female workers to specific chemicals during the reproductive cycle can have an effect on the development of the fetus.
In women, toxic chemicals can have a direct effect on the female reproductive system, affect conception, cause changes in maternal hormone secretions, cause genetic damage to the egg cell, or pass through the placenta to directly affect the fetus.
In men, toxic chemicals can cause changes in the testes, interfere with the production of male hormones, or cause genetic damage to the sperm cells.
These conditions can act on a developing child to cause death, spontaneous abortion, malformation, retarded growth and postnatal functional deficits. In particular, an embryo toxin or fetotoxin is a substance that causes death or abnormal development of one or more body systems of the unborn child.
A mutagen is a substance that causes a genetic change in the unborn child.
A teratogenic agent is a substance that causes physical defects in the developing baby.

b. Safety Precautions - The period of greatest susceptibility to reproductive hazards is prior to

conception and during the first twelve weeks of pregnancy, when the majority of the baby's organ systems are formed.
This is also the period when a woman may not know she is pregnant, therefore special precautions shall be taken at all times.
Both men and women of childbearing age shall always take adequate precautions to guard against inhalation, direct skin contact or accidental ingestion of chemicals known to be reproductive hazards.
Operations shall always be carried out using impermeable containers in adequately ventilated areas (inside laboratory fume hoods or ventilated equipment.)
Appropriate PPE shall be worn, especially gloves.
Laboratory hoods shall be inspected for proper operation before works begins.
Chemicals, which may be reproductive hazards, shall be labeled. Some of the reproductive hazards that may be found in laboratories are classified below:

Metals: Mercury, lead, arsenic, cadmium, aluminum, lithium (metals and salts), and chromium

Gases: Ethylene oxide

Organic Chemicals: N-methyl-2-pyrrolidone, N,N-dimethylacetamide, y-butyrolactone, polychlorinated biphenyls (PCBs), dibenzofurans, benzene, xylene, cyclohexanone, glycol ethers and glycol ether acetates, alkanesulfones, acetamides, formamides, dibromochloropropane, and methanol

The Lab Manager/Safety Officer, Faculty and Staff shall be notified of pregnancy as soon as possible.
Pregnant employees shall only be allowed to work in the laboratory after a thorough evaluation of the hazards has been conducted by the supervisor and the employee's doctor.

c. Accident Response - In case of a medical emergency exposure dial CAMPUS POLICE 823-9000.
Notify your supervisor and the Lab Manager/Safety Officer, Faculty or his/her designee immediately concerning all incidents of exposures or spills.

d. Transfer and Transport - Use appropriate precautions whenever transferring or transporting these materials to eliminate exposure.

e. Storage - Store these substances, properly labeled, in a well-ventilated area, preferably in an unbreakable container.

2. Allergens or Sensitizers

a. General Information - Allergens are substances, which produce skin and lung hypersensitivity. Examples include dianhydrides, most resin curing agents, diazomethane, chromium, nickel, bichromates, formaldehyde, isocyanates, and certain phenols.
There is a wide variety of response from one individual to another so contact with chemicals of unknown activity should be avoided.

b. Safety Precautions - Wear suitable gloves and clothing to prevent skin contact with allergens or substances of unknown allergenic potential.
Work with adequate ventilation.

c. Accident Response - In case of a medical emergency exposure dial CAMPUS POLICE 823-9000. If a major spill occurs outside a hood, evacuate the area and contact the Lab Manager/Safety Officer, Faculty or Supervisor or his/her designee and ENVIRONMENTAL HEALTH, SAFETY AND RISK MANAGEMENT OFFICE at 823-9142.
Only individuals wearing the appropriate protective clothing shall clean up spills.
If a spill involves a significant quantity of a toxic material, a full-face supplied air respirator shall be used.

d. Transfer and Transport - Take normal precautions during transfer and transport to avoid exposure and breakage.

e. Storage - Store breakable containers in chemically resistant trays.
Store contaminated waste in labeled impervious containers.
For liquid waste, store in glass or plastic bottles.

3. Chemicals of High Chronic Toxicity

a. General Information - These substances include, but are not limited to, methanol, certain heavy metals, their derivatives, and potent carcinogens.
Contact the ENVIRONMENTAL HEALTH, SAFETY AND RISK MANAGEMENT OFFICE for more information concerning the safety permit or the use of suspected carcinogens.

b. Safety Precautions - Use of these chemicals shall occur only in a controlled area (a laboratory, or portion of a laboratory or a facility such as an exhaust hood, which is designated for use of highly toxic substances).
The controlled area shall be conspicuously marked with warning and restricted access signs. Use of this area shall not be limited to toxic substances but all personnel who have access to it shall be aware of the substances being used and the necessary precautions.
Protect vacuum pumps against contamination by scrubbers or cold traps and vent them into the

hood.
Decontaminate vacuum pumps or other contaminated equipment, including glassware, in the hood before removing them from the controlled area.
Decontaminate the work area before normal work is resumed.
On leaving a controlled area remove any protective apparel, place it in an appropriate labeled waste container, and thoroughly wash hands, forearms, face, and neck.

c. Accident Response - In case of a medical emergency exposure dial CAMPUS POLICE 823-9000.
Contingency plans, equipment, and materials to minimize exposures of people and property in case of an accident shall be readily available.
Use chemical decontamination whenever possible.
If dry powder is used, use wet mops or a High Efficiency Particulate Air (HEPA) exhausted vacuum cleaner instead of dry sweeping.
Ensure that containers of contaminated waste, including washings from contaminated flasks, are transferred from the controlled area in a secondary container.

d. Transfer and Transport - Conduct all transfers in the controlled area.
Make sure all materials are properly labeled with chemical name and "high chronic toxicity" or "carcinogen" before being transported.

e. Storage - All containers shall be labeled with the appropriate identification and warning labels. Labels shall at the least include chemical name, NFPA code, and the words "Carcinogen" or "High Chronic Toxicity."
Store containers of these chemicals only in ventilated limited access areas in labeled, unbreakable, chemically resistant, secondary containers.
Keep accurate records of the amounts of these substances stored and used, the dates of use, and the names of all users.

5. Flammables/Explosives
1. Flammables
a. General Information - Flammable substances are those, which catch fire readily and burn in air. Examples include acetone, ethanol, methanol, isopropanol, toluene, ethyl ether, dioxane and tetrahydrofuran.
b. Safety Precautions - These substances shall only be handled in areas free of ignition sources. They shall never be heated by using an open flame.
Use a steam, water, oil or air bath or a heating mantle.
Use adequate ventilation to prevent the formation of flammable atmospheres.
c. Accident Response - In case of a medical emergency exposure 823-9000.
Follow appropriate first aid procedures.

For small spills (< 1L), clean up promptly using appropriate absorbent materials and PPE.
For large spills (> 1L) evacuate the area and notify the Faculty, Lab Manager/Safety Officer Supervisor or his/her designee immediately.
Know the location of your nearest spill kit and how to use it.
d. Transfer and Transport –
When transferring these substances in metal containers, static generated sparks shall be avoided by bonding and the use of ground straps
e. Storage - Store these materials in flammable solvent cans approved by NFPA.
These substances shall be kept in special cabinets designed for this purpose.

2. Highly Reactive Chemicals and Explosives
a. General Information - This class of compounds includes peroxide forming compounds and explosives.
Important to NORFOLK STATE UNIVERSITY AND MVMCAR are the peroxide forming compounds.
These react with oxygen present in the atmosphere to form peroxides.
Peroxides are unstable and there are risks of explosion.
The concentration of the peroxide contaminant plays an important role and can change through evaporation and distillation processes.
Heat, shock, and friction can create dangerous situations, which can lead to explosions.
Classes, which can form peroxides, include aldehydes, ethers, most alkenes, and vinyl and vinylidene compounds.
Specific chemicals include cyclohexene, cyclooctene, decalin, p-dioxane, diethyl ether, diisopropyl ether, tetrahydrofuran (THF), and tetralin. Aging of the chemical is a significant factor in the production of peroxides.
These compounds often contain additives to prevent the formation of peroxides, however, the addition of additives does not eliminate the hazard and only delays it.
The procurement, storage, handling, use, and disposal of explosive materials is referenced in LPR 1710.7, "Use and Handling of Explosives and Pyrotechnics."
b. Safety Precautions - These substances shall be purchased in small quantities, not stockpiled.
Unused peroxides shall not be returned to the container.
Organic peroxide forming materials are issued by the Chemical Manager and shall be returned prior to the expiration date for testing.
The sensitivity of most peroxides to shock and heat can be reduced by dilution with inert solvents, such as aliphatic hydrocarbons.
Solutions of peroxides in volatile solvents shall be handled so as to prevent evaporation of the solvent as the peroxide concentration will increase.
Metal spatulas shall not be used to handle peroxides because metal contamination can lead to explosive decomposition.
Ignition sources shall not be permitted in the area.

Friction, grinding, and other forms of impact shall be avoided.
Any questions should be forwarded to the Explosives Support Engineer.
c. Accident Response - In case of a medical emergency exposure CAMPUS POLICE 823-9000.
All spills shall be cleaned up immediately.
Absorb liquids with vermiculite. Notify the Lab Supervisor/Faculty, Lab Manager/Safety Officer or his/her designee immediately.
d. Transfer and Transport - Small quantities of peroxides shall be handled so as to ignition sources, shock and extreme temperature changes.
e. Storage - Peroxide formers shall be stored in airtight containers in a cool, dry, dark place.
Glass containers that have glass stoppers shall not be used.
Polyethylene shall be used, if possible.

To minimize the rate of decomposition peroxides shall be stored at the lowest temperature consistent with their solubility or freezing point but not lower because they become more sensitive to shock and heat.

They shall be properly labeled with the receiving date, the opening date, and the date recommended for disposal.

These chemicals shall not be stored for long periods of time, but returned to FACILITIES MANAGEMENT after a given period if not used.

Metal containers with screw lids shall be avoided.

If old bottles of these materials are discovered, especially if they are in poor condition, contact the Lab Manager/Safety Officer, his/her designee or alternate immediately.

3. Pyrophorics
a. General Information and Storage Requirements - These are liquids or solids which will spontaneously ignite in air at temperatures less than 130°F.
This includes oily rags, dust accumulations; organics mixed with strong oxidizers, alkali metals such as sodium, potassium, lithium and phosphorus, butyl lithium and tetraethyl aluminum solutions.
These substances shall be treated with the same respect accorded all chemicals. Their storage requirements, however, require noting.
These substances shall be stored in inert atmospheres or under kerosene.

6. Compressed gases
Compressed gases present the potential for exposure to both chemical and mechanical hazards depending on the particular gas.

Compressed gases fit into one of six classifications:
1) Flammable- < 13% of gas mixed with air will ignite
2) Asphyxiant- can displace oxygen
3) Oxidizer
4) Corrosive
5) Toxic
6) Highly Toxic

If the gas in question is flammable, flash points lower than room temperature, compounded by high rates of diffusion, present fire and explosion hazards.
There are also reactivity and oxygen displacement considerations.
The large amount of potential energy present in the pressure used to compress gas makes for a potential rocket or fragmentation bomb.
This creates the need for special handling procedures for compressed gases, the cylinders used to contain them, and the regulators and piping used to control and direct the flow.

1. General Information
The Department of Transportation defines a compressed gas as "any material or mixture in the container with an absolute pressure greater than 276 kPa (40 lbf/in2) at 21°C or an absolute pressure greater than 717 kPa (104 lbf/in2) at 54°C or both, or any liquid flammable material having a Reid vapor pressure greater than 276 kPa (40 lbf/in2) at 38°C."

2. Safety Precautions
The contents of any compressed gas shall be clearly identified on the cylinder.
All gas lines shall also be clearly labeled so as to identify the gas being transported. The labels shall be color coded to distinguish hazardous gases.
Signs identifying flammable compressed gases shall be clearly posted.

Cylinders shall be firmly secured at all times using a clamp and belt or chain.
Pressure release equipment for protecting devices attached to cylinders containing potentially hazardous gases shall be vented to a safe place.

Cylinders shall be placed in such a way that the cylinder valve is readily accessible at all times.
The main cylinder valve shall be closed whenever the gas is not in use.
This is not only necessary for safety reasons but also to prevent contamination and corrosion in empty cylinders from the diffusion of air and moisture into the cylinder.
The proper tools shall be used on cylinder hardware.
Pliers shall not be used.
Valves shall be opened slowly and it is never necessary to open the main valve all the way.
When opening a cylinder containing toxic gas, stand upwind and to the side or use proper

ventilation equipment.
Be aware of the location of fellow workers in case a leak exists.

Do not use common brass pressure regulators with corrosive gases such as ammonia, boron trifluoride, chlorine, hydrogen chloride, hydrogen sulfide, and sulfur dioxide; special corrosion resistant regulators shall be used.
Regulators used with carbon dioxide shall have special internal designs and special materials in order to prevent freeze-up and corrosion problems.

All pressure regulators shall be equipped with spring-loaded pressure relief valves.
When used for hazardous gases of any type these valves shall be properly vented.
Do not use internal bleed type regulators.
Sparks and flames shall be kept from the area of flammable gas cylinders.
All piping, regulators, appliances, and hoses shall be kept tightly sealed and in good condition.
Equipment used for flammables shall not be interchanged with similar equipment used for other gases.

Cylinders shall not be emptied less than 172 kPa because the residuals may become contaminated if the valve is left open.
Empty cylinders shall not be refilled, the regulator shall be removed and the valve cap replaced.
Labels for cylinders, which designate whether they are full, in use or empty shall be used.

All pressure equipment shall be inspected periodically, more often where corrosive or hazardous gases are used.

3. Storage
Cylinders containing flammables and other hazardous gases shall be stored in a well-ventilated area.
Cylinders of oxygen shall never be stored with cylinders containing flammables.
Do not store empty and full cylinders in the same location and do not lay empty cylinders on the ground.

7. WATER REACTIVE CHEMICALS

1. General Information and Storage Requirements - Examples include aluminum and magnesium powder, and calcium and lithium hydride.

These chemicals can lead to the formation of flammable toxic gases or release of an extreme amount of energy following contact with water.

This property shall be considered when handling.

Areas where these compounds are present shall be posted in such a way that fire-fighting personnel are aware of their presence.

They shall be stored in waterproof, polyethylene bags, in tightly sealed containers.

V. PROCEDURES, ACTIVITIES OR OTHER OPERATIONS WHICH WARRANT PRIOR APPROVAL BEFORE IMPLEMENTATION

A. GENERAL

In the interest of integrating safe laboratory practices, whenever a particular procedure, operation or activity is to involve the use of carcinogens, reproductive toxins and/or substances with a high degree of acute or chronic toxicity, the LABORATORY MANAGER/SAFETY OFFICER shall be informed during the planning stages. It shall be the responsibility of the USER to investigate the toxicity of materials of interest and to inform the LABORATORY MANAGER/SAFETY OFFICER in writing of the plans. In accordance with OSHA 29 CFR 1910.1450 prior approval shall be given before beginning work with hazardous materials.
Examples of activities and operations requiring prior review and approval before implementation are given below:

Use of OSHA regulated carcinogens and gases with Idles < 5000 ppm.
Any new or radically modified experiment, including scale-ups exceeding 4 liters.
Any new activity, which will involve the use of high temperature and/or pressure.
Any activity, which will utilize a toxic substance for an extended period of time.
This includes storage as well as handling times.
This will limit the need for evaluating operations involving one-time use of a chemical.
Any activity utilizing a substance requiring special disposal or storage requirements for itself or its derivatives.
Any activity involving the use or synthesis of organometallic materials.

VI. DESIGNATED WORK AREAS

Designated work areas shall be established for work involving the use of carcinogens, reproductive toxins, and or substances with a high degree of acute toxicity.
Laboratory hoods shall be identified throughout the area of such work.
Signs can be obtained through the LABORATORY MANAGER/SAFETY OFFICER.

VII. LABORATORY FUME HOOD PROGRAM

A. INTRODUCTION:
This section establishes specifications and minimum requirements for the inspection of laboratory fume hoods.
The section provides a quantitative procedure for testing hood performance and criteria for judging the acceptability of hoods.
The recommended practices for the safe use of laboratory hoods and basic information on hood function and performance are addressed. These practices are as important as good hood design and inspection procedures in achieving maximum protection of personnel.

B. VENTILATION SPECIFICATIONS:
All new, existing or upgraded laboratory hoods intended for use with any material shall attain an average linear face velocity of 100 feet per minute (fpm), with the sash fully opened or lowered to a minimum, allowable working sash height of 12".
If the hood face opening has to be reduced to achieve 100 fpm or a high velocity for a particular hood use, then visible markings shall clearly indicate the working sash height.
Directional arrow stickers shall be used on all hoods to designate the proper working sash height.
All hoods shall be designed and operated to maintain relatively uniform air velocity over the entire face.
As a general rule, the velocity measured at any single point shall not vary more than 20 percent from the overall average.

C. LABORATORY HOOD GUIDELINES

The LAB MANAGER/SAFETY OFFICER and staff shall inspect existing laboratory hoods for proper use, air turbulence and adequate face velocity at least annually and after any adjustment, modification or maintenance service.
New hoods shall be inspected at the time of installation and before use.
Required laboratory hood inspections for both new and existing hoods are given below:

1. Fume Hood Baffle Adjustment
Utilize the baffle adjustment controls to attain uniform face velocity.
Most hoods have at least two adjustable baffle slots at the rear to assist in achieving an even distribution of airflow over the entire hood face.
Start baffle adjustment by positioning the bottom slot fully open, the top slot one-half open and the middle slot, where provided, in a slightly open position.
These slots can also be adjusted to accommodate special hood use conditions such as high heat loads and heavier-than-air vapors.

a. High Heat Loads - High heat loads are best controlled by fully opening the top slot.

b. Heavier-than-Air Vapors - Heavier-than-air vapors are best controlled by increasing the bottom slot opening and decreasing the top slot opening.
Avoid shutting off an exhaust slot completely.
All parts of the hood cavity require some air circulation to control vapor release.
Closing off the top slot may cause a dead space in the upper section of the hood.
As a result, contaminated air from the hood may escape along the upper edge of the sash.
Do not attempt to adjust the balancing dampers in the air ducts above a hood.
System balance is critical and should be left to qualified personnel.

2. General Requirements
Large bulky objects and hood clutter are detrimental to hood performance.
Too much equipment and bulky objects in the hood are common causes of poor air performance, i.e., air turbulence and dead space.
Place work well inside the hood.
The forward six inches of the hood are most subject to draft and turbulence.
Pour, transfer and weigh materials as far back as possible.
Avoid placing your head inside the hood.
Maintain the hood sash at the smallest practical open area.
Keep the hood clean. Clean-up spills immediately to avoid build-up of contaminants within the hood.
A visual indicator is a desirable feature for laboratory hoods to warn if ventilation fails or is inadvertently turned off, or falls below a predetermined unacceptable value for the work being performed.
A hood suspected of not performing properly shall be promptly brought to the attention of the LAB MANAGER/SAFETY OFFICER or his/her designee.

3. Evaluation of Hood Performance
Uniformity of airflow in the hood can best be determined with velometer measurements and smoke tube tests.
The velometer shall be used for quantitative evaluations, whereas the smoke tubes are useful in detecting reverse flow and other undesirable flow conditions.
The ENVIRONMENTAL HEALTH, SAFETY AND RISK MANAGEEMENT staff shall be responsible for these measurements on a periodic basis.
These measurements shall be recorded on stickers and placed on the outside of the laboratory hoods.

a. Quantitative Evaluations
Make sure the hood fan is on, that all other hoods on the same system are in normal operation

and that the system as a whole is balanced.

Open the sliding sashes to their maximum operating position.

Remove bulky items and obstructions that are not normally present when the hood is in use.

Determine the average linear face velocity of the hood using an instrument such as a velometer.

Evaluate the uniformity of airflow at the hood face by comparison of individual velocity readings with the overall average.

Non-uniformity is indicated by individual variations of greater than 20 percent relative to the average.

Velocity is defined in the laboratory hood as face velocity, which is the inward velocity of air at the open face of the hood, usually expressed in feet per minute (fpm).

Face velocity is a function of total airflow rate expressed in cubic feet per minute (cfm) and open face area of the hood. The relationship between face velocity, airflow rate, and hood face area is shown by the following equation:

Q = AV
Q = air flow rate (cfm)
A = hood face area (square feet)
V = hood face velocity (fpm)

b. Qualitative Evaluation

Inspect hoods for excessive turbulence, reverse flow or dead space.
This inspection shall be accomplished by use of smoke tubes liquid nitrogen. When using smoke tubes or liquid nitrogen, make a complete traverse of the hood face and along interior walls and work surfaces parallel to the plane of the hood face at a distance of six inches inside the hood.
A visual indicator is located inside each fume hood and it shall be the individual's responsibility using the hood to notify the LAB MANAGER/SAFETY OFFICER or his/her designee if the ventilation fails.

VIII. SAFETY DATA SHEET (MSDS) PROGRAM

A. INTRODUCTION

OSHA requires that all employers maintain a complete and accurate SDS for each chemical hazardous, or not that is used on site. Manufacturers/suppliers shall supply this information when a material is purchased.
These SDS' shall be updated whenever new and significant information becomes available concerning a product's hazards or ways to protect against these hazards.

B. OBJECTIVE
These SDS' provide an excellent source of specific information on the chemicals, which employees must handle.
The SDS' will inform you so that you can protect yourself and respond to emergency situations.

C. LOCATION
SDS' shall be readily available in each facility. SDS' for new chemicals shall be obtained from the manufacturer when the chemicals are ordered.

LAB-SPECIFIC INFORMATION
The following required information shall be documented and maintained in each facility requiring a CHP. For additional information regarding compiling this information contact LAB MANAGER/SAFETY OFFICER at 823-0001.

LABORATORY SPECIFIC CHP INFORMATION for BLDG_____, ROOM_____

The Laboratory Supervisor/Telephone No. is _____/_____
Emergency Information:

Emergency eyewashes/showers are located in _____

Safety Data Sheets (SDS):
SDS' are readily available in the notebook in Room _____

Spill kits are available in _____
Waste disposal:
Chemical/biological wastes shall be properly labeled and deposited in the appropriate containers.
Waste labels shall be available in _____ or from the Environmental Department.

Personal Protective Equipment:
Hearing protection - The following processes require hearing protection:
Process Plugs Muffs

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Hearing protection is available in Room _____

Glove Protection - The following processes require protective gloves:

Process	Chem.	Heat	Cryo	Kevlar
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Gloves are available from _____

Eye/Face Protection - The following processes require eye/face protection:

Process	Safety Glasses	Chemical Goggles	Face shield
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Eye/Face protection are available from_____

Torso Protection - The following processes require torso protection:

Process	Lab Coats	Rubber Aprons	Tyvek Coveralls
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Torso protection is available from _____

Respiratory Protection - The following processes require respiratory protection:
Full Half Dust

Process	Face	Face	Mask
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Respiratory protection is available from_____
Other Protective Devices:

Laboratory hoods are located in _____

Weighted Bench-top Safety Shields are available from _____

NOTE: A facility diagram shall be included detailing the laboratory locations.

DEFINITIONS AND TERMINOLOGY

Acute Exposure:
Short duration contact, typically minutes or hours.

Asphxiatory:
Capable of causing injury by depriving the body of oxygen. Substances producing this effect by dilution of atmospheric oxygen are referred to as simple asphyxiants.

Autoignition Temperature:
The temperature at which a material will self-ignite and sustain combustion in absence of a spark or flame.

Carcinogenic:
Capable of causing cancer. (NOTE: SDS' are required to list any carcinogens present.)

Chronic Exposure:
Long duration contact, typically days, months, or years.

Cryogenic:

Maintained at extremely low temperatures.

Explosive Range:
Range of concentration of a gas or vapor in air above and below which the mixture will not burn. Usually described as Lower and Upper Explosive Limits (LEL and UEL) and expressed in percentage.

Flash Point:
Lowest temperature at which a liquid will give off enough flammable vapor at or near its surface so that it will ignite upon introduction at an ignition source.

IDLH:
Immediately Dangerous to Life or Health Concentration. Concentration at which serious health impairments, or irreversible biological effects possibly leading to death in a period of seconds or several days later, could occur.

Narcotic:
Capable of causing depression of the central nervous system; drowsiness, stupor, loss of coordination, unconsciousness.

PEL (Permissible Exposure Level):
Airborne concentration exposure standards are specified by Federal Law (OSHA, 29 CFR). Concentrations may be for 8-hour workdays, or shorter periods (usually 15 minutes). (See also Threshold Limit Values.)

TLV (Threshold Limit Value):
Airborne concentration at or below which it is believed nearly all workers may be repeatedly exposed day after day with no adverse effect. Usually expressed in parts per million (ppm) for gases or vapors and milligrams per cubic meter (mg/m3) for dusts, fumes, and mists. Threshold Limit Values are specified by the American Conference of Governmental Industrial Hygienists and several have been adopted for use by OSHA.
Ratio of the specific gravity of a vapor to that of air. Materials having a vapor density greater than one are heavier than air.

Vapor Density:
The measure of tendency for a liquid to go into a gaseous state. Usually expressed in millimeters of mercury (mm Hg). More volatile materials have higher vapor pressures.
Vapor Pressure
The measure of tendency for a liquid to go into a gaseous state. Usually expressed in millimeters

of mercury (mm Hg). More volatile materials have higher vapor pressures.

PUBLICATION
Upon approval, policy may be found in the Norfolk State University Policy Library and the Facilities Management EHS&RM webpage.

REVIEW SCHEDULE
Next Scheduled Review: _MM/DD/YYYY_

Approval by Administrator: _____; MM/DD?YYYY

Revision History: None

Supersedes:

RELATED DOCUMENTS
None

FORMS
None