Chemical Hygiene Plan [29CFR1910.1450]

4.0 Occupational Exposure to Hazardous Chemicals In Laboratories

The Laboratory Standard **applies to all employers engaged in the laboratory use of hazardous chemicals. This standard was issued to specifically address the use of chemicals in a laboratory setting. Suffolk County Community College is implementing a Chemical Hygiene Plan. This plan sets forth required procedures, equipment and work practices to protect employees from the hazards associated with the laboratories at Suffolk County Community College.**

The purpose of this rule is to provide a safe and healthy work environment for all laboratory employees at Suffolk County Community College.

The following requirements of the Chemical Hygiene Plan will be discussed in this section:

4.1 General Principles for Work with Laboratory Chemicals

4.2 Chemical Hygiene Responsibilities

4.3 The Laboratory Facility

4.4 The Chemical Hygiene Plan

4.5 Standard Operating Procedures for Working with Chemicals

4.6 Employee information and Training

4.7 Medical Consultation and Medical Exams

4.8 Glossary of Terms

4.9 Contacts

Appendix A

Appendix B

4.1 General Principles for Work with Laboratory Chemicals

There are four general principles that should always be taken into account when individuals are working with chemical substances. Chemicals are an integral part of any laboratory. Safety must be incorporated into the laboratory environment. The following principles have been incorporated in the Suffolk County Community College's Chemical Hygiene Plan.

1. **It is prudent to minimize all chemical exposure.** There are few laboratory chemicals without hazards. We will not address each specific chemical individually, but will identify classes of chemicals. **General precautions** are provided for each class of **laboratory chemicals**. As a general rule, all skin contact with laboratory chemicals should be avoided. Additionally, instructors should use the most innocuous chemicals possible when designing labs.

2. **It is critical that individuals working with chemicals never underestimate the risk.** Even if a substance has no significant hazard, exposure should still be minimized. One should always assume that any mixture will be more toxic than its most toxic component. If a substance's toxicity is unknown, consider it toxic.

3. **Never underestimate the importance of adequate ventilation.** The best way to prevent the exposure of airborne contaminants into the working atmosphere is by providing and maintaining adequate ventilation.

4. **Never underestimate the importance of a written mandatory chemical hygiene plan designed specifically for each laboratory.** We are looking towards the creation of a working hygiene plan that is functional and easily utilized by staff.

4.2 Chemical Hygiene Responsibilities

- The **specialist** or designated individual shall be responsible for implementation of the CHP and assisting the chemical hygiene officer in fulfilling their duties.

- The **Assistant Director of Public Safety and Environmental Health** will work with administrators and employees to develop and implement the necessary chemical hygiene practices and policies. He/she will be the ***Safety Officer*** as far as this plan is concerned.

- The **academic chair or, if none, associate/assistant dean** or the individual(s) designated by the college shall be responsible for their laboratories as covered under the chemical hygiene plan. They will act as the ***chemical hygiene officers.*** *He/she will have* complete authority (subject to appeal and review by the college safety officer and the college chief financial officer), and be responsible for the College's compliance with this mandated program as required in 29 CFR 1910.1450**.** The individual(s) designated by the college will oversee and enforce the policies and procedures in the SCCC Chemical Hygiene Plan.

4.2.1 The ***safety officer*** shall:

a. Monitor disposal of chemicals used in the laboratories.
b. Perform and maintain records of audits and inspections.
c. Maintain and disseminate information on current regulatory requirements and changes in the Standards that affect SCCC.
d. Provide appropriate educational programs and training for faculty, specialist and laboratory supervisors.
e. Receive, prepare and maintain all reports required by the college and regulatory agencies.
f. Review the CHP at least annually, and make changes to it as required by Federal/State regulation.

g. Work with administrators and other employees to develop and implement effective and appropriate chemical hygiene practices and policies.

4.2.2 ***Specialist or equivalent*** shall:

a. Work with administrators and other employees to develop and implement effective and appropriate chemical hygiene practices and policies.
b. Monitor procurement, use and disposal of chemicals in the laboratories.
c. Advise department head and safety officer on programs needs which may include improvements to the CHP or personal protective equipment requirements.
d. Know and understand the current legal requirements concerning regulated substances being used as provided by the safety officer.
e. Coordinate safety information from the safety officer to all areas within their department.
f. Perform weekly chemical hygiene inspections and maintenance of all department laboratories and stockrooms.

4.2.3 **Assistant/Associate dean or academic chair or, if none, equivalent** shall:

a. Act as the **chemical hygiene officer** for their assigned area.
b. Be responsible for compliance of required actions as written in the CHP by their department(s).
c. Advise the safety officer of any additional program needs or improvements to the CHP.
d. Ensure that employees know and follow the CHP, that PPE (personal protective equipment) is available and in good condition.
e. Schedule required training and make sure it has been provided to all affected employees.
f. Review inspection records during the months of October and April of each year.
g. Be responsible for preparing required SOPs for each laboratory. Copies shall be forwarded to the safety officer.

4.3 The Laboratory Facility

4.3.1 Laboratory Design: All OSHA regulated laboratories will have appropriate general ventilation available and adequate chemical storage areas. Hoods and sinks will be conveniently located and accessible in each lab and/or prep area. Each laboratory will have an eyewash fountain and safety shower available. Waste containers for glass, chemical and biohazard waste will be provided.

4.3.2 General Laboratory Maintenance: All laboratory equipment will be continually evaluated and periodic calibration of equipment will be performed. Equipment checks will be the responsibility of the affected department. The specialist will keep a record of all maintenance, deficiencies and corrective actions. Plant operations will be responsible for maintenance, repair and general cleaning of the lab and prep rooms. **Custodial personnel <u>are not</u> responsible for cleaning countertops and upper laboratory surfaces.** All required repairs should be documented by a written work order and forwarded to the director of physical plant.

4.3.3 Ventilation and Hoods: General room ventilation cannot be relied upon to provide sufficient protection from toxic substances. Laboratories will draw air from non-laboratory areas and exhaust to the outside. Hoods will provide the primary working area for chemicals. A hood with a continuous monitoring device will be required to maintain a face velocity between 75-100 lfm (linear feet per minute). Records shall be kept by the department in a maintenance file that is readily available. Each department head will assign a specialist to be responsible for performing the required monitoring. The monitoring forms are located in the form section of this plan.

Any repair or deficiency shall be reported by a work order to the director of physical plant. The hood shall have a sign placed on it informing laboratory personnel that the hood is not working properly and should not be used until repaired. Any hood not passing inspection is designated out of service immediately and will not be used until the hood has passed inspection. Inspection records will be reviewed by the chemical hygiene officer (CHO) and the safety officer during the months of

November and May of each year. Inspection tags will be placed on each fume hood. Results shall be marked on the tag for each test performed.

4.3.4 Alarm System: There shall be an alarm system outlined in each laboratory's SOP. The procedures will identify the emergency coordinator for each building and the system of notification to alert employees to evacuate the building. The alarm can be an audible alarm, which is activated by the fire alarm pull box, an announcement or designated individual(s) that physically notifies personnel in the building. These procedures will automatically be put in place the moment a *responsible party* (see section 4.8) is aware of a *significant hazard* (see section 4.8) in an area of a building.

4.4 The Chemical Hygiene Plan: All hazards will be identified with appropriate planned safety procedures and written policies. Appropriate safety equipment shall be obtained and distributed by the department head.

4.4.1 Unattended Projects or Experiments: If there is the need for a laboratory project to be left unattended, the individual responsible for the project must notify the appropriate specialist, the director of physical plant and security. The lights in the room will remain on and an appropriate sign will be placed on the door. The individual responsible for the setup will need to provide for containment of the chemicals involved in the event of an unforeseen accident.

4.4.2 Hoods: A fume hood will be used for any process or experiment that may generate toxic vapors or dust. Use a fume hood when using any volatile substance with a TLV (threshold limit value) of 50 ppm or less. Always confirm the hood performance by either checking the continuous monitoring device or checking with a flow meter. Keep hood face closed as much as possible when in use to maintain a face velocity of 75-100 lfm. Chemicals shall not be stored in hoods. Excess volatiles shall not be disposed of in hoods. Hoods should remain on if the general ventilation in the laboratory is not adequate. A prominent sign shall be placed on the hood explaining that it is to be left on and why.

4.4.3 Professional Responsibility: Academic chairs (if none, assistant dean), specialists, and teaching faculty are responsible for safety in their laboratories. Laboratory Personnel are required to be alert to unsafe conditions and promptly correct or report them. All teaching faculty are required to follow appropriate procedures as outlined in the SCCC Chemical Hygiene Plan. Failure to do so can lead to disciplinary action. The chemical hygiene officer will provide a copy of the hygiene plan to all teaching faculty. A log will be kept which include the following:

Date Received	Name of Faculty Member	Faculty Member's Signature	Chemical Hygiene Officer Signature	Section 4.4.3
				Faculty member should read this section in the presence of the CHO and initial this box to show an understanding of their professional responsibility.

4.4.4 Waste Disposal Program: The handling of reaction byproducts, surplus and waste chemicals and contaminated materials is an important part of laboratory safety. All laboratory personnel are responsible for the waste streams they generate. Any process or experiment that involves chemicals shall include plans and training for waste disposal. Waste shall be deposited in appropriately labeled containers. Laboratory chemical waste shall be removed from the laboratory to the central storage area at least once a month unless the quantities stored in the lab warrant more frequent transfer to the central waste storage area. **Disposal of chemicals down the drain is prohibited. Fume hoods** shall not be used as a means for disposal of volatile organics.

- **Dispose of waste materials promptly.** When disposing of chemicals, one basic principle applies: Keep each different class of chemical in a separate clearly labeled disposal container. The generator space designated on the label must be filled in with the name of the faculty member who generated the waste material. A container of chemical waste cannot be placed on the shelf in the designated chemical waste storage area unless a label with the following information is on the container:
  HAZARDOUS WASTE (in large, bold letters)
  Contents: (name)
  PH:
  State: (solid/liquid/gas)
  Suffolk County Community College- (631)851-6771
  Start and end dates
  Hazard Class (es)

- All chemical waste must be numbered and logged onto the chemical waste inventory sheet located on a clipboard in the designated waste storage area for each department. The waste storage area shall be under the control of one person. The name of the designated specialist shall be posted at the entrance of each waste storage area. No chemical waste can be placed in the storage area without their approval. Each designated specialist will check the container integrity, the label and the entry on the inventory sheet. Listed below is a sample of the waste inventory sheet.

[*Print all information legibly*]
Location: _____
Building: _____

Date	Contents/Chemical Name	State	Quantity	Approved by

- All specialists are responsible for enforcing the waste inventory procedure. The Department Head is ultimately responsible for teaching faculty's compliance with the SCCC Waste Management Program.

- Chemical waste pickups shall be scheduled at least every 180 days. A TSDF (Treatment, Storage or Disposal Company) on College contract shall be used. Once a pickup of chemical waste has occurred, all manifests must be forwarded to the college safety officer. Each Department will maintain a copy of the manifest for their own records.

- Upon the **termination or leave** of an employee, for whatever reason, all chemicals for which that person had responsibility for shall be accounted for and inventoried. These chemicals will be returned to the stockroom, transferred to another individual or designated for disposal. This process shall be activated by the department head immediately upon knowledge of the leave or termination.

- **Never put chemicals into the sink or down the drain.** As a general rule, do not put chemical waste down the drain. Contaminated paper or trash must be treated as a chemical waste.

- Broken glass must be placed in the designated glass waste container located in each laboratory. Disposal of broken glass in the regular trash is prohibited.

- The Specialist shall inspect the chemical waste storage area weekly. A log will be kept on these inspections (as per Federal Law 40CFR 262.34(d)2).

4.4.5 Chemical Procurement, Distribution, Storage & Handling:

- **Procurement:** All purchases of new hazardous chemical substances must have prior consultation with the chemical hygiene officer and the safety officer. **Chemicals will only be acquired through the College.** If required, the safety officer will provide the chemical hygiene officer with safety concerns and required engineering controls related to the particular chemical. When a hazardous substance is received, information on the proper handling, storage and disposal will be disseminated to those individual employees that will be handling the material. A MSDS will be filed in the laboratory's MSDS binder. A copy of the MSDS will be forwarded to the safety officer and maintained in a central file. No container shall be accepted from a vendor without a proper identification label and a MSDS unless one is already on file. Toxic substances shall be segregated in a well-identified area with local exhaust ventilation. Any chemicals that are highly toxic shall be placed in unbreakable secondary containers. Open containers shall be stored on spill trays. Stockrooms shall not be used for the preparation or repackaging of chemical products. Each stockroom shall be under the control of one person. Keys to all chemical storage areas must be returned to the responsible chemical hygiene officer when a faculty member leaves his/her position at the College.

- **Inventory:** Stored chemicals shall be examined annually by the designated individual for replacement, deterioration and container integrity. Chemicals will be dated when received. A copy of the inventory shall be forwarded to the college safety officer by January 31st of each year. Chemicals will be listed alphabetically according to the most commonly used product name.

- **Distribution:** When chemicals are hand carried, the container shall be placed in the appropriate carrier or vehicle (cart). Transporting bottles without a carrier is prohibited.

- **Storage & Handling Precautions:** The amount of chemical storage permitted in the laboratories shall be as small as practical. There shall be no chemical storage on bench tops. Fume hoods shall not be used to store chemicals. Special attention must be paid to ensure that oxidizing and other reactive chemicals are not stored together.

    1. **Flammable substances** stored in the laboratory shall be in minimal quantities and segregated. A material is considered flammable if it can generate sufficient vapors to ignite at temperatures below 100 degrees Fahrenheit.
        Precautions**:** Flammables may not be stored in any refrigerator except those certified as explosion proof. All domestic refrigerators in the lab will be labeled with "Do Not Store Flammables in This Refrigerator". Signs can be requested from the college sign shop. Domestic refrigerators shall only be purchased if they will not be used for flammable storage and there is at least one explosion safe refrigerator within the immediate area. Large amounts of flammables shall be kept in an approved flammable storage cabinet. When transferring flammable liquids from bulk, the containers shall be bonded and grounded. All flammable storage cabinets are to be properly vented to allow proper vapor dissipation.

    2. **Combustible Materials**: Materials that can generate sufficient vapors to ignite at temperatures at or above 100 degrees Fahrenheit. Follow the same handling precautions as flammable products.

    3. **Corrosives:** Materials that cause visible destruction or irreversible alterations of living tissue by chemical action at the site of contact. They can be solid, liquid or gas and act

on the body tissue through direct contact, inhalation or ingestion. Corrosives can be categorized as strong acid, strong base, oxidizing agent, dehydrating agent or water reactive. Corrosive liquids are responsible for most corrosive based injuries. Corrosive gases are the most serious because they can be readily absorbed into the body through inhalation.

Precautions: Eye protection and rubber gloves should always be worn when handling corrosives. Strong oxidizing agents should always be stored in glass or other inert material (preferably unbreakable). Safety rubber bottle carriers or non-breakable bottles shall be used for the transport of strong acids and bases from one location to another. Containers and equipment used for storage shall be corrosion resistant. Acids and bases shall be stored separately. Organic acids shall be stored separate from oxidizers including oxidizing acids.

4. **Compressed gases:** Compressed gas is a term, which represents three different types of gas products: compressed gases, liquefied gases, and cryogenic gases. Compressed gases may be grouped into various hazard classifications based on their physical or health properties. A gas could be corrosive, flammable, toxic or an oxidizer. An additional hazard is due to the fact that gases are stored under pressure. Cryogens create unique hazards including embrittlement of materials and skin or eye burns upon contact with the liquid. Pressure is a hazard because of the large expansion ratio from liquid to gas, causing pressure to build up in containers.

   Precautions: Gas cylinders shall always be transported using a hand truck and with the valve cap in place. All cylinders must be secured in a cart or chained in place against a wall. Exposure of compressed gas cylinders to excessive heat or direct sunlight shall be avoided. Never drop cylinders or permit them to strike each other. Never tamper with safety devices in valves or cylinders. No part of a cylinder shall be subjected to temperatures higher than 125 degrees Fahrenheit. A flame shall never be permitted to come in contact with any part of a compressed gas cylinder. Do not store full and empty gas cylinders together. Bond and ground all cylinders, lines and equipment used with flammable gases. Use compressed gases only in a well ventilated area. Toxic, flammable and corrosive gases should be handled in a hood. When returning empty cylinders, close the valve before shipment, leaving some positive pressure in the cylinder. Replace any valve outlet and protective caps originally shipped with cylinder. Mark or label cylinder "empty" and store in a designated area.

5. **Peroxidizables:** Materials, which react with oxygen to form peroxides, which can explode on impact, heat or friction. Peroxide-forming compounds can be divided into three categories:
   1.) Compounds forming peroxides that can spontaneously decompose during storage. Maximum storage time is three (3) months. Examples are isopropyl ether, potassium metal, vinylidene chloride, sodium amide.
   2.) Compounds forming peroxides that require the addition of a certain amount of energy (distillation, shock) to explosively decompose. Maximum storage time is twelve (12) months. Examples are cyclohexene, diacetylene, ether, dioxane, methyl acetylene, methyl isobutylketone, tetrahydrofuran. 3.) Compounds that have the potential to form peroxide polymers, a highly dangerous form of peroxide, which precipitate from solution easily and are extremely heat and shock-sensitive. Maximum storage time is twelve (12) months. Examples are acrylic acid, acrylonitrile, butadiene, stryene, methyl methacrylate, vinyl acetate, vinyl chloride, vinyl pyridine, and chloroprene.

   Precautions: All peroxidizables shall be dated upon receipt and opening. Do not open any container that has crystal formation around the lid.

6. **Reactive Chemicals: "**Reactive" is a term given to a chemical class that displays a broad range of reactions. This includes explosive, oxidizers, reducers, water reactive,

air reactive, etc. These substances are capable of forming toxic gases, explosive mixtures and reacting with water violently. Reactives can be broadly classified into two groups: those that explode and those that do not.

Class I: Chemicals normally unstable that readily undergo violent change without detonating. Pyrophoric: spontaneous ignition in contact with air, i.e. metal alkyls, divided metal powders such as magnesium, aluminum and zinc. Polymerizable: spontaneous polymerization in contact with air, i.e. divinyl benzene. Oxidizer: violent reaction in contact with organic materials or strong reducing agents, i.e. perchloric, chromic and fumic nitric acid.

Precautions: For pyrophoric, prevent contact with air or water. Use and store in inert environment. Polymerizable**:** Keep cool and avoid contact with water. Oxidizer: Use minimum amounts for procedure; do not keep excessive amounts of material in the vicinity of the process. Store away from organic materials, flammable materials and reducers.

Class II: Chemicals that react violently with water. These chemicals cause a large evolution of heat when in contact with water. They decompose in moist air and violently decompose when exposed to liquids. Examples are sulfuric acid, oleum, acetyl halides and phosphorus halides.

Precautions: Handle materials like corrosives. Use protective acid-resistant rubber or plastic clothing along with gloves, eye protection and face shield. Keep away from moisture. Handle materials in fume hood since fuming in moist air can result in exposure to corrosive and toxic vapors.

Class III: Chemicals that form potentially explosive mixtures. Class III chemicals decompose violently in water with evolution of heat and flammable gases, which may ignite if exposed to an ignition source. This evolution of heat with water may be sufficient to cause auto-ignition and explosion. Examples are alkaline metals, alkaline earth metals, alkaline metal hydrides, and alkaline metal nitrides.

Precautions: Always provide ventilation to disperse flammable gases. Avoid contact with and handle away from water sources.

Class IV: These chemicals when mixed with water generate toxic gases, vapors or fumes in quantity sufficient to present danger to human life and the environment. These chemicals react rapidly with water to produce gases or vapors which are acutely toxic to human health. Examples are alkaline metal phosphides, phosphorus halides, and aluminum phosphide toluene diisocynate.

Precautions: Provide adequate ventilation when handling. Keep containers sealed. Do not handle near water.

Class V: These are cyanide and sulfide bearing chemicals that produce extremely toxic hydrogen cyanide or hydrogen sulfide gases on contact with acids or materials which form acids in the presence of moisture or water. Examples are metal cyanide salts, organic cyanide compounds, metal sulfide salts, organic sulfides and mercaptans.

Precautions: Do not store in cabinets with acids and oxidizers. Isolate from other reactive chemicals. Protect sulfide salts from moisture. Provide adequate ventilation.

Class VI: These chemicals are capable of detonating or exploding if subjected to a strong initiating source or if heated under confinement. Detonation or explosion can occur if heated above ambient temperature or if exposed to an initiating source such as shock, mechanical shock, spark or flame, or a catalyst, which accelerates decomposition. Examples are lead amide, sodium amide, metal azides, ammonium picrate and organic perchlorates.

Precautions: Protect containers from physical damage, heat and incompatible chemicals. Chemicals in this class exhibit a wide variety of properties. Know the properties of the materials being worked with.

Class VII: These chemicals are readily capable of detonation, explosive decomposition, or reaction at standard temperature and pressure without any external initiating

source. Examples are ammonium chlorate, organic azides, metal azides, benzoyl peroxide, and peroxidized ethers.

Precautions: Materials should only be handled by knowledgeable and trained individuals. Evaluate chemicals periodically to determine if deterioration has occurred.

Class VIII: These chemicals are forbidden explosives capable of detonation or explosive decomposition under ambient conditions. They are considered too dangerous for transport.

7. **General Handling Procedures for Carcinogenic, Reproductive and Highly Toxic Chemicals**: ***Use of these chemicals in the laboratories is prohibited. Permission for the use of these chemical products must have approval of the chemical hygiene officer and the safety officer.***

Carcinogen is a substance capable of producing cancer in mammals. A chemical is considered to be a carcinogen if it is: listed by the IARC (International Agency for Research on Cancer); listed as a carcinogen or potential carcinogen by the National Toxicology Program (NTP) in its annual report on carcinogens; regulated as a carcinogen under OSHA.

Reproductive toxin is a substance that can affect the reproductive capabilities including chromosomal damage (mutations) and effects on the fetus (teratogens).

Highly toxic chemical a substance that is considered a poison, i.e. median lethal dose (LD50) administered orally is 50 mg. or less.

Precautions: Establish a designated area for use of these chemicals such as a fume hood. Store these items separately in a locked area and use only the smallest possible quantities.

4.4.6 Spill Cleanup: All chemical spills shall be promptly confined with spill pillows and/or absorbents. All nonessential and unprotected personnel shall leave the affected area during clean-up and decontamination.

- If the spill is flammable, make sure all sources of ignition (electrical or flame) are turned off. Maintain ventilation if possible.
- Laboratory personnel will don appropriate protective equipment. Consult the MSDS for proper clean-up and neutralization materials and procedures. If specific clean-up procedures are not specified in the laboratory standard operating procedures (SOPs), contact the **specialist** and the **chemical hygiene officer** for specific instructions.
- The **college safety officer** must additionally be contacted anytime there is a *significant spill* (see section 4.8) in the laboratory.
- **At least two protected individuals** should be present at any chemical spill cleanup. An employee shall not clean up a chemical spill alone. Spill kits are strategically located in the vicinity of each lab and their locations are clearly marked. If a spill kit is used, a written notification must be sent to the specialist in charge of the laboratory supplies. The specialist is responsible for replenishing all spill kits.
- If the spill is infectious, i.e. blood, follow the spill cleanup procedures listed in the College Bloodborne Pathogen Plan.
- All spill accumulation containers should be marked according to the waste labeling system defined in the SCCC Waste Management Program [see section 4.4.4].

Each laboratory shall develop and maintain specific chemical spill protocols for the most likely spill risks. The department head is responsible for forwarding a copy of the SOPs to the director of physical plant and the safety officer. For example, if mercury is a spill risk in your laboratory, a SOP for spill cleanup of mercury and a spill kit for a mercury spill must be available.

No employee will be required to clean an unknown chemical spill. An unknown spill will be properly confined, and an outside firm will be contacted to perform the cleanup.

4.4.7 Chemical Monitoring: Regular monitoring of airborne concentrations is not usually justified, but shall be instituted in select cases when deemed necessary by responsible faculty and implemented by the safety officer:

1) There is any reason to believe that exposure levels routinely exceed the TLV, PEL or STEL values.
2) There is a redesign of ventilation or hoods.
3) A highly toxic substance is used regularly in the lab
4) Personal exposure has occurred.
5) Formaldehyde is used (initial monitoring is required).
6) Anesthetic gases are used (initial monitoring is required).
7) Monitoring reveals an exposure level above what is allowed.

The safety officer will notify the chemical hygiene officer in writing of the monitoring results. The department head will then notify the affected employees of the results.

4.4.8 Housekeeping, Maintenance and Inspections:

- **Cleaning:** Floors shall be cleaned regularly (1x/week) by custodial staff. Counters and lab benches will be cleaned after each use by laboratory staff. **Custodial personnel are not responsible for cleaning countertops and upper laboratory surfaces.** Stairwells, aisles and hallways shall remain free from obstruction and debris. Custodial personnel are not permitted to clean up any type of spill. If laboratory staff is not available, contact the SCCC Department of Fire and Public Safety at 851-6771.

- **Inspections:** Formal housekeeping and chemical hygiene inspections will be conducted by a specialist who is responsible for each designated laboratory and designated by the chemical hygiene officer. These inspections will be performed during the months of October and April of each year. A written report will be generated and sent to the chemical hygiene officer and the safety officer. Any deficiencies will require an immediate corrective action.

- **Maintenance** inspections for all laboratory equipment will be the responsibility of the designated specialist. Safety showers shall be test activated monthly. Eyewash stations shall be test activated weekly. If equipment is not operating properly, contact Plant Operations. A work order may be required. All inspections shall be documented in a maintenance log book. The following information should be included: location; date of inspection; type of inspection; type of equipment; deficiencies in operation; corrective action taken; name of inspector. Stairways and hallways shall not be used as storage areas. All access to exits, emergency equipment and utility shall be clear. Fire extinguishers shall be inspected annually by the fire equipment service company that is on county contract. Monthly in-house inspections shall be performed by plant operations staff. A copy of any safety related work orders shall be sent to the safety officer.

4.4.9 The Personal Protective Equipment: PPE is necessary when hazards are assessed for specific processes and environments. Chemicals, radiation, mechanical irritants, infrared light, electrical and biohazards are some of the many hazards that may be encountered at Suffolk County Community

College. These hazards are all capable of causing injury, impairment and/or illness through absorption, inhalation and physical contact.

- **Protective equipment** includes personal protective equipment for eyes, face, head and extremities, protective clothing, respiratory devices, and protective shields and barriers. Suffolk County Community College will provide PPE to employees based on the hazard assessment created for each job title (see section 3.0). The employee is responsible for the **use** and **maintenance** of PPE in a sanitary condition.

  1. **Types of Personal Protective Equipment:** *Personal protective equipment (PPE) acts as a barrier to protect employees from hazards in the workplace. Some examples of PPE are gloves, masks, face shields, and safety glasses. Appropriate PPE is expected to be used whenever occupational exposure to chemicals or blood may occur. The type of PPE selected depends on the type of hazards that exist in the workplace.*

     - **Hand Protection**: Suffolk County Community College will select and require employees to use appropriate hand protection when an employee's hands are exposed to hazards, i.e. skin absorption of harmful substances, severe cuts, lacerations, abrasions, punctures, chemical burns and thermal burns. The following is a listing of available hand protection:

       a) *Exam gloves:* Exam gloves protect your hands from contamination from blood and OPIM (other potentially infectious materials). Exam gloves are typically made from latex. Latex provides adequate hand protection against mild chemicals and most biological agents. Exam gloves should be worn when it can be reasonably anticipated that employees may have hand contact with blood.
       Exam gloves are a *single-use* item. Disposable gloves must be replaced when torn, punctured or their ability to protect and function as a barrier is compromised. They cannot be reused. Various glove sizes are available and one should be chosen that comfortably fits each individual. Employees with sensitivity to latex gloves (see Section 10, NIOSH Latex Allergy Alert) can arrange for suitable alternatives, i.e. hypoallergenic gloves, vinyl gloves, glove liners, by contacting their supervisor.

       b) Utility gloves: Utility gloves protect your hands from potential exposure to chemicals. Utility gloves should always be used when handling chemicals. The MSDS will state whether a waterproof or protective glove is needed. If you are not sure which glove to choose, always check your MSDS. Many utility gloves are made of a material called Nitrile. Nitrile is a soft, elastic material with better puncture and abrasion resistance than latex. As a general rule, wear utility gloves when cleaning. Reuse of these gloves following proper decontamination is permissible. Discard gloves when their effectiveness is compromised (punctured, worn, cracked, peeling, torn, etc.).

     - **Face and Eye Protection**: *Suffolk Community College will select and require employees to use appropriate face and eye when an employee's face and/or eyes are exposed to hazards, i.e. flying particles, chemical splash and/or splatter, acids or caustic liquids, chemical gases or vapors, blood. The type of face and eye protection you choose depends on the hazards present in your work area. The following is a listing of available face and eye protection.*

       1. Safety glasses: Safety glasses with side shields are to be worn when you need impact protection. Safety glasses provide protection from dusts, mists, particulate and flying particles. The shape of your eyewear will have an effect on the degree of protection. Glasses with flat side shields will offer more front protection, but will have some openings from the brow to the temple.

Some safety glasses also have a brow guard. The College will offer a standard set of safety glasses with side shields and adjustable side pieces.

2. Goggles: Goggles provide protection from chemical splash, dusts, vapors and fumes. It is important to choose the proper vent when selecting the appropriate goggles. The vent will be dependent upon the application:

   a) Direct vents for impact: Goggles with direct vents provide protection from impact only. They fit snugly around your eye area and stop the entry of flying particles from striking your eye. The venting allows air to flow through to prevent fogging.

   b) Indirect vents for impact and splash: Goggles with indirect vents provide protection from impact and splash. Indirect vents are capped to allow air to pass freely, but will not allow particles or splash in. The indirect vent does not allow as much air to pass through which may cause lenses to fog. Goggles with an anti-fog coating may be required in certain applications.

   c) Non-vented for vapors: Goggles that are non-vented are simply lenses and frames with no holes that allow air to pass through. These goggles offer protection against fumes and vapors. Since no air is allowed to pass through these lenses, you must have lenses with an anti-fog coating to keep them from steaming up.

   ? **Note:** *The need for eye protection is dictated by the hazards associated with the jobs we perform. Even with the appropriate eye protection, the use of contact lenses can pose a hazard to your eyes. Small quantities of vapors, mists, dusts, etc can readily enter between the lens and the eye's surface causing irritation, infection or eye damage. Soft lenses have the potential to absorb toxic or corrosive materials, which can injure your eyes. For these reasons, soft contact lenses should not be worn in working areas of the campuses where exposure to chemicals, vapors or gases is likely.*

3. Face Shields: Face shields are considered to be secondary protection. They are not to be worn alone. Face shields provide a barrier to flying particles, splash or splatter of blood. They are not designed to protect your eyes or act as a barrier to nose and mouth. In certain applications, face shields must be worn in conjunction with eye protection and a mask.

4. Mask: A mask must be worn whenever there is the anticipation of splash or splatter of dust, particulate, blood or OPIM to the nose or mouth. Masks are designed to cover the mouth and nose. Masks are manufactured from various materials. Masks made of glass fiber or synthetic fiber mats are considered more efficient in filtering bacteria than gauze and paper masks. Most masks are marketed as a single-use disposable item and should be discarded after each use. Masks should be comfortable and fit snugly over the bridge of your nose to reduce fogging of glasses.

- **Protective Clothing:** *Suffolk County Community College shall select and require employees to use appropriate protective clothing when an employee's body, skin and/or personal clothing are exposed to hazards such as chemical splash and/or splatter, acids or caustic liquids, chemical gases or vapors, blood. The type of*

protective clothing you choose depends on the type of hazards present in your workplace. The following is a list of available protective clothing.

1. Gown, coveralls or lab coat: A protective gown or lab coat provides protection when splash or splatter of chemicals or infectious body fluids can be reasonably anticipated. Protective clothing must be fluid resistant and provide adequate protection of personal clothing and skin from chemicals and blood. The gown or lab coat should have a closed collar to cover the lower neck area and long sleeves with tightly fitting cuffs at the wrist to protect the arms. Length of the garment is dependent upon the task and degree of exposure anticipated. Protective clothing can be either disposable or reusable (requires laundering).

- **Foot Protection**: *Suffolk County Community College shall require employees to wear protective footwear when working in areas where there is a danger of foot injuries due to falling, piercing, rolling objects and electrical hazards.*

1. Safety Shoes: Safety shoes are usually worn when there is the danger of foot injuries due to falling and/or rolling objects. Foot protection is also warranted in situations where employees are exposed to electrical hazards. Safety shoes are of sturdy construction with an impact resistant toe. The minimum required foot protection is a solid closed-toe shoe.

Defective and Damaged Equipment: *Defective and damaged personal protective equipment shall not be used. Protective equipment will be inspected periodically for defects and wear by the user before use. If PPE is found to be worn or defective it will be replaced at no charge to the employee by the affected department.*

4.4.10 Emergency Equipment: All laboratories shall have the following emergency equipment available: an easily accessible drench-type safety shower, an accessible eyewash station, an ABC fire extinguisher within each laboratory, telephone for emergency use and a fire alarm system in close proximity.

4.4.11 Signs and Labels can be obtained from the SCCC sign shop located on the Ammerman campus or from a commercial vendor. Written request for signs and labels must be forwarded to the plant facilities administrator. These requests will then be forwarded directly to the sign shop. The specialist assigned to each laboratory will be responsible for assuring that all signs and labels are posted prominently and are present in all required areas. Contact the safety officer with any questions concerning the type of signs or labels required in your laboratory. Other postings that are required are:

- Emergency phone numbers: Health Services, Security, College Safety Officer, Department Head, Specialist, Director of Physical Plant.
- Post location signs for all emergency equipment: safety showers, eyewash stations, first aid supplies, spill kits, exits.
- Post signs for restricted areas.
- All secondary containers of chemical products shall be labeled using the Hazardous Material Information System (HMIS, detailed below and in Appendix A).

  Hazardous Chemical Labeling: In most cases, products are properly labeled when they are received in the laboratory or work area. It is the responsibility of the manufacturer to label the products when they are packaged for sale and/or distribution. Products regulated under the Food and Drug Administration are not covered under the Hazard Communication Standard. This includes pharmaceuticals and drugs in solid form. When chemical products are transferred to secondary containers a label is required. The

label should be created by the person preparing the secondary container. This will require a review of safety information on the primary container and if the safety code is not on the original label, the MSDS should be consulted. The specialist for the area can consulted if there is any difficulty in preparing the label The Department Head (or designee) is responsible for labeling compliance in their assigned laboratories. Each color symbolizes a different hazard class.

1) The color **Blue** represents the **health hazard class**. The degree of the health hazard is designated through the use of a number rating system. The range is from 0 - 4. The zero represents a minimal health hazard and the number four represents an extreme health hazard.

2) The color **Red** represents the **flammability hazard class**. The degree of the flammability hazard is designated through the use of a number rating system. The range is from 0 - 4. The zero represents a minimal fire hazard and the number four represents an extreme flammability hazard. The fire hazard rating is dependent on the flashpoint of the chemical.

3) The color **Yellow** represents the **reactivity hazard class**. The degree of the reactivity hazard is designated through the use of a number rating system. The range is from 0 - 4. The zero represents a minimal reactivity hazard and the number four represents an extreme reactivity hazard.

Chemical Labeling Guidelines

1. Each container received in your department should be checked for appropriate labeling. A proper label will list the chemical identity, appropriate hazard warnings, along with the name and address of the manufacturer and target organ system.

2. All product labels should be left in place.

3. It is important that labels on products be read and reviewed by the individuals who will be working with the product. Directions for safe handling should be followed.

4. Containers, which have transferred material, must be labeled with the appropriate label: product name, manufacturer, health hazard information, and target organ. Don't forget this also includes equipment that has chemicals poured into it. For example, an x-ray processing tank or automatic processor requires labels.

5. Containers don't require a label if the product transferred into the container will be used immediately by the employee who is transferring the product. For example, a bucket with floor cleaner, a beaker used in a lab experiment.

4.4.12 Machine Guarding: All mechanical equipment shall be adequately furnished with guards that prevent access to electrical connections or moving parts, i.e. belts and pulleys. All laboratory employees shall inspect equipment prior to using it to ensure that the guards are in place and functioning.

- Safety shielding should be used for any operation having the potential for explosion. Centrifuges that are not fitted with an interlocking lid shall not be used.

- Gas hose connectors are allowed to be used for laboratory equipment, such as Bunsen burners, provided the following items are met:

    1. A shut off valve is installed where the connector is attached.

2. The connector shall not exceed 6 feet.

3. The connector shall not be concealed nor shall it pass from room to room or through walls, ceilings or floors.

4. Only listed gas hose connectors shall be used. According to the National Fuel Gas Code, latex tubing is not allowed to be used as a connector between a gas source and a Bunsen burner.

4.4.13 Emergencies, Spills and Incident: the chemical hygiene officer for each laboratory or group of laboratories shall develop a written emergency plan. These plans are specific to the risks associated with each lab. The plan shall include, but not be limited to:

- Procedures for *ventilation failure*, including the presence of hazardous chemicals and marked temperature changes.
- *Fire emergency* procedures, including specific evacuation routes.
- *Medical Emergency* Procedures beyond those listed in the CHP.
- *Utility Failures* of all types
- Contamination and spill procedures specific to the laboratory

All accidents or near accidents are to be reported to the safety officer. The supervisor is responsible for completing the SCCC incident form and distributing it to the safety officer for review. A copy of the incident report form is in section 4.9.

4.5 Standard Operating Procedures in the Laboratory: ALWAYS develop and encourage safe work practice to avoid exposure to hazardous substances:

- Wear appropriate eye protection at all times in the laboratory. The use of contact lenses in the lab and/or prep areas is discouraged. In some laboratories, the use of contact lenses may be prohibited. The SOPs for each laboratory will state whether contact lenses are permitted to be worn.
- Smoking is prohibited in all College buildings including laboratories, preparation rooms, and storage areas.
- Note the locations of all emergency equipment: fire extinguishers, safety showers, eyewash stations, fire blankets and emergency exits.
- Eating, drinking and the application of cosmetics are prohibited in the laboratory and prep areas.
- Food and beverages cannot be stored in refrigerators used to store chemicals and/or products for laboratory operations.
- No children are allowed in the laboratory or prep areas unless they are involved in a structured program at the college.
- Never touch chemicals. Chemical products can be absorbed through the skin. Protective gloves must be worn when handling chemicals.
- Wash your hands thoroughly with soap and water when leaving the laboratory.

- Avoid inhalation of fumes. Never smell a chemical reaction while it is occurring. Whenever possible, vent toxic discharges through approved ventilation or hood exhaust systems.
- Do not use mouth suction when filling pipettes with chemical reagents. Always use a suction bulb or other engineering device.
- Never work alone in the laboratory.
- Appropriate clothing should be worn in the laboratory. No open-toed shoes are allowed. A laboratory coat or apron should be worn to provide adequate protection at all times in lab and prep areas.
- When exiting from the lab, all contaminated clothing must be discarded or placed in appropriate container prior to exiting the lab. Laboratory coats should not be worn outside the lab and/or prep area.
- Confine or tie back long hair and avoid dangling jewelry.
- Keep your work area neat at all times. Clean up your work space, including wiping the surface and putting away all chemicals and equipment. Make sure that gas and water are turned off.
- Always pour acids into water when mixing.
- Don't force a rubber stopper onto glass tubing or thermometers. See section 4.9 "Protocol for Insertion of Glass Tubing into Rubber Stopper".
- Never place spatulas or pipettes in reagent bottles. Return reagent bottles promptly to their proper place. Do not return excess reagent to supply bottles.
- Do not use damaged equipment or glassware. Discard or clearly label inoperative equipment to prevent its use.
- Dispose of broken glass in designated glass disposal boxes.
- Dispose of chemical waste in designated chemical waste containers.
- Do not leave any laboratory experiment or reaction unattended.
- Test tubes being heated or containing reacting mixtures should never be pointed at anyone.

4.6 Employee information and Training

The following are some general rules that apply to all employees who are involved in laboratory work. Each laboratory will be required to prepare their own SOPs that are specifically designed for the work performed in that laboratory. The SOPs shall address all likely circumstances that could arise in each individual laboratory and prep area.

4.6.1 Supervisory training will be arranged through the safety officer and the Department Head. The safety officer shall be responsible for the acquisition and dissemination of regulatory and technical information pertaining to the chemical hygiene plan. The safety officer will provide the chemical hygiene officers, department heads, teaching faculty and other laboratory personnel with pertinent educational programs. The Department Head is responsible for arrangement of the training session. Each employee who is working with chemical products will receive training as required under the Hazard Communication Standard. Each laboratory will assign a specialist to be responsible for the maintenance and update of the MSDS binder. All MSDSs will be kept on hand in each laboratory for every hazardous chemical used. MSDSs will be kept in the MSDS binders.

- **Initial Orientation Training**: The new hire's supervisor will review safety manual, SOPs, personal protective equipment upon initial assignment. Documentation from initial orientation will be forwarded to the safety officer.

- **Emergency Procedures Training:**
  1. Spill kits
  2. SOPs
  3. Hazardous waste handling
  4. MSDS
  5. Fire extinguisher
- **PPE Training**
  1. Hazard Assessment
  2. Certification of Assessment
  3. Types of PPE and Applications
  4. Fit, Maintenance and Use
- **Bloodborne Pathogen Training (as necessary)**
  1. Exposure Control Plan
  2. Chain of Infection
  3. SOPs
  4. PPE
  5. Labeling
  6. Biohazard Waste Disposal

4.7 Medical Consultation and Medical Exams: SCCC shall maintain for each employee a record of any monitoring of employee exposures and any medical examinations or consultations, including written opinion. The medical surveillance program shall be the responsibility of the chemical hygiene officer. The medical surveillance program will be initiated:

- When an employee develops signs and symptoms associated with a hazardous chemical.
- When exposure monitoring reveals a level above the PEL or STEL for an OSHA regulated substance.
- When a spill occurs with possible personnel exposure. The affected employees shall be provided with an opportunity for medical evaluation.

Medical surveillance shall be arranged through employee resources. All medical examinations and consultations shall be performed without cost or loss of pay to the employee. The physician shall be provided with the identity of the chemical, a description of the circumstances and signs and symptoms of the employee. The physician shall supply SCCC with a written opinion to include: recommendations for further medical follow-up, the results of the examination and testing, any medical condition found which may place the employee at increased risk, a statement that the employee has been fully informed.

Work Related Injury, Illness or Toxic Exposure: Treatment shall be sought as follows if a laboratory employee suffers an "on the job" injury/illness or exposure to a toxic substance: Incidents occurring during normal working hours shall **contact Campus Health Services**:

Western ext. 6709
Eastern ext. 2690
Ammerman ext. 4047
Contact security for any incidences occurring after hours at ext. 4242

All work related injuries, illnesses or exposures to toxic substances must be reported on the SCCC Incident Report Form. A copy of this form will be forwarded to the safety officer.

First aid kits shall be located in each laboratory. These kits will conform to OSHA standards as laid out in 29CFR1910.151.

Exposure Incident:

- **Eye Contact:** Promptly flush with water for at least 15 minutes. Contact Campus Health Services Department. After hours, contact Campus Security.
- **Skin Contact:** Promptly flush with water. If body is exposed to a chemical product, use the safety shower to adequately flush. Remove contaminated clothing. Contact Campus Health Services Department. After hours, contact Campus Security.
- **Ingestion:** Consult the Material Safety Data Sheet (MSDS). Contact Campus Health Services Department. After hours, contact Campus Security.

4.8 Glossary of Terms

1. **ACGIH -** American Conference of Government Industrial Hygienists.
2. **CFR -** Code of Federal Regulations
3. **Chemical name -** The scientific designation of a chemical in accordance with the nomenclature system developed by the International Union of Pure and Applied Chemistry (IUPAC) or the Chemical Abstracts Service (CAS) rules of nomenclature, or a name which will clearly identify the chemical for the purpose of conducting a hazard evaluation.
4. **Common name -** Any designation or identification such as code name, code number, trade name, brand name, or generic name used to identify a chemical other than by its chemical name.
5. **Container -** Any bag, barrel, bottle, box, can, cylinder, drum, reaction vessel, storage tank, or the like that contains a hazardous chemical. For purposes of this section, pipes or piping systems, and engines fuel tanks or other operating systems in a vehicle are not considered to be containers.
6. **EPCRA -** Emergency Planning and Community Right-To-Know Act (Title III or SARA)
7. **Hazardous chemical -** Any chemical, which is a physical hazard or a health hazard.
8. **IARC -** International Agency for Research on Cancer.
9. **Laboratory -** A facility where the "laboratory use of hazardous chemicals" occur. It is a workplace where relatively small quantities of hazardous chemicals are used on a non-production basis.
10. **LD50 -** Lethal dose needed to kill 50% of the test population.
11. **MSDS -** Material Safety Data Sheet.
12. **NIOSH -** National Institute for Occupational Safety and Health
13. **NTP -** National Toxicology Program
14. **PEL -** Permissible Exposure Limit
15. **RCRA -** Resource Conservation and Recovery Act
16. **Responsible party** is defined as any individual employed by the College.
17. **SARA-** Superfund Amendments and Reauthorization Act of 1986
18. **Select carcinogen -** Any substance which meets one of the following criteria:
19. **SIC -** Standard Industrial Code.
20. **Significant hazard** is any hazard, which left untreated, will result in injury or harm to life or property.
21. **Significant spill** is any hazard, which left untreated, will result in injury or harm to life or property.
22. **SOPs -** standard operating procedures

Section 4.9: Laboratories and Contacts

CAMPUS	CHEMICAL HYGIENE OFFICER	EXTENSION	LABORATORIES
AMMERMAN, PHYSICAL SCIENCES	CARL SPONHEIMER	4318	SMITHTOWN SCIENCE BLDG. T12, T14, T15, T26, T116, T119, T213, T222, T211, T209, T201, T209A
AMMERMAN, LIFE SCIENCES	ROSA GAMBIER	4316	SMITHTOWN SCIENCE BLDG. T23, 24, 25, 27 KREILING HALL (MARSHALL BLDG.) M100, M109, M200, M203, M206, M212A, M112, M202, M10 AND ADJACENT PREP ROOMS
WEST	JANET HAFF	6551	SAGTIKOS BLDG. 240, 243, 244, 246, 247, 247 PAUMANOK BLDG. 100, 102
WEST		6301/6289	PAUMANOK BLDG. VETERINARY SCIENCE
EAST	TED KOUKOUNAS	2670	SHINNECOCK BLDG. S111, S112, S116, S208, S209, S212 AND ADJACENT PREP ROOMS

Appendix A:

Health and Safety Rating: The health and safety rating scale provided in this appendix can be used to assess the level of hazard associated with a specific laboratory project. The rating should be determined by teaching faculty prior to submission to chemical hygiene officer. Any project with a health and safety rating of "4" requires a discussion with the responsible chemical hygiene officer and the safety officer with regards to controls and feasibility of preparation and performance of the laboratory project.

Explanation of the HMIS Ratings
HEALTH HAZARD RATINGS
*** Chronic Hazard** Chronic (long-term) health effects may result from repeated overexposure
0 Minimal Hazard No significant risk to health
1 Slight Hazard Irritation or minor reversible injury possible
2 Moderate Hazard Temporary or minor injury may occur
3 Serious Hazard Major injury likely unless prompt action is taken and medical treatment is given
4 Severe Hazard Life-threatening, major or permanent damage may result from single or repeated overexposures

FLAMMABILITY RATINGS
0 Minimal Hazard Materials that will not burn
1 Slight Hazard Materials that must be preheated before ignition will occur. Includes liquids,solids and semi solids having a flash point above 200 F. (Class IIIB)
2 Moderate Hazard Materials which must be moderately heated or exposed to high ambient temperatures before ignition will occur. Includes liquids having a flash point at or above 100 F but below 200 F. (Classes II & IIIA)
3 Serious Hazard Materials capable of ignition under almost all normal temperature conditions. Includes flammable liquids with flash points below 73 F and boiling points above 100 F. as well as liquids with flash points between 73 F and 100 F. (Classes IB & IC)
4 Severe Hazard Flammable gases, or very volatile flammable liquids with flash points below 73F, and boiling points below 100 F. Materials may ignite spontaneously with air.(Class IA)

PHYSICAL HAZARD RATINGS
0 Minimal Hazard Materials that are normally stable, even under fire conditions, and will NOT react with water, polymerize, decompose, condense, or self-react. Non-Explosives.
1 Slight Hazard Materials that are normally stable but can become unstable (self-react) at high temperatures and pressures. Materials may react non-violently with water or undergo hazardous polymerization in the absence of inhibitors.
2 Moderate Hazard Materials that are unstable and may undergo violent chemical changes at normal temperature and pressure with low risk for explosion. Materials may react violently with water or form peroxides upon exposure to air.
3 Serious Hazard Materials that may form explosive mixtures with water and are capable of detonation or explosive reaction in the presence of a strong initiating source. Materials may polymerize, decompose, self-react, or undergo other chemical change at normal temperature and pressure with moderate risk of explosion
4 Severe Hazard Materials that are readily capable of explosive water reaction, detonation or explosive decomposition, polymerization, or self-reaction at normal temperature and pressure.

REACTIVITY RATINGS
0 Minimal Hazard Materials which are normally stable even under fire conditions, and which will not react with water.
1 Slight Hazard Materials which are normally stable, but can become unstable at high temperatures and pressures.
2 Moderate Hazard Materials that undergo violent chemical change at elevated temperatures and pressures. These materials may also react violently with water.

3 Serious Hazard Materials that are capable of detonation or explosive reaction, but require a strong initiating source, or must be heated under confinement before initiation. Materials which react explosively with water.
4 Severe Hazard Materials that are readily capable of detonation or explosive decomposition at normal temperatures and pressures.

Appendix B:

Safety Protocols

A. PROTOCOL FOR THE INSERTION OF GLASS TUBES OR RODS INTO STOPPERS OR FLEXIBLE TUBING

The following practice will help prevent accidents:

1. Make sure the diameter of the tube or rod is compatible with the diameter of the hose and/or stopper.
2. If not already fire polished, fire polish the end of the glass to be inserted; allow ample time for it to cool before handling it. Unpolished cut glass has a razor-like edge, which not only can lacerate the skin, but will also cut into a stopper or rubber hose making it difficult to insert the glass tube properly. **All glass tubing and rods, including stirring rods, should be fire polished before use.**
3. Lubricate the glass. Water is probably sufficient, but glycerol is a better lubricant.
4. Wear heavy gloves or wrap layers of cloth around the glass and protect the other hand by holding the hose or stopper with a layered cloth pad.
5. Hold the glass not more than 5 cm. (2 inches) from the end to be inserted.
6. Insert the glass with a slight twisting motion, avoiding too much pressure and torque.
7. When helpful use a cork borer as a sleeve for insertion of glass tubes.
8. If appropriate, substitute a piece of metal tubing for glass tubing.
9. Remove stuck tubes by slitting the hose or stopper with a sharp knife.