HUNTER COLLEGE

CHEMICAL HYGIENE PLAN

FOR

LABORATORIES AND STUDIOS

Revised: June, 2020
Environmental Health and Safety

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I. INTRODUCTION

The following Chemical Hygiene Plan describes Hunter College's efforts to maintain a safe and healthy work environment for all laboratory employees. The development of this plan is one of a number of ways we are complying with the Occupational Safety and health Administration's (OSHA) "Occupational Exposure to Hazardous Chemicals in Laboratories" standard (Code of Federal Regulations 29, Part 1910.1450), a copy of which may be found in the Appendices of this plan. Throughout this plan, this regulation will hereafter be referred to as the "Laboratory Standard."

This plan covers all areas of Hunter College in which laboratory work involving the use of hazardous materials is performed. While the plan addresses primarily chemical hazards, other materials and processes, such as radiological and biological hazards, are referred to and must be controlled according to specific standards and regulations referenced in the Appendices.

All laboratory personnel, including principal investigators and other laboratory supervisors, science department chairpersons, technicians and appropriate support staff should read this plan in full. It is available for review in the following locations:

Locations Where the Chemical Hygiene Plan Is Available

Location	Department	Contact	Room #	Phone #
East Building	EHS	Melisa Puglisi	HE1211A	(212) 772-4462
North Building	Chemistry	Nicole Popa	HN1400B	(212) 772-5348
	Biology	Brian Herbert	HN918	(212) 772-4155
Brookdale Campus	Medical Lab Sciences	Steven Einheber	East 108	(212) 481-5057
Campus Schools	Sciences	Phil Jeffery	344	(212) 860-1279

II. CHEMICAL HYGIENE RESPONSIBILITIES

The President of Hunter College has the ultimate responsibility for chemical hygiene within the institution and provides, along with other officers and administrators, continuing support for efforts to improve chemical laboratory safety and health.

The Vice President of Finance and Administration supervises the Office of Environmental Health and Safety and authorizes that office to take the necessary steps to carry out the objectives of the Chemical Hygiene Plan.

The Director of the office and Environmental Health and Safety (EHS) reports to the Vice President of Finance and Administration. This individual has the authority to recommend that a laboratory be closed down or have the operations suspended if the lab does not conform to the health and safety practices required by this chemical hygiene plan. The acting Chemical Hygiene Officer will exercise his/her authority to minimize the short and long-term danger to laboratory employees, other workers, the community and to the environment.

A. THE CHEMICAL HYGIENE OFFICER

The Chemical Hygiene Officer or CHO oversees issues related to the Management of chemical substances. Currently, Hunter College does not have a person designated as a fulltime CHO. The Director of Environmental Health and Safety assigns the functions of the CHO to members of the EHS office.

The major duties of the Chemical Hygiene Officer are as follows:

- serve as chairperson to the Chemical Hygiene Committee and with that committee evaluate, implement and update the Chemical Hygiene Plan
- provide technical expertise and administrative support to the laboratory community in the area of laboratory safety and health
- ensure that hazardous substances are appropriately labeled, handled and stored, and that specific standard operating procedures are developed that instruct all personnel in the safest use of these substances
- review new research protocols prior to their initiation to determine if hazardous chemicals are used and, if so, to ensure proper measures are taken to protect laboratory personnel
- conduct biannual inspections of laboratories and storage areas either alone or with other members of the Chemical Hygiene Committee and provide inspection forms to departmental personnel and principal investigators to conduct their own routine inspections
- write inspection report and recommend follow-up activities (with input from other members of the inspection team)
- coordinate the operation, acquisition and maintenance of fume hoods, emergency showers, eyewashes and fire extinguishers in all laboratories where chemicals are

handled
- facilitate the correction of violations from Fire Department or work with those departments that can to allow for the receipt of lab permits
- conduct (or coordinate) department-specific laboratory health and safety training sessions, and assist laboratory supervisors in developing and conducting hands-on sessions with employees
- investigate all reports of laboratory hazards, incidents, spill, fires and near misses to prevent repeat occurrences
- develop and maintain a College-wide chemical inventory system complete with access to an SDS library
- maintain records of training, exposure, incidents, PPE, etc., and make them available to employees and administrative personnel
- coordinate all levels of waste collection, consolidation and removal (chemical, biohazard, radiological)
- remain aware of College wide health and safety issues

B. THE CHEMICAL HYGIENE COMMITTEE

The functions of the Chemical Hygiene Committee are overseen by the Laboratory and Radiation Safety Committee (the committee). Members of the committee members are appointed by the Provost. The members of the committee are as follows:

- Maria Figueiredo-Pereira, PhD. Prof. of Biology and co-Chairperson for lab safety
- Lynn Francesconi, PhD. Prof. of Chemistry and co-Chairperson for radiation safety
- Patricia Glenn, DVM and director of the Animal Facility
- Robert Rafaniello, PhD. Medical Lab Sciences
- Robert Buckley, MS. Research Administration (non-voting)
- Melisa Puglisi, Environmental Health and Safety
- Garrett Hauschild, MS, Environmental Health and Safety
- Ali Younes, PhD, Radiation Safety Officer
- Two representatives of the community

The committee should function as advisor to the Chemical Hygiene Officer and academic departments. In addition, it should oversee and monitor the effectiveness of the Chemical Hygiene Plan, and revise and update it annually. In absence of the committee and the Chemical Hygiene Officer, the Director of EHS will do this last task on an annual basis.

Other responsibilities of committee members include:

- Attend meetings as needed
- Participate in inspections of laboratories and follow-up visits to laboratories not meeting compliance
- Assist with all duties of the Chemical Hygiene Officer in relation to their respective

departments

C. DEPARTMENT CHAIRPERSONS

The department chairperson is ultimately responsible for chemical hygiene in his/her department and must know and understand the goals of the Chemical Hygiene Program.

The duties of the chairperson are to ensure that:

- Completion of an annual computerized inventory of all chemicals in storage rooms and laboratories in their departments
- Maintenance of Safety Data Sheets (SDS) for chemicals used in their departments
- Ensuring that all laboratory personnel are trained who come into contact with hazardous chemicals
- Development of checklists for needed safety items and to ensure proper acquisition of that equipment
- Ensuring that newly constructed laboratories meet safety standards and are fully equipped with safety devices

D. LABORATORY PRINCIPAL INVESTIGATORS

Principle investigators, faculty and other laboratory supervisors have ultimate responsibility for chemical hygiene in the research or teaching laboratories in which they work.

It is their duty to:

- know the guidelines and procedures in the Chemical Hygiene Plan
- write specific operating procedures for handling and disposing
- of extremely hazardous substances used in their laboratories and submit these procedures for review
- train laboratory personnel in these operating procedures and ensure the use of proper control measures
- conduct routine inspections of laboratories with their employees
- ensure that all appropriate controls including fume hoods and safety equipment are available and in good working order
- ensure all incidents in labs are reported to CHO and a written incident report is filed
- provide chemical inventories to departmental representatives
- supervise the maintenance of SDS's
- ensure personnel have appropriate training
- Ensure that before leaving the institution, prepare an inventory of excess and waste chemicals and locations of each area where they are stored

E. LABORATORY EMPLOYEES

Laboratory employees are responsible for:

- following procedures and guidelines outlined in the Chemical Hygiene Plan
- reporting any unsafe working conditions, faulty fume hoods or emergency safety equipment to the laboratory supervisor
- filing incident reports with administration or departmental designees in the event of an occurrence
- conduct hazard evaluations for procedures conducted in the laboratory and maintain a file of these evaluations

III. CHEMICAL INVENTORY AND RECEIVING

This section of the Chemical Hygiene Plan describes standard operating procedures for procuring, receiving and inventorying chemicals. It is important that chemicals or inventories are received by a central location in which this information can be logged into a system. This system may help to:

- allow for better monitoring of chemicals stored and used in the different locations within the facility
- reduce waste involved with duplicate purchase and the discarding of unknowns
- reduce disposal costs
- facilitate compliance with regulations

A. CHEMICAL INVENTORYING

Each laboratory and in turn, each department, should have a centralized inventory system for all chemicals purchased and stored. A designated individual will be charged with the duty of this for each lab and for each department. The information will then be entered by the department onto the College- wide system with the following information:

- the name of chemical and CAS (chemical abstract service number)
- location by room number and location in a room
- the amount and units
- expiration dates (if any)

Chemical inventories will be linked to a centralized database which will supply the following information by entry:

- name of Principle Investigator
- hazard information
- reporting requirements
- SDS availability

Hunter College has joined ChemTracker to inventory all chemicals and their locations in the college. Any space that stores or uses chemicals is required to keep an up-to-date ChemTracker inventory. If you do not already have login information, please contact EHS to receive a username and password. Chemicals that are emptied or given for disposal should be deleted from the list all together.

B. CHEMICAL RECEIVING

All incoming shipments must be inspected by the labs receiving them to insure that:

- proper labels must be attached
- containers must be intact and in good condition

Any containers that are leaking, broken or damaged must be treated as spilled material (see spill response)

Expiration dates must be assigned to each chemical container of the following:

- picrics
- peroxides
- polymerizes that react violently
- perchlorates
- peroxidizable materials
- other materials know to deteriorate or become unstable or reactive over time

The expiration date should be no longer than one year after the date of acquisition. These chemical containers must also be labeled with the dates they are first opened (if expiration date is not available).

All areas where shipments of chemicals are opened should have personal protective equipment available as well as spill control material. All individuals should have some form of laboratory employee training as discussed in this plan.

IV. HAZARD COMMUNICATION: SIGNS, LABELS AND SAFETY DATA SHEETS

A. Signs

All laboratories or storage areas that work or contain hazardous materials are required (NYFD I-66) to have the following posted:

LABORATORY, POTENTIALLY HAZARDOUS SUBSTANCES
NO SMOKING

These signs are generally in red lettering on a while background and are posted at midpoint of each laboratory door.

Other signs which may be needed for additional hazards:

- Flammable Gas
- Water Reactive Materials
- Warning Biohazardous Materials
- Radioactive Materials
- Chemical Waste Storage
- Chemical Storage
- Biomedical Waste Storage
- Radioactive Waste Storage
- Lasers

B. Emergency Equipment and Exit Identification

Signs posted at safety showers, eyewash stations, fire extinguishers, sinks (do not pour chemicals down) and exits should be legible and conspicuous.

C. Emergency Telephone Numbers

Telephone numbers of emergency personnel, the Facilities Department, Environmental Safety must be posted on or around the door of each lab, studio, stockroom or storeroom (inside door sleeve).

D. Laboratory Information

On or by the door of each laboratory a sleeve is installed which indicates laboratory information and contains the following:

- Laboratory Safety/ Spill Plan/Chemical Hygiene Plan Manual
- Radiation Safety Manual
- Chemical Inventory
- SDS's of most used chemicals

E. Labels

All chemical manufacturers are required under the Federal OSHA Hazard Communication Standard to provide users and distributors of their products with properly labeled containers. Labels must include the following information:

- common name of chemical
- name, address and emergency telephone number of the company responsible for the product
- a hazard warning indicating the most serious health or safety hazard the chemical poses
- (e.g., corrosive, carcinogen, etc.)

The OSHA laboratory standard requires that labels on all incoming containers be maintained and not defaced.

Never deface or remove a label from a container unless it is empty and ready to be discarded. Portable containers used by more than one person must be labeled with the information described above. This information can be found on the original label or on the safety data sheet for the product.

Adequacy of container labeling will also be assessed during routine inventorying of chemicals and inspection of laboratories and storage areas by department designees. Unlabeled containers, if unidentifiable, will be disposed of according to the NYS Department of Environmental Conservation regulations and the College's hazardous waste disposal policy.

Principle investigators in research labs will be responsible for ensuring that newly synthesized chemicals are used exclusively in their areas only and the label must indicate that the potential hazards of that substance have not been tested and are unknown.

F. Safety Data Sheets

The OSHA Laboratory Standard hand the New York State Right to Know Law requires that Safety Data Sheets (SDS's) be collected and maintained for virtually all chemicals used and stored in the laboratory. As with labels, the Hazard Communication Standard mandates that chemical manufacturers provide SDS's for each chemical. SDS's provide basic information about the safety and health hazards posed by a chemical and precautions to take when using it.

The following standard OSHA SDS form indicates the specific information that must be provided by manufacturers (see end of section)

Safety Data Sheets must be collected and distributed in each science department to assure that all employees may have access to them.

The following is a description of the system used to collect and make available SDS's: Laboratories can access SDS's for their chemicals via ChemTracker, the college's chemical inventory database. ChemTracker has a SDS link that provides access to SDS's for most chemical substances. In the absence of a SDS, like in the case of some chemical formulations, hard copies are collected by EHS and sent to the appropriate labs. The SDS's of those chemicals used in large quantities will be placed in the Laboratory Information sleeve located on or by the door of each lab.

ChemTracker's SDS's database can accessed as follows:

- Environmental Health and Safety website at www.hunter.cuny.edu/ehs
- ChemTracker website

V. CHEMICAL STORAGE

Chemical storage areas in the college include central stockrooms, storerooms, laboratory work areas (shelves and bench cabinets), storage cabinets and refrigerators/freezers. There are established legal requirements as well as recommended practices for storing chemicals. These requirements and guidelines are summarized below. They fall into the following areas:

- general requirements
- segregation of incompatible chemicals
- specifications for chemical storerooms
- chemical storage in labs
- additional storage requirements and recommendations for some specific hazard chemical classes

A. General Requirements

- Every chemical should have an identifiable storage place and should be returned to that location after each use
- A storage scheme must be developed in each chemical storage area to ensure the segregation of incompatibles and efforts must be made to isolate particularly flammable, reactive, and toxic materials. An exclusively alphabetical storage scheme is prohibited.
- Chemical storage on bench tops will be minimized in order to reduce the amounts of chemicals unprotected from a potential fire and easily knocked over.
- Compatible chemicals should be grouped by container size to make it easier to retrieve chemicals and reduce the possibility of bottle breakage. Large containers should be stored on lower levels.
- Chemicals must not be stored on the floor
- Chemical Storage in hoods should be minimized. Storing containers inside the hood interferes with airflow, reduces and clutters up the work space and may involve the stored materials in a spill, fire or explosion.
- When possible, chemicals will be stored in cabinets which vent directly into the fume hoods.
- Labels must be maintained on all stored materials.
- Stored chemicals must not be exposed to direct sunlight or heat.
- Storage trays should be used to minimize the spread of a spill in the case of strong oxidizers or when corrosives are being stored on metal shelves.
- Laboratory refrigerators must never be used to store food.
- All chemical containers left out of storage areas must be checked at the end of each

workday. Unneeded items must be returned to storerooms, cabinets or stockrooms.

- Dates of the first opening must be assigned to all chemicals in the following groups by the first laboratory employee using it. The date of the chemical should be noted with each use and any chemical should not be held past its recommended expiration date or in the specific amount of time from the date of its opening:

- Picrics
- Perchlorates
- Peroxidizable materials (aldehydes, ethers and compounds containing benzylic hydrogen atoms)
- Chemicals that react violently in polymerization or become hazardous after polymerization
- Materials that are known to deteriorate or become unstable or reactive over time

- All laboratory personnel on termination, transfer, or graduation must arrange for the removal or safe storage of all hazardous materials by the Office of EHS
- Appropriate spill control, clean-up and emergency equipment must be available wherever chemicals are stored.

B. Segregation Of Incompatible Chemicals

Chemicals must not be arranged alphabetically or haphazardly either in stockrooms or in the laboratory work areas. Chemicals must be segregated to prevent mixing of incompatible chemical vapors or liquids in the event that containers break and/or leak.

Numerous approaches can be taken to segregate chemicals in storage. Different approaches may be required depending upon the type and amount of space available for storage and the environmental conditions of the spaces. Major considerations for criteria to segregate should include water compatibility and flammability. Some examples of storage schemes and chemical compatibility are given at the end of this section.

At least one chemical storage/waste room under the supervision of a qualified person is essential for each department that stores large quantities of chemicals. The storage room(s) should be secured and should include the following:

- fire extinguishers of the approved type, including sand and bicarbonate
- positioned near the escape route
- spill control and clean-up material

- safety shower
- approved eye/face wash
- smoke detector or alarm
- forced ventilation with 6 air changes per hour
- cabinets or shelving that is secured to the wall
- safety cabinets for specific groups of compatible substances
- communication system to emergency center
- a sill at the doorway to prevent spills from spreading

C. Storage suggestions

- Avoid the floor for storing chemicals, particularly bottles
- Do not use top shelves for chemical storage
- Do not store chemicals above eye level
- Shelves should be secured firmly to walls
- Provide anti-roll lip on all shelves
- Store acids and corrosives in dedicated cabinets and separate acids and bases. Nitric acid can be stored (on a tray) with other acids
- Store flammables in dedicated flammables cabinet
- Store those requiring special storage requirements separately. Special attention must be paid to the following:

    - Nitrates, nitrites and azides
    - Perchlorates
    - Perchloric and nitric acid
    - Peroxide formers
    - Phosphorus
    - Water reactives (sodium, lithium, potassium)
    - Strong oxidizers

D. Specifications for Chemical Storage

Storerooms are areas in which large quantities of chemicals are stored for laboratory use. They need to be:

- access limited to designated personnel
- locked and secured when designated personnel are not present
- mechanical exhaust present that provides 6 air changes per hour
- additional local exhaust if dispensing occurs in area
- safety shower, eyewash station and appropriate adequate fire extinguishing equipment
- master control shut-off for water electricity and gas
- shelving must be well-braced, secure, with anti-roll lips, where weight limits are not exceeded
- metal shelves that is corrosion resistant or have liners or trays if storing corrosives
- aisles between shelving that are at least 3 feet wide
- exits (two if possible) that are clearly marked and unobstructed
- well illuminated so labels can be read easily
- aisles should be kept clear of clutter
- no extremes changes in heat and humidity. Localized heat, open flames and smoking are not permitted
- floors must be kept clean and dry

- equipped with respirator(s) with the proper cartridges where toxic chemicals are stored and could potentially be released

E. Flammable Materials Storerooms

- the walls, ceiling, floors and doors of a flammable materials storeroom should be constructed of materials with at least a two hour fire rating
- All doors between the room and the building should be self-closing Class fire doors
- Adequate mechanical ventilation must be provided and controlled from outside the storeroom in areas where Class I flammable liquids are stored and dispensed, electrical power, lights, switches and sockets must be explosion proof
- fan motors and ventilation equipment must be non-sparking
- all smoking and lighting of matches are prohibited

The following rooms are currently approved chemical storage rooms:

- Rooms 1507, 1508, 1509 North (Chemistry Department)
- Room 857 North (hazardous waste)
- Room E023 East Brookdale Campus (health Sciences)

F. CHEMICAL STORAGE OUTSIDE OF THE CHEMICAL STOREROOM

The nature of laboratory work calls for a certain amount of chemicals to be on hand for easy access. However, all laboratory employees must limit, as much as possible, the amount of chemicals stored on bench tops, in hoods, and other exposed areas, especially when these chemicals are flammable, combustible, reactive, toxic or corrosive.

The NYC Fire Department sets legal limits on the amount of flammables, combustibles, reactives and unstable chemicals that are stored in laboratories and storerooms based on the presence of a sprinkler system and the number of heads on the system.

FDNY Classification of Chemical Laboratories and Allowable Storage Limits

Lab Type	Fire Rating	Fire Protection	Flammable Liquids	Flammable Solid	Oxidizing Materials	Unstable
I	2 hours	Sprinklers	30 gal	15 lbs	50 lbs	12 lbs
II	1 hours	Sprinklers	25 gal	10 lbs	40 lbs	6 lbs
III	2 hours	No Sprinklers	20 gal	6 lbs	30 lbs	3 lbs
IV	1 hours	No Sprinklers	15 gal	3 lbs	20 lbs	2 lbs

Laboratory supervisors must inventory chemicals in laboratories on a regular basis to ensure that the above described limits are not exceeded. Those areas with quantities over the legal amount will be flagged and identified on the inventory system and excess material must be removed and placed in designated storerooms.

Flammable liquid storage cabinets isolate flammables apart from other chemicals. They should be OSHA and NFPA approved which require that burning cabinet's contents are protected from temperatures exceeding 325°F for at least 10 minutes, enough time for personnel to evacuate the area. Commercial flammable storage cabinets are available to store 30, 45 and 60 gallons of flammable materials. Cabinets are available with work bench surfaces and as fume hood bases where the cabinet is vented through the fume hood itself.

Please reference product technical specifications for flammable/combustible storage limits. Other recommendations that should be considered:

- the bottom, top and sides must be at least of 18 gauge metal iron and double walled with a one and a half inch air space
- joints must be riveted, welded or made tight by equally effective alternative means
- the cabinet door should have a 3 point lock
- the door sill should be raised at least 2 inches above the bottom of the cabinet
- cabinets must be conspicuously labeled "Flammable-Keep Fire Away!"

G. Storage Requirements for Specifics Hazard Classes of Chemicals

I. Flammables and Combustibles

OSHA and NFPA limit the size of the container for classes of flammable and combustible materials. The more resistant a container, the larger it may be.

OSHA (1910.106) Maximum Allowable Size of Containers NFPA Flammable and Combustible Storage Allowances					
Container Type	**Flammable Liquid Class***			**Combustible Liquid Class***	
	1A	1B	1C	II	III
Glass	1 pt (a)	1 qt (a)	1 gal	1 gal	1 gal
Metal (other than DOT drums)	1 gal	5 gal (b)	5 gal (b)	5 gal (b)	5 gal (b)
Safety Cans	2 gal	5 gal (b)	5 gal (b)	5 gal (b)	5 gal (b)

OSHA (1910.106) Maximum Allowable Size of Containers NFPA Flammable and Combustible Storage Allowances					
Metal drums (DOT Spec.)	5 gal	5 gal (b)	5 gal (b)	60 gal (b)	60 gal (b)

(a) Sizes as large as 1 gallon may be used if the purity of the liquids is adversely affected by storage in metal or if liquid causes excessive corrosion of the container
(b) In instructional laboratories, no containers for Class I and II liquids can exceed 1 gallon unless they are stored in safety cans which may be of 2 gallon capacity

NFPA Classification of Flammable and Combustible Liquids		
Classification	**Flash Point**	**Boiling Point**
Class IA Flammables	< 73F	< 100F
Class IB Flammables	< 73F	At or > 100F
Class IC Flammables	At or > 73F	And < 100F
Class II Combustibles	At or above 100F	And < 140F
Class III Combustibles	At or > 140F	

Safety cans for flammables should be used, if possible, for storing flammable liquids. Flammable liquids, in quantities greater that 1 liter (2.2 quarts) should be stored in metal containers fitted with flame arresters. Safety cans are available in a variety of sizes and materials and are designed to prevent explosions in the event of a fire through spring-loaded spout cover which opens to relieve internal pressure when subjected to a fire. These cans will not leak if tipped over.

II. Compressed Gases

Compressed gases should have:

- Names of the gas marked on the cylinder
- storage of more than one cylinder of flammable gas in a lab is not permitted unless they are in use
- Flammable gas cylinders should be stored in a separate area from other types of compressed gasses
- Cylinders of incompatible gases must be segregated by distance. Group cylinders by the type of gas (e.g., toxic, corrosive, etc)
- Empty cylinders should be separated from full cylinders and labeled "empty or MT"
- All compressed gases must be stored away from direct or localized heat (including radiators, steam pipes or boilers) in well-ventilated and dry areas, and way from areas where heavy items may strike them (e.g., near elevators or service corridors)
- All compressed gases, including empty cylinders, must be secured in an upright position with chains, straps or special stands, and must be capped when stored or moved
- A hand truck must be available for transporting gas cylinders to and from storage areas

III. Oxidizers

Oxidizers are any solid or liquid that readily yields oxygen or other oxidizing gas or that readily reacts to oxidize combustible materials. Strong oxidizers can present fire and explosion hazards on contact with organic compounds or other oxidizable materials. Some examples are:

- Hydrogen peroxide (>8%)
- Magnesium perchlorate
- Nitric acid
- Silver nitrate
- Calcium hypochlorite
- Chromic acid
- Sodium peroxide
- Ammonium dichromate
- Sodium chlorate

Oxidizers must be stored away from incompatible materials such as:

- flammable and combustible materials
- greases
- paper trash bins
- finely divided metals
- organic liquids
- other oxidizers

Nitric acid and perchloric acid should be stored in separate cabinets or break-resistant containers or tubs and placed on acid resistant trays and not stored directly on metal or wood shelves.

Some oxidizers can undergo explosive reactions when catalyzed or exposed to heat, shock or friction and must be physically separated from other chemicals. These are:

- ammonium perchlorate
- ammonium permanganate
- hydrogen peroxide (> 91% by weight)
- perchloric acid (> 72.5% by weight)
- potassium superoxide

Strong oxidizing agents should be stored and used in glass or other inert containers. Corks or rubber stoppers should not be used.

IV. Peroxides And Chemicals Which Tend To Form Peroxides

Storage of peroxides must be in air tight containers in a cool and dry place. To minimize the rate of decomposition, peroxide-forming materials should be stored at the lowest possible temperatures consistent with their solubility and freezing point. Liquid or solutions of peroxide should not be stored at or lower than the temperature at which the peroxide freezes or precipitates, because peroxides in these forms are extremely sensitive to shock and heat.

V. Toxics

Toxic chemicals can cause either severe short-term health effects and/or severe long-term chronic health effects. These include corrosives, dehydrating agents, carcinogens, potential carcinogens, allergic sensitizers and are productive hazards. They also include chemicals known to affect the nervous system, the liver, the kidneys, or the respiratory system.

These chemicals must be stored in unbreakable chemically resistant containers. Adequate ventilation must be provided in storage areas especially for toxics that have a high vapor pressure. All dispensing for these materials must be conducted in a fume hood.

VI. WASTE MANAGEMENT

Many laboratories generate chemical, radiological, biological and other types of waste that pose human and environmental hazards. These wastes are considered hazardous and are regulated by federal, state and local laws. There are separate laws and regulations for radioactive and biomedical wastes. The first part of this section will deal chemical wastes. Other wastes will be address later on in this section.

A. HAZARDOUS WASTE LAWS AND REGULATIONS

The most important laws and regulations that apply to laboratories located in New York State are:

- The Federal Resource Conservation and Recovery Act
- The New York State Environmental Conservation Law

Laboratories located in New York City must also comply with the New York City Rules and Regulations Relating to the Use of Public Sewers.

Federal Resource Conservation and Recovery Act (RCRA)

RCRA was passed in 1976 by the U.S. Congress and gives the EPA (Environmental Protection Agency the authority to establish a "cradle-to-grave" system for the proper management of hazardous waste. A "cradle-to-grave" system is one which tracks a material from the time it is generated until its disposal.

On May 19, 1980, the EPA issued regulations implementing RCRA. These regulations are found in Title 40 of the Code of Federal Regulations (40CFR) Parts 260-272. They establish the minimum standard for hazardous waste management in the United States. RCRA permits states to enact their own more protective legislation.

New York State Environmental Conservation Law

NYS Environmental Conservation Law was passed in 1978 and is enforced by the NYS Department of Environmental Conservation (DEC). Contacts in this department are included in Appendix B.

The New York State Program includes regulations covering the three stages of the waste stream: the generation, the transportation, and the treatment, storage, disposal (TSD). Most colleges and universities are subject to the requirements for generators of hazardous waste, which are found in the Part 370 Series of Title 6, New York Code if Rules and Regulations. Copies of this are available for the local DEC office indicated in the Appendices.

All laboratory personnel of this institution must adhere to policies developed by this institution in response to federal, state and local hazardous waste disposal laws.

NYC Sewer Regulation (NYC Department of Environmental Protection Sewer Regulations)

The following are banned from the NYC Sewer System:

- All flammables
- Explosives
- Water and Air Reactives
- Acids with pH below 5.0
- Bases with pH above 9.5
- Toxic substances that are harmful to humans animals and aquatic life
- Noxious and malodorous substances
- Radioactive material not in compliance with NYC health code Article 175

B. CHEMICAL WASTE

1. Storage and Collection in the Laboratory- Satellite Storage

Chemical waste in the laboratory should be kept in a specifically designated area which will be considered "satellite storage" for this purpose. All personnel in the lab will be informed of this. The waste can be stored in a cabinet or a fume hood if the material is volatile.

All waste should contain the following:

- Hazardous waste label identifying it as such, the date at the beginning of collection, and contents with each filling.
- Bottles should be capped at all times when not in use.
- Chemicals other than collected wastes should also be designated as waste by indicating this on the labels. This is to alert lab personnel that the material is for purposes of disposal. This includes broken thermometers, oil, silica gel and other types of waste material.
- If dripping occurs on the sides of the container, attempts must be made to clean the container off and maintain the legibility of the label.
- Unknowns left by exiting personnel should have some attempt at identification made. If this is impossible, characterization must be made such as if the material is water soluble, acidic, basic, etc.

2. Waste Storage and Collections areas:

❖ Chemical Waste

The College maintains two chemical waste storage areas and one area for asbestos/lead waste (at 68th Street). They are located in the following areas and store the following:

Room 1507, 1508, 1509 North Building (Chemistry Department)

For access to these rooms, contact Chemistry Department stockroom at X-15381. The chemical waste collected in this area includes:

- Labeled bottles and other containers and bulk drums
- Drums set up for bulk collection of the following: flammable waste (all solvents with the exception of water and halogenated materials)
- halogenated waste (all solvents containing halogens or halogenated materials)
- inorganic salts (containing heavy metals and other inorganic chemicals)
- All bulked solvents and chemicals should be of a neutral pH and free of oxidizers, reactive and corrosives. Other materials stored for disposal are:
- Pure chemicals
- Broken thermometers, manometers, barometers
- Gas cylinders
- spill clean-up material (used pillows, pads and powders are to be placed in yellow hazardous material bags labeled with the name of the chemicals spilled on the bag
- used silica gel, organic and inorganic solids bulked in containers made of poly or cardboard

Room 857 North Building

The waste collected in this area includes the following:

- Bulk chemicals:
- Organic waste (methanol, ethanol, butanol, isopropanol, chloroform, ethidium bromide, phenol, xylene, etc.)
- waste oil
- paint residues and thinners
- unspent pure chemicals
- used spill material and solvent contaminated rags
- batteries
- cylinders
- solutions incompatible with bulk waste above
- broken thermometers

❖ **Asbestos Waste and Lead Paint Chips**

Room, Sub-basement North

Contact x-14462 if you have asbestos waste to dispose of. The following wastes are stored in this area:

- asbestos waste in bags and drums
- lead paint chip waste in drums
- limestones from the cleaning of acid neutralizing tanks

Brookdale Campus

- Waste at the Brookdale campus is to be stored in the labs by the procedures of satellite storage. Due to low volume, there is no designated waste storage area at this campus. Call 772-4462 to arrange with the Office of EHS to have the waste vendor visit the campus and remove the waste. Waste is removed from the Brookdale campus generally biannually.

❖ **Radioactive Waste**

Room 928, North

Radioactive waste must be segregated in its physical form and by isotope for collection. These are as follows:

- Dry waste (lab trash, plastic, paper, gloves, etc.)
- liquid aqueous waste
- liquid scintillation vials
- mixed organic waste

For other types of waste, specific arrangements need to be made. This is particularly in the case of naturally occurring isotopes such as the chemicals in the uranium series. Isotopes are segregated by their half-life and stored as such:

- Decay in storage: P-32, S-35, I-125, Tc-99, Tc-99m,
- Ship out: H-3, C-14
- For other isotopes, please speak with Radiation Safety Officer

Brookdale Campus

Currently, there is no one licensed at the Brookdale campus to handle these types of materials.

❖ Biomedical Waste

Room 665 North

All laboratory waste at Hunter is packaged and disposed of as biomedical waste. This is to comply with State and City regulations regarding wastes that have the potential to be of the infectious nature.

All lab waste that is not considered "sharps" is to be place in marked cardboard medical waste boxes with a red bag liner. Boxes come in two sizes and are constructed to stand when taped appropriately. Items are placed in the red liner and when the box is full, it is taped closed. The address of the College and lab number is written on the outside of the box.
Sharps are any objects that can puncture the cardboard box or human skin. This includes but is not limited to the following:

- Syringes
- pipettes (Pasteur and other)
- razor blades
- lances
- slides
- broken glass

These objects are to be places in a plastic sharps containers. The College currently provides two sizes, 8 gallon and 11 gallon that fit in both size boxes. When full, the lids are snapped into place, placed inside the red liner in the cardboard box and the box is sealed as before.

Unbroken glass bottles such as solvent or chemical bottles should be rinsed and the label removed. The bottle should then be placed inside the recycle containers that are found on each floor throughout the College

Brookdale Campus

Biomedical waste removal from the Brookdale campus by the licensed vendor is done biannually, generally at the end of each semester. Waste is prepared in the same manner and is brought down to the medical waste storage area, by the generating laboratory**,** near the loading dock area.

C. Waste Collection Schedule

The following are the various waste collection schedules:

❖ **Radioactive Waste**

- The waste room is located in 928 North
- Make an appointment with the EHS office (X14462)
- Bring identified waste to room at agreed upon time

❖ **Biomedical Waste**

Biomedical waste is picked up from outside labs on Wednesdays after 4:00 PM (weekly unless otherwise informed). Waste, properly packaged, should be left outside lab no earlier than Wednesday morning.

For supplies, call x-4136 (Sal) before 1:00 PM on Wednesday to have supplies delivered to lab. Leave a message that includes your name, telephone number, lab location and the type and quantity of supplies that you need.

❖ **Chemical Waste**

Call the HES office at (212) 772-4462 to dispose of any stock chemicals, chemical waste, waste oil, broken thermometers, spill clean-up. Identification of waste and proper labeling (hazardous waste, non-hazardous waste, DEA controlled substance, used oil) must be made for it to be picked up.

VII. Handling Chemicals

A. Operating Procedures For Laboratory Work With Chemicals

1. Evaluation of Potential and Known Hazards

Prior to initiating a new experiment or procedure, all laboratory employees must evaluate the potential physical and health hazards associated with its chemicals and processes. Container labels and safety data sheets should be part of the evaluation. Laboratory personnel should be familiar with procedures from previous evaluations prior to beginning work and will use the appropriate ventilation, protective equipment and procedures to minimize exposure. Evaluations should also plan for emergency response.

2. Substitution As A Primary Method Of Control

Following hazard evaluation, laboratory personnel should always consider substituting less hazardous and toxic substances. Only chemicals for which appropriate exposure controls are present may be used.

3. Prior Approval

Laboratory employees must obtain approval to proceed with a laboratory task from the supervisor when:

- a procedure that is being carried out by a new employee that involves chemicals with specific hazards such as flammable solids, explosives, reactives, etc.
- a procedure that is being carried out by a new employee which utilizes flammable gases
- a procedure that is being carried out by a new employee in which carcinogenic
- material is being used
- proper safety equipment is not available such as fume hoods, etc.
- procedure in which results are unknown

4. Reporting Laboratory Incidents and Unsafe Conditions

Report all laboratory incidents no matter how minor to your supervisor and the Office of Environmental Health and Safety. Incident reports are available and need to be filed. Unusual or unexplainable chemical incidents should be discussed with other in the department to caution others as to the risk of the procedure. Report any unsafe conditions by contacting the EHS office:

- all non-functioning hoods and those particularly where hazardous materials are being used
- unsafe storage conditions
- improperly charged or discharged fire extinguishers
- eyewash or safety showers that do not work
- absence of personal protective equipment (goggles, gloves, etc)

5. Personal Hygiene

- Never store food or beverages in storage areas, refrigerators, freezers, or use glassware and utensils which are used for laboratory operations
- Do not eat, drink, smoke, chew gum, or apply cosmetics in laboratories where chemicals or other hazardous materials (radioactive and biohazards) are present
- Never mouth pipette. Always use a pipette bulb or other mechanical filling device
- Do not smell or taste chemicals
- Wash hands and other exposed skin before leaving the lab

6. Wearing Appropriate Apparel

- Shoes should be worn at all times
- Sandals and open-toed shoes are not permitted.
- Long hair and loose clothing should be tied or controlled so as not be interfere with experiments
- A lab coat should be worn at all times
- Jewelry that may interfere with work should be removed

7. Proper Equipment Use

- Use equipment for its intended purpose only
- Inspect equipment for damage before use
- Never use damaged equipment such as cracked glassware or frayed electrical wiring
- Shield or wrap Dewar flasks and other evacuated equipment to contain glass fragments in the event of an implosion.

8. Personal Protective Equipment and Fume Hoods

- Inspect all protective equipment (glasses, gloves, goggles) before use for damage. Do not use if this is apparent
- Check fume hoods before use to ensure adequate functioning
- File a work order request with Facilities if it is not functioning

(http://www.hunter.cuny.edu/facilities)

- Wear appropriate gloves when there is a potential for skin contact with toxic chemicals. When ordering gloves, laboratory personnel should request chemical permeation and resistance charts. Call the EHS office as well.
- If respiratory protection is needed, arrangements should be made with the EHS office for a scheduled medical, fit testing and assignment of the proper respiratory protection.

9. Transport of Chemicals from Storerooms to Stockrooms and Laboratories

- Hand carried chemicals should be placed in an outside container or acid carrying bucket to prevent breakage.
- Wheeled cards used to transport chemicals should be stable and move smoothly over uneven surfaces without tipping or stopping suddenly and should have lipped surfaces which would contain the chemicals by preventing slippage or contain in the event of breakage.
- Laboratory employees transporting chemicals must wear splash goggles and lab coat in the event of the containers splashing or breaking.
- All containers brought on elevators should be capped, sealed or covered (as with Parafilm) to prevent exposure to other elevator occupants.
- Compressed gas cylinders should be transported on hand trucks with the cylinders strapped in place. Cylinders should never be rolled or dragged. Keep all cylinders capped until used.

10. Housekeeping

- Keep all work areas, such as benches, floors, hoods, shelves, etc., clean, dry and uncluttered
- Access to emergency equipment, utility controls, showers, eyewash stations, showers, exits MUST NOT BE BLOCKED

11. Working Alone

Under most circumstances, individuals should avoid working alone when conducting research and experiments involving hazardous stances and procedures. Rules are as follows:

- Undergraduate teaching labs – a lab instructor, faculty member or CLT must be present at all times when undergraduate students are conducting

experiments.

- Research labs – Personnel working alone on non-experimental work should alert security to their presence in the facility and be checked on periodically. Personnel should plan a route of escape in the event of an emergency. At no time should experiments be undertaken if individual is alone.

12. Toxic Discharges and Waste Disposal

All toxic releases should be done in a full functioning fume hood. Equipment such as vacuum pumps, distillation columns, and rotary evaporators should vent in hoods if this is the case. Extremely toxic vapors need to pass through scrubbers prior to being discharged into the local exhaust system.

VIII. CONTROLS

The OSHA Laboratory standard required that "fume hoods and other protective equipment function properly and that specific measures are taken to ensure proper and adequate performance of such equipment." Provisions are also required for additional employee protection when working with particularly hazardous substances.

It is this institution's responsibility to provide the following controls where they are needed to protect employees and to ensure that:

- general ventilation systems and fume hoods are functional and meet the requirements for procedures performed
- personal protective equipment is appropriate and available
- emergency safety facilities and equipment are sufficient and accessible

Requirements with respect to the first two types of controls and criteria for their use are described below. Requirements for emergency safety facilities and equipment are covered in Chapter IX.

A. VENTILATION SYSTEMS

1. General Ventilation

The general ventilation system in laboratories must be well maintained and the quantity of airflow monitored every 12 months.

Eight to fourteen (8 – 14) room changes per hour should be provided by general ventilation in laboratories where fume hoods are used as the primary method of control. Storage areas used for flammables must have 6 air changes per hour. Air should be 100% outside air in all active laboratories and chemical storage areas. Air removed from the laboratories through vents and ducts by general ventilation should be vented to the outside, not into the general facility circulation. Intake vents for the system should be far enough removed from the system's exit port to prevent cross contamination. A slightly negative pressure should be maintained in laboratories to ensure airflow into the laboratory from uncontaminated areas. These advisories will be taken into account in all future design and redesign of ventilation systems for laboratory use.

General ventilation will not be relied upon to protect employees from toxic exposures. Fume hoods and other local exhaust systems devices must be used for these purposes. Specific circumstances under which fume hoods must be used are indicated below.

2. Chemical Fume Hoods (ducted)

Fume hoods minimize personal risk of exposure to toxic and hazardous materials isolating activities from the general laboratory environment and by capturing chemical vapors, fumes and mists at their source, preventing them from entering the general laboratory environment. Their use is encouraged whenever possible and mandated for certain substances and procedures as outlined below.

Performance Requirements

The First Department regulations in NYC require that all fume hoods be vented so that a minimum average face velocity of 100 linear feet per minute (100 ft/min) is achieved or no area of the hood face has a velocity of less than 75 feet per minute (75 ft/min). The EHS office checks hood flows once yearly in compliance with these regulations. Hood malfunctions must be reported to the Department of Facilities through a work order request and the hood flow checked once it is back in operation and before work is to commence.

Use of Hoods

The toxicity of the substance used should be considered when deciding if it needs to be worked with in a fume hood. Hoods should be used if the material is a known or suspected carcinogen/mutagen, reproductive hazard, sensitizer, acutely toxic, or presents any type of hazard. The quantity should be considered when deciding to use a hood. Hoods should always be used when handling large quantities of chemicals (over 500ml of liquid or over 30gm of solid material). Flammable and reactive materials should be handled in a fume hood. Running new experiments that may be unpredictable or old reactions that have a history of causing problems should be used in a hood.

Required Work Practices with a Fume Hood

All laboratory employees must check the functioning of the fume hoods before use and employ work practices which optimize the protection afforded by fume hoods. If hood is not constantly venting, it must be turned on and the face velocity checked prior to use. Do not block vents in the hood (baffle) with stored chemicals. Doing so interferes with proper air flow. Immediately report all improperly functioning fume-hoods the supervisor.

Methods for evaluating fume hood performance will be a subject covered in employee training and will generally include:

- types of hoods
- continuous monitoring devices
- velometer to check flow
- smoke tests to indicate flow direction

Storage of chemicals and waste should be kept at a minimum in the hoods. If the hood is one of the designated satellite storage areas, only the bottle that is being currently filled should be kept in the hood, capped at all times unless in use. Hoods used to experiments that generate particular hazards should have filters or scrubbing devices attached to the exhaust to collect these before they are released into the environment.

Hood sashes should be closed when hood is not in use. Keep sashes down as much as possible even when in use to improve overall performance of the hood. If chemicals or reactions remain in hood after use, the fan should be left running.

Keep all chemicals and equipment at least 6 inches inside the hood face.

Connect electrical equipment to outlets outside the hood when possible. This way, in the event of an emergency, one can disconnect equipment without creating a spark inside the hood. Be cautious of tripping hazards with cords.

Wash the hood work surface as often as necessary to maintain a clean dry surface.

Fume hoods in which heating perchloric acid, strong oxidizing agents, or highly reactive chemicals are used.
Hoods in which these materials are used should serve an independent duct. If you are unsure of whether this is the case when using these materials, do not go forward with your work. Contact the EHS office or the lab supervisor.

When the hood is not functioning adequately, it should not be used and the Department of Facilities should be notified to determine if the system was routinely shut down or malfunctioning. The experiment should cease and an alternative found until the hood is back on line.

The lab, department and EHS Office should be notified in advance of plans for any new construction of fume hoods in laboratory facilities to ensure that safety regulations are considered.

3. Chemical Fume Hood (Ductless)

Performance Requirements

Ductless fume hoods are used when the requirements of the lab are such that a ducted hood is not needed. The ductless fume hoods make use of a filter bed that can filter such hazards as particulates, vapors, acids and bases. The Fire Department recognizes the use of these hoods for low level chemical use. The same performance standards apply for the use of these hoods as with ducted hoods with the one addition that the filter system MUST be changed as per manufacturer's directions if filter bed is exhausted.

Use of Hoods

Ductless fume hoods are to be used with low levels of chemicals only highly toxic, explosive, or reactive chemicals or procedures are not to be used with these hoods filter usage must be tracked and filters changed on a vendor recommended basis. The proper filters need to be used for the proper usage.

Required Work Practices with Ductless Hoods

- Hood fans should be turned on when in use
- Hood face velocity should be monitored
- Filters should be in good working condition
- Sash must be kept in the lowest position possible for maximum face velocity
- Do not store chemicals and equipment in hood
- Wash hood work surface as often as necessary

4. Biosafety Cabinets (Laminar Flow Hoods)

Performance Requirements

Biological safety cabinets are ductless laminar flow hoods that utilize a HEPA filtering system for keeping out microbes from within the hood and preventing microbes from venting outside the hood depending on the Class of hood used. There are several classifications of biosafety cabinets depending on the Biohazard Class of the agent that is being used. Currently, no one at the College is using greater than a Biohazard Class I which constitutes no hazard to laboratory personnel. Cabinets are used to protect tissue culture samples and other procedures from ambient contamination and wild growth. Hoods should be monitored and certified yearly by an outside vendor that specializes in this type of certification. This becomes mandatory if working with greater than a Class I Biohazard. Also, provisions for

ducting must be addressed if working with greater than a Class I hazard. The College Biosafety Committee must be notified in the event that a lab is planning to work with greater than a Class I Biohazard.

Use of Cabinets

- turn hood on before use
- check if flow is sufficient across hood work surface
- do not store equipment in hood
- do not use chemicals in hood
- decontaminate hood surface after each use

5. **Fume Hood Checklist**

- Prior to starting an experiment, know the physical, chemical and toxicological properties of all the materials that you will be working with.
- Prior to using the hood, verify that the exhaust system is operational.
- Work at least 6 inches inside the hood.
- Keep hood surfaces clear and baffles unobstructed to allow proper air flow.
- When large pieces of equipment are used inside the hood, elevate the base at least two inches from the hood bench to allow proper air flow.
- Lower sash to the lowest possible position; use the sash as a shield.
- Keep hair, jewelry, clothing, etc., out of fume hood.
- Walk slowly in front of fume hoods to minimize interfering with air flow.
- Check hood flow periodically with a hood velometer. Hoods are checked on a yearly basis by the EHS office.
- Report all hood malfunctions to the EHS office and the Department of Facilities.
- Biosafety cabinets or laminar flow hoods are for biological materials only; do not use flammable chemicals in these hoods.

B. PROTECTIVE EQUIPMENT AND CLOTHING FOR ROUTINE USE

Choose protective equipment and clothing based on the types of chemicals handled, the degree of protection required, and the areas of the body which may become contaminated. All clothing and equipment must at a minimum must meet standards set by the American Standards Institute (ANSI). All respiratory protection must be chosen in conjunction with the EHS Office since there are strict legal requirements as to the use and distribution of these devices.

Every effort must be made to evaluate the effectiveness of equipment and make improvements where possible
Special consideration must be given to purchasing appropriate personal protective equipment and other safety equipment when extremely hazardous substances are involved. Choice of this equipment under these circumstances

must be reviewed by the EHS Office.

1. Eye Protection

All laboratory personnel must wear some type of eye protection when working in the laboratory. This acts as a protection not only of chemical, biological and radiological hazards but also from physical hazards as well. All eyewear must meet the American National Standards Institute's (ANSI) "Practice for Occupational and Educational Eye and Face Protection", Z87.1 – 1989. Prior to use, personnel will verify that the equipment has been approved for the particular procedure (e.g. protective equipment may be ANSI certified for chemical splashes but not for impact). For labs, ANSI standards require a minimum lens thickness of 3mm impact resistance, passage of flammability test and lens retaining frames.

Do not wear contact lenses, even under glasses or goggles, when performing lab experiments. Gases and vapors can concentrate under lenses and cause permanent eye damage. It is almost impossible to remove contact lenses to irrigate the eye in an emergency. Soft lenses can absorb solvent vapors.

The following table should be consulted in choosing protective eyewear:

OHSHA Guidelines for Selection of Eye and Face Protection		
Source	**Assessment of Hazard**	**Protect**
IMPACT – Chipping, grinding machining, masonry work, woodworking, sawing, drilling, chiseling, powered fastening, riveting, and sanding	Flying fragments, objects, large chips, particles sand, dirt, etc.	Spectacles with side protection, goggles, face shields. See notes (1), (3), (5), (6), and (10). For severe exposure, use faceshield.
HEAT – Furnace operations, pouring, casting, hot dipping, and welding	Hot sparks	Faceshield, goggles, spectacles with side protection. For severe exposure use faceshield. See notes (1), (2), (3).
	Splash from molten metals	Faceshields worn over goggles. See notes (1), (2), (3).
	High temperature exposure	Screen face shields, reflective face shields. See notes (1), (2), (3).
CHEMICALS – Acid and chemicals handling, degreasing plating	Splash	Goggles, eyecup and cover types. For severe exposure, use face shield. See notes (3), (11).
	Irritating mists	Special-purpose goggles.
DUST – woodworking, buffing, general dusty conditions	Nuisance dust	Goggles, eyecup and cover types. See note (8)
LIGHT and/or RADIATION --		
Welding: Electric arc	Optical radiation	Welding helmets or welding shields.

OHSHA Guidelines for Selection of Eye and Face Protection		
		Typical shades: 10-14. See notes (9), (12)
Welding: Gas	Optical radiation	Welding goggles or welding face shield. Typical shades: gas welding 4-8, cutting 3-6, brazing 3-4. See note (9)
Cutting, torch brazing, torch soldering	Optical radiation	Spectacles or welding face-shield. Typical shades, 1.5-3. See notes (3), (9)
Glare	Poor vision	Spectacles with shaded or special-purpose lenses, as suitable. See notes (9), (10).

Notes to eye and face protection selection chart:

1) Care should be taken to recognize the possibility of multiple and simultaneous exposure to a variety of hazards. Adequate protection against the highest level of each of the hazards should be provided. Protective devices do not provide unlimited protection.
2) Operations involving heat may also involve light radiation. As required by the standard, protection from both hazards must be provided.
3) Face shields should only be worn over primary eye protection (spectacles or goggles).
4) As required by the standard, filter lenses must meet the requirements for shade designations in 1910.133(a)(5). Tinted and shaded lenses are not filter lenses unless they are marked or identified such.
5) As required by the standard, persons whose vision requires the use of prescription (Rx) lenses must wear either protective devices fitted with prescription (Rx) lenses or protective devices designed to be worn over regular prescription (Rx) eyewear.
6) Wearers of contact lenses must also wear appropriate eye and face protection devices in a hazardous environment. It should be recognized that dusty and/or chemical environments may represent an additional hazard to contact lens wearers.
7) Caution should be exercised in the use of metal frame protective devices in electrical hazard areas.
8) Atmospheric conditions and the restricted ventilation of the protector can cause lenses to fog. Frequent cleansing may be necessary.
9) Welding helmets or faceshields should be used only primary eye protection (spectacles or goggles).
10) Non-side shield spectacles are available for frontal protection only, but are not acceptable eye protection for the sources and operations listed for "impact."
11) Ventilation should be adequate, but well protected from splash entry. Eye

and face protection should be designed and used so that it provides both adequate ventilation and protects the wearer from splash entry.

12) Protection from light radiation is directly related to filter lenses density. See note (4). Select the darkest shade that slows task performance.

2. Gloves

Gloves must be worn at all times in the lab whenever there is a chance for hand contact with chemicals, biological agents, radioactive materials and other lab materials. At minimum disposable latex type gloves should be worn and heavy gloves in the event if the chemicals involved are easily absorbed through the skin or are acute or chronic toxins. A chemical marked in the far right hand column of the Permissible Exposure Limits Table in the Appendices identifies those regulated chemicals which pose skin hazards.

Lab personnel must inspect gloves prior to use. Gloves must be washed before removal except those that are considered disposable or those that are permeable to water.

Prior to use, lab personnel will consult the glove manufacturer's permeation and resistance charts to make sure the glove is made of the proper material for the chemicals being used. These materials vary in the way they resist being degraded and permeated. NO glove totally resists degradation and permeation over time and must be replaced periodically, depending on how often it is used, for what concentration of chemical and for how long. The make up and the thickness of the glove determine its appropriateness. A sample glove chart follows.

3. Clothing

The choice of protective clothing depends upon the degree of protection required. Protective and appropriate clothing is required when a potential exists for chemical splashes, fire, extreme heat or cold, excessive moisture and radiation. Setting requirements for their use is largely the responsibility of lab supervisors and directors.

Protective clothing which should be readily available to laboratory personnel includes:

- lab coats
- lab aprons
- shoe covers
- coveralls

Laboratory personnel must be instructed to consider the following characteristics in protective clothing selection and purchase:

- ability to resist fire, heat and chemicals used
- impermeability when needed
- comfort, permitting easy execution of tasks when worn
- ease of cleaning (unless disposable)
- ability to be removed during an emergency or chemical splash (fasteners instead of buttons)

4. Safety Shields

Safety shields should be used on or near equipment when there is potential for explosion or splash hazards. Fixed shields will be used whenever possible, recognizing that their weight and resistance provides superior protection against minor blasts. Portable shields may be used when the hazard is limited to small splashes, heat or fire. When combustion is possible, the shield must be made of non- flammable or slow burning material.

5. Respirators

Respirators must be worn in the lab when performing non-routine operations such as chemical waste disposal, or spill response, or those procedures that pose a respiratory hazard (working with extremely toxic materials or doing a procedure where the fume hood is not sufficient. These procedures will require the use of a negative pressure half face, full face or self-contained breathing apparatus.

Each lab will determine if any operations require the use of a respirator. Respirators are available to those individuals that:

- routinely clean up chemical spills
- work with extremely toxic chemicals or gases

Under no circumstances, is respiratory protective equipment to be used by a person unless they have participated in a respiratory protection program which includes training, assignment, fit testing and medical exam as required by OSHA Respiratory Standard (Title 29, Code of Federal Regulations, Part 1910.134). Procedures for all aspects of respiratory protection are found in the Hunter College Respiratory Protection Program.

C. MANAGEMENT OF CONTROLS SYSTEM

1. Inspection and Maintenance

The Office of EHS will coordinate the maintenance and inspection of facilities, general ventilation systems, fume hoods and emergency facilities and equipment such as eyewash stations, safety showers and fire extinguishers in laboratories, chemical storage areas teaching labs. The frequency of these inspections and maintenance programs are described in below.

2. Employee Reporting of Improperly Functioning Equipment

Between inspection and maintenance intervals, all laboratory employees must report improperly functioning fume hoods, ventilation, safety shower/eyewash malfunctions to the Office of EHS and Department of Facilities.

3. Safety and Protective Equipment Checklist

The Office of Facilities Management and Planning maintains a checklist of maintenance of all safety items within each lab. The EHS Department checks that proper maintenance is being conducted. Each laboratory supervisor must ensure that all safety equipment has been serviced (check tags) and that it remains unobstructed by lab equipment or other materials.

4. Availability of Equipment

Each lab must ensure that all the necessary equipment is present and made available to employees. The Office of EHS checks for the presence and maintenance of safety equipment during inspections but absence of improper function needs to be reported to the Department of Facilities immediately. The EHS office should also be notified.

IX. Emergency Planning and Response

This chapter of the Chemical Hygiene Plan describes how this institution will meet its responsibilities to prepare for laboratory related emergencies. Described below are emergency are emergency safety equipment and materials required in every laboratory, guidelines for responding to chemicals spills, fires and medical emergencies and procedural and educational steps to ensure that laboratories and laboratory personnel are prepared for chemical spills and emergencies.

A. Emergency Preparation Responsibilities Of Laboratory Staff

1. Procedures for Responding to Spills, Fires and Medical Emergencies

All laboratory personnel are responsible for attending and in house laboratory training that deals with responding to emergencies such as spills, fires and medical emergencies. Laboratory supervisors must review the procedures with personnel to ensure there is complete understanding of the rules.

2. Additional Training for Spill Responders

Those individuals that are responsible for spill response or clean up must attend further training through an EPA accredited training program. Such training programs range from 24 to 40 hours initial with an 8 hour annual refresher training. The following individuals are required to attend: EHS personnel, laboratory technicians, personnel in charge of hazardous waste room facilities and others as designated.

3. Development of On-site Emergency Response

There are presently individuals in various departments at the College that are equipped through additional training to contain and handle chemical releases. They are as follows:

Department/Office	Person Name	Location	Phone Number
Environmental Health & Safety	Ricardo Franco	HE-1211A	212 772 4462
Chemistry	Nicole Popa, Chief CLT	HN-1400B	212 772 5348
Health Sciences	Camille McIntyre, Chief CLT	Brookdale East 108	212 481 5057

4. Establishment of Outside Assistance and Response Capabilities

Off –site resources are available to perform functions beyond the ability of available staff or scope of permitted actions of the institution. Emergency

resources have been established for the following:

Emergency Contact List		
Emergency	Response unit	Telephone Number
Fire	NYC Fire Department	911
Large Chemical Spills, Releases, Waste Removal	Triumvirate Environmental	(800) 427-3320
Medical Emergencies	NYC Fire Department	911
Radiation Waste Removal	RADIAC	(718) 963-2233
Medical Waste Removal	Approved	(914) 664-4791

Local Government Agencies to be Contacted During or After an emergency		
Emergency	Response Unit	Telephone Number
Laboratory Fire	FDNY, Bureau Of Fire Prevention Laboratory Unit	(718) 999-2502
Radiation Release	NYC DOH, Bureau Of Radiological Control	(212) 676-1552
Chemical Release	NYC DEP, Hazardous Materials Unit	(718) 595-4650
Oil Spill	See SPCC Plan	

5. Reporting and Investigation of Incidents

All laboratories experiencing one of the above incidents is to file an Incident Report with the Office of EHS. This report discusses the incident and the remedial measures that were taken to correct it. Inspections will be made after the incident to ensure the potential is removed for the incident to repeat itself

6. Laboratory Safety Equipment Checklist

Each laboratory will have a checklist of all safety equipment required to protect employees in the event of a fire, spill, splash or evacuation. The list will be kept in the sleeve by the door that holds this plan, SDS's, laboratory inventory and other relevant information. Maintenance of this equipment will be recorded and updated as needed.

B. Laboratory Emergency Equipment

It is the laboratory's responsibility to identify and purchase spill control and

personnel protective equipment for employees working in laboratories. This includes gloves, eyewear, spill material, respirators and first aid kits. In house safety equipment is purchased through the College and maintained by the Department of Facilities. Facilities will service this equipment if notified by the lab that it has been used or is not functioning or through annual inspections. This includes fire extinguishers, safety showers, and eyewash stations.

1. Emergency Telephone Numbers

Every lab will have a list of emergency telephone numbers posted on or by the door sleeve containing safety information. If there is no phone in the lab, there must be an alternative written plan outlining procedures for contacting emergency personnel. This must also be posted with the other safety information. The list in included in this program.

2. Deluge Showers and Eyewash Stations

Showers must be located within 25 feet of every laboratory, storage area or chemical preparation room wherever corrosive, dehydrating agents, solvents or other hazardous chemicals are stored or used. Instructions for activating the shower should be clearly posted and all lab personnel trained to the use of these.

The shower must provide up to 30 gallons/minute (supply must be at least a one inch line). The water supply should run until it is released. Deluge showers should be able to deliver 50-60 gallons of water at one time.

Eyewash stations should be centrally placed in a lab along a normal path of egress and should take no longer than 15 seconds to reach from any point in the laboratory. The eyewash can be located next to the shower but is usually by a sink to catch the flow of water and direct it down the house plumbing system.

The eyewash supply must provide 0.4 gallons/minute of water at 25psi or less to flood the eyes and face with potable, aerated water for at least 15 minutes. The best design is 2 nozzles facing upward and aimed slightly inward.

Valves on eyewash and safety showers should be easily turned on in one second or less and designed so that water flow stays on for a substantial amount of time. Ideally, the water temperature should be at $90 – 95\ ^{o}F$ ($32\text{-}35\ ^{o}C$) but not over $100\ ^{o}F$.

3. Fire Related Safety Equipment

- **Fire alarm system** - All laboratory facilities must be capable of notifying all personnel in the vicinity of a fire so that they may evacuate the building. Locations which have no alarm system must have alternative ways of notifying employees and other persons. These alternative methods must be communicated to all personnel.

- **Fire extinguishers** - Portable fire extinguishers must be present in all laboratories, chemical storage and preparation areas. They must be of the correct type for the lab and the correct capacity (volume) to be able to extinguish the amount of material that may be involved in a fire. The table below shows the uses for the different types of extinguishers and is a guide for the choice of the proper extinguisher in any laboratory. Fire extinguishers should be located near doors of labs, storage or work areas or just inside or outside of the door so that when the occupant attempts to retrieve the extinguisher, they should be moving toward the exit.

  Fire extinguishers are subject to the maintenance guidelines described in Chapter X.

Types Of Fire Extinguishers		
Fire Class	**Pictogram**	**Intended Use**
A	Garbage can and wood pile burning	Ordinary solid combustibles
B	Fuel container and burning puddle	Flammable liquids and gases
C	Electric plug and burning outlet	Energized electrical equipment
D	Burning gear and bearing	Combustible metals
K	Pan burning	Cooking oils and fats

Type of Fire Extinguisher	Effective Against	Do Not Use on
Water [A]	Class A Fires: burning paper, wood, coal electrical, liquid or Rubber and textiles	Electrical, liquid or metal fires
Carbon Dioxide [BC]	Class B Fires; petroleum hydrocarbons, (flammable solvents, motor oil, grease, etc.) Class C Fires: electrical fires in the presence of sensitive	Metal fires (including lithium aluminum hydride)

Type of Fire Extinguisher	Effective Against	Do Not Use on
	equipment, optical systems, computer equipment	
Dry Powder [ABC]	Class B Fires: burning solvents and chemicals, large quantities of these	Metal fires, fires involving sensitive equipment
Met-L-X and other special granular formulations alloys [D]	Class D fires: burning metal (e.g. magnesium, lithium, sodium, potassium, or reactive metals, metal hydrides, metal alkyls, other organometallics)	Paper, trash, solvent, electrical

Multipurpose extinguishers are good for areas where fires may involve different classes of materials, dry powder extinguishers, for example, would be god for a fire involving all or one of the following: solvents (Type B), and electrical (Type C). If a laboratory also use combustible metals (magnesium or sodium) a second extinguisher for Type D fires (e.g. Met-L-X) is required.

Fire Blankets – Fire blankets, if used, must be readily available in each laboratory to use to cover an injured victim who may be in shock until emergency medical help arrives. NEVER USE FORE BLANKETS TO COVER A VICTIM IN A STANDING POSITION WHERE CLOTHING IS ON FIRE. ALSO, BE CAREFUL NOT TO COVER FACE AND HEAD WHEN ROLLING VICTIM IN BLANKET. This could increase the amount of hot gases and smoke inhalation as well as possibly cause face and head burns. Procedures for clothing fires are described below.

C. Chemical Spill Equipment

Each department will ensure that all teaching and research laboratories will have sufficient spill control equipment either in the laboratory itself or readily available to respond to spills involving the chemicals used in the laboratory. Chemical spill supplies must be capable of dealing with a spill of up to two gallons. Supplies available are as listed:

- neutralizing powders for acids and bases
- absorption powders for solvents
- pads and pillows of various sizes containing universal absorbent material

- pads and pillows specific for water based solutions and/or oil
- broom and dustpan
- hazardous waste bags of different sizes
- mop
- bucket
- containers (5 gallon plastic)
- booms (for containing large spills) containing universal absorbent
- goggles
- gloves
- coveralls
- shoe covers or boots
- respirators
- spill identifiers
- mercury spill material

Supplies should be available in each lab. An extensive collection of supplies are also stored in both chemical waste areas:

- Room 857 North

The nature of the chemicals used in each lab will determine the type of spill material present. Non aqueous spills should not be cleaned up using paper towels and then discarded.

In cleaning up any chemical spill, goggles, gloves, respirator and clothing cover should be worn at all times. If the spill is large, this is to include shoe covers as well. All material for spill clean-up must be classified as hazardous waste and removed by licensed hazardous waste hauler.

D. First Aid Kit

Every laboratory should have a First Aid Kit containing the following:

- a variety of bandages
- adhesive tape
- alcohol swaps
- gauze
- cold and hot packs
- burn spray, abrasion ointment
- tweezers
- scissors
- first aid manual

E. Guidelines for Chemical Spills, Fires, and Medical Emergencies

1. Standard operating procedures in the event of an emergency

Each lab must consider the types of emergencies that may arise in the course of their daily operations and develop their own procedures in the event of an emergency. Any lab handling materials that are hazardous (including carcinogens, potential carcinogens, reproductive hazards, sensitizers, biological or radiological materials) need distinct protocols that must be reviewed with all members of the laboratory and introduced to all new members.

In the event of any chemical spill, release, injury, illness, medical emergency or fire, incident reports must be filled out by either the person involved or an alternate person of choosing. Forms located in this section should be copied and kept on hand. The filled out copy should be forwarded to Human Resources/Room 1502 East (212-772-4451) where copies will be distributed to various College personnel. A copy should be kept for the lab file.

Laboratory personnel present at the time of the emergency must not take it upon themselves to respond to the emergency unless they are familiar with standard operating procedures on how to respond and feel they can handle the situation. They should contact the proper department and wait for assistance to arrive. This includes:

- Cleaning up a spill which is too large or unmanageable or where they are unfamiliar with the material
- Put out a fire
- Administer medical assistance

Emergency Contacts For the Laboratory		
Emergency	Contact or Location	Telephone
Fire and Explosion	Public Safety	(212) 772-4444
	Fire Department	911
Medical Emergencies (Daytime)	College Emergency Medical Services	(212) 772-4800 or (212) 772-4336
Medical Emergencies (Night time, Holidays and After Hours)	Public safety	(212) 772-4444
	EMS	911
Nearest Hospital	New York Hospital (York	

Emergency Contacts For the Laboratory		
	Avenue and 68th Street)	
Chemical, Radiological, Biological Spills and Releases	Environmental Health & Safety – Ricardo Franco	(212) 772-14462
	Chemistry – Nicole Popa	(212)772-15381
	Biology – Gus Pita	(212) 772-14155
	Brookdale Health Sciences – Camille McIntyre	(212)481-5056
Chemical, Radiological, Biological Spills and Releases (Night Time, Holidays and After Hours)	Public Safety	(212) 772-4444
Facility Emergency (Daytime)	Facilities Department	(212) 772-4422
Facility Emergency (Night Time, Holidays and After Hours)	Watch Engineer	(212) 772-4379

2. SPILL CLEAN UP

Never contact custodial services or facilities to respond to chemical spill. In general, they are not trained or equipped to cleanup a chemical spill.

Those personnel at the College that are presently licensed and trained to clean up chemical spills are as follows:

- Lab PI's if the spill is small, it involves low hazard chemicals and they are familiar and equipped to deal with the spilled material
- EHS Personnel

All personnel involved or affected by a chemical spill, release or other incident are entitled to a medical consultation by a physician experienced in identifying and treating people experiencing toxic effects of chemicals.

After each incident, designated department representative must ensure that all emergency spill equipment, supplies and materials are replaced.

F. Guidelines for Handling Chemical Spills

1. Solid Spills:

Inert solids such as inorganic salts, desiccants, etc. can be swept up and placed into a container constructed of material compatible material. However, certain solids pose toxic, flammable and reactive hazards and must never be swept up routinely or mixed in with regular trash.

Oxidizers such as nitrates, permanganates and perchlorates must be separated from other types of waste products and kept away from paper, wood and other combustibles.

Extremely toxic solids such as beryllium, cadmium, arsenic, barium, mercury and their compounds should be picked up with extreme caution and the scattering of dust should be minimized as much as possible. Respiratory protection should be worn when doing this.

Air reactive solids, which burn when exposed to air such as white phosphorus which must be kept wet when spilled, preferably with wet sand.

Water reactive solids**,** which burn when, exposed to water or moisture such as sodium, potassium, and lithium metals. For potassium, cover with dry sodium carbonate, scoop up and keep pending disposal.

Explosive solids**,** only trained personnel should handle spills involving these materials

2. Liquid Spills

All liquid spills should be diked or compatible absorbent placed around the spilled material prior to being picked up to avoid the spread of the liquid. The material is then neutralized and/or absorbed onto a solid material before disposal. There are several types of absorbents, each appropriate for certain types of chemical spills:

- organic absorbents (sawdust, paper towels), inappropriate for most spills except for aqueous buffers, salts and fairly neutral material.
- mineral (granular clay, vermiculite, diatomaceous earth, sand). This is the most inert type of absorbent material to use, but should not be used for chemicals that liberate vapors.
- synthetic (polypropylene fibers) not good with strong oxidizers. Only absorbent appropriate for hydrofluoric acid spills.

The area of a spill must always be decontaminated after the spilled material is removed (see decontamination issues below).

Never use a mop, wringer or bucket on a hazardous or flammable liquid. Mops should only be used on nontoxic, noncorrosive, nonflammable and inert liquids.

Do not dilute spilled liquid laboratory chemicals with water unless absolutely necessary (there are no neutralizing materials available) for the following reasons:

- In some cases it is dangerous. For example, with sulfuric acid it can cause splattering and related harm
- It does not work organic solvents and other hazardous liquids.
- It is not legal to flush chemicals into the sewer system.
- The liquid must be removed and treated as hazardous waste.
- It causes the spill to spread further that it might.
- It drives up the ultimate cost of disposal.

Before responding immediately to a spill, consider the potential vapor concentration and toxicity of the material. Consider the rate of evaporation of the liquid, the environmental conditions of the room (adequacy of ventilation, temperature), and the time elapsed since the spill occurred.

Always make sure to have the necessary personal protective equipment before attempting to clean up a chemical spill.

All contaminated spill materials, including disposable personal protective Equipment, (almost always) must be disposed of as hazardous waste. Contents of all containers or plastic bags must be properly labeled. See the Waste Disposal Policy for further details.

Always address an injury first before attempting to respond to a spill.

G. Guidelines for Hazard Classes

Corrosives (strong acids and bases, nonmetal chlorides, dehydrating agents, halogens)

Strong acids: Don splash protective goggles, acid-resistant gloves, (use manufacturers glove chart to determine in advance what kind of glove material you will need). Coveralls and plastic shoe coverings may be necessary if the spill is large. Slowly add the proper amounts of a weak base to the spill area (e.g. sodium bicarbonate, sodium carbonate, calcium carbonate) and physically mix the neutralizing agent slowly and uniformly into the acid with a plastic, corrosion resistant material. An eventual lack of foaming or fizzing

indicates that point of neutralization

Then add absorbent such as vermiculite or spill pads and place in a hazardous materials bag or container.

Hydrofluoric acid: HF is extremely corrosive. The acidic fluoride attacks the skin quickly and without initial pain and can cause severe delayed effects which require calcium gluconate injections. Never clean up HF spills no matter how small unless you are absolutely certain you have the proper gloves and that they are free from holes or punctures. Apply calcium containing compound and sodium bicarbonate to precipitate fluoride ion as calcium fluoride and render a neutral pH. DO NOT use mineral absorbents. Many universal polymer spill materials are permissible to use in HF spills such as pillows and pads.

Strong bases: Don the same protection equipment for strong acids. Add a weak acid (e.g. citric or weak hydrochloric acid solution). The pH indicator paper should be used to ensure that the material has been neutralized.

Flammable solvents: Before proceeding with clean up, turn off all power supplies and unplug any equipment that may spark. Hoods should also be turned off. Then follow guidelines for non-corrosive liquid spills. Flammable vapors may travel distances to ignition sources and flash back to the source of the vapors, rapidly creating a very dangerous environment.

High energy oxidizers: The oxidative power of the material should be neutralized, if possible. The material can then be swept up or absorbed using universal absorbent materials.

Compressed gas leads or releases: Area should be immediately ventilated and occupants must leave the area regardless of the gas released. For flammable gasses, all sparking sources should be turned off immediately.

Mercury: All labs where mercury is used must have acceptable means of containing and cleaning up spills. It easily can fill cracks and crevices where it will continue to evaporate at room temperature. Spill kits are commercially available that consist of a small pump, sponges impregnated with a mercury absorbent, powders that react and absorb the mercury. The absorbents form an amalgam with the liquid mercury. The powders should be poured into seams and cracks as well. All powders and sponges must be activated with water to be effective. Never use regular vacuum cleaners to pick up mercury.

H. Medical Emergencies

In the event of a medical emergency, call TBD.

After hours, call the Public Safety Department (212) 772–4444, EMT/FDNY - 911.

All incidents involving chemical contamination (skin contact, inhalation or ingestion) or injury must be followed up by trained medical personnel at no cost to the employee. Listed below are initial steps to take to minimize harm after chemical exposure or injury. All incidents must be reported to the Department of EHS and an INCIDENT REPORT FORM filled out as soon as possible.

Chemical eye splashes: Immediately rinse the affected eye or eyes at the eyewash station for at least 15 minutes while holding the lids open to ensure proper irrigation. Seek medical attention by calling the above numbers. Obtain SDS to assist first aid providers.

Contamination to large areas of the body: Immediately remove contaminated clothing while using the safety shower for at least 15 minutes. Wash contaminated areas with a mild soap and water. Do not waste time because of modesty. Do not use neutralizing agents or salves. Seek medical attention by calling the above numbers. Obtain SDS to assist first aid providers.

Ingestion of chemicals: Encourage victim to drink large quantities of water and seek medical attention by call the numbers mentioned above immediately. Obtain SDS (Safety Data Sheet) to assist first aid providers.

Inhalation of chemicals: Get victim to fresh air and call seek medical attention by calling the numbers mentioned above immediately. Obtain SDS to assist first aid providers.

Thermal and chemical burns: Where appropriate, flush the area with cold running water. For extreme burns, seek medical attention by calling the above numbers immediately. For chemical burns, obtain the SDS to assist first aid providers.

Gashes, cuts and heavy bleeding: Apply compression to wound to slow bleeding using paper towels, lab coat or any clean material. Seek medical attention by calling the above numbers immediately.

I. Fires and Fire Related Incident

- Pull the nearest fire alarm if accessible
- Notify Public Safety x-4444, x-4445, x-4446 and call the Fire Department 911
- Evacuate all unnecessary people from the area. Follow building evacuation procedures established by the College Public Safety Department.
- If there is time and if conditions are safe, shut off all power and close the door of the room where the fire is behind you.
- If you are working and you hear the fire alarm, immediately leave the building by taking the nearest stairwell. ALWAYS USE THE STAIRS, NEVER TAKE THE ELEVATOR.

1. **Attempting To Put Out A Fire**

   Judgment must be used to determine whether to attempt to put the fire out yourself. Circumstances in which an attempt may be made are:

- The fire is small
- The chemicals or processes involved are not potentially explosive
- The fire is isolated
- You have experience using a fire extinguisher
- The fire extinguisher is the right type for the chemical involved
- A move towards the fire extinguisher does not trap you in the room in the event that the fire spreads

2. **Circumstances under which an attempt should not be made include:**

- The fire has spread to a secondary source (other than the site where it originated)
- You don't have experience with a fire extinguisher
- A move to get the fire extinguisher may entrap you in the room if the fire spreads
- The fire is very close to many other chemicals
- The fire extinguisher is the wrong type

If the fire is in a beaker or small container, it may be stopped by placing a watch-glass over it with tongs or other tool. Never place a watch-glass over the fire directly with your hands.

If the fire is in the chemical fume hood, immediately close the sash to isolate the fire from the rest of the lab. Depending on the type of hood, the fire may

extinguish itself, however, call for assistance anyway.

3. **Using a Fire Extinguisher**

In the event that a fire extinguisher is used, the following four steps should be taken:

- PASS is a key word to remember the sequence of steps to take
- Pull the pin out on the extinguisher (P)
- Aim the extinguisher at the base of the fire (A)
- Squeeze the nozzle to release the extinguishing material (S)
- Sweep using a back and forth sweeping motion (S)

If after a few minutes the intensity or size of the fire has not diminished, get out and close the door behind you.

A large, rapidly growing fire must be left up to the fire department.

When a person and/or Clothing is on Fire:

If you are on fire stop, drop and roll. Your body weight will smother the fire. Do not run. Simply put, running fuels the flames. Use the safety shower if immediately accessible.

If you witness a person on fire, make sure they stop, drop and roll. Do not wrap a person in a vertical position in a fire blanket to smother the flames. This could make the situation worse. Wrap the person in a lab coat or blanket but be careful not to cover the head. Call for assistance immediately.

Mechanisms to ensure that laboratories are prepared to deal with emergencies

All laboratory personnel are required to participate in drills (for fires, chemical spills and medical emergencies), which are coordinated through Public Safety. If you are in an area where you cannot hear the fire alarm or public address system, please call the office at (212) 772-4422 immediately.

Routine inspections will be conducted by individuals or teams to evaluate the adequacy of emergency safety facilities and equipment described in this plan. Emergency facilities and equipment are maintained periodically to ensure that when they are needed, they will function properly. After each incident, designated department personnel will ensure that all emergency equipment,

supplies and materials are replenished. Chemical and laboratory incident reporting and follow-up should be filed with the Office of EHS. The EHS office is located in HE-1211A. The factors responsible will be examined and corrected, if possible.

X. Maintenance and Inspection Program

Hunter College has a maintenance and inspection program to ensure that ventilation systems and emergency safety equipment are functioning properly and that laboratory working conditions meet legal as well as acceptable standards. The maintenance and inspection program will target facilities know to be using large quantities of chemicals.

A. Maintenance Program

1. General Ventilation System

General ventilation performance in laboratories should be evaluated by the Facilities staff at least twice a year to ensure that:

- General mechanical ventilation (if present) provides outside air between 4 to 12 air changes per hour in all laboratories where hoods are used.
- All exhausted air is vented to the outside and not recirculated throughout the building.
- All chemical storage areas receive 6 air changes an hour and exhausted air is vented outside and not recirculated.
- Centralized HVAC (heating, ventilation and air conditioning) that affect laboratories will also be maintained. This includes the following:
    - Filters are changed or cleaned
    - Standing water is checked for biological growth
    - Condensate pans are cleaned regularly

2. Local Exhaust System: Ducted Chemical Fume Hoods

The cleaning of the hood is the responsibility of the laboratory personnel and hoods should be kept clean and uncluttered.

Fume hood face velocities are checked annually by the office of EHS and more often if needed. The Department of Facilities is responsible for checking and maintaining the actual mechanical components of the hoods. They should be contacted immediately at (212) 772-4422 if hoods appear not to be functioning. Fume hoods and related ventilation equipment are checked periodically by the office of facilities. This inspection includes:

- Bearings for overheating (grease as required)
- Belt drives for proper tension
- Fan wheel for proper rotation and freedom from accumulation (to ensure the fan is not operating in reverse)

- Ductwork check: the ducting should be inspected to ensure that joints are intact and there are no holes in the system
- Visual inspection of hood for signs of corrosion or other indication of needed repair such as sash cracks, frozen baffles, etc.
- The cleaning of the hood is the responsibility of the laboratory personnel and hoods should be kept clean and uncluttered.

3. Emergency Eyewash and Deluge Showers

Showers are checked yearly by the Department of Facilities. Eyewashes are also checked yearly by Facilities but should be checked and flushed monthly by laboratory personnel. Any maintenance work will be done as needed or contact x-4422 if there seems to be a problem with this equipment.

4. Fire Extinguishers

All fire extinguishers should be inspected by the Facilities Department on a yearly basis where they are weighed and tagged to ensure that they are charged. Extinguishers are sent out every five years for hydrostatic testing. If the fire extinguisher is discharged or if the gauge reads "not full," call Public Safety at (212) 772-4422 to have it replaced.

B. Mechanisms for Reporting Malfunctioning Equipment

Any indication of improperly functioning lab safety equipment such as hoods, fire extinguishers, etc., should fill out a work order with the Department of Facilities on line at the Hunter Web site. Be specific about location and what the problem is. If you are unsure, call Office of EHS (x-4462).

C. Laboratory Inspections

Inspections are performed yearly by the Office of EHS, Fire Department and/or designated departmental representatives. Items that will be targeted are unsafe conditions and practices as well as the testing of safety equipment to see if it is functional.

Inspection reports will be generated identifying problems needing immediate attention and those that are of lesser priority. Inspection results will be discussed with chairpersons, supervisors and lab workers indicating what follow up is needed to correct the problems if any.

The inspection will consist of:

- Evaluation of fume hood performance
- use smoke tubes to determine if the hood is exhausting air

- measure the rate of flow at the face of the hood
- ask employees about hood performance
- Inspect and test all emergency equipment including eyewashes and safety showers (with the cooperation of the in-house plumber)
- Check fire extinguishers to ensure they are properly charged
- Looked for block exits
- Check availability of spill control and other personal protective equipment
- Check holder by door for: inventory, SDS's, copy of this plan, radiation safety plan, list of emergency telephone numbers
- Observe general housekeeping conditions
- Check for the posting of signs
- storage of chemicals in cabinets, hoods and ensure the proper segregation
- Check satellite accumulation areas of chemical waste
- Check biomedical waste accumulation
- Check radioactive waste accumulation

D. Routine inspection by Laboratory Personnel

Laboratory personnel should schedule self-inspections of their respective laboratories on a quarterly basis. Each inspection should focus on two particular areas with an evaluation and a list of needed improvements written up. These inspections will serve as interim monitors of safety between the annual inspections.

E. Follow up Measures

After inspections, follow up visits in ensure compliance will be carried out, either by the members of the lab or the inspection team. Minor problems will be addressed immediately with other issues addressed by the office of EHS, Facilities or other departments.

XI. Laboratory Employee Information and Training Programs

All laboratory employees must have access to a copy of the OSHA Laboratory Standard and this plan. Employees must also have access the Safety Data Sheets and other references on chemical hazards during normal working hours

A. Training

All laboratory employees of Hunter College including faculty, graduate students, undergraduate students, research associates, post-doctoral assistants, laboratory technicians, etc., who do research in a laboratory must attend a laboratory employee training session provided by the Office of EHS at their start of their employment and each year afterwards. In this training, topics covered are their rights and responsibilities under the OSHA Laboratory Standard and specific operating procedures for working with chemicals.

B. Training Program Elements

Training is offered through the Office of EHS. Information regarding these trainings is made available via e-mail to Principle Investigators and or lab personnel. All laboratory employees must complete at least one initial training and we recommend refresher training every three years unless annual retraining is mandated for the specific hazards in the lab. The trainings will include the following:

- Contents of the OSHA Laboratory Standard
- Radiation Safety
- Other regulatory standards including NYS Right to Know and OSHA Blood borne Pathogen Standard
- The Chemical Hygiene Plan, safety data sheets and resources on chemical hazards
- Physical and health hazards of chemical classes and operating procedures for the handling, storing and disposing of these materials
- Types of exposure and signs and symptoms of overexposure
- Fume hoods and biosafety cabinets
- Safety items in each lab
- Personal protective equipment
- Exposure limits
- Incident reports
- Waste disposal
- Fire extinguisher handling
- Spill maintenance

- Waste management procedures
- Hands on training (if applicable)
- Links to Chemical Hygiene Plan including the chemical storage scheme chart, chemical lists by hazard class, incident form

Laboratory PI's are required to provide specific training for hazards that are unique to their labs and for the lab equipment including:

- proper use of fume hoods and other local exhaust systems
- use of emergency showers and eyewash stations
- location and use of spill equipment for different waste streams
- emergency protocol and telephone numbers
- fire extinguishers and procedures in the event of a fire

The following materials are distributed at each training session:

- laboratory standard with copy of slides presented
- list of key emergency telephone numbers
- sample SDS and fact sheet on how to read them

Suggested Laboratory Training Outline	
1. Introduction	
2. Laws and Regulations	OSHA Lab Standard, NYS Right To Know Law, OSHA Bloodborne Pathogen Standard, EPA SARA TITLE III, EPA RCRA, Fire Department Directive
3. Reactives And Explosives (Video)	
4. Management of Chemicals	Classes, Hazards, Storage and Safety Data Sheets (SDS's)
5. Personal Protective Equipment	
6. Good Laboratory Practices	
7. Laboratory Fume Hoods (Video)	
8. Other Laboratory Safety Equipment	Eye Wash Stations, Safety Showers, Spill Control, Fire Extinguishers
9. Emergencies and Spills	Medical Emergencies, Fire Emergencies, Spill Emergencies
10. Waste Disposal	Sewer Regulations, Chemical Waste, Bio-Medical Waste, Radioactive Waste

XII. RECORDKEEPING

Hunter College maintains the following records as required under the OSHA Laboratory Standard and other relevant OSHA standards. These records will be made available to employees, administration or any outside regulatory agencies upon request. All training records are kept on file in the EHS Office. This includes the following:

- Training attendance records
- Medical monitoring and follow ups
- Incident reports and follow ups
- Laboratory inspection reports

XIII. Medical Consultations and Exams

Hunter College will provide employees who work with hazardous chemicals an opportunity to receive a medical examination whenever an employee develops signs and symptoms of exposure associated with chemicals they are using (or come into an overexposure situation) in a laboratory.

A medical consultation will be offered to employees who are present in the event of a chemical spills, leak, explosion or other situation that exposes them to a hazardous chemical. The purpose of the consultation is to determine whether the employee needs a medical examination with follow-up treatment.

These consultations and exams will be provided at no cost to the employee without loss of pay and at a reasonable time and place.

Every effort will be made to refer employees to licensed physicians who have been trained to recognize chemical related signs and symptoms of exposure and disease.

The EHS Office will forward the incident report and any information to the attending physician involved:

- The hazardous chemical the employee was exposed to
- Conditions in which the exposure occurred
- Signs and symptoms of exposure experienced by the employee during, soon after and with 72 hours after the incident

The physician must inform the EHS office in writing and the examined employee of any necessary follow-up results of the medical exam and associated tests and any medical conditions which would place the employee at increased risk as a result of exposure to a hazardous chemical in the workplace.

XIV. Appendices

Appendix A	List of government agencies
Appendix B	OSHA Chemical Hygiene Standard
Appendix C	OSHA Permissible Exposure Levels
Appendix D	Sara Title III Reportable Quantities
Appendix E	NYC Fire Department Directive For Laboratories
Appendix F	NYC DEP Sewer Disposal Regulations
Appendix G	References On Safety And Health Issues
Appendix H	Various Chemical Hazards
Appendix I	Glossary of Terms