Dutchess Community College
Chemical Hygiene Plan

Submitted by: Jeff Cavalieri

Reviewed by: Chemical Hygiene Committee

Date: May 3, 2019

DUTCHESS COMMUNITY COLLEGE

CHEMICAL HYGIENE PLAN

I. Purpose of the Chemical Hygiene Plan at DCC

The purpose of Dutchess Community College's Chemical Hygiene Plan is:

A. To delineate fundamental safe procedures for the storage, use, and disposal of chemicals at Dutchess Community College;

B. To outline basic responses to chemical emergencies, and

C. To provide other background information for the safe handling of chemicals.

Issues of chemical hygiene may arise in laboratory work in a variety of academic disciplines, in the use of chemicals by DCC staff in the course of their duties, and through contact with chemicals by persons visiting areas where they are being used. All staff who must work with chemicals in the course of their duties should be knowledgeable about safe procedures for their storage, use, and disposal, and how to respond to potential emergencies. Furthermore, faculty and staff who work with or teach students must pass on to them appropriate safety information, and enforce student observation of agreed upon safety procedures.

This is an internal document that is intended to be a resource for DCC employees and students. It is available to all college personnel on the ***My*DCC** web page under **Quick Links: Chemical Hygiene Plan**.

II. Safe Handling of Hazardous Chemicals

OSHA (the Occupational Safety and Health Administration) has made significant revisions to the Hazard Communication Standard in recent years. These include adoption of the UN's new Globally Harmonized System of Classification and Labeling of Chemicals (GHS). The final date for compliance with the GHS labeling system was in 2015. Procedures at DCC are in full compliance with the current OSHA Hazard Communication Standard. OSHA continues to revise regulations that are applicable to DCC, necessitating continuous review and revision of procedures.

A copy of the Hazards Communications/Right to Know Program is readily available on the ***My*DCC** web page under **Emergency Services: Emergency Procedures and Additional Information: More Information: Environmental Health and Safety: DCC Hazard Communication/Right-to-Know Program**.

OSHA requires that all chemicals have their own Safety Data Sheet (SDS), which contains information such as the properties of each chemical; the physical, health, and environmental health hazards; protective measures; and safety precautions for handling, storing, and transporting the chemical. An SDS for each chemical used or stored at a site must be available at all times. At DCC, SDSs are maintained on line and are available through the *My*DCC Web Page under **Quick Links: Safety Data Sheet E-Library**. A back up copy of the online SDS electronic library is maintained and is available 24/7 in the Public Safety and Security Department.

DCC is in compliance with the latest GHS standard for labels. Vendors must sell chemicals labeled according to this standard. On the DCC campus, chemicals dispensed from these primary containers into "secondary containers" for use in laboratories must also be labeled with GHS-compliant labels. When chemicals used are dispensed into "tertiary containers" that are too small for adequate labeling (for example, dropper bottles), the GHS required information will be kept on hand at all times. In student laboratories, a notebook containing the GHS standard information for each chemical being used will be on hand in the lab whenever such tertiary containers are employed.

Upon receipt, all chemical containers must be inspected and dated. Unlabeled or improperly labeled containers must not be accepted; the shipper should be notified immediately and arrangements should be made to return the item to the sender. An inventory of all chemicals in storage rooms and laboratories must be kept by the responsible staff member. DCC's chemical inventory is maintained by DCC staff, using the "MSDS Online" service. Locations and quantities are to be updated as chemicals arrive on campus, or as they are used.

An annual inventory should include an inspection of all containers for integrity; the expected shelf life of the stored chemicals should be checked, and all labels should be checked for legibility. All containers containing chemicals (regardless of hazard) must be labeled during use and storage. A chemical that has been transferred from its original container into a secondary container must be labeled with the name of the chemical, the date and the person responsible for the transfer. For hazardous chemicals, the GHS required labeling information must be used. Ordinarily, the contents of the labels provided by the manufacturer of a chemical or material will be transferred from labels on primary containers shipped from manufacturers to labels on secondary containers used at the site. Nonetheless, staff must be familiar with the contents, in order to be able to read the labels correctly, or in order to label a synthesized chemical or a composed mixture that was prepared on site.

The new GHS pictogram system (below) will now be used on all primary and secondary containers, and posters describing it should be posted in all areas where chemicals are stored or handled.

GHS compliant labels will include the following information:

1. **Signal Words** – Indicate to the reader the severity of the hazard, which will be described in more detail on the label. Only two signal words are used for all the hazard classes. "Danger" is used for more severe hazards, and "Warning" for less severe hazards. Only one word will be used on each label regardless of how many hazards a chemical may present. If a chemical requires a "Warning" label for one hazard class, but "Danger" for another hazard class, then only the word "Danger" should appear on the label.

2. **Hazard Statements** – Including hazard class (aligned with pictogram) and severity. Severity of each hazard is given a numerical rating from 1 to 5, with the lower numbers signifying the more severe hazard. In the GHS system, LOWER NUMBERS mean a MORE SEVERE HAZARD. (Note that this order is the opposite of that used in the NFPA system.)

3. **Precautionary Statements** – Recommended measures to prevent or minimize adverse effects from exposure to the chemical. There are four types of precautionary statements:

prevention (to minimize exposure); response (in case of accidental spillage or exposure emergency response, and first-aid); storage; and disposal. At its website, OSHA provides the following example for a chemical presenting a specific target organ toxicity through repeated exposure. It would include the following on the label: "Do not breathe dust/fume/gas/mist/ vapors/spray. Get medical advice/attention if you feel unwell. Dispose of contents/ container in accordance with local/regional/ national and international regulations."

4. **Product Identifier** – Matching that used on the SDS. Should include chemical identity (chemical name, or material or product name), including all ingredients that contribute to toxicity, skin corrosiveness or eye damage, mutagenicity, carcinogenicity, reproductive toxicity, skin or respiratory sensitization, or specific target organ toxicity.

5. **Supplier Identification** – Name, address, and telephone number of the manufacturer or supplier of the substance or mixture.

The GHS pictogram system:

Health Hazard

- Carcinogen
- Mutagenicity
- Reproductive Toxicity
- Respiratory Sensitizer
- Target Organ Toxicity
- Aspiration Toxicity

Flame

- Flammables
- Pyrophorics
- Self-Heating
- Emits Flammable Gas
- Self-Reactive
- Organic Peroxides

Exclamation Mark

- Irritant (Skin & Eye)
- Skin Sensitizer
- Acute Toxicity (Harmful)
- Narcotic Effects
- Respiratory Tract Irritant
- Hazardous to Ozone Layer
  (Non-Mandatory for HazCom)

Corrosion

- Skin Corrosion / Burns
- Eye Damage
- Corrosive to Metals

Gas Cylinder

- Gases Under Pressure

Exploding Bomb

- Explosives
- Self-Reactives
- Organic Peroxides

Skull & Crossbones

- Acute Toxicity
  (Fatal or Toxic)

Flame Over Circle

- Oxidizers

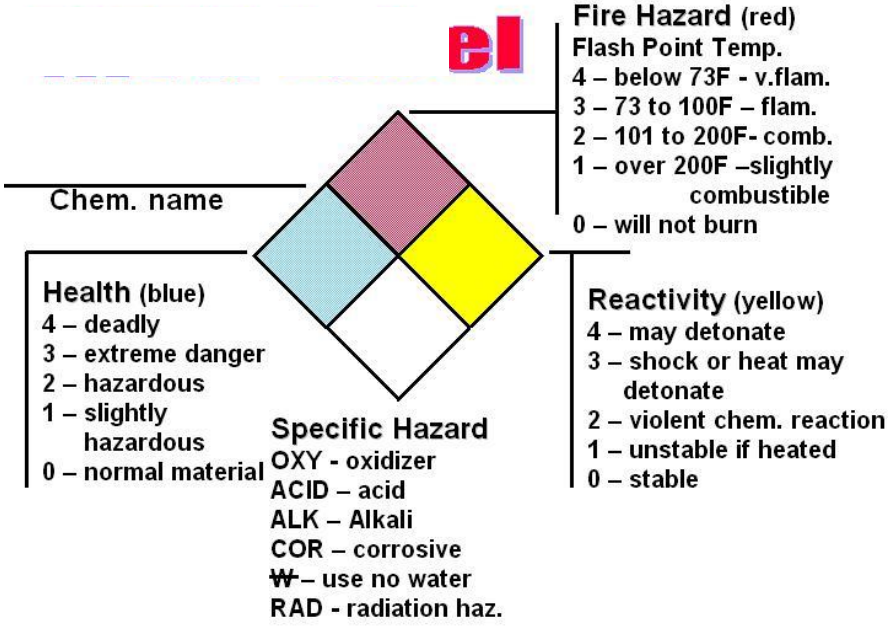
Environment
(Non-Mandatory for HazCom)

- Aquatic Toxicity

Sample GHS compliant label:

The National Fire Protection Association (NFPA) labeling system uses the NFPA fire diamond (shown below), and may still be present on older containers. It may continue to be used on labels and on warning signs for storage locations.

NFPA Fire Diamond:



Mixtures or dilutions of chemicals must be labeled appropriately as well, including new concentrations of all components. If additional hazards are created by potential chemical reaction of mixed components (for example, if nitric acid were mixed with alcohols, or any other oxidizer/reducer mixture were made and not used immediately), these hazards must be indicated on the label using the appropriate terminology, as well as the required GHS pictograms.

Only chemicals approved and purchased by the College are to be stored and used on campus. At no time will the College allow outside chemicals to be brought on campus for use without prior approval from the Chemical Hygiene Committee.

III. General Recommendations for Safe Practices in the Laboratory

Scientists must use hazardous materials and therefore certain precautions must be regularly observed in order to minimize the probability and consequences of an accident. Safety is a result of an alert, thoughtful and informed attitude on the part of each individual. Thus, the most important and reliable way to maintain a safe working environment is to assure that everyone involved in laboratory operations is safety conscious. It is the responsibility of all administrators, faculty, staff and students to promote safety awareness.

While it is impossible to design a specific set of rules that will encompass all potential dangers and thus assure safety in all laboratories, the following general guidelines have proven useful in avoiding accidents and minimizing injuries in the laboratory. A general respect for these rules can make the laboratory a very safe place to work.

1. Before beginning any new task or experiment, prepare by carefully reading instructions and any necessary background information so that you are aware of the potential hazards (physical, chemical, biological, or radiological) and thus can take the necessary precautions. Do not attempt any procedure for which you have not been appropriately trained, and do not handle any chemical unless you are familiar with its properties and hazards.

2. All persons working in the laboratory should be familiar with the location and operation of the basic safety equipment appropriate for the specific laboratory. This includes fire extinguishers, eyewashes, showers, fume hoods, and emergency exits.

3. Appropriate clothing should be worn in the laboratory. This means sturdy shoes, not sandals (no open toed shoes are allowed), and it excludes clothing of fluffy or bulky material, clothing with excessively loose sleeves or other areas of fabric, or which exposes large areas of skin. Long hair should be tied back. Clothing such as headscarves should be fastened so that there is no way that they can swing into a heat source or open chemical.

4. Safety goggles must be worn in the laboratory at all times when experiments are in progress. Contact lenses should not be worn in a laboratory. If a chemical does splash into the eyes, rinse the eyes thoroughly using an eyewash for a minimum of twenty minutes. Seek medical attention immediately by contacting Emergency Services at 911. A secondary call should be made to the College's Security Department at x8070 (845-431-8070 via cell phone).

5. Goggles must also be worn by student aides at all times when working in preparatory labs and storage areas containing chemicals, and while washing laboratory glassware and equipment.

6. Wear a chemical-resistant laboratory apron, lab coat, and/or gloves as appropriate. For example, extra protection of this kind is often needed to protect against biological hazards, corrosive liquids, and allergenic, sensitizing, or toxic chemicals.

7. Consumption of food or drink is prohibited where chemicals are being used or stored. Smoking is not allowed.

8. Avoid unnecessary exposure to chemicals. Do not taste chemicals, and generally do not "sniff" to test chemicals. Do not pipette chemicals by mouth. Do not leave chemicals in unmarked containers.

9. Never light a Bunsen burner in the laboratory without considering what flammable materials may be in use in the laboratory. Make sure the burner is in good working order, and that the hose is in good condition and free of leaks. Never leave a lit Bunsen burner unattended. When gas is not in use, make sure the safety valve for that room is in the OFF position. If a strong odor of sulfides is present in the room (methane thiol is added to gas to make leaks detectable), turn off the gas and leave the room until the odor clears. Do not flip any electrical switches. If the odor persists, call Campus Security from a place of safety at extension 8070 (845-431-8070 via cell phone); they will notify the appropriate emergency services.

10. Wash well with soap and water whenever your skin has been exposed to a hazardous chemical. Always wash your hands before leaving the laboratory.

11. Avoid hazards to the environment by following appropriate procedures for chemical recovery, treatment, or waste disposal of used chemicals. Be sure all used chemicals are placed in clearly labeled containers. Make sure students are aware of the appropriate disposal requirements of each chemical in use.

12. Keep all work areas, especially laboratory benches, free of clutter. Keep all aisles, hallways, and stairs clear of chemicals. Store chemicals in their proper locations.

13. Promptly clean up all spills. Properly dispose of the spilled chemicals and clean-up materials. Students and student aides should immediately inform a faculty or staff member of any spill or injury.

A. Preparation before working in the laboratory:

Always read through an experimental procedure carefully before you plan to conduct the experiment. Be aware of the hazards associated with the experiments. For example, become familiar with special techniques, specific chemicals which may be hazardous, and specific biological hazards before beginning work. Any unusual procedures should get prior approval

from the department head, laboratory supervisor, or a responsible faculty member in that department. Any of the following circumstances would require prior approval:

1. Using hazardous chemicals in quantities which exceed what is considered laboratory scale.
2. Using extremely hazardous materials such as teratogens, blood products, and infectious agents.
3. Using chemicals for which an SDS is not available.

All laboratories where hazardous chemicals are used should be equipped with basic safety equipment like fire extinguishers, showers, fume hoods, and eye washes. Acquaint yourself with the location and use of all safety equipment. In addition, gloves should be available to all workers in the laboratory. Chemical "spill kits" should be placed in strategic locations in the laboratory so that they are easily accessible to instructors and laboratory assistants. All chemical containers must be labeled clearly with the identity of the contents and special hazards. Containers which are not labeled properly should be treated as waste and disposed of in an appropriate manner. Broken glass should not be disposed of with ordinary garbage, but placed in specially marked receptacles. Contaminated, single-use glassware shall be disposed of in an appropriate manner in specially marked receptacles.

B: Procedure-Specific Safety Procedures:

All workers using a chemical should first make themselves fully informed of its properties, specific hazards, and toxicity. If you are unfamiliar with a specific chemical you plan to use, consult the Safety Data Sheet (SDS) online. Take note of the recommended procedures for handling a spill, and for proper disposal of the chemical. Consult an appropriate reference for specific disposal procedures (Appendix I). The law states that a material is not waste until the worker declares it to be waste. In DCC labs, certain chemicals are collected for recovery, reuse, and treatment. These will be declared waste by the laboratory staff when it is decided that they are no longer useful.

Avoid working alone with chemicals in the laboratory. If this is not possible, arrange for a co-worker or Campus Security personnel to check in with you periodically. While faculty and staff may find that working in the laboratory alone is necessary on some occasions, it is best to avoid chemicals and procedures that expose them to higher levels of risk (chemicals with acute toxicity, instability, fire hazard, for example). Students should never work in the laboratory alone. A staff or faculty member should always nearby. Student aides given more training may be entrusted with greater responsibility.

Toxic Chemicals:

Toxic chemicals are those which damage biological structure and function through exposure or accumulation in the tissues. Usually a poison is defined as a substance which may cause serious health effects or death if relatively small amounts of the toxin are inhaled, ingested or absorbed by the skin. The SDS for many chemicals used in the laboratory will state the recommended limits or OSHA-mandated limit, or both, as guidelines for exposure. These limits may be used to assist the worker in determining the safety precautions, control measures and safety apparel appropriate when working with this chemical.

Carcinogens are a class of toxic chemicals capable of increasing the risk of cancer through exposure, usually over time. Teratogens are toxic chemicals capable of causing an increased risk of birth defects in children of exposed workers. Prudent practices are essential when working with known or suspected carcinogens and teratogens to minimize exposure to these chemicals.

Generally, when the volatile chemical has a threshold limit value (TLV) or permissible exposure level (PEL) which is <50 ppm or 100 mg/m^3, an approved fume hood should be used. Hoods should be operated with the sash placed in the optimal position, never fully open. Chemicals should be placed at least four inches inside the sash, and face velocity should be within the range of manufacturer's specifications. Avoid skin contact by wearing the proper type

of protective gloves. Each experimental procedure should include specific instructions on proper disposal of the toxic material.

Use of toxic materials like mercury should be avoided when reasonable alternatives exist. All laboratories which use mercury (for example, mercury thermometers or barometers) should be equipped to handle mercury spills. Two procedures prevail as the leading methods for the proper disposal of mercury: 1. Vacuuming of the spilled mercury with a laboratory aspirator set-up or "sweeper" followed by storage in a closed container for later disposal as heavy metal waste. 2. Absorption with Hg Absorb™ powder or sponges; a mercury amalgam is generated and the resulting amalgam will not emit mercury vapors.

If a small quantity of spilled mercury is discovered anywhere on campus, keep students and staff away from the spilled area until the cleanup is completed. Do not vacuum. Contact the chemistry lab (431-8542 or 431-8539) for help with cleanup. They will assess the situation, and take the necessary steps. Hg Absorb™ is available in the chemistry stockroom, and stockroom staff can provide advice and assistance with the cleanup. The vapor pressure of mercury at room temperature is extremely low, and it will not pose any immediate hazard.

Flammable Chemicals:

Flammables are materials which may easily ignite, burn and serve as a source of fuel for a fire. In general, the flammability of a chemical is determined by its flash point, the lowest temperature at which an ignition source can cause the chemical to ignite momentarily under certain controlled conditions. Chemicals with low flash points, below 200 °F (93.3 °C), are generally considered "fire-hazard chemicals". Organic solvents are the most common flammable chemical in the science laboratories. All fire-hazard chemicals should be stored in a flammable-solvent storage area or in a designated cabinet. Remember that the vapors of flammable liquids are heavier than air and thus will travel along bench tops and down drain troughs, and collect in low areas like sinks. It is therefore essential that all flames within the vicinity of a flammable liquid be extinguished and all possible spark or ignition sources be excluded. Adequate

ventilation is one of the best ways to prevent vapors from accumulating and thus when working with large quantities of flammable liquids, it is best to work in a fume hood.

When working with flammable materials, be sure that there is a fire extinguisher and safety shower nearby. Should a person's clothing catch fire, immediately put the person under a safety shower, or if none is available, push them to the ground and roll them over to extinguish the flames. Prevent the victim from running. A so-called “fire blanket” is not the best choice - it tends to funnel flames past the victim's mouth, and clothing continues to char beneath it. However, it is useful for retaining warmth to ward off shock after the flames are out, and may be used to smother a small fire on a table or floor.

Use of fire extinguishers:

Staff and Faculty should make sure that the appropriate class of fire extinguisher is available in their area. Each fire extinguisher is labeled with its class designation, A, B, C, D, or K, based on the type of fire it is appropriate to fight. It can be dangerous to use the wrong extinguisher for a particular flammable material. For instance, CO_2 extinguishers should not be used to fight fires in combustible metals, since many metals can be oxidized by CO_2. Water or fire extinguishers dispensing water are ineffective on burning organic solvents, since most organics will float on water, which can cause them to spread. (Regardless of this, a deluge of water is the best way to extinguish a fire on a person, even if a solvent is involved.) Some extinguishers are appropriate for more than one type of fire.

- Class A fire extinguishers are effective against fires on wood, paper, textiles, or plastics.
- Class B extinguishers are effective against flammable liquids.
- Class C extinguishers are for electrical equipment.
- Class D extinguishers are for combustible metals, like magnesium, sodium, titanium, etc.
- Class K extinguishers are for kitchen fires, primarily fats and oils.

Follow these FEMA guidelines to decide whether you should fight a small fire or evacuate. Only attempt to extinguish the fire if -

- The fire is small and contained,
- You are safe from toxic smoke,
- You have a means of escape,
- Your instincts tell you it's OK.

If in doubt, evacuate and call Campus Security at ext. 8070 (431-8070 from a cell phone). They will contact the necessary emergency services.

The use of most handheld fire extinguishers is summarized by the “P-A-S-S” mnemonic.

1. P - Pull the pin.
2. A - Aim low, at the base of the flames.
3. S - Squeeze the lever. Release to stop the flow.
4. S - Sweep from side to side.

Most extinguishers work for only 1-2 seconds per pound. A typical wall mounted extinguisher may last for 10-20 seconds. The stream will reach a maximum distance of 5-20 feet, depending on the type. Be sure to familiarize yourself with the type of extinguisher in your work areas.

Reactive Chemicals:

Reactive chemicals are materials which may release large amounts of energy under certain reaction conditions. A reliable reference on chemical reactivity is the "Hazardous Chemicals Desk Reference" by Richard J. Lewis, Sr. (Wiley-Interscience). Guidelines on which

chemical are reactive are sometimes provided on the SDS and on labels. Particular caution should be exercised when working with oxidizers, organic peroxides, water-reactive materials, air-sensitive materials and explosives. In general, handle reactive chemicals with all the proper safety precautions, including segregation in storage and prohibition on mixing even small quantities with other chemicals without prior approval and appropriate protection. For example, oxidizers should not be stored with flammable materials, and concentrated strong acids should not be stored with concentrated strong bases.

Peroxides are explosive impurities that can form spontaneously in certain chemicals in the presence of air. When containers are opened and air enters the headspace, peroxides may form thereafter during storage. They act as high explosives, and are very unstable. Even small traces are enough to ignite vapors of flammable chemicals. They may collect around the cap of the bottle, where friction during opening may later cause ignition. People handling chemicals should make themselves aware of the potential of peroxide formation.

Although many chemicals are potential peroxide formers, the risk is particularly high with ethers like diethyl ether. Cans or bottles of ether solvents should be dated when opened and, if not used within a year, should be tested and treated for peroxides or disposed of. Opening bottles of ethers that have come into contact with air and then been stored for an extended period of time can be very dangerous. If in doubt, transfer such samples to a qualified disposal company without opening them.

Disposal of reactive chemicals generally requires prior treatment to render the chemical less hazardous. Consult an appropriate reference (Appendix I).

Corrosive and Contact-Hazard Chemicals:

Strong acids, bases (alkalis), dehydrating agents, and oxidizing agents should be handled carefully, avoiding contact with the skin and eyes and breathing of or skin contact with the vapors. Corrosiveness, allergenic, and sensitizer information is often given on manufacturer's SDS or on labels. Wear safety goggles, gloves, and a protective laboratory apron or coat.

Because many acids and bases release a tremendous amount of heat when they are mixed with water, they should always be added to water when diluting rather than water added to them. This is particularly true of concentrated acids and bases. This provides a heat sink (the water) to minimize the risk of spattering.

All spills should be cleaned up immediately. Small spills of acids and bases may be diluted with water and then flushed to the sewer system. Large spills of concentrated acid and bases should be neutralized before diluting with water. Laboratories handling such reagents should have a spill kit. (See "Chemical Spills" section for contents.) Consider that if other toxic substances are present (perhaps a heavy metal ion), the mixture may not be appropriate for disposal in the drains.

If skin or eye contact does occur with one of these substances, the affected area should be washed immediately and thoroughly with large quantities of water for at least 20 minutes, using eyewash fountains or the sink faucet as the situation warrants. No attempt should be made to neutralize the reagent chemically after contact has occurred. Remove any contaminated clothing. Contact the laboratory supervisor in the event of any accident. Seek medical attention immediately by contacting Emergency Services at 911. A secondary call should be made to the Campus Security at ext. 8070 (431-8070 via cell phone).

Vapors of volatile acids and of ammonia (a volatile base) can be very harmful and corrosive, and are inhalation hazards and lachrymators. Spills of large quantities of these substances should be remediated by specialists using SCBA equipment. Evacuate the area and call Campus Security at ext. 8070 (431-8070 via cell phone); they will notify the appropriate emergency services.

In any case where there is a medical emergency, call Emergency Services first at 911. Immediately thereafter a second call should be made to Campus Security at ext. 8070 (431-8070 via cell phone). If there is no medical emergency (as in gases of spills, gas leaks, etc.), call Campus Security first.

Compressed Gases:

Regardless of the use or contents of a cylinder, compressed gas cylinders represent a serious health and safety hazard. Flammable gases and toxic gases present obvious hazards but even "harmless" or inert gases may cause asphyxiation if the gas accumulates to a high concentration. All cylinders should be checked for leaks, before and after a regulator is put in place. A compressed gas cylinder is a potential projectile or explosion risk if damaged. Damage is most likely when not properly secured. All compressed gas cylinders should be clamped securely at all times during usage, transport and storage. In addition, during transport and storage, regulators must be removed and the cylinder caps must be secured. Gas cylinders must always be transported in a cylinder cart.

Storage incompatibility rules must also be followed in the storage of compressed gases. In particular, oxidizing gases like oxygen (O_2) should be stored apart from any combustible gas, ideally in a different room, or with at least 6 feet of separation.

Chemical Spills:

Regardless of the chemical involved, an immediate and appropriate response is essential. The first line of defense is spill prevention. Large bottles of reagents should be carried inside a bottle caddy or other unbreakable container. Generally, small spills (less than 1 L) may be handled safely with the proper materials and appropriate training. A chemical spill kit should be available in all laboratories where chemicals are used and stored. However, never attempt to clean up a chemical spill if you are uncertain how to do so safely or lack the proper protective equipment. Evacuate the area and get assistance. In addition, if the spill is large, evacuate the area and get assistance before attempting to deal with the spill. Chemistry staff will have access to spill dams to help isolate the area. If the spill is large (greater than 1 L) and the chemical is toxic, volatile, flammable, or very reactive, or if the available staff are unequipped to handle the spill, evacuate the area. Call Campus Security at ext. 8070 (431-8070 via cell phone); they will notify the appropriate emergency services.

Attend to any individual contaminated in the spill. If skin contact with a corrosive or toxic chemical is involved, immediately douse the affected area with water using a shower, sink faucet, or eye wash as necessary. Remove all contaminated clothing and jewelry and continue flushing with large quantities of water for at least 20 minutes. Notify the laboratory supervisor. Seek medical attention immediately by contacting Emergency Services at 911. A secondary call should be made to the Campus Security at ext. 8070 (431-8070 via cell phone).

There are two basic options when handling a chemical spill - chemical neutralization and chemical absorption. Most organic solvents (both water soluble and insoluble) should be collected using a dry absorbent. Absorption reduces the chance for fire by suppressing flammable vapors. The used absorbent should be collected, bagged, labeled and stored for proper disposal. Most acids and bases can be safely neutralized by using either sodium bicarbonate ($NaHCO_3$) or a commercially available neutralizer. Be sure to follow directions which accompany the commercial neutralizers. Spill Kits should be maintained in laboratory stockrooms.

Sample Spill Kit Contents:

2 pounds acid neutralizer	4 chemical sorbent sheets
2 pounds base neutralizer	2 waste disposal bags
5 pounds clay-type absorbent	spill waste disposal labels
2 pairs gloves	1 organic vapor / acid gas respirator
2 pairs safety goggles	Hg Absorb powder or aspirator system
Spill dams (“Pigs”)	for Hg collection

IV. Safe Handling and Disposal of Biological Hazards:

Biological hazards (e.g. pathogens, bacteria, blood, etc.) will normally be used only in the Microbiology and MLT (Medical Laboratory Technology) laboratories. Faculty should be trained in precautions and disposal procedures for these hazards.

Handling of biological hazards in the AHBS Department will not normally include the blood or infectious agents as listed in "Biosafety in Microbiological and Biomedical

Laboratories", at the U.S. Centers for Disease Control and Prevention website (https://www.cdc.gov/labs/BMBL.html). Prudent handling practices (hood, sterile techniques) and proper protective equipment (gloves, lab coat, goggles, etc.) will be used when handling biological hazards. A reliable reference on Biological Hazards is Biosafety in the Laboratory (Appendix I).

Biological waste should be placed in appropriately labeled receptacles and disposed of by autoclaving at 121˚C and 15 psi for one hour. After treatment, the waste is considered non-hazardous but is collected for disposal by a medical waste transporter. Contaminated syringes, needles and Pasteur pipettes should be disposed of in an appropriately labeled "sharps" container and stored properly until approved pick-up is arranged.

Medical Waste Management System:

The College health office is the office responsible for sharps and medical waste program. Call extension 8075 for details.

Hypodermic needles and syringes, whether or not intended for medical purposes, must be kept locked in an approved receptacle. The AHBS labs have appropriate storage and can store needles for other departments.

V. Chemical Waste Disposal Program:

The aim of the program is to minimize risk to people and the environment upon disposal of laboratory chemicals. First and foremost, efforts to minimize the quantity of chemical waste must be made. Chemicals should be purchased in quantities that are consistent with their planned use. In addition, staff and faculty should regularly consider ways of reducing the amounts of chemicals used and reusing chemicals generated in laboratory experiments and procedures. In short, recycling and chemical reclamation should be used whenever possible.

Each written laboratory experiment should include specific information for students on the safe treatment and disposal of hazardous chemicals used. Staff and faculty should prepare

themselves before scheduled labs, and be ready to answer student questions on the subject of safe handling and disposal. Chemicals used in laboratory work should be collected for recovery and possible recycling for reuse. These should be stored properly until recovery is completed, at which time they may be declared waste by the laboratory supervisor. Once officially declared to be chemical waste, they should be prepared for timely pick-up by a professional waste disposal company. In general, concentrated acids or bases, highly toxic, malodorous or lachrymatory substances, and any substance which might interfere with the biological activity of waste water treatment plants, create fire or explosion hazards, cause structural damage, or obstruct flow must not be placed in the sewer system. Regular inspections will be made to ensure labels are affixed and the receptacles of waste are not leaking and are stored correctly.

Small quantities of non-toxic water-soluble materials may be disposed of in a laboratory drain. Small quantities of common mineral acids and bases may be diluted and disposed of in a laboratory drain. Larger quantities of acids and base should be neutralized prior to disposal down the sink. Volatile organic solvents should be separated into halogenated and non-halogenated substances and stored until the next pick-up by a qualified waste disposal company. Incineration in an environmentally acceptable manner is the most practical method for disposal of combustible laboratory waste. Heavy metal wastes should be collected and stored for processing and disposal.

Appendix A: Responsible Personnel

The Chemical Hygiene Committee (CHC) oversees and monitors the effectiveness of the Chemical Hygiene Plan and revises and updates it annually. The CHC meets on a monthly basis to discuss chemical hygiene issues. Members include staff and/or faculty representatives of departments that operate laboratories where chemicals are handled, AHBS, PSET, and PVAC, as well as the Chemical Hygiene Officer and the Campus Safety Coordinator.

The Chemical Hygiene Officer (CHO) for the College must have expertise in chemistry and experience in undergraduate labs, and is available to provide advice on chemical properties

to the Chemical Hygiene Committee and any DCC personnel who have questions. The CHO will:

i) provide technical guidance in development and implementation of the Chemical Hygiene Plan,

ii) oversee that any monitoring or medical records necessary are kept in accordance with the OSHA requirements, that the SDS collection is maintained in the appropriate departments, and

iii) consult with staff members on the procurement and storage of laboratory chemicals and disposal of waste materials.

The Campus Safety Coordinator will work with the CHO in conducting periodic safety inspections and training sessions, and addressing any actual or potential safety hazard in laboratory operations. Liaison to the administration is also through the Campus Safety Coordinator, a member of the Office of the Dean of Administration.

Academic department heads have the responsibility to insure that the general recommendations for safe laboratory practices are followed in all laboratories in their department, and that departmental faculty and staff handling chemicals receive appropriate training. In addition, they must ensure that appropriate safety equipment is available to laboratory workers, and provide names of new hires to the Campus Safety Coordinator to facilitate safety training. The personnel responsible for the individual laboratories are Teaching Laboratory Assistants from the PSET (chemistry), AHBS (biology), and PVAC (art) departments. They should be contacted immediately in case of any accident occurring in their laboratories. The Teaching Laboratory Assistants are responsible to maintain the online SDS files through "MSDS Online" for each of their areas of responsibility. They are also responsible to maintain accurate chemical inventories and to ensure that all chemicals under their responsibility are properly labeled in accordance with the GHS format. Campus Security's telephone number should also be posted, as they must also be contacted in the case of emergencies. In the case of a chemical spill, personnel who should be notified include the

Security Director, the Campus Safety Coordinator, the Chemical Hygiene Officer, the HVAC Supervisor, the Chemistry Teaching Laboratory Coordinator, and the department head or designee in whose area the spill occurs.

Appendix B: Employee Information and Training

Appropriate training for all College personnel that work in the laboratory setting shall be provided. The training shall include the following:

- Methods and observations that may be used to detect the presence or release of a hazardous chemical (such as monitoring conducted by the employer, continuous monitoring devices, visual appearance or odor of hazardous chemicals when being released, etc.);
- The physical and health hazards of chemicals in the work area;
- The measures employees can take to protect themselves from these hazards, including specific procedures the employer has implemented to protect employees from exposure to hazardous chemicals, such as appropriate work practices, emergency procedures, and personal protective equipment to be used; and
- Applicable details of the College's written Chemical Hygiene Plan.

General safety instructions (preferably included in the lab books) should be given to every student before he or she uses the laboratory. Directions for addressing problems, which are specific to any experiment, should accompany that experiment.

Laboratory assistants should be given explicit instructions on how to deal with potential problems such as fires, burns, cuts and toxic chemical spills.

All lab workers will be informed as to the provisions of the OSHA standards "Occupational Exposures to Hazardous Chemicals in the Laboratories" (29 CFR 1910.1450 dated 5/1/90). This is available online at: https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10106

The Chemical Hygiene Plan is available to all employees **on the *My*DCC Web Page under Quick Links: Chemical Hygiene Plan**.

All laboratory workers will be aware of how to access the online SDS files and other reference material on the safe handling, storage and disposal of hazardous chemicals in the workplace.

Employees will be made aware of permissible exposure limits (PEL) for regulated substances and recommended exposure limits for other hazardous chemicals where no OSHA standard applies. Employees will be made aware of signs and symptoms associated with exposure to hazardous chemicals.

Appendix C: Emergency medical procedures

In the event of a medical emergency, laboratory personnel are not required to provide direct first aid, although they may do so on a voluntary basis. They should contact Emergency Services immediately at 911. A secondary call should be made to the Campus Security at ext. 8070 (431-8070 via cell phone).

Appendix D: Medical records

1 - All injuries occurring in the laboratory should be reported to the Dutchess Community College Health Office, which will maintain a record of incidents.

2 - A physical examination or medical consultation should be available to employees whenever:

a) Any lab worker develops signs or symptoms of a chemical exposure.

b) Routine exposure, spill, leak or other unusual occurrence causes the probability of an exposure.

c) Requested by an employee.

3 - The employer will provide the examining physician with specific information on the identity of the hazardous chemical, conditions of exposure, and a description of the signs and symptoms experienced by the worker.

4 - The physician will provide a written opinion for a recommended follow-up examination, test results, detected medical conditions that may pose increased risk and a statement that the employee was informed of medical examination and consultation results.

Appendix E: Safety Inspections

The Campus Safety Coordinator and the Chemical Hygiene Officer will schedule regular safety inspections of laboratories and chemical storage facilities. Safety equipment will be regularly checked, including fire extinguishers, eyewashes, showers, spill kits, stockrooms, and fume hoods.

Appendix F: Disposal of Hazardous Chemical Waste

Specifically labeled bottles must be kept available for all used chemicals being recovered. Used chemicals should be collected for appropriate treatment or recovery procedures. The chemicals may be designated as waste with the approval of the Chemistry Teaching Laboratory Coordinator. These should be separated according to compatibility and may include designations such as "halogenated solvents", "non-halogenated solvents", "solid organics", "heavy metals", and "mercury". These substances should be stored in the flammables cabinets, in secondary containers such as bins, until pick-up, when they will be sent to an approved disposal facility.

Appendix G: Medical Waste

In order to manage the medical waste, its usage (including sharps) and collection, the following guidelines are offered.

College Health Office

The supervising nurse shall be responsible for overseeing the college's medical waste operation. An authorized medical waste transporter shall be identified via the Bid Process and a

contract will be signed for services. The supervising nurse will prepare purchase orders and D.E.C. tracking forms, and coordinate pick-ups. Additionally, areas will be identified for the temporary storage for medical waste bags and sharps containers. The medical waste must be placed in authorized cadmium-free red bags and separately stored, labeled and sealed securely until pick-up by the authorized private contractor is necessary. The supervising nurse will train key people in those departments, to be identified as Medical Waste Collectors.

Additional Information

Falcon Hall Gym, the Campus Security Department, and Day Care will have any medical waste generated brought to the College Health Office for bagging, labeling and disposal as soon as possible. The supervising Nurse will retain all copies of medical waste manifests for tracking purposes.

Appendix H : Security Issues

In accordance with heightened national security, the security of our laboratories and chemical storage areas has become a more dominant issue in our planning and operation activities.

1. Training

The Chemical Hygiene Officer has redacted the training module to emphasize the Federal and State requirements, critical areas on campus, properly identifying materials (radioactive, chemical, biological) and the mandate associated with securing them.

2. Security Measures

A layered approach to security of chemical storage includes key controls, random security patrols, lab assistant oversight of student aide access to chemicals, instructor responsibility for students in labs, and supervision by Department Heads. Other "target hardening" measures such as added CCTV and emergency phones, coupled with the college's chemical hygiene committee's self-inspection audits throughout the year, will add to the heightened awareness of risk and enable necessary responses.

3. Liaison

The Director of Campus Safety is in contact with the NY State Police Counterterrorism Intelligence Unit, the Dutchess County Sheriff's Counterterrorism Unit, the Town of Poughkeepsie Police Department, Fairview Fire Department, the Dutchess County Coordinator of Emergency Response, and other State emergency management teams on a regular basis.

4. Follow-up Inspections

As is the present practice, unannounced inspections of labs and storage areas by department heads, fire marshals, OSHA or PESH representatives, and members of the Chemical Hygiene Committee will continue to be the norm. Lab staff and staff responsible for chemical storage areas should be ready at all times for inspection. When necessary, in-place procedures may be changed. Appropriate action will be taken when non-conformance is discovered, whether through administrative or criminal channels, as the situation dictates.

Appendix I: Reference Texts

- *Handbook of Laboratory Safety*, The Chemical Rubber Company, Cleveland, Ohio 1971.
- *Laboratory Health and Safety Handbook*, John Wiley and Sons, NY, 1990.
- *Prudent Practices for Handling Hazardous Chemicals in Laboratories*, National Academy Press, Washington, D.C. 1981.
- *Guide for Safety in the Chemical Laboratory,* Manufacturing Chemists Association, 1972.
- *Rapid Guide to Hazardous Chemicals in the Workplace,* Irving Sax and Richard Lewis, 1986.
- *Toxic and Hazardous Industrial Chemicals Safety Manual,* International Technical Information Institute, 1986.
- *Working Safely with Chemicals,* Christine Gorman, Genium Publishing, 1993.
- *Organic Chemistry Laboratory Survival Manual, 3rd ed.,* Zubrick, Wiley, New York, 1992.

- *Safe Storage of Laboratory Chemicals,* Pipitone, 1984.
- *Hazardous Chemicals, Information and Disposal Guide*, 3rd ed., M. A. Armour, L. M. Browne and G. L. Weir. Department of Chemistry, University of Alberta, Edmonton, Alberta, Canada, T6G 2G2, 1988.
- *Destruction of Hazardous Chemicals in the Laboratory,* G. Lunn and E. B. Sansone, Wiley, New York, 1990.
- *Prudent Practices for the Disposal of Chemicals from Laboratories*, National Academic Press, Washington, D.C. 1983.
- *Waste Disposal in Academic Institutions,* J. Kaufman, 1990.
- *Handbook of Laboratory Disposal,* Martin and Eva Pitt, 1985.
- *Biosafety in the Laboratory; Prudent Practices for the Handling and Disposal of Infectious Materials,* National Academy Press, Washington, D.C. 1989.
- *"Hazardous Chemicals Desk Reference"* Richard J. Lewis, Sr., Wiley-Interscience, 2006.