Onondaga Central School District

Chemical Hygiene Plan

Purpose/Scope: To Communicate Chemical Hazards in the Science Laboratory

Reason for Revision: Annual review and updates.

Distribution List:

Superintendent
Building Administrators – Jr. High School and High School
Chemical Hygiene Officer
Science Instructors – Jr. High School and High School
Director of Facilities

Revised: July 2024

TABLE OF CONTENTS

I. INTRODUCTION

The **Onondaga School District** has developed the following Chemical Hygiene Plan as required by OSHA 29 CFR 1910.1450 which addresses Occupational Exposure to Hazardous Chemical in Laboratories. A copy of the OSHA Standard is provided as Appendix A of this plan.

This Chemical Hygiene Plan provides general information and specific procedures on chemical safety within the laboratory and is to be used as a reference guide by the chemical hygiene team and laboratory instructors who use or may be potentially exposed to hazardous chemicals and substances during the course of instruction.

The purpose of this plan is as follows:

1. To protect laboratory instructors and students from health hazards associated with the use of hazardous chemicals in the laboratory and to minimize exposures.

2. To minimize chemical exposures in the laboratory to the extent where the Permissible Exposure Limits (PEL) will not be exceeded.

This plan will be made available for review to all affected employees and a copy will be located in the following areas:

1. **Science Department Office: Jr. Sr. High School**

2. **Main Office Jr. Sr. High School**

3. **District Office**

4. **Online District Website**

This plan will be reviewed annually by the **Chemical Hygiene Team, along with the District's Safety Officer,** and updated as necessary.

II. GENERAL PRINCIPLES FOR WORKING WITH LABORATORY CHEMICALS

A. **Minimize all chemical exposures:** Because few laboratory chemicals are without hazards, general precautions for handling all laboratory chemicals should be adopted, rather than specific guidelines for particular chemicals. Skin contact with chemicals should be avoided as a cardinal rule.

B. **Avoid underestimation of risk:** Even for substances of no known significant hazard, exposure should be minimized; for work with substances which present special hazard, special precautions should be taken. One should assume that any mixture will be more toxic than its most toxic component and that all substances of unknown toxicity are toxic.

II. GENERAL PRINCIPLES FOR WORKING WITH LABORATORY CHEMICALS (cont'd)

C. **Provide adequate ventilation:** The best way to prevent exposure to airborne substances is to prevent their escape into the working atmosphere by use of hoods and other ventilation devices.

D. **Institute a chemical hygiene program:** A mandatory chemical hygiene program designed to minimize exposure is needed; it should be a regular, continuing effort, not merely a standby or short-term activity.

E. **Conduct regular and frequent safety inspections:** Perform routine inspections of laboratory facility, safety equipment and personal protective equipment. Mitigate hazardous situations immediately. Investigate and analyze all accidents and near accidents to prevent possible reoccurrence.

F. **Perform chemical safety training:** Train all science personnel who use hazardous chemicals in the proper use of laboratory and protective equipment, emergency equipment and safe work procedures.

III. RESPONSIBILITIES WITHIN THE CHEMICAL HYGIENE PLAN

The following individuals are assigned responsibilities within this plan:

School Superintendent: Robin Price

School Business Administrator: Joseph Sterbank

Department Chairperson: Eric Sharpsten

Building Administrator(s): Jr/Sr.High School, Mr. Mumford

Chemical Hygiene Officer: Eric Sharpsten

All District Science Instructor(s): See Appendix B

A. Chief School Officer/Superintendent: Has the ultimate responsibility for chemical hygiene within the institution and must, with other administrators, provides continuing support for institutional chemical hygiene.

B. Department Supervisor and/or chairperson: Is responsible for chemical hygiene in that department and/or building. Also, has overall responsibility for chemical hygiene in the laboratory including responsibility to:

1. Ensure that staff knows and follows the chemical hygiene rules, that protective equipment is available and in working order, and that appropriate training has been provided;

III. RESPONSIBILITIES WITHIN THE CHEMICAL HYGIENE PLAN (cont'd)

2. Provide regular, formal chemical hygiene and housekeeping inspections including routine inspections of emergency equipment;

3. Ensure that facilities and training for use of any material being ordered are adequate.

C. Chemical Hygiene Officer is responsible to:

1. Work with administrators and other employees to develop and implement appropriate chemical hygiene policies and practices;

2. Monitor procurement, use and disposal of chemicals used in the laboratories. See that appropriate inventories are maintained;

3. Know the current legal requirements concerning regulated substances;

4. Determine the required levels of personal protective equipment. Help develop precautions and adequate facilities;

5. Seek ways to improve the chemical hygiene program.

D. Laboratory Instructor/Staff is responsible for:

1. Planning and conducting each lesson and/or operation in accordance with the institutional chemical hygiene procedures;

2. Including in all lesson plans, hazards likely or possible encountered and emergency responses and preventive measures for remediation;

3. Enforce standard operating procedures and proper personal chemical hygiene habits in the laboratory.

IV. EMPLOYEE INFORMATION, TRAINING, AND RECORDS

A. Employee Information

1. Signs and Labels: The OSHA Laboratory Safety Standard (29 CFR 1910.1450) requires that the original manufacturer's label is retained and that this label is not defaced or altered. These labels must not be removed. If defaced, either a new label must be made or the chemical removed from use. All containers shall be labeled with the identity of the contents (including water), and where appropriate a hazard warning for that chemical.

IV. EMPLOYEE INFORMATION, TRAINING, AND RECORDS (cont'd)

A. Employee Information:

1. Signs and Labels

Hazard warnings are commonly expressed in words such as "Corrosive - Do not splash in eyes or on skin - will cause burns". However, it has become increasingly popular to use symbols and pictograms to express hazards. If a unique system is used, such as the NFPA labeling system, a wall chart should be posted explaining the system. Portable containers into which hazardous chemicals are transferred into from stock containers can be labeled with the product name only.

All waste containers must be labeled to indicate the type of waste that can be safely deposited within that receptacle. See Section IX of this plan for more information on waste disposal.

In addition to labels, prominent signs and labels of the following types should be posted in the laboratory and storage areas.

a. Emergency telephone numbers including emergency responders, administrators, Chemical Hygiene Officer, Poison Control (1-800-222-1222).
b. Location signs for emergency equipment such as eyewash stations, safety showers, fire extinguishers, fire blankets, emergency exits, first aid equipment, areas restricted to food and beverage consumption and other safety signage as necessary.
c. Signs and warnings at areas or equipment where special or unusual hazards exist and designated areas for particularly hazardous substances.

2. Chemical Handling: Individuals handling chemical stocks should be familiar with the hazards of the chemicals. Knowledge must include safety precautions, handling equipment and procedures, protective apparel, proper storage and any pertinent regulations. They also should know who to call if any chemical container is leaking or damaged and that they are not to touch it or attempt to clean it up.

3. Literature/Consultation: Literature and/or consulting advice concerning chemical hygiene should be readily available from the Chemical Hygiene Officer for laboratory personnel and students. A list of resources and references is provided in Appendix F of this plan.

IV. EMPLOYEE INFORMATION, TRAINING AND RECORDS (cont'd)

B. Employee Training:

The training and education program should be a regular, continuing activity not simply a one-time presentation. Training will be provided by the Science Department Staff and/or OCM BOCES Health and Safety Personnel. Information and training is to be provided at the time of an employee's initial employment and prior to any assignments involving any chemical exposure. Additional training shall be provided whenever a new chemical hazard is introduced into the laboratory. The frequency of refresher training is at the discretion of the district.

The goal of the District's training program is to assure that all individuals working in labs are adequately informed about the work in the laboratory, the risks, and what to do if an accident occurs.

Every laboratory instructor and his/her substitute should know the location and proper use of available protective apparel and equipment.

The information and training program shall inform all laboratory employees of the following:

1. The contents of the Chemical Hygiene Standard, OSHA 29 CFR 1910.1450, shall be made available to laboratory employees.

2. The location, specific details, and availability of the District's Chemical Hygiene Plan.

3. The location and proper use of available personal protective equipment (chemically-resistant gloves, splash goggles, etc.) and emergency equipment (eyewash stations, safety showers, etc.).

4. Provisions of the labeling requirements of the Globally Harmonized System (GHS) as required within the revised OSHA Hazard Communication Standard.

5. Signs and symptoms associated with exposures to hazardous chemicals used in the laboratory.

6. The location and availability of known reference material on the hazards, safe handling, storage and disposal of hazardous chemicals found in the laboratory including, but not limited to, Safety Data Sheets (SDS) received from the chemical manufacturer and/or supplier.

7. Methods and observations that may be used to detect the presence or release of a hazardous chemical.

8. The physical and health hazards of chemicals in the work area.

9. The measures employees can take to protect themselves from such hazards, including any specific procedures that the District has implemented. Examples include appropriate work practices, emergency procedures, spill response, and use of personal protective equipment.

IV. EMPLOYEE INFORMATION, TRAINING AND RECORDS (cont'd)

C. Records:

The Chemical Hygiene Officer will supervise the maintenance of all records associated with this plan.

1. Accidents: Accidents shall be documented using the district accident form and retained in the business office at the district office. These should include all injuries, property damage and near misses. All reportable accidents (as defined) must be included on the annual DOSH 900 accident log forms.

2. Safety Inspections: Records should be maintained to document inspections of facilities, equipment and procedures and the remediation of all non-compliant areas.

3. Testing: Records of all equipment test records must be maintained. Records of all environmental tests and/or air monitoring must be retained.

4. Inventory: Inventory records must be maintained in accordance with Education Law, section 305, and updated at least annually.

5. Waste: Disposal manifests and bill-of-ladings must be maintained according to applicable regulations.

6. Medical Records: All medical records, if applicable, must be retained in a confidential manner in accordance to state and federal regulations, including OSHA 29 CFR 1910.1020.

7. All training records shall be maintained for the length of employment plus 30 years.

V. MEDICAL CONSULTATION AND EXAMINATION

A. Requirements within the Laboratory Standard:

The laboratory standard does not mandate medical surveillance for all laboratory workers. There are, however, certain circumstances where employers must provide any employee who works with hazardous chemicals an opportunity for medical attention. Specifically, medical attention, including any follow-up examination and treatment recommended by the examining physician, must be offered under the following circumstances:

1. Whenever any employee exhibits signs or experiences symptoms associated with exposure to a hazardous chemical used in the laboratory.

V. MEDICAL CONSULTATION AND EXAMINATION (cont'd)

2. Whenever any employee who is exposed routinely above the action level or, in the absence of an action level, above the permissible exposure limit (PEL) for an OSHA regulated substance for which there are exposure monitoring or medical surveillance requirements such as formaldehyde, formalin, and lead.

3. Whenever an event takes place in the laboratory area such as a spill, leak, explosion, or other occurrence resulting in a potential significant exposure to a hazardous chemical.

B. Required Information and Records:

When required, the district must provide the physician specific information on the identity of the hazardous chemical, conditions under which the exposure occurred, and a description of the signs and symptoms experienced by the employee. The District also must obtain from the physician any written opinion for a recommended follow-up examination and any test results. The District must also obtain a statement from the physician verifying the date the examination was performed and that the employee was informed of the medical examination/consultation results.

C. First Aid:

Personnel trained in first aid (i.e., school nurse) should be available during working hours. All staff should be trained in the procedures to follow in the event of an emergency. Emergency telephone numbers including the School Nurse, Administrators, and the Chemical Hygiene Officer, should be posted in each laboratory. The following measures should be taken immediately upon chemical contact.

1. Skin, eye or mouth contact: Wash the affected area immediately with large amounts of clean water for at least fifteen minutes. Summon the school nurse immediately.

2. Chemical contamination of clothing: Take off the item of clothing immediately to avoid soaking through to the skin. If skin contact has occurred follow (1) as listed above.

3. If possible, determine the chemical involved and its concentration, to assist medical personnel in treatment.

VI. CHEMICAL PROCUREMENT, DISTRIBUTION, AND STORAGE

A. Procurement:

Laboratory chemicals should be purchased cooperatively district-wide to avoid duplication and excess chemicals. Before a substance is received, information on its proper handling, storage and disposal should be known to those who will be involved in handling and using the substance. No container should be accepted without an adequate identifying label and accompanying SDS. Preferably, all substances should be received in a central location and handled only by knowledgeable staff. Whenever possible, a non-toxic or less hazardous chemical should be substituted for toxic materials.

B. Distribution:

Transporting chemicals from one area to another can be a serious safety and health problem. Employees who are not knowledgeable about the characteristics of the chemical could be unduly exposed through lack of awareness, carelessness or neglect. For this reason, extra precautions are not only prudent, but necessary.

When chemicals are hand carried, the container should be placed in a secondary container or bucket. Flammable, corrosive and other noxious chemicals supplied in glass containers should be protected with bottle carriers or transported in the original Styrofoam overpack.

C. Storage:

1. Stockrooms/Storerooms: Toxic substances should be segregated in a well identified area with local exhaust ventilation. Stockrooms/storerooms should not be used as preparation or repackaging areas unless provisions for adequate ventilation and appropriate safety equipment have been made. Chemicals which are highly toxic/corrosive, that have been removed from their original shipping container, should be placed inside an over pack with Styrofoam or an unbreakable secondary container capable of holding the contents of the original vessel should it break.

Stored chemicals should be examined periodically (at least annually) for replacement, deterioration, container integrity and proper labeling. Storage of non-chemical items such as glassware and apparatus should be kept orderly to avoid clutter and accident potential. The amount of ordinary combustibles, such as wood, paper and plastic, should be minimized in storerooms that contain significant quantities of flammable liquids. All flammables must be stored in rated flammable storage cabinets or safety cans. Strict housekeeping must be maintained, see Section VIII (B) of this plan.

Section 305 of the New York State Education Law requires that all chemical must be stored in locked storage rooms or cabinets. Section 305 establishes requirements concerning placement, spacing, arrangement, inventory, ventilation and fire protection.

VI. CHEMICAL PROCUREMENT, DISTRIBUTION, AND STORAGE (cont'd)

C. Storage: (cont'd)

1. Stockrooms/Storerooms (cont'd)

a. ***Placement:*** Chemical containers should not be stored on benchtops or in chemical hoods. Chemicals should not be placed on the floor or left in carts. Exposure of chemicals to heat and direct sunlight should be avoided. Containers should not be stored above eye level or on top of cabinets.

b. ***Spacing:*** Chemical containers should be neatly arranged with sufficient space (about an inch) between rows to allow easy retrieval. Containers should be placed at least one inch from the front edge of the shelf. Shelves used for chemical storage should have a front lip to prevent accidental slippage. Chemicals should not be stored more than 12 inches deep in areas where retrieval of back containers could cause accidental slippage of containers stored at the front.

c. ***Arrangement:*** Toxic substances should be segregated from other chemicals in a well identified area with local exhaust ventilation. Chemicals which are considered highly toxic, carcinogenic or otherwise hazardous, should be placed in an unbreakable secondary container and properly labeled. All chemicals must be stored according to compatibility. Chemicals must **never** be stored strictly on an alphabetical system. Chemicals must be grouped and stored according to their compatibility, e.g., Flinn Scientific or Fisher Chemical suggested storage patterns. Stockrooms/storerooms should not be used as preparation or repackaging areas, should be open during normal working hours, be controlled by one person and locked whenever unoccupied.

d. ***Ventilation:*** All chemical storerooms and stockrooms must be equipped with a local exhaust system. Explosion-proof equipment should be considered for areas used to store significant quantities of flammable materials. Similarly, corrosion resistant equipment should be considered for areas used to store significant quantities of acids and caustics. Direct in-line storage cabinet ventilation pipes should not be cross-connected with cabinets storing incompatible chemicals.

e. ***Fire Protection****:* Flammable liquids must be stored in a NFPA approved fire rated storage room, storage cabinet or safety can. Container size shall not exceed five gallons and the total amount of flammables cannot exceed 120 gallons within any rated storage room.

VI. CHEMICAL PROCUREMENT, DISTRIBUTION, AND STORAGE (cont'd)

C. Storage: (cont'd)

1. Stockrooms/Storerooms (cont'd)

e. ***Fire Protection**:* (cont'd)

Flammable liquids at the point of use shall meet the following maximum container size restrictions:

Container	**Category 1**	**Category 2**	**Category 3 & 4**
Glass or approved plastic	1 pt	1 qt	1 gal
Metal (non-DOT)	1 gal	5 gal	5 gal
Safety Cans	2 gal	5 gal	5 gal

Category 1 liquids have flash points < 73.4°F (23°C) and boiling points < 95°F (35°C).
Category 2 liquids have flash points < 73.4°F (23°C) and boiling points > 95°F (35°C).
Category 3 liquids have flash points > 73.4°F (23°C) and boiling points < 140°F (60°C).
Category 4 liquids have flash points > 140°F (60°C) and at or below 199.4°F (93°C).

2. Inventory: A complete chemical inventory must be maintained in accordance with Education Law, Section 305 and updated annually. A sample inventory record form is provided as Appendix E of this plan. All stockrooms and laboratories where science chemicals are stored must be inventoried. The inventory must contain the following information for each chemical:

a. chemical name
b. Chemical Abstract Service Registry Number (CAS#)
c. hazard warning code
d. method(s) of disposal
e. compatible storage code
f. date received
g. expiration date or scheduled date of disposal, if applicable
h. quantity received
i. quantity remaining
j. location

VI. CHEMICAL PROCUREMENT, DISTRIBUTION AND STORAGE (cont'd)

C. Storage: (cont')

3. Laboratory storage: The correct storage of chemicals within the classroom laboratory has become increasingly important to maintain a safe working and learning environment. Amounts permitted should be as small as practical. Storage on bench tops and in hoods is inadvisable. Exposure to heat or direct sunlight should be avoided. Annual inventories must be conducted. Excess and unneeded items must be returned to the storeroom/stockroom. All unwanted chemicals must be discarded according to applicable regulations, see Section IX of this plan for more information on waste disposal.

VII. PROTECTIVE APPAREL, EQUIPMENT, MAINTENANCE, AND INSPECTIONS

A. Protective Apparel and Equipment:

Protective apparel must be compatible with the required degree of protection for the substances being handled. The degree of protective apparel and equipment depends on the chemicals used and may include the following:

1. Personal protective equipment (PPE) such as goggles, chemical resistant aprons and gloves. Respirators are usually not appropriate or necessary for use in school science labs. Exposures can be controlled by the use of engineering controls and work practices, such as chemical hoods or by substituting non-toxins in experiments. Respirators are usually not appropriate or necessary for use in school science labs. If respirators must be used, then a Respiratory Protection Plan, through the Chemical Hygiene Officer, shall be implemented. The plan shall include, but not be limited to, provisions for medical evaluation, fit-testing, equipment selection, monitoring and training.
2. An easily accessible drench-type safety shower.
3. An eyewash fountain.
4. A fire extinguisher appropriate for the types of fire hazards present in the laboratory. Fire extinguisher training must be provided to all personnel designated to use them.
5. Fire alarm and telephone for emergency use should be available nearby.
6. Spill and cleanup materials should be available.
7. Other items designated by the Chemical Hygiene Officer.

B. Maintenance:

Eyewash stations shall be activated on a weekly basis to flush the line and verify operation as required by ANSI. **Safety showers** should be tested, as recommended by the manufacturer and ANSI. Other safety equipment should be inspected regularly. Records of testing and inspection should be maintained.

C. Inspections:

Formal housekeeping and chemical hygiene inspections should be conducted periodically, i.e. annually and documented; informal inspections should be continual.

VIII. LABORATORY FACILITIES AND VENTILATION

A. The Laboratory Facility:

1. Design: The laboratory facility should have:

a. an appropriate general ventilation system with air intakes and exhausts located so as to avoid intake or recirculation of contaminated air;
b. adequate, well ventilated stockrooms/storerooms;
c. laboratory chemical hoods and sinks;
d. other safety equipment including eyewash stations and drench showers, and;
e. arrangements for waste disposal.

2. Maintenance: Service utilities such as natural gas, electricity and plumbing located within the laboratory must be included in the inspection and maintenance program.

Existing main shut-off valves must be labeled and should not be accessible to students. All gas shut-offs should be accessible, not blocked and inspected for operation. If shut-off requires the use of a wrench to operate, a dedicated wrench shall be affixed or mounted adjacent to the valve. Valves that are frozen or corroded must be replaced. Replacement valves should be of the type that clearly identifies the ON and OFF position. Replacement valves should be able to be locked in the OFF position. Flexible gas pipe inside each lab table must be inspected for leaks and corrosion. Replacement pipe should be hard pipe where possible. All lab station gas jets must be routinely inspected with defective or leaking jets replaced or repaired.

All electrical outlets at a laboratory table or adjacent to any sink should be ground fault equipped. All broken faceplates and/or damaged electrical outlets must be replaced immediately. Equipment having a three-pronged plug must be used in a three-prong, grounded, electrical outlet. At no time should the third prong (ground) be removed to allow use in a two-prong outlet. Inspections should also be made of junction boxes and connectors located under or inside lab tables.

Plumbing fixtures such as faucet handles and goosenecks should be inspected for tightness and leaks. Drain lines and traps should be inspected for leaks. All drain lines and traps must be corrosion resistant. Regular PVC or metal hardware must not be used and drain lines should be threaded not glued. Drain traps should be of the type to allow easy access to remove blockage such as the glass jar type.

3. Usage: The experiments conducted and their scale must be appropriate to the physical facilities available and especially to the quality of ventilation.

VIII. LABORATORY FACILITIES AND VENTILATION (cont'd)

B. Housekeeping, Maintenance, and Inspections:

Laboratories should be maintained in an orderly manner. Work areas must be kept clean and free from obstructions. Unused items should be placed in storage. Items, especially chemicals and glassware, should never be stored above eye level or on top of cabinets. Equipment and materials should be neatly arranged so as to avoid tipping and tripping. Laboratory experiments should be broken down, cleaned and stored at the end of each lesson. Stock chemicals should be returned to the storeroom at the end of the day and put into the proper compatibility group.

Counter tops should be cleaned regularly by the laboratory instructor. Custodial staff should be knowledgeable of general chemical safety and be instructed not to move, handle or disturb chemical containers or ongoing experiments.

Storage areas should be kept neat and orderly. Overspills of solids and liquids must be cleaned up immediately, if it can be done without injury (see Section X beginning on page 20 of this plan for more information). Shelves and containers must be wet wiped periodically to avoid dust and overspill accumulation.

Stairways and hallways should not be used as storage areas. Access to exits, emergency equipment, and utility controls should never be blocked.

C. Environmental Monitoring:

Regular instrumental monitoring of airborne concentrations is not usually justified or practical in school laboratories but may be appropriate when testing or redesigning hoods or other ventilation devices or when a highly toxic substance is stored or used regularly.

D. Ventilation:

1. General laboratory ventilation: This system should provide a source of air for breathing and an adequate supply of make-up air for local ventilation devices. It should not be relied upon for protection from toxic substances released into the laboratory. General dilution ventilation provides only modest protection against toxic gases, vapors, aerosols and dusts. It is an inefficient way to control highly toxic contaminants because of the large amount of air exchange necessary to achieve dilute concentrations within acceptable ranges.

VIII. LABORATORY FACILITIES AND VENTILATION (cont'd)

D. Ventilation: (cont'd)

Laboratory air should not be recycled. General dilution ventilation can serve several purposes including:

a. Heating, cooling and humidity control,
b. Dilution of byproducts of respiration, common pathogens, and odors caused by normal human occupancy.
c. Dilution of low levels of slightly toxic gases or solvent vapors.
d. Dilution of low levels of combustible vapors (below the lower explosive limit).

Ventilation rates for the science laboratory have varied over the years. Actual rates are dependent upon the building codes in effect at the time of construction or last renovation within the laboratory. Ventilation requirements in 1989 were set at a rate of 20 cubic feet of outside air per minute (CFM) per student. The 2015 building codes specify 25 CFM per student for new ventilation systems serving a science lab. These rates are provided that local exhaust is the primary method of control for hazardous emissions. General air flow should not be excessively turbulent and should be relatively uniform throughout the laboratory, with no high velocity or static areas. The ventilation system should direct air flow into the laboratory from non-laboratory areas and exhaust out to the exterior of the building. Rooftop exhaust units used to vent laboratory air must not be placed in direct proximity to air intakes.

2. Local Exhaust Ventilation: There are several types of local exhaust ventilation systems that are designed to capture contaminants near their source without allowing them to escape or disperse into the laboratory atmosphere. These systems exhaust contaminants directly to the exterior of the building.

Laboratory hoods provide local exhaust ventilation to prevent harmful dusts, mists, fumes as well as toxic gases and vapors from entering the laboratory air. A laboratory hood also offers a physical barrier between the user and the chemical reactions taking place inside. This physical barrier will provide protection from hazards such as chemical splashes, spills, sprays, fires and minor explosions from an uncontrolled reaction.

VIII. LABORATORY FACILITIES AND VENTILATION (cont'd)

D. Ventilation: (cont'd)

2. Local Exhaust Ventilation (cont'd)

At least one laboratory hood with adequate performance should be available in all laboratories where potentially hazardous chemicals are used or hazardous reactions performed. Airflow into and within the hood should be uniform and not excessively turbulent. For traditional chemical hoods, several professional organizations including the National Research Council's publication *Prudent Practices in the Laboratories*, have recommended that the chemical hood maintain a face velocity between 80 and 100 feet per minute (fpm). Face velocities between 100 and 120 fpm have been recommended in the past for substances of very high toxicity or where outside influences adversely affect hood performance. High-performance hoods, also known as low-flow hoods, achieve the same level of containment as traditional ones, but at a lower face velocity. These chemical hoods are designed to operate at 60 to 80 fpm and in some cases even lower. If the chemical hood is not equipped with a continuous monitoring device of the hood's performance, then the airflow (face velocity) should be checked annually using a velometer – Appendix C. If this is not possible or the hood does not generate adequate airflow, then work with substances of unknown toxicity should be avoided or other types of local ventilation devices should be provided.

A properly functioning hood in an adequately ventilated room can provide protection when certain work practices are followed. The following work practices must be adhered to in order for a hood to perform as intended and provide maximum protection to the user.

a. Conduct all operations which may generate air contamination at or above permissible exposure limits (PELs) inside the hood.
b. Keep all apparatus at least 6 inches back from the face of the hood. A stripe on the bench surface can be a good reminder.
c. Do not put your head in the hood when contaminants are being generated.
d. Do not use the hood as a waste disposal mechanism except for very small amounts of materials.
e. Do not store chemicals or apparatus in the hood.
f. Keep the hood sash closed as much as possible. Label working sash height.
g. Keep the slots in the hood baffles free of obstruction by apparatus or containers.
h. Minimize foot traffic past the face of the hood.
i. Keep laboratory classroom doors closed.
j. Do not remove hood sash or side panels.
k. Do not use electrical receptacles inside the hood when flammable liquids or gases are generated. No permanent electrical receptacles should be located inside chemical hoods.
l. Use appropriate barricade if there is a chance of explosion or eruption.

D. Ventilation: (cont'd)

2. Local Exhaust Ventilation (cont'd)

m. Provide inspections/maintenance for chemical hoods and general ventilation systems. Document chemical hood airflow checks (see Appendix C).

3. Other local ventilation devices: Ventilated storage cabinets, canopy hoods, snorkels, etc. should be provided as needed. It is recommended that each canopy hood and snorkel should have a separate exhaust duct.

4. Evaluation: Quality and quantity of ventilation should be evaluated upon installation, regular intervals (i.e., annually for chemical hoods), and reevaluated whenever a change in local ventilation devices are made. Records should be maintained of all evaluations.

5. Modifications: Any alteration of the ventilation system should be made only upon review and recommendation of an HVAC professional. Thorough testing should be performed after any modification to ensure that protection for airborne hazards will continue to be adequate, and that the proper function of the system is not compromised.

IX. WASTE DISPOSAL

A. Aim:

To assure that minimal harm to people, other organisms, and the environment will result from the disposal of waste laboratory chemicals. The disposal of waste chemicals must be conducted in a legal, safe and environmentally proper manner.

B. Waste Minimization:

To the extent possible, each laboratory instructor shall adhere to waste minimization practices. Such practices include:

1. Reduction: Laboratory waste can be significantly reduced by downsizing experiments such as with microchemistry techniques. Some waste products can be distilled, decanted or precipitated to reduce the total volume of the waste.

2. Reuse/Recycle: Often chemical byproducts can be reused or reclaimed for future use.

3. Substitution/Elimination: The instructor should explore alternatives to hazardous chemicals or experiments that produce hazardous wastes.

IX. WASTE DISPOSAL: (cont'd)

C. Waste Generation and Responsibility:

The responsibility for identification and handling of waste chemicals within the laboratory rests with each faculty member whose classroom and preparatory activities result in the generation of chemical wastes. Indiscriminate disposal by pouring waste chemicals down the drain is unacceptable. The laboratory must set up a plan for the proper disposal of chemical wastes generated from each experiment, activity or demonstration.

The waste disposal plan should be included in the instructor's lesson plans. The plan must identify

the waste products that will be generated and the proper disposal method for each. Waste chemicals that are to be collected must be segregated as to their compatibility. If temporary waste receptacles are used in the classroom then each must be clearly marked as to its contents. At no time should all waste products be dumped into one catch-all container. Transfer from temporary to permanent waste containers should take place within the chemical hood while wearing appropriate protective equipment. Permanent waste storage receptacles must be protected and securely capped. The waste containers must be properly identified as to all contents, hazards and necessary precautions.

Permanent waste containers shall not be labeled "waste" but shall be marked "Excess material - Do Not Use". Such containers shall be placed in the central chemical store room in the appropriate compatible storage cabinet or shelving unit. All waste chemicals shall be disposed of as outlined in Section D below.

D. Waste Disposal:

1. Treatment: Some waste products such as acids and bases can be treated to allow conventional disposal, see science catalogues such as Flinn and Boreal. The instructor should never attempt complex treatments or procedures that could be dangerous. The instructor must be knowledgeable as to the reactions and byproducts of all treatments. Treatment byproducts must be disposed of according to applicable regulations.

2. Evaporation/Destruction: Only very small amounts of volatile liquids can be reduced through evaporation and must only be done in a chemical hood. Burning of combustibles and flammables should be done very selectively and only for very small amounts. The instructor must be knowledgeable as to the chemical characteristics and of the reactions and byproducts, see also science catalogues such as Flinn and Boreal. Byproducts such as precipitates must be disposed of according to applicable regulations.

IX. WASTE DISPOSAL: (cont'd)

D. Waste Disposal: (cont'd)

3. Licensed Chemical Waste Facility: An inventory of all "excess", old, outdated and other unwanted chemicals shall be maintained by the Chemical Hygiene Officer. OCM BOCES routinely coordinates cooperative bids for chemical waste disposal for all component school districts by a licensed waste hauler and disposal facility. The Chemical Hygiene Officer in conjunction with the Right-to-Know Officer and Director of Facilities will apprise the BOCES Health and Safety Office of disposal needs.

Unlabeled containers of chemicals and solutions should undergo prompt disposal; if partially used, they should not be opened.

Before an instructor's employment in the laboratory ends, chemicals for which that person was

responsible should be discarded or returned to storage.

X. ACCIDENTS AND SPILLS

All incidents such as fires, explosions, medical emergencies, leaks, spills and system failures must be reported to the Building Administrator or the Director of Facilities, and follow the Building Level Emergency Response Plan and District Emergency Management Plan. The fire alarm system should be used whenever there is a danger of fire or explosion. Unless the building's fire alarm system is explosion-proof the fire alarm must not be used in the event of a gas leak.

A. Accidents:

All accidents or near accidents should be carefully analyzed with the results distributed to all who might benefit.

B. Minor Spills:

Laboratory instructors shall receive training in differentiation between spills that they can clean up and spills needing specialized equipment and personnel. Instructional staff should never attempt to clean up a chemical spill if they are uncertain as to how to do so safely or lack the proper protective equipment.

The SDS will provide spill and cleanup information for a particular chemical/product and should be reviewed prior to working with chemicals. Once a spill occurs time may not allow SDS consultation.

In addition to personal protective equipment, spill clean-up and containment supplies such as absorbent towels, socks or other absorbent mediums should be maintained in the laboratory. Mercury spill kits should be included wherever mercury or mercury- containing equipment is used.

X. ACCIDENTS AND SPILLS (cont'd)

B. Minor Spills: (cont'd)

If a minor spill occurs (approximately one liter or less for most materials) within the laboratory do the following:

1. Attend to any persons who may have been contaminated, wash/flush affected area; see Section V, Part C located on page 7 for first aid measures.

2. Alert classroom occupants to the spill and its location.

3. If the spilled material is flammable, instruct all students to turn off ignition and heat sources, i.e., Bunsen burners and alcohol lamps.

4. If there are toxic fumes and a danger of fire or explosion, evacuate the classroom immediately and close door behind last person. Sound building fire alarm and summon fire department. Notify Building Principal, Custodian, Right-to-Know Officer and Chemical Hygiene

Officer. If gas leak, see Section X, Paragraph 1, beginning on page 20.

5. If safe to do so, the instructor should open windows and turn on exhaust fans.

6. Notify Chemical Hygiene Officer, Director of Facilities, and determine if the District Safety Officer will need to be consulted.

7. Put on chemical resistant gloves, splash goggles and apron.

8. Clean-up spill (lab instructor familiar with chemical spilled and hazards)

a. ***Non-corrosive, low toxicity materials:***
Use absorbents, vermiculite, paper towels or sponge to clean up. Discard materials in a double or triple bag. Remove trash to exterior trash receptacle.

b. ***Corrosive materials:***
Spread neutralizers such as sodium carbonate over spill and/or flush with large amounts of water. Sweep or mop up as directed above.

c. ***Heavy metals and high toxicity materials:***
Place absorbent materials over spill. Place used absorbent materials in a plastic pail with lid (or other leak proof non-breakable container). Label container as to contents of spill and dispose according to applicable regulations. Store container in a well-ventilated and unoccupied area until disposal arrangements can be made.

d. ***Mercury:***
Utilize mercury spill kit to catch all liquid beads. Inspect a large area around the spill including under desks and tables. While working inside a chemical hood, place collected mercury into a container with an airtight stopper.

X. ACCIDENTS AND SPILLS (cont'd)

C. Major Spills:

If a major spill (approximately one liter or more of material) occurs within the laboratory do the following:

1. Evacuate classroom immediately. Notify Building Administrator and Director of Facilities.

2. If there are toxic fumes, danger of fire or explosion sound building fire alarm and summon fire department. If gas leak, see Section X, first paragraph, page 18.

3. Summon fire department, apprise them of chemical spill and give them as much information as possible.

XI. BASIC RULES AND PROCEDURES FOR THE LABORATORY

The following general rules should be implemented as part of the Chemical Hygiene Plan. All laboratory staff should be made aware of and follow these rules.

The following should be used for essentially all laboratory work with chemicals:

A. Personal protection:

Assure that appropriate eye protection is worn by all persons, including visitors, where chemicals are stored or handled.

Wear appropriate gloves when the potential for contact with toxic materials exists; inspect the gloves before each use, wash them before removal, and replace them periodically.

Use any other protective and emergency apparel and equipment as appropriate.

Avoid use of contact lenses in the laboratory unless necessary; if they are used, students must inform the lab instructor so special precautions can be taken.

Remove laboratory coats immediately upon significant contamination.

B. Mouth suction:

Do not use mouth suction to pipette or to start a siphon.

XI. BASIC RULES AND PROCEDURES FOR THE LABORATORY (cont'd)

C. Eating, smoking, etc.:

Eating, drinking, smoking, gum chewing, or application of cosmetics in areas where laboratory chemicals are present are prohibited; wash hands before conducting these activities.

Avoid storage, handling or consumption of food or beverages in storage areas, refrigerators, glassware or utensils which are also used for laboratory operations.

D. Personal apparel:

Confine long hair, loose clothing and jewelry. Wear shoes at all times in the laboratory, but do not wear sandals or perforated shoes.

E. Horseplay:

Avoid practical jokes or other behavior which might confuse, startle or distract another person.

F. Planning:

Seek information and advice about hazards, plan appropriate protective procedures, and plan positioning of equipment before beginning any new operation.

G. Choice of chemicals:

Use only those chemicals for which the quality of the available ventilation system is appropriate. Use least hazardous materials and process available.

Work involving reproductive toxins (teratogens), carcinogens or mutagens, are not appropriate for use in student laboratory experiments and will not be used.

H. Avoidance of "routine" exposure:

Develop and encourage safe habits; avoid unnecessary exposure to chemicals by any route;

Do not smell or taste chemicals. Vent apparatus, which may discharge toxic chemicals (vacuum pumps, distillation columns, etc.) into local exhaust devices.

Inspect gloves and test chemical hoods before use.

I. Use of hood:

Use the hood for operations which might result in release of toxic chemical vapors or dust.

XI. BASIC RULES AND PROCEDURES FOR THE LABORATORY (cont'd)

I. Use of hood: (cont'd)

As a rule of thumb, use a hood or other local ventilation device when working with any appreciably

volatile substance with a TLV of less than 50 ppm.

Confirm adequate hood performance before use; keep hood closed at all times except when adjustments within the hood are being made; keep materials stored in hoods to minimum and do not allow them to block vents or air flow.

Leave the hood "on" when it is not in active use if toxic substances are stored in it or if it is uncertain whether adequate general laboratory ventilation will be maintained when it is "off".

J. Vigilance:

Be alert to unsafe conditions and see that they are corrected when detected.

K. Equipment and glassware:

Handle and store laboratory glassware with care to avoid damage; do not use damaged glassware. Use extra care with Dewar flasks and other evacuated glass apparatus; shield or wrap them to contain chemicals and fragments should implosion occur. Use equipment only for its designed purpose.

L. Working alone:

Avoid working alone in a building; do not work alone in a laboratory if the procedures being conducted are hazardous.

M. Accidents and spills:

Eye Contact: Promptly flush eyes with water for a prolonged period (15 minutes) and seek medical attention.

Ingestion: Identify material, concentration and amount ingested for medical personnel.

Skin Contact: Promptly flush the affected area with water and remove any contaminated clothing. If symptoms persist after washing, seek medical attention.

Clean-up: Promptly clean up spills, using appropriate protective apparel and equipment and proper disposal.

XI. BASIC RULES AND PROCEDURES FOR THE LABORATORY (cont'd)

N. Waste disposal:

Assure that the plan for each laboratory operation includes plans and training for waste disposal.

Deposit chemical waste in appropriately labeled receptacles and follow all other waste disposal procedures of the Chemical Hygiene Plan.

Do not discharge to the sewer concentrated acids or bases; highly toxic, malodorous, or lachrymatory substances; or any substances which might interfere with the biological activity of waste water treatment plants, create fire or explosion hazards, cause structural damage or obstruct flow.

O. Personal housekeeping:

Keep the work area clean and uncluttered, with chemicals and equipment being properly labeled and stored; clean up the work area on completion of an operation or at the end of each day.

P. Exiting:

Wash areas of exposed skin well before leaving the laboratory.

APPENDIX A

CHEMICAL HYGEINE STANDARD
OSHA 29 CFR 1910.1450

The complete OSHA standard can be found on the OSHA website at:

https://www.osha.gov

APPENDIX B

Science Laboratory Instructors
2024-2025

NAME	TITLE	ROOM#
Steve Louis	Teacher	207
Jason Mauro	Teacher	130
John Miller	Teacher	201
Eric Sharpsten, Dept. Chair & Chemical Hygiene Officer	Teacher	209

APPENDIX C
Science Department
Chemical hood Inspection Form

Building	Room #	Date Inspected	Inspected By	Average Performance Rating*	Notes
Jr.Sr. H.S.	201	7/11/2024	Paul Smith OCM BOCES	Working sash height of 17" average of 9 readings 107 ft./min	Velocity Air Velocity meter
Jr.Sr. H.S.	209	7/11/2024	Paul Smith OCM BOCES	Working sash height of 17" average of 9 readings 117 ft./min	Velocity Air Velocity meter

*Indicate method of evaluating performance.

APPENDIX D

CHEMICALS NOT TO BE DISPOSED OF IN ACID NEUTRALIZATION TANKS

If acid neutralization tank(s) are in place to dispose of used acids or excess acids, it is extremely important that there is one disposal sink per neutralization tank, and that the building location is on a municipal sewage system. The use of one disposal sink reduces the risk of mixing acids that are reactive, and the municipal system insures further dilution of acids that are disposed of using acid neutralization tanks.

Only acids should be disposed of through acid neutralization tanks. Take precautions to prevent, and emphasize during laboratory training, that only acids can be disposed of using acid neutralization tanks. The existence of neutralization tank(s) should be discussed periodically with village, town, or county waste regulatory officials.

Insure that the chemicals and/or chemical families listed below are not disposed of through laboratory sinks:

- Flammables and Combustibles including petroleum based compounds and alcohols such as: Acetone, Benzene, n-Butyl Alcohol, Carbon Disulfide, Ether, Ethyl Acetate, Methanol, and Xylene.
- Water-reactive metals and compounds such as Sodium, Potassium, Magnesium, Lithium, Phosphorus, Acetyl Chloride, Aluminum Chloride (Anhydrous), Calcium Carbide, and Benzoyl Chloride.
- Do not mix Inorganic and Organic Acids during disposal (example: Nitric & Acetic).
- Highly caustic chemicals such as Sodium Hydroxide and Ammonium Hydroxide.
- Arsenic, Barium, Chromium, Lead, Mercury, Selenium, and Silver/Silver Compounds.
- Refrain from mixing all waste solutions into one “slop” bucket.
- Reactive chemicals that generate extreme heat.
- Carcinogens: Dioxane, Aldehydes, Benzene, Cadmium, and Arsenic Trioxide.
- Toxic chemicals: Antimony, Aniline, Bromine, Potassium/Sodium Cyanide, Sodium Azide, and Vanadium.
- Solvents.
- Pesticides and/or pesticide residues.
- Organic Acid Halides before pH neutralization.
- Picric Acid.
- Oxidizing Agents.
- Cyanides should be removed by waste disposal professionals.
- Organic and Inorganic Peroxides before neutralization.
- Barium Compounds.

APPENDIX E
Chemical Hygiene Program
Chemical Inventory Record
(Ed. Law Sec. 305)

School District: _____
Building:_____
Year: _____

Chemical Name	CAS #	Hazard Warning Code	Method of Disposal	Storage Code	Date Received	Expiration Date	Quanitity Received	Quantity Remaining	Location

Inventory completed by: _____ Date:_____

APPENDIX F

RESOURCES AND REFERENCES

Reference	**Location**
Flinn Chemical Inventory, SDS System	High School Chemical Hygiene Officer Computer
OSHA PEL – "Exposure Limits Sub Part Z"	Individual Teachers
ACGIH – TLV's "Threshold Limit Values"	Individual Teachers
Safety in Academic Chemistry Laboratories	Individual Teachers
NFPA 45 – *Fire Protection for Laboratories using Chemicals*	Individual Teachers
ANSI Z358.1 Standard for Emergency Eyewash and Shower Equipment	Individual Teachers

Additional Resources available on the Web:

- Consumer Product Safety Commission (DPSC)/National Institute for Occupational Safety and Health (NIOSH) School Chemistry Laboratory Safety Guide http://www.cpsc.gov/CPSCPUB/PUBS/NIOSH2007107.pdf
- Occupational Safety and Health Administration https://www.osha.gov/SLTC/index.html
- U.S. Chemical Safety Board http://www.csb.gov/
- The Laboratory Safety Institute http://labsafetyinstitute.org/Resources.html
- National Science Teachers Association http://www.nsta.org/safety/

APPENDIX G

REVISED OSHA HAZARD COMMUNICATION – PICTOGRAMS
GLOBALLY HARMONIZED SYSTEM (GHS)

OSHA® QUICK CARD™

Hazard Communication Standard Pictogram

As of June 1, 2015, the Hazard Communication Standard (HCS) will require pictograms on labels to alert users of the chemical hazards to which they may be exposed. Each pictogram consists of a symbol on a white background framed within a red border and represents a distinct hazard(s). The pictogram on the label is determined by the chemical hazard classification.

HCS Pictograms and Hazards

Health Hazard  • Carcinogen • Mutagenicity • Reproductive Toxicity • Respiratory Sensitizer • Target Organ Toxicity • Aspiration Toxicity	**Flame**  • Flammables • Pyrophorics • Self-Heating • Emits Flammable Gas • Self-Reactives • Organic Peroxides	**Exclamation Mark**  • Irritant (skin and eye) • Skin Sensitizer • Acute Toxicity (harmful) • Narcotic Effects • Respiratory Tract Irritant • Hazardous to Ozone Layer (Non-Mandatory)
Gas Cylinder  • Gases Under Pressure	**Corrosion**  • Skin Corrosion/ Burns • Eye Damage • Corrosive to Metals	**Exploding Bomb**  • Explosives • Self-Reactives • Organic Peroxides
Flame Over Circle  • Oxidizers	**Environment** (Non-Mandatory)  • Aquatic Toxicity	**Skull and Crossbones**  • Acute Toxicity (fatal or toxic)