IEA, INC.

NORTHFIELD PUBLIC SCHOOLS


Contact Us:

**BROOKLYN PARK OFFICE**
9201 W. BROADWAY, #600
BROOKLYN PARK, MN 55445
763-315-7900

**MANKATO OFFICE**
610 N. RIVERFRONT DRIVE
MANKATO, MN 56001
507-345-8818

**ROCHESTER OFFICE**
210 WOOD LAKE DRIVE SE
ROCHESTER, MN 55904
507-281-6664

**BRAINERD OFFICE**
13432 ELMWOOD DRIVE, STE. #5
BAXTER, MN 56425
218-454-0703

**MARSHALL OFFICE**
1420 EAST COLLEGE DRIVE
MARSHALL, MN 56258
507-476-3599

**VIRGINIA OFFICE**
5525 EMERALD AVENUE
MOUNTAIN IRON, MN 55768
218-410-9521

www.ieasafety.com

info@ieasafety.com

800-233-9513


# Management Plan for Chemical Hygiene

**SEPTEMBER 2016**

**IEA Project #201410725**

Northfield Public Schools

# Management Plan for Chemical Hygiene

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**Contact Person:** Dan Taylor

**Phone Number:** 507-663-0630

**Email Address:** dtaylor@northfieldschools.org

***Northfield Public Schools* Annual Review Form *Management Plan for Chemical Hygiene***

## Certification

**I certify that I have reviewed the information provided and accept this written management plan. With assistance from our EHS consultant, the district will implement the policies and procedures noted within this plan. The written plan is a working document that will be reviewed and revised annually, or as needed.**

| Print Name | Signature | Date |
|---|---|---|

**Program reviews and follow-up of program-related issues are documented below.**

| Date | Actions/Comments | Reviewed by: |
|---|---|---|
| 9/16/16 | Update CHO information | Ben Olsen, IEA |
| 10/18 | Reviewed plan, no changes | Cassie Bowser, IEA |
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## 1.0 Objectives

Northfield Public Schools strives to maintain a safe work place and learning environment for employees and students. The purpose of the Chemical Hygiene Program is to address policies, procedures, equipment, and classroom practices utilized to protect district science instructors, classroom aides, and other facility occupants from health and safety hazards associated with the use of hazardous laboratory chemicals. Compliance requirements of OSHA Standard 29 CFR 1910.1450, *Occupational Exposure to Hazardous Chemicals in Laboratories*, are met through implementation and active practice of the elements of this plan. Though not required by regulation, additional objectives of the plan are to improve student safety and guide a more complete educational experience in the science laboratory.

The Management Plan for Chemical Hygiene has been developed specifically for use within Northfield Public Schools and is written to address "laboratory use" of hazardous chemicals. The plan is not intended to address the use of non-laboratory hazardous chemicals such as corrosive chemicals used for boiler treatment or custodial cleaning supplies. The district's *Employee Right-to-Know Program* contains information on non-laboratory chemical safety and education.

To meet our objective of providing a safe laboratory work and learning environment, the district works toward optimizing the following general principles of good chemical hygiene:

- Minimize chemical exposures through prudent laboratory practices and good common sense.
- Use the smallest quantity of chemicals or other potentially hazardous materials necessary to demonstrate the principle of an experiment or demonstration.
- Reduce the number and type of hazardous materials used in the science laboratory by substituting currently-used hazardous materials with less hazardous materials whenever possible.
- Assume all chemicals have potential toxicity that require safe handling and control. Do not underestimate the actual or potential risk inherent to any chemical substance or process.
- Provide and use engineering and administrative controls as well as personal protective equipment (PPE) to reduce the potential for exposure to hazards. Examples include fume hoods, laboratory policies, and safety eyewear.
- Teach and demonstrate laboratory safety to our students.

## 2.0 Coordination with Other District Health and Safety Plans

A significant number of protective measures must be considered and implemented to provide safe laboratories for both staff and students. This plan intends to address those measures, but only to the extent they are not addressed in separate health and safety programs. Specific references to other safety programs are indicated where appropriate.

## 3.0 Responsibilities

The Management Plan for Chemical Hygiene is written to be functional and performance-orientated, which means it addresses laboratory safety and health issues applicable to our school environment and guides employees to make realistic attempts to optimize employee and student laboratory safety. Successful implementation and functioning of this plan is contingent upon well-defined expectations and voluntary acceptance of assigned responsibilities, as follows:

### District Administration

District administration is responsible for supporting a performance-orientated chemical hygiene program that protects district employees from health and safety hazards associated with science laboratory activities. District administration acknowledges the importance of laboratory safety and is willing to become involved when deficiencies cannot otherwise be controlled. Plan development and associated activities may be delegated to other parties, such as district staff or third-party consultants, but ultimate responsibility and support cannot be reassigned.

**Director of Buildings and Grounds**
The Director of Buildings and Grounds has general responsibility for coordination of the district health and safety programs and will therefore be involved to whatever extent necessary to achieve program success.

**Principal or Supervisor**
The immediate supervisor or principal of any employee engaged in laboratory activities is responsible for his or her employees and is held accountable for acceptable job performance, as assigned. Administering and tracking employee training may be delegated to another responsible person or third party.

**Instructors**
District science instructors or associated laboratory support staff are responsible for attending scheduled safety training sessions, following laboratory safety guidelines as made known to them, and to otherwise perform all duties and responsibilities to achieve a safe working and instructional environment. Lack of compliance or other disregard for rules governing laboratory safety will be promptly addressed and corrected.

**Chemical Hygiene Officer**
The Chemical Hygiene Officer (CHO) for the district is Dan Taylor and can be reached at 507-663-0630. The CHO is a liaison between staff members, district administration, safety representatives, and others involved in, and/or responsible for, laboratory safety. The CHO assists with:

- Developing, reviewing, and implementing laboratory work practices, procedures, student safety procedures, and various control measures
- Monitoring chemical use, safety procedures, housekeeping, and other aspects of good laboratory practices through periodic inspections and general observations
- Coordinating laboratory safety training activities
- Developing and supporting rules regarding procurement, distribution, and storage of chemicals
- Identifying needs for appropriate PPE and safety devices
- The annual Chemical Hygiene Plan review
- Completion of the *Periodic Laboratory Checklist*, *Science Safety Checklist*, and *End-of-Year Laboratory Closure Checklist* (see Appendices)
- Weekly inspection of emergency eyewash stations and safety showers
- Monthly fire extinguisher inspections
- Annual inspections of fume hoods with results posted on the hood
- The district's Health and Safety Committee

## 4.0 Basic Rules and Procedures

Science laboratories and associated work areas are intended to be serious learning and working environments. Lack of instructor observation, inappropriate student behavior, or similar inattention to the fundamental importance of control and safety in the laboratory can lead to illness and injury. Common laboratory hazards and health effects of chemical hazards are described in the appendices. To enhance safety and the educational benefit to students, each instructor must provide ultimate guidance and lead by example at all times. The following are fundamental rules and behaviors to support a safe laboratory environment.

**Avoidance of Routine Exposure**
Develop and encourage safe habits in the laboratory workplace, such as:

- Do not smell or taste chemicals.
- Do not use mouth suction for pipetting or to start a siphon.
- Eating or drinking is not allowed in any science area, especially where chemical or biological science activities take place.
- Do not apply cosmetics in the laboratory.

- Do not store food items in laboratory refrigerators. Signs are used to advertise this restriction.
- Label all chemical containers as to content and hazards. Do not use chemical formula as a means of labeling.
- Label hot surfaces accordingly.
- Guard against physical hazards. Use protective covers on moving belts and pulleys, never leave heat sources unattended, and dispose of broken glass and other sharps in sharps boxes.

**Supervision and State of Mind**

A qualified instructor is present at all times while students are present in the laboratory. Hazardous laboratory experiments are never left unattended. All persons are in good mental condition when working in the laboratory and associated work areas. Intoxication, medical drug use, extreme fatigue, stress, and other distractive conditions can cause serious mistakes to be made.

**Horseplay**

Conduct that may be termed "practical joking", "fooling around", or "horseplay" is strictly prohibited at all times in the laboratory and classroom. Any person displaying such conduct is counseled immediately and/or removed from the environment.

**Clothing and Jewelry**

Clothing must be suitable for the laboratory environment and associated hazards. Loose clothing and hair is confined. Loose neck jewelry, rings, bracelets, and watches are not worn in order to prevent chemical seepage under the jewelry, contact with electrical sources, catching on equipment, and damage to the jewelry itself. Substantial footwear is required to prevent exposure to chemical and physical hazards. High-heeled or open-toed shoes, sandals, or shoes made of woven material are not worn in the laboratory. Shorts, cutoffs, and miniskirts are also not allowed when working with chemicals.

**Glassware**

Handle all glassware carefully and do not use if chipped, cracked, broken, or otherwise damaged. In addition, the following safety measures are taken:

- Glassware is cleaned at the laboratory sink or in laboratory dishwashers.
- Hot water is used where available, and soap or other detergent is used rather than strong cleaning agents such as nitric acid, chromic acid, sulfuric acid, strong oxidizers, or any chemical with a "per" in its name (such as perchloric acid, ammonium persulfate, etc.) unless specifically instructed otherwise. The use of flammable solvents is minimized.
- Rubber or plastic mats are placed on the bottom of sinks to help minimize glass breakage.
- The workspace around a sink is normally limited, and piling up dirty or cleaned glassware leads to breakage. Remember that the turbid water in a sink may hide a jagged edge on a piece of broken glassware that was intact when put into the water. A pair of heavy gloves may be useful for removing broken glass, but care must be exercised to prevent glove contamination.

**Personal Protection**

PPE is worn as appropriate for the laboratory exercise (see section 9.0 for more information). Tight-fitting goggles that have an indirect vent or are non-vented are worn by students, staff, and visitors when working with chemicals in the laboratory or preparation area. PPE is inspected before use and maintained properly.

**Fume Hoods**

Chemicals are only used when adequate ventilation is available. Fume hoods are used when working with volatile or hazardous chemicals. Where fume hood control is required but is not available, the chemical experiment will not be conducted. In addition, the following rules apply to fume hoods:

- Hoods are closed at all times except when adjustments within the hood are required.
- Fume hoods are not used for general storage.

- Fume hoods are not used to evaporate chemical solvents as a means of disposal.
- Placement of equipment within the hood is not allowed, as it may restrict airflow or otherwise negatively affect hood performance.
- Fume hoods are clean and orderly at all times.
- Fume hood airflow is inspected at least annually or if mechanical systems are adjusted.

**Electrical Hazards**

Electric wiring throughout the district complies with the National Electric Code. In addition, the following rules apply:

- Strip sockets, extension cords, or "octopus" arrays of plugged in wires and cords are not used in place of permanent wiring.
- Frayed or otherwise damaged wires and cords are removed from service.
- Wires and cords do not lie in puddles of water or liquid chemicals.
- Electrical wires and cords are kept away from sources of heat, flame, corrosive materials, or oxidizing agents that might be spilled.
- Plugs that are broken, corroded, or become hot are not used.
- Outlets equipped with ground fault circuit interruption protection are used in wet environments.

## 5.0 Chemical Procurement, Distribution, and Storage

**Procurement**

The district works to maintain reasonable chemical inventories. To meet this goal, we support careful laboratory planning and centralized purchasing of laboratory chemicals. Instructors are encouraged to not attempt to consume excess budgets through excess chemical purchases and to critically evaluate if quantity-based purchase savings will pay off in the long run. Sometimes the cost to dispose of excess and/or outdated chemicals exceeds the initial bulk-purchase savings. Responsibility for inventory control will be delegated as appropriate. Recommendations for chemicals appropriate for each level of curriculum can be found in the appendices.

Chemicals are ordered individually by each teacher. All requisitions will be submitted to the CHO for approval. Before a new chemical that is known or suspected to be hazardous is received, those individuals who will handle it have information on proper handling, storage, and disposal. It is the responsibility of the Director of Buildings and Grounds and the CHO to make sure that the laboratory facilities in which the hazardous chemicals will be handled are adequate. If additional training is required on incoming chemicals, the district will arrange training for those who will handle the chemicals.

Note: No container should be accepted without an adequate identifying label.

***Northfield Public Schools does not accept free products containing hazardous chemicals unless the following conditions are met:***

1) The amount of free material that may be accepted by an individual, laboratory, or other administrative unit must be limited to the amount that is likely to be actually needed in the proposed program.
2) The donor must agree in writing to accept the return of any unused amounts. The recipient may agree to waive this requirement if the donor is prepared to pay for the legal and safe disposal of the material from his own funds.
3) If the utilization or storage of the free material is likely to pose any substantive risk to personnel or property, the CHO, facility manager, or safety consultant must become involved prior to formalizing the agreement. This will allow time to evaluate the risks involved and determine if adequate facilities are available before the proposed use is formally approved by the district.

**Northfield Public Schools *is working toward becoming a mercury-free environment.*** Employees are not authorized to purchase, rent, accept donations of, or bring in mercury containing science equipment or chemicals. For questions regarding the district's Mercury Free Program, please contact the CHO or Director of Buildings and Grounds.

**Distribution and Transfer**

Chemicals are delivered to the building's main office throughout the school year. The chemicals are then arranged to be delivered to the science department after arrival. The CHO will store the chemicals in the chemical storage area along with the product's original Safety Data Sheet (SDS), which is provided by the vendor. The following procedures are followed when transporting or transferring chemicals:

- Two hands are used when carrying a chemical container.
- The container-within-a-container concept is used whenever moving chemical containers more than a short distance. Large containers of corrosives are transported from central storage in a chemically resistant bucket or other container designed for this purpose. Stairs must be negotiated carefully. Elevators are not used for carrying chemicals.
- When a flammable liquid is withdrawn from a drum, or when a drum is filled, both the drum and the other container are electrically wired to each other and to the ground in order to avoid the possible buildup of a static charge. Only small quantities are transferred to glass containers. If transferring from a metal container to glass, the metal container is grounded.

**Storage**

Northfield Public Schools **permits** as little chemical storage as is practical for the curriculum. The following procedures are followed where chemicals are stored:

- Chemicals are stored according to established compatibility and segregation principles. See the appendices for recommended storage patterns.
- Flammable liquids are stored in approved cabinets.
- Ethers and other forms of peroxidizable materials are not stored past their expiration date, as they will tend to form explosive and shock-sensitive peroxides.
- New bottles of chemicals are dated and properly stored.
- Boxes of chemicals are not stored on top of one another.
- Aisles are not blocked with equipment or chemicals.
- Materials are not stored in front of safety eyewashes and showers, exit doors, fire extinguishers, or other safety equipment.
- Laboratory equipment or other materials are not stored within eighteen inches of sprinkler heads.
- Liquid chemicals are not stored on shelves above eye level.
- Storage shelves have one-inch stops installed on the front of the shelf.
- Chemicals are properly labeled (see Section 10.0 for more information).

## 6.0 Environmental Monitoring

The district is responsible to provide a work environment where chemical exposure limits are not exceeded. This can be accomplished in laboratories by engineering controls, prudent practices, and use of personal protective devices. For maximum benefit, engineering controls must not be circumvented or made less effective, and PPE must meet requirements and be utilized as required.

If there is reason to believe that a district employee has, or possibly could be, exposed to a hazardous material in excess of established exposure guidelines, the district will take appropriate steps to assess the exposure situation. If this assessment reveals an over-exposure, the district will take immediate steps to inform the employee in writing and through conversation and will promptly address the hazardous chemicals and/or process involved.

All data accumulated during monitoring surveys will be kept on file by the Buildings and Grounds department.

## 7.0 Medical Program

Whenever an employee develops signs or symptoms associated with exposure to a hazardous chemical, the employer provides the employee with an opportunity to receive a medical consultation and examination, as applicable. Where monitoring reveals an exposure above the action level or Permissible Exposure Limit (PEL), medical surveillance is established for the affected employee according to the relevant standard for that substance. Whenever an event such as a spill, leak, or explosion takes place, the affected employee is provided an opportunity for a medical consultation to determine if there is a need for a medical examination.

All medical examinations and consultations are performed by a licensed physician and are provided at no cost to the employee, without loss of pay, and at a reasonable time and place. All records will be maintained for the employee's duration of employment plus 30 years at a minimum.

The district will provide the following information to the physician:

- The identity of the hazardous chemicals
- A description of the conditions of exposure
- A description of the signs and symptoms the employee is experiencing, if any

The district will obtain a written opinion from the physician that includes:

- A recommendation for further follow-up, if necessary
- The results of the medical examination and associated tests
- Any medical condition revealed in the course of the examination that may place the employee at increased risk as a result of exposure to a hazardous chemical
- A statement that the employee has been informed by the physician of the results of the consultation or examination and any condition that may require further examination or treatment

***The written opinion shall <u>not</u> reveal specific findings of diagnoses unrelated to occupational exposure***

## 8.0 Housekeeping and Inspections

**<u>Housekeeping</u>**

In the laboratory and elsewhere, keeping things clean and neat generally leads to a safer environment. Avoid unnecessary hazards by keeping drawers and cabinets closed while working. Never store materials, especially chemicals, on the floor, even temporarily. Workspaces and storage areas should be kept clear of chemicals, scraps of paper, and other clutter. Keep aisles free of obstructions such as chairs, boxes, and waste receptacles. Avoid slipping hazards by keeping the floor clear of ice, water, stoppers, glass beads or rods, other small items, and spilled liquids. Custodial cleaning of lab counters and floors is conducted on an every other day basis.

**<u>Inspections</u>**

The following inspections are conducted:

- Fume hoods – annually
- Science safety checklists (MDE Attachment 5) – annually
- Formal laboratory inspections – semi-annually
- Fire extinguishers – monthly
- Eyewash and shower stations – weekly
- Personal protective equipment – prior to each use

## 9.0 Personal Protective Equipment (PPE)

There is no single material that will protect against all possible chemicals in the laboratory. Knowledge of the hazardous chemical and its intended use will guide proper selection of the protective equipment. Some level of basic protection is necessary in most laboratory environments.

*Eye Protection:* All persons *working with hazardous substances or being near work operations* in the laboratory and/or science classroom must wear eye protection at all times. Impact and chemical splash are primary concerns, so tight-fitting goggles are worn. Contact lenses are not recommended when working with laboratory chemicals.

*Protective Clothing:* Clothing worn in the laboratory should offer protection from splashes and spills and should be equipped with snap fasteners instead of buttons, for ease of removal. Nonflammable, nonporous aprons offer the most satisfactory and the least expensive protection.

*Hearing Protection:* School laboratories are not expected to have noise levels that exceed established guidelines. All noise issues will be managed in accordance with the district's *Hearing Conservation Program.*

*Respiratory Protection:* Employees required to wear respirators or voluntarily selecting to use respirators will participate in the district's *Respiratory Protection Program*.

## 10.0 Records, Signs, and Labels

### Records

The Chemical Hygiene Plan is maintained in each secondary building's science department and in the District Office. In addition, the following records are retained in the District Office:

- Accident investigations
- Chemical inventories
- Safety data sheets (SDS)
- Medical records
- Training agenda and participant signatures and/or quizzes

### Signs

Signs of the following type are prominently posted:

- Emergency telephone numbers
- Location signs for emergency eyewash and shower stations
- Location signs for first aid equipment
- Food/beverage signs
- Warnings at areas or equipment where unusual hazards exist

### Labels

All hazardous chemicals are clearly labeled with the hazardous chemical identity and an appropriate hazard warning. The chemical formula is not used as a means of labeling. In addition, the following procedures are implemented:

- All incoming hazardous chemicals are checked to make sure the manufacturer's labels and warnings are correct and have not been removed.
- If a hazardous chemical is received with a label that has been removed or defaced, the CHO is notified so it can be labeled properly.
- Stationary processing units or machines are labeled with the identity and hazard warnings for hazardous chemicals that may be used in these machines.
- Hazardous waste is properly characterized, labeled, and stored until disposal is arranged.

## 11.0 Employee Information and Training

Employees are provided appropriate information and training at the time of assignment to a chemical work area and prior to assignments involving new exposure situations. This training aims to protect employees by helping them to understand and appreciate the hazards involved in their work environment. Employees attend an annual refresher-training course or participate in annual online training. Standard information and training provided includes:

- Contents of the law
- Location and availability of the *Chemical Hygiene Plan*
- The name, location, and phone number of the CHO
- Information regarding exposure limits established by OSHA or the ACGIH
- Signs and symptoms associated with exposures to hazardous chemicals used in the laboratory
- The locations and availability of known reference materials, such as MSDSs
- Labeling procedures
- Methods and observations that may be used to detect the presence or release of a hazardous chemical
- General information regarding physical and health hazards of chemicals in the work area
- Measures employees can take to protect themselves from exposure to hazardous chemicals and reduce the overall potential for accidents and incidents
- Waste management

## 12.0 Spills and Accidents

A written emergency response plan has been developed by the district, including information on spill response, fire or other evacuation, medical care, and drills. Please reference the district's *Emergency Action Plan* for details.

Accidents involving injury are immediately assessed for severity. If the injury can be handled internally, the employee or student is taken to the nurse's office. If the injury is more severe, 911 is called and emergency responders will take the lead. In the event of a chemical spill, the following basic chemical spill procedures are followed. Emergency contact information is provided in the appendices and posted outside the chemical prep/storage room.

**Solid Material Spills**

- Alert other persons of the spill and the need to evacuate the area.
- Determine the degree of hazard before attempting to clean up and take the necessary preventative measures (e.g., PPE).
- Wear PPE appropriate for the situation.
- Generally, solids of low toxicity can be swept up into a dustpan and placed into a container compatible with the chemical. Damp toweling should be used to pick up and transfer materials of higher toxicity level to a compatible waste container. Confirm with the chemical's MSDS that the material is not water sensitive before using this procedure.
- Double bag contaminated clean up materials and seal. Label all disposal containers or bags with a descriptive name, the words "Hazardous Waste," and the date.
- When clean up operations are complete, wash hands with soap and water.
- Clean, dry, and place PPE back in storage.

**Liquid Chemical Spills**

- Alert other persons of the spill and the need to evacuate the area.
- Determine the degree of hazard before attempting to clean up and take the necessary preventative measures (e.g., PPE).
- Wear PPE (goggles, face shield, gloves) appropriate for the situation.
- Confine or contain spill to smallest area possible with sand or other absorbent material.

- For small quantities of acids, use a neutralizing agent or absorbent mixture (e.g., soda ash, sodium bicarbonate). Bases can be neutralized by using citric acid or boric acid. Check spill area with a pH indicator paper to confirm complete neutralization.
- For small quantities of flammable/combustible liquids, a commercially purchased spill pillow (specifically designed for solvents) can be used. Mineral absorbent materials, such as sand, or kitty litter can be used; however, fumes can still volatilize from these materials. Commercial absorbent powders are available.
- For small quantities of other materials, absorb the materials with non-reactive materials (e.g., clay, dry sand, towels).
- Mop up the spill if necessary, wringing out the mop in a pail equipped with rollers. Do not use your hands.
- Carefully pick up any broken glass using mechanical means such as tongs or a broom and dustpan (do not use your fingers).
- Carefully pick up and clean any cartons, bottles, or equipment that may have been splashed and contaminated. If absorbent has been used to clean up flammable or volatile chemicals, it must be stored in a well-ventilated area, away from sources of heat or ignition.
- Double bag contaminated clean up materials and seal. These materials must be disposed of as hazardous waste. Label all disposal containers or bags with a descriptive name, the words "Hazardous Waste," and the date.
- When clean up operations are complete, wash hands with soap and water.
- Clean, dry, and place non-disposable PPE back in storage.

Never assume gases or vapors do not exist or are harmless because of a lack of smell. Many chemicals anesthetize the nose and the sense of smell is eliminated, or they do not have any odor at all.

## 13.0 Emergency Equipment

Eyewash and shower stations, first aid kits, and spill kits are present in the chemical storage area. Equipment is inspected consistent with Section 8.0 and is used only as intended (i.e., eyewashes are not used as drinking fountains). Eyewash and shower stations are not blocked, and first aid kits and spill kits are maintained in an accessible area.

## 14.0 Chemical Waste and Disposal Information

The disposal of hazardous waste is conducted according to the district's Management Plan for Hazardous Waste. Each facility generating waste has been given a unique EPA Identification Number. The appropriate number should be used when hazardous waste is generated and transported.

| | | | |
|---|---|---|---|
| High School | MN0000610337 | 1400 Division Street S.<br>Northfield, MN 55057 | Conditionally Exempt Small Quantity Generator |
| Greenvale Park Elementary | MNS000126755 | 700 Lincoln Parkway<br>Northfield, MN 55057 | None Generator |
| Sibley Elementary | MN0000690412 | 1400 Maple Street<br>Northfield, MN 55057 | None Generator |

The following rules apply to disposal of hazardous waste:

- Chemical waste is not disposed of down the sink unless specifically authorized to do so.
- Evaporation (i.e., in a fume hood) is not used as a means of chemical disposal.
- Non-compatible chemical wastes are not mingled.
- Chemical waste collection and storage containers are clearly labeled with a descriptive name, the words "Hazardous Waste," and the accumulation start date.

- Waste materials are disposed of in accordance with applicable rules and regulations.
- When disposal is necessary, the CHO and Director of Buildings and Grounds is contacted.

## 14.0 Recommended References

*Prudent Practices for Handling Hazardous Chemicals in Laboratories*
National Academy Press
2101 Constitution Avenue NW
Washington, DC 20418

*Emergency Medical Treatment for Poisoning*
National Poison Center Network
125 Desoto Street
Pittsburgh, PA 15213

*Fire Prevention Guide on Hazardous Materials*
National Fire Protection Association (NFPA)
Batterymarch Park
Quincy, MA 02269

*First Aid Manual for Chemical Accidents*
Lefevre, Marc J.
Dowden, Hutchinson & Ross
Stroudsburg, PA 18360

*NIOSH/OSHA Pocket Guide to Chemical Hazards DHHS (NIOSH) Publication Number 78-210*
U.S. Government Printing Office
Washington, DC 20402