Regional School District 13

Chemical Hygiene Plan & Chemical Inventory

Update September 2018

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INTRODUCTION

1.1 Purpose of This Document

This Chemical Hygiene Plan is a document designed to express the policies and procedures adopted by **Regional School District #13**, as they relate to the safe operation of the school laboratory. The Chemical Hygiene Plan is derived from the Laboratory Standard, a regulation promulgated in the January 31, 1990, issue of the Federal Register. The goal of the Laboratory Standard is to provide a safe laboratory workplace, and it includes requirements on occupational exposures to hazardous chemicals.

The OSHA Laboratory Standard requires that employers protect workers through the development and implementation of a Chemical Hygiene Plan tailored to the individual laboratory workplace. The purpose of the Laboratory Standard and of this Chemical Hygiene Plan is to protect employees from harm due to exposure to hazardous chemicals while they are working in the laboratory.

Many policies and practices may not be part of the Chemical Hygiene Plan, and yet they are crucial to the planning process that must be part of maintaining a safe environment for employees and students. The number of students per class or teacher and the amount of physical space available to each student are examples of policies and practices that affect establishment of a safe environment, but which are not required by OSHA to be included in the Chemical Hygiene Plan.

1.2 Application of the OSHA Laboratory Standard

The Occupational Safety and Health Act is administered by the Occupational Safety and Health Administration, which is part of the Department of Labor. OSHA regulations are found in the Code of Federal Regulations (CFR), Title 29, Section 1910 (cited as 29 CFR 1910). Appendix A of this document contains the full text of 29 CFR 1910.1450, "The Laboratory Standard," and this introduction contains a summary of that code.

The Laboratory Standard requires that the school district have a Chemical Hygiene Plan and a Chemical Hygiene Officer. There should be a district-wide officer, but it is also recommended that a person be designated as a School Chemical Hygiene Officer at each school if there are several schools in the district.

What Is Covered By The Laboratory Standard

"Laboratories" are defined as facilities where the "laboratory use of hazardous chemicals" occurs. "Laboratory use of hazardous chemicals" refers to the handling or use of such chemicals in which all of the following conditions are met:

- Chemical manipulations are carried out on a laboratory scale.
- Multiple chemical procedures or chemicals are used.
- The procedures involved are not part of a production process, nor in any way simulate a production process.
- Protective laboratory practices and equipment are available and in common use to minimize the potential for employee exposure to hazardous chemicals.

"Hazardous Chemical" means a chemical for which there is statistically significant evidence, based on at least one scientific study, showing that acute or chronic health effects occur in exposed employees. A chemical prepared for the first time and for which safety data is not available should be treated as a "hazardous chemical" until data is available to show otherwise. The term "health hazard" includes carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, sensitizers, and corrosives.

"Employees" who must abide by this Chemical Hygiene Plan are individuals employed in the laboratory workplace who may be exposed to hazardous chemicals in the course of their assignment. Included are employees who work in the laboratory such as instructors and teacher's aides, and other employees of the district who enter the laboratory to perform their assigned responsibilities such as maintenance and janitorial personnel.

"Laboratory scale" means work with substances in which the containers used for reactions, transfers, and other handling of substances are designed to be easily and safely manipulated by one person.

What Is Not Covered by the Laboratory Standard

The Laboratory Standard is a regulation promulgated for the protection of employees. Since students are not employees, they are not officially covered by provisions of the Chemical Hygiene Plan. However, since this document contains guidance on generally accepted good laboratory practice, it should be used to establish minimal safety instruction and procedures for students.

The Laboratory Standard does not apply to uses of hazardous chemicals which do not meet the definition of "laboratory use." However, the Hazard Communication Standard may apply in these instances.

Laboratory uses of hazardous chemicals which provide no potential for employee exposure, including procedures using chemically impregnated test media such as Dip-and-Read tests, are not covered by the Laboratory Standard. The Lab Standard does not cover the use of commercially prepared kits, such as those used in performing pregnancy tests in which all of the reagents needed to conduct the test are contained in the kit.

Laboratory visitors, such as sales staff, outside repair persons, and guests are not included in the definition of employee, and thus do not need to be addressed in the Chemical Hygiene Plan. All such persons should be offered the same protection given to employees and students.

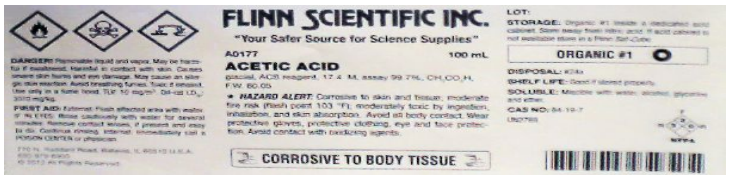
1.2b Updates made to the Laboratory Standard effective December 1, 2013

The following major changes have been made to the Hazard Communication Standard:

1. Safety Data Sheets (SDS): The Material Safety Data Sheet (MSDS) will be replaced with a Safety Data Sheet (SDS which will have 16 sections in an established format.

2. Hazard Classification: The physical and health hazards of each chemical (and chemical mixtures) have to be identified by the manufacturer using specific criteria for classification. There are criteria established for 16 physical hazards and 10 health hazards.

3. Labels: Chemical manufacturers are required to provide a label that includes the chemical name, harmonized signal word indicating the relative degree of severity of a hazard (such as “danger” and “warning”), pictogram and hazard statement for each hazard class and category. Precautionary statements must also be used. The manufacturer name, address and phone number must be included and all this must be in consistent format as shown in the example below.



1.3 Summary of the Chemical Hygiene Plan

In compliance with the Laboratory Standard, the district has prepared and implemented the Chemical Hygiene Plan. Adherence to the Plan will assure that employees will be protected from health hazards associated with hazardous chemicals in the laboratory, and exposed to regulated substances at a level that will not exceed the permissible exposure limits.

This Chemical Hygiene Plan is composed of the following sections:

- This Introduction which states the goal and basis for the Chemical Hygiene Plan.
- A List of the District Personnel responsible for various aspects of the Plan and its implementation.
- General Principles which outlines the guidelines for working with laboratory chemicals.
- Standard Operating Procedures for Laboratories, the implementation of which will help the Chemical Hygiene Officer and all employees in meeting the goal of the Chemical Hygiene Plan.
- Record-Keeping Requirements and procedures for reporting items related to laboratory health and safety.
- Laboratory Safety Procedures.
- Procedures for Inspecting Laboratories and reviewing the Chemical Hygiene Plan.
- A description of the situations in which employees must use Specific Exposure Control Measures.
- Information regarding Training Opportunities for employees.
- Emergency Response Procedures.
- Spill Response Procedures.
- Appendices which supply references and other useful information.

CHEMICAL HYGIENE PLAN

Regional School District #13

Prepared by: Bill Healey, edited by Lavinia Vigue, Susan Michael
to cover the following schools: Coginchaug Regional High School, Strong School and Memorial School

Emergency Phone Numbers:		Home/Mobile	Work/School
Operations Manager	Mrs. Susan Gaudreau	860-301-5857 (C)	860-349-7200 ext. 261
Facilities Manager	Mr. James Croteau	860-335-8761 (C)	860-349-7200 ext. 489
Superintendent	Dr. Kathryn Veronesi	860-849-3464(C)	860-349-7200 ext. 245
Chemical Hygiene Officer	Mrs. Lavinia Vigue	860-759-4914(C)	860-349-7215 ext. 203
Principal (CRHS)	Mr. Brian Falcone	860-490-8910(C)	860-349-7215 ext. 252
Assistant Principal (CRHS)	Mr. Patrick Gustafson	860-575-9411(C)	860-349-7215 ext. 251
Head Custodian (CRHS)	Mr. Jeffrey Sienna	860-344-1001(H)	860-349-7215 ext. 223
Science Dept. Chair (CRHS)	Mrs. Erika Anderson	860-575-3416(C)	860-349-7215 ext. 292
Principal (Strong)	Mr. Scott Sadinsky	860-206-2175(H)	860-349-7222 ext. 240
Principal (Memorial)	Mrs. Debra Stone	203-484-2552(H)	860-349-7235 ext. 201

Signature Date
District Superintendent

Signature Date
District Chemical Hygiene Officer

Last Reviewed:

DISTRICT ORGANIZATION

The continuing execution of the provisions of the district's Chemical Hygiene Plan is a responsibility of all employees who are involved in the laboratory science program. However, certain employees and entities are specifically charged with the successful execution of the Chemical Hygiene Plan.

2.1 Superintendent or Chief Executive Officer

The Superintendent, as Chief Executive Officer, has the ultimate responsibility for chemical hygiene within the school district. The superintendent should, with other administrators, provide continuing support for district-wide chemical hygiene programs, including the development and enforcement of the Chemical Hygiene Plan.

2.2 Principal

At each local school, the Principal or other administrative head is responsible for chemical hygiene programs at that location. The principal should monitor compliance with the Chemical Hygiene Plan.

2.3 Project Director

Some situations may require a Project Director, who may be a science department head, science supervisor, science teacher, or someone from outside the normal school structure who has a particular responsibility related to the laboratory, but who is not part of the regular teaching or instructional responsibilities. The project director has specific responsibilities requiring work in the laboratory. For example, a project director may be an adviser to a chemistry club, an adviser to Boy Scouts, Girl Scouts, or some civic organization having approval to work in the laboratory, or the supervisor of a student research project, which is not done as part of a regular class, but for which credit may be awarded. The project director has the primary responsibility for chemical hygiene procedures for that project.

2.4 School District

The responsibilities of the school district, which is the employer of record, include the following:
• Appointing a Chemical Hygiene Officer and assigning the Chemical Hygiene Officer the various responsibilities outlined below.
• Making manufacturer's safety data sheets accessible to employees.
• Providing employees with training and information regarding chemical and physical hazards.
• Posting "Designated Areas" if any select carcinogens, reproductive toxins, or acute toxins are used in the laboratory.
• Measuring the concentration of hazardous chemical(s), if there is any reason to believe that the action level has been exceeded.
• Keeping records of employee exposure to hazardous chemicals for a period of 30 years beyond the time of exposure. These records should be filed by the employee, with the school district, in writing, within two weeks of the exposure.
• Providing medical consultations and examinations required as a result of exposure to hazardous chemical(s).
• Providing respirators when necessary. (See the sections on training, monitoring, and record-keeping for further information on the use of respirators.)

2.5 School Employees

All employees who normally work in a laboratory area are responsible for
• Participating in training programs provided by the school district.
• Maintaining awareness of health and safety hazards.
• Planning and conducting each operation in accordance with the school district's chemical hygiene procedures.
• Consulting reference materials, including material safety data sheets, related to chemical safety whenever appropriate.
• Using good personal chemical hygiene habits.
• Reporting accidents, injuries, unsafe practices, and unsafe conditions.

2.6 Chemical Hygiene Personnel

Districts composed of several schools covered by the Laboratory Standard, may designate a District Chemical Hygiene Officer, and assign responsibility in the local school to a School Chemical Hygiene Officer on site.

The District Chemical Hygiene Officer is appointed by the Superintendent. Susan Gaudreau will serve in this position for the school district, in accordance with the contract between the two parties.

The District Chemical Hygiene Officer should be qualified by training and experience to provide technical guidance in the development and implementation of the Chemical Hygiene Plan. In the event a district does not have a qualified person, the district may contract with a consortium of districts, another district, or a qualified consultant to serve in this capacity. The Chemical Hygiene Officer should report directly to the Superintendent.

The responsibilities of this position require the District Hygiene Officer to
• Develop and implement the Chemical Hygiene Plan and the safety program for the district, including training, reporting, and other functions noted here.
• Work with administrators and teachers to develop and implement the safety program.
• Maintain a list of School Chemical Hygiene Officer(s) to monitor the procurement, use, and disposal of chemicals used in the schools' laboratory programs.
• Assure that inspections of equipment and space in the laboratory are performed when appropriate and that records of inspections are maintained.
• Provide technical assistance to schools and employees on the Chemical Hygiene Plan.
• Assure that the Chemical Hygiene Plan is reviewed annually and revised as needed, so that it is always in compliance with current legal requirements.
• Make decisions regarding requests to use chemicals identified as explosive, carcinogenic, mutagenic, highly toxic, or otherwise unsuitable for general school laboratories.

• Determine the need for personal protective equipment beyond that specified for general laboratory use.
• Implement appropriate training with regard to chemical hygiene for all district employees whose normal work locations include laboratory areas.

The School Chemical Hygiene Officer will be designated by the principal. Lavinia Vigue will serve in that position for the school, in accordance with the governing contract between the two parties. The School Chemical Hygiene Officer will serve as the building's contact person for chemical hygiene programs.

The School Chemical Hygiene Officer will have the responsibilities listed below:
• Ensure that employees have received appropriate training.
• Ensure that employees have access to the Chemical Hygiene Plan, safety data sheets and other suitable reference materials. See Appendix B for a selected bibliography.
• Provide regular, formal chemical hygiene and housekeeping inspections.
• Coordinate requests to the District Chemical Hygiene Officer and Principal for acquisition, use or disposal of chemicals identified as explosive, carcinogenic, mutagenic, highly toxic, or otherwise unsuitable for general school laboratories.

2.7 Science Teachers

Science teachers should support the implementation of the chemical hygiene plan by:
• Ensuring that the General Principles and Standard Operating Procedures are being followed
• Providing safety education to students at the beginning of each school year (or semester for half year courses)
• Distribute to students, review rules and collect document after parents and students sign the Science Safety Acknowledgement document.
• Provide appropriate safety information to students at the start of every laboratory activity.
• Have SDS sheets available for each chemical being used for every laboratory.
• Properly store and label chemicals used in the classroom.
• Complete end of the school year inventory of chemicals stored in prep room cabinets.

2.8 Students

Students are not specifically covered by the Laboratory Standard. However, good personal chemical hygiene habits should be taught to all students at every reasonable opportunity, particularly to those who use the laboratory while enrolled in science courses. Students should not be allowed to use school laboratories outside of regular science course classes unless they first obtain permission and are directly supervised by the instructor during their work.

GENERAL PRINCIPLES

The following statements and explanations are general principles for the use of those handling laboratory chemicals. While the list is not complete, these concepts provide the fundamental underpinning for laboratory work in this district.

3.1 Be Prepared

The School District will train employees in how to find and use information from SDSs, this Chemical Hygiene Plan, and other safety publications. Employees should familiarize themselves with the hazards associated with the chemicals they expect to use and should take appropriate steps to minimize their exposure to those chemicals.

3.2 Follow the Chemical Hygiene Plan

The Chemical Hygiene Plan provides specific laboratory practices designed to minimize employees' exposure to hazardous substances. Employees should follow the practices specified in the Chemical Hygiene Plan to minimize their health and safety risks.

3.3 Minimize Exposure to Chemicals

It is prudent to minimize all chemical exposures, because most laboratory chemicals present hazards of one type or another. Employees will follow general precautions for handling all laboratory chemicals. Specific guidelines for some chemicals, such as those found in the appropriate SDSs, will also be followed.

3.4 Consider the Risk

Employees should not underestimate risk, and exposure to hazardous substances should be minimized. The decision to use a particular substance will be based on the best available knowledge of each chemical's particular hazard and the availability of proper handling facilities and equipment. Substitutions, either of chemicals or experiments, will be made where appropriate to reduce hazards without sacrificing instructional objectives. When the risk outweighs the benefit and no substitute is available, then the experiment, procedure, or chemical should be eliminated.

3.5 Observe PELs and TLVs

The permissible exposure limit (PEL) and threshold limit value (TLV) of a typical chemical used in the laboratory are available on the SDS for that chemical. Employee exposure to hazardous chemicals should not exceed those limits.

3.6 Provide Adequate Ventilation

The best way to prevent exposure to airborne substances is to prevent their escape into the laboratory by using hoods or other ventilation devices. Those devices should be kept in good working condition in order to provide employees with a safe working area. The later section on Inspections in the laboratory establishes procedures for ensuring that equipment is working properly.

3.7 Use Safety Data Sheets

The district should not accept a chemical from a supplier unless it is accompanied by the corresponding SDS, or an SDS from that supplier for that chemical is already on file. All SDSs should be accessible to employees at all times. Employees should be trained to read and use the information found on SDSs.

STANDARD OPERATING PROCEDURES

The goal of the Chemical Hygiene Plan is to protect employees (and students) who work in the laboratory, others who may be exposed, and the environment from injury due to hazardous chemicals. This section is written in several parts and is meant as a guide for the district and its employees. Other specific safety rules for a particular laboratory may be added by the Chemical Hygiene Officer as needed.

It is recommended that these same standards be communicated to students, expected of students, and promoted by the school and laboratory personnel.

4.1 General Rules

The instructor (and aide, if any) should review laboratory instructions, safety procedures, and reagents prior to each laboratory activity. They should be aware of the following:

- The chemical hazards for each chemical, as determined from the SDS or other appropriate reference.
- Appropriate safeguards for using each chemical, including personal protective equipment.
- Location and proper use of emergency equipment.
- Proper storage of chemicals.

• Appropriate personal hygiene practices.
• Correct methods for transporting chemicals within the laboratory facility.
• Appropriate procedures for emergencies, including evacuation routes, spill clean-up procedures, and fire control.
• Proper procedures for the disposal of hazardous substances.
• Procedures for notifying supervisory persons in the case of an accident or injury.

4.2 Working Alone

Employees should not work alone in a laboratory or chemical storage area unless other employees are in the vicinity and are aware that someone is in the laboratory, in which case periodic checks should be made. At no time should a student ever work alone in a laboratory or chemical storage area.
Whenever chemicals are in the laboratory and not in locked cabinets or storerooms, the unattended laboratory will be locked.

4.3 Personal Protective Equipment and Clothing

The employee should use appropriate protective clothing and equipment. Laboratory aprons or coats, eye protection, and nonpermeable gloves are considered standard equipment for school laboratory programs and should be readily available to employees and students. Required personal protective equipment must be supplied by the district.

4.3.1 Eye Protection

Everyone, including visitors to the laboratory, should wear eye protection at all times when working with chemicals, glassware and heat. Eye goggles should provide splash and impact protection and should conform to ANSI Standard Z87.1-1989. Eyeglasses, even with side shields, are not acceptable protection against chemical splashes. Refer to the State Department of Education Prudent Practices and Regulations for Science Teachers.
State of Connecticut Goggle Statutes
Equipment should be available with which to clean and sterilize goggles and should be used whenever two or more persons use the same goggles. It is recommended that a sterilization cabinet be available particularly for use with goggles shared by students.

Contact lenses are not necessarily prohibited in the laboratory. If contact lenses are permitted, chemical splash goggles must also be worn at all times. Because there may be a need to remove contacts quickly, contact lens wearers may inform the appropriate personnel of the contacts before an emergency arises. Approved standing shields or face shields should be used when there is potential for explosions, implosions, or splashes, or when corrosive liquids are used. Goggles should be worn whenever using standing or face shields.

4.3.2 Protective Clothing

Protective clothing worn in the laboratory should offer protection from splashes and spills, should be easy to remove in case of an accident, and should be fire resistant. Nonflammable, nonporous rubber or plastic aprons offer the least expensive protection. They should be long enough to cover from the neck area to the knees. Clean chemical and fire resistant laboratory coats may be worn. They should be long-sleeved and long enough to cover the knees. Snap fasteners or Velcro closures are better than buttons, because the laboratory coat is more easily removed in an emergency.

Laboratory coats, jackets, aprons, or clothes on which chemicals have been spilled should be washed separately.

4.3.3 Gloves

When gloves are required, it should be remembered that no one kind of glove is suitable for all situations. The SDS should be consulted for information regarding the proper type of gloves to be used. For example, corrosion-resistant gloves should be worn when working with corrosive liquids.

- Gloves that resist permeation by chemicals that are allergenic, sensitizing, or toxic should be worn when appropriate.
- Gloves should be removed before leaving the laboratory, touching door knobs, telephones, or lab notebooks.
- Gloves should be checked before each use to ensure the absence of cracks and small holes and should always be worn with the same side out.

4.4 Advance Planning

The employee should not rely solely on the textbook, laboratory manual, or other instructional material for safety precautions required for a particular experiment. Consult the SDSs for chemicals and safety references for equipment, particularly when the anticipated experiment is new to the instructor. The instructor or laboratory aide should review potential hazards and specifically describe them to all classes and all students immediately before each experiment. The scale of the procedure should be reduced as much as possible to bring to a minimum the generation of waste chemicals. Use only those chemicals for which the ventilation system is adequate.

4.4.1 Demonstrations

Never perform a first-time demonstration in front of your class. Always perform first-time demonstrations in front of other instructors to evaluate the safety of the demonstration.

4.5. Personal Behavior

The laboratory should never be left unattended while students are performing an experiment in that laboratory. However, it is recognized that some experimental procedures, such as crystallization or incubation, are a normal part of some experiments and that such procedures may safely be left while they are in progress. The employee should use the best available information when deciding whether a particular procedure may be left unattended.

Horseplay, pranks, or other acts of mischief should not be tolerated in chemical work areas and laboratories. Additionally, activities using unauthorized chemicals should not be performed by employees or students.

Every precaution should be taken to insure that chemicals are never removed from the laboratory by unauthorized persons.

4.6 Personal Hygiene

All employees should use appropriate personal hygiene practices, including the following:

- Wash promptly whenever any hazardous chemical has contacted the skin, except in those few cases in which chemicals will react dangerously with water.
- Never pipet by mouth. Always use a bulb or other device for suction.
- Avoid inhalation of chemicals used for an experiment, including gases, vapors, and aerosols.
- “Wafting” to test chemical odors should only be done with extreme caution and only when specifically directed to do so in the written experimental procedure.
- Wash well with soap and water before leaving the laboratory, even if gloves have been worn.
- Never wash with organic solvents.
- Never smoke in the laboratory. Be aware that tobacco products in opened packages can absorb chemical vapors.
- Do not apply or store cosmetics in the chemical laboratory.
- Seek immediate, appropriate medical treatment whenever signs/symptoms of exposure to a hazardous chemical are manifested.

4.7 Housekeeping

Because many accidents may be attributed to sloppy work areas, all laboratory spaces must be kept clean and contain only those items needed for the task at hand. Cleanup should immediately follow the completion of each operation and at the end of each day.

- Place all wastes in appropriate, segregated receptacles that are correctly labeled.
- Store all equipment and chemicals properly. Chemicals should not be stored in aisles, on the floor, in stairwells, on desks or laboratory tables.
- Do not leave chemicals overnight on shelves over the workbench.
- Never block access to emergency equipment, showers, eye washes, or exits.
- Clearly label all chemical containers with the identity of the contents and the hazards those contents present. These labels should be consistent with all state and federal requirements.
- Keep all cabinets and drawers closed when not in use to avoid catching and bumping hazards.
- Clean all working surfaces and floors on a regular basis. Keep the floor clear of slipping hazards such as ice, spilled liquids, glass beads, or other small items.
- Clean up all chemical spills as soon as they occur. Chemicals and cleanup materials should be disposed of correctly.

4.8 Food Handling

No food or beverages should be stored, handled, prepared, or consumed in the laboratory or other areas where chemicals are used or stored. Additionally, laboratory chemicals and laboratory equipment should not be brought into smoking or eating areas. Glassware or utensils that have been used for laboratory operations should never be used to prepare or consume food. Laboratory refrigerators, ice chests, microwave ovens, and cold rooms should not be used for food storage or preparation.

4.9 Glassware

Careful storage and handling procedures should be used to avoid glassware breakage. In the event of breakage, protection for the hands should be worn when picking up the broken pieces. Small pieces should be swept up with a brush and pan. Broken glass should be separated from other waste by placing it in a special container marked Broken Glass. Broken glass contaminated with chemicals must be treated as hazardous waste.

When inserting glass tubing into rubber stoppers or corks or when placing rubber tubing on glass hose connections, adequate hand protection in the form of heavy gloves or cloth towels should be used. When inserting glass tubing into a stopper, the hands should be held close together to limit movement of glass, and the glass should be lubricated. Tubing should be fire polished or rounded at the end.

4.10 Flammability Hazards

Open flames should not be used to heat a flammable liquid or to carry out a distillation under reduced pressure. Before lighting a flame, all flammable substances should be removed from the immediate area of the flame. All containers of flammable substances in the area should be checked to ensure that they are tightly closed.

Flammable materials should be stored in a flammable liquid storage cabinet or other appropriate location. When transferring significant quantities of flammable liquids from one container to another, it is particularly important that they be properly grounded to prevent accidental ignition of flammable vapors and liquids from static electricity or other sources of ignition. Large quantities of flammable chemicals stored outside cabinets should be in flame-proof storage cans which conform to NFPA (National Fire Protection Association) guidelines. NFPA Standards 30, Flammable and Combustible Liquids Code, and 45, Fire Protection for Laboratories Using Chemicals, and/or the applicable local fire codes should be followed.

4.11 Electrical Hazards

All electrical outlets should have a grounding connection accommodating a three-prong plug. Most electrical equipment is wired with a three-prong plug. The grounding post should never be removed from such a plug. Some equipment is designed for safe use with two-prong plugs. If the appliance comes with a two-prong plug, there is no need to change; it will work in a three-prong socket.

All laboratories should have circuit breakers readily accessible. Employees should know how to cut off electrical service to the laboratory in case of emergency. Laboratory lighting should be on a separate circuit from electrical outlets so that electric service can be cut off during an emergency. All electrical outlets should be checked for continuity after initial occupancy (upon new construction or when first used by an employee) and whenever electrical maintenance or changes occur.

If electrical equipment shows evidence of undue heating, it should be immediately unplugged.

4.12 Compressed Gases

If compressed gas cylinders are used in the laboratory, procedures for their use should be in accordance with guidelines established by the Compressed Gas Association, particularly CGA P-1 919965, Safe Handling of Compressed Gases. Some of the more important considerations in using gas cylinders correctly are the following:

- No cylinder should be moved from one location to another until the protective cap is securely in place.
- Both full and empty cylinders should only be stored where they may be securely restrained by straps, chains, or a suitable stand.
- All cylinders should be used with a correct regulator, and should be fitted with delivery tubes that do not leak and which are tightly fastened to the cylinder.
- A cylinder should be considered to be empty when there is still a slight positive pressure.
- An empty cylinder should be returned to the supplier as soon as possible after having been emptied, or when it is no longer needed.
- Cylinders should not be exposed to temperatures above 50.0 °C (122.0 °F).

4.13 Prior Approval

Teachers, instructors and aides should obtain prior approval from the appropriate Chemical Hygiene Officer whenever a new laboratory experiment or test is to be carried out. This prior approval should also be sought for experiments that have not been performed recently or for which the potential for harm is present. The potential for harm may be affected by a change in the amounts of materials being used, the conditions under which the experiment is to be conducted, or the substitution, deletion, or addition of a chemical.

Prior approval before doing any procedure should be obtained where one or more of the following conditions exist:
- Potential for a rapid rise in temperature.
- Potential for a rapid increase in pressure.
- Substitution of flammable solvent for one less flammable.
- Potential for chemical explosion.
- Potential for spontaneous combustion.
- Potential for the emission of toxic gases that could produce concentrations in the air that exceed toxic limits.
- Change in a procedure, even if the change is quite small.

Prior approval should be obtained before again performing any procedure after there has been a failure of any of the equipment needed for the process, especially of safeguards such as fume hoods.

RECORD-KEEPING PROCEDURES

The district should maintain specific records to verify safety practices.

Regular instrumental monitoring of airborne concentration is not usually justified or practical in school laboratories. Monitoring may be appropriate when toxic materials are used or stored, or when ventilation devices are tested or redesigned. It is required after each documented incident of exposure to toxic chemicals.

5.1 Training Records

The district should maintain records of employee training for at least 30 years and should make those records available to employees and/or their representatives when requested.

5.2 Safety Data Sheets

The district should maintain a file of manufacturers' SDSs and should make them accessible to employees in the laboratory. If a SDS is not available when a new chemical is received, that chemical should not be used until a SDS is obtained. It is recommended that copies of SDSs be kept at both the District Offices and the school where the chemical is located.

5.3 Prior Approval

Laboratory employees should be informed of those laboratory procedures and operations which require prior approval from the Chemical Hygiene Officer, so that these activities can be carefully monitored for adherence to the Chemical Hygiene Plan. Request for approval must be made in writing.

5.4 Incident Reports

Each incidence of an accident of injury or "near miss" should be reported to the local Chemical Hygiene Officer and the District Chemical Hygiene Officer in writing in accordance with Worker's Compensation rules. If staff or students were witnesses to the accident of injury, they should also complete the appropriate form found in Appendix D. The District should keep records for 30 years from the time of the lost work, in the event of lost work resulting from an exposure to a hazardous chemical or a job-related accident. Near miss reports are very useful in determining what areas might benefit from a review of procedures.

5.5 Chemical Inventory Records

Each school should maintain an overall Chemical Inventory List as well as Preparatory Room Chemical Inventory Lists, which will be updated annually. Copies of all Chemical Inventory Lists should be kept at the local school main office, classroom and District Office. If this is done by a computer-based inventory program, backup copies should be maintained in a separate location.

5.6 Waste Disposal Records

The District should maintain records of waste chemicals and products from reactions or processes that are transferred to an authorized and/or certified chemical disposal agent, and chemicals that are transported to a new site. These records should conform to requirements of the Environmental Protection Agency and Department of Transportation, either of which may have jurisdiction over these types of transfers. The records should also conform to state requirements.

5.7 Safety Inspections and Recommendations

The district should keep records of the regular safety inspections, including the date of the inspection and the person conducting the inspection. The district should keep records of permanent safety equipment, showing the

dates of inspection and the results of any inspection. Examples of equipment to be inspected are fire extinguishers, drench showers, eye wash fountains, and fire blankets. The district should maintain records showing dates of needed repairs and regular maintenance for control systems.

Written safety suggestions from employees should be recorded by the district. The dates the suggestions were submitted, the name of the person submitting the suggestion, the disposition of the suggestion, and the reasons for that particular action should be kept.

LABORATORY SAFETY PROCEDURES

6.1 Employee Exposure Protection and Monitoring

If there is reason to believe that exposure levels for a regulated substance have exceeded the action level or permissible exposure limit, the school Chemical Hygiene Officer should ensure that employee or student exposure to that substance is measured.

Factors which may raise the possibility of overexposure and therefore warrant an initial measurement of employee or student exposure include:

- The manner in which the chemical procedures or operations involving the particular substance are conducted.
- The existence of historical monitoring data which shows elevated exposures to the particular substance for similar operations.
- The use of a procedure which involves significant quantities or is performed over an extended period of time.
- There is reason to believe that an exposure limit may be exceeded.
- Signs or symptoms of exposure (e.g., skin or eye irritation, shortness of breath, nausea, headache), which are experienced by employees or students. (Some of these symptoms are very general and can be due to many other causes including emotional stress or hysteria.)

If the initial exposure determination described above indicates employee or student exposure over the action level for a particular substance, the school district should immediately comply with the exposure-monitoring requirements for that substance.

6.2 Laboratory Facilities

The type and scale of work conducted in a laboratory should be appropriate to the physical facilities available and to the quality of the ventilation system. A laboratory should include, where appropriate:

- An adequate general ventilation system with air intakes and exhausts located so as to avoid intake of contaminated air.
- Well-ventilated stockrooms and storerooms.
- Proper chemical storage for specific hazardous materials such as flammables, corrosives, carcinogens, and highly toxic chemicals, so far as they are likely used.
- Adequate laboratory hoods and sinks.
- Emergency equipment, including proper fire extinguishers, spill kits, alarms, access to a telephone with an outside line, eye wash, safety shower, and fire blanket.
- First aid equipment including first aid kits.
- Arrangement for proper waste storage and disposal.

6.3 Laboratory Ventilation

Laboratory fume hoods are not meant for either storage or disposal of chemicals. If a hood must be used for storage, in order to provide adequate ventilation for flammable chemicals, for example, it must not be used for laboratory experiments or transfer of chemicals. In that event, it must be used only for storage.

General laboratory ventilation should not be relied on for protection from exposure to hazardous chemicals. A rate of 8–12 room air changes per hour should be the accepted standard when local exhaust systems such as hoods are used as the primary method of control. Laboratory airflow should not be turbulent and should flow continuously throughout the laboratory.

A laboratory hood with a minimum of 2–3 linear feet of hood space per person should be provided for every two students if they spend most of their time working with chemicals. Airflow into and within the hood should not be excessively turbulent. Excessive turbulence may be produced when a hood face velocity exceeds 125 linear feet per minute. Fume hoods should provide adequate airflow at about 60–100 linear feet per minute. The airflow should be measured regularly by the instructor or School Chemical Hygiene Officer.

Cabinets and rooms which store hazardous chemicals should be well ventilated.

The quality and quantity of ventilation should be evaluated when installed, regularly monitored, and reevaluated whenever a change in ventilation devices is made, or the ventilation system is repaired.

6.4 Medical Consultations and Medical Examinations

Employees who work with hazardous chemicals should be provided with an opportunity to receive medical attention when overexposure to a hazardous chemical is reasonably suspected.

In the event that employees' work involves regular and frequent handling of toxicologically significant quantities of a chemical, the District Chemical Hygiene Officer should determine whether consultation with a qualified physician is necessary to set up a plan for routine surveillance.

Cause for Consultation or Examination

In relation to the exposure of hazardous chemicals, medical attention should be provided to an employee under the following circumstances:
• Whenever an employee develops signs or symptoms of exposure to a hazardous chemical to which the employee may have been exposed in the laboratory.
• Whenever exposure monitoring reveals an exposure level above the action level or permissible exposure level for an OSHA-regulated substance.
• Whenever an event such as a spill, leak, or explosion, takes place in a laboratory which results in the likelihood of exposure to a hazardous substance.

Type of Medical Attention

All medical examinations and consultations should be performed under the direct supervision of a licensed physician and should be provided without cost to the employee, without loss of pay, and at a reasonable time and place. All questions regarding medical consultations and examinations should be directed to the District Chemical Hygiene Officer, who should arrange for consultation with the district's medical consultant.

Information for the Physician

The following information should be provided to the physician conducting medical consultations and examinations:

• The identity of hazardous chemicals to which the employee may have been exposed.
• A copy of the safety data sheet for the chemical.
• A description of the conditions under which the exposure occurred, including quantitative exposure data.
• A description of the signs and symptoms of exposure that the employee is experiencing.

Physician's Report

A written opinion from the examining physician for any consultations or examinations performed under this standard should include any recommendation for further medical attention, the results of the medical examination and any associated tests, any medical condition revealed during the examination which might compromise employee safety during, or as a result of, exposure to hazardous chemicals found in the workplace, and a statement that the employee has been informed by the physician of the results of the consultation or examination and any medical

condition that may require further examination or treatment. The written opinion should not reveal specific diagnoses unrelated to occupational exposure, except as noted above.

6.5 Chemical Purchase and Procurement

The purchaser of chemicals should be guided by the maxim that less is better. The lower the chemical inventory, the fewer the problems associated with storage, and the less likely that the school district will face excessive costs to dispose of outdated or surplus chemicals.

- Chemicals should be ordered in quantities that are likely to be consumed in one year or less.
- Chemicals should be purchased only when needed for specific experiments or research projects. The chemicals should be purchased only in the quantity sufficient for the declared use.
- All chemicals should be in tightly closed, sturdy, and appropriate containers.
- A chemical should not be accepted without being accompanied by the safety data sheet.
- The container should be marked with the date at the time it is received and the date it is opened.
- Chemicals should not be accepted if the original container has been broken, opened, or has been compromised in some other way.
- The Chemical Inventory List should be updated each time a chemical is received.
- Donated chemicals should be accepted only after approval is obtained from the District Chemical Hygiene Officer. It should be established that the donated chemical is in excellent condition, that an appropriate material safety data sheet is available, and that there is a specific use for the donated material.

6.6 Storage and Distribution

- All chemicals should be in tightly closed, sturdy, and appropriate containers.
- If the chemical has been transferred to a secondary container, the new container should be appropriately labeled, including all of the hazard information. Specifications for labeling follow in Section 6.8.
- Chemicals should be stored based on the reactive nature of the chemical. Storage patterns should never be based solely on the alphabetical arrangement of chemicals.
- The classification system used for the storage of chemicals should be displayed in the principal storage area.
- Large containers and containers with reactive chemicals, such as acids and bases, should be on low shelves. No chemical should be stored on top of a storage shelf or cabinet.
- All shelves on which chemicals are stored should have a lip of approximately 3/4" or greater in order to prevent bottles from sliding off the shelf.
- Flammable chemicals should be stored in approved storage cans or approved flammable chemical storage cabinets.
- Combustible packaging material should not be stored near flammable chemical storage cabinets.
- All storage areas should be securely locked when not in use by the employee. Storage and preparation areas should be accessible only to those persons authorized to use the chemicals. Such personnel should have had proper training in the handling and use of the chemicals.
- Chemicals classified as acute poisons should be kept in a separate, locked location, which has been appropriately labeled.
- Chemicals which present a fire hazard should be stored in quantities less than 500 mL, unless metal safety cans are used, or the container is stored in a suitable flammable storage cabinet.
- If approved metal safety cans are used, the spring-loaded closure should not be disabled, the flame-arrestor screen should be kept in place, the arrestor screen should be replaced whenever it is punctured or damaged, and the arrestor should never be immersed in the flammable liquid.
- Chemicals should not be distributed to other persons or to other areas of the school without prior approval of the School Chemical Hygiene Officer. Chemicals should not be transferred to another location without the simultaneous transfer of a copy of the appropriate material safety data sheet, nor should they be transferred without the person receiving the chemicals having had appropriate training in their use, storage, and disposal.

6.7 Inventory Control

- A Chemical Inventory List should be updated each time a chemical is received or consumed. The list should be audited for accuracy on at least an annual basis.
- The Chemical Inventory List should contain the following information about each chemical found in storage: the chemical name, the date purchased, the amount present, the Chemical Abstracts Registry (CAS) number, and the examination date for possible disposal.
- Every area in which chemicals are used or stored should have an up-to-date inventory.
- A printed copy of the most recent inventory should be kept by the School Chemical Hygiene Officer, the Principal and the District Chemical Hygiene Officer.

6.8 Hazard Identification and Labels

- Laboratory chemicals should be properly labeled to identify any hazards associated with them for the employees' information and protection.
- If a chemical is stored in its original bottle, it should have the manufacturer's original label identifying potential hazards, and the date of purchase, the date opened, and the initials of the person who opened the container.
- If a chemical has been transferred to a secondary container, the new container should be appropriately labeled with the chemical name, formula, concentration (if in solution), solvent (if in solution), hazard warnings, and name or initials of the person responsible for the transfer.
- Unlabeled bottles should not be opened, and such materials should be disposed of promptly, as outlined in the section on disposal procedures.

6.9 Safety Data Sheets

- The Safety data sheets for each chemical used in the laboratory should give recommended limits or OSHA-mandated limits, or both, as guidelines to exposure limits. Typical limits are expressed as threshold limit values (TLVs), permissible exposure limits (PELs), or action levels. When such limits are stated, that limit, along with any other information about the hazardous characteristics of the chemical, should be used to set laboratory guidelines. These laboratory guidelines may be used by the District or School Chemical Hygiene Officer and the teacher in determining the safety precautions, control measures, and personal protective equipment that apply when working with that toxic chemical.
- Each SDS received with incoming shipments of chemicals should be maintained and made readily available to laboratory employees and to students.
- A safety data sheet for each compound on the Chemical Inventory List should be available in the department, except for those chemicals which predate the Laboratory Standard. Safety data sheets can often be obtained by requesting them from companies that currently sell the chemicals. Chemical manufacturers and suppliers are required to supply one copy of a material safety data sheet the first time the chemical is purchased by the school or institution.
- All laboratory employees will be trained to read and understand the SDSs.

6.10 Waste Disposal

The District and School Chemical Hygiene Officers should ensure that laboratory chemicals are disposed in compliance with appropriate regulations and in a manner which minimizes damage to human health and the environment.

Every process that uses chemicals has the potential for producing hazardous waste. The purchaser or producer of chemicals should take into consideration the waste that should be produced and the cost of waste disposal. The product of a reaction or process only becomes hazardous waste when it is removed from the reaction system and called waste and it is hazardous material.

Treatment of hazardous waste must be done by a licensed facility. If a process generates a hazardous waste, either that waste should be collected for treatment outside the school or the experimental procedure should be altered to avoid production of the waste.

There are several references concerning the deactivation of hazardous materials that may be used to help devise suitable schemes for modifying experiments. Useful references are in Appendix B.

The following are specific guidelines for hazardous waste disposal:
- Chemicals should be ordered in quantities that are likely to be consumed in one year or less.
- Potential waste materials are surplus, old, and/or unnecessary chemicals. Every attempt must be made to avoid accumulating such chemicals.
- No flammable, combustible, or water-immiscible material will be poured down the drain.
- Separate waste containers should be provided for heavy metal compounds, chlorinated hydrocarbons, and nonchlorinated hydrocarbons. Separation of wastes in this manner will make disposal less costly.
- Acids and bases may be neutralized before disposal down the drain.
- Hazardous waste should never be placed in the common solid trash container(s).
- Waste chemicals should be stored in appropriately labeled containers, inside secondary containment. Labeled waste chemical containers should only include chemicals from the same family and be stored in the appropriate area in the chemical storeroom.
- The products of projects, experiments, or other chemical procedures should be recycled and/or decontaminated whenever possible.
- All waste containers should have an up-to-date log of the material that is in the container. Each entry for an addition to the container should be dated and initialed by the instructor, or person who puts the waste in the container. The entry should provide the correct chemical name and amount of chemical added.
- When feasible and safe, a large container of a given waste should be used instead of several small containers of the same material for financial reasons.
- Waste materials should not be allowed to accumulate in laboratories or preparation rooms. The sealed containers should be removed to the designated waste storage location. There are regulatory limits depending on quantity which need to be verified with local officials.
- Waste materials should be identified using a chemical identification form and/or label ensuring sufficient information for their safe transportation, treatment, storage, and disposal.
- The disposal of hazardous wastes should follow the guidelines established by the appropriate local, state, and federal regulations.

Procedures for Inspections

All employees should be alert to unsafe conditions and should inform the Principal and the Chemical Hygiene Officer in writing, when an unsafe condition occurs.

7.1 Laboratory Equipment

The presence of necessary safety equipment, in proper working condition, a list of which is provided in Appendix E, will be verified and maintained in each school and laboratory area at least quarterly by the Chemical Hygiene Officer. The following general standards will apply:
- Each hood will have a face velocity of 60–100 linear feet per minute.
- Each shower will be capable of supplying a continuous flow of tepid, potable water. (ANSI Standard Z358.1-1990)
- Every eye wash will be capable of supplying a continuous gentle flow of aerated, tepid, potable water to both eyes. (ANSI Standard Z358.1-1990)
- Each fire extinguisher will be fully charged.
- Every goggle sanitizer will have its UV bulb and timer operating properly.
- Equipment will be tagged following the inspection, showing the date, inspector, and results.

Written records of all inspections will be maintained by the Chemical Hygiene Officer.

7.2 Safety Inspections

Inspections in the laboratory will be conducted at least two times each year. Inspection records will be kept by the Principal and School Chemical Hygiene Officer. A form for conducting these inspections is shown in Appendix E.

These general inspections will cover all of the emergency equipment identified above, and also the following:
• Gas cylinders are firmly secured.
• Chemicals will not be stored in hoods in which experiments are performed.
• Egress routes are not obstructed.
• Chemicals are not stored on top of cabinets or on shelves that do not have lips.
• Electrical cords are in good condition.
• Rubber hoses are not cracked and are otherwise in good condition.
• Other items will be listed on the “safety audit, or inspection,” sheet.

SPECIFIC EXPOSURE CONTROL MEASURES

This section addresses criteria that would invoke the use of specific exposure control measures, which are more stringent than those procedures specified as standard operating procedures or general laboratory safety rules. These specific exposure control measures are designed to reduce the exposure of instructors, aides, students, and other employees to especially hazardous chemicals. Employees should read and understand these practices before commencing a procedure using one or more of these chemicals.

8.1 Toxic Chemicals

The SDSs and labels for many of the chemicals used in the laboratory recommend specific limits for exposure. Other limitations may be specified by OSHA-mandated limits. Typical limits are threshold limit values (TLVs), permissible exposure limits (PELs), and action levels. When such limits are stated, they should be used to assist the Chemical Hygiene Officer(s) and the teacher in determining the safety precautions, control measures, and safety apparel.

When a TLV or PEL value is less than 50 ppm or 100 mg/m3, the user should use it in an operating fume hood, glove box, vacuum line, or other device equipped with appropriate traps. If none are available, no work should be performed using that chemical.

If a TLV, PEL, or comparable value is not available, the animal or human median inhalation lethal concentration information, LC50, should be used as a guideline. If that value is less than 200 ppm or 2000 mg/m3 when administered continuously for one hour or less, then the chemical should be used in an operating fume hood, glove box, vacuum line, or similar device, equipped with appropriate traps. In none are available, no work should be performed using that chemical.

Whenever laboratory handling of toxic substances with moderate or greater vapor pressures is likely to exceed air concentration limits, work with such liquids and solids should be conducted in a fume hood, glove box, vacuum line, or similar device, equipped with appropriate traps. If none are available, no work should be performed using that chemical.

Examples of toxic chemicals that were commonly used in the past are benzene, chloroform, formaldehyde, bromine, carbon disulfide, carbon tetrachloride, cyanide salts, and hydrofluoric acid. The use of these chemicals has been substantially reduced in the past few years because of their toxicity.

8.2 Flammable Chemicals

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 a flashpoint below 200°F (93.3°C) should be considered “fire-hazard chemicals.” Any chemical whose SDS or label states “Flammable” is in this category.

OSHA standards and the National Fire Protection Association (NFPA) guidelines or local fire regulations should be consulted on the proper use of flammable chemicals in the laboratory. Specific references are found in Appendix B.

Fire-hazard chemicals in excess of 500 mL should be stored in a flammable solvent storage area, safety cans, or in storage cabinets designed for flammable materials.

Examples of commonly used flammable chemicals are diethyl ether, acetone, methanol, ethanol, glacial acetic acid, heptane, and petroleum ether.

8.3 Reactive Chemicals

Reactivity information may be given in manufacturers' SDSs and on labels. The most complete and reliable reference on chemical reactivity is the current edition of Bretherick's Handbook of Reactive Chemical Hazards, edited by P.G. Urben, published by Butterworths. Other useful references are cited in Appendix B.

A reactive chemicals is one that
- Is described as such on the label, in the SDS, or by Bretherick.
- Is ranked by the NFPA as 3 or 4 for reactivity.
- Is identified by the Department of Transportation (DOT) as an oxidizer, an organic peroxide, or an explosive (Class A, B, or C).
- Fits the Environmental Protection Agency (EPA) definition of reactive in 40 CFR 261.23.
- Is known or found to be reactive with other substances.

Reactive chemicals should be handled with all proper safety precautions, including segregation in storage and prohibition of mixing even small quantities with other chemicals without prior approval and appropriate personal protection and precautions.

Examples of commonly encountered reactive chemicals are ammonium dichromate, nitric acid, perchloric acid, hydrogen peroxide, and potassium chlorate.

8.4 Corrosive Chemicals and Contact-Hazard Chemicals

Corrosiveness, allergen, and sensitizer information is provided in manufacturer's SDSs and on labels. Other guidelines on which chemicals are determined to be corrosive can be found in the publications cited in Appendix B.

A corrosive chemical is one that
- Fits the OSHA definition of corrosive in 29 CFR 1910.1450 or 29 CFR 1910.1200.
- Fits the EPA definition of corrosive in 40 CFR 262.22 (has a pH greater than 12 or less than 2.5).
- Is known to be reactive to living tissue, causing visible destruction of, or irreversible alterations of, tissue at the site of contact.

A contact-hazard chemical is an allergen or sensitizer that
- Is so identified or described in the SDS or on the label.
- Is so identified or described in medical or industrial hygiene literature.
- Is known to be an allergen or sensitizer.

Corrosive and contact-hazard chemicals will be handled with all proper safety precautions, including wearing safety goggles, gloves tested for the absence of pinholes and known to be resistant to permeation or penetration by the chemical, and a laboratory apron or laboratory coat.

Examples of corrosive chemicals are hydrochloric, sulfuric, nitric, phosphoric, and perchloric acids (all acids in greater than 1 Molar concentration), and potassium hydroxide (either solid or in aqueous solution of greater than 1 Molar concentration).

8.5 Reproductive Toxins

A reproductive toxin is a compound that
- Is described as such in the applicable SDS or label, or

• Is identified as such by the Oak Ridge Toxicology Information Resource Center (TIRC), (615) 576-1746.
No reproductive toxins should be allowed in middle or high school laboratories without written authorization from the District Chemical Hygiene Officer.

If such chemicals are used, they should be handled only in a hood and when satisfactory performance of the hood has been confirmed. Skin contact should be avoided by using gloves and wearing protective apparel. Persons using such substances should always wash hands and arms immediately after working with these materials. Unbreakable containers of these substances should be stored in a well-ventilated area and will be labeled properly.

Examples of reproductive toxins are organomercurial compounds and ethidium bromide, a reagent used with DNA analysis.

8.6 Select Carcinogens

All work with these substances should be conducted in a Designated Area, such as a fume hood, glove box, or portion of a laboratory designated for use of chronically toxic substances. Such a Designated Area should be clearly marked with warning and restricted access signs.

Any procedure that may result in a generation of aerosols or vapors should be performed in a hood whose performance is known to be satisfactory.

Skin contact should be avoided by using gloves and other protective apparel as appropriate. Any protective clothing should be removed before leaving the Designated Area and placed in a labeled container. Hands, arms, face, and neck should be washed after working with these materials.

Select carcinogens should be stored in unbreakable containers in a ventilated area with controlled access. All containers should be labeled with the identity and hazard of the substance. Immediately upon completion of the project, all unused reproductive toxin should be disposed of following standard hazardous waste disposal procedures.

No select carcinogens are allowed in middle or high school laboratories without written authorization from the District Chemical Hygiene Officer.

Examples of select carcinogens are benzene, nickel metal dust, and vinyl chloride.

8.7 Exposure Potential

The routes of exposure to chemicals are inhalation, ingestion, contact with skin or eyes, or injection.

Inhalation of chemical vapors, aerosols, gases, or dusts can produce poisoning through the mucous membranes of the nose, mouth, throat and lungs. The degree of injury resulting from exposure to these chemicals depends on the toxicity of the material, its solubility in tissue fluids, its concentration, and the duration of exposure.

Ingestion is extremely dangerous. The relative acute toxicity can be evaluated by comparing the LD50, which is defined as the quantity of chemical that will cause the death of 50% of the test animals when ingested. Many chemicals will directly damage the tissue of the mouth, throat, nose, lungs, and gastrointestinal tract.

Contact with skin and eyes can lead to local irritation as well as significant chemical injury. In addition, many chemicals can be absorbed through the skin and may cause systemic poisoning. Alkaline materials, phenols, and strong acids can cause permanent loss of vision upon contact with the eye.

Injection of chemicals can occur through mechanical injection from glass or other materials contaminated with chemicals.

TRAINING OPPORTUNITIES

9.1 Information Program

Laboratory employees should be informed of at least the following information:
- The contents of appropriate governing standards, as shown in Appendix A.
- The location and availability of the Chemical Hygiene Plan.
- The location and availability of known reference materials on the hazards, safe handling, storage, and disposal of hazardous chemicals found in the laboratory.
- The use and location of safety data sheets.

9.2 Employee Training Program

Laboratory employees should be trained on the applicable details of the Chemical Hygiene Plan, including a review of the general rules for laboratory safety. The training program should describe appropriate sections of the standard operating procedures, particularly those procedures that require prior approval of the Chemical Hygiene Officer. Employees should be informed as to the responsibilities of the Chemical Hygiene Officer responsible for the laboratory in which they work. Emergency procedures adopted by the school district, including response to spills, fires, explosion, evacuation, and decontamination, should be described. Employees should be trained in measures they may take to protect themselves from exposure to hazardous chemicals, including the location and proper use of protective apparel and emergency equipment. In addition, the training must also include a discussion of inventory procedures to be followed, proper storage and ordering rules, and district hazardous waste disposal procedures.

9.2.1 Information and Training

To facilitate understanding of the updated Laboratory Standard, workers are required to be trained by December 1, 2013 on the new label elements and safety data sheet format.

9.2.2 Timetable for Laboratory Standard (29 CFR 1910.1200) Updates

Effective Completion Date	Requirement(s)	Who
December 1, 2013	Train Employees on the new label elements and SDS format.	Employers
June 1, 2015 December 1, 2015	Comply with all modified provisions of this final rule, except: Distributors may ship products labeled by manufacturers under the old system until December 1, 2015	Chemical manufacturers, importers, distributors and employers
June 1, 2016	Update alternative workplace labeling and hazard communication program as necessary, and provide additional employee training for newly identified physical or health hazards	Employers
Transition Period	Comply with either Laboratory Standard(29 CFR 1910.1200), or current standard or both	Chemical manufacturers, importers, distributors and employers

9.3 Training of Students

The District requires that instruction in laboratory safety practices be provided to all students involved in laboratory studies. Such training must be appropriate to their level of chemical handling and potential exposure to hazardous chemicals. The extent of training should be based on their grade level, courses of study, the laboratory facility, and the individual policies of the school district as stated in the Chemical Hygiene Plan. The education of students is particularly important, because they are near the beginning of their experience with science, chemicals, and chemical safety. Instruction in safety should include the importance of the label and the MSDS as important reference sources. As appropriate, the student should also be introduced to other sources of chemical safety information.

EMERGENCY PREVENTION AND RESPONSE

10.1 Standard Emergency Procedures

Emergency procedures should address a failure in the ventilation systems, evacuation, fire and spill response, or the failure of other procedures to limit exposure of employees to hazardous chemicals. These emergency procedures should be established, regularly practiced, and should be posted in appropriate public places. These procedures should include the routes of egress from the laboratory, procedures by which to notify appropriate individuals, and telephone numbers of fire, police, ambulance, and school authorities.

10.1.1 Spill and Accident Procedures

Remember "**NEAR**"

Notify—Call for help.
Evacuate—Get everyone to a safe location.
Assemble—Assemble and take attendance of all students and employees.
Report—Fill out a detailed accident report after the emergency is over.

The laboratory should have a plan for everyone to follow if an evacuation is necessary. The employees should be sure that they know the main and alternative routes, as well as the procedure for accounting for each person after an evacuation. The most appropriate response to a serious fire is evacuation and subsequent action by the fire department.

10.2 Specific Emergency Response Procedures

When helping another person, employees should evaluate the potential danger to themselves before taking action. Do not move any injured persons unless they are in immediate danger from chemical exposure or fire.

The employee should follow the facility's emergency response procedures. These procedures have been established, documented, and practiced.

10.3 First Aid

Suitable first aid equipment should be available in the laboratory area, including a blanket, a general first aid kit, and small bandages for minor cuts and abrasions. The school should have personnel trained in first aid available during working hours to render assistance until medical help can be obtained. Personal injury beyond the purely superficial requires professional medical treatment. Additional information may be obtained from the Red Cross or references in Appendix B.

10.3.1 Injury Protocol

Injuries sustained in the classroom should be sent to the nurse for attention.

10.4 Emergency Equipment

The School and District Chemical Hygiene Officers should ensure that adequate emergency equipment is available in the laboratory and inspected periodically to ensure that it is functioning properly. All personnel should be properly trained in the use of each item. It is recommended that students also be trained to use the fire blanket, eye wash fountain, safety drench shower, and telephone for safety purposes.

Equipment items that should be available in the laboratory include:
• Eye wash fountain.
• Fire extinguisher of an appropriate type.
• Telephone, with access to an outside line, for emergency response.
• Fire blanket.
• Identification signs.

Refer to the Safety Inspection Report in Appendix E.

10.5 Fire Prevention

The best way to fight a fire is to prevent it. Fires can be prevented or their severity considerably reduced by proper housekeeping and by thoughtful reflection about what is being done. This includes the prompt removal of waste, separation of flammable liquids from combustible material, storage of only limited quantities of flammable material, and the maintenance of unobstructed aisles and exits.

10.6 Dealing with a Fire

In preparation for dealing with a fire, a copy of the current Chemical Inventory List should be available outside the work area. Laboratories should be posted with the National Fire Protection Association (NFPA) diamond, which provides much emergency information. The information on the NFPA warning must be current. Since fires involving laboratory chemicals increase the possibility of explosions, special care should be taken to keep fire or excessive heat from volatile solvents, compressed gas cylinders, reactive metals, and explosive compounds.

If a fire occurs, the following actions should be followed, depending on its severity:
• A fire contained in a small vessel should be suffocated by covering the vessel. The vessel should not be picked up, nor covered with dry towels or cloths.
• Nearby flammable materials should be removed to avoid spread of the fire.
• If a fire burns over a larger area, all persons should evacuate the area, except those trained and equipped to fight structural fires.
• The fire extinguisher should be used only by trained people, and only from a position from which escape is possible.
• Stairs, not elevators, should be used to leave the area of the fire.
• The fire alarm should be activated and the fire department called.
• Firefighters should be informed of what chemicals are involved.
As soon as possible, all extinguishers that were used should be recharged or replaced with full extinguishers.
LOCAL PRACTICE MUST BE IN COMPLIANCE WITH LOCAL FIRE CODES.

10.7 Personal Injuries Involving Fires

Persons whose clothing is ablaze should STOP–DROP–and–ROLL. If a safety shower is immediately available, the individual may be doused with water. Once the fire is out, the individual should be wrapped to avoid shock and exposure. The individual should be kept warm, and medical attention should be promptly sought.

If a fire blanket is available, it should be used to smother the fire. The person should not be wrapped to avoid the chimney effect with the fire blanket.

10.8 Chemical Spills on Personnel

For spills covering small amounts of skin, the area should be washed immediately with flowing water for 15 minutes. To facilitate cleaning, jewelry should be removed. If there is no visible burn, the 15-minute wash with water is sufficient. If a burn is visible, medical attention should be sought after the washing has been completed. After washing, the SDS should be consulted to determine if any delayed effects should be expected. Depending on the information from the SDS, follow-up medical attention may be necessary.

For spills on clothing and whenever necessary, the clothes as well as shoes and jewelry to facilitate washing should be removed as quickly as possible. The washing should be resumed if pain continues. No creams, salves, or lotions should be placed on the affected area, and medical attention should be sought as soon as possible.

Special care should be taken to prevent chemicals from entering the eyes. Contaminated clothes should be washed separately from other personal clothing.

10.9 Splashes in the Eyes

Whenever potentially harmful chemicals enter the eye(s), the eye(s) should be immediately flushed with tempered potable water from a gently flowing source for at least 15 minutes. The eyelids should be held away from the eyeball, while the eyeball is moved up, down, and sideways to wash behind the eyelid(s). Assistance is absolutely necessary at this time. If contact lenses are worn, they should be removed as soon as possible to allow complete rinsing of the eye(s).

10.10 Dealing with Medical Help

Medical personnel should be fully informed about the chemical involved in the spill and the circumstances of the spill. Whenever possible a safety data sheet should be provided to the medical person providing assistance.

10.11 Other Accidents Involving Personal Injury

Anyone overcome with smoke or fumes should be removed to uncontaminated air and treated for shock. Potential rescuers should evaluate the possibility of harm to themselves before entering or remaining in a toxic environment.

If hazardous chemicals are ingested, the first aid treatment shown on the label or in the safety data sheet should be undertaken.

If an injured person is not breathing, the rescuer should provide mouth-to-mouth resuscitation, using appropriate methods. Special training is required to provide cardiopulmonary resuscitation (CPR). Consult the local Red Cross for details.

Bleeding should be controlled by compressing the wound with a clean cloth or other appropriate compress. However, because of the possibility of infection with one or more bloodborne pathogens, such as the HIV virus, adequate personal protection should be used. The injury should be elevated above the level of the heart. After bleeding is controlled, the injured person should be covered to avoid shock. Medical attention should be called for as soon as possible.
If a person is in contact with a live electrical circuit, the power should be shut off at the most convenient switch. The person should not be touched until the power has been disconnected.

10.12 General Chemical Spills

All spills should be cleaned up promptly. Any individual at risk of involvement should be warned about the spill. Local procedures should be established and followed for determining when evacuation is necessary.

The spread of chemicals in a spill is important, and so absorbent material should be used to surround the spill area. After the spill has been contained, it can be cleaned up with appropriate tools, including commercial spill control kits, for example. If the spilled material is a hazardous chemical, that chemical and all the cleanup material must be treated as chemical waste and properly disposed.

10.13 Accident Reports

All accidents and near accidents should be carefully investigated. The results of that investigation and recommendations for the prevention of similar occurrences should be forwarded to the Principal and the District Chemical Hygiene Officer. Accident reports should be kept on file, as indicated in the record-keeping section of this document.

SPILL RESPONSE PROCEDURES

11.1 Personal Injury

In the event of a spill, the first response should be to determine if anyone has come in contact with the spilled chemical. A minimum 15-minute rinse is indicated. Remember if clothing is splashed, it must all be removed, since the rinse is designed to remove chemicals only from the skin. The fire blanket may be used as a privacy shield. Any suggestion of splash in the eyes requires a 15-minute rinse at the eye wash. Hold the eyelids open and allow the water to rinse the eye surface. If contact lenses are worn, they should be removed as soon as possible to allow complete rinsing of the eye.

11.2 Identification of the Spill

If the spill appears to be organic solvents, ammonia, or other volatile reagents, evacuate the area as soon as possible. Use fire drill procedures and ventilate the area. Be aware of the possibility of sparks from electrical switches, open flames, or other sources of ignition.

If the chemical involved in the spill is judged to present an immediate hazard, the evacuation is to be absolute, and the area isolated until a HAZMAT team is called.

11.3 Containment of the Spill

If there is no immediate danger to personnel, containment should be accomplished by use of spill pillows, towels, rolls, or other devices that will keep it from spreading.

If practical, a dam to contain the spill may be formed using coarse vermiculite, kitty litter, or another absorbent material.

Another inexpensive absorbent can be made from a mixture of sand and sodium carbonate. This is particularly effective with corrosives because the soda will neutralize acids, and the sand improves the footing and minimizes the possibility of slipping and falling into the spill. The use of sodium bicarbonate is also effective, and it will neutralize caustic spills.

11.4 Cleanup

If hazardous vapors are present, the area should be isolated. Only persons trained in the use of respirators may enter the area. This will frequently mean waiting for the arrival of the HAZMAT team.

Cleanup can proceed once the area is vented and the spill is contained. Mops, shovels, scoops, and buckets can be used in the usual manner.

Once the spill is thoroughly absorbed, the waste should be collected in heavy plastic bags, clearly labeled, and isolated for disposal.

After all hazardous material has been removed, cleanup can be completed using standard custodial cleaning procedures.

11.5 Protective Equipment

Protective equipment to be used in the cleanup process should include chemical splash goggles, face shields, heavy rubber gloves, coveralls or aprons or lab coats, and either rubber boots or plastic over-the-shoe protectors.

In no case should the cleanup of a major spill be undertaken by one not trained in these procedures. No one should work alone. The buddy system is essential to protect the workers. Further, the cleanup team should not begin work before contacting the Chemical Hygiene Officer or other appropriate authorities.

11.7 Disposal

If the spilled material was a hazardous chemical, all of the materials involved in the cleanup will be considered hazardous waste and must be disposed of as such.

In those few instances in which the cleanup transformed the material to a nonhazardous form, the cleanup residue may be disposed of in a local sanitary landfill. Check with local landfill authorities before attempting to do this.

11.8 Record Keeping

Complete records of the incident, including injuries, witnesses, response and cleanup procedures, waste disposal, additional assistance, and final evaluation will be collected for the School and District Chemical Hygiene Officers, and the Principal.

Appendix A

THE LABORATORY STANDARD:

Appendix B

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Appendix C

REGIONAL DISTRICT 13 INCIDENT REPORT FORM

Employee Name: Circle one : Staff Teacher Student	Date: Date of Incident:
School:	Location of Incident:

DESCRIPTION OF THE INCIDENT (USE BACK OF PAGE IF NEEDED)
WHAT ACTION WAS TAKEN TO DEAL WITH THE INCIDENT?
SUGGESTIONS FOR CORRECTIVE ACTION
COMPLETE NAMES FOR ALL INDIVIDUALS INVOLVED

PERSON FILING REPORT	CHEMICAL HYGIENE OFFICER
Name: Date: Signature:	Name: Date: Signature:

A STATEMENT FROM EACH PERSON INVOLVED AND FROM EACH WITNESS SHOULD BE ATTACHED.

Appendix D

LABORATORY SAFETY EQUIPMENT

Personal Clothing and Equipment

Aprons, rubber or plastic	Extends to or below the knees but not long enough to present a tripping hazard.
Gloves	The SDS will provide information about the appropriate gloves to be used. Vinyl gloves are not to be used in a chemistry lab. The material from which the glove is made must be carefully chosen so that the glove is not permeable to the liquids or vapors anticipated for the experiment.
Chemical splash goggles	Meets ANSI Standard Z87.1 Eye protection must be worn by teachers, students and all visitors. Chemical splash goggles must be worn anytime working with chemicals, glassware, or heat. Goggles should be cleaned and sterilized between uses.
Face shield	When used, should be worn with goggles.
Laboratory Coat, Tyvek, Dacron & cotton, cotton	Has long sleeves. Extends to or below the knees.

Laboratory Safety Equipment

Eye wash	Should deliver tepid, potable water to both eyes. Should provide a steady, gentle flow for at least 15 minutes without need to hold valve.
Fire blanket, wool	Most useful to keep a victim warm while waiting for medical attention. A blanket should be available but not on a roller. The purpose of the blanket is to cover the victim, not encircle. Wrapping a burning victim may cause additional burns to neck and face due to the chimney effect.
Fire extinguisher	Should be suitable for Class A, B & C fires.
First aid kit	Any good, general purpose first aid kit is suitable.
Flammable storage cabinet	May be made of wood or metal. Check local fire codes.
Fume Hood	Should have a face velocity of 60–100 linear feet per minute. Should be vented to the outside. May have a vertical or horizontal sash. Should be kept clean and uncluttered.
Safety cans	Some occasions demand that volatile, flammable or combustible solvents be stored in safety cans. Each can should have a flame arrestor in good working order. Check local fire codes and NFPA standards 30 and 45.
Signs	Signs are useful for designating the location of safety equipment, means of ingress and egress, etc.

Signs should be chosen to be in conformity with state guidelines and recommendations.

Laboratory Spill Protection

General purpose	A general purpose adsorbent, such as a mixture of kitty litter, sand, and vermiculite is suitable for containing many chemical spills.
Acid spills	Best treated with sodium bicarbonate, which may be mixed with kitty litter and/or sand.
Base spills	Best treated with sodium bisulfate, which may be mixed with kitty litter and/or sand.
Halogen spills	Best treated with sodium thiosulfate, which may be mixed with kitty litter and/or sand.

Laboratory Safety Inspection Checklist

Conducted By: _____ Date of Inspection: _____ Location (room #):

I. Laboratory Work Practices

	Yes/No	*Comments*
● No food & beverages rules are observed.		
● Food & beverages are not stored in the laboratory areas, refrigerators or in glassware also used for laboratory operations.		
● Laboratory surfaces are reasonably clean.		
● Required personal protective equipment is being worn.		

II. Housekeeping

	Yes/No	*Comments*
● Laboratory and storage areas uncluttered and orderly; no tripping hazards		
● Hoods are not being used for storage.		
● Aisles & exits are free from obstruction.		
● Electrical cords are in good condition and are UL listed.		
● Tools and equipment are in good repair and electrically grounded.		
● Tops of cabinets and shelves are free from stored items.		
● Heavy objects are confined to lower shelves.		
● Glassware is free from cracks, chips, sharp edges and other defects.		
● Broken glass containers are available and in use.		
● Classroom has no blind spots; students can be supervised from anywhere in the room		
● Gas outlets and burners are maintained in safe working condition; gas outlet covers are in good condition.		

III. Personal Protective Equipment

	Yes/No	*Comments*
● Protective gloves are available and matched to hazards involved.		
● Appropriate eye protection is available and in use in all laboratories.		
● Goggle sanitizer is used after each goggle use. Bulb and timer working.		
● Goggles have been washed recently to remove debri built up from use.		
● Lab aprons are available and in use.		
● Lab coats are only worn in the laboratory and are removed before entering offices, lunchrooms, restrooms, conference rooms and other non-laboratory general use areas. (This includes disposable protective clothing).		

IV. Hazard Communication

	Yes/No	*Comments*
● Primary & secondary chemical containers are labeled with identity, appropriate hazard warnings, and expiration dates.		
● Signs on storage areas (e.g. Refrigerators) and laboratories are consistent with hazards within.		
● SDS binders/sheets are available for chemicals used/ stored in area.		
● Employees know the location of the SDS binders/sheets for their work area and where to find additional SDS sheets as needed.		

V. Chemical Storage

	Yes/No	*Comments*
● Incompatible materials are segregated.		
● Corrosives and flammables stored below eye level.		

● Hazardous materials used/stored in the laboratory are limited to quantities as needed. Stock containers are not stored in the classroom.		
● Unnecessary or unused materials are removed from laboratories and chemical storage areas.		
● All lab carts have side-rails & are available for transporting chemicals		
● All containers are properly labeled with: Name, Date, Contents, Concentration (where applicable)		
● Updated inventory present of all chemical stored in the prep room		

VI. Flammable Liquids Storage & Handling

	Yes/No	*Comments*
● Flammable liquids are stored and used away from ignition sources.		
● Bulk quantities of flammable liquids are stored in approved storage cabinets.		
● Flammable liquid storage cabinets are properly labeled.		
● Flammable liquid storage cabinets close properly.		
● Flammables stored on open shelves in glass or plastic containers in small quantities (less than 500ml) only for immediate expected use.		
● Safety cans used to handle small quantities of flammable liquids are properly labeled and in proper working order.		
● Solvent waste cans are labeled properly with: Name, Contents		
● Nothing is stored on top of flammable cabinets.		

VII. Waste Handling: Hazardous, Non-Hazardous & Biological

	Yes/No	*Comments*
● No hazardous waste is disposed of in the sinks or the sewer.		
● Hazardous wastes are not accumulated for longer than one month in the laboratory.		

● Waste streams are separated and labeled as necessary: ex. Solid vs. liquid, hazardous vs. non-hazardous		
● Waste containers are appropriately tagged before placing in chemical storeroom (waste area).		
● Sinks free and clear of all materials hazardous or nonhazardous.		

VIII. Means of Egress and Emergency Exits

	Yes/No	*Comments*
● Exits are clearly marked.		
● Exits are free from obstruction.		
● All fire doors are self-closing.		
● All fire doors are kept closed.		
● Fire alarms are provided.		
● Telephones are labeled with emergency numbers.		
● Emergency evacuation routes are clearly posted.		
● Emergency exit lights are working and clear of obstruction.		

XV. Safety Equipment

	Yes/No	*Comments*
● Safety showers and eyewash stations are clearly labeled, and these areas are clear from obstruction.		
● All showers/eyewash stations are clean, covers are replaced and in good working condition.		
● Safety shower and eyewash have been tested within the last two weeks; dates are documented on the tag provided on device.		
● Fire extinguishers are available.		
● Fire extinguishers are the appropriate type for the hazard in the work area.(ABC)		

● Fire extinguishers are checked monthly to ensure that extinguishers are charged. (Checked yearly via service contract)		
● Fire detection devices, smoke alarms, sprinkler systems, lighted exit signs are in good working condition.		
● First-aid supplies are readily available, refreshed and clearly visible.		
● Spill Kits present, complete and readily accessible.		

XI. Other Labeling & Posting

	Yes/No	*Comments*
● Warning signs and labels are present whenever required where chemicals are stored.		
● Warning signs and labels are present and posted on doors of laboratories when lasers are in use.		
● “Caution- Radioactive Material” signs are posted on doors of all authorized laboratories, and rooms where stored.		
● Biohazard symbols are posted on access doors to biohazard laboratories and animal rooms and on potentially contaminated equipment.		

Instructor(s) Signature(s):_____

Inspectors Signature: