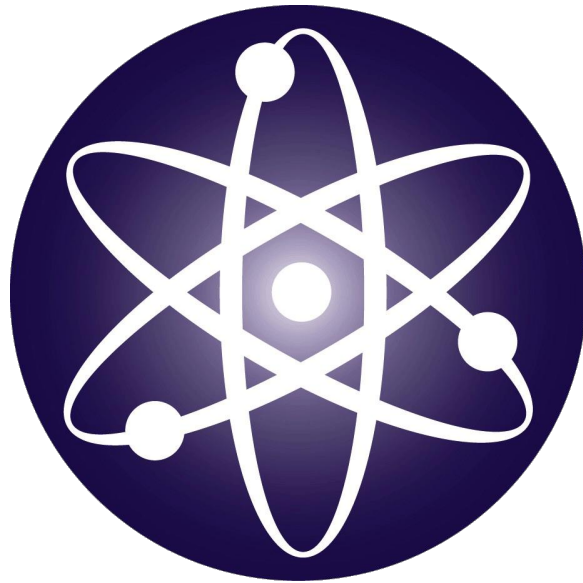


Safety Policies and Procedures in K-12 Science



A Guide to Policies and Procedures in the Science
K-12 Curriculum

Broward County Public Schools
**Includes the Florida Dept. of Education
support information*

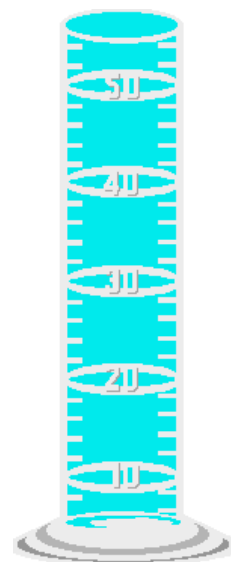
I. Introduction

The use of laboratory investigations has played a vital role in distinguishing science from most other disciplines encountered in the classroom. Just as scientists acquire knowledge through a process of experimentation, students learn to appreciate how this wealth of knowledge was accumulated by simulating this same investigative process.

Without the laboratory experience as an integral part of the scientific process, only facts can be memorized. A true feeling for the process is lost. It is of vital importance that a laboratory component be incorporated into the science curriculum.

Once the laboratory component has been added to a curriculum, it becomes necessary for a teacher to understand that additional safety requirements and procedures must be implemented. These additions will provide for a more safe and meaningful experience for students.

This manual was written to provide basic safety information in the science laboratory and classroom, plus, outline a method for proper chemical storage, handling, and disposal. Particular emphasis was placed on the appropriate use of equipment and the selection of chemicals that are deemed safe to use in the K-12 academic environment.



Acknowledgments

This science safety manual was written to address concerns expressed by science teachers, administrators, students, and parents regarding safety in the K-12 science curriculum. It contains procedures, guidelines and suggestions in accordance with local, state and federal regulatory agencies. Additionally, it provides a broad range of fundamental information for safe operation of science laboratories and classrooms.

Valuable assistance was given by other school districts, safety agencies, Broward teachers and science supply companies. Suggestions, comments and input from district teachers and administrators are gratefully acknowledged.

This manual has been revised and edited under the direction of Dr. J.P Keener, Science Curriculum Supervisor, for use by the Broward County School Board, 2009.

Safety in Science Handbook

A guide to policies and procedures in the science curriculum

Grades K-12

Broward County Public Schools

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School Board of Broward County Safety, Policies and Procedures in Science Handbook

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II. Responsibility for Safety

The main law that affects science laboratory teachers is the Occupational Safety and Health Administration (OSHA) Laboratory Standard (29CFR1910.1450), which was initiated in 1990. The standard requires that school systems design, implement, and enforce a Chemical Hygiene Plan to insure employee safety in a hazardous environment. Although OSHA only protects employees, students usually are required to follow these standards in the science laboratory to maintain a safe environment for all.

When laboratory activities and demonstrations are made an integral part of a science curriculum, the science teacher assumes the responsibility for implementing and documenting a program of safety. It is essential that a science teacher be familiar with safety procedures and laboratory techniques when handling, storing, and disposing of chemicals. The teacher should be completely familiar with laboratory facilities so that he/she can adequately instruct students in all aspects of the aforementioned topics.

It is the added responsibility of the science teacher to insure the correct functioning of scientific equipment and laboratory facilities to prevent unwarranted accidents. To insure that students are well-trained in safety techniques and equipment usage, the teacher should utilize information in several formats. A number of video presentations are available which provide an adequate introduction to the proper handling of safety equipment, chemicals, and laboratory apparatus. Several companies also supply safety films, safety tests, and safety contracts. A student must be instructed and then assessed to insure thorough understanding of laboratory safety. Student safety performance should be monitored during every experiment and good safety procedures reinforced.

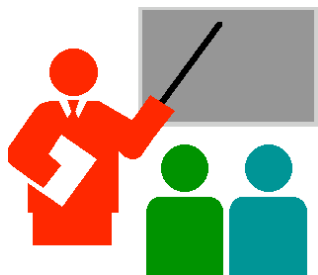
A. Administrative Responsibility

Since the ultimate responsibility for all school functions rests with the administration, liability resulting from a laboratory accident will fall under its purview. The following considerations might help to eliminate liability:

1. Ensure that class sizes in science laboratories do not exceed the allowable safe maximums for space and facilities.
2. Ensure that safety equipment is present and functioning properly.
3. Inform all staff members of those persons trained in CPR and first aid and their location throughout the day.
4. Design and implement a contingency plan for laboratory emergency situations.
5. Ensure that adequate lighting for experimentation is available. Impaired vision is an invitation to accidents.
6. Ensure that master shut-offs are present in every laboratory for gas, electricity, or any other service that might involve danger should an accident occur.
7. Ensure that all electrical outlets are grounded and facilities are available for grounding all electrical apparatus.

8. Make sure fire extinguishers are available in each science class. Fire extinguishers should be checked at least twice a year to insure proper functioning.
9. Make sure that each science lab is equipped with a safety shower and eyewash that are periodically checked for proper operation.
10. Make sure that there is adequate ventilation to the outside for each laboratory in which noxious fumes might be generated.

B. Teacher Responsibility

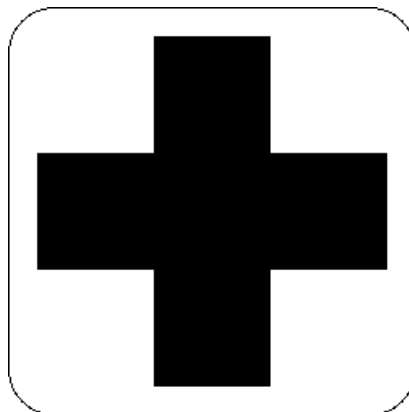


The following steps should be taken by the teacher to fulfill safety objectives:

1. Make the safety program a major emphasis in the science curriculum.
2. Provide a list of safety rules which must be read and signed by the student and parent or guardian.
3. Show the student where the safety equipment is located, and how it works. Explain under what conditions it is to be used.
4. Explain the consequences for violating safety regulations in detail.
5. Instruct students in how to evacuate the lab in the proper fashion in case of emergency.
6. Point out specific safety considerations in a particular experiment.
7. Explain possible hazards in handling and disposing of chemicals used in an experiment.
8. Never leave students alone and/or unsupervised in the lab.
9. Frequently remind the students often that they are not allowed in chemical storerooms or lab preparation areas.
10. Prohibit students from bringing any food or drink into the lab.
11. Instruct students to never put any chemicals in their lab drawers unless told specifically to do so.
12. Discuss the lab with students the day before the experiment is to be done so that safety situations and possible hazards can be clarified.
13. Notify the administration, in writing, of any possible safety hazard that exists in the laboratory, especially the overcrowding of the science lab room.
14. Provide only immediate care in case of an accident to prevent additional complications from arising. Contact your administration and call 911 immediately.
15. Science fair projects should be scrutinized for safety hazards and corrected before teacher approval is given. Remember the science teacher is ultimately responsible for all assigned science activities.

Injuries and Emergencies:

During the course of the school year, accidents may occur in the science laboratory that will require action by the teacher. Emergency assistance is immediate care for laboratory injuries. It is designed to prevent further complications from arising until qualified medical assistance is available. Dispensing of any medications by teachers is prohibited.



IN CASE OF EMERGENCY

- Notify the administration as soon as possible. Have them call 911 if conditions warrant it.
- All accidents should be reported to the administration, in writing as soon after the incident as possible. An accident report sheet must be faxed to the proper location at Risk Management. The school office will have the necessary forms to report student accidents on file.
- In the event of the need to evacuate a classroom or school (gas leak, chemical spill, etc.), please follow the emergency evacuation plans as outlined in your school principals' emergency procedures handbook. Please discuss these procedures with your school-based administration in advance. All science teachers should be aware of the procedures for initiating and conducting a classroom /school evacuation.

Burns: Hold the burned area in cold water or apply ice. In case of a chemical burn, place the area under water for at least five minutes.

Cuts: Rinse minor cuts with a small quantity of water. To stop severe bleeding, place a thick gauze pad over the wound and apply direct pressure. **DO NOT** apply a tourniquet.

Eye Injuries: If an object or chemical reagent gets in the eye, flood the eye with water for 15 minutes. All lab-classrooms must have an eyewash station. Remind the students not to rub the eye, as this will aggravate the injury. Do not try to remove fragments from the injured eye. Contact administration or dial 911 immediately.

C. Student Responsibility

Since the student is the individual most imminently involved in laboratory safety he/she should adhere to the following guidelines to minimize the possibility of a laboratory accident.

1. Heed all written precautions and verbal instructions.
2. Do the experimental procedure as directed.
3. Do not taste, eat, smell, or touch chemicals unless specifically told to do so by your instructor.
4. Wear eye protection, aprons, and closed shoes on lab days and tie long hair back.
5. Notify the teacher if any hazard is present.
6. Clean up your work area after each experiment.
7. Know the location and proper use of safety equipment as previously taught.
8. Do not wear contact lenses on days when chemical labs are performed since they may absorb chemicals and cause eye inflammation and damage.
9. Inform your teacher of any health problems or difficulties you might encounter while doing a given experiment.
10. Make sure you do not remove any chemicals or equipment from the lab unless your teacher tells you to do so.
11. Never eat or drink anything in the laboratory.
12. Report any accident or mishap to your teacher immediately no matter how trivial it might appear.
13. Dispose of chemicals or broken equipment in the proper receptacle.
14. Never pick up broken glass with bare hands.
15. Never work alone in the lab; make sure your teacher is present when doing an experiment.
16. Wash hands thoroughly before leaving the lab.
17. Do not wear rings or bracelets during an experiment. Chemicals can seep under them causing severe injuries.
18. Remember the appropriate evacuation procedure and route.
19. Do not put chemicals or equipment in your lab drawer unless told to do so by your instructor.
20. Never run or horseplay in the lab.

Students must abide by a student safety contract to be distributed by the teacher and signed by the student and the student's parent or guardian. Contracts must be collected and kept on file with each science instructor. A sample contract has been included for your use.



K-5 Safety in Science Student Laboratory Contract

I know that being safe is important, and I agree to follow these rules:

- I will follow all written precautions and verbal instructions.
- I will do the experimental procedure as directed.
- I will not taste, eat, smell, or touch substances unless specifically told to do so by my instructor.
- I will handle all equipment and materials carefully and use as directed.
- I will wear safety goggles to protect my eyes when appropriate or as directed by the teacher.
- I will notify the teacher if any hazard is present.
- I will clean up my work area after each experiment.
- I will inform my teacher of any health problems or difficulties I might encounter while doing a given experiment.
- I will make sure I do not remove any substances or equipment from the lab or classroom unless my teacher tells me to do so.
- I will not eat or drink anything in the laboratory or classroom without my teacher's permission.
- I will report any accident or mishap to my teacher immediately no matter how trivial it might appear.
- I will not pick up broken glass with bare hands.
- I will make sure an adult is present when I am working in the lab or classroom.
- I will wear gloves when handling animals.
- I will not run or participate in horseplay in the lab or classroom.

Failure to follow these guidelines may result in reduction in grade,
disciplinary action, and/or exclusion from laboratory activities.

Student Signature _____ *Date* _____

Parent Signature _____ *Date* _____



6-12 Safety in Science Student Laboratory Contract

I have been instructed in the necessary safety procedures required in this course. I agree to abide by the following guidelines:

1. Safety apparel will be worn when specified by the instructor.
2. Long or loose hair will be tied back. Excessively loose clothing or jewelry will not be worn.
3. Texting devices, Cell Phones, and electronic music devices are not permitted in the science laboratory.
4. There will be no drinking or eating in the laboratory.
5. Experiments will be done in the specified order with the prescribed quantities of chemicals.
6. Only the chemicals specified by the teacher will be used. No unauthorized experimentation will be done.
7. The proper use of safety equipment and correct evacuation procedures will be followed.
8. Wash hands thoroughly before beginning and after completing an experiment.
9. Contact lenses will not be worn during specified experiments.
10. Horseplay or other inappropriate behavior will not be tolerated during laboratory experiments.
11. Never taste chemicals or smell them directly.
12. Never pick up broken glass with bare hands.
13. Report all accidents, no matter how minor, to the teacher.
14. Never work without teacher supervision in the lab.
15. Do not remove any chemicals or equipment from the lab without the teacher's permission.

Failure to follow these guidelines may result in reduction in grade, disciplinary action, and/or exclusion from laboratory activities.

Student Signature _____

Parent Signature _____

date: _____

D. Parent Responsibility

In order for a laboratory component to be safely implemented in a science curriculum, it is essential that a teacher have the full cooperation of parents and/or guardians. Since students must be properly attired, have contact lenses removed, and be cognizant of safety equipment and possible hazards, the parent or guardian must help in assuming the responsibility for his/her child. It is the obligation of the parent or guardian to do the following:

1. Carefully read and sign the safety contract.
2. Insure that your child is dressed appropriately for school-based activities (hat, sunscreen and sunglasses for outdoor exploration or long-sleeve shirts and pants for indoor labs).
3. Reinforce the no eating or drinking rule.
4. Remind your child of the importance of using goggles and aprons.
5. Review safety rules with your child on a regular basis.
6. Remind your child of penalties for violating safety procedures.

III. What Exactly is a SAFE Class Size?

From Teaching in an Equitable--and Safe--Science Laboratory. October 2000. *ENC Focus* 7(4) p.43-44. (<http://csss.enc.org/media/scisafe.pdf>), "The room should not be overcrowded with 4.2 - 5.6 square meters of working space per student, depending upon the type of activities to be performed. It should be designed for no more than 24 students and teacher."

The Individuals with Disabilities Education Act (IDEA)--also known as the PL 105-17 Reauthorization Act of 1997--has increased the mainstreaming of special education students in all classrooms. Science laboratories are included, except where an alternative placement is determined by an Individual Education Program (IEP) or by action of a Planning and Placement Team (PPT).

Two major factors in determining an appropriate class size are the number of special needs students and the extent of their needs. NFPA Occupancy Load standards require a minimum of 50 net square feet per occupant in science laboratories. Academic professional standards by the National Science Teachers Association (NSTA) set a maximum of 24 students for any laboratory course in science. For safety as well as pedagogical purposes, the NFPA square footage per occupant should be increased and the NSTA maximum number of students in a laboratory should be reduced in a class size.

IV. Legal Considerations

A. Liability, Damages, Negligence, Foreseeability and Attractive Nuisances

Who is held liable in case an accident occurs in the laboratory depends upon many factors. The purpose of this discussion is to acquaint the science teacher with three major aspects of liability and damages: negligence, foreseeability, and attractive nuisances.

Definition of Terms:

Liability: An actual or potential legal obligation, duty, debt, or responsibility to another person; the obligation to compensate (cover **Damages**), in whole or in part, a person harmed by one's acts or omissions.

Damages: Money awarded in a suit or legal settlement as compensation for an injury or loss caused by a wrongful or negligent act or a breach of contract. Most often, damages are intended as compensation to an injured person for both economic and noneconomic losses, but damages occasionally include a noncompensatory award to punish intentional or wanton wrongdoing, called punitive (or exemplary) damages.

Negligence: That degree of care which an ordinarily careful and prudent person would exercise under the same or similar circumstances; a breach of the duty to act with care appropriate to the situation and the relationship of the persons, so as not to cause harm or loss.

Foreseeability: "Reasonable anticipation" that a particular event might occur (eg. An unpolished piece of glass tubing has the potential to cut a student). The type of activity and the circumstances under which it is done will ultimately determine whether negligence and foreseeability were present and applicable to the science teacher.

Attractive nuisance: An attractive nuisance is any inherently hazardous object or condition of property that can be expected to attract children to investigate or play (for example, laboratory equipment or unattended chemical containers). The doctrine imposes upon the teacher either the duty to take precautions that are reasonable in light of the normal behavior of young children--a much higher degree of care than required toward adults.

Many considerations play an important role in determining possible liability. The science teacher should be keenly aware of the fact that a student is a minor and legally is not bound by the same standards as is an adult. Behavior that is considered customary and usual for an adult might not be considered the same for a minor. Far more supervision and instruction is required of a teacher in a science laboratory for a child than is mandated for an adult.

Additionally, the concept of attractive nuisance comes into play far more extensively with minors. Leaving chemicals or glassware unprotected and available for students to procure is considered an attractive nuisance.

If the chemicals are in an unlocked cabinet labeled "Do Not Touch", and if a student is injured by taking some, the teacher is still liable. Those chemicals would be considered an attractive nuisance to a child and adequate precaution was not taken to prevent that child from obtaining them.

How does the science teacher insure that he/she is not liable in case an accident does occur? Of prime importance is the necessity of adequate supervision in the laboratory. Any condition that prevents adequate supervision places the teacher in a dubious situation. An overcrowded classroom is a major cause of laboratory accidents. Lack of adequate space among students and the inability of the teacher to "see" everything that is going on sets the stage for an accident to occur. No science facility should be expected to accommodate more students than it is designed to serve.

Instituting an adequate safety policy does not mean an accident will not occur or the teacher will not be sued. If a lawsuit is instigated and the teacher shows that adequate safety instruction and appropriate supervision was maintained, he/she will have a better chance of avoiding punitive action.

B. Determining Negligence

The legal definition of negligence is important for every teacher to know. Negligence, as defined by the courts today, is conduct that falls below a standard of care established by law or risk of harm, or the failure to exercise due care. It should be noted that in the absence of specific laws or local policies, the standard of care expected is set by the profession, e.g., position statements adopted by the National Science Teachers Associations, the American Chemical Society, the National Association of Biology Teachers, or the Council of State Science Supervisors.

The science teacher has three basic duties relating to the modern concept of negligence:

- Duty of instruction
- Duty of supervision
- Duty to properly maintain facilities and equipment

Failure to perform any duty may result in a finding that a teacher and/or administrator within a school system is/are liable for damages and a judgment and award against him/them.

1. Duty of Instruction:

Includes adequate instruction before a laboratory activity (preferably in writing) that:

1. Is accurate; is appropriate to the situation, setting, and maturity of the audience and addresses reasonably foreseeable dangers.
2. Identifies and clarifies any specific risk involved, explains proper procedures/techniques to be used, and presents comments concerning appropriate/inappropriate conduct in the lab.

Instruction must follow professional and district guidelines. Teachers who set bad examples by not following proper laboratory procedures may be sued if injury results from students following the teacher's bad examples.

2. Duty of Supervision:

Includes adequate supervision as defined by professional, legal and district guidelines to ensure students behave properly in light of and foreseeable dangers. Points to remember:

1. Misbehavior of any type must not be tolerated.
2. Failure to act on improper action is grounds for liability.
3. The greater the degree of danger, the higher the level of supervision should be
4. The younger the age of students or the greater the degree of inclusion of special population students, the greater the level of supervision should be.
5. Students must never be left unattended, except in an emergency where the potential harm is greater than the perceived risk to students. Even the risk should be minimized to responsibility transferred to another authorized person if the situation allows.

3. Duty of Maintenance:

Includes insuring a safe environment for students and teachers. This requires that the teacher:

1. Never use defective equipment for any reason.
2. File written reports for maintenance/correction of hazardous conditions or defective equipment with responsible administrators.
3. Establish regular inspection schedules and procedures for checking safety and first aid equipment.
4. Follow all safety guidelines concerning proper labeling, storage and disposal of chemicals.

By keeping files of all hazard notifications and maintenance inspections, teacher liability in the event of an accident is minimized in cases where no corrective actions were subsequently made.

V. General Laboratory Safety

Science teachers must become safety conscious advocates. It is dangerous to assume that students remember safety procedures and equipment discussed at the beginning of the school year. It is advisable that teachers emphasize safety techniques that pertain to specific laboratory activities at the time these events occur. The science instructor should always be alert to possible safety hazards and conditions in an activity. Laboratory exercises should be modified and students reminded of proper lab procedure every time a potentially hazardous situation is encountered.

A. Classroom and Laboratory Safety Equipment

Laboratory Safety Equipment Checklist:

Before your year begins, make sure that your laboratory is a safe laboratory. The following items should be in all properly maintained lab rooms. If your location is improperly equipped, please inform your science administrator and always conduct laboratories in properly equipped, safe rooms.

- A. Master shut-off switches should be located within each lab room. Water, gas and electricity should be turned off when not in use.
- B. Adequate numbers of tri-class (ABC) fire extinguishers (at least one per room).
- C. Eyewash stations: 30 steps or 15 seconds from any location in the room.
- D. Safety Shower: accessible on three sides, 30 steps or 15 seconds from any location in the room, 30-60 gallons per minute at a pressure of 20-50 psi.
- E. Fume Hood (for chemical laboratories): vented through roof, face velocity 60-100 feet/minute (18-30 meters / minute). The hood should not be within 10 feet of an exit or a main aisle.
- F. All electrical outlets within 5 feet of sinks should be fitted with Ground-Fault Interrupters (GFI).
- G. Retardant-treated wool fire blanket: 30 steps or 15 seconds from any location in the room.



Laboratory Safety Equipment Checklist (continued):

- H. Approved safety goggles: American National Standards Institute (ANSI) coded Z87 or Z87.1 G or H - SPLASH PROOF eye protection must be worn by students, teachers and visitors to the laboratory according to Florida State law 232.45.
- I. Sanitizing and/or sterilizing equipment for safety goggles.
- J. An approved safety shield should be used whenever the possibility of an explosion is present.
- K. Non-absorbent, chemical-resistant aprons should be provided for each student during lab activities where there is a danger of spillage or spattering of chemicals or hot liquids.
- L. Separate acids cabinet and flammables cabinet should be secured in the storeroom.
- M. A container should be provided and clearly marked for the disposal of broken glass only.
- N. A chemical spills kit must be available for general chemical spills.
- O. A stock supply of vinegar and baking soda for base and acid spills should be available during acid and base lab activities. Disinfectants and 10% Clorox bleach solutions should be used to sterilize equipment and wash down counter tops.
- P. An adequately stocked first-aid kit for teacher use should be easily accessible in an emergency.
- Q. MSDS catalog or safety sheets: know the hazards associated with all the chemicals used in the class experiments.
- R. Proper chemical containers: do not repackage chemicals into smaller containers unless the new containers are chemically secure, appropriately dated, and labeled.
- S. Safety posters should be prominently displayed in the room.
- T. Emergency procedures and telephone numbers should be prominently posted in the room.

B. Goggle Protection

ANSI Z87.1 Section 7.3(3)

The teacher must "make a judgement in selection of the appropriate protective equipment so that the protection is greater than the estimated hazards".

Occupational Safety and Health Administration OSHA 1910.1450 (Laboratory Standard) Section D(6)

School laboratories should include "protective apparel compatible with the required degree of protection for substances being handled."

Florida Law 232.45

Eye-protective devices shall be worn by students, teachers and visitors in courses including, but not limited to, chemistry, physics, or chemical-physical laboratories, at any time at which the individual is engaged in or observing an activity or the use of hazardous substances likely to cause injury to the eyes.

School Board of Broward County Safety Policy

Requires "American National Standards Institute (ANSI) coded Z87 or Z87.1 type G or H - SPLASH PROOF eye protection to be worn by students, teachers and visitors to the laboratory according to Florida State law 232.45." Additionally, any time goggles are required, a laboratory eyewash is also required as defined in the Educational Specifications.

School Board of Broward County Educational Specifications: Any science laboratory facility that conducts labs that require the use of goggles must also provide a safety eye/face wash (Eyewash Speakman SE 603ADA or equivalent). Chemical laboratory facilities must provide an eye/face wash and shower (shower and eye wash Speakman SD 3603ADA or equivalent). An eyewash is to be open from 3 sides, and to be accessible within 15 steps from any location in the room

Just because eyewear meets Z87.1 standards does not necessarily mean it provides adequate protection from the dangers of splashed chemicals. Eyewear that does not provide a complete, snug seal around the eyes may be fine for some activities but not when using hazardous chemicals. For this reason, the School Board of Broward County requires the use of vented splash-proof goggles (ANSI Z87.1 type G or H) in all laboratory situations. When vent openings are provided on splash-proof goggles the vents should be indirect, with covers and/or baffles preventing straight-line passage of liquids into the goggle.

In all cases, when goggles are required, an eyewash is required as well. Rooms not equipped with an eye wash are not designated laboratory locations and are not safe locations for laboratory activities. Every science room, lab, or shop where students handle materials or chemicals is provided with eye wash facilities. An eye wash facility is a fixture that provides a minimum of 15 minutes of continuous irrigation to both eyes simultaneously. It must be easily activated and drained.

Additionally, according to Florida Law 232.45, Eye and face protection shall be sanitized on a regular basis. Quantities shall include a minimum of one set for each elementary school, for every two science teachers at the middle/junior high, and for each science laboratory room at the high school.

C. Chemical Purchasing

In order to minimize chemical hazards and difficulties with chemical storage, the notion that "less is better" plays a major role in establishing purchasing policy.

Remember that a chemical is yours from its cradle to its grave. Once purchased, you own that chemical and must dispose of it properly when finished. Even if a disposal company is hired, the ultimate responsibility for the chemical is still yours.

With these facts in mind, the School Board of Broward County has established the following purchasing criteria:

1. Purchase only a one-year supply of the chemicals necessary to implement your instructional program.
2. Do not buy bulk chemicals and repackage into smaller quantity bottles. Reagent bottles and caps are de-signed to minimize specific hazards.
3. Store Material Safety Data Sheets (MSDS) for each received chemical in a convenient location. Possible hazards in handling, storage, and disposal should be understood before the chemical is used. A sample of a MSDS can be found in Appendix A.
4. The maximum size container in which to order all liquid reagents (acids, bases, and solvents) is one pint (500 ml).
5. The maximum size container in which to order all solid reagents is one pound (500 grams).
6. All indicators or dyes should be purchased in pre-mixed solutions whenever possible.
7. All chemicals purchased should be of technical grade purity, unless a higher purity is needed for an experiment or the chemicals are only available in reagent grade.
8. Chemical requisitions should be separate from supply and equipment requisitions.
9. Chemicals may be purchased from the district-designated vendor. Only chemicals not available from the district-designated vendor can be purchased from other approved sources.
10. A chemical inventory should be kept and updated regularly.
11. No school in Broward County shall accept gifts of chemicals from individuals, government installations, corporations, companies, or any other source without the specific authorization of the appropriate District Level Science Supervisor.

** The County Chemical Manager reviews all chemical orders. Dangerous or inappropriate chemicals will be removed from the order.

All Material Safety Data Sheet (MSDS) are electronically on file and easily accessible for ALL chemicals at www.browardschool.com > Departments > risk management (<http://www.broward.k12.fl.us/rmt/MSDS-PDF.html>). MSDS sheets should be referenced for proper handling, storage and for appropriate personal protective equipment. If an MSDS is not available, request one from the manufacturer or obtain online at <http://www.msdsonline.com>. A sample MSDS sheet is provided for you.

E. Chemical Handling

The science teacher should discuss the following guidelines with students enrolled in courses involving the use of chemical. Students will be expected to adhere to all procedures specified below.

1. Excess chemicals should never be returned to a reagent bottle. Notify instructor or any excess chemicals.
2. Always wear appropriate protective gear when handling chemicals.
3. Never handle chemicals directly with your hands. Use spatula or scoopula provided with each bottle.
4. Always read the label of the chemical reagent bottle at least twice to insure correct selection. The spelling of chemical names may only differ by one letter.
5. Never eat or drink while handling chemicals.
6. Always wash your hands after handling chemicals.
7. Never taste or directly smell an unknown chemical unless your instructor tells you to do so.
8. Do not substitute chemicals in an experiment unless told to do so by the teacher.
9. Use only the designated quantities of chemicals specified in an experiment.
10. Dispense liquid chemicals into a small beaker first; then transfer them to the appropriate glassware using a stirring rod.
11. Never weigh a solid chemical directly on the pan of a balance. Always use weighing or filter paper.
12. Listen to your instructor when possible chemical hazards for your experiment are discussed.
13. Never pipette liquid chemicals by mouth.
14. If a spill occurs, notify the teacher immediately.
15. Never store chemicals in your laboratory drawer.

All Material Safety Data Sheet (MSDS) are electronically on file and easily accessible for ALL chemicals at www.browardschool.com > Departments > risk management (<http://www.broward.k12.fl.us/rmt/MSDS-PDF.html>). MSDS sheets should be referenced for proper handling, storage and for appropriate personal protective equipment. If an MSDS is not available, request one from the manufacturer or obtain on online at <http://www.msdsonline.com>. A sample MSDS sheet is provided for you.

D. Chemical Storage

Remember that a chemical is yours from its cradle to its grave. Once purchased, you own that chemical and must dispose of it properly when finished. Even if a disposal company is hired, the ultimate responsibility for the chemicals is still yours.

1. Store chemicals in compatible families as indicated in the Flinn Chemical Catalog and Reference Manual. **Do not store chemicals alphabetically!**
2. Whenever possible, avoid storing any chemicals on the floor.
3. Shelves should be of wood construction and firmly secured to walls by the use of fixed wooden supports. Do not use metal, adjustable clips.
4. Provide anti-roll lips on shelves whenever possible.
5. Store flammables in a dedicated flammable cabinet.
6. Store metals and hydrides away from any water.
7. Store ammonium nitrate away from other chemicals.
8. Chemicals prone to instability should be dated and disposed of after use.
9. Do not use the fume hood as a storage area.
10. Label all chemicals with the date of receipt.
11. Store all compressed gases separately.
12. All chemical storage areas should be locked and clearly designated off limits to everyone except authorized personnel.
13. Solid chemicals should only be purchased in one pound bottles and liquids in one-pint bottles.
14. Do not store chemicals in your classroom. Keep them locked in the chemical storage room.
15. Chemicals should be accessible to students during actual laboratory exercises only.
16. Never store chemicals on the floor of storage areas nor on the top of storage cabinets. Keep storage areas free from clutter.
17. Order enough chemicals for one school year only.
18. Know the hazards associated with all the chemicals used in class experiments.
19. Do not repackage chemicals into smaller containers unless the new containers are chemically secure, appropriately dated, and labeled.

All Material Safety Data Sheet (MSDS) are electronically on file and easily accessible for ALL chemicals at www.browardschool.com > Departments > risk management (<http://www.broward.k12.fl.us/rmt/MSDS-PDF.html>). MSDS sheets should be referenced for proper handling, storage and for appropriate personal protective equipment. If an MSDS is not available, request one from the manufacturer or obtain one online at <http://www.msds-online.com>. A sample MSDS sheet is provided for you.

SAMPLE

Flinn Scientific, Inc.

Materials Safety Data Sheet

FLINN SCIENTIFIC, INC. • P.O. BOX 219 • BATAVIA, ILLINOIS U.S.A. • PHONE: (312) 879-6900

CHEMICAL NAME & SYNONYMS Limewater Solution (Calcium Hydroxide Solution)		FLINN CATALOG NUMBER L0021, L0022
FORMULA Mixture	FORMULA WEIGHT (F.W.) Mixture	CAS NO. None Established
PHYSICAL DATA (DENSITY, SOLUBILITY, ETC.) Ingredients: Calcium Hydroxide Water		
APPEARANCE AND ODOR Clear, water-white solution that turns cloudy on absorbing carbon dioxide.		
COMPATIBLE CHEMICAL FAMILY Inorganic #4 <small>See Flinn Chemical Catalog/Reference Manual</small>	DOT CLASS Not Regulated	REACTIVITY Stable
CONDITIONS TO AVOID (IF ANY): Avoid contact with skin.		
HEALTH HAZARDS (IF ANY): Strongly basic; may be skin irritant. Not all health aspects of this product have been fully investigated.		TOLLERANCE LIMIT VALUE (TLV) (IF ESTABLISHED) None Established
FIRE HAZZARDS (IF ANY): Non flammable		
SPILLS AND LEAKS: Absorb on sand or vermiculite. Place in a suitable container, and use suggested disposal method at right.		DISPOSAL NO. 10 <small>See Flinn Chemical Catalog/Reference Manual 1987</small>
SPECIAL PRECAUTIONS (IF ANY): Chemical gloves and goggles		
FIRST AID (IF SUBSTANCE DANGEROUS): External: Wash affected areas with copius quantities of water. Internal: Wash mouth; see a physician. For Eyes: Wash continuously for 15 minutes; see a physician.		
Consult your copy of the Flinn Chemical Catalog/Reference Manual for even more information about laboratory chemicals.		

N/A = NOT APPLICABLE

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Industrial color-coding and storage:

allows for the separation of chemicals into compatible hazard types. See Below:

Green – Low Hazard
Red – Flammable
Yellow – Oxidizer
White – Corrosive
Blue - Poison


**AREA 1
MINIMUM TO
MODERATE
HAZARDS**

Storage Code Green:
suitable for general
storage areas.




**AREA 2
FLAMMABILITY
HAZARD**

Storage Code Red
Store in flammables
area, separating water
compatible and water
incompatible groups.




**AREA 3
CONTACT
HAZARD**

Storage Code White:
store in corrosion-
proof area separating
acids and strong bases.
Nitric acid should be
isolated.




**AREA 4
REACTIVITY
HAZARD**

Storage Code Yellow:
Oxidizers must be stored
away from flammables
and combustibles.



**AREA 5
HEALTH HAZARD**

Storage Code Blue:
Store in secure poisons
area.



FLINN STORAGE CATEGORIES

ORGANIC

1. Acids, anhydrides, peracids
2. Alcohols, glycols, amines, amides, imines, imides
3. Hydrocarbons, esters, aldehydes
4. Esters, ketones, ketenes, halogenated hydrocarbons, ethylene oxide
5. Epoxy compounds, isocyanates
6. Peroxides, hydroperoxides, azides
7. Sulfides, polysulfides, sulfoxides, nitrates
8. Phenols, cresols

Source: Flinn Scientific

FLAMMABLES



ORGANIC #2
ALCOHOLS, GLYCOLS
(Store flammables in a dedicated cabinet)

ORGANIC #3
HYDROCARBONS, ESTERS, etc.
(Store flammables in a dedicated cabinet)

ORGANIC #4
ESTERS, KETONES
(Store flammables in a dedicated cabinet)

ORGANIC #2
ALCOHOLS, GLYCOLS,
AMINES, AMIDES,
IMINES, IMIDES
(Store flammables in a dedicated cabinet)

ORGANIC #3
HYDROCARBONS,
ESTERS, ALDEHYDES
(Store flammables in a dedicated cabinet)

ORGANIC #4
ETHERS, KETONES, KETENES,
HALOGENATED HYDROCARBONS,
ETHYLENE OXIDE
(Store flammables in a dedicated cabinet)

ORGANIC #5
EPOXY COMPOUNDS
ISOCYANATES

ORGANIC #7
SULFIDES, POLYSULFIDES,
ETC.

ORGANIC #8
PHENOL, CRESOLS

ORGANIC #3
PEROXIDES, AZIDES
HYDROPEROXIDES

ORGANIC #1
ACIDS, ANHYDRIDES,
PERACIDS
(Store certain organic acids in acid cabinet)

MISCELLANEOUS

MISCELLANEOUS

INORGANIC

1. Metals, hydrides
2. Halides, sulfates, sulfites, thiosulfates, phosphates, halogen, acetates
3. Amides, Nitrates (except ammonium nitrite), nitrites, azides and nitric acid
4. Hydroxides, oxides, silicates, carbonates and carbon
5. Sulfides, selenides, phosphides, carbides and nitrides
6. Chlorates, perchlorates, perchloric acid, chlorites, hypochlorites, peroxides, hydrogen peroxide
7. Arsenates, cyanides, cyanates
8. Borates, Chromates, manganates, permanganates
9. Acids (except Nitric)
10. Sulfur, phosphorus, arsenic, phosphorus pentoxide

INORGANIC #10
SULFUR, PHOSPHORUS,
ARSENIC,
PHOSPHORUS PENTOXIDE

INORGANIC #2
HALIDES, SULFATES,
SULFITES, THIOSULFATES,
PHOSPHATES, HALOGENS,
ACETATES

INORGANIC #3
AMIDES, NITRATES (not
AMMONIUM NITRATE)
NITRITES, AZIDES
(Store Ammonium Nitrate away from all other
substances - ISOLATE IT)

INORGANIC #1
METALS & HYDRIDES
(Store away from any water)
(Store flammable acids in flammable acids in
flammables cabinet)

INORGANIC #4
HYDROXIDES, OXIDES,
SILICATES, CARBONATES,
CARBON

INORGANIC #7
ARSENATES, CYANIDES,
CYNATES


INORGANIC #5
SULFIDES, SELENIDES,
PHOSPHIDES, CARBIDES,
NITRIDES

INORGANIC #8
BORATES, CHROMATES,
MANGANATES,
PERMANGANATES

INORGANIC #6
CHLORATES, PERCHLORATES,
CHLORITES, PERCHLORIC ACID,
PEROXIDES, HYPOCHLORITES,
HYDROGEN PEROXIDE

MISCELLANEOUS

ACID



INORGANIC #9
ACIDS, EXCEPT NITRIC
(Acids are best stored in
dedicated cabinets)

Store Nitric Acid away from
other acids unless your acid
cabinet provides a separate
compartment for Nitric Acid

F. Disposal Techniques

The Environmental Protection Agency has established a manifest system that requires the waste generator to keep detailed records and to report to the agency. Under these guidelines, a chemical and all the waste generated from it is the responsibility of the purchaser from “cradle to grave.” Even if a disposal company is hired, the ultimate responsibility for the chemical is still the purchaser's. The following guidelines are to be observed.

1. Dilute water solutions of most chemicals may be poured down the drain.
2. Most chemicals should be boxed (compatible families) for removal. Each box will be tagged with its contents (use the disposal form next page). The box(es) must remain in the chemical storage room or designated area.
3. Box flammable liquids separately. Each box will be tagged with its contents. The chemical disposal form may be used to tag each box.
4. Out-dated diethyl ether (ethyl ether) should not be handled. If you have a container of outdated ether, have your administrator call the Chemical Manager in the Risk Management and Safety Department to arrange for removal.
5. All unlabeled, outdated, prohibited and/ or potentially hazardous chemicals or those chemicals in excess of the maximum storage quantity must be boxed (compatible families) for disposal.
6. The Risk Management and Safety Department Chemical Manager shall be notified, in writing, regarding:

1. School name
2. Exact location of chemicals to be disposed
3. Name(s) of chemical to be disposed
4. Quantity of chemical to be disposed
5. Contact person and phone number

Other Hazardous Materials: Other items, including used batteries, halogen bulbs (containing mercury), old thermometers (containing mercury) or other materials identified as hazardous may be boxed for removal and stored in the chemical storage area. Complete the attached form for removal/ disposal.

SEE FORM NEXT PAGE

After the above information is received, a removal date will be scheduled. A chemical disposal form is provided for you. Complete and fax this form to risk management.

Attention Risk Management
754-321-1917

Chemical Disposal Form

School: _____

Location (FISH number): _____

Contact Person: _____

Phone: _____

Chemical To Be Removed

	Name	Quantity	Box Number
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			

Department Head

Principal

Date

Date

G. Prohibited Chemicals

Chemicals categorized as human or animal carcinogens, mutagens, teratogens, highly toxic, explosive, or corrosive are prohibited from use in the Broward County Schools. In all cases, these substances are considered so hazardous that their potential danger outweighs their educational benefit. The following definitions are important in discussing chemical safety:



PROHIBITED CHEMICALS	
MUTAGEN	A substance capable of causing changes in genetic material of a cell, which can be transmitted during cell division.
HIGHLY TOXIC	Agents or substances that when inhaled, absorbed or ingested in small amounts can cause death, disablement, or severe illness.
EXPLOSIVE	An unstable substance capable of rapid and violent energy release.
CORROSIVE	A substance that causes destruction of tissue by chemical action on contact.
IRRITANT	A substance that on immediate, prolonged, or repeated contact with normal tissue will induce a local inflammatory reaction.
CARCINOGEN	A substance capable of causing cancer or cancerous growths in mammals.

Prohibited Chemicals:

The following prohibited chemicals are based on lists 1 and 2 of the National Institute for Occupational Safety and Health (NIOSH) and the Florida Department of Environmental Protection (FDEP). Hazards include toxicity, carcinogenicity, terato-genicity, flammability, and explosive propensity.

*No compressed gasses	Cadmium sulfate	Formaldehyde
Acetaldehyde	Calcium cyanide	Formalin
Acetyl Chloride	Calcium fluoride	Fuchsin
Acid Green	Calcium phosphide	
Acrylonitrile	Carbon disulfide	
Acrylaldehyde	Carbon tetrachloride	
Acrylamide	Carmine	Gasoline
Acrylic Acid	Catechol	Gunpowder
Adrenaline	Chlorine	
Ammonium bicarbonate	Chloral hydrate	
Ammonium bifluoride	Chloretone	Hematoxylin
Ammonium chromate	Chlorobenzene	Hexanes
Ammonium dichromate	Chloroethanol	Hexane(cyclo)
Ammonium oxalate	Chlorophenol	Hexachlorophene
Ammonium perchlorate	Chloroform	Hydriodic acid
Ammonium vanadate	Chloropromazine	Hydrobromic acid
Aniline	Chlorosulfonic acid	Hydrofluoric acid
Aniline Hydrochloride	Chromic acid	Hydrogen
Antimony oxide	Chromium	Hydrogen fluoride
Antimony potassium tartrate	Chromium acetate	Hydrogen sulfide
Antimony trichloride	Chromium oxide	Hydroquinone
Arsenic	Chromium potassium	
Arsenic chloride	Chromium trioxide	Indigo carmine
Arsenic oxide	Cobalt Metal	Iso-amyl alcohol
Arsenic pentoxide	Colchicine	Iso-butyl alcohol
Arsenic trichloride	Copper Cyanide	Iso-pentyl alcohol
Arsenic trioxide	Cresol	
Asbestos	Cumene	Lead powder
Ascarite	Cyclohexane	Lead arsenate
		Lead carbonate
		Lead(VI) chromate
		Lithium metal
		Lithium aluminum hydride
Barium oxalate	Dichlorobenzene	
Benzene	Dichlorethane	
Benzidine	Diethylamine	
Benzone	Dimethylaniline	Magnesium metal (powder)
Benzonitrile	2,4-Dinitrophenol	Magnesium chlorate
Benzoyl Chloride	Diisopropyl ether	Mercury
Benzoyl peroxide	p-Dioxane	Mercuric bichloride
Beryllium	Diphenyl ester carbonic acid	Mercuric iodide
Beryllium carbonate		Mercuric chloride
Bonine fluid	Ethyl chloride	Mercuric nitrate
Bromine (concentrated gas)	Ethyl ether	Mercuric oxide
Bromobenzene	Ethyl iodide	Mercuric sulfate
	Ethyl nitrate	Mercuric sulfide
	Ethylenediamine	Mercurous chloride
Cadmium chloride	Ethylene dichloride	Mercurous nitrate
Cadmium nitrate	Ethylene oxide	Mercurous Oxide
Cadmium Metal		Mesitylene

School Board of Broward County Safety, Policies and Procedures in Science Handbook

Methylamine	Potassium perchlorate	
Methyl iodide	Potassium peroxide	
Methyl methacrylate	Potassium sulfide	
Methyl oleate	Pridine	Talc
Methyl orange	Pyrogalllic acid	Tannic acid
Methyl red		Testosterone
		Tetrabromoethane
Naphthylamine, a-	Saccharine, pure	Tetrahydrofuran (THF)
Nickel metal	Salol	Thallium
Nickel carbonate	Selenium	Thermite and compounds
Nickel oxide	Silver cyanide	Thioacetamide
Nickelous acetate	Silver oxide	Thiourea
Nicotine	Sodium arsenate	Titanium trichloride
Nitriloacetic acid	Sodium arsenite	Toluene
Nitrobenzene	Sodium azide	o-Toluidine
	Sodium bromate	Trichloroethane
	Sodium borohydride	Trichloroethylene
Osmium tetroxide	Sodium chlorate	Triethylamine
	Sodium chromate	Trinitrobenzene
	Sodium cyanide	
Paradichlorobenzene	Sodium dichromate	Uranium
Paraformaldehyde	Sodium ferrocyanide	Uranyl acetate
Paris green	Sodium fluoride	Uranyl nitrate
Pentane	Sodium nitrate	Urethane
Perchloric acid	Sodium nitrite	
Phenol	Sodium oxalate	
1-phenyl-2-thiourea	Sodium perchlorate	Vanadium pentoxide
Phenylthiocarbamide	Sodium peroxide	Vinylite
Phosphorus, red, white, yellow	Sodium silicofluoride	
Phosphorus pentoxide	Sodium sulfide	
Phthalic anhydride	Sodium thiocyanate	Wood's Metal
Picric acid	Stannic chloride	
Potassium metal	Stearic acid	
Potassium chlorate	Strontium	Xylene
Potassium chromate	Sudan III	
Potassium cyanide	Sudan IV	
Potassium oxalate	Sulfamathazine	All alkali metals, radioactive chemicals, azides, acetylides, stypnates, and cyanides
Potassium periodate	Sulfuric acid, fuming	
Potassium permanganate		

H. Reagent Concentrations and Alternate Reagents:

In many instances, the concentration of chemicals determines the degree of toxicity and irritation. Commercially prepared dilute solutions provide for a safe way of obtaining the necessary reagents with minimal hazard involved. The following list of chemicals must be ordered as dilute solutions for use in secondary schools only:

Barium nitrate
Lead nitrate
Silver nitrate
Cobalt nitrate
Strontium nitrate

Several classic chemistry experiments have reagents that are prohibited. Alternative reagents are now available for these experiments:

Alternate Reagents

1. Trichlorotrifluoroethane (TTE) or perchloroethylene may be substituted for carbon tetrachloride in halogen replacement experiments.
2. Hydrogen peroxide may be substituted for potassium chlorate to generate oxygen.
3. Water should be substituted for glycerin as a lubricant when strong oxidizing agents are present.
4. Toluene may be substituted for benzene in experiments.
5. Naphthalene or p-nitrotoluene may be substituted for paradichlorobenzene. Do not use acetamide as a substitute since it is a suspected carcinogen.
6. Substitute formalternate for formaldehyde or formalin.
7. Biuret reagent should be used in place of Millon's reagent. Millon's reagent contains highly corrosive concentrated nitric acid and carcinogenic mercury.
8. Bromophenol blue and bromothymol blue can be used as alternatives to methyl orange and methyl red.



I. Chemical Labeling

1. Reading Chemical Labels

Chemical manufacturers are currently using several different chemical labeling procedures. Most vendors from whom chemicals in Broward County are ordered use the National Fire Protection Association (NFPA) template. In addition many vendors have labels which provide visual hazard warnings and additional safety information.

The NFPA label provided consists of four categories: health, flammability, reactivity, and unusual reactivity. Each category gives a numerical rating of 0-4, with 4 being a severe hazard and 0 no special hazard. The descriptive visual characteristic of the NFPA label shown below is designed to make the user aware of these four special hazards: health, flammability, reactivity, and unusual reactivity. See Page 28.

2. Writing Chemical Labels

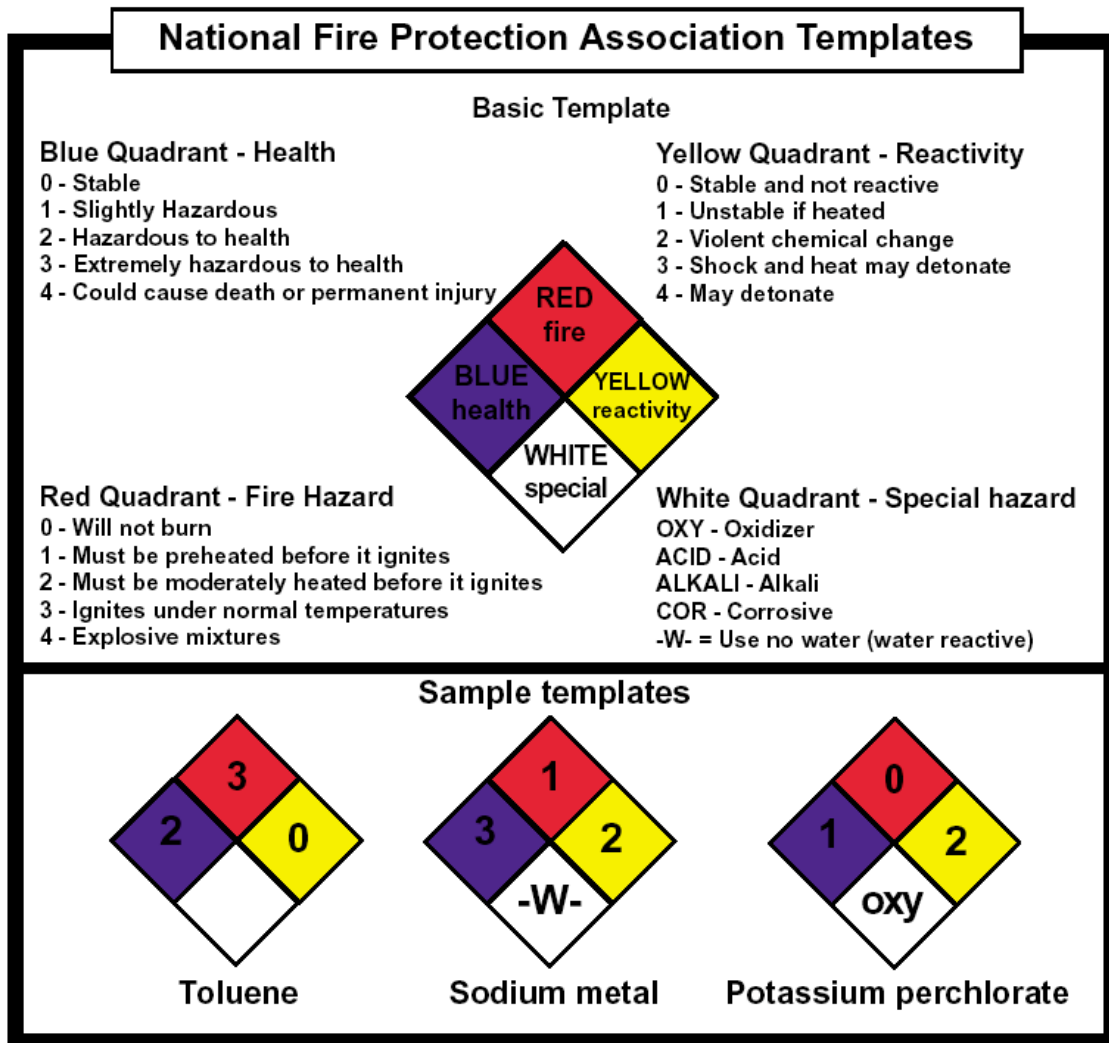
When chemicals are transferred from the reagent bottle to a smaller solid bottle or made into a dilute solution, appropriate label information must be indicated on the new bottle. The following information should be included on the labels of all containers:

- a. Name of chemical
- b. The chemical formula
- c. Concentration (Solutions)
- d. Statement of hazard



School Board of Broward County Safety, Policies and Procedures in Science Handbook
 National Fire Protection Association Template:

The NFPA label provided consists of four categories: health, flammability, reactivity, and unusual reactivity. Each category gives a numerical rating of 0-4, with 4 being a severe hazard and 0 no special hazard. The descriptive visual characteristic of the NFPA label shown below is designed to make the user aware of these four special hazards: health, flammability, reactivity, and unusual reactivity.



J. The Use of Classroom Microwaves:

The School Board of Broward County prohibits the storage of microwave ovens in the classroom.

A Microwave oven is a dangerous example of laboratory equipment. Since their use in the science laboratory has gained popularity, there have been several nation-wide cases of laboratory fires that have occurred when improper or inappropriate materials were placed in these machines. In some cases, teachers were causing the fires accidentally. However, in most cases, students were placing gum foil, tin foil w/paper or cigarette packs in the oven, turning it on, and leaving the room (unsupervised laboratories or substitute days, etc). Most of these combinations resulted in fires and school evacuation -costing the school and the city great sums of money for fire departments and evacuation procedures. Other activities resulted in ruined equipment (exploding pens, melted rubber, etc) and in some cases, dangerous explosions were documented (exploding cigarette/butane lighters). In all, multiple occurrences were recorded.

Since there was and is no real reason to have these machines stored in the classroom they were pulled out of the science classroom and placed only in the planning/prep areas. Policy currently prohibits these machines in a science classroom.

HOWEVER: they may be used for demonstration purposes tied to the curriculum, much like any other piece of dangerous equipment. In these cases, all lab procedures must be followed (safety goggles, no horseplay, etc) and when the activity is done, the microwave is returned to the storage area. They may remain ONLY in rooms for ESE where essential skills are taught.

VI. Curriculum Specific Policies and Safety Guidelines

Awareness of safety practices is the key to any successful secondary science program. Experience has demonstrated that the best way to protect yourself and your students is to incorporate safety as an integral part of every laboratory course and procedure.

The following list of safety procedures has been arranged by grade level /subject matter. Every science teacher should read them carefully and refer to them frequently.

A. Elementary Safety Guidelines

Children begin to learn science from the moment they start to perceive their environment. Schools can expand their universe and open new areas of inquiry, or they can close off their search for knowledge by presenting science as strange words to be memorized from a book. Teaching science at the elementary level does not require complicated expensive apparatus or chemicals. The following guidelines will ensure the science experience is a safe one.

1. Encourage appropriate safe behavior during laboratory activities.
2. Warn children that eating candy and chewing gum are not permitted during laboratory activities.
3. Children should wear safety goggles when handling any chemicals or hot liquids. An eye-wash is required for these materials as well.
4. Instruct children in the proper use of safety equipment, especially goggles, and eyewash stations.
5. Children should be taught to clean-up and put away equipment and supplies at the end of the laboratory activities.
6. Never let children focus magnified sunlight. It may cause severe burns.
7. When handling pointed scissors, children should be reminded that scissors are sharp and may cause injury.
8. The teacher should tape the ends of all sharp glass objects (mirrors, lenses, glass tubes, etc.).
9. Keep sharp instruments (knives, scissors, needles, razor blades or glass objects) in a locked drawer.
10. Children should be instructed never to use rubber bands as sling shots.
11. Children should be instructed never to place sharp, metallic objects in electrical outlets.
12. Care should be exercised when utilizing a sling psychrometer. Insure that children are well out of the path of the sling.
13. Never view a solar eclipse directly. Only indirect methods of observation are permitted.
14. Do not allow children to handle pumps and aquarium filters without proper instruction and supervision.

15. Children like to explore and experiment. It is important to keep all chemicals in a locked area.

16. The teacher should label all chemicals with the date of purchase so that old chemicals can be eliminated.

17. Remind students that many household chemicals are dangerous and should be handled with care in the classroom and at home. Household chemicals should never be mixed together unless an adult is present.

18. Children should be taught correct emergency procedures: how to evacuate the room in case of fire, what to do if a chemical is spilled, and the procedure to follow in case a child is injured. These procedures should be practiced on a regular basis.

19. Pour kitty litter on acid or base spills to absorb the chemicals. Sweep up the residue and dispose of it in a trash can.

20. Only provide the exact amount of chemicals for an experiment.

21. Show children how to "smell" a chemical. The wafting technique is utilized. Hold the container at arm's length in front of the face. Wave one hand over the open end of the tube toward the face, letting some fumes reach the nose.

22. Most of the chemicals used at the elementary level can be disposed of properly by diluting them with plenty of water and pouring the resulting solution down the drain. Consult the chemical vendor for additional information.

23. Do not use ammonium dichromate to simulate a volcano. This chemical decomposes to form chromium oxide and chromium(III), a suspected carcinogen.

24. Use plastic-ware whenever possible.

25. Wounded or stray animals should not be brought to school. Household pets are also forbidden.

26. Do not permit reptiles or amphibians to be brought to class. They are carriers of Salmonella, a dangerous bacterium.

27. Laboratory activities that require an eyewash station must be conducted in a location with access to an eyewash. Activities that require an eye-wash include any activity that utilizes caustic or irritating liquids that may splash or fine powders or sands that may irritate the eye.

** An eyewash has been provided and installed at each elementary location. Please determine the location of your eyewash station to be used in the event of an emergency. Most often, the station may be found in the school clinic area.

B. Middle School Science (6-8)

Middle school science is composed of biological, physical and earth sciences. Middle school teachers should be familiar with the high school practices in each of these disciplines, and apply them where appropriate.

C. Earth and Space Science/Integrated Science

1. Never look directly at the sun.
2. Never look directly at infrared or ultraviolet light sources since they might damage the eyes.
3. Caution should be exercised when utilizing hydrochloric acid to study rock samples.
4. Wear protective goggles when working with chemicals, when cleaving rocks or fragmenting minerals.
5. Do not simulate a volcano using ammonium dichromate and magnesium. Chromium compounds are suspected carcinogens and burning magnesium is dangerous to the eyes.
6. Never taste any field specimens.
7. Wash hands after handling field specimens.
8. Rockets must not exceed approved size (between 10 inches and fifteen inches). Only Class IIIA or smaller rocket engines and commercially prepared propellants may be ordered.
9. Have a safety contract on file for each student prior to any laboratory activity.

D. Biological Sciences/Integrated Science

1. Glass slides and glass cover slips should be handled with care.
2. Avoid touching hot illuminator bulbs with bare hands.
3. Safety goggles must be worn when handling hot liquids, using gas burners, handling caustic material and dissecting lab specimens.
4. Wear appropriate gloves when handling hot glassware. Remember hot glass looks the same as cold glass.
5. Approved insect anesthetizers should be used instead of ether or chloroform (i.e. FlyNap).
6. Purchase and use only non-pathogenic pure bacterial cultures.
7. Organisms collected on agar from air samples should be taped shut and not reopened.
8. All bacteria should be treated as pathogenic; it is difficult to distinguish between benign and pathogenic organisms.
9. Hands should be washed before and after any procedure utilizing microorganisms or cultures.
10. Never pipette by mouth when transferring bacteria.
11. After use, all glass petri dishes should be sterilized by an autoclave, a pressure cooker, or soaked in a strong disinfectant over night and washed in detergent. Disposable petri dishes should be soaked in a strong disinfectant, sealed in heavy plastic and placed in a waste receptacle.
12. Alternatives to dissections are encouraged. No cat dissections are allowed at any level.

13. Disposable petri dishes and commercially prepared media should be utilized whenever possible to minimize contamination. Dishwashers are not a substitute for sterilization techniques!!
14. Lab tables should be wiped with a strong soap or a 10% bleach solution after microbiology exercises involving the transfer or use of bacterial cultures.
15. Only use science kits that have clearly labeled chemicals that are approved for use in the schools.
16. The use of formaldehyde or formalin as a preservative for live or dead animals is prohibited in Broward County Schools.
17. Know and follow the district plant, animal and dissection policies.
18. Be especially careful when handling soil or water samples that might be contaminated by sewage or chemicals.
19. Never do experiments utilizing human blood or other body fluids and tissues.
20. Hypodermic needles are not permitted in the schools.
21. Testing with PTC (phenylthiocarbamide or phenyl-thiourea) taste paper is not permissible. PTC is a rodenticide and extremely toxic. It has not been approved by the Federal Drug Administration (FDA) for human consumption.
22. Extreme care should be exercised when using an aquarium with electrically operated pumps or lights.
23. Never order animals preserved in 100% formaldehyde or formalin. These chemicals cause respiratory and skin irritation and are suspected carcinogens. Order dry-packed (formaldehyde removed) specimens, alcohol packed specimens or specimens preserved in glycerin only. Use caution when working with dry-packed specimens as they retain <4% formaldehyde. Please reference the specimen MSDS for preservation details and information.
24. Latex gloves are no longer utilized in the public school environment due to latex allergies. Utilize a "latex free" alternative.
25. Have a safety contract on file for each student prior to any laboratory activity.

E. Physics/ Physical Science/Integrated Science

The misuse of projectiles, rotating devices and electrical equipment is representative of the common concerns teachers can anticipate in physics classes. The following practices should be observed.

1. Power supplies should have an on/off switch and be properly grounded.
2. It is advisable to wear rubber-soled shoes when working with electrical equipment to prevent electrical shock.
3. Projectile apparatus should never be aimed at another student. They can cause serious injuries.
4. All electrical equipment should be examined periodically for frayed power cords and, if necessary, corrected in order to prevent shocking.
5. Caution should be exercised when thermometers are utilized since they break easily. They are not to be used as stirring rods. Organic solvent thermometers (alcohol) are the only thermometers allowed in Broward County Schools. The use of mercury thermometers is prohibited.
6. Laboratory aprons and goggles should be worn by all participants prior to heating any liquid to prevent splashing on clothes and into eyes.

7. Make sure hands and feet are dry before experimenting with electricity, otherwise a shock may occur.
8. Do not heat batteries directly in a flame since they are explosive.
9. Do not attempt repairs on any electrical equipment. High voltages may be present and cause severe injuries.
10. Do not use electrical equipment such as mixers or hotplates around flammable solvents.
11. Avoid looking directly into sunlight reflected from lenses or mirrors.
12. Use tongs or insulated gloves when handling dry ice.
13. Use insulated wire only. Discard wire that has worn or damaged insulation.
14. Batteries should be removed from equipment that is not used for long periods of time. Batteries can corrode and damage equipment.
15. Only three pronged outlets should be used for electrical connections.
16. Store electrical equipment properly to prevent short circuits.
17. Students using Van De Graaf generators should stand on a rubber mat to prevent electrical shocks. The voltage is extremely high and could be hazardous if a short circuit occurs.
18. Do not permit students to construct extremely high voltage tesla coils or induction coils for science fair projects.
19. Avoid unnecessary handling of commercially purchased tesla coils. The voltages are high and present a shock possibility.
20. Never touch electricity and a ground such as water or a gas pipe at the same time.
21. Use caution when viewing spectral tubes or other sources of bright light since retinal damage might occur.
22. Never view laser beams directly even with protective goggles since retinal damage is probable.
23. Terminate laser beams in a non-reflective material to prevent the possibility of eye damage from occurring.
24. Never leave an operable laser unattended and accessible since possible eye damage may occur.
25. Never use machinery unless adequately trained and supervised by your teacher.
26. Only Class IIIA lasers rated at 5.0 milliwatts output may be used in the schools.
27. Never use multiple plugs in an outlet because of the possibility of an overload.
28. Do not use excessively long extension cords that may cause a person to trip.
29. Check all lenses and prisms for sharp edges since students are apt to be cut by them.
30. Know and follow the district model rocket policy.
31. Have a safety contract on file for each student prior to any laboratory activity.

F. Chemistry/Integrated Science

1. Use the fume hood when an experiment produces toxic vapors.
2. Always use a suction bulb when pipetting.
3. Observe proper procedure for inserting glass tubing or thermometers into rubber stoppers.
4. Use insulated gloves or tongs to handle dry ice.
5. Grind only compatible chemicals. Some chemicals explode when ground (chlorates).
6. Never pour liquids from large containers directly into graduated cylinders or small-mouthed glassware. Always use a small beaker for transferring liquids.

7. Caution -- be extremely careful when using wooden splints to test for the identity of an unknown gas. The gas may explode and shatter the glassware.
Petri dishes used to display chemicals or cultures, must be taped shut.
8. Use a spatula or scoopula to remove solid chemicals from a reagent bottle. Never return excess chemicals to the reagent bottle.
9. Use appropriate tongs or insulated gloves when handling hot glassware.
10. When heating a substance, angle the mouth of the test tube away from you and other students.
11. Use appropriate techniques for cutting and bending glass tubing.
12. Do not heat flammable liquids directly. Use a water bath on a hot plate when heating any flammable liquid.
13. Slowly add concentrated acids to water while stirring. Never add water directly to concentrated acid!
14. The ammonium dichromate volcano demonstration is forbidden. Ammonium dichromate produces chromium(III) ions that are suspected carcinogens. Do not use magnesium ribbon as the ignition source.
15. Substitute butanone for acetone, whenever possible. Butanone is less flammable and evaporates as quickly.
16. Never use a metal spatula with peroxides. Metals will decompose explosively in peroxides.
17. Cyclic ethers will form explosive peroxides. Limited quantities and short storage periods are strongly advised.
18. Hydrogen sulfide is extremely dangerous. Irritation of skin and eyes with ultimate loss of consciousness is probable with low concentrations. Reactions that generate hydrogen sulfide are permitted only in a properly functioning fume hood.
19. Thioacetamide (TA) is usually used as a substitute for hydrogen sulfide in qualitative analysis experiments. Dilute solutions of this chemical may only be used in an Advanced Placement Chemistry required lab exercise.
20. Ensure proper ventilation during laboratory activities.
21. Be aware of all chemical placements in the room during chemical activities. Concentrated acids and bases should be directly supervised at all times.
22. Be certain that all students know the placement and usage of all safety equipment.
23. Know and follow all state and district safety guidelines.
24. Know and follow all policies for ordering, storage, use and disposal of chemicals.
25. Be aware of chemical allergies and offer alternative experiments or activities for in cases where allergies may be suspect.
26. Know your legal responsibilities and be aware of negligence.
27. Have a safety contract on file for each student prior to any laboratory activity.

G. Marine/Environmental/Botany, Zoology

These courses follow a variety of different guidelines. However, in most cases these types of courses house plants and animals in the classroom. Please follow the plant and animal guidelines carefully.

VII. General Science Safety Checklist

- Have appropriate protective equipment, e.g., American National Standards Institute (ANSI) Z87 or Z87.1 coded goggles, chemicals aprons, non-allergenic gloves, dust masks, eyewash, showers, ABC fire extinguishers, sand buckets and fire blankets.
- Guarantee proper placement of all safety equipment in accessible locations. The general rule is accessibility within 15 seconds or 30 steps from any location in the room.
- Make certain that instructor and students wear adequate protective equipment, including safety goggles and aprons when experiments involving hazardous chemicals or procedures are conducted.
- Notify supervisors immediately of hazardous or potentially hazardous conditions, such as lack of ground-fault interrupters (GFIs) near sinks, inadequate ventilation, or potential hazards, e.g., study halls scheduled in laboratories or tile floors not waxed with non-skid wax.
- Check the fume hood regularly for efficiency and never use the hood as a storage area. Ensure that the hood is vented properly through the roof.
- Use only equipment in good condition and efficient working order.
- Have a goggle sanitation plan for goggles used by multiple classes per day.
- Have separate disposal containers for broken glassware or flammables.
- Discuss and post emergency escape and notification plans/numbers in each room. Clearly mark fire exits, and keep exits unobstructed.
- Have and enforce a safety contract with students and parents.
- Identify medical and allergy problems for each student to foresee potential hazards.
- Model, post and enforce all safety procedures, display safety posters.
- Keep laboratory uncluttered and locked when not in use or when a teacher is present.
- Know district and state policies concerning administering first aid and have an adequately stocked first aid kit accessible at all times.
- Know and follow district and state policies for use of hazardous chemicals live animals, and animal and plant specimens in the classroom/laboratory
- Report all injuries, including animal scratches, bites and allergic reactions, immediately to appropriate supervisors.
- Keep records on safety training and laboratory incidents.
- Provide accessible lab stations having sufficient workspace for each student, including low table access for wheel chair access.
- Have master cut-off switches/valves within each laboratory. Know how to use them, and keep water, gas and electricity turned off when not in use.
- Maintain up-to-date chemical and equipment inventories, including Material Safety Data Sheet (MSDS) files.
- Label equipment and chemicals adequately with respect to hazards and other needed information.
- Post the National Fire Protection Association (NFPA) diamond at all chemical storeroom entrances denoting the most hazardous chemical in each category within. Regularly send an updated copy of the inventory to the district office and local fire department.

- Organize chemicals by National Institute for Occupation Safety and Health (NIOSH)/ Occupational Safety and Health Administration (OSHA) compatibility classes, with special storage available for oxidizers, non-flammable compressed gases, acids, and flammables.
- Store chemicals in appropriate places, e.g., below eye level, large containers no higher than 2 feet above floor, acids in corrosives cabinets, and solvents in approved flammables cabinets-with acids physically separated from bases and oxidizers physically separated from organics within secure, limited access, adequately ventilated store rooms. Chemical shelving should be wooden, with a front lip and without metal supports.
- Provide in a readily accessible location appropriate materials and procedures for clean-up of hazardous spills and accidents, e.g., vermiculite and baking soda for acids, and 10% Clorox bleach solution or 5% Lysol solution for body fluids, and appropriate procedures for disposal of hazardous materials.
- Prohibit the use of pathogens or any procedures or materials in any school laboratory above Biosafety level 1 as outlined by Centers for Disease Control/National Institutes of Health Protocols.
- Keep live animals and students adequately protected from one another.
- Provide this safety manual to all science instructors/administrators and staff. Review it regularly to assure safety standards.

VIII. Prohibited Practices

The following procedures are prohibited in Broward County Schools.

1. Draw or analyze human blood, urine or other body fluids, because of the possibility of AIDS.
2. Scrape cheek cells for microscopic analysis because of the possibility of infection or AIDS.
3. Heat glassware that is not labeled Kimax or Pyrex since it may shatter.
4. Handle, inhale, or use equipment containing mercury in the school since mercury poisoning may occur even with low level contamination.
5. Use alcohol burners or propane tanks because of their high flammability. Gas burners and hot plates are the only allowed sources of heat.
6. Use PTC (phenylthiocarbamide) taste paper because it is a rodenticide and not approved by the Federal Drug Administration (FDA) for human consumption.
7. Order animals preserved in 100% formaldehyde or formalin. These chemicals cause respiratory and skin irritation and are suspected carcinogens. Order dry-packed (formaldehyde removed) specimens, alcohol packed specimens or specimens preserved in glycerin only. Use caution when working with dry-packed specimens as they retain <4% formaldehyde. Please reference the specimen MSDS for preservation details and information.
8. Place living specimens in formalin or formaldehyde.
9. Allow reptiles or amphibians in the classroom (without proper veterinary documentation) since they may carry Salmonella, a dangerous bacterium.
10. Look directly at burning magnesium metal since the bright light may damage the eyes.
11. Purchase or use hypodermic needles.
12. Demonstrate the thermite reaction since the heat produced is difficult to control and using magnesium is hazardous.
13. Stare directly into a laser beam because of the possible retinal damage that might occur.
14. Conduct any type of dissection in grades K-5.
15. Store a microwave oven in the science classroom.
16. Latex gloves are no longer utilized in the public school environment due to latex allergies. Utilize a "latex free" alternative.

IX. Laws, Regulations, Guidelines and Policies for the Science Classroom

A. Model Rocketry

Model rocketry provides an amazingly effective means of teaching the basic principles of physics and aerodynamics. Students are motivated to learn through the hands-on experience of building and launching their own rockets.

Scientific concepts such as inertia, momentum, acceleration, applied forces, center of gravity, center of pressure, stability, and aerodynamics of flying objects are successfully taught, applied and reinforced through rocketry.

1. Model rockets may only be constructed from lightweight materials such as wood, paper, plastic, or without any metal used as structural parts.
2. Model rockets must be between ten to fifteen inches in height and must not weigh more than 1500 grams at lift-off. Engines may not contain more than 62.5g (as regulated by CFR.55.141) of propellant. The manufacturer must recommend model rocket engines for that rocket. Rocket engines must comply with the manufacturer's recommended maximum lift-off weight.
3. Only pre-loaded, factory-made, National Association of Rocketry (NAR) certified model rocket engines will be used in accordance with manufacturer recommendations. Rocket engines may not be dismantled or reloaded.

The 101.25 Federal Aviation Association (FAA) regulation requiring schools to notify FAA concerning model rocket launches does not apply to model rockets which conform to the above listed specifications.

4. The following launch specifications are required for all school based model rockets:
 - Launch systems must be remotely controlled from a safe distance and electrically operated.
 - Launch systems must contain a launching switch that will return to the off position when released.
 - Launch systems must have a removable safety lock or removable key.
 - All persons must remain at least 30 feet away from any model rocket when igniting engines.
 - Only electrical igniters may be used. These must ignite the rocket engine within one second of actuation of the launching switch.
5. Model rockets may not carry live animals or payloads that are intended to be flammable or explosive.
6. Rockets must be launched outdoors in a cleared area, free of trees, power lines and buildings.

7. The following launch safety specifications must be met for all school based model rockets:

- Rockets must be launched from a rod or other device that provides rigid guidance until the rocket has reached a speed adequate to ensure a safe flight path.
- To prevent accidental eye injury, the launch rod must be above eye level or be capped when approached.
- The launch rod must be capped when disassembled and never stored in an upright position.
- The launch device must have a jet deflector to prevent the engine exhaust from hitting the ground directly.
- The area around the launch device must be cleared of brown grass, dry weeds and other easy to burn materials.
- An ABC type fire extinguisher must be within close proximity to the launch site.
- All launches must be supervised by an SBBC employee/teacher.

8. No one may approach a model rocket on a launcher until the safety has been removed or the battery has been disconnected. If a misfire occurs, one full minute should be allotted before approaching the launcher.

9. No model rocket may be launched within five miles of the boundary of any airport, or within 1500 feet of any person or property that is not associated with the school board.

10. Model rockets must not be launched so their flight path will carry them against targets. The launch device must be pointed within 30 degrees of vertical. Model rocket engines must never be used to propel any device horizontally.

11. A recovery system must be used in model rockets that will return them safely to the ground so that they may be flown again. Only flame-resistant recovery wadding should be used in the recovery system. No attempt should be made to recover rockets entangled in power lines.

12. A maximum of 1,500 grams of propellant may be stored within the school storage facility. All rocket propellants must be stored in the flammable storage cabinet within the chemical storage rooms. Rocket engines may not be stored in the classroom.

B. Animals in the Classroom

Some animals are allowed in the science classroom. However, all animals represent a high level of safety concern since their behavior is often unpredictable. Additionally, many animals carry pathogens or allergens that may impact the student population. These considerations must be addressed prior to any animal being placed in the student area. For this reason, both parent and principal permission are required before an animal may be placed in the classroom.

All animals must be tied directly to the curriculum. For example, fish in a marine science lab have a direct connection to the content. Students will participate in the development and maintenance of the aquarium, and the content is enhanced by the placement of these tanks in the classroom. However, a hamster in a physical science class has no direct instructional relationship and is not appropriate for this classroom. In the elementary setting, these same guidelines apply. A hamster in an elementary classroom is only appropriate if instruction is enhanced by its placement in the classroom. Students can learn a great deal about animal behavior, nourishment, life patterns, and environmental considerations by observing animals.

Due to the threat of *Salmonella*, all reptiles and amphibians are forbidden in the Broward County Schools, UNLESS a veterinary certificate is on file declaring these animals safe and pathogen free. Snakes, turtles and iguanas all require a veterinary certificate prior to their placement in a student area. Increasing evidence suggests that amphibians also are a source for *Salmonellosis*. Frogs and toads are frequent carriers of *Salmonella* and have been linked by epidemiological evidence to outbreaks. As such, veterinary certificates are required for these animals as well. Stray animals (birds, frogs, turtles, snakes, etc.) are forbidden unless proper veterinary documentation is obtained.

Additionally, Pets are NEVER to be brought in to school (for show-and-tell or any reason). These are not controlled situations and open students to dangerous animal interactions. Students found bringing a pet to school must be sent home with their animal. These animals are not allowed in the school.

If you wish to provide animal access to your students, you must meet these 5 requirements:

1. Parent permission is obtained for all students who may come in contact with, or be in the same location as the animal(s).
2. Curriculum is tied directly to the animal(s).
3. Principal permission is obtained. The principal has the right to deny animal placement in any classroom.
4. Safety contracts are on file for each student, and student/animal interaction is addressed in each safety contract.
5. Animals are healthy and those animals that may carry pathogens have been declared pathogen free by a veterinary examination.

C. Animal Care and Handling:

The care and well-being of animals studied in the classroom should be of major importance to the science teacher and student. The science teacher is ultimately responsible for all animals kept in the classroom. Students may participate in maintaining a schedule for feeding animals, cleaning their cages, supplying water, and maintaining appropriate temperature. The teacher must supervise all student involvement. PARENT PERMISSION IS REQUIRED.

Before using animals, teachers establish guidelines to avoid any intentional or unintentional abuse, mistreatment, or neglect of animals and to promote humane care and proper animal husbandry practices. Whenever animals are to be used in science activities with students, it is imperative that care be exercised to protect both the animals and the students. If animals are to be kept at any time in the room in cages, be certain that adequately sized and clean cages are provided to all animals. Keep cages locked and in safe, comfortable settings.

Animals can stimulate and enhance learning and should be used safely in the laboratory/classroom. Because increased activity and sudden movements can make animals feel threatened, ALL student contact with animals should be highly organized and supervised. Teachers should keep the following precautions in mind to ensure an enjoyable and comfortable experience for their students.

Utilize the following policy guidelines for proper selection, care, handling and use of animals in the laboratory:

1. Inquire beforehand about student allergies associated with animals. PARENT PERMISSION IS REQUIRED.
2. Animals must be hardy and able to thrive in captivity.
3. Animals must have natural habitats that can be easily replicated.
4. Incompatible animals may never be housed in the same cage.
5. Animal quarters must be kept clean, protected from the elements, and have enough space for normal activity.
6. The quantity and type of food must meet the animal's nutritional requirements.
7. Temperature, lighting and other environmental features must be appropriate for the type of animal being housed.
8. Precautions must be taken to prevent unauthorized students from harassing or injuring the animal or themselves.
9. Careful monitoring of the animal's health is required and a licensed veterinarian, if it becomes necessary, must carry out euthanasia.

10. Students must be thoroughly instructed in the care and handling of animals before access to any animal is permitted. Safety contracts must outline these instructions.
11. Students must wear heavy cotton work gloves when handling animals that may bite and students must wash their hands after handling animals.
12. Never allow students to tease animals or touch animals to their mouths.
13. Animals must be handled in the manner and extent indigenous to the species.
14. Students must report all bites or scratches to the teacher.
15. Provisions must be made for animal care over weekends and holidays.
16. After the study of animals is completed, they should be returned unharmed to their natural environment.
17. Reptiles and Amphibians (Turtles, iguanas, frogs, etc.) are prohibited due to Salmonella poisoning.
18. Wounded or stray animals must not be brought to the school.
19. Have a veterinarian evaluate all animals that die unexpectedly.
20. Snakes that feed on other animals must not be fed in the presence of children.
21. Hatching chicken, duck or other fowl eggs in the classroom is prohibited. Children may handle only cooked eggs that have been boiled for three minutes. When eggs are needed in a recipe, teachers will break the eggs. Children may not eat products that contain uncooked eggs.
22. Never dispose of fecal matter in sinks or with commonly used equipment.
23. Fish tanks must be constructed of a shatterproof/tempered glass. Plate glass tanks may not be used as fish tanks.
24. Fish tanks must not be placed in locations that compromise electrical safety. Filters, hoses and water outlets must not be located near electrical outlets unless the outlet is rated Ground Fault Interrupt (GFI). The OSHA standard suggests keeping all water/tanks at a distance of 3 feet or more from a non-GFI electrical outlet.
25. Poisonous fish, insects or animals are all forbidden, and aggressive carnivorous fish (Piranha, Oscar, etc.) are forbidden.
26. The principal of a school has the right to add additional restrictions and provisions for animal care and handling

D. School Board of Broward County Animal-Organization Screening Guidelines For Requests to use Animals in Educational Presentations

From time to time, an organization that uses animals as part of its ongoing operations, such as K-9 units of local police departments, will be asked to visit classrooms. These presentations are possible as long as the presenter and the school follow some basic health and safety procedures.

1. Liability Coverage:

We ask private companies to provide a Certificate of Insurance for \$1 million, naming the School Board of Broward County as an additional insured party. The certificate should either state the specific date for the presentation, or if the organization intends to visit several schools, a description of the period of time; such as “various Broward County Public Schools during the 1997-98 School Year.”

2. A Veterinary Certificate of Health:

We ask that the owner/handler of the animal have a current vet’s certificate on hand. The certificate should indicate current shots and license have been secured.

3. Controlled Environment:

This is perhaps the most important element in the presence of animals in a classroom. For many animals being in a large group setting can be rather intimidating. Many animals will become passive and can easily be handled. However, some animals may feel threatened and try to strike out to protect themselves, or their owners.

E. Animal Dissection

This policy is in accordance with the National Science Teachers Association, 2000.

6-12: Teachers using dissection as a method of instruction should be able to state sound educational goals and objectives for the dissection. Appropriate pre-dissection discussion and instruction, dissection directions and guidance, and post dissection activities should be planned and implemented for each lab. Teachers should be prepared to discuss the structural significance of the species being studied in relation to humans and other organisms. As with all instruction, the use of animal dissection in the curriculum should be well-planned and educationally sound. **IN ALL CASES, ALTERNATIVES TO DISSECTION ARE STRONGLY ENCOURAGED.**

Guidelines for animal dissection in Broward County Schools:

1. No animal dissections of any kind will be done in grades K-5.
2. Consistent with the intent of F. S. 232.45 safety goggles must be worn by all students involved in dissection.
3. Vinyl, polyethylene, or polyvinyl disposable gloves will be used during dissection.
4. Only invertebrate dissection is allowed in the middle school 6-8. The specimen's taxonomic order and cost should be commensurate with the level, nature, and performance standards of the course.
5. In high school, 9-12, the specimen's taxonomic order and cost should be commensurate with the level, nature, and performance standards of the course. No turtles, birds, bats, dogs, rabbits, cats, or minks are allowed. Cat dissections are forbidden. Vertebrate dissections will only be allowed for honors level science courses (where appropriate in the curriculum) including Honors Anatomy and Physiology, and Honors Marine Science courses.
6. Do not order animals preserved in 100% formaldehyde or formalin. These chemicals cause respiratory and skin irritation and are suspected carcinogens. Order dry-packed (formaldehyde removed) specimens, alcohol packed specimens or specimens preserved in glycerin only. Use caution when working with dry-packed specimens as they retain <4% formaldehyde. Please reference the specimen MSDS for preservation details and information.
7. All used dissection specimens will be wrapped in strong plastic bags and placed in a waste receptacle for disposal.
8. Only preserved specimens obtained from an approved commercial vendor may be used for dissection. Purchasing animals (chicken, fish, squid, etc.) or animal parts (hearts, eyeballs, etc.) from a grocery store for the purpose of dissection is prohibited.
9. Alternative instructional activities will be provided at all levels for those students who refuse or are unable to participate in dissection labs, as per Florida Statute 233.0674.

10. Dissections at all levels are to be done as a group activity or a teacher demonstration. This practice will minimize the number of specimens needed, reduce cost, and promote cooperative learning.

F. Plants in the Classroom

While plants produce the oxygen necessary for animal life, provide us with food, and beautify our surroundings, some produce very toxic substances. Teachers should familiarize themselves thoroughly with any plants they plan to use in the classroom.

It is important to realize that plants may carry allergens and are, in some cases, poisonous. For this reason, parent permission is required prior to plants being placed in the classroom. Parents must always be aware of the types of plants or animals their children may come in contact with throughout their educational day. In all cases, poisonous plants are forbidden.

Utilize the following policy guidelines for proper selection, care, handling and use of plants in the laboratory:

1. Inquire beforehand about student allergies associated with plants. Parent permission is required.
2. Never use poisonous or allergy-causing plants in the classroom.
3. Never burn plants that might contain allergy-causing oils, e.g., poison ivy or peanuts.
4. Make a clear distinction between edible and non-edible plants.
5. Never allow plants to be tasted.
6. Have students use gloves while handling plants and wash hands afterwards.
7. Alcohol should be substituted for chloroform in chlorophyll extractions.

G. Teaching Evolution:

Placed in its most elemental terms, creationism is a religious doctrine relating to the origin of the universe and mankind and is premised upon the literal interpretation of the Bible and the book of Genesis. Creation science does not qualify as scientific theory (McLean v. Arkansas Board of Education, 1982). Evolution is a theory that describes change over time, and is not a form of religion (Epperson v. Arkansas, 1968).

Under applicable law, there can be no school board policy that would single out a particular religious doctrine to be either included or excluded in the classroom (Lemon v. Kurtzman, 1971). Teaching and learning must not be tailored to the principles of any religious sect or dogma. Since Creationism is a religious idea, to mandate or advocate it in the public schools would be unconstitutional (Edward v. Aguillard, 1987).

The aim of the School District is to provide curriculum to public school children in a manner that neither advances nor inhibits religion or free speech (Lemon v. Kurtzman, 1971). The law does not preclude education on the role religion has played in our history. The law protects against religious indoctrination and against religious instruction, and not against an analytical, comparative or historical study of religion for genuinely educational purposes. Should a pupil raise a question regarding a religious doctrine, or such a doctrine be mentioned by the instructor, it is the instructor's role to stay within the approved course curriculum and not aid one religion, aid all religions, or prefer one religion over another (Everson v. Board of Education, 1947). An appropriate treatment of the situation may be to place the religious doctrine within a historical perspective within the framework of the course curriculum. It is important to realize that scientific theories, including evolution, do not answer all questions, but do address many.

H. Teaching Family Life/ Human Sexuality:

Family Life/Human Sexuality concepts are mainly biological but are also intensely personal and emotional. It is necessary for teachers to distinguish between their own personal feelings, beliefs and values and their professional position in teaching this subject matter. The primary objective of this program is to enhance positive aspects of family living and encourage students to make healthy decisions.

- School Board policy #6000.1 requires teachers who teach the Family Life/Human Sexuality and/or HIV/AIDS prevention units to participate in staff development (once every 3 years). Teachers assigned to teach these units who have not yet been trained, should contact Health Education Services at (754) 321-2273 for a training schedule. Online courses are available.
- Permission letters must be sent to parent/guardian prior to instruction.
- Parents/guardians may preview materials being used.
- Students returning a signed statement of exemption from their parent(s)/guardian for this unit will receive unrelated alternative assignments.
- Follow the SBBC curriculum. Teach only material which is specifically described in the unit for each specific grade level or a lower grade level.
- Invite only approved speakers. Check with Health Education Services office at (754) 321-2273.
- ALL MATERIALS (audiovisual and printed) MUST BE PRE-APPROVED BY A COUNTY-LEVEL CLEARINGHOUSE COMMITTEE. If you have a question or concern, please call Health Education Services at (754) 321-2273.
- Requests from community agencies and organizations for presentations in the schools must be reviewed by District Level Screening Committee. Please check with your principal.
- The Broward County Health Department (BCHD), Health Education Department provides approved programs and speakers for this unit. Please call BCHD at (954) 467-4807 for further information.

I. Teaching HIV/AIDS

Florida Statutes:

233.672 Health Education; Instruction in Acquired Immune Deficiency Syndrome.

- (1) Each district school board may provide instruction in acquired immune deficiency syndrome education as a specific area of health education. Such instruction may include, but not be limited to, the known modes of transmission, signs and symptoms, risk factors associated with acquired immune deficiency syndrome and means used to control the spread of acquired immune deficiency syndrome. The instruction shall be appropriate for the grade and age of the student and shall reflect current theory, knowledge, and practice regarding acquired immune deficiency syndrome and its prevention.
- (2) Throughout instruction in acquired immune deficiency syndrome, sexually transmitted diseases, or health education, when such instruction and course material contains instruction in human sexuality, a school shall:
 - (a) Teach abstinence from sexual activity outside of marriage as the expected standard for all school-age children while teaching the benefits of monogamous heterosexual marriage.
 - (b) Emphasize that abstinence from sexual activity is a certain way to avoid out-of-wedlock pregnancy, sexually transmitted diseases, including acquired immune deficiency syndrome, and other associated health problems.
 - (c) Teach that each student has the power to control personal behavior and encourage students to base actions on reasoning, self-esteem, and respect for others.
 - (d) Provide instruction and material that is appropriate for the grade and age of the student.

233.67 Comprehensive Health Education and Substance Abuse Prevention.

- (10) Student Exemption – any child whose parent presents to the school principal a signed statement that the teaching of disease and its symptoms, development, and treatment, and the use of instructional aids and material of such subjects, conflicts with his religious beliefs shall be exempt from such instruction. No child so exempt shall be penalized by reason of such exemption.

School Board of Broward County Safety, Policies and Procedures in Science Handbook
Instructional Procedures and Guidelines for the teaching of HIV/AIDS:

- Family Life/Human Sexuality Unit must be taught prior to implementing the HIV curriculum.
- Permission letters must be sent to parent/guardian prior to instruction.
- Parents/guardians may preview materials being used.
- Students returning a signed statement of exemption from their parent(s)/guardian for this unit will receive unrelated alternative assignments.
- Follow the SBBC Curriculum. Teach only material that is specifically described in the SBBC curriculum for this grade level or a lower grade level.
- Invite only approved speakers. Check with Health Education Services office at (754) 321-2273 for resources.
- **ALL MATERIALS (audiovisual and printed) MUST BE PRE-APPROVED BY A COUNTY LEVEL CLEARINGHOUSE COMMITTEE.** If you have a question or concern, please call Health Education Services.
- Requests from community agencies and organizations for presentations in the schools must be reviewed by District Level Screening Committee. Please check with your principal.
- The Broward County Health Department (BCHD), Health Education Department provides approved programs and speakers for this unit. Please call BCHD at (954) 467-4807 for further information.
- Proper terminology must be used at all times.
- Respect students' privacy. Do not ask students to disclose any information about their personal behavior. Teachers will not disclose any information about their personal behavior.
- No one is to ridicule anyone for asking a question.
- Use "I" statements. Allow students to speak for themselves.
- An anonymous question box will provide a way for students to ask questions or express feelings and concerns without fear of embarrassment. This instructional strategy is important in establishing a safe, trusting environment.

School Board of Broward County Safety, Policies and Procedures in Science Handbook

- Provide only factual information using a non-judgmental approach. Topics such as premarital sexual intercourse, masturbation, homosexuality, and adultery all have social, psychological, biological and religious implications. Issues requiring further discussion should be continued in the home at the discretion of the parents.
- Stress that abstinence is the only 100% sure way to avoid contracting HIV and other sexually transmitted diseases.

X. Field Trip Safety Considerations

In many science curriculum areas, field trips play an important part in enhancing or augmenting textbook information. The science teacher should be aware of possible safety hazards and precautions to be taken when taking students on a field trip. The following list emphasizes several pre-field trip considerations:

1. Have parent consent slips and field trip forms signed.
2. Keep all students under your direct supervision at all times.
3. If plants are to be encountered, ascertain if any student is allergic to a particular type of species.
4. If the possibility of insect bites is likely, determine if any may be allergic.
5. Determine if any student is limited in his/her physical activity and make appropriate preparations.
6. If the field trip involves outdoor exploration, indicate appropriate clothing, sun protection, foul weather gear, and insect protection.
7. Insure that adequate numbers of male and female chaperones are present.
8. Carry a first aid kit.
9. Bring appropriate safety equipment for hazardous procedures (i.e. goggles for chipping rocks).
10. Warn students about eating wild fruits or drinking water from lakes or ponds.
11. Warn students about putting their hands into any unexposed areas; that is, under bushes, in holes, under rocks or logs.
12. Travel the route in advance and examine the site to insure adequate time for the activity.
13. Advise students about appropriate behavior on buses and at the site.
14. Instruct students to report to a designated emergency location if any difficulty arises.
15. Establish a buddy system so that students are never alone.
16. Take attendance periodically.
17. Wear gloves while handling any field specimens.
18. Remind students to report any accident or mishap to the teacher immediately; check students for unreported injuries.
19. Never enter any caves or caverns unless accompanied by an experienced guide.

**** See your Department Head for a list of currently approved “water related” field trips.**

Appendix A: Water Related Field Trip Criteria

PROCEDURES FOR NEW WATER-RELATED FIELD TRIPS

1. The principal or designee is to complete the Water-Related Field Trip Information Form, which can be obtained from Risk Management, the Area Office or Science Supervisors office, and provide the information listed below:
 - a. Certificate of Insurance naming the School Board as an Additional Inured for not less than \$1,000,000.
 - b. Life Guard Certificate (at least one certified instructor per trip)
 - c. Red Cross/CPR certificate for all instructors.
 - d. Commercial License and Boating Certificate from Coast Guard.
2. After completing procedure #1, all information must be approved by the principal and sent to the Area Office for review and approval.
3. Upon approval by the Area Office, the information must be forwarded to the Science Curriculum Department for curriculum approval.
4. After curriculum approval, the information is then sent to the Risk Management Department for insurance verification and final approval.
5. After completing insurance verification, the Risk Management & Safety Department will then duplicate and distribute to the Area Offices, so that the information can be inserted into the water-related field trip binders.

**** See your Department Head for a list of current approved “water related” field trip locations.**

*Note: Broward County teachers are not authorized to sign any release liability forms for outside vendors used by your organization .

Appendix B: The Florida State Department of Education Guidelines

Science Laboratory Safety

Support Information
Division of Public Schools
Bureau of Curriculum, Instruction and Assessment
Curriculum Support Section

For additional information: Florida Department of Education, 325 West Gaines Street, Suite 444, Tallahassee, Florida 32399-0400, 800/471-8276

This paper is a part of an ongoing effort to maintain a safe and engaging science learning environment of Florida students. It will help educators and students identify and examine science classrooms and chemical storage areas and make them as safe as possible. The guiding principles are the State Board Rules, Florida Law, and Criteria established by members of the Florida Association of Science Supervisors. Each school should conduct a self-directed initiative to ensure that all of these guiding principles are followed. This will enable the science teacher to work knowing that they have taken due care.

All middle and high schools science teachers need to know the rules that govern them as they work to offer safe, profitable learning experiences for their students. The grid sheets on page x and y should be completed for each room where science activities take place. Individual classrooms and storage area numbers should be recorded across the top of the page. Place a check in the box for compliance and a zero for noncompliance.

The specific citations from Florida Law, State Board Rule, and other Criteria are identified here. Below each citation of law, rule, or criteria are the definitions in italics to aid in interpretation of the citation.

Florida Law

http://www.leg.state.fl.us/citizen/documents/statutes/StatuteBrowser99/index.cfm?mode=Display_Statute&Search_String=&URL=Ch0232/SEC45.HTM

232.45 Eye-protective devices required in certain chemical laboratory courses.--

(1) Eye-protective devices shall be worn by students, teachers and visitors in courses including, but not limited to, chemistry, physics, or chemical-physical laboratories, at any time at which the individual is engaged in or observing an activity or the use of hazardous substances likely to cause injury to the eyes.

Activity or the use of hazardous substances likely to cause injury to the eye includes:

- (a) Heat treatment; tempering or kiln firing of any metal or other materials;
- (b) Working with caustic or explosive materials;
- (c) Working with hot liquids or solids, including chemicals which are flammable, caustic, toxic, or irritating.

(2) School boards shall furnish plano safety glasses or devices for students, may provide such glasses to teachers, and shall furnish such equipment for all visitors to such classrooms or laboratories, or may purchase such plano safety glasses or devices in large quantities and sell them at cost to students and teachers, but shall not purchase, furnish, or dispense prescription glasses or lenses.

(Eye-protective devices including goggles or face shields shall be present and shall meet the standards of the American National Standards Institute for academic grade eye and face protection. (Goggles Z87.1/ 1979, Face Shields Z97.1/ 1989) Eye and face protection shall be sanitized on a regular basis. Quantities shall include a minimum of one set for each elementary school, for every two science teachers at the middle/ junior high, and for each science laboratory room at the high school.)

State Board Regulations

<http://www.firn.edu/doe/rules/begin.htm>

Chapter 5.5 Existing Facilities

This section is intended to provide for the safety, comfort, and health of occupants in existing educational, auxiliary, and ancillary facilities under a school board or a community college board of trustees' jurisdiction.

(11) **Equipment:** Equipment meets the following minimum safety, casualty, and sanitation requirements for instructional, health, sanitation, safety, recreational, and operational features, etc., including relocatables, as applicable.

(a) **Fire Extinguishers and Fire Blankets:** Fire extinguishers and fire blankets are provided as follows (Class ABC extinguishers may be used for all types of fires classified as A, B, or C except as modified below):

1. Fire extinguishers and fire blankets are placed in locations which are readily accessible and suitable for the hazard present and are readily visible.

2. Extinguishers and blankets are on hangers or brackets, shelves, or cabinets so that the top of the extinguisher or blanket is five (5) feet or less AFF. [Objects projecting more than four (4) inches from the wall comply with state and federal accessibility requirements.]

5. Class B fire extinguishers of at least 20-B:C capacity are installed in spaces where flammable liquids are stored, such as science labs, auto shops, boiler rooms, duplicating stations, and bulk storage of paints; and extinguishers are located so that the travel distance from any point in the space to an extinguisher is fifty (50) feet or less.

9. Fire extinguishers are readily accessible at all times. (Fire extinguishers may be located inside student-occupied spaces provided they are located adjacent to the primary exit door, the door remains unlocked when the facility is occupied, and a permanently affixed sign, with a red background and white letters reading "FIRE EXTINGUISHER INSIDE" is placed on the outside adjacent to the door.)

10. Fire blankets are located in each laboratory and each shop where a personal fire hazard may exist.

(13) **Special Construction.** The spaces and facilities listed in this section meet the following minimum safety, casualty, and sanitation requirements for special construction, including relocatables, as applicable:

(p) **Laboratories and Shops.** Laboratories and shops comply with the general requirements found elsewhere in this section as well as the special safety provisions found herein.

1. Each laboratory type space, such as chemistry, physics, and home economic labs, and each shop type space, such as automobile, wood working, and welding shops, equipped with unprotected gas cocks, compressed air valves, water service, and electric service, easily accessible to students, has master control valves or switches with permanently attached handles. (Ordinary office machines, non-hazardous machines, and domestic sewing machines are not required to have emergency shut-off.)

(A science laboratory is a facility where science investigations occur and where potentially hazardous chemicals, materials, or conditions may exist.)

a. The master control valves and switches are clearly labeled and located in a non-lockable place accessible at the instructor's station to allow for emergency cut-off of services, and valves completely shut-off with a one-quarter () turn.

b. The master control valves and switches are in addition to the regular main gas supply cut-off, and the main supply cut-off is shut down upon activation of the fire alarm system.

2. Every science room, lab, or shop where students handle materials or chemicals potentially dangerous to human tissue is provided with a dousing shower, floor drain, and eye wash facilities.

(A dousing shower must deliver a large amount of water in a very short period of time, no less than 30 gallons per minute at 30 psi, to reduce flammable/chemical exposure to the body.)

(A floor drain is a grate-covered, plumbed opening in the floor that can evacuate the large amounts of water produced by the operation of a safety shower or eye wash station. The drain shall be located directly below the safety shower and eye wash station.)

(An eye wash facility is a fixture that provides a minimum of 15 minutes of continuous irrigation to both eyes simultaneously. It must be easily activated and drained.)

3. Laboratory and shop spaces, such as the following, are provided with exhaust systems:

a. Chemistry laboratories have a high capacity emergency exhaust system and are provided with a source of positive ventilation and signs providing instructions are permanently installed at the emergency exhaust system fan switch.

(A high capacity emergency exhaust system must be present in chemistry laboratories and shall be capable of the rapid mechanical exhaust of between 6 and 12 room air exchanges per hour. The system must be separate from the fume hood and must possess a source of positive ventilation. The air that is exhausted must not mix with other building air supplies.)

b. Chemistry labs are provided with fume hoods and fume hood supply fans automatically shut down when the emergency exhaust fan is turned on.

(aa) Storage. The areas above or below exit stairs and ramps, whether interior or exterior, are free of any storage rooms or closets and are not used for storage of any kind.

1. General Storage: General storage areas are kept separated from mechanical spaces and are equipped with shelving, racks, bins, or other devices necessary to protect the stored materials, supplies, equipment, and books.

2. Chemical and Hazardous Storage: Chemical and hazardous storage facilities comply with the following:

a. Rooms and/ or cabinets used for the storage, handling, and disposal of chemicals are lockable, vented to the exterior, and have shelves with a one-half () inch lip on the front; and door locks are

operable at all times from the inside of the room, even if key locked from the outside; and rooms are kept at moderate temperatures and well illuminated.

(Room venting: Chemical and biological storage rooms which contain chemicals must be provided with the high capacity exhaust system. Flammable cabinets not located in a properly exhausted storage room may need to be vented. Ventilation shall provide adequate air exchanges in rooms where chemicals or preserved biological specimens are stored at a rate of 6-12 room air changes per hour.)

(Temperatures in rooms where chemicals are stored may not exceed 85 degrees F/29 degrees C.)

b. Buildings and/ or rooms used for the storage, handling, and disposal of flammable, poisonous, or hazardous materials or liquids, and equipment powered by internal combustion engines and their fuels are kept in a safe, secure, and orderly condition at all times and shall comply with all applicable NFPA standards. (Work areas shall be clean and uncluttered with chemicals and equipment properly labeled and stored. A clear aisle at least three feet wide shall be maintained.)

c. Explosion-proof heat detectors, electrical fixtures, switches, and outlets in flammable storage rooms are maintained in an operational condition at all times.

(Explosion Proof Heat Detector: A device which may activate within a specified temperature range and is incapable of causing an explosion during its operation.)

(15) Mechanical: Mechanical systems meet the following minimum safety, casualty, and sanitation requirements for ventilation, building service equipment, plumbing, etc., including relocatables, as applicable:

(a) Ventilation: All occupied rooms and other rooms where odors or contaminants are generated are provided with either natural or mechanical ventilation.

(The ventilation system should provide adequate air changes for science laboratory rooms where biological or chemical investigations are being conducted.)

1. Windows, louvers, or other openings utilized for natural ventilation are maintained in an operable condition at all times.

2. Mechanical ventilation systems are maintained in an operable condition at all times.

(16) Electrical: Electrical systems meet the following minimum safety, casualty, and sanitation requirements for illumination, fire alarms, detector systems, etc., including relocatables, as applicable.

(e) Fire Alarms and Heat/ Smoke Detectors: Fire alarms and heat or smoke detectors are maintained in an operational condition at all times and comply with the following:

13. Explosion-proof detectors are installed in flammable storage rooms.

(f) Power. Electrical wiring and equipment are maintained in a safe and secure condition at all times and comply with the following:

1. Electrical outlets:

a. All outlets are grounded.

b. All convenience outlets installed within two (2) feet [within six (6) feet for new construction under SREF 97] of water supplies, wet locations, toilet rooms and the exterior with direct grade level access have a ground fault circuit interrupt protection device (GFCI). (The ground fault circuit interrupt protection device is not required for grounded receptacles serving only water coolers, if the receptacle is single or covered behind the water cooler enclosure.)

c. Outdoor ground fault interrupter protected outlets are provided for all buildings.

d. Flammable storage rooms are free of electrical receptacles.

e. Extension cords are free of being stapled to any surface or run through or over doors, windows, or walls. They are used only in continuous lengths and without splice or tape. Adapters comply with Underwriters Laboratory (UL) and have over-current protection with a total rating of no more than fifteen (15) amperes.

3. Emergency Shut-Off Switches:

a. Every laboratory space which has electrical receptacles at student work stations has an unobstructed emergency shut-off switch within fifteen (15) feet of the instructor's work station.

B. Monitoring Guide for Chemical Storage

1. All chemical storage areas are secured with lock and key with limited student access.
(All doors or secure partitions to storage areas are provided with exterior keyed locks. Signs prohibiting student access are clearly posted.)
2. All chemical storage areas are well illuminated to avoid chemical mix-ups.
(Illumination in chemical storage areas shall meet or exceed the classroom standards and be sufficient for clear identification of chemicals.)
3. Chemical storage areas are free of cluttered floor space.
(Items stored on the floor shall not impede access to storage items or egress from the storeroom. A clear aisle at least three feet wide shall be maintained.)
4. Chemical storage areas are inventoried at least once each year. The inventory shall include the Chemical Name, Supplier, Date of Purchase of Mix, Concentration, and Amount Available.
5. All chemical storage areas are purged at least once each year.
(There shall be an annual inventory and purge, if needed, of chemicals following accepted disposal guidelines. The inventory and unwanted chemicals are reported and documented to appropriate authorities.)
6. All stored chemical shall be arranged by compatible groups according to recognized storage patterns and not in alphabetical order.
(Chemical shall be stored in compatible groups by reactivity. Chemical storage patterns in storerooms shall follow recognized guidelines.)
7. Stored chemicals must have specific information on the label. Labels shall contain: the Chemical Name, Date Received or Mixed, Chemical Supplier and Concentration.
(Special Note: Stock classroom sets of chemicals and chemicals contained in commercial kits are exempt from this requirement.)
8. Each science laboratory must be prepared to dilute and absorb a large (one gallon) volume chemical spill.
(Where concentrated acids, bases or solvents are used or stored, chemical spill protection shall consist of a commercial spill kit and/or at least 50 pounds of absorbent (cat litter or vermiculite), 25 pounds of neutralizer (sodium bicarbonate) and 50 pounds of containment materials (sand). Appropriate person protection shall also be available. An approved mercury-spill apparatus shall be available if mercury is present.)

9. The following chemicals present a potential for explosion and are not allowed in science laboratories or storage areas:

benzoyl peroxide	carbon disulfide	phosphorus
diisopropyl ether	ethyl ether	potassium chlorate
picric acid	perchloric acid	potassium metal

10. The following chemicals present a danger as a human carcinogen and are not allowed in science laboratories or storage areas:

arsenic compounds	acrylonitrile	asbestos
benzene	bensidine	cadmium compounds
chloroform	chromium compounds	ethylene oxide
nickel powder	ortho-toluidine	

Check List for Chemical Storage

Room Number				
1. Ventilation				
2. Temperature				
3. Heat Detector				
4. Secured				
5. Well Illuminate				
6. Uncluttered Floor				
7. Chemical Inventory				
8. Purged Annually				
9. Chemicals Grouped Correctly				
10. Labels on Chemical Containers				
11. Flammables Cabinet				
12. Spill Protection				
13. No Explosives				
14. No Carcinogens				

Checklist for Science Classrooms

Room Number				
1. Fire Extinguisher				
2. Fire Blanket				
3. Gas Cut-Off (Present and labeled)				
4. Water Cut-Off (Present and labeled)				
5. Electrical Cut-Off(Present and labeled)				
6. Dousing Shower				
7. Floor Drain				
8. Eye Wash Facility				
9. Room Ventilation Adequate				
10. Fume Hood				
11. Grounded Receptacles				
12. Ground Fault Circuit Interrupters Within 2” of Water				
13. No Flammable Storage				
14. Face Protection Meet Standards				
15. Face Protection in Sufficient Numbers				
16. Face Protection Sanitized				

Please use these checklists to insure safety in your classrooms. If you need additional information please look to the following websites:

<http://www.osha.gov>

<http://www.enc.org/csss/safety.htm>

<http://www.practicingsafescience.org>

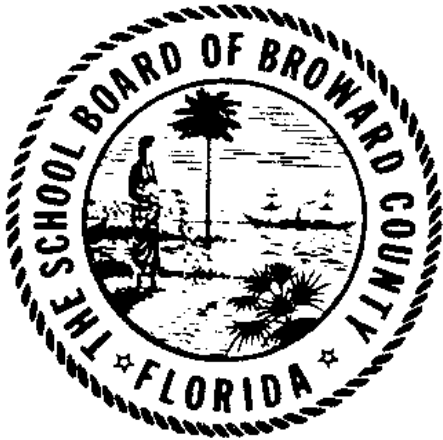
<http://dchas.cehs.siu.edu/>

Appendix C: Broward County Safety Inspection Check-list

Punch list for Safety Inspection items
Science Labs, Classrooms, and Lab Preparation Areas

1. Fire extinguishers
2. Fire blanket
3. Shower working and unblocked
4. Eye wash working and unblocked
5. Goggles (splash-proof board approved) in good order and enough for class usage.
6. Goggle cabinet bulb working
7. Chemicals and materials stored in the proper locations – not in fume hoods or classrooms (not stored alphabetically).
8. Fume hoods in working order
9. Purge fans in working order
10. Chemical storage fans in working order
11. Chemical storage organized and safe lights working, doors locked, floors free of materials, chemicals stored properly.
12. Safety contracts on file for each teacher conducting labs signed by parent and student.
13. Electrical hazards not present – extension cords, overloaded plugs.
14. GFCI outlets near water
15. Gas and water shut-off areas unlocked and accessible by the teacher.
16. Lip on shelves in storage room
17. Hi/low ventilation working properly in the storage room.
18. The classroom is free of sharp/dangerous equipment or obstruction.
19. Ceiling tiles are not painted and are in good condition (not missing, cracked or altered).
20. Exit hallways are free of obstruction (up to 6 feet of clearance).
21. Exits and paths to the exits are clear of any obstructions.
22. Vision panel on doors uncovered.
23. Lights working (no burned out bulbs).
24. No holes in the walls
25. Outlets covered with a face plate.
26. Light switch covered with a face plate.
27. 20% rule met – no artwork paper on walls covering over 20%
28. Furniture in good condition (not damaged or broken)
29. Floor tiles not broken
30. Shut off switches are not blocked (emergency and under teacher's desk).
31. No coffee pots, microwave ovens, or hot plates (unless they are part of an approved curriculum).
32. Spill kit
33. 911 poster mounted
34. Chemical spill procedures

Appendix D: Safety in Science Signature Page



I have read and understood the Broward County Safety in Science Policies and Procedures, and I understand my responsibility as an administrator/ instructor/ facilitator of science.

I understand that all science classrooms must comply with these safety policies and procedures.

I understand that no laboratory activity will be performed without proper facilities and safety instruction.

I understand that I may be held negligent and liable if I do not follow these safety guidelines.

Name (please print) _____

Title (please print) _____

Signature _____ Date _____

To be kept on file with the science administrator, and renewed yearly