Safety Spotlight

Safety in School Laboratories

With an increasing emphasis on hands-on instruction within laboratory settings, it has become more important for science teachers to be as knowledgeable as possible about laboratory safety issues and their own responsibilities. The following sections address common questions and their responses to how teachers can make their science labs safer places for not only their students but also themselves.[1]

What are my responsibilities relating to negligence?[1]

- Duty of instruction – includes adequate instruction before a laboratory activity (preferably in writing) that identifies and clarifies any specific risk involved, explains proper procedures/techniques to be used, and presents comments concerning appropriate/inappropriate conduct in the lab.
- Duty of supervision – includes adequate supervision as defined by professional, legal, and district guidelines to ensure students behave properly in light of any dangers.
- Duty to properly maintain facilities and equipment – includes ensuring a safe environment for students and teachers by never using defective equipment, filing written reports for maintenance/correction of hazardous conditions or defective equipment, establishing regular inspection schedules and procedures for checking safety and first-aid equipment, and following all safety guidelines concerning proper labeling, storage, and disposal of chemicals.

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 them.

What should be included in a general science-safety checklist?[1]

- Have appropriate personal protective equipment (PPE) (*see protective equipment checklist*) in easily accessible locations (general rule is within 15 seconds or 30 steps from any location in the room) and make sure instructors and students utilize it, especially when conducting experiments involving hazardous chemicals.
- Notify supervisors immediately of hazardous or potentially hazardous conditions, such as lack of Ground-Fault Interrupters (GFIs) near sinks or inadequate ventilation.
- 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.
- Only use equipment that is in good condition.
- 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 plans and numbers in each room/lab. Clearly mark fire exits, ad keep exits (preferably two from labs) unobstructed.
- Have and enforce a safety contract with students and parents.

> *"Have appropriate personal protective equipment in easily accessible locations – general rule is 15 seconds or 30 steps away from any location in the room.[1]"*

FLEURY

RISK MANAGEMENT

fleuryrisk.com

[1] *Castillo-Comer, Christina, et al. "Science & Safety: Making the Connection." Council of State Science Supervisors, 2000.*

Safety Spotlight

Safety in School Laboratories

- Identify medical and allergy problems for each student.
- Display safety posters and enforce all safety procedures.
- Keep lab uncluttered and locked when not in use or when a teacher is not present.
- Know district and state policies concerning the administration of first aid and have an adequately stocked first aid kit accessible at all times.
- Know and follow district and state policies for the use of hazardous chemicals, live animals, and animal and plant specimens in the classroom/lab.
- Report all injuries, including animal scratches, bites, and allergic reactions immediately.
- Keep records on safety training and any lab incidents.
- Maintain up-to-date chemical and equipment inventories, including Material Safety Data Sheet (MSDS) files.
- Label equipment and chemicals with respect to hazards. Chemical labels should include: chemical name and/or trade name of the product, date received or date placed in the container, strength of the chemical, precautions to be observed in handling or mixing the chemical, and appropriate hazard symbol NFPA rating.
- 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 update copy of the inventory to the local fire department.
- Organize chemicals storerooms according to NIOSH and 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 OSHA/NFPA approved flammables cabinets – with acids physically separated from organics within secure, limited access, adequately vented storerooms. Chemical shelving should be wooden, with a front lip and without metal supports.
- Provide appropriate materials and procedures for clean-up of hazardous spills and accidents including aspirator or kit for mercury spills, vermiculite and baking soda for acids, and 10% Clorox bleach solution of 5% Lysol solution for body fluids. Also include appropriate procedures for disposal of chemo- and bio-hazardous materials.

What should be included in a chemical hygiene checklist for school science labs?[1]

- Development of a statement that includes clearly defined responsibilities of the superintendent, principles, department chairs, classroom teachers, students, and parents.
- Inclusion of a lab safety program as part of the curriculum and instruction.
- Regular training for all staff on safety policies, record keeping, and other procedures.
- Evaluation of lab facilities and procurement of equipment needed.

> *Maintain up-to-date* chemical and equipment inventories, including Material Safety Data Sheet files.[1]

FLEURY

RISK MANAGEMENT

fleuryrisk.com

Safety Spotlight

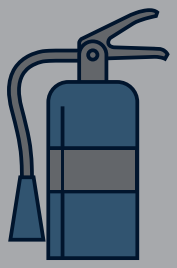
Safety in School Laboratories

- Development and enforcement of a plan for monitoring safety equipment and storage areas.
- Preparation and storage of safety records including chemical inventories, Material Safety Data Sheets (MSDS), accident/incident reports, and hazard notification reports.
- Identification of hazardous chemicals and minimizing exposure to students and teachers through a handwritten or computerized inventory.
- Development of safety policies and procedures for procurement, distribution, storage, and disposal of chemicals using MSDS files.
- Development of a written emergency plan and practiced procedures for spills or accidents involving chemicals.
- Implementation of a plan for posting signs and labels.

What protective equipment should be kept/provided in a lab?[1]

- Master shut-off valves/switches should be located within each lab, preferably in one secure location accessible only to the instructor. Water, gas, and electricity should be shut off when not in use.
- Adequate numbers of tri-class ABC fire extinguishers should be strategically placed within 30 steps/15 seconds of any location in the room. These should be checked and certified as fully charged and in working order at least every six months.
- Multiple faucet-type portable eyewash stations should be strategically placed within 30 steps/15 seconds of any location. Eyewash stations should be forearm or foot-operated for hands-free operation. Flow rate of potable water at 1.5 gallons/minute at pressure below 25 PSI is recommended if a standard eyewash unit is installed.
- Forearm or foot-operated face/body sprayers, with adequate flexible hoses and water pressure within 30 steps/15 seconds of any location. If a standard plumbed safety shower unit is used, it should provide potable water at a flow rate of 30-60 gallons/minute at a pressure of 20-50 PSI.
- An appropriate fume hood, vented through the roof to at least 8 feet above the roof line, with a face velocity of 60-100 feet/minute of air through the roof. The hood should not be within 10 feet of an exit or on a main aisle.
- All electrical outlets within 5 feet of sinks and serving delicate electrical equipment should be fitted with Ground-Fault Interrupters (GFI). Where thunderstorm activity is a regular meteorological phenomenon, it is essential that outlets be equipped with GFI. Outlets should be capped when not in use and placed along walls or counters at intervals of 6-8 feet.
- Retardant-treated wool fire blankets, free of friable asbestos, should be prominently labeled and placed within 30 steps/15 seconds of any location.
- A bucket of dry, organics-free sand should be available for alkali metals fires.

> *Adequate numbers of tri-class ABC fire extinguishers* should be strategically placed within 30 steps/15 seconds of any location in the room.[1]



FLEURY

RISK MANAGEMENT

fleuryrisk.com

Safety Spotlight

Safety in School Laboratories

- American National Standards Institute (ANSI) coded Z87 or Z87.1 approved safety goggles should be provided for each student when there is danger of chemical or projectile hazards. Specially marked, non-vented goggles should be available for contact lens wearers.
- Sanitizing and/or sterilizing equipment or materials (i.e. ultraviolet cabinets or alcohol swabs) should be available and used between classes to clean safety cover goggles.
- Non-absorbent, chemical-resistant aprons should be provided for each student during lab activities where there is a danger of spillage or splattering of chemicals or hot liquids.
- Heavy-gauge metal storage cans with an internal flame arrester (heat sump) should be used for storage and dispensing of flammable chemicals by the teacher only.
- Separate corrosives (primarily for acids) and OSHA/NFPA approved flammables cabinets (primarily for alcohols and solvents) should be secured in the storeroom.
- A container should be provided and clearly marked for the disposal of broken glass.
- Containers of diatomaceous earth should be kept available for general chemical spills. Vinegar and sodium hydrogen carbonate (sodium bicarbonate/baking soda) are needed for neutralization of bases and acids, respectively.
- An adequately stocked first aid kit for teacher use should be easily accessible in an emergency.
- Emergency procedures and telephone numbers should be prominently posted.

> *An adequately stocked first aid kit* for teacher use should be easily accessible in an emergency.[1]

FLEURY

RISK MANAGEMENT

fleuryrisk.com