Chemical safety in the school laboratory

School laboratories can be unsafe for staff and students because of the presence of toxic or flammable chemicals. There can be excessive stocks of chemicals, ones with a greater hazardous nature than educational utility, and chemicals that are outdated, unlabeled, and in nonlaboratory type containers.

Proper management and use of chemicals reduces risks to staff, students, and the environment.

Local associations and science teachers should take an active role in assuring that school districts meet their obligation to provide a good lab chemical safety program for staff and students. They should insist that districts comply with New Jersey Public Employee Occupational Safety and Health (PEOSH) standards on laboratory chemicals, personal protective equipment, eyewashes and showers, and fire extinguishers.

Elements of Lab Chemical Safety

Although successful lab chemical safety programs range in their design, there are some essential pieces, including those listed below.

- **Written chemical hygiene plan**: If multiple chemicals or chemical procedures are used, a written chemical hygiene plan is required by PEOSH standard 1910.1450, *Occupational Exposure to Hazardous Chemicals in Laboratories*. The written plan must be developed and implemented by the district. Such a plan sets forth procedures, equipment, personal protective equipment and work practices to protect staff from the health hazards presented by hazardous chemicals used in laboratories.

  If multiple chemicals or chemical procedures are not required, the PEOSH Hazard Communication standard applies instead.
- **Staff information and training**: Information, including a *Material Safety Data Sheet* (MSDS) and a *Hazardous Substance Fact Sheet (HSFS)*, must be provided for each chemical in use. Science teachers must be provided training on how to detect the presence or release of a hazardous chemical, the physical and health hazards of chemicals in the work area, and the measures they can take to protect themselves from these hazards.
- **Exposure control**: Minimization of chemical inhalation and skin contact is achieved through training in proper working techniques, lab hood ventilation, and personal protective equipment such as gloves, chemical splash goggles, lab coats, and aprons. Any demonstration by the teacher to the class of any experiment that has the potential for an uncontrolled reaction should be shielded. Personal protective equipment for staff is covered by PEOSH standards 1910.132, *Protective Clothing*; 1910.133, *Eye and Face Protection*; and 1910.138, *Gloves*. An emergency eyewash and shower are covered by PEOSH standard 1910.151, *Medical Services and First Aid*.
- **Fire control**: Basic fire control includes providing sand buckets, fire blankets, fire alarms, and fire extinguishers. Portable extinguishers are covered by PEOSH standard 1910.157.
- **Inventory control**: An accurate and complete inventory of every lab chemical, preferably using a computerized spreadsheet, should be taken. The school's 2003 complete *New Jersey Right to Know (RTK) Survey* and 2004-2006 survey updates are a good starting point. The RTK Survey is a comprehensive inventory of all hazardous chemicals on site, including information on the amount stored, location, and special health and safety hazards.
- **Proper storage**: Stored items should be consolidated into a single, well-ventilated, and secure area with cabinets for corrosive and flammable materials. Any shelving should have "lips."
- **Proper labeling**: Label shelving, cabinets, and chemical containers with a color-coded numbering system that will allow containers to be easily returned their proper location, organized by compatible chemical families, not alphabetically.
- **Spill clean-up**: Spill procedures and kits for major categories of hazardous materials should be available so that staff knows what to do if a spill occurs.
- **Green chemistry**: Microscale or green chemistry approaches to laboratory experiments should be adopted. Premixed chemicals in quantities sufficient for use by an individual class can be purchased. Avoid buying "high risk" chemicals or larger quantities of chemicals than needed.
- **Chemical clean-out**: A waste disposal program that includes chemical removal and disposal of unwanted, excess, dangerous, or inappropriate chemicals should be in place.

Assistance for school chemical waste disposal available

The New Jersey Department of Environmental Protection (DEP) offers cost-free site visits and educates school districts on applicable regulations and best management practices for chemical safety, inventory reduction, proper storage, and proper disposal of waste materials.

Local associations should work with their UniServ field representative and district administration when applying for assistance.

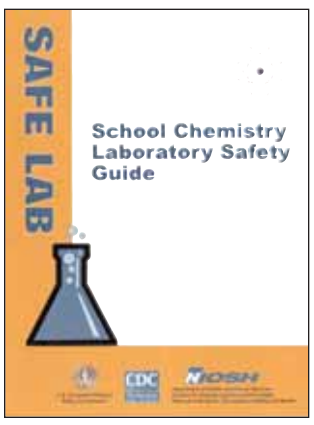
For more information, contact the DEP's Office of Local Environmental Management at 609-292-1305. Information is also located on the web at www.nj.gov/depenforcement/cehacountyinitiative.html

Chemical container labeling

School districts must ensure that products containing chemicals are labeled according to both the PEOSH Hazard Communication standard and the New Jersey Worker and Community Right to Know Act.

- The Hazard Communication label must include:
  - The identity of the product or chemical
  - Appropriate hazard warnings
  - The name and address of the manufacturer or importer
- The Right to Know label must include:
  - The chemical names of the top five ingredients of the product, whether they are hazardous or not
  - The chemical names of any other hazardous chemicals in the product that are not included in the top five ingredients
  - Chemical Abstracts Service (CAS) numbers of the ingredients listed on the label (CAS numbers are unique numerical identifiers for chemical compounds.)

A publication every science teacher should have



School Chemistry Laboratory Safety Guide

www.cdc.gov/niosh/docs/2007-107/pdfs/2007-107.pdf

Two federal agencies issued this 78-page guide in October 2006. It contains practical safety information on the teacher's responsibilities, student dos and don'ts, chemical labeling and storage, suggested shelf storage patterns, substances with greater hazardous nature than educational utility, recommended safety and emergency equipment, compressed gas cylinder handling, and more.

Where to Get More Information

OSHA Laboratories Topic Page
www.osha.gov/SLTC/laboratories/index.html.

Schools Chemical Cleanout Campaign Tool Kit,
U.S. Environmental Protection Agency, 2007
www.epa.gov/epaoswer/osw/conserve/clusters/schools/toolkit.htm
The EPA's web-based tool kit helps schools start chemical management programs that will improve their chemical management practices.

Model Chemical Hygiene Plan, PEOSH, 1994
www.state.nj.us/health/eoh/peoshweb/labstand.pdf
This publication provides an outline for a written chemical hygiene plan.

New Jersey Hazardous Substance Fact Sheets
http://web.doh.state.nj.us/rtkhsfs/IndexFs.aspx?lan=english
The fact sheets give accurate and complete health and safety information on over 1700 specific chemicals. Over 600 are also available in Spanish.

Green Chemistry Experiments
www.state.tn.us/environment/sc3/greenchemistry.shtml
Green Chemistry is in part the practice of using chemicals with less hazardous characteristics. Student and teacher resources are provided.

Greening Schools
www.greeningschools.org/
Greening Schools is a joint project between the Illinois EPA and the Waste Management Research Center.

Rehab the Lab
www.govlink.org/hazwaste/schoolyouth/rehab/
A free service to schools to help schools manage their hazardous chemicals. Download fully scripted lesson plans.