

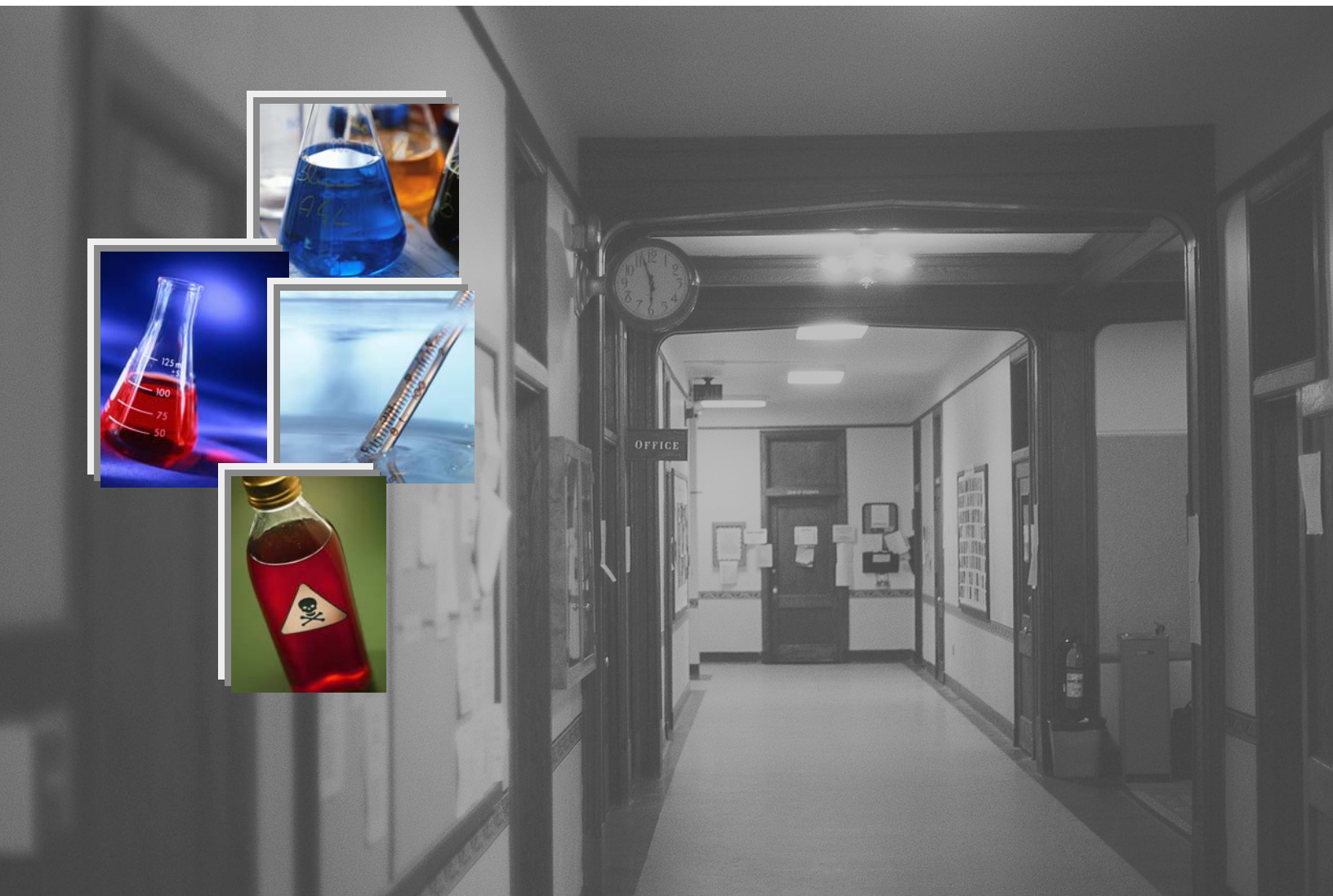


United States
Environmental Protection
Agency

Office of Pollution Prevention
and Toxics
Washington, DC 20460

EPA 747-R-06-002
December 2006

Chemical Management Resource Guide for School Administrators



Acknowledgements

The time and effort that many individuals contributed to the review and development of this document is gratefully acknowledged by the U.S. Environmental Protection Agency (EPA). This document was prepared by Battelle Memorial Institute under contract EP-W-04-021 at the direction of Mr. Clarence Lewis of the EPA Office of Pollution Prevention and Toxics.

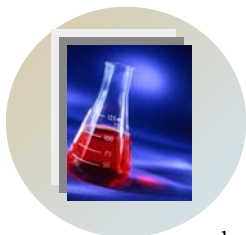
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Summary

“...No one was sure what chemicals were involved in the fire [in the facilities maintenance warehouse at the school]. Pallets of bleach, ammonia and sulfuric acid based drain cleaner had been stored adjacent to each other, and rupturing of the chemicals during the fire created an acid vapor cloud as well as chlorine and phosgene gases. The total cost of this event was about half a million dollars.”

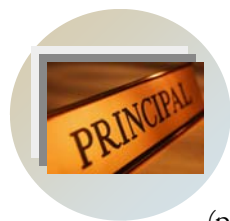
– From a case study of a suburban public high school in New England¹



Are there Dangerous Chemicals in Your School?

The sources of dangerous chemicals in schools are not always obvious. This guidance applies to any school that **purchases, uses, stores, or disposes** of chemicals or products containing dangerous materials. Some of the most common dangerous chemical products in schools include:

- Laboratory chemicals (e.g., acids, bases, solvents, metals, salts)
- Industrial arts or “shop” classes (e.g., inks, degreasers)
- Art supplies (e.g., paints, photographic chemicals)
- Pesticides, fertilizers, and de-icers
- Maintenance supplies and equipment (e.g., drain cleaners, floor stripping products, paints, oils, boiler cleaners, fuels, mercury switches and gauges)
- Health care equipment (e.g., mercury thermometers).



Who Should Read This Guidance?

This document is designed primarily for school administrators (principals and other policymakers), but may also be of value for teachers, maintenance personnel, superintendents, school business officials, insurance industry risk managers, and parents.

What Can Schools Do to Prevent Spills and Costly Incidents of Dangerous Chemicals?



- Establish a leadership team consisting of qualified and experienced individuals to oversee chemical management activities and confirm the availability of budget and resources (**Section III.A**)
- Implement pollution prevention and green chemistry (safer alternatives) principles, whenever possible, to minimize the use of hazardous chemicals at schools (**Section III.B**)
- Establish a chemical management policy and chemical hygiene plan (**Section III.C**)
- Conduct periodic chemical inventories to identify hazards (**Section III.D**)
- Establish an environmentally preferable purchasing policy (**Section III.E**)
- Implement an appropriate chemical storage and handling policy (**Section III.F**)
- Establish a training program for hazardous chemicals management and safety (**Section III.G**)
- Develop a hazard communication plan to foster awareness among school personnel and students about the range of chemicals and products used in schools (**Section III.H**)
- Create an emergency response and spill clean-up plan and ensure that all chemicals are disposed of in accordance with federal, state, and local regulations (**Section III.I**)

Where Can I Get Additional Help?

Each EPA Regional Office shares common chemical management goals; each region has its own contact point to best serve schools in their respective states. For more information on EPA programs for schools, such as EPA's Schools Chemical Cleanout Campaign (SC3), legal requirements that schools may face, and where your school can receive additional help, refer to the following regional contact information and websites in the box below.

Local government entities that may be able to help your school understand and address chemical management issues (e.g., treatment and disposal options) include Local Emergency Planning Committees (LEPCs), local health departments, state environmental departments, and fire departments. For more information about how local organizations can help, visit EPA's SC3 - Businesses and Community Organizations website at <http://www.epa.gov/sc3/>.



Check It Out

EPA Resources for Additional Information

- EPA, Healthy School Environments, <http://www.epa.gov/schools/>
- EPA's Schools Chemical Cleanout Campaign (SC3), <http://www.epa.gov/sc3/>
- EPA, Where You Live, <http://www.epa.gov/epahome/whereyoulive.htm>

What Legal Requirements Do I Have?

Some chemicals purchased by schools may need to be managed as hazardous wastes and may ultimately require disposal as such. Hazardous wastes need to be managed from their initial point of generation until their ultimate point of disposal, known as "cradle to grave." The Resource Conservation and Recovery Act (RCRA) gives EPA the authority to control the generation, transportation, treatment, storage, and disposal of hazardous waste. Any school that generates hazardous wastes must notify their state environmental agency and obtain an EPA Identification (ID) Number. This EPA ID Number must be put on all manifests for tracking disposal of school wastes and must be site specific for the address given. School liability does not end when the wastes leave the school, and school administrators must make sure they receive a copy of the shipping manifest stating that their wastes arrived at their destination (e.g., treatment, storage, or disposal facility). Laws and regulations pertaining to RCRA are available at <http://www.epa.gov/epaoswer/osw/laws-reg.htm>.

EPA's Healthy School Environments Assessment Tool (HealthySEAT) provides information to help determine if a school is subject to Federal OSHA requirements at <http://www.epa.gov/schools/healthyseat/frequentquestions.htm>. Although Federal OSHA does not have jurisdiction over state and local government employees, including those in public schools, the 26 states that operate OSHA-approved State Plans are required to extend their state standards to these workers. A list of OSHA State-Plan states is located at <http://www.cdc.gov/niosh/docs/2004-101/appena.html#oshasps>. Each state's programs are unique and may have additional regulations and requirements. In states under Federal OSHA without State Plans, OSHA has no authority to inspect or enforce standards in public schools; however, the local Federal OSHA office may be able to provide hazard recognition assistance and technical support. Compliance assistance information is available on OSHA's website at <http://www.osha.gov>.

The National Institute for Occupational Safety and Health (NIOSH) provides a comprehensive safety checklist program for schools at <http://www.cdc.gov/niosh/docs/2004-101/default.html>, which contains recommendations and detailed checklists on OSHA regulations, along with background information on how to make sense of regulations that may be applicable to schools (<http://www.cdc.gov/niosh/docs/2004-101/chap1.html>).

In addition, EPA may enforce certain OSHA standards, such as Hazardous Waste Operations (29 CFR 1910.120) or relevant EPA standards in public schools. In addition to Federal requirements, states may have their own laws. Legal requirements are often updated and vary from state to state. In many states, the health and safety of public employees, including teachers and other school staff, fall under the jurisdiction of a state agency, such as the state department of labor or commerce.

Note:
This document is intended to serve as guidance only and does not supersede any federal, state, or local laws and regulations.

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I. Overview

I.A. Introduction

From elementary school maintenance storage closets to high school chemistry laboratories, schools house a variety of chemicals. Many of these chemicals are hazardous and are used daily; however, in some cases, these chemicals have been unused for decades. Ensuring that these chemicals are managed properly will help school administrators to: safeguard the health and safety of students and school employees; avoid disposal expenses and *costly* school closures associated with spills and emergency incidents; maintain a sense of trust between the district and the surrounding community; and prevent damage to the environment. School districts need solid, useful, specific recommendations and information on responsible chemical management to facilitate the establishment of sound district-level policies and procedures.

This document is intended to aid K-12 public school districts and private, religious, and independent schools and school system policymakers in reducing dangerous chemical use and implementing responsible chemical management practices. Institutionalizing such practices will help to minimize the incidence of chemical spills, exposures, and emergency scenarios in schools. This document focuses on broad policy considerations that EPA recommends school administrators consider implementing to properly manage and use all dangerous chemicals. Parents and others in the community interested in school health and safety policies also may use this booklet to determine whether their children's schools are effectively minimizing potential exposure to dangerous chemicals and products.

This document is part of EPA's Healthy School Environments Initiative. The Healthy School Environments website (<http://www.epa.gov/schools/>) serves as a gateway to on-line resources to help school administrators, teachers, facility managers and other staff, and parents address environmental health issues in schools. This document is also an integral part of the EPA Schools Chemical Cleanout Campaign (SC3) toolkit. The goals of the SC3 are to: remove potentially harmful chemicals from schools; emphasize the implementation of preventive programs such as chemical management training for lab instructors and microscale techniques; and raise national awareness of the issue of chemicals in schools. The ultimate goal of the SC3 is to create a chemically safer school environment in which chemicals are purchased wisely, stored safely, handled by trained personnel, used responsibly, and disposed of properly. Finally, this document includes numerous boxes highlighting information on relevant EPA and state information, such as the HealthySEAT tool developed by EPA as a resource to address chemical management among other environmental, safety, and health issues.



EPA has developed a unique software tool to help school districts evaluate and manage all of their environmental, safety, and health issues, including all aspects of their chemical management programs. The Healthy School Environments Assessment Tool (HealthySEAT) can be customized and used, free of charge, by district-level staff to conduct voluntary self-assessments of their facilities and to manage information on environmental conditions within each building.

Source: EPA, HealthySEAT,
<http://www.epa.gov/schools/healthyseat/index.html>

I.B. Organization of this Guide

Section I explains the need for responsible chemical management policies and why school administrators must be concerned about chemical management in their schools.

Section II provides an overview of the various classes of hazardous chemicals and products of concern found in schools, and discusses where these chemicals and products of concern might commonly be found in schools.

Section III presents recommendations for school administrators to develop their own consistent and effective policies, promotes concepts such as pollution prevention and green chemistry, and provides information on best practices for the purchase, identification, tracking, storage, use, and disposal of hazardous chemicals found in elementary and secondary schools.

Section IV discusses special types of chemicals that are of particular concern.

Section V presents conclusions.

The **Appendix** lists specific examples of various “how to” forms, templates, and checklists for establishing policies and procedures that schools may use to facilitate the implementation of EPA’s recommendations.

This document contains numerous references and endnotes to school-focused guidance documents and materials on chemical management, green chemistry, pollution prevention, environmentally preferable purchasing, and school cleanout campaigns initiated in school districts. For example, the Los Angeles Unified School District, one of the largest school districts in the country, along with its home state of California, have been committed to spreading awareness about chemicals in schools, as illustrated below.



The Los Angeles Unified School District (LAUSD) has been particularly active on issues related to chemicals in schools. The LAUSD’s Office of Environmental Health and Safety (OEHS) website contains a wealth of resources for school officials, including a searchable product review tool available on the OEHS Chemical Evaluation Program page (http://www.lausd-oehs.org/productreview_chemeval.asp) and comprehensive information about its Chemical Hygiene Program. The OEHS Chemical Hygiene Program page (<http://www.lausd-oehs.org/chemical-hygiene.asp>) contains links to various handouts and the *Science Safety Handbook for California Public Schools* (<http://www.lausd-oehs.org/docs/Misc/CAScienceSafetyHandbook.pdf>). It also lists chemicals approved by the State of California and OEHS for use in LAUSD school laboratories. These chemicals can be viewed by clicking the “View Approved Laboratory Chemicals” button on the OEHS Chemical Hygiene Program page (listed above).

The State of California has customized EPA’s HealthySEAT software to incorporate California’s regulations and links to other state-specific information, including funding sources. State-customized versions of HealthySEAT make it easier for individual school systems to adapt and use the tool.

I.C. Why You Should Be Concerned

There are five key reasons why school administrators should be concerned about chemical management in their schools:

1 Improper chemical management poses *health and safety risks to students and school employees*. Health, learning, and behavior risks to students are of particular concern, as children are more vulnerable than adults to chemical exposures because their bodily systems are still developing; they eat more, drink more, and breathe more in proportion to their body size; and their behavior can expose them more to chemicals than adults.

2 The *expenses incurred from disposal, spills, and other incidents*, including potential liabilities/lawsuits, can be considerable. The costs of responding to chemical incidents can reach hundreds of thousands of dollars or more at a single school.² In addition to response costs, improper chemical waste management can result in fines and increased insurance premiums.

3 It only takes one chemical incident, such as a spill, explosion, or chemical exposure, to *break the trust with the community*. Reported school

incidents can lead to increased parental and community concern, negative publicity, and embarrassment to the school and school district.

4 Improper chemical management may result in school closures that result in a *loss of valuable education time*.

5 Improper chemical management can lead to unintended chemical discharges and spills, which inflict *damage upon the environment* where students, teachers, staff, and parents live and work. Improper chemical discharges into sanitary sewer lines or on-site waste treatment systems (including septic tanks) can have adverse effects on rivers, streams, and groundwater. Chemical releases and spills can also contribute to air pollution. Spills to the ground can ultimately result in long-term harm to the land and considerable remediation costs.

A safe school environment that prevents harm to students and protects school employees from dangerous chemicals must be promoted. Responsible chemical management is likely to lead to improved learning in the classroom and improved overall health of the environment and the community.

II. Hazardous Chemicals and Products in Schools

II.A. Chemicals and Products of Concern

Approximately 75,000 chemical substances are in commercial use today.³ Many of these chemical substances are considered toxic or otherwise hazardous to humans and other living beings. Toxic chemicals are associated with a variety of serious health problems, including cancer, brain and nervous system disorders, reproductive disorders, organ damage, as well as asthma. Toxic chemicals that are persistent in the environment and bioaccumulate through the food chain can make exposure during childhood and adolescence especially dangerous. Chemicals also can irritate the skin, eyes, nose, and throat. Some chemicals pose significant safety hazards, such as fire or explosion risks.








The risks associated with exposure to a chemical are dependent on many factors, including the chemical's hazard level (degree of flammability, toxicity, etc.), the route of exposure (e.g., absorbed through skin, inhaled, consumed, injected), and the duration of exposure.

Many hazardous chemicals can be found in school facilities. Material Safety Data Sheets (MSDS), comprehensive fact sheets prepared by chemical manufacturers, describe the physical properties, health effects, and other characteristics of chemicals, as well as procedures for handling, storing, and disposing of these substances.⁴ Chemical manufacturers should supply MSDSs along with each shipment of chemicals delivered to your school. The proper use and management of these substances, as well as the products that contain them, are critical to maintaining a healthy atmosphere for school occupants and the surrounding environment. The term “hazardous chemicals” may include (but is not limited to) the following:

- Laboratory chemicals used or stored in science laboratories and preparation areas;
- Art supplies, including paints, stains, inks, glazes, and photo processing chemicals, used in (visual and performing) art and shop;
- Cleaning products utilized by custodial, cafeteria, and maintenance staff;
- Pesticides, fertilizers, and de-icers/salts/sands used for grounds maintenance, as well as pesticides used for building maintenance;
- Paints, solvents, fuels, degreasers, and lubricants used in building operation and maintenance;
- Oils, fuels, paints, antifreeze, and other chemicals used to maintain and repair equipment for transportation, school maintenance, and shop classes;
- Inks, solvents, and adhesives used for printing in school offices; and
- Chemicals used to treat water associated with drinking water and swimming pools.

II.B. Chemical Categories

Chemicals can be grouped based on the type of hazard they pose. Understanding the different types of chemicals in a school is important for developing an effective chemical management policy. Hazardous substances in schools may fall into one or more of the following categories: flammables/explosives, corrosives (the majority of which in high school laboratories are acids and bases), oxidizers/reactives, toxins, and compressed gases. Federal agencies and legislative authorities have developed specific definitions for each of those categories; however, the hazards can be described generally as follows:⁵

Chemical Type	Description and Examples	
Flammables/ Explosives		Chemicals that have the potential to catch fire rapidly and burn in the air. Liquids, gases, and solids (in the form of dusts) can be flammable and/or explosive. <i>Examples: paint thinner; laboratory solvents (acetone, alcohols, acetic acid, hexane); adhesives (some)</i>
Corrosives		Chemicals that can burn, irritate, or destroy living tissue or corrode metal through direct chemical action. This category includes strong acids and bases (alkalines), as well as dehydrating agents and oxidants. <i>Examples: sulfuric, nitric, and hydrochloric acids; potassium, ammonium, and sodium hydroxides (bases); hydrogen peroxide or chlorine (oxidants); acetic acid</i>
Oxidizers/ Reactives		Chemicals that react violently when combined with heat, light, water, or atmospheric oxygen, causing explosions or violent chemical reactions. <i>Examples: nitrates; chlorates; nitrites; peroxides; picric acid (crystallized); ethyl ether (crystallized); water reactive metals (e.g., sodium)</i>
Toxins		Any substances that, even in small amounts, can injure living tissue when ingested, inhaled, or absorbed into the skin. <i>Examples: mercury; arsenic; lead; asbestos; cyanide</i>
Compressed Gases		Gases stored under high pressure such that cracks or damage to the tanks and valves used to control these gases could cause significant physical harm to those in the same room. <i>Examples: acetylene; helium; nitrogen</i>



Check It Out

Improper storage practices may increase the risks associated with certain chemicals, particularly those that are flammable, corrosive, or reactive. The King County Laboratory Waste Management Guide (<http://www.govlink.org/hazwaste/publications/LabGuidelinesRevAugust06.pdf>) provides suggestions for safe and effective chemical storage, including shelf storage patterns for small stockrooms (see Table 1).

EPA's "No More 'Methyl Something': Improving Management of Curriculum Chemicals in Schools" presentation provides examples of dangerous storage scenarios: <http://www.epa.gov/epaoswer/osw/conserveschools/pdfs/chemsafe.pdf>.

II.C. Where Chemicals and Products are Found

Chemicals can be found throughout a school. They are used in both the maintenance of schools and the curriculum taught. Chemicals help students to perform experiments and learn new skills, among other benefits. In the absence of chemicals, schools would lack certain fundamental tools needed to educate students. Despite their useful purposes, chemicals can be dangerous to students and staff when managed improperly. Hazardous chemicals are found in classrooms, laboratories, storerooms, maintenance sheds, and numerous other areas. High schools usually have larger inventories and more hazardous chemicals than middle and elementary schools. Chemicals may have been purchased by the school or brought in by employees or students for their personal use.

The table on the following page lists some specific locations in which chemicals and products of concern might be found in a typical school. Please keep in mind that this list is by no means all-inclusive, and that chemicals, when used appropriately, can be important to the educational process.



Hazardous chemicals are found in classrooms, laboratories, studios, maintenance areas, and numerous other areas. The photo above depicts one location where chemicals and products of concern might be found in a typical school. This photo also demonstrates a properly organized chemical storage area.

*Photo Credit: Rehab the Lab Program,
Local Hazardous Waste Management,
King County, Washington*



Check It Out

Types and Locations of Hazardous Chemicals/Products in Schools:

- EPA, Chemical Management and Usage, http://www.epa.gov/Region7/education_resources/teachers/ehsstudy/ehs1.htm and "No More 'Methyl Something': Improving Management of Curriculum Chemicals in Schools," <http://www.epa.gov/epaoswer/osw/conserv/clusters/schools/pdfs/chemsafe.pdf>
- Colorado Department of Public Health and Environment, One Hundred Most Commonly Found Explosive and Shock-Sensitive Materials, www.cdph.state.co.us/cp/Institutions/Schools/ChemInSchools/ExplosiveTop40.PDF

Alternatives to Products of Concern:

- EPA, Environmentally Preferable Purchasing, [http://www.epa.gov/epp/Massachusetts Environmentally Preferable Purchasing Program, Product and Service Information, http://www.mass.gov/epp/products.htm](http://www.epa.gov/epp/Massachusetts%20Environmentally%20Preferable%20Purchasing%20Program,%20Product%20and%20Service%20Information,%20http://www.mass.gov/epp/products.htm)
- Maryland State Department of Education, Safety in Ordering, Storing, Using and Disposing of Chemicals, <http://www.mdk12.org/instruction/curriculum/science/safety/chemicals.html>

Location	Product Type	Hazardous Ingredient Examples
Science laboratories	Concentrated Acids (undiluted)	Hydrochloric acid Nitric acid
	Concentrated Bases (undiluted)	Sodium hydroxide
	Solvents	Methanol Methylene chloride
	Oxidizers	Lead nitrate
	Compressed gases	Oxygen
	Toxins	Cyanides Chromates (VI) Lead salts Mercury salts
Vocational and trade shops (can also be referred to as Career and Technical Education)	Solvents (used in paints, paint thinners, adhesives, lacquers, primers, and other products)	Petroleum naphtha Turpentine
	Cleaning supplies/detergents	Phosphoric acid Sodium silicate
	Compressed gases	Acetylene Nitrogen
	Fuels, transmission, and brake fluids	Gasoline
Visual and performing art studios	Solvents (used in paints, inks, paint thinners, adhesives, lacquers, primers, and other products)	Toluene Mineral spirits
	Pottery clear coating glaze	Lead Other heavy metals
	Pigments for paints and coatings	Cadmium Manganese Chromium
	Dry clay for ceramics and jewelry	Silica
	Acids for etching	Nitric acid Hydrochloric acid
Custodial/maintenance areas	Cleaning supplies/detergents	2-Butoxyethanol Trisodium phosphate
	Drain cleaners (alkaline) Drain cleaners (acidic)	Potassium hydroxide Sulfuric acid
	Pesticides (including disinfectants/sterilizers)	Permethrin Sodium hypochlorite
	Paint thinners	Toluene
	Solvents (used in paints, paint thinners, adhesives, lacquers, primers, and other products)	Xylene
	Water treatment chemicals for swimming pools	Chlorine tablets
Kitchens/cafeterias	Pesticides (including disinfectants/sterilizers)	Permethrin Sodium hypochlorite
	Refrigerants	Freon Ammonia
	Cleaning supplies/detergents	Ammonium hydroxide
Nurses' offices	Medical equipment	Mercury (thermometers and blood pressure manometers)
Photography laboratories	Intensifiers/reducers	Potassium dichromate Hydrochloric acid
	Developers	Hydroquinone Lactic acid
	Stop baths and fixer	Acetic acid Chrome alum (potassium chromium sulfate)
School grounds/athletic fields	Pesticides	2,4-D
	De-icers	Sodium chloride
	Fertilizers	Ammonium nitrate
Administrative offices	Correction fluid	Ethylene glycol Trichloroethane
	Solvents (used in paints, inks, paint thinners, adhesives, lacquers, primers, and other products)	Methyl ethyl ketone Petroleum distillates
	Printer/copier toners	Carbon black

III. Policies and Actions

The following sections provide guidance on recommended chemical management policies. These policies relate to: pollution prevention and green chemistry (concepts that minimize the potential for hazardous chemical use in the first place); the general management of chemicals and products already present in schools; chemical inventories; the purchasing and tracking of chemicals; the storage and handling of hazardous chemicals; personnel training and hazard communication; and chemical spills, cleanup, and disposal. To properly implement these suggested policies, schools should establish a leadership team and confirm the availability of budget and resources.

III.A. Leadership and Resources

To institute good chemical management policies, school administrators need to set the tone that chemical management is important by assigning roles and responsibilities for implementing proper safety and chemical hygiene practices. Guidelines are provided below that policymakers at the district level and school administrators should implement in order to initiate responsible chemical management practices in their schools.

Training and Teamwork Approach to Safety and Chemical Hygiene

"Northshore School District, in Washington State, has adopted the training and teamwork approach to Safety and Chemical Hygiene in the past 2 years. As a result, last year our insurance pool lowered our annual insurance premium by \$30,000 for our efforts. In enacting these programs our Director of Curriculum, Director of Risk Management, and the Chemical Hygiene Officers saved money for the district."

*John Schmied,
Northshore School District
Chemical Hygiene Officer*

- **Establish or confirm that your district has committed budget and staff resources for chemical management.** When schools consider their costs for chemicals, they generally consider only the purchase price. Each stage of chemical and product management, however, has associated costs of labor (e.g., training chemical hygiene officer and other staff), materials, equipment, and disposal, as well as costs of storage space and potential liability when responsible chemical management is not practiced.
- **Design and communicate a chemical management policy.** School district administrators and principals need to establish an overall policy stating a strong commitment to responsible chemical management, including implementation of the policies and actions defined in this document. The policy should be communicated to all by the highest level of management. Strong support from the administration, combined with adequate resources, will enable responsible chemical management. Active involvement by the full school community is an important element of success, as well.
- **Appoint a chemical hygiene officer.** The chemical hygiene officer is someone who is qualified by training and experience to provide technical guidance and leadership in the development and implementation of the provisions of the chemical hygiene plan. The position description or job classification of a chemical hygiene officer will vary across school districts; however, in all cases, they should be trained to provide chemical management leadership to the school.
- **Designate a team to oversee the chemical management program at your school.** This team should consist of teachers, janitorial staff, and maintenance personnel to comply with the chemical hygiene plan and help oversee the chemical

management program at your school described in the sections that follow. Team members should be trained by the chemical hygiene officer (and reinforced at least annually). At a minimum, team members should understand physical/chemical properties and potential health effects of chemicals, chemical compatibility, applicable environmental regulations and compliance issues, and waste management procedures of the school. You may also consider involving students (as applicable) as part of the process.

- **Disseminate information.** Share experiences and lessons learned with other school districts and administrators. Maintain a proactive program of informing parents, guardians, teachers, and other staff about chemical and product management activities ongoing at your school.

III.B. Pollution Prevention and Greener Alternatives

A key aspect of responsible chemical management is identifying opportunities to minimize chemical use through the implementation of pollution prevention and green chemistry principles.

Pollution prevention (sometimes referred to as “P2”) is defined as preventing or reducing pollution at the source, whenever feasible, and other practices that replace or eliminate the creation of pollutants. An example of pollution prevention would be using smaller quantities of (or environmentally benign substitutes for) chemical products used for grounds maintenance or cleaning.

A related concept, green chemistry, focuses on science laboratories by reducing the levels of toxicity and amount of chemicals used in experiments, promoting safety, pollution prevention, and waste minimization. Similar concepts, microscale chemistry and small-scale chemistry, involve scaling down the quantities of chemicals required for science experiments resulting in improved laboratory safety. Exploring and adopting pollution prevention and green chemistry concepts in a school system results in many direct environmental benefits and often results in cost savings for schools.

The following guidelines can be used to reduce or eliminate the generation of chemical pollutants and wastes.

- Establish a policy that makes pollution prevention the preferred form of waste management and strives to eliminate the purchase and use of most, if not all, hazardous chemicals. If elimination of the particular chemicals is not possible, other options include, in order of preference, reuse or recycling of chemicals and products; treatment of chemicals to reduce toxicity; and disposal of chemicals in an environmentally safe manner.



Check It Out

While treatment may be a useful activity, it should be cautioned that the treatment of hazardous waste may require a permit or be subject to regulation. You should consider discussing any treatment options with state or local regulatory agencies before you implement them in your laboratory. Neutralization of acids and bases, permitted under federal law, is probably the most commonly used treatment method in educational institutions; however, states may have more stringent standards regulating the disposal of acids and bases. To learn more about treatment methods, see Battelle Seattle Research Center’s “In-Laboratory Treatment of Wastes,” available on the P2 Pays website at <http://www.p2pays.org/ref/01/text/00779/ch13.htm>.

- Contact your state pollution prevention department for assistance in conducting a pollution prevention opportunity assessment, or contact your EPA Regional Office at <http://www.epa.gov/p2/pubs/local.htm> to find programs available in your area as well as the issues affecting your part of the country. Each EPA Regional Office supports pollution prevention activities that reduce or eliminate the sources of waste and pollutants through work with voluntary programs, partnerships with business and industry, state and local governments, citizens groups and other federal agencies.
- Establish a pollution prevention program to help your school minimize the amount of chemical waste generated throughout your school. The program may consist of developing school-wide and departmental annual waste reduction goals. The program may also include pollution prevention education sessions for teachers, maintenance staff, and students emphasizing the importance of substituting hazardous chemicals with chemicals that are less hazardous and scaling down the volume of chemicals used in classroom experiments and maintenance applications.
- Minimize the use of pesticides, a term that refers not only to insecticides but also to herbicides, fungicides, and various other substances used to control pests. Children may be especially sensitive to the health risks posed by pesticides because their bodies are growing and developing; they may also have greater exposure to pesticides because of their increased hand-to-mouth behaviors. A form of pollution prevention, integrated pest management (IPM), is an effective and environmentally sensitive approach to pest control that relies on common sense strategies to disrupt the life cycles of pests.

The following resources provide technical background information to help schools implement their own pollution prevention/waste minimization programs:

- Ohio EPA, Laboratory Pollution Prevention fact sheet, http://www.epa.state.oh.us/opp/Fact16_web.pdf and P2 checklist of lab opportunities, <http://www.epa.state.oh.us/ocapp/p2/labp2checklist.pdf>
- Battelle Seattle Research Center, Laboratory Waste Minimization and Pollution Prevention: A Guide for Teachers, <http://www.p2pays.org/ref/01/00779.htm>, and Chapter 8, Scaling Down Experiments, <http://www.p2pays.org/ref/01/text/00779/ch08.htm>
- EPA, Pollution Prevention: Definitions, <http://www.epa.gov/opptintr/p2home/p2policy/definitions.htm>
- EPA, 12 Principles of Green Chemistry, <http://www.epa.gov/greenchemistry/principles.html> and Teachers, <http://www.epa.gov/epaoswer/osw/conserved/clusters/schools/teachers.htm>
- EPA, state P2 Programs, <http://www.epa.gov/opptintr/p2home/resources/statep2.htm>
- EPA, Integrated Pest Management (IPM) in Schools, <http://www.epa.gov/pesticides/ipm/>
- EPA's Schools Chemical Cleanout Campaign (SC3), <http://www.epa.gov/sc3/>
- Great Lakes Regional Pollution Prevention Roundtable, Topic Hub™ for Pollution Prevention for Arts Education, <http://www.glrppr.org/hubs/toc.cfm?hub=509&subsec=7&nav=7>
- Green Cleaning Pollution Prevention Calculator, <http://www.ofee.gov/janitor/index.asp>
- Colorado State University, National Small-Scale Chemistry Center, <http://www.smallscalechemistry.colostate.edu>
- Merrimack College, National Microscale Chemistry Center, <http://www.microscale.org/>

III.C. Chemical and Product Management

Responsible chemical management is critical to controlling a variety of environmental, health, and safety issues within any school. Knowing what materials are present in your school and how they are used, stored, and discarded will enable you to understand the issues associated with these substances. Properly recognizing and controlling the hazards inherent to these materials, wherever they are found in your schools, will enhance your ability to create a safe school with minimal environmental liabilities/lawsuits.

EPA's Schools Chemical Cleanout Campaign

Resources such as EPA's SC3 program (see <http://www.epa.gov/sc3/>) are designed to facilitate chemical and product management. The purpose of SC3 is to reduce chemical exposures and improve chemical management in K-12 schools. By achieving these environmental goals, the SC3 will contribute to the broader goals of fewer lost school days and healthier students, faculty, and staff.

In addition to EPA's SC3, states have developed their own SC3 programs:

- Florida Department of Environmental Protection, School Chemical Cleanout Campaign (SC3), <http://www.dep.state.fl.us/waste/categories/hazardous/pages/schoolchemicals.htm>; and
- Tennessee Department of Environment and Conservation, School Lab Chemical Cleanout Campaign (SC3), <http://www.state.tn.us/environment/sc3/>.

Guidelines are provided below that schools and administrators should implement to initiate responsible chemical management practices in their school.

- Establish an environmentally preferable chemical management policy considering the entire chemical and product lifecycle, which begins with chemical purchasing and includes identification, labeling, storage, inventory maintenance, and the activities associated with the use and disposal of chemicals and wastes generated from their use, including training, spill control procedures, and record-keeping requirements.



Chemicals that are not correctly and clearly labeled, as shown in the photos above, should be disposed of properly. Products used in schools should have an MSDS, be stored in their original containers, and be correctly and clearly labeled.

*Photo Credit: Rehab the Lab Program,
Local Hazardous Waste Management
King County, Washington*

- Establish a district-level chemical purchasing policy, chemical products evaluation process, and a district-approved chemicals and products list (see Section III.E). For example, the Los Angeles Unified School District's Chemical Hygiene Program (<http://www.lausd-oehs.org/chemical-hygiene.asp>) allows only approved chemicals to be used in school laboratories. Controlling what chemicals are used within your schools is essential to ensuring that only products that have been reviewed and approved for use are brought into the school environment.
- Create a written chemical hygiene plan that describes procedures and practices for the protection of students and school employees from the health hazards presented by hazardous chemicals and products that are found in school laboratories. The chemical hygiene plan is a critical element of chemical management and should contain specific requirements and guidelines for chemical handling, inventory, storage, spills, and disposal. The plan should be updated annually and whenever necessary. The Appendix contains excerpts and references to several examples of chemical hygiene plans

currently in use by school districts nationwide.

- Contact state or local health departments or environmental agencies for more information. Many chemical management practices are often regulated at the federal, state, and/or local level.

III.D. Chemical Inventory

Existing accumulations of outdated, unknown, poorly labeled, improperly stored, degraded, and excessive quantities of hazardous chemicals are present in many schools. These chemicals pose safety and health risks to students and school personnel. Properly identifying and removing these chemicals is a key step in preventing accidents. An important part of responsible chemical management is the creation of an accurate chemical inventory. A chemical inventory identifies the quantities and physical locations of, as well as the potential hazards associated with, all of the chemicals

used and stored in a school. It also serves as a reference for school and emergency personnel (e.g., local fire department) in the event of an emergency. Furthermore, a chemical inventory, when used to guide necessary purchases, can reduce the costs and management needs associated with excess chemicals.

Guidelines are provided below that schools and administrators should follow in order to conduct an inventory at their school. Some guidelines refer to other documents (e.g., chemical hygiene plans); information about these documents is discussed in later sections.

- Conduct an inventory of all of the chemicals and products containing chemicals (e.g., mercury thermometers) stored on-site, covering all sections of the school including maintenance rooms and closets, storage sheds, greenhouses, and all

Chemical Inventory Safety Tips

The process of assessing existing chemical hazards can be dangerous. The following guidelines are recommended:

- Contact a trained professional to conduct a walk-through inspection of the school to pre-screen for potential hazards. Certain types of chemicals pose an imminent hazard (e.g., shock-sensitive materials) and must be handled only by qualified emergency personnel or hazardous waste professionals.
- If the pre-screening establishes that it is safe to conduct an inventory, ensure that the inventory team is properly equipped with personal protective equipment and emergency response supplies as well as chemical management and safety knowledge.
- Ensure that chemical storage areas are properly ventilated and that potential sources of ignition are turned off.
- Conduct pre-screening, inventory and removal while students are NOT in school.
- When complete, provide your local fire department a copy of the chemical inventory.

Appendix 2 of the Massachusetts School Chemical Management Program (available at <http://www.mass.gov/dep/service/schlchem.pdf>) includes a step-by-step guide to conducting chemical inventories.



A chemical inventory identifies the amount and location of all of the chemicals stored on-site, covering all sections of the school including maintenance areas. A thorough inventory would identify inappropriate chemical storage practices, such as the one shown in this photo. Chemicals such as ammonia and bleach are commonly found in schools. Despite their useful purposes, these chemicals are incompatible and should not be stored near each other, especially in maintenance storage areas or in hot boiler rooms where the bottles may bulge or break. Mixing of these two chemicals would create a chlorine gas cloud.

Photo Credit: Marina Brock, Barnstable County (Massachusetts) Department of Health and Environment

classrooms. Engage all school staff who will either be involved in conducting the inventory, or will be having their chemicals inventoried. Pre-packaged science experiments or demonstration kits should be included in the chemical inventory.

- Establish a policy that chemical inventories be conducted and updated annually, unless state or local regulations require a more frequent schedule. Contact your local state agency, college or university, industry partner, or chemical supplier, or identify a responsible person within the school who has training in hazardous chemical management to assist with the inventory.
- Review other documents you may have in schools in your district, such as a *chemical hygiene plan* or *hazard communication plan*, to ensure that chemicals are consistently being managed, stored, handled, and disposed of properly. Review your *approved chemicals and products list* (see Section III.E). Chemicals and products not on this list should be removed and properly disposed of or recycled according to applicable federal, state, and local laws. Update the inventory when new chemicals or products are added to the list and when chemicals or products are used or disposed.
- Conduct periodic cleanouts by identifying and removing unnecessary hazardous materials and expired chemicals through appropriate recycling and/or disposal methods. Chemical inventories should be conducted prior to cleaning out chemicals from schools. Contact your local state agency, college or university, industry partner, or chemical supplier, or someone with technical qualifications to identify potentially dangerous situations (i.e., school staff should not move very old chemicals because of the extreme hazard they may present) and properly handle the chemicals during a chemical cleanout.



Check It Out

The following resources provide information to help schools conduct their own chemical inventories, including a suggested chemical inventory list. You may also wish to check with your own state's environmental and educational agencies.

- Colorado Department of Public Health and Environment, Guidance on Chemical Management in Schools, <http://www.cdphe.state.co.us/cp/Institutions/Schools/ChemInSchools/ChemMgmt.html>
- Montana Department of Environmental Quality, Montana School Labs, <http://www.mdeqschoollabs.com/>

III.E. Purchasing

Chemicals enter school systems through a variety of avenues such as regular purchases (including purchase orders, purchasing cards, and personal purchases) by teachers and facility maintenance personnel, as well as donations from local industries and chemical suppliers.

Chemicals have varying hazard levels; thus, the determination to purchase should factor in need, use, safety, environmental factors, and chemical/product management lifecycle costs. Remember, just because a chemical can be purchased at your local hardware or grocery store does not mean it is safe if improperly used or stored.

To create a chemically safer school environment, school administrators should implement measures to reduce the amount and hazardous nature of chemicals entering their schools. Perform small-scale or microscale chemistry experiments or seek environmentally preferred products or services “that have a lesser or reduced effect on human health and the environment when compared with competing products or services that serve the same purpose.”⁶

Here are some suggestions of best management practices to create a chemically safer school environment:

- Establish a purchasing policy that addresses how chemicals and products containing chemicals are entering a school, who is using them, why they are being used, and how they will need to be disposed. Involve all teachers, maintenance and custodial personnel, and other staff to ensure that the chemical purchasing policy meets educational and facility maintenance needs while reducing the quantities and toxicity of chemicals. The Appendix provides resources to chemical purchasing examples in schools.
- Investigate pollution prevention and green chemistry options (see [Section III.B](#)) to determine whether certain chemicals can be reduced in quantity or eliminated entirely from science and art classes.

Environmentally Preferable Purchasing

EPA's Environmentally Preferable Purchasing (EPP) program was developed to assist federal agencies in making environmentally conscious purchasing decisions; however, businesses and state and local agencies have also found the program to be of value. The EPP website (<http://www.epa.gov/oppt/epp/pubs/about/faq.htm>) discusses frequently asked questions concerning EPP and includes a number of tools and links to guidance documents and case studies that schools can use to identify products that are less hazardous.

- Establish an environmentally preferable chemical screening process to ensure that all chemicals and products containing chemicals have been screened for environmental, health, and safety hazards prior to purchase, thus reducing and/or eliminating hazardous chemicals. For example, the Maryland State Department of Education provides guidance on responsible chemical purchasing.⁷ The MSDS may be useful in this process.

- Create an approved chemicals and products list, based on less toxic or non-toxic alternatives to make non-toxic implementation and enforcement easier in your school. Only allow procurement of approved chemicals.
- Purchase chemicals and products containing chemicals in quantities that will be used during the current school year or that can be fully consumed under normal conditions within the shelf life of the product. Another concept is “just in time” purchasing in which chemicals are purchased as needed throughout the school year. These purchasing methods reduce the costs and management needs associated with excess and expired chemicals.
- Use products purchased or approved by the school. Teachers and other staff should be strongly discouraged from bringing in products on their own. Products used in schools should have an MSDS, be stored in their original containers in a secure location, and be correctly and clearly labeled.



Schools should exercise **EXTREME CAUTION** when accepting chemical donations, product samples, or promotional products (e.g., do not accept chemicals more useful for electroplating than for the teaching of high school chemistry). Schools should not give away chemicals to avoid the costs of disposal.

III.F. Storage and Handling

School administrators should be aware of proper use and storage policies and procedures to ensure student and employee safety. Guidelines are provided below that schools and administrators can follow in order to reduce the risk of chemical accidents and ensure that chemicals and products in their schools are stored and handled safely.

- Establish a chemical storage and handling policy that addresses how chemicals should be properly stored, labeled, and secured, as well as who should have access to these chemicals and chemical storage locations. Chemicals should not be stored in areas that are occupied by or accessible to students, such as classrooms or restrooms; they should preferably be stored in a central, secure location. The Appendix provides resources to guidelines on the proper labeling of chemicals, recommended storage methods, and other considerations for proper storage (e.g., examples of incompatible chemicals and chemical segregation).
- Conduct at least annual inspections of classrooms, janitorial closets, and chemical storage rooms and cabinets in your school to ensure the integrity of chemicals and



To avoid a situation like the example shown above, schools should establish a chemical storage and handling policy that addresses how chemicals should be properly stored, labeled, and secured, as well as who should have access to them.

*Photo Credit: Rehab the Lab Program,
Local Hazardous Waste Management,
King County, Washington*

storage structures. Spot inspections may be performed periodically throughout the school year. Engage maintenance staff in these inspections if storage shelving or locks are in need of updates or repair. Create and maintain an up-to-date map of the location and storage pattern of chemical storage rooms and cabinets in your school.

- Inspect and test emergency equipment (e.g., eyewash stations and safety showers) as well as fume hoods and ventilation systems/exhaust fans at least on an annual basis. Engage maintenance staff in these inspections if safety equipment is in need of updates or repair. Establish protocols for the upkeep of emergency equipment and the associated maintenance records.
- Work with a local chemical supplier to ensure you have MSDS information for all chemicals on site. Hazardous chemicals in schools should be stored in accordance with MSDS specifications. Maintaining a hard copy or secure website access to MSDS information at the district level could be a cost-effective approach to ensuring that chemical safety information is available across all schools. At a minimum, MSDS information should be located in all chemical storage rooms and cabinets and in a central place within the school (away from the chemicals), as well as a central location for the school district.

A few school districts have developed their own chemical hygiene plans that provide step-by-step procedures, as well as checklists for the safe handling and storage of chemicals.

- Northshore School District Chemical Hygiene Plan, http://schoolcenter.nsd.org/education/components/scrapbook/default.php?cms_mode=view§iondetailid=58540&sc_id=1161987494
- Lake Havasu Unified School District, Arizona District Chemical Hygiene Plan, <http://www.havasu.k12.az.us/support/warehouse/chempolicy.html>
- LAUSD, School Laboratory Chemical Hygiene and Safety Plan (Appendix F), <http://www.lausd-oehs.org/docs/CSC/Chemical%20Hygiene%20Plan.pdf>

III.G. Training

Proper training of staff and students on the handling of chemicals and products containing chemicals will help prevent accidents, thus reducing exposure to harmful chemicals. Training at various levels should be provided for all school employees and students on basic chemical hygiene, storage and handling procedures, and how to respond in the event of a chemical spill or accident. Guidelines are provided below that schools and administrators should follow on training.

- Establish a hazardous chemicals management and safety training program that addresses how school employees (and students, as applicable) are to be properly trained to handle certain chemicals and products and how to respond to a chemical spill or release, to understand the hazards of these materials, and to understand the types of liability associated with accidents

involving chemical usage in schools. Targeted employees should include school management, custodial and maintenance personnel, and appropriate teaching staff. The training program should include a review of the chemical hygiene plan, hazard communication plan, and approved products listing. Training sessions should be documented in a log for each employee and repeated periodically (e.g., on an annual basis) to serve as a refresher for existing personnel. Training also should be conducted for new hires.

- Contact a local health department, environmental management agency, hazardous waste agency, or chemical supplier to provide a training session with school employees that raises their awareness of using less toxic alternatives to certain chemicals, chemical substitutions, green purchasing, and performing small-scale experiments.



Check It Out

The following resources provide useful additional information on training:

- LAUSD, School Laboratory Chemical Hygiene and Safety Plan (Section III), <http://www.lausd-oehs.org/docs/CSC/Chemical%20Hygiene%20Plan.pdf>
- OSHA, Training Curriculum Guidelines - (Non-mandatory) - 1910.120 App E, http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9770

III.H. Hazard Communication

Hazard communication planning is an important element in chemical and product management. Dissemination of information on the quantity and hazards of hazardous chemicals and products creates awareness about the range of chemicals and products used and fosters proper use and disposal of these chemicals and products.

Guidelines are listed that schools and administrators should follow in order to create a safer school environment for students and school employees.

- Create a written hazard communication plan that communicates how chemicals should be properly managed, stored, handled, and disposed. The plan should consist of an updated chemicals and products list, chemical labeling requirements, MSDS information, a disposal log, and instructions on employee training programs regarding hazards of chemicals and protective measures. The Appendix offers examples of hazard communication programs that have been implemented for various school districts across the country.
- Work with your local chemical supplier to help identify specific concerns. Depending on your location, state and/or federal hazard communication requirements specify your responsibility to identify and address the hazards associated with the chemicals and products used in your school facility.

Environmental Planning and Community Right-to-Know Act

The Environmental Planning and Community Right-to-Know Act (EPCRA) was passed in response to concerns regarding the environmental and safety hazards associated with toxic chemicals. EPCRA establishes emergency planning and chemical reporting ("Community Right-to-Know") requirements for Federal, state, and local governments; Indian Tribes; and industry. The reporting provisions help increase the public's knowledge and access to information on chemicals at individual facilities (such as schools), their uses, and accidental releases into the environment. The EPA sponsors various programs that pertain to chemical management.

For more information see: EPA, EPCRA Information, <http://yosemite.epa.gov/oswer/ceppoweb.nsf/content/EPCRA.htm?OpenDocument>

III.I. Spills, Cleanup, and Disposal

Failing to take necessary safety precautions may put your school at increased risk of fire, explosions, and spills that may result in chemical exposure to students and school personnel, harm to the environment, and considerable clean-up costs to the school district. Hazardous wastes must be disposed of in accordance with RCRA and other applicable state and local requirements. Such requirements generally prohibit any drain disposal of hazardous chemicals or "treatment" of hazardous wastes beyond pH adjustment, and may be far more stringent than the disposal suggestions provided by chemical suppliers.



Check It Out

Refer to these resources as recommended guidance for creating your hazard communication plan:

- OSHA Hazard Communication Standard, Title 29 Code of Federal Regulations 1910.1200, http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10099
Reminder: Federal OSHA does not have jurisdiction over state and local government employees, including those in public schools.
- Section III, Summary and Explanation of the Issues and the Provisions of the Final Rule, <http://www.osha.gov/pls/oshaweb/owadisp>.
- LAUSD OEHS Hazard Communication training presentation, <http://www.lausd-oehs.org/docs/CSC/HazComPresentation.ppt>

Proper chemical disposal can reduce the costs and management burdens associated with excess chemicals, including disposal costs of expired chemicals and the time required for inventory and storage of excess and unwanted chemicals, as well as costs of penalties due to enforcement actions that may result from improper chemical management.

Guidelines are provided below that schools and administrators can follow in order to reduce the risk of chemical accidents, improve spill response procedures, and ensure that chemicals and products in their schools are safely discarded.

- Create a written emergency response and spill clean-up and response plan for all chemicals and products. This plan should describe what to do and who to contact in the event of a spill or release, as well as the location of spill management supplies and equipment (e.g., spill kits, spill control materials, fire extinguishers) within the school. The clean-up and response plan should include a process for communicating with students, parents, teachers, and other staff about the incident, as well as methods for preventing accidents and exposures.

Chemical Safety Day Program in Minnesota

The Chemical Safety Day Program (CSDP) is a cost-effective waste management program available to educational institutions and non-profit organizations throughout the state of Minnesota. The CSDP has helped hundreds of high schools, colleges, and nonprofit organizations in disposing of hazardous material/waste at a reasonable cost and in an environmentally responsible way. More information about the program can be found on the CSDP website at <http://www.dehs.umn.edu/csdp/>.



As shown in the photo above, existing stocks of outdated, unknown, degraded, and excessive quantities of hazardous chemicals are present in many schools posing safety and health risks to students and school personnel. Identifying and removing these chemicals is a key step in preventing accidents. Establish a chemical disposal policy that addresses how unused and outdated chemicals and products containing chemicals should be properly removed from schools.

Photo Credit: Rehab the Lab Program, Local Hazardous Waste Management, King County, Washington

- Develop a budget for chemical management and disposal. Initial costs may involve hiring a chemical expert and disposing of accumulated chemicals and products. A longer-term waste disposal budget should account for the staff time necessary to develop and maintain disposal procedures, the purchase of special equipment and supplies, the upkeep of safety equipment (e.g., fume hoods), and annual hazardous chemical disposal and staff training.
- Establish a chemical disposal policy that addresses how unused and outdated chemicals and products containing chemicals should be properly removed from schools, including materials generated from the cleanup of spills.



Check It Out

The following resources may provide useful additional information in order to reduce the risk of chemical accidents, improve spill response procedures, and ensure chemicals and products in their schools are safely discarded:

- EPA, Hazardous Waste & Your School, www.epa.gov/ne/assistance/schools/pdfs/mefact.pdf
- King County, Washington, Laboratory Waste Management Guide, Final Report, <http://www.govlink.org/hazwaste/publications/LabGuidelinesRevAugust06.pdf>
- Nebraska Department of Environmental Quality, Guidance Documents: School Chemicals and Disposal, <http://www.deq.state.ne.us/Publications/nsl/0/d9583aaae76ad49c8625690b007378a3?OpenDocument>
- Massachusetts Department of Environmental Protection, Massachusetts School Chemical Management Program, Working Draft, <http://www.mass.gov/dep/service/schlchem.pdf>
- Council of State Science Supervisors, Science and Safety: Making the Connection, <http://www.csss-science.org/downloads/scisafe.pdf>

The U.S. National Library of Medicine's on-line Wireless Information System for Emergency Responders (WISER) provides assistance in identifying hazardous substances, as well as spill containment advice. See <http://webwiser.nlm.nih.gov> for more information.

Disposal Guidelines for School Facilities

Schools must comply with regulations regarding the management, transport, and disposal of hazardous waste. Schools are required to track the amount of hazardous waste they generate and ensure that all wastes are properly disposed of according to federal, state, and local requirements. These requirements can affect the way chemicals and chemical wastes are managed in schools. Subtitle C of RCRA regulates hazardous waste generators. According to RCRA (40 CFR Part 261), there are three categories of hazardous waste generators (large, small, and conditionally exempt), based upon the quantity of waste they produce per month. Most schools fall into the Conditionally Exempt Small Quantity Generator (CESQG) category. A CESQG generates 100 kilograms (220 pounds) or less per month of hazardous waste, or 1 kilogram (2.2 pounds) or less per month of acutely hazardous waste. EPA provides definitions of each generator category and its specific requirements at http://www.epa.gov/epaoswer/osw/gen_trans/generate.htm; however, states may have additional requirements for generators. Refer to these waste management and disposal resources as recommended guidance for your school:

- EPA, Hazardous Waste Management for School Laboratories and Classrooms, <http://www.epa.gov/region8/humanhealth/children/2HWMManagementToolkit.pdf>
- Idaho Department of Environmental Quality, Idaho Chemical Roundup Waste Management and Disposal at Schools, http://www.deq.state.id.us/waste/educ_tools/chemical_roundup_waste_disposal_fs.pdf
- Nebraska Department of Environmental Quality, School Chemicals and Disposal, <http://www.deq.state.ne.us/Publications/nsl/0/d9583aaae76ad49c8625690b007378a3?OpenDocument>
- Florida Department of Environmental Protection, Disposal Guidelines for School Facilities, http://www.dep.state.fl.us/waste/quick_topics/publications/shw/hazardous/SC/DisposalMemoFinal.pdf

IV. Special Cases

Certain chemicals are worthy of special consideration due to their presence in schools and their negative impacts upon human health and the environment. It is important to identify potential sources of exposure to these chemicals in schools and to follow procedures for minimizing the risk of such exposures. Although this section is not all-inclusive, several examples of chemicals that pose special risks to children (arsenic, asbestos, lead, and mercury) are discussed.

IV.A. Arsenic

Arsenic is a toxic heavy metal used in products such as wood preservatives and pesticides. Exposure to arsenic is associated with an increased risk of bladder and lung cancers, among other serious health effects.⁸ Children may be exposed to arsenic on school grounds through contact with materials containing arsenic compounds, such as chromated copper arsenate (CCA). CCA is a preservative and pesticide that was historically used to pressure-treat lumber for outdoor products, including playground equipment. Children can be exposed to arsenic by playing on CCA-treated recreational equipment. Arsenic-contaminated soil from playground areas containing CCA-treated wood also can be tracked into classrooms on shoes or clothing.⁹

The likelihood that wooden playground equipment at existing schools has been treated with CCA is high. Though its use was discontinued in 2003, existing stocks of CCA-treated wood may have been sold through mid-2004. If there is any question as to whether wooden playsets have been treated with CCA, it should be assumed that

they have.¹⁰ Exposure to CCA-treated wood can be minimized. Children should wash their hands thoroughly with soap and water immediately after outdoor play. Children also should be discouraged from eating near CCA-treated wood.¹¹



If your school is planning to replace its playground equipment, alternatives to CCA are available. These alternatives include several arsenic-free wood pressure treatments and building material alternatives to pressure-treated wood. EPA provides information on alternatives to CCA at the Chromated Copper Arsenate (CCA) homepage, <http://www.epa.gov/oppad001/reregistration/cca/index.htm#alternatives>.

IV.B. Asbestos

Asbestos is a naturally occurring mineral that was once widely used in products for its heat resistant properties, though its uses have diminished substantially. Exposure to asbestos, particularly for long periods of time, can lead to diseases such as asbestosis, lung cancer, and mesothelioma.¹² Intact, undisturbed asbestos-containing materials (ACMs) generally do not pose a health risk. These materials may become hazardous if they are damaged, disturbed, or allowed to deteriorate and thus release asbestos fibers into building air.

Though its use has been discontinued in many products, ACM can be found in most of the nation's primary, secondary, and charter schools. Asbestos is most commonly found in insulation and building materials such as floor and ceiling tile, cement asbestos pipe, corrugated paper pipe wrap, acoustical



Check It Out

The EPA provides links to detailed information on Chromated Copper Arsenate (CCA), its uses, and its potential health effects on the CCA homepage, <http://www.epa.gov/oppad001/reregistration/cca/>.

and decorative insulation, pipe and boiler insulation, window caulking, spray-applied fireproofing, and plaster walls in older schools. Asbestos has also been used in laboratory gloves, laboratory hoods, and chalkboards.¹³ *Some of these products remain on the market.*

Federal requirements for asbestos management in schools were established by the Asbestos Hazard Emergency Response Act (AHERA) of 1986, which requires public school districts and non-profit private schools to inspect buildings for asbestos; develop plans to manage any asbestos found in these buildings; and carry out management plans in a timely fashion.¹⁴ Damaged ACM may be managed through repair; various containment methods; or, in cases where loose fibers are present, proper removal. It is important to note that AHERA only applies to building materials. No regulations govern the purchase or use of certain asbestos-containing products, such as laboratory gloves, in schools.¹⁵ EPA recommends that asbestos-free versions of these products be purchased for use in schools, along with proper disposal of existing asbestos-containing materials.

Asbestos in Schools

EPA's The ABCs of Asbestos in Schools (available at <http://www.epa.gov/asbestos/pubs/abcsfinal.pdf>) answers common questions about asbestos in schools and outlines the responsibilities of school boards and other school officials to protect children and employees from exposure to asbestos.

IV.C. Lead

Lead is a highly toxic metal once widely used in products like paint, gasoline, solder, pipes, plumbing, and construction materials. Other sources of lead in the environment include lead from industrial emissions. Exposure to lead occurs when it enters the body through inhalation or ingestion of lead dust, particles, or chips. Lead can cause serious damage to the brain, nervous system, kidneys, and red blood cells. Young children, especially those 6 years and younger, are at particular risk for lead exposure because they have frequent hand-to-mouth activity and absorb lead more easily than do adults. Even at low levels, lead can cause children to have learning and behavior problems, delays in physical growth, and lower IQs.

In schools, lead is most commonly found in the paint, dust, soil, and water. Some schools may have other sources of lead, such as art and photography supplies, pottery glazes, and science lab materials. Consider reducing the use of lead in science experiments and, where it must be used, only use it in dilute solutions that are captured and properly disposed.

Lead paint hazards are of special concern in areas occupied by children. In 1978, the Consumer Product Safety Commission banned the use of lead in paint; therefore, lead-based paint is limited to older school buildings. These buildings and the surrounding soil can be contaminated by flaking paint chips or dust. The only way to know for sure whether your school has lead-based paint is to have the paint and soil tested for lead by a state-certified lead inspector.



Check It Out

Lead in Paint, Dust, and Soil:

- EPA, Rules and Regulations, <http://www.epa.gov/lead/pubs/regulation.htm>

Lead in Drinking Water in Schools:

- EPA, 3Ts for Reducing Lead in Drinking Water in Schools, http://www.epa.gov/safewater/schools/pdfs/lead/toolkit_leadschools_guide_3ts_leadschools.pdf
- EPA, Guidance and Tools, <http://www.epa.gov/safewater/schools/guidance.html>

Lead can also leach into drinking water from pipes, solder, or brass plumbing fixtures. There is no federal law requiring sampling of drinking water in schools that are served by a public water system, although schools and local jurisdictions may establish programs for testing drinking water lead levels in schools. EPA and others have issued guidance designed to help schools develop and implement a sampling protocol to test for lead in their drinking water.^{16,17,18,19}

IV.D. Mercury

Mercury is a naturally occurring element used to make many consumer products. Exposure to high levels of mercury, as would occur with the direct inhalation of mercury vapor released during a mercury spill, is associated with damage to the brain, heart, kidneys, lungs, and immune system.²⁰ While the general public can clean up small mercury spills no greater than the amount contained in a single fever thermometer following proper instructions, larger spills must be cleaned up by professionals.²¹ In fact, when a spill of more than two tablespoons of mercury occurs, it is mandatory to call the National Response Center (800-424-8802).²²

Science classrooms and storerooms often contain elemental mercury or mercury compounds used as laboratory reagents. Science classes also may use mercury thermometers, or other mercury-containing laboratory instruments such as barometers (pressure gauge for measuring the pressure of the atmosphere). These all create significant risks of mercury spills, particularly if students have access to them. There is no need for science classrooms to use these chemicals or devices; there are safe, non-mercury



Schools should not use or store elemental mercury or mercury compounds. They should replace all mercury thermometers and manometers with mercury-free products. Mercury must be disposed of properly.

A Mercury Spill in Washington, D.C.

"On October 2, 2003, the Washington, D.C.'s Fire Department Hazmat Unit responded to an emergency call unlike any call Ballou High School had ever had to make. What the D.C.'s Hazmat unit found that afternoon proved to be the beginning of a long, exhausting search for and clean up of an elemental mercury spill. By the time the D.C. Hazmat Team and the D.C. public health officials arrived, it was too late to contain all the spills; varying amounts of mercury were found in the classrooms, gymnasium, and cafeteria. Contamination did not stop there. Students unknowingly carried mercury through the streets, onto city and school buses, and into their homes. As a result of the spill, Ballou High School was closed for 35 days and over 200 homes were tested for mercury contamination."

For additional information, see EPA's Superfund Featured News Article, <http://www.epa.gov/superfund/news/mercury.htm>

replacements for all of them. In addition, nurses' offices often contain mercury fever thermometers and sphygmomanometers (blood pressure measuring devices), which also pose spill risks because they are easily breakable. EPA encourages schools to prevent spills by removing all elemental mercury, mercury compounds, and mercury measurement devices from classrooms and nurses' offices.

Mercury is also used in many of the types of items that are found in all buildings, such as thermostats, flow meters, boiler controls, and electrical equipment. Generally, such equipment poses little risk of spill because the mercury is not easily accessible and the products are not easily broken. However, such equipment needs to be disposed of properly at the end of its life, and new equipment should be mercury free. School building maintenance staff should inventory mercury-containing equipment, properly dispose of it when it comes out of service, and implement mercury-free purchasing policies. Maintenance staff should also not use, and instead properly dispose of, any remaining stores of old janitorial supplies, such as latex paints (prior to 1992) and pesticides (prior to 1994), because these may contain mercury.²³

Schools should continue to use one category of mercury-containing product – fluorescent lamps. There is currently no alternative to mercury-containing fluorescent lamps that is as energy efficient and that is appropriate for general indoor lighting. The energy efficiency of fluorescent lamps makes them a good environmental choice because of less emissions of mercury and other pollutants

from power generation. However, while the amount of mercury in each lamp is small, schools use significant numbers of lamps, and these must be disposed of properly. Contact your EPA Regional Office, the EPA RCRA hotline at (800-424-9346), or your state agency to confirm the most current rules and information on fluorescent lamp waste management and disposal in your state.

V. Conclusion

Chemicals are used daily in both the maintenance of schools and the curriculum taught. They help students to perform experiments and learn new skills, among other benefits. They are important to many aspects of school maintenance. In the absence of chemicals, schools would lack certain fundamental tools needed to educate students. Despite their useful purposes, chemicals can be dangerous to students and staff when managed improperly. Some chemicals that are persistent in the environment and bioaccumulate through the food chain can make exposure during childhood and adolescence especially dangerous. Ensuring that chemicals are properly managed will help school administrators to safeguard the health and safety of students and school employees; avoid disposal expenses and school closures associated with spills and emergency incidents; maintain a sense of trust between the district and the surrounding community; and prevent unintended discharges and spills which inflict damage upon the environment.

Consistent policies and practices are recommended in all school systems:

- Appoint responsible leadership and institute “team training” regarding best practices of chemical and product management.
- Support chemical management effort with appropriate budget.

- Share your experiences with other districts and administrators.
- Purchase safer alternatives to hazardous substances.
- Adopt policies encouraging proper purchasing, labeling, storage, and disposal of chemicals and products.
- Train faculty and staff (and students, as applicable) on the potential dangers posed by chemicals and on alternatives that are less hazardous that may be available.
- Disseminate information on reducing the quantity and hazards of hazardous chemicals and products.

When implemented effectively, chemical management promotes awareness about the range of chemicals and products used in schools and creates a healthier and safer atmosphere for school occupants and the surrounding environment. For additional information, contact your EPA Regional Office or consult on-line resources to understand environmental health issues in schools, such as EPA’s SC3 and EPA’s HealthySEAT. The ultimate purpose of the SC3 is to reduce chemical exposures and improve chemical management in K-12 schools, while HealthySEAT can be customized to assist school districts in the evaluation and management of all of their environmental, safety, and health issues, including all aspects of their chemical management programs.



Check It Out

EPA Resources for Additional Information

Schools Chemical Cleanout Campaign (SC3), <http://www.epa.gov/sc3/>
Healthy School Environments Assessment Tool (HealthySEAT), <http://epa.gov/schools/healthyseat/>

References

- 1 EPA. 2006. Case Study – Environmental, Health & Safety Issues in One New England Public High School, Summary 1996. Available at <http://www.epa.gov/region1/assistance/schools/health.html> [Accessed March 24, 2006].
- 2 University of Wisconsin-Extension. 2004. Why Focus on Mercury in Schools? Available at <http://www.mercuryinschools.uwex.edu/schools/why.htm> [Last updated July 15, 2004; Accessed May 23, 2006].
- 3 EPA. 2006. What is the TSCA Chemical Substance Inventory? Available at <http://www.epa.gov/opptintr/newchems/pubs/invntory.htm> [Last updated March 3, 2006].
- 4 National Institutes of Health, National Library of Medicine. 2004. Household Products Database Frequently Asked Questions. Available at <http://householdproducts.nlm.nih.gov/faq.htm#7> [Accessed April 26, 2006].
- 5 Maryland State Department of Education. 1999. Science Safety Manual: Chapter VII. Chemicals: Managing, Handling and Disposing. Available at <http://www.mdk12.org/instruction/curriculum/science/safety/chemicals.html> [Accessed April 6, 2006].
- 6 Executive Order 13101-- Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition. September 14, 1998, available at <http://www.ofee.gov/eo/13101.htm>.
- 7 Maryland State Department of Education, <http://www.mdk12.org/instruction/curriculum/science/safety/chemicals.pdf>.
- 8 U.S. Consumer Product Safety Commission. 2006. Chromated Copper Arsenate (CCA) – Treated Wood Used in Playground Equipment Fact Sheet. Available at: <http://www.cpsc.gov/phth/ccafact.html> [Accessed April 5, 2006].
- 9 Shendell, D., C. Barnett, and S. Boese. 2004. Science-based recommendations to prevent or reduce potential exposures to biological, chemical, and physical agents in schools, Healthy Schools Network, Inc. [Available at <http://www.healthyschools.org/documents/HPSchlsWhtPpr.pdf>].
- 10 U.S. Consumer Product Safety Commission. 2006. Chromated Copper Arsenate (CCA) -Treated Wood Used in Playground Equipment Fact Sheet. Available at: <http://www.cpsc.gov/phth/ccafact.html> [Accessed April 5, 2006].
- 11 U.S. Consumer Product Safety Commission. 2006. Chromated Copper Arsenate (CCA) -Treated Wood Used in Playground Equipment Fact Sheet. Available at: <http://www.cpsc.gov/phth/ccafact.html> [Accessed April 5, 2006].
- 12 EPA. 2006. Asbestos and Schools. Available at: <http://www.epa.gov/asbestos/pubs/asbestosinschools.html#5> [Accessed April 5, 2006].
- 13 EPA. 2006. Where Can Asbestos Be Found? Available at: <http://www.epa.gov/asbestos/pubs/asbuses.pdf> [Accessed April 5, 2006].
- 14 EPA. 2003. The ABC's of Asbestos in Schools. Available at <http://www.epa.gov/asbestos/pubs/abcsfinal.pdf> [Revised August 2003; Accessed October 4, 2006].
- 15 Phil King, U.S. EPA Region V Asbestos Coordinator. 2006. Personal communication [February 24, 2006].

- 16 University of California at Berkeley. 2000. Working in a Lead-Safe School, Facts for School Maintenance Workers. Available at <http://ist-socrates.berkeley.edu/~lohp/graphics/pdf/LEADSAFE.PDF> [Accessed May 30, 2006].
- 17 EPA. 2006. Lead in Paint, Dust, and Soil. Available at <http://www.epa.gov/lead/index.html> [Accessed May 16, 2006].
- 18 EPA. 2006. 3Ts for Reducing Lead in Drinking Water in Schools. Available at http://www.epa.gov/safewater/schools/pdfs/lead/toolkit_leadschools_guide_3ts_leadschools.pdf [Accessed May 26, 2006].
- 19 EPA. 1994. Lead in Drinking Water in Schools and Non-Residential Buildings. Available at <http://www.epa.gov/safewater/consumer/pdf/leadinschools.pdf> [Accessed May 30, 2006].
- 20 EPA. 2006. Mercury - Basic Information. Available at <http://www.epa.gov/mercury/about.htm#sources> [Accessed April 5, 2006].
- 21 EPA. 2006. Mercury - Spills, Disposal, and Site Cleanup. Available at <http://epa.gov/mercury/disposal.htm#SPILLS> [Accessed April 5, 2006].
- 22 EPA. 2006. Environmental Emergencies. Available at <http://www.epa.gov/epahome/emergenc.htm> [Accessed November 1, 2006].
- 23 University of Wisconsin Extension's Solid and Hazardous Waste Education Center. 2003. Where is Mercury in Schools? Available at <http://www.mercuryinschools.uwex.edu/schools/where.htm> [Accessed April 5, 2006].
- 24 LAUSD, OEHS. 2005. LAUSD Approved Chemicals List (Inventory List). Available at <http://www.lausd-oehs.org/docs/CSC/Combined%20Chemical%20Inventory.pdf> [Accessed April 5, 2006].
- 25 Californians for Alternatives to Toxics. 2006. Model School IPM Policy. Available at <http://www.alternatives2toxics.org/pdfs/sampleIPMpolicy.pdf> [Accessed April 4, 2006].
- 26 LAUSD, OEHS. 2005. School Laboratory Chemical Hygiene & Safety Plan. Available at <http://www.lausd-oehs.org/docs/CSC/Chemical%20Hygiene%20Plan.pdf> [Accessed April 5, 2006].
- 27 U.S. Centers for Disease Control and Prevention, Office of Health and Safety. 2000. Chemical Storage Guidelines. Available at <http://www.cdc.gov/od/ohs/ENVIRONM/khemstore.htm> [Accessed April 28, 2006].
- 28 Rhode Island Department of Health and Department of Elementary and Secondary Education. 1964 (as amended, through 2005). Rules and Regulations for School Health Programs. Available at http://www.rules.state.ri.us/rules/released/pdf/DOH/DOH_3592.pdf [Accessed April 5, 2006].
- 29 Washington Department of Health and Office of Superintendent of Office of Public Instruction. 2003. Health and Safety Guide for K-12 Schools in Washington, 2nd Edition. Available at <http://www.k12.wa.us/SchFacilities/pubdocs/SafetyManual2002-2003/CompleteSafety&HealthManual2002-2003.pdf> [Accessed April 27, 2006].

Appendix

Chemical Hygiene and Management Plans

Responsible chemical management and hazard communication procedures help to minimize the risk of accidental exposures in schools. **Chemical hygiene or management plans** provide guidelines for handling chemicals in schools using tools such as inventory lists (see example below, extracted from an existing inventory list²⁴).

LAUSD APPROVED CHEMICALS LIST (INVENTORY LIST)

School/Site: _____
 Name: _____
 Signature: _____

Room No.: _____
 Time Spent: _____
 Date: _____

Chemical Name	Manufacturer	Material Safety Data Sheet Yes/No	Compatible Storage	Hazard Health Effects	HR	Total Number of Containers	Total Quantity GM=grams, KG=kilograms, LB=pounds, OZ=ounce, CC, liter	Shelf Life (Months)	Expired Chemical Yes/No
Gram's Iodine Stain= Iodine Solution, Gram			I-2	Poison, Human mutation data reported, Experimental reproductive effects.	3			1 – 10	
Gypsum CaSO ₄ .xH ₂ O			I-2	See Hazard Rating (HR)	1			1 – 10	
Iodeosin C ₂₀ H ₁₄ O ₅			I-2	Poison, Human mutation data reported, Experimental reproductive effects.	3			1 – 10	
**** Iodine (crystals) (PEL 0.1 ppm)			I-2	Poison, Human mutation data reported, Experimental reproductive effects.	3			1 – 10	
Iodine Solution			I-2	Poison, Human mutation data reported, Experimental reproductive effects.	3			1 – 10	
Lithium Chloride LiCl			I-2	Poison, Human mutation data reported, Questionable carcinogen, Experimental neoplastigenic, teratogenic and reproductive effects.	3			1 – 10	



Check It Out

Examples of school chemical hygiene/management plans and associated resources include:

- Maine Department of Labor, Sample Chemical Hygiene Plan for Maine Schools, http://www.safetyworksmaine.com/safe_workplace/sample_programs/school_chemical_hygiene_plan.htm
- Maine Department of Environmental Protection, Scientific Lab Chemical Inventory spreadsheet, http://www.maine.gov/dep/mercury/chemical_inventory_list.xls
- Colorado Department of Public Health and Environment, Guidance on Chemical Management in Schools, <http://www.cdph.state.co.us/cp/Institutions/Schools/Chems%20In%20Schools/ChemMgmt.html>
- Massachusetts Department of Environmental Protection, Massachusetts School Chemical Management Program, <http://www.mass.gov/dep/service/schlchem.pdf>
- Illinois State Board of Education, Chapter 12 of the Guidebook for Science Safety in Illinois, http://www.isbe.net/ils/science/pdf/science_safety.pdf
- EPA, Chemical Management and Usage, http://www.epa.gov/Region7/education_resources/teachers/ehsstudy/ehs1.htm

Hazard Communication Programs also have been implemented in various school districts:

- Putnam City Schools (Oklahoma) – Hazard Communication Standard, <http://www.putnamcityschools.org/pageid333.html>
- Penasco Independent School District (New Mexico) – Hazard Communication Program, http://www.penasco.k12.nm.us/policies/10_12.htm

Sample Guidelines

In addition to preparing comprehensive management plans, many school districts throughout the U.S. have implemented **other types of guidelines**, such as integrated pest management (IPM) policies, to minimize the use of toxic chemicals. An excerpt adapted from a **sample policy** developed for use by California schools is shown below:²⁵

Model School IPM Policy

A. Policy Statement

The {insert name} School District recognizes that the maintenance of a safe, clean, and healthy environment for students and staff is essential to learning. It is the goal of the District to provide the safest and lowest risk approach to control pest problems, while protecting students, staff, the environment, and district property.

The District hereby adopts a Least-Toxic Integrated Pest Management (IPM) policy. This policy shall focus on long-term pest prevention and give non-chemical methods first consideration when selecting appropriate control techniques. The full range of alternatives, including taking no action, will be considered first, with chemical controls used as a last resort. Preference will be given to chemicals and methods of application that pose the least hazards to people and the environment. The District's long-term goal is the elimination of all chemical pest control methods.

B. Role of the IPM Coordinator

The IPM coordinator shall be named to coordinate the district's efforts to adopt IPM techniques, and shall be provided with training on least toxic pest management practices. Specific responsibilities include:

- Overall program management and providing proposed regulations or procedures and products for use in managing pest populations
- Education and training for IPM personnel
- Formal annual notification to parents, staff, and students of any potential chemical pesticide application
- Posting of warning signs for all pesticide applications
- Establishment and maintenance of a registry of parents, staff, and students who have indicated a desire for prior notification of each pesticide application
- Advance notification for individual pesticide applications
- Recordkeeping for any chemical pesticide application

C. Pesticide Product Selection and Use Approval

Selection of pesticide products will be based on the IPM coordinator's review of the product's contents, precautions, and adverse health effects. The IPM Coordinator will prioritize the use of the following nontoxic products:

1. Approved Products

Mechanical or Biological Products

- Caulking agents and crack sealants
- Physical barriers
- Electronic products, heat, and lights

Chemical Products

- Soap-based products
- Borates, silicates, and diatomaceous earth
- Insecticide or rodenticide self-contained baits and traps



Check It Out

For more information on IPM in schools, visit:

- EPA, Integrated Pest Management (IPM) in Schools, <http://www.epa.gov/pesticides/ipm/>
- EPA, Pesticides: Controlling Pests, Storing Pesticides, <http://www.epa.gov/pesticides/ipm/brochure/steps6-7.htm>
- California Department of Pesticide Regulation, Model Program Guidebook, 2nd Edition, http://www.cdpr.ca.gov/cfdocs/apps/schoolipm/managing_pests/guidebook.cfm
- University of Florida/EPA, National School IPM Information Source, <http://schoolipm.ifas.ufl.edu/>
- Texas A&M University/EPA, IPM Resource Center for Schools and Childcare Facilities, <http://schoolipm.tamu.edu/>
- Massachusetts Natural Resources Collaboration, IPM Tools & Resources, <http://massnrc.org/ipm/schools-daycare/ipm-tools-resources.html>
- Minnesota Department of Agriculture, Management of Pesticides, www.mda.state.mn.us/ipm/fspesticides.pdf
- National Pesticide Information Center, <http://npic.orst.edu/>

Checklists

Checklists are often used to clearly identify chemical management actions and to verify that they have been completed (see basic example below, an excerpt adapted from the Los Angeles Unified School District “School Laboratory Chemical Hygiene & Safety Plan”²⁶).

LOS ANGELES UNIFIED SCHOOL DISTRICT MONTHLY CHECKLIST FOR SAFE HANDLING AND STORAGE OF CHEMICALS

To be completed by C.S.C.

ACTIVITY	Yes	No
1. All chemicals are correctly and clearly labeled.		
2. Unlabeled containers and chemical wastes have been inventoried and a disposal request submitted to OEHS.		
3. Only chemicals that are being used are continually being stored.		
4. Only the amount of chemicals which can be consumed within a year are being stored.		
5. CSC is aware of and has trained others on hazards and precautions for protection prior to using any chemical, and has reviewed the precautionary labels and contents before using any chemical product.		
6. All chemicals are stored by compatibility (see CHSP Appendix IV, Table 1: Chemical Shelf Storage Identification Chart and Table 2: Storage for Compatibility Categories).		
7. Chemicals are stored on shelves below eye level.		
8. Chemicals are being stored on the floor.		
9. Chemicals are being stored in approved storage cabinets.		
10. Neutralizing chemicals, absorbent and other spill control materials are readily available.		
11. Compressed gas cylinders are upright and secured to the wall with caps in place.		
12. Storage cabinets for corrosive chemicals (separated for acids and for bases) are appropriately labeled.		
13. Flammable materials are stored in approved storage cabinets.		
14. Shelving is equipped with lips to prevent products from rolling off shelves and secured to walls/floor to prevent tipping of entire sections.		
15. Storage areas/cabinets are labeled to identify the hazardous nature of the products stored within.		
16. Class ABC fire extinguishers are available in chemical storage areas and are in working order.		
17. There are no sources of ignition in the chemical storage area.		
18. Chemical storage area has two exits and egress (exiting) area is clear.		
19. Used and contaminated reagents are stored and labeled properly.		
20. Current and dated inventory lists are posted clearly in each storage room throughout the science department.		
21. Chemical storage cabinets are locked when laboratory classes are not in session.		

Certification: I hereby certify that I have completed all of the above activities in fulfillment of my responsibilities as the Chemical Safety Coordinator (CSC) for my school.

Date

School

CSC Signature

CSC Name (print)



Check It Out

Additional checklists are available at:

- EPA, HealthySeat Assessment Checklist, http://www.epa.gov/schools/healthyseat/AssessmentChecklist_Blank.pdf
- National Institute for Occupational Safety and Health, NIOSH Safety Checklist Program for Schools, <http://www.cdc.gov/niosh/docs/2004-101/default.html>
- Massachusetts Healthy Schools Council, Checklist Concerning Environmental Health & Safety in Schools, http://mass.gov/Eeohhs2/docs/dph/environmental/iaq/schools_checklist.pdf
- Washington Department of Health and Office of Superintendent of Office of Public Instruction, Health and Safety Guide for K-12 Schools in Washington (Part II), <http://www.k12.wa.us/SchFacilities/HealthSafetyGuide.aspx>

Chemical Purchasing, Storage, and Design Guidelines

Chemical purchasing, storage, and design guidelines have been developed by many school districts and state agencies in an effort to eliminate unnecessary purchases of hazardous substances and avoid dangerous storage scenarios. General chemical storage principles are illustrated in the following example, adapted from the U.S. Centers for Disease Control and Prevention, Office of Health and Safety's Chemical Storage Guidelines:²⁷

Class of Chemical	Recommended Storage Method	Examples	Incompatibilities
Compressed gases – Flammable	Store in a cool, dry area, away from oxidizing gases. Securely strap or chain cylinders to a wall or bench.	Methane, Hydrogen, Acetylene, Propane	Oxidizing and toxic compressed gases, oxidizing solids
Compressed gases – Oxidizing	Store in a cool, dry area, away from flammable gases and liquids. Securely strap or chain cylinders to a wall or bench.	Oxygen, Chlorine, Bromine	Flammable gases
Compressed gases – Poisonous	Store in a cool, dry area, away from flammable gases and liquids. Securely strap or chain cylinders to a wall or bench.	Carbon monoxide, Hydrogen sulfide, Nitrogen dioxide	Flammable and/or oxidizing gases
Corrosives – Acids	Store separately in acid storage cabinet. Segregate oxidizing acids (i.e., Chromic, nitric, sulfuric, and perchloric acids) from organic acids.	Acetic acid, Phenol, Sulfuric acid, Chromerge, Nitric acid, Perchloric acid, Chromic acid, Hydrochloric acid	Flammable liquids, flammable solids, bases, oxidizers
Corrosives – Bases	Store in separate corrosive storage cabinet. Store solutions of inorganic hydroxides in labeled polyethylene containers.	Ammonium hydroxide, Sodium hydroxide, Calcium hydroxide	Flammable liquids, oxidizers, poisons, acids
Flammable Liquids	Store in flammable storage cabinet and away from sources of ignition. Store highly volatile flammable liquids in an explosion-proof refrigerator.	Acetone, Benzene, Diethyl ether, Methanol, Ethanol, Toluene, Glacial acetic acid	Acids, bases, oxidizers, poisons



Check It Out

Consult the following resources for more information on chemical storage, purchasing, and design:

- Californian Department of Environmental Health Hazard Assessment, Art Hazards, <http://www.oehha.ca.gov/education/art/index.html>
- King County, Washington, Rehab the Lab, <http://www.govlink.org/hazwaste/schoolyouth/rehab/index.htm> and <http://www.epa.gov/epaoswer/osw/conserves/2004news/03-labs.htm>
- Iowa Metro Waste Authority, Rehab the Lab (Hazardous Materials), http://www.metro-waste.com/sch_reh.html
- EPA, Healthy School Environment Resources: Chemical Purchasing, http://cfpub.epa.gov/schools/top_sub.cfm?t_id=361&s_id=363
- Massachusetts Department of Environmental Protection, Massachusetts School Chemical Management Program, <http://www.mass.gov/dep/service/schlchem.pdf>
- Commonwealth of Massachusetts, Environmentally Preferable Purchasing Program, Product & Service Information, <http://www.mass.gov/epp/products.htm>
- Illinois EPA and Waste Management Resource Center, Greening Schools homepage, <http://www.greeningschools.org/>
- Maryland State Department of Education, Science Facilities Guidelines, Chapter 5: Design Considerations, http://www.mdk12.org/instruction/curriculum/hsa/science_facility/chapter5.html

Use of Chemicals in Schools

Some states have taken **regulatory actions** to limit the use of chemicals in schools. For example, Rhode Island²⁸ prohibits the use of listed chemicals in schools (see excerpts from Rhode Island’s list below). The State of Washington’s Department of Health and Office of Superintendent of Public Instruction also have published a tiered list of chemicals: (1) unsuitable for use (see Appendix D, Table 1 of their guide) in K-12 schools due to excessive risk that exceeds their educational utility, and (2) appropriate only for advanced-level high school science classes due to high risk and limited to small- or micro-scale quantities (see Appendix D, Table 2 of their guide).²⁹ Furthermore, chemicals that are allowed in schools may vary across districts for different reasons (e.g., staff experience, training).

Full Chemical Name	CAS #	Reference
1-(2-tert-Butylperoxy isopropyl)-3-isopropenylbenzene	96319-55-0	49CFR173.225
1-(o-Chlorophenyl)thiourea	5344-82-1	EPA Acutely Toxic (P Listed)
1,1-Di-(tert-amylperoxy)cyclohexane	15667-10-4	49CFR173.225
1,1-Di-(tert-butylperoxy)-3,3,5-trimethylcyclohexane	6731-36-8	49CFR173.225
1,1-Di-(tert-butylperoxy)cyclohexane	3006-86-8	49CFR173.225
1,1'-Diazoaminonaphthalene		DOT Forbidden
1,1-Dimethyl-3-hydroxybutylperoxyneohexanoate		49CFR173.225
1,2,3-Propanetriol, trinitrate (R)	55-63-0	EPA Acutely Toxic (P Listed)
1,2,4-butanetriol trinitrate		DOT Forbidden
Benzene	71-43-2	Reproductive Toxin, Select Carcinogen
benzene diazonim chloride		DOT Forbidden
Benzene sulphohydrazide	80-17-1	49CFR 173.224
benzene triozone		DOT Forbidden
Benzene, (chloromethyl)-	100-44-7	EPA Acutely Toxic (P Listed)
carbazole	86-74-8	IARC List of Known and Suspected Human Carcinogens
Carbonic dichloride	75-15-0	EPA Acutely Toxic (P Listed)
carrageenan	9000-07-1	IARC List of Known and Suspected Human Carcinogens
chlordane	57-74-9	IARC List of Known and Suspected Human Carcinogens
dichloromethane	75-09-2	IARC List of Known and Suspected Human Carcinogens
Dieldrin	60-57-1	EPA Acutely Toxic (P Listed)
guanyl nitrosaminoguanlydene hydrazine		DOT Explosive
hexanitrodiphenylamine	131-73-7	DOT Explosive
Isopropyl Ether	108-20-3	Peroxidizable
Lead and lead compounds	7439-92-1	Reproductive Toxin
Methyl chloromethyl ether	107-30-2	OSHA Listed Chemicals
Methyl ethyl ketone peroxide	1338-23-4	49CFR173.225



Check It Out

Other states that have passed regulations related to chemicals in schools:

- Colorado Department of Public Health and Environment, Rules and Regulations Governing Schools in the State of Colorado, http://www.csmate.colostate.edu/cltw/Colorado_Rules.pdf

Leadership and Resources

Pollution Prevention and Greener Alternatives

Chemical and Product Management

Chemical Inventory

Purchasing

Storage and Handling

Training

Hazard Communication

Spills, Cleanup, and Disposal



*United States Environmental Protection Agency
Office of Pollution Prevention and Toxics, (7409-M)
Washington DC 20460*

*Official Business
Penalty for Private Use \$300*

*EPA 747-R-06-002
December 2006*