Hazardous Waste Management for School Laboratories and Classrooms

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EPA Region 8 INFORMATION KIT
EPA 908-F-06-001

In This Tool Kit

This tool kit is designed for teachers and students of the science laboratory. School administrators, science department personnel, janitorial staff, and others who have an interest and involvement in the laboratory would also benefit from the information contained within this tool kit.

Contact Us

U.S. EPA Region 8

1-800-227-8917

For More Information

www.epa.gov/schools/

School Science Laboratories

Most of the waste chemicals resulting from science laboratory experiments are considered hazardous, so the generation, storage, and disposal of hazardous wastes must be given special consideration in every experiment.

This tool kit provides guidelines for proper management of your wastes and resources to help minimize risks and maintain a safe school laboratory environment. Integrating these guidelines in your teaching curriculum will help reinforce to students the importance of lessening the impact to and protecting the environment.

The following sections address issues that should be considered in the management of wastes that are generated from science education. Specific information about mercury, lead, asbestos and polychlorinated biphenyls is also presented. These hazardous materials may pose potential concerns in laboratories as well as in other school environments. This tool kit is not meant to be a comprehensive information source on all school hazards. For more information about other important topics such as pesticides, facility maintenance, and environmentally preferable cleaning products, please visit EPA's Healthy School Environment Resources web site at **http://cfpub.epa.gov/schools/index.cfm**.

The regulatory information provided in this tool kit does not itself represent or replace the applicable environmental regulations for schools; instead, the information is intended for informational and guidance purposes only.

Hazardous Waste Management

Everyone associated with the school science laboratory shares the responsibility to minimize the amount of waste produced, and to dispose of wastes in a way that has the least impact on human health and the environment. Prior to generating and managing any wastes, carefully evaluate each experiment and confirm that your work environment and disposal methods are safe and in compliance with all applicable regulations.

- Carefully evaluate each experiment to be sure that:
  - There is reasonable justification for use of the chemicals
  - The potential risks are understood
  - Less hazardous substitutes are not available
  - The quantities to be used are as small as practical, and
  - The waste disposal method is within the capabilities of the school and in accordance with current regulations;
- Consider developing a *Waste Management Plan*;
- Contact your governing regulatory authority (tribal environmental director, local health department, state, and/or EPA) for assistance;
- Contact your local fire department or local emergency planning committee (LEPC) for fire codes and emergency planning information, and chemical handling assistance if needed;
- Do not dispose of any materials or wastes in sinks and drains without prior approval from the local publicly owned treatment works (wastewater treatment department);
- Do not dispose of any materials or wastes in sinks and drains if your school discharges to a septic tank system;
- Do not dispose of any chemicals in the trash without contacting your regulatory authority and your solid waste disposal service for approval;
- Do not dispose of any chemicals by evaporation in a fume hood or other location.

Regulatory Information

When wastes are generated from science activities used for instruction, various regulatory requirements may apply. It is the school's responsibility to determine if hazardous wastes are being generated and how the hazardous waste regulations apply. The following information and links provide resources and direction for compliance with the applicable regulatory requirements, but do not serve as a substitute for the regulations themselves. Some best management practices are also provided. Proper waste management will ensure a safer school and protection of human health and the environment.

It is important to realize that you may be held legally liable for your hazardous waste and any damage it creates even after it leaves your school and is transported to a treatment, storage, or disposal facility. Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund, you can be required to contribute to the costs of cleaning up any contamination resulting from your wastes wherever they may end up. Therefore, it is important to ensure compliance with the regulations and that the business you pay to dispose of your wastes is approved and in full compliance.

Prudent Practices in the Laboratory: Handling and Disposal of Chemicals
National Research Council, 1995: (www.nap.edu/books/0309052297/html)

Treatment of Hazardous Wastes **(http://waste.custhelp.com)**

Little Known But Allowable Ways to Deal with Hazardous Waste **(www.epa.gov/sbo/pdfs/hazwaste_500.pdf)**

Free Reference Manual with Waste Management Information for Science Teachers **(www.flinnsci.com/Sections/Freebies/flinnFreebies.asp)**

RCRA Regulations and Standards **(www.epa.gov/epaoswer/osw/laws-regs.htm)**

Environmental Management Guide for Small Laboratories **(www.epa.gov/sbo/labguide.htm)**

State Environmental Offices **(www.epa.gov/epaoswer/osw/stateweb.htm)**

Tribal Environmental Offices **(www.epa.gov/indian/tcont.htm)**

To avoid liability and ensure compliance with regulations:

- Maintain accurate records from the point of waste generation to waste disposal, including the final disposition of the wastes;
- Treat/neutralize wastes yourself in accordance with the rules. Generators of hazardous waste may be able to treat their wastes onsite in tanks, containers, or containment buildings without obtaining a permit if certain requirements are met.
- Make sure the people you pay to dispose of your wastes are in full compliance.
    - Check the company's compliance status via EPA's Enforcement and Compliance History Online, or ECHO, at www.epa.gov/echo/
    - Ask them to provide written documentation of all necessary permits, and maintain copies of these
    - Inquire about their record keeping practices for transport and disposal
    - Ask them about their treatment and disposal practices, and the final disposition of your wastes
    - Inquire about any special conditions or minimum pick-up requirements that may apply to your wastes
    - Make arrangements by phone before shipping any amount

Reducing the amount of hazardous waste you produce will be the most economical and environmentally sound approach to minimizing the requirements that apply to your school.

- Please review the section on Waste Minimization and Pollution Prevention in the "Pollution Prevention Measures for Safer School Laboratories" (EPA 908-F-06-002) tool kit for tips and recommendations.

The generation and management of hazardous wastes are specifically regulated under the Resource Conservation and Recovery Act (RCRA). Major highlights under this regulation are outlined below in steps as a general guide for examining the proper management of your wastes. Please refer to a more complete discussion of the Federal regulatory requirements for hazardous waste management in the Code of Federal Regulations (CFR), CFR 40 Parts 260-279, to understand all of the requirements that may apply to your school.

STEP 1:

- **Check with your state and tribal environmental offices to determine how hazardous wastes are regulated**. Many state and tribal programs and regulations can be more comprehensive and/or more stringent than Federal regulatory requirements.

STEP 2:

When waste is produced, determine whether it is hazardous.

Hazardous Waste Identification **(www.epa.gov/epaoswer/hazwaste/id/id.htm)**

Identification and Listing of Hazardous Waste [40 CFR 261] **(www.epa.gov/docs/epacfr40/chapt-I.info)**

Click on the Part 261 link.

Hazardous Waste Identification Training Module **(www.epa.gov/epaoswer/hotline/training/hwid05.pdf)**

Introduction to Generators Training Module **(www.epa.gov/epaoswer/hotline/training/gen05.pdf)**

Resources for Small Quantity Generators of Hazardous Waste **(www.epa.gov/epaoswer/osw/gen_trans/sqg_resources.htm)**

Managing Your Hazardous Waste: A Guide For Small Businesses **(www.epa.gov/epaoswer/hazwaste/sqg/sqghand.htm)**

- Waste is considered hazardous if it is (a) solid waste defined as a liquid, solid, semi-solid, contained gaseous material, or combination thereof, (b) discarded material (no longer usable; will be disposed of or recycled; will be accumulated, stored, or treated for disposal), (c) is not excluded from regulation as a hazardous waste, and (d) meets *any* of the following criteria:

  - It displays certain hazardous characteristics based on the physical and chemical properties of the waste: ignitability, corrosivity, reactivity, or toxicity;
  - It is listed in the regulations as hazardous.

Hazardous waste may demonstrate more than one characteristic or be both listed and characteristically hazardous waste.

STEP 3:

Calculate the total amount of all of the hazardous waste your school generates on a monthly basis. The amount you generate will determine your generator status and the different regulatory requirements that will need to be met.

In general, the less waste your laboratory produces, the fewer regulations the school must comply with. Most schools are small generators of hazardous waste. Note that certain chemicals are considered acute hazardous waste, such as mercury, so small amounts of these chemicals can define your generator status.

The following outlines the major requirements for small generators:

- Conditionally Exempt Small Quantity Generators (CESQGs) generate less than or equal to 100 kg (220 lbs) of hazardous waste or less than or equal to 1 kg (2.2 lbs) of acute hazardous waste per month [40 CFR 261.5]. This is roughly less than half of a 55-gallon drum.
  - CESQGs must not accumulate more than 1,000 kg (2,200 lbs) of hazardous waste at any time
  - CESQGs must ensure that their hazardous waste is delivered to someone who is authorized (state approved, RCRA permitted, or legitimate recycler) to manage their waste
  - Personnel training is not required, however recommended.

- Small Quantity Generators (SQGs) generate between 100 kg (220 lbs) and 1,000 kg (2,200 lbs) per month of hazardous waste [40 CFR 261.5 and 262].
  - SQGs must obtain an EPA Identification number (contact your authorized state for this number)
  - SQGs must comply with proper handling requirements for packaging, labeling (contents, date), marking, placarding, satellite accumulation, etc.
  - SQGs must not accumulate more than 6,000 kg of hazardous waste for more than 180 days (or 270 days if waste is to be transported over 200 miles)
  - SQGs must comply with the manifest system. A manifest is a form that tracks waste from its origin to its disposal.
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- SQGs must comply with record keeping and reporting requirements
- SQGs must ensure that their hazardous waste is delivered to someone who is authorized (RCRA permitted or legitimate recycler) to manage their waste
- Basic personnel training is required.

Large Quantity Generators of Hazardous Waste **(www.epa.gov/epaoswer/hazwaste/gener/lqgfact.txt)**

- Large Quantity Generators (LQGs) generate more than 1,000 kg (2,200 lbs) of hazardous waste or more than 1 kg (2.2 lbs) of acute hazardous waste per month [40 CFR 262].
  - LQG requirements are more comprehensive than for small generators. Refer to the regulations for LQG requirements.

- Remember that states and tribes may have additional requirements for generators. Contact your state or tribe if you are not familiar with the requirements that may apply to you.

STEP 4:

Store your wastes properly prior to disposal or recycling. All hazardous wastes should be placed in containers that are in good condition and compatible with the wastes, and kept closed at all times except when adding or removing wastes. Hazardous waste containers should be placed on an impervious surface (pavement, tile) without floor drains.

Follow storage limits and permissible accumulation times according to your generator category (outlined in Step 3).

- Keep individual and incompatible hazardous waste streams segregated:
  - Store recyclable wastes like recoverable metals and solvents separately, as well as separate from nonrecyclable wastes
  - Keep nonhazardous wastes separate from hazardous wastes
  - Do not mix incompatible wastes (e.g. ignitables and oxidizers);

- In most cases when a hazardous waste is mixed with a nonhazardous waste, the mixture will be regulated as a hazardous waste. Separating these wastes helps limit your total amount of hazardous waste.

STEP 5:

Land Disposal Restrictions **(www.epa.gov/epaoswer/hazwaste/ldr/index.htm)**

Land Disposal Restrictions (LDRs) are regulations that minimize hazards from the land disposal of hazardous wastes. LDRs set treatment standards for constituents in hazardous wastes, including mercury, which must be achieved before land disposal [40 CFR 268].

- LDRs are applicable to SQGs and LQGs, and a possible state requirement for CESQGs.

Common School Hazards

The presence of mercury, asbestos, lead, and polychlorinated biphenyls in schools may present potential health hazards. It is important to understand the sources of these materials, routes of exposure, health effects, and the regulations that apply to their management.

MERCURY

Mercury and its compounds, both organic and inorganic, are serious health hazards. The most harmful acute exposure occurs through inhalation, but it is also harmful by absorbance through the skin. Production of mercury vapor is heightened by heating mercury or by splattering that occurs during a spill. Symptoms of mercury exposure can include tremors, emotional changes, headaches, neuromuscular changes, disturbances in sensations, changes in nerve responses, and performance deficits on tests of cognitive function. Higher mercury exposures can include kidney effects, respiratory failure and death. Laboratory sources of mercury include, among others, thermometers, manometers (barometers), lamps, lab supplies and chemicals, and batteries.

- Mercury is regulated by several environmental laws. The regulation most applicable to your school is the Resource Conservation and Recovery Act (RCRA).
- EPA strongly encourages schools to discontinue use of and remove all mercury compounds and mercury-containing equipment.
- Mercury wastes are determined hazardous by assessing whether the wastes are characteristic or listed (see Step 2 above).
- LDRs and treatment standards apply to mercury contained in hazardous waste.
- Products containing mercury, such as batteries, thermostats, and fluorescent lamps or other mercury-containing lamps, are considered hazardous and may be managed under the Universal Waste Regulations. The Universal Waste Regulations [40 CFR 273] streamline collection requirements and decrease regulatory burden, while promoting proper recycling and management. The primary benefits of the Universal Waste Rule are that the waste does not count towards the monthly total of hazardous waste in determining generator status; there are reduced notification and record-keeping requirements; and less stringent storage time limits. In Colorado, for example, wastes may be shipped without a manifest and shipped by common carrier instead of a hazardous waste transporter.

ASBESTOS

The presence of asbestos in schools presents the potential for both intentional and accidental disturbance and exposure. Asbestos is a naturally occurring mineral fiber that has been added to a variety of building products to strengthen them and to provide heat insulation and fire resistance. For the most part, asbestos is safe if it is intact. If

Mercury Information and Regulation **(www.epa.gov/mercury)**

Mercury Regulations **(www.epa.gov/epaoswer/hazwaste/mercury/reg_stand.htm)**

Lamp Recycling Outreach Project **(www.almr.org/almr_project_web.html)**

Universal Waste Regulations **(www.epa.gov/epaoswer/hazwaste/id/univwast.htm)**

asbestos is disturbed and fibers are released into the air, they can be inhaled into the lungs and become a potential health risk. Continued exposure can increase the amount of fibers that remain in the lung. Fibers embedded in lung tissue over time may cause serious lung diseases.

Asbestos Information and Regulation **(www.epa.gov/asbestos/pubs/asbestos_in_schools.html)**

- Asbestos is regulated by the Asbestos Hazard Emergency Response Act (AHERA), the Toxic Substances Control Act (TSCA), and the Clean Air Act (CAA).
- Schools are required to inspect for asbestos-containing material (ACM), to develop and maintain an up-to-date Asbestos Management Plan, and to safely manage ACM.

LEAD

The presence of lead in schools may also present a health hazard. The most common lead hazards in schools are lead-based paint, lab chemicals, lead dust, and contaminated soil. Other sources of lead hazards are older plumbing fixtures, vinyl miniblinds, painted toys and furniture made before 1978 that may be painted with lead-based paint, glazes (pottery), and nearby lead smelters or other industrial sources. Exposure to low levels of lead can cause nervous system and kidney damage, learning disabilities, attention deficit disorder, and decreased intelligence. High levels of lead can have devastating effects on children, including seizures, unconsciousness, and, in some cases, death.

Lead in Schools **(cfpub.epa.gov/schools/top_sub.cfm?t_id=41&s_id=29)**

Lead in Paint, Dust, and Soil **(www.epa.gov/lead)**

- Lead is regulated by the Toxic Substances Control Act (TSCA), the Resource Conservation and Recovery Act (RCRA), and the Safe Drinking Water Act (SDWA).
- Child-occupied facilities must comply with specific standards for lead paint hazards.

POLYCHLORINATED BIPHENYLS (PCBs)

Polychlorinated biphenyls (PCBs) are mixtures of synthetic organic chemicals with the same basic chemical structure and similar physical properties ranging from oily liquids to waxy solids. PCBs were used in hundreds of industrial and commercial applications including electrical, heat transfer, and hydraulic equipment; as plasticizers in paints, plastics, and rubber products; in pigments, dyes, and carbonless copy paper as well as other applications. The most common type of PCB-containing waste that may be found in schools is fluorescent light ballasts manufactured prior to 1979. PCBs are probable human carcinogens (cancer-causing) and can also cause a series of non-cancer adverse health effects, including effects on the immune system, reproductive system, nervous system, endocrine system, and others.

PCB Information **(www.epa.gov/pcb)**

- PCBs are regulated by the Toxic Substances Control Act (TSCA), which includes prohibitions on the manufacture, processing, and distribution in commerce of PCBs; and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).
- Fluorescent and high intensity discharge ballasts manufactured prior to 1979 contain PCBs. Light ballasts should be marked with either a date of manufacture or a marking by the manufacturer stating “No PCBs.” If neither is found, the ballast must be assumed

EPA Approved PCB Waste Handlers **(www.epa.gov/pcb/pubs/waste.html)**

Submersible Pump Units that Contain PCBs **(www.epa.gov/compliance/resources/publications/monitoring/tsca/manuals/pcbinspect/pcbinspectapph.pdf)**

to contain PCBs and be managed according to regulation.

- The proper method for disposing used ballasts depends on the type and condition (leaking or non-leaking) of the ballasts, as well as the regulations in the state where they are removed and discarded. Under TSCA, non-leaking PCB-containing ballasts may be disposed in a municipal solid waste landfill. However, to minimize potential releases to the environment, EPA highly recommends that they be packed in drums and shipped for disposal to a TSCA landfill, TSCA high temperature incinerator, an approved hazardous waste landfill, or to an approved recycler.

- If your school disposes a pound or more of PCBs (roughly 12-16 fluorescent ballasts) in a 24-hour period, the National Response Center at 1-800-424-8802 must be notified.

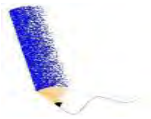
- Disposers of non-leaking PCB-containing light ballasts are subject to liability under CERCLA should the municipal landfill where the ballasts were disposed have releases and become subject to clean-up.

- Submersible pumps used for groundwater wells have the potential to contain capacitors containing PCBs. Contact a state-licensed well driller to learn whether the pump motor is likely to contain a PCB-filled capacitor. Licensed pump installers can advise well owners on leak detection, pump replacement, water supply system cleanup, and proper disposal of contaminated pumps. Drinking water samples collected for testing should be sent to a certified water testing lab.

In addition to hazardous waste regulations in the Resource Conservation and Recovery Act (RCRA), Subtitle C, and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), other environmental regulations that may apply to your school include:

- RCRA Subtitle D – solid waste management
- Emergency Planning and Community Right-to-Know Act (EPCRA)
- Toxic Substances Control Act (TSCA)
- Occupational Safety and Health Act (OSHA)
- Clean Air Act (CAA)
- Clean Water Act (CWA)
- Safe Drinking Water Act (SDWA)
- Asbestos Hazard Emergency Response Act (AHERA)
- Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)
- Department of Transportation (DOT) regulations
- National Fire Protection Association (NFPA) regulations
- Municipal and local standards.

Compliance Assistance



There are many U.S. EPA resources available to provide additional information on regulatory requirements and waste reduction methods for hazardous wastes.

U.S. EPA Region 8
Solid & Hazardous Waste Program
1-800-227-8917
http://www.epa.gov/region08/land_waste/rcra/rcracontact.html

- Solid and hazardous waste staff are available to answer specific questions and provide additional information on hazardous waste issues

U.S. EPA Healthy School Environments
http://cfpub.epa.gov/schools/index.cfm

- Provides on-line resources to help facility managers, school administrators, architects, design engineers, school nurses, parents, teachers and staff address environmental health issues in schools.

U.S. EPA Small Business Ombudsman Clearinghouse/Hotline
1-800-368-5888
Small Business Division (1808T)
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue NW
Washington, D.C. 20460
(202)566-2822
www.epa.gov/sbo/sboquest.htm

- Helps private citizens and small businesses with questions on all program aspects within EPA

U.S. EPA National Center for Environmental Publications and Information
1-800-490-9198
www.epa.gov/ncepihom

- Provides access and information about EPA publications

American Indian Environmental Office
www.epa.gov/indian

- Provides information on programs, laws, regulations, grants, and tribal contacts

Region 8 Tribal Programs and Environmental Directors
www.epa.gov/region08/land_waste/rcra/tribal/trcontacts/trR8tribes/trr8tribes.html

- Provides direct links to various tribal homepages and or the email addresses for the tribal environmental coordinators

U.S. EPA RCRA Online
www.epa.gov/rcraonline

- Provides information related to hazardous waste regulations and RCRA, CERCLA, and EPCRA

Asbestos Abatement/Management Ombudsman
Hotline: **1-800-368-5888**

- Provides information on handling, abatement, and management of asbestos in schools; interpretation of the asbestos in schools requirements and publications to explain recent legislation

National Lead Information Center & Clearinghouse
Hotline: **1-800-424-LEAD (5323)**
www.epa.gov/lead

- Provides information about lead, lead hazards, and how parents can help protect their children from lead poisoning

U.S. EPA Hotline List
www.epa.gov/epahome/hotline.htm

- Provides a comprehensive list of all EPA sponsored hotlines

Montana Department of Environmental Quality
Business and Community Assistance Program (BCAP)
www.deq.mt.gov/Recycle/index.asp

- BCAP works with schools on a wide variety of projects, including environmental management programs

SCHOOL LAB CLEANOUT PROGRAMS IN U.S. EPA REGION 8

Colorado Consumer Protection Division
www.cdphe.state.co.us/cp
Click on "Guidance on Chemical Management in Schools"

- Colorado provides resources and helpful information on procedures for conducting an inventory, a list of common hazards and guidelines for handling hazardous materials, a self-assessment tool for determining compliance with applicable rules and regulations, questions and information to obtain from potential hazardous waste vendors, and a list of hazardous waste disposal companies.

Montana Department of Environmental Quality
Hazardous Waste Program
www.mdeqschoollabs.com

- Montana provides resources and helpful information on proper management and disposal of hazardous chemicals, related school science lab links, chemical information, and links to lab clean-out projects in other states.

Wyoming Department of Education
www.epa.gov/epaoswer/osw/conserve/2004news/09-rural.htm

- The Wyoming Department of Education (WDE) developed a cleanout program that requires school districts to match funding and implement best management practices guidelines. Contacts are Matt Langenfeld at EPA (303)312-6284, or Bruce Hayes at WDE (307)777-6198.

U.S. Environmental Protection Agency
Schools Chemical Cleanout Campaign (SC3)
www.epa.gov/epaoswer/osw/conserve/clusters/schools/index.htm

- The SC3 Campaign provides information about how to remove potentially harmful chemicals from schools; emphasizes the implementation of preventive programs such as chemical management training for lab instructors and microscale techniques; and raise national awareness about chemical hazards in schools.

References

Battelle Pacific Northwest Laboratories, Battelle Seattle Research Center. Laboratory Waste Minimization and Pollution Prevention: A Guide for Teachers.

Chase, J. (1995) Blueprint for a Green School. Scholastic, Inc. New York.

U.S. Environmental Protection Agency. www.epa.gov/

U.S. Environmental Protection Agency (2000). Environmental Management Guide for Small Laboratories.

U.S. Environmental Protection Agency. Schools Chemical Cleanout Campaign (SC3).

Please Note: The inclusion of non-EPA links and their content does not necessarily reflect the views and policies of the EPA, nor does the mention of trade names or commercial products constitute endorsement or recommendation for use. These links are included to maximize the utility the Internet provides and to better fulfill our role as information provider and disseminator.

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