



STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT
ENGINEERING & ENFORCEMENT DIVISION

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Environmental Program Fact Sheet

Hazardous Waste Management in Academic Laboratories

What You Should Know

Teachers, students and administrators are sometimes unaware that chemicals purchased and used as part of daily use in chemistry and other laboratory situations are hazardous waste when discarded. Examples of common laboratory hazardous wastes include, but are not limited to metals such as mercury and arsenic, various acids (including nitric acid and picric acid), and bases (such as sodium hydroxide and bleach).

Improper management and disposal of these chemicals and hazardous wastes can injure janitorial staff, students, teachers and sanitation workers, damage septic and sewage systems, contaminate soils and ground water supplies (which may lead to contaminated drinking water), increase hazardous air emissions or cause fires and explosions.

Are You a Generator of Hazardous Waste?

Most schools in the state are classified either as Conditionally Exempt Small Quantity Generators, or Small Quantity Generators, although over-accumulation of waste can trigger Large Quantity Generator requirements. The differences among these three generation categories are *briefly* described below in a table that outlines the different requirements applicable to the generators. More detailed guidance is available from DEP (see contact information at the top of this page).

- 1) Conditionally Exempt Small Quantity Generator (CESQG)** - Generates no more than 100 kg of hazardous waste per calendar month, and never accumulates more than 1000 kg of hazardous waste or 1 kg of acutely hazardous waste on-site at any one time. (This generation category includes most schools, and a CESQG guidance document is available for generators in this category.)
- 2) Small Quantity Generator (SQG)** - Generates greater than 100 kg but less than 1000 kg of hazardous waste in any one calendar month, and never accumulates more than 1000 kg of hazardous waste or 1 kg of acutely hazardous waste at any time. (An SQG guidance document is also available.)
- 3) Large Quantity Generator (LQG)** - Generates 1000 kg or more of hazardous waste in any one calendar month, or more than 1 kg of acutely hazardous waste. This category is subject to more comprehensive regulation under RCRA than CESQG and SQG categories. (Fact sheets and other guidance documents are available for generators in this category).

NOTE: This guidance document does not and is not intended to replace or supersede either Regulations of Connecticut State Agencies (RCSA), Sections 22a-449(c)-100-119 and 22a-449(c)-11 ("Hazardous Waste Management Regulations") or the Code of Federal Regulations Title 40 ("40 CFR"), Parts 260 through 279. DEP advises the regulated community not to rely solely upon the information presented in this guidance document, but to read all applicable regulations set forth in both the Hazardous Waste Management Regulations and Title 40 CFR, Parts 260 through 279, and to keep informed of all subsequent revisions or amendments to these regulations.

Requirements for Generators of RCRA Hazardous Waste			
	Large Quantity	Small Quantity	Conditionally Exempt
Amount of Hazardous Waste Generated (per calendar month)	More than 1000 kg of hazardous waste <u>or</u> More than 1 kg of acute hazardous waste.	More than 100 kg but less than 1000 kg of haz. waste <u>and</u> No more than 1 kg of acute hazardous waste.	No more than 100 kg of hazardous waste <u>and</u> No more than 1 kg of acute hazardous waste.
Hazardous Waste Determination Required	Yes	Yes	Yes
EPA ID Number Required	Yes	Yes	No
Accumulation Quantity Limits	None	1000 kg hazardous waste	1000 kg hazardous waste
Maximum Accumulation Time	90 days	180 days	No Limit*
Storage Requirements	-40 CFR Subpart I and J Container and Tank Storage Requirements. - container dating & marking. -secondary containment. -preparedness & prevention requirements. -general requirements for ignitable, reactive & incompatible wastes -storage area inspections.	-40 CFR Subpart I and J Container and Tank Storage Requirements. - container dating & marking. - secondary containment. - preparedness & prevention requirements. - storage area inspections.	None*
Off-Site Waste Management	RCRA permitted or interim status HW facility.	RCRA permitted or interim status HW facility.	RCRA permitted or interim status facility, or approved household hazardous waste (HHW) collection program.**
Contingency Plan	Full plan to minimize hazards from fires, spills, explosion.	Posting emergency information by telephones.	None*
Permitted Transporter Required	Yes	Yes	Yes
Treatment on-Site Without a RCRA Permit or Interim Status	No (With exceptions including treatment in containers and tanks).	No (With exceptions including treatment in containers and tanks).	No (Except for treatment in containers and tanks or on-site recycling).

* Best Management Practices, including responsible handling and storage of wastes are recommended.

** HHW programs must be specifically permitted to accept CESQG waste.

Requirements for Generators of RCRA Hazardous Waste			
	Large Quantity	Small Quantity	Conditionally Exempt
Manifest Required for Off-site Shipments	Yes	Yes	No
Biennial Report	Yes	No	No
Recordkeeping	-Manifests. -Biennial reports. -Exception reports. -Test results. -Waste determinations. -Records of past management practices. -Documentation if any past decontamination of equipment to eliminate waste codes.	-Manifests. -Exception reports. -Test results. -Waste determinations. -Records of past management practices. - Documentation if any past decontamination of equipment to eliminate waste codes.	-Waste Determinations.
Personnel Training	Formal classroom training with annual updates - Documented in writing and kept on-site.	Employees must be familiar with waste handling and emergency procedures relevant to their position.	None*

* Best Management Practices, including responsible handling and storage of wastes are recommended.

What You Can Do

Inventory your chemical laboratories and storerooms. In doing this, you will be able to:

- 1.) Identify and dispose of chemicals no longer needed due to changed curriculum.
- 2.) Dispose of chemicals that have outlasted their shelf life.
- 3.) Re-sort the chemicals on clean, stable shelves with other compatible chemicals, using secondary containment of the chemicals when possible. Clearly label the shelves and containers to assure segregation by chemical groups or types.
- 4.) Stop ordering chemicals that are already in the storage area, but are not readily available. It is recommended that schools keep an accurate and up-dated inventory of chemicals in their laboratory areas.

Note: Schools that generate acutely hazardous waste should eliminate this waste stream, and properly dispose any acutely hazardous waste found in the laboratory immediately. Examples of common acutely hazardous waste include, but are not limited to arsenic oxide, beryllium, copper cyanide, and potassium cyanide.

How to Begin

Because there are so many chemicals used in school laboratories, and because many types of hazardous wastes are generated during laboratory practice sessions, totally eliminating hazardous waste generation from labs would be difficult, if not impossible for most schools. What *is* possible is to increase your overall awareness about these laboratories, and to improve your purchasing habits, storage, use, and disposal of the chemicals and wastes.

- **Read labels and know what you are purchasing for the school.** Whenever possible, review the school science curriculum and conduct laboratory practice sessions with few or no hazardous materials or wastes. In addition, teachers and administrators should add their own **label and date** when the

chemical is shipped to the school. This will prevent overstocking of chemicals and serve to ensure the prompt disposal of the chemical when it has passed its shelf life.

- **Purchase only the amount necessary.** Avoid having leftover products that will cause storage and disposal problems later. Most schools find this a challenge when academic budgets are uncertain from year to year. However, buying more than the necessary quantity of chemicals by buying them in bulk will only cost more in the end, due to the added expense of having to dispose of old or unusable chemicals at the end of the school year. It is important to realize that, by making **careful estimates** of class size and quantities of materials needed per student before ordering, and **buying just the amount that you need**, you will save the school significant amounts of money and yourself a lot of time.
- **Store all chemicals in their original containers.** If the chemicals must be transferred, never put them into containers that are incompatible with the chemical, or that contain or previously contained incompatible materials. It is recommended that the containers be inspected to ensure adequate condition and proper storage. **Storage areas** should be dry, and not subject to extreme temperatures (hot or cold) that may damage or weaken the container. **Incompatible materials**, such as acids and bases, should be separated on the shelves. Shelves should be in excellent condition, without sagging, cracking or other problems that could lead to the chemicals falling off the shelves and spilling on the floor. The shelving must also be compatible with the chemicals that are stored there, so any incidental drips that may occur will not cause corrosion and weaken the shelf.
- **Microscaling of the chemistry experiment.** Microscaling can be done with most experiments and is an inexpensive way to conduct an experiment, using fewer hazardous chemicals, yet still teaches the same scientific concepts. (Laboratory Waste Minimization and Pollution Prevention - A Guide for Teachers, written by Battelle Labs, contains information and other references for laboratory management and alternative microscale experiments. To obtain an electronic copy of the document, go to the Battelle web site at <http://www.seattle.battelle.org/Services/ES/p2labman/>.)
- **The waste generated must be properly managed or disposed at the end of the experiment.** In most cases, wastes would typically be containerized for off-site disposal. However, it may be possible to discharge the wastes to the sanitary sewer, after the necessary approvals and/or permits have been obtained. You should contact the DEP Bureau of Water Management at (860) 424-3018 concerning the procedure for obtaining a discharge permit.

DEP, as well as environmental groups, encourage the use of non-hazardous materials in laboratories, and there are books available on experiments without hazardous chemicals. Administrative research of these different books should prove useful for teachers in developing curricula without hazardous chemicals. DEP also encourages schools to consult with their local fire departments and fire officials to ensure proper management of their hazardous materials.

If you have questions regarding the management or disposal of hazardous wastes at schools, you may call DEP's Waste Engineering and Enforcement Division at the telephone numbers listed at the beginning of this fact sheet. Additional guidance and information is also available on the DEP web site, <http://www.dep.state.ct.us>. In particular, information on hazardous waste and other waste management issues may be found at <http://www.dep.state.ct.us/wst/index.htm>. The U.S. Environmental Protection Agency (EPA) also has lots of useful information at its "Tools for Schools" web site at <http://www.epa.gov/iaq/schools/>.

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