

Ohio Hazardous Waste

Notifier

A Publication of Ohio EPA, Division of Hazardous Waste Management

Laboratory Pollution Prevention (P2)

by Helen Miller

Did you know that many of the same P2 and waste minimization strategies used in industry can be applied to laboratories? Labs can be found at businesses (for quality control), schools, hospitals and commercial testing facilities. These labs generate many types of hazardous waste. This article outlines some P2 opportunities and provides links to Internet resources to help reduce lab waste.

What is the biggest lab-generated hazardous waste stream?

According to the American Chemical Society (ACS), unused chemicals make up more than 40 percent of the hazardous waste generated by labs.

Unused chemicals are costly for labs because they:

- cause labs to analyze unknowns;
- require storage, packaging, transportation and disposal; and
- increase the risk of accidents by long-term storage.

How can you reduce lab waste?

Buy only the chemicals you will use.

Some buyers select larger packages assuming they save money. However, buying larger packages may:

- result in partially used containers that degrade, expire or become unstable;
- take up more space and require more maintenance; and
- increase the risk of fire, explosion and personnel exposure to the chemical.

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Economy of Size Myth- Cost Analysis of Xylene		
Package Size	1 Liter	4 Liter
Purchase price	\$ 42.49	\$ 93.72
Unit purchase price per ml when 2,000 ml are used	\$.04	\$.02
Unit purchase price per ml	\$.04	\$.05
Disposal costs	\$ 0	\$ 29.80
Purchase + disposal cost per ml used	\$.04	\$.06
Purchase + disposal cost	\$ 84.98	\$ 123.52

From "Less is Better," American Chemical Society, 2002

Substitute less hazardous or non-hazardous materials.

Substitution of less hazardous or non-hazardous materials can effectively reduce the amount of hazardous waste generated from your lab and risk of exposure to lab workers.

Examples of Substituting Less Hazardous Chemicals

- propylene glycol instead of ethylene glycol;
- ethyl alcohol instead of methylene alcohol;
- alcohol thermometers instead of mercury thermometers;
- Alconox, Pierce RBS35 and Nochromix instead of chromic acid cleaning solutions; and
- detergent and hot water instead of organic solvent cleaning solutions

Implement a Purchasing/Inventory Control Program.

This consists of:

- rotating stock "first-in, first-out";
- addressing shelf-life issues;
- completing an inventory review at least once per year; and
- using surplus chemicals within an organization or distributing to others via a chemical/material exchange.

OMEx - *The Ohio Materials Exchange* distributes free information on surplus and/or waste materials available from or wanted by industrial and commercial entities. There are details on the Office of Compliance Assistance and Pollution Prevention's (OCAPP) [Web site](#).

Success Story:

The Ohio National Guard's 180th Fighter Wing, Swanton, OH implemented a Hazardous Materials Pharmacy (HMP), or inventory control system, as part of an enforcement settlement with DHWM in 1998. The HMP provides a centralized storage and distribution center for all hazardous materials. The Guard saved an estimated at \$10,000-\$30,000 per year in chemical purchase costs and reduced disposal of expired chemicals by 1,000 pounds per year.

Segregate your waste.

Keep individual hazardous waste streams segregated: hazardous from non-hazardous and recyclable from non-recyclable.

Success story:

A lab in Arizona reduced hazardous waste generation by **87 percent** in one year by training employees to segregate waste.

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How can colleges and universities reduce lab waste?

The Massachusetts Institute of Technology (MIT) developed the *Environmental Virtual Campus* as part of a settlement of a U.S. EPA and Department of Justice (DOJ) enforcement action. This online program can help a university make sure it is in compliance with environmental regulations and reduce the amount of hazardous waste it generates.

Enforcement settlement:

In September 2004, U.S. EPA and the University of California (UC) settled a case resolving 98 RCRA violations involving 4,000 containers. UC estimated that it has spent \$1.78 million and 23,645 staff-hours since 2001 to complete an environmental audit of 47 university facilities.

Evaluate implementation of microscale chemistry.

The volume of chemicals used to conduct tests and experiments is reduced when you implement microscale chemistry. This reduces the amount of waste generated during lab experiments by 99 percent in some cases.

Success story:

Bemidji State University in Minnesota reduced their chemistry lab waste by almost 35 percent and saved \$35,000 per year by having chemistry students scale down their lab experiments.

How can middle and high schools reduce lab waste?

There are many resources available online.

Lab Waste and P2-A Guide for Teachers

In this *guide*, Battelle Seattle Research Center explains how hazardous wastes and other by-products generated by classroom experiments can be minimized. It is intended for middle school, high school and college science teachers.

“Healthy School Environments”

This U.S. EPA *Web site* is targeted to facility managers, school administrators, architects, design engineers, school nurses, parents, teachers and staff. It addresses chemicals used by students, teachers, facility personnel and administrative staff in science classes, labs, art classes, vocational shops such as auto body, auto repair and printing and in facility maintenance such as cleaning, painting and pest control.

Rehab the Lab

Rehab the Lab is a program developed to help schools in King County, Washington manage their hazardous materials. It includes a collection of downloadable lesson plans for less toxic chemistry lab experiments.

How can hospitals reduce lab waste?

Hospitals are sources of many types of hazardous wastes. Many hospitals have found that working to reduce hazardous wastes, such as mercury, or specific types of wastes, such as laboratory waste, has resulted in significant cost savings.

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Online resources:

Hospitals for a Healthy Environment (H2E)

H2E is a joint project of the American Hospital Association, the U.S. EPA, Health Care Without Harm and the American Nurses Association. Various state and local resources also have joined the effort to help health care facilities achieve the goals outlined in H2E.

Sustainable Hospitals

Sustainable Hospitals Program (SHP) is part of The Lowell Center for Sustainable Production. SHP is located within the University of Massachusetts, Lowell, Department of Work Environment. SHP provides technical support to the healthcare industry for selecting products and work practices that reduce occupational and environmental hazards, maintain quality patient care and contain costs.

Success Story:

To recycle formaldehyde waste, Albany Medical College purchased a five-gallon unit for \$10,000. From 1995-2004, they recycled 40,000 gallons of formaldehyde and **saved \$327,000** (\$185,000 in disposal costs and \$142,000 in chemical purchasing costs).

Ohio EPA resources:

Ohio EPA has free *online P2 training* designed for lab managers/staff or environmental staff who inspect or audit lab facilities. It addresses all types of labs such as commercial testing labs, academic teaching facilities (middle and high schools, universities and colleges), manufacturing facility Quality Assurance/ Quality Control (QA/QC), treatment, storage and disposal facility labs and hospital and medical labs.

OCAPP has developed a P2 *checklist* for labs. The checklist contains suggestions for substituting materials; purchasing and inventory control; improving process efficiency; recovery, reuse and recycling; and implementing innovative alternatives.

Managing Hazardous Waste Generated in Laboratories, Ohio EPA Division of Hazardous Waste Management (DHWM) Fact Sheet, January 2005 at: www.epa.state.oh.us/dhwm/pdf/ManagingHazardousWasteFromLaboratories.pdf.

DHWM's reference list on Laboratories at: www.epa.state.oh.us/dhwm/guidancedocs.html#labs.

If you have additional questions or would like other advice about how to generate less hazardous waste, please contact your district office inspector. To learn more about pollution prevention visit *OCAPP's* Web site.

Reference:

Less is Better Guide to Minimizing Waste in Laboratories, 9 pp, American Chemical Society, updated in 2002. membership.acs.org/ccs/pubs/less_is_better.pdf.

Case Studies:

Fort Bliss, TX, U.S. Army Hazmart Case Study: aec.army.mil/usaec/support/p203.html.

Bemidji State University: mntap.umn.edu/intern/projects/BSU.htm.

Albany Medical College Case Study:

www.sustainablehospitals.org/cgi-bin/DB_Report.cgi?px=W&rpt=Subcat&id=18!21.

U.S. EPA enforcement information on university labs: www.epa.gov/Compliance/resources/newsletters/civil/enfalert/labalert.pdf.



Aerosol Can Questions

by Rose McLean and Jeff Mayhugh

This article is intended to clarify two questions that we frequently receive about the regulatory status of aerosol cans: When are aerosol cans considered empty? If aerosol cans have not been punctured, must they be managed as hazardous waste (when the can is not being reclaimed, reused or recycled)?

The main focus of both these questions hinges on what you plan to do with the “empty” can. You may want to refer back to the *Winter 2002 Notifier* newsletter for more information about management requirements.

First, understand that you are required to evaluate both the contents and the can itself. When evaluating the contents, there is a two-pronged test to determine if the can is empty:

- it must be emptied of all waste using practices commonly employed to remove materials from that type of container, that is, pouring, pumping and aspirating; (the easiest way to do this is to use a can puncturing device)
- contain less than or equal to 2.5 centimeters of liquid residue or no more than three percent by weight of the total capacity of the container remains.

If the aerosol can did not contain a material that would be a hazardous waste now that it will be disposed of, then the material remaining in the can is not subject to any hazardous waste rules, including the *RCRA empty* rule (which determines when a container is empty). If the aerosol can contains a hazardous waste, either *listed* or *characteristic*, then its contents will be subject to the hazardous waste rules. However, the can itself must be evaluated regardless of its contents.

When are aerosol cans considered empty?

To answer that, you must first determine what the aerosol can contained. The definition of an empty aerosol can depends on the can’s original contents and the planned method of disposal. The best way to manage aerosol cans is to recycle both the can and the contents so as to avoid having to make an empty container determination (and eliminating the need to read any further).

Are you planning to throw the can away?

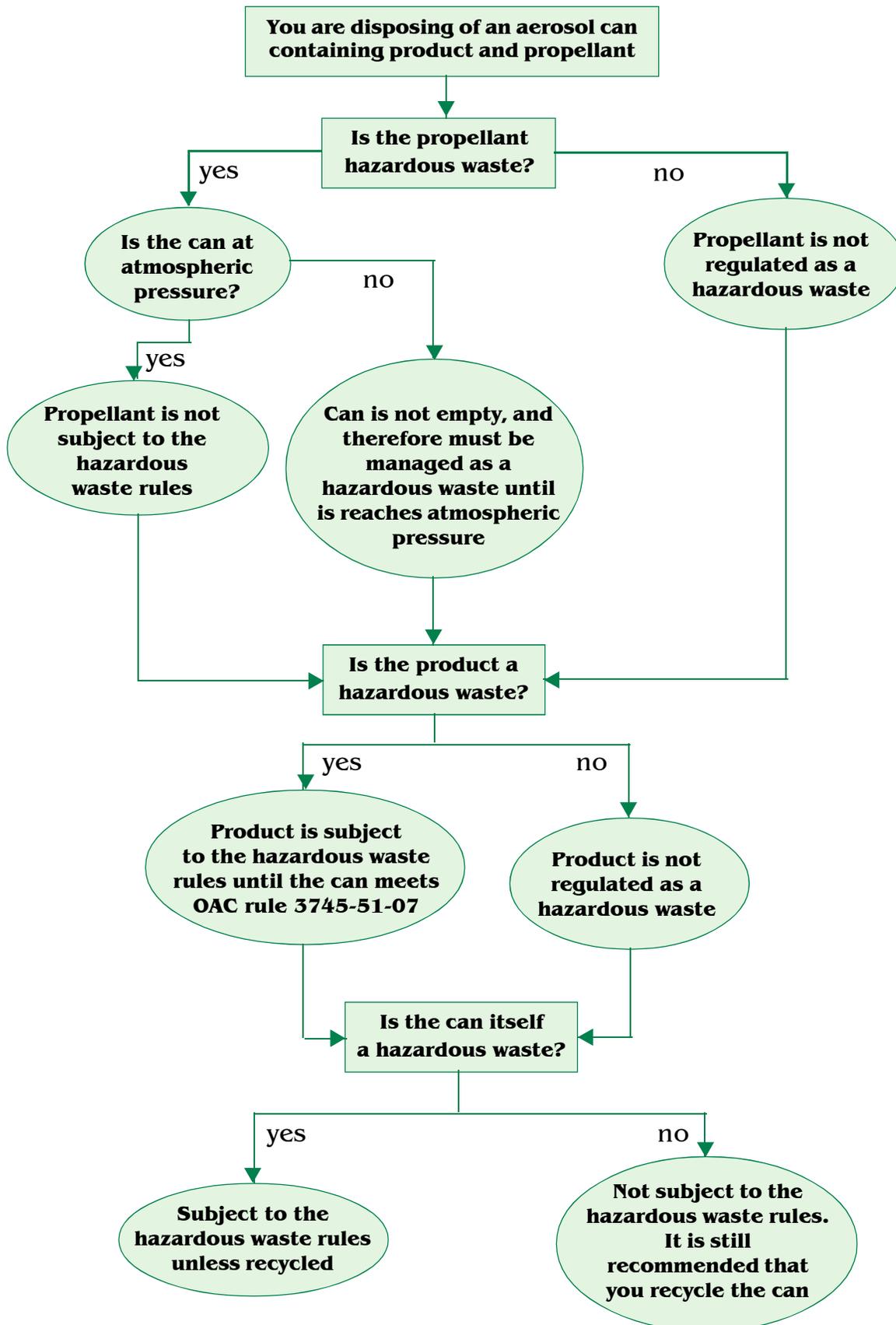
If so, here are the management topics that affect you:

- If the aerosol can contains only a hazardous compressed gas, such as butane used to calibrate your air monitoring equipment, then the can is empty once it reaches atmospheric pressure [see Ohio Administrative Code (OAC) rule *3745-51-07(B)(2)*]. Once the can is empty, any hazardous waste remaining in it is not subject to Ohio’s hazardous waste rules. However, since you are disposing of the container, you would still be required to *evaluate* the shell (can) prior to disposal. If the shell is hazardous, then you must manage it according to the applicable hazardous waste *regulations*. Please note that you can use *generator knowledge* to determine whether the shell is hazardous.
- If the aerosol can contained a product such as paint or solvent, and you have emptied it according to normal methods of emptying an aerosol can, then the can is not empty until no more than 2.5 centimeters of liquid residue remains on the bottom of the container or no more than three percent by weight of the total capacity of the container remains [see OAC rule *3745-51-07(B)(2)*]. Since the aerosol can houses two substances, the liquid product and the compressed gas propellant, the container is not empty until both materials meet the requirements for empty containers (both bullet items). Once both materials meet these requirements, then you must evaluate the shell (can) prior to disposal. Evaluate the shell (can) according to OAC rule *3745-52-11*.

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Example of How to Determine if Your Aerosol Can is Empty



Are you planning to recycle the can?

If so, here are the management topics that affect you:

- If the aerosol can contained only a compressed gas, such as the previous example, then the can is empty once it reaches atmospheric pressure. Once that occurs, then it no longer contains a hazardous waste. Since you are recycling the container, it is not subject to hazardous waste rules.
- If the aerosol can contained a product such as paint or solvent, then once it no longer contains a significant amount of liquid, it meets the definition of scrap metal and would be exempt from regulation under OAC rule [3745-51-04\(A\)13](#).

According to U.S. EPA, aerosol cans that have been punctured so that most of the remaining liquid may drain from the can (for instance, at either end of the can), and drained (for example, with punctured end down), would not contain significant liquids (view the U.S. EPA [letter](#)). However, although recommended, there is no specific regulation requiring that aerosol cans be punctured. That is unless you maintain a can puncturing unit at your facility, wherein puncturing would be considered “a practice commonly employed to remove materials from aerosol cans,” and therefore, your aerosol cans must be punctured in order to be considered empty. In addition, many scrap metal recyclers require that cans be punctured.

If aerosol cans are not empty and have not been punctured, must they be managed as hazardous waste (can and contents if they are not being reclaimed, reused or recycled)?

The best way to manage aerosol cans is to recycle both the can and the contents. When managed this way, they are not subject to the hazardous waste rules.

If you intend to throw away non-empty aerosol cans, you must evaluate the contents to determine if they are hazardous. If the contents are hazardous waste, either [listed](#) or [characteristic](#), then they will be subject to the [hazardous waste rules](#). In addition, the can itself must be evaluated regardless of its contents. If the shell (can) is listed or characteristic, then it must be managed according to the hazardous waste rules. 

New Option for CESQGs in Northeast Ohio

by Pam Allen

Are you a conditionally exempt small quantity generator (CESQG) in Northeast Ohio?

If so, you may have a new option for managing your hazardous waste, universal waste and used oil. The BIZMATSM center is open for business and is accepting certain wastes from CESQGs in Summit, Cuyahoga, Stark, Portage, Medina and Wayne counties. The majority of the material brought to the center will be recycled.

BIZMATSM is operating as a two-year pilot program and is managed by the Ohio Organization for Recycling and Reuse (OORR), a non-profit organization. Heritage Environmental Services oversees the daily operations.

As participants, CESQGs will be able to bring their waste to BIZMAT. The cost to dispose of as much as 220 pounds of material is \$95; \$75 of that fee will go toward paying the operating costs for the center and \$20 will go into a fund established to help businesses finance brownfield restoration projects.

Additional information is available at www.bizmatcenter.org. 

Emergency Equipment Testing Schedules?

by Dan Sowry

When required, all facility communications or alarm systems, fire protection equipment, spill control equipment and decontamination equipment must be tested and maintained “as necessary” to ensure proper operation during an emergency (Ohio Administrative Code (OAC) rule [3745-65-33](#)). Small and large quantity generators of hazardous waste must comply with this rule. The term “as necessary” often causes some confusion.

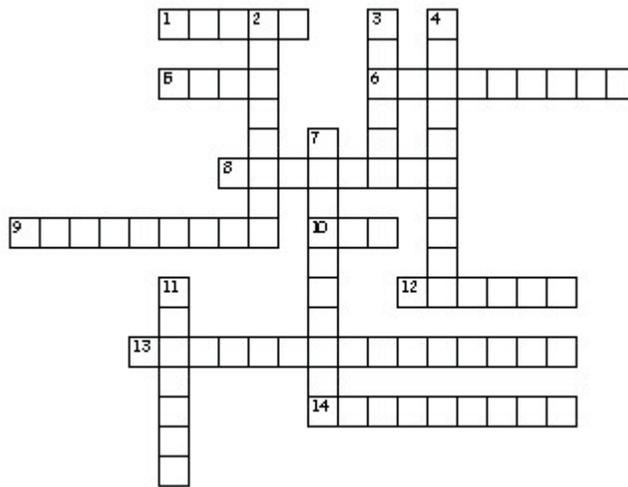
“As necessary” simply means that emergency equipment must be tested and maintained to ensure it will work correctly during an emergency. When determining compliance with this rule, Ohio EPA refers you to the manufacturer’s suggested testing and maintenance schedule. For example, if the manufacturer of a fire extinguisher requires it be tested once every six months to determine whether it is operating correctly, then testing once every six months would meet the rule’s requirement. Though not required by the OAC rule, it may be helpful to have a copy of the manufacturer’s suggested maintenance schedule ready for your hazardous waste inspection.

The OAC rule also requires that you keep a record of all emergency equipment testing and maintenance activities in a log or summary. Ohio EPA has developed an emergency equipment *inspection log* that you can use to comply with this rule. 

Emergencies at Your Facility: SQGs and LQGs

Across

1. You must have an internal communications or ___ system.
5. ___ are required to prepare and maintain a written contingency plan.
6. If required, there should be one employee who has ___ access to a device that can summon external emergency assistance.
8. When a facility uses its contingency plan, it must submit a written ___ report to the director of Ohio EPA.
9. You must have a device such as a ___ or two-way radio capable of summoning emergency assistance.
10. Equipment inspections must be recorded in this.
12. Emergency equipment must be ___ and maintained as necessary to ensure its proper operation during an emergency.
13. Unless none of the hazards posed by the waste that you handle require it, you must have portable fire control, spill control and ___ equipment.
14. Emergency ___ must be maintained on-site by SQGs and LQGs.



Down

2. Contingency plans must contain ___ procedures whenever there is a fire, explosion or release of hazardous waste or hazardous waste constituents which could threaten human health and the environment.
3. Contingency plans may include information stating that the ___ nature of hazardous waste you are managing would not pose a threat to human health or the environment in certain emergency situations.
4. Your emergency equipment must be ___ with the waste.
7. You must maintain adequate ___ to allow unobstructed movement of personnel and emergency equipment to any area of your facility in the event of an emergency. (two words)
11. You must maintain and ___ your facility to minimize the possibility of emergencies.

Tank or Container?

by Jeff Mayhugh

The hazardous waste management requirements for containers differ significantly from the requirements for tanks. To be in compliance, you must properly determine whether your hazardous waste management unit is a container or a tank. Both “container” and “tank” are defined in Ohio Administrative Code (OAC) rule [3745-51-10](#) [paragraphs (A)(17) and (A)(114)].

What is a container?

A container is any **portable** device in which a material is stored, transported, treated, disposed of or otherwise handled.

What is a tank?

A tank is a **stationary** device, designed to contain an accumulation of hazardous waste, which is constructed primarily of non-earthen materials (for example, wood, concrete, steel, plastic) that provides structural support and “Tank system” means a hazardous waste storage or treatment tank and its associated ancillary equipment and containment system.

The key to properly identifying whether you have a tank or a container hinges on the characteristics of the unit (portable or stationary) and how the unit is used at your facility. If you do not use it to move the hazardous waste, it is most likely a tank. If the unit is used to collect the material in one location and it is then moved to another location, it is a container.

Examples:

If you accumulate hazardous waste in a reinforced fiberglass, 500-gallon vessel that is never moved, the vessel is a tank.

If you accumulate your hazardous waste in the same vessel but you periodically move it with a forklift to another part of the facility to pump the waste into a tank truck, the vessel is a container.

What are the differences between the hazardous waste requirements for tanks and containers?

Containers must be in good condition, compatible with the hazardous waste they store, and kept closed except when adding or removing waste. The area where containers are stored must be inspected at least weekly.

For tanks, you must provide secondary containment that meets the requirements in OAC rule [3745-66-93](#). All tank systems, until such time as secondary containment meeting these requirements is provided, must have performed an integrity assessment and must complete a leak test on it annually. The tank must have a leak detection system that is capable of detecting releases within 24 hours. All above-ground portions of the tank system must be inspected daily.



One-Time LDR Notification

by Karen Hale

Under the land disposal restriction (LDR) rules, which are located in Ohio Administrative Code (OAC) Chapter [3745-270](#), most hazardous wastes cannot be disposed of unless they meet the treatment standards listed in OAC rule [3745-270-40](#). If sending hazardous waste off-site for treatment, the generator must complete and provide a one-time LDR notification to the treatment facility to ensure they can properly treat the waste to meet the required LDR standards.

The generator must provide the following information to the treatment facility:

- the waste code(s) that describe the waste;
- a statement informing the treatment facility that the hazardous waste is subject to the LDR rules;
- for F001-F005 wastes, a list of the chemical name(s) of the solvent(s) in the waste;
- for F039 waste, a list of all of the hazardous constituents in the waste that exceed the treatment standard;
- for characteristic hazardous wastes, a list of all of the underlying hazardous constituents (unless the treatment facility treats hazardous wastes for all underlying hazardous constituents);
- a determination indicating whether the waste is a wastewater or non-wastewater; and
- a determination of the subcategory of the waste (if applicable).

This information must be provided to the treatment facility with the initial waste shipment or any time the hazardous waste changes resulting in a change of the applicable LDR treatment standard. The generator also must keep a copy of the notification.

Although not required by the LDR rules, generators should know how the hazardous waste will be treated (for example, incineration, stabilization, distillation) to ensure proper treatment. Additionally, LQGs are required to report how the waste is treated in their Annual Report. 

Ask the Inspector: Generator Training Requirements

by Andy Kubalak



As a large quantity generator (LQG):

1. Am I required to provide hazardous waste training to all of my employees?

No. Ohio Administrative Code (OAC) rule [3745-65-16](#) requires only that all LQG personnel *involved* with hazardous waste management receive training. The training program must teach facility personnel hazardous waste management procedures relevant to their position.

Hazardous waste management activities could include:

- properly evaluating waste to determine whether it is hazardous;
- properly handling hazardous waste;
- responding to facility hazardous waste emergencies;
- implementing the facility's contingency plan;
- labeling and dating containers used to store hazardous waste;
- filling out the uniform hazardous waste manifest;
- conducting inspections of areas where containers of hazardous waste are stored;
- conducting inspections of required emergency equipment;
- using, repairing and replacing emergency equipment;
- using, repairing and replacing communication or alarm systems; or
- using, repairing and replacing emergency systems, and automatic waste feed cut-off systems

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2. How soon must I train my staff after employment or assignment to a position involving hazardous waste management?

Employees must receive training within six months after the date of their employment or assignment to an applicable position at the facility. Employees must not work in unsupervised positions until they have completed the training requirements of paragraph (A) of OAC rule 3745-65-16. Personnel also must complete an annual training review.

3. Do I have to train contractors hired for the management of some or all of the facility's hazardous waste?

Contractors hired to do work which involves management of the facility's hazardous waste must receive the same training as facility employees.

4. How do I know whether I am qualified to provide the required training?

The person who is instructing the hazardous waste training program must be trained in hazardous waste management procedures to ensure that the facility is in compliance with the applicable requirements found in OAC Chapters 3745-65 to 69 and Chapter 256 (as required by OAC rule 3745-65-16(C)). To gain the needed knowledge and experience the training program instructor may have coursework and /or on-the-job experience with the hazardous waste rules that qualifies him or her to train facility personnel as appropriate. Each facility training program must be individually developed to address the site specific hazards based on the work performed at that site, the type of waste generated and managed at the site, and the toxicity of that waste. The training program must teach facility personnel hazardous waste management procedures relevant to the positions in which they are employed. The training program must be designed to ensure that facility personnel are able to respond effectively to emergencies, provide instruction in waste management procedures and implement the company's contingency plan.

The person providing the training must receive annual refresher training and be able to document that the refresher training has been completed. Documented completion of annual refresher training will ensure compliance with OAC Chapters 3745-65 to 69 and Chapter 3745-256.

5. Are training records required?

Yes. The following training records must be maintained at the facility.

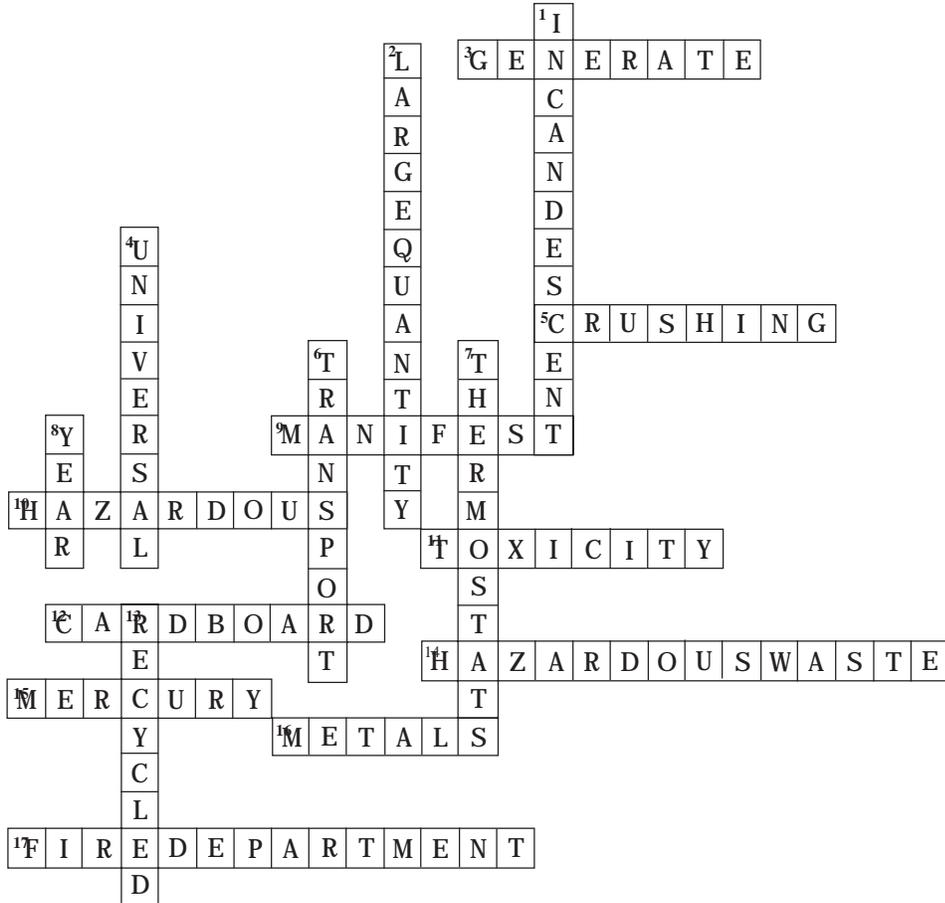
- For each position related to hazardous waste management, the job title and name of each employee, along with written job descriptions, including the required skills, education or other qualifications.
- A written description of the type and amount of introductory and continuing training that will be provided to each person filling a hazardous waste management position.
- For current employees, records documenting that training has been must be maintained until the facility closes. Training records for previous employees must be maintained for a minimum of three years for previous employees.

Are small quantity generators (SQGs) required to train facility personnel?

According to OAC rule 3745-52-34(D)(5)(c), SQGs must ensure that all employees are thoroughly familiar with proper waste handling and emergency procedures relevant to their responsibilities during normal facility operation and emergencies.

The *Spring 2006 Notifier* will feature a supplemental article on SQG training requirements.





Ohio Hazardous Waste

Notifier

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