

Managing Hazardous Waste Generated in Laboratories

DHWM Guidance Document

Date: January 2005

PURPOSE:

This guidance document is intended to explain how to properly manage hazardous waste generated in environmental laboratories. Its purpose is to assist laboratories in complying with Ohio's hazardous waste laws by explaining hazardous waste management requirements specific to wastes that laboratories commonly generate.

BACKGROUND:

During recent contract audits of environmental labs throughout Ohio, Ohio EPA hazardous waste inspectors observed hazardous waste management practices that were not being conducted according to the hazardous waste regulations. These observations included failure to comply with waste evaluation, accumulation, disposal, recordkeeping and emergency preparedness requirements. Not complying with these hazardous waste regulations can lead to significant fines, penalties and environmental health hazards. It is important that laboratory personnel take steps to avoid violating regulatory requirements.



RESOURCES:

Ohio EPA's [Division of Hazardous Waste Management](#) (DHWM) has a wealth of on-line resources pertaining to Ohio's hazardous waste management requirements. These include [guidance documents](#), [generator handbooks](#), [Answer Place \(FAQs\)](#) and [Notifier articles](#). Ohio EPA's [Office of Compliance Assistance and Pollution Prevention](#) (OCAPP) also maintain documents relevant to proper hazardous waste management. If you do not have a basic understanding of Ohio's hazardous waste regulations or you have a question while reading this guidance document, please refer to the above mentioned and hyperlinked documents for further information or contact DHWM's [Regulatory Services Unit](#) at 614-644-2917.

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Ohio EPA is divided into five regulatory divisions, each of which regulate separate environmental rules specific to your laboratory's activities. For questions pertaining to air permits, see Ohio EPA's [Division of Air Pollution Control's](#) Web page. If you wish to gain laboratory certification for drinking water analyses, see Ohio EPA's [Division of Drinking and Ground Water's](#) Web page. If you generate solid or infectious waste, see Ohio EPA's Division of [Solid and Infectious Waste Management's](#) Web page. For questions pertaining to onsite wastewater treatment facilities, see Ohio EPA's [Division of Surface Water's](#) Web page. If you have a release of hazardous materials to the environment or have questions pertaining to the prevention/cleanup of a spill, see Ohio EPA's [Division of Emergency and Remedial Response's](#) Web page.

How Does A Material Become Subject to Hazardous Waste Regulation In A Laboratory?

In order for a material to become subject to hazardous waste regulation, it must first be considered a waste. Generally, a waste is any discarded material that is not excluded by rule or other legal mechanism. If you have a material that you can no longer use, it is probably a waste. Examples can include off-specification chemicals, spent glass cleaning ware, spent solutions and samples.

If you have a material that you can no longer use, Ohio Administrative Code (OAC) rule [3745-52-11](#) requires you to determine if that waste is a hazardous waste. A waste is considered a hazardous waste if:

- it is not excluded from regulation as a hazardous waste in OAC rule [3745-51-04](#) and
- it exhibits a [characteristic](#) of hazardous waste, or
- it is listed in OAC rules [3745-51-30 to 3745-51-33](#), or
- it is a mixture of a waste and a hazardous waste.

If you produce a hazardous waste, then you are considered a hazardous waste generator. A generator is defined as "any person, by site, whose act or process produces hazardous waste identified or listed in OAC Chapter [3745-51](#) or whose act first causes a hazardous waste to become subject to regulation." Ohio has three categories of hazardous waste generators.

What Is My Hazardous Waste Generator Category?

To determine what regulations your laboratory must follow, you must determine your laboratory's generator category. These categories are based on the cumulative weight of hazardous waste generated (produced); **NOT** by the weight of the waste shipped off-site. There are three categories of hazardous waste generators:

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- **Conditionally Exempt Small Quantity Generator (CESQG)**
If you generate no more than 100 kilograms (about 220 pounds or 25 gallons) of hazardous waste, and no more than one kilogram (about 2.2 pounds) of acutely hazardous waste in any calendar month AND never accumulate more than 1,000 kilograms (2,200 pounds) of hazardous waste on your property, you are a CESQG of hazardous waste. CESQG requirements are found in OAC rule [3745-51-05](#). As a CESQG, you can only treat your hazardous waste onsite without a hazardous waste installation and operation permit if you comply with the large quantity generator provisions in OAC rule [3745-52-34](#).
- **Small Quantity Generator (SQG)**
If you generate more than 100 and less than 1,000 kilograms (between 220 and 2,200 pounds, or about 25 to less than 300 gallons) of hazardous waste, and not more than one kilogram (about 2.2 pounds) of acutely hazardous waste in any calendar month AND never accumulate 6,000 kilograms (13,200 pounds) of non acutely hazardous waste onsite at any one time, you are an SQG of hazardous waste. SQG requirements are located in OAC Chapter [3745-52](#). As an SQG, you can treat and store your hazardous waste onsite for up to 180 days if you comply with the SQG provisions in OAC rule [3745-52-34\(D\)](#).
- **Large Quantity Generator (LQG)**
If you generate 1,000 kilograms (about 2,200 pounds or 300 gallons) or more of hazardous waste, or more than one kilogram (about 2.2 pounds) of acutely hazardous waste in a calendar month, you are a LQG of hazardous waste. As a LQG, you can treat and store your hazardous waste onsite for up to 90 days if you comply with the LQG provisions in OAC rule [3745-52-34\(A\)](#).

Note: Hazardous waste is counted when it is first generated, not after it is determined to be hazardous or after you filled your drum. You should be aware that the waste you must count during a given calendar month is the waste you actually generated in that month.

What Do I Count Towards My Generator Status?

The rules stating which hazardous wastes are counted in your monthly quantity determination are found in OAC rules [3745-51-05\(C\)](#) and [\(D\)](#).

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Do count:

- All quantities of [listed](#) and [characteristic](#) hazardous wastes that are accumulated at your laboratory for any period of time before treatment, disposal or recycling, except for wastes managed immediately upon generation only in onsite elementary neutralization units, wastewater treatment units or totally enclosed treatment facilities;
- All quantities of listed and characteristic hazardous wastes that are packaged and transported away from your laboratory;
- All quantities of listed and characteristic hazardous waste that are placed directly in a regulated treatment container or tank at your facility; and
- All quantities of listed and characteristic hazardous wastes that are generated as still bottoms or sludges and removed from product storage tanks, which should be counted only the first time they are generated.

Do NOT count:

- Samples of waste and samples of water, soil or air or other media which are collected and managed, according to OAC rule [3745-51-04\(D\)](#);
- Treatability study samples, managed according to OAC rule [3745-51-04\(E\)](#);
- Samples undergoing treatability studies at laboratories, managed according to OAC rule [3745-51-04\(F\)](#);
- Specific recyclable materials that will be recycled, managed according to OAC rule [3745-51-06\(A\)\(3\)](#);
- Hazardous waste remaining in either an empty container or an inner liner removed from an empty container, according to OAC rule [3745-51-07\(A\)\(1\)](#);
- PCB wastes regulated under the Toxic Substance Control Act, according to OAC rule [3745-51-08](#);
- Wastes that are recycled, without prior storage, only in an onsite recycling process unit subject to regulation under OAC rule [3745-51-06\(C\)\(2\)](#);
- Wastes residues that have not exited raw material storage or production unit yet, unless the hazardous waste remains in the unit more than 90 days after the unit ceases to operate, according to OAC rule [3745-51-04\(C\)](#);
- Wastes that are immediately managed upon generation in an "elementary neutralization unit," a "totally enclosed treatment facility" or a "wastewater treatment unit," without being stored in a separate container/tank that is not part of the wastewater treatment unit, totally enclosed treatment facility or elementary neutralization unit first (see OAC rule [3745-50-10\(A\)](#) for definitions of these units) (see [Wastewater Treatment Unit Exemption](#) guidance);
- Wastes that are discharged directly to a publically owned treatment works (POTW) without being stored or accumulated first. Discharges to a POTW must comply with the Clean Water Act;
- Used oil managed under the requirements of OAC Chapter [3745-279](#);

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- Spent lead-acid batteries that will be reclaimed and managed under the requirements of OAC rule [3745-266-80](#); or
- [Universal wastes](#) managed under OAC Chapter [3745-273](#) (e.g., batteries, pesticides, thermostats and lamps).

What If The Weight Of Hazardous Waste My Laboratory Generates Fluctuates From Month To Month?

If the amount of hazardous waste you generate changes from month to month, you may be in a different generator category depending upon the weight changes. If you change hazardous waste generator categories from month to month, you are an episodic category generator (see discussion above regarding generator categories). If this happens, your generator category and therefore the rules you must follow may change from month to month. This may be expected, unexpected or as a result of a one-time occurrence such as lab clean-outs or off-specification chemical inventories.

In many cases, generators that fall into different generator categories at different times choose to satisfy the more stringent requirements to simplify compliance. For additional information on episodic generators, refer to our March 2007, [Hazardous Waste Generator Categories and Episodic Generation](#).

How Do I Manage Lab Samples?

Samples sent to a laboratory are only exempt from being a hazardous waste when:

- transported to a lab before testing;
- transported back to the sampler after testing;
- stored by the sample collector prior to transport to a lab;
- stored by a lab prior to testing;
- stored in a lab after testing but prior to returning to the sample collector; or
- stored in a lab pending enforcement actions.

Note: Samples do not remain excluded from hazardous waste regulation indefinitely.

If your samples do not meet one or more of the bulleted criteria above (specified in OAC rule [3745-51-04](#)), they are no longer excluded from being a waste and you must evaluate them to determine if they are a hazardous waste. Ohio EPA's OCAPP maintains an on-line fact sheet entitled, "[Identifying Your Hazardous Waste](#)" which may be helpful in making hazardous waste determinations.

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What If I Pour My Lab Waste Down The Drain?

In some cases, wastes are excluded from hazardous waste regulation when properly discharged to a sewer system and mixed with domestic sewage that will be treated in a publically owned treatment works (POTW) (see OAC rule [3745-51-04\(A\)](#) for specifics). In other cases, pouring hazardous waste down the drain is considered impermissible dilution, e.g., D003 reactive cyanide wastewater (see OAC rule [3745-270-03\(B\)](#) for specifics). In addition, according to OAC rule [3745-3-04\(B\)](#), you are not allowed to introduce certain wastes into a publically owned treatment works (POTW). This rule lists wastes prohibited from discharge including:

- pollutants which create a fire or explosion hazard;
- pollutants that will cause corrosive structural damage to the POTW;
- solid or viscous pollutants that will cause obstructions;
- any pollutant released in a discharge at a flow rate and/or pollutant concentration as to cause interference in the POTW;
- heat in amounts that will inhibit biological activity;
- petroleum oil;
- pollutants which result in the presence of toxic gases, vapors or fumes within the POTW; and
- any hauled pollutants (except at discharge points).

However, according to OAC rule [3745-51-03\(A\)\(2\)\(e\)](#), mixtures of waste and hazardous waste listed in OAC rules [3745-51-30](#) through [3745-51-35](#) are not hazardous waste if you can demonstrate that the mixture consists of laboratory wastewater containing toxic (T) wastes and provided that you meet the annualized average flow rates specified in these rules. It is important, therefore, to know and track the type and quantities of hazardous wastes you are pouring down the drain.

Note: If the material being sampled is a listed hazardous waste, the sample regains that hazardous waste listing when it is no longer covered under the sample exclusion. It is important, therefore, to determine how the sampled material from the sample collector or the original generator was produced.

Note: Permission from your POTW is required prior to pouring any waste down the drain.

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Your lab may also have some sort of treatment system, such as a neutralization pit, which serves as a pretreatment to your wastes prior to discharge to a POTW. Eventually you will need to clean out the material in your neutralization pit. Due to the derived-from rule in OAC rule [3745-51-03](#), if you put a listed hazardous waste down the drain into your neutralization pit, the resulting mixture from the pit becomes a listed hazardous waste when removed for disposal [unless the resultant mixture meets the standards in OAC rule [3745-51-03\(G\)](#)].

Can I Consolidate My Hazardous Waste?

Yes. Consolidation is the act of combining hazardous waste streams together. Consolidation occurs, for example, when you remove hazardous waste from two or more containers and place them together into larger containers. Consolidation can also mean taking smaller loads of individual containers and placing them into a large transport vehicle. DHWM created on-line guidance document entitled, "[Hazardous Waste Consolidation](#)" which may be helpful.

Both characteristic and listed hazardous wastes can be consolidated if compatible. However, you need to be aware that consolidating waste may constitute treatment as defined in OAC rule [3745-50-10\(A\)](#) and therefore require following the generator treatment requirements in OAC rule [3745-52-34](#) (see DHWM's guidance document entitled, "[Generator Treatment](#)" for more information). Furthermore, consolidating listed waste with non-listed materials may increase your disposal burden and affect your generator status [unless the resultant mixture meets the standards in OAC rule [3745-51-03\(G\)](#)]. You also need to be careful not to violate OAC rule [3745-66-77](#) concerning mixing incompatible wastes or impermissible dilution under the land disposal restrictions (LDRs) in OAC rule [3745-270-03](#) (see DHWM's guidance document entitled, "[Land Disposal Restrictions](#)" for more information). In addition, you will need to maintain records of your waste determinations (see OAC rule [3745-52-40](#) for specifics) and comply with the LDR one-time written notice requirements (see OAC rule [3745-270-07](#)).

Note: Hazardous waste transportation requirements vary depending on your generator status. Only SQGs and LQGs are required to [manifest](#) and use a hazardous waste transporter with an [EPA Identification Number](#) when transporting their hazardous waste off-site.

If My Facility Has More Than One Laboratory, May We Consolidate Our Hazardous Waste?

If your facility has more than one laboratory onsite (see OAC rule [3745-50-10\(A\)](#) for a definition of "onsite") and you wish to consolidate your hazardous waste prior to shipment, you must comply with consolidation requirements as stated above and with the appropriate generator accumulation provisions in OAC rule [3745-52-34](#).

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If your facility has more than one laboratory **not** located onsite and you wish to consolidate your hazardous waste at these sites, the transporter must comply with OAC Chapter [3745-52](#) if they mix hazardous waste with different [US DOT](#) shipping descriptions. This would include preparing a new manifest as well as attaching the original manifest(s) to the new manifest [see OAC rule [3745-53-10\(C\)\(2\)](#)]. Additionally, each laboratory you or your transporter picks up from could become subject to permitting requirements unless they comply with the transfer facility requirements of OAC rule [3745-53-12](#).

A transfer facility is a transportation-related facility that includes loading docks, parking areas, storage areas and other similar areas where shipments of manifested hazardous waste are held in containers during the normal course of transportation.

All of the containers must meet the requirements of OAC rule [3745-52-30](#) for packaging wastes in accordance with U.S. Department of Transportation (U.S. DOT) regulations (see 49 CFR Parts [173](#), [178](#) and [179](#)). Transfer facilities can only store

manifested waste shipments in containers meeting the requirements of OAC rule [3745-52-30](#) for up to 10 days without complying with the facility hazardous waste storage requirements as described in OAC rule [3745-53-12](#).

Finally, the facility noted as the designated facility on the manifest cannot act as a transfer facility. Transportation ends when the hazardous waste arrives at the designated facility.

What Requirements Apply to Hazardous Waste That My Laboratory Accumulates Near Where It Is Generated?

Hazardous waste that is accumulated in small amounts where it is first generated is referred to as satellite accumulation. The satellite accumulation requirements, found in OAC rule [3745-52-34\(C\)](#), allow generators to accumulate as much as 55-gallons of hazardous waste or one quart of acutely hazardous waste in containers at or near the point of generation if those containers are under the control of the operator of the process which generated the waste. For more information on [DHWM](#)'s satellite accumulation requirements, see our guidance document entitled, "[Satellite Accumulation Under Ohio Hazardous Waste Rules](#)."

Example: A laboratory has two facilities located on non-contiguous properties. The two facilities consolidate sample waste, waste/expired reagents, solvents, etc., together into the same drum or container for disposal.

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What Are Lab Packs?

A lab pack is a collection of different types of hazardous waste (in small volume containers) that are placed in one large container for storage, transportation or treatment. Such activity is considered consolidation. If you combine your hazardous waste in containers, you must comply with the applicable requirements for hazardous waste consolidation as stated above.

Are There Any Special Rules For Lab Packs?

Yes, lab packs have special requirements with regard to packaging prior to landfilling or incineration. In order for hazardous waste lab packs to be placed in a landfill or incinerated, they must meet the requirements of OAC rules [3745-57-16](#) and [3745-68-16](#). For packaging prior to disposal in an approved landfill, you must use DOT approved non-leaking "inside containers" that are compatible with the hazardous waste. These inside containers must be over-packed in a metal drum that is no more than 110-gallons in capacity and the inside container(s) must be surrounded by enough compatible sorbent material to sorb all the liquid contents in the metal shipping container.

A drum is considered over-packed or full when it is packed with inside containers and sorbent material. In addition, incompatible hazardous waste cannot be placed in the same outside container as reactive hazardous waste, other than cyanide- or sulfide-bearing wastes, and must be treated or rendered non-reactive before packaging for disposal in a landfill.

If your lab packs are going off for incineration, you may use fiberboard drums in place of metal outer containers. Such fiberboard drums must meet DOT specifications (see 49 CFR [173.12](#)) and be over-packed. And as an alternative to the otherwise applicable treatment standards under the LDRs, lab packs can be land disposed without further treatment provided that:

- you comply with the packaging requirements listed above;
- the lab pack does not contain any of the wastes listed in Appendix 1 to OAC rule [3745-270-42](#);
- the lab packs are incinerated; and
- any incinerator residues from lab packs containing D004 through D008, D010 and D011 are treated in compliance with the applicable treatment standards as specified in OAC rules [3745-270-40 to 3745-270-49](#) (for specifics, see OAC rule [3745-270-42](#)).

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May I Intentionally Allow a Hazardous Waste to Volatilize Under a Hood?

No. Intentionally allowing a hazardous waste to volatilize or evaporate, even under the protection of a hood, is considered unlawful disposal as well as a violation of the container management standards. Disposal, as defined in OAC rule [3745-50-10\(A\)](#), includes the release of hazardous waste to the air and requires a hazardous waste installation and operation permit.

This activity also cannot be conducted under the generator treatment provision which allows generators to treat hazardous waste they generate onsite without a hazardous waste permit, provided they comply with the requirements of OAC rule [3745-52-34](#) (see our guidance document on the [Regulatory Status of Generator Treatment](#)). For more information on air permitting requirements, please visit Ohio EPA's Division of Air Pollution Control's [Web page](#). For more information on hazardous waste evaporation, see DHWM's Summer 2004 [Notifier newsletter](#) article entitled, "Can I Evaporate My Hazardous Waste?"

Must Containers as Small as 1cc from an Instrument's Carousel Containing Listed or Characteristically Hazardous Waste be Handled and Disposed of as Hazardous Waste?

Yes, listed or characteristic hazardous waste must be managed as hazardous waste regardless of the quantity or the size of the container. OAC rule [3745-50-10](#) defines "container" as any portable device in which a material is stored, transported, treated, disposed of or otherwise handled. This definition is intentionally broad to encompass all different types of portable devices that may be used to handle hazardous waste, which would include such small containers as carousel vials and analytical "boats." When a container is considered to be "empty," the waste that remains in it is no longer subject to hazardous waste regulation. OAC rule [3745-51-07](#) sets forth criteria that a container must meet in order to be "empty." This rule includes the requirements for rendering a container empty (see our guidance on ["Container Washing Operations"](#) for more information).

How Can I Minimize the Waste Generated in My Laboratory?

Minimizing waste at your laboratory can save you money, possibly reduce your regulatory burden, and expose your employees to fewer hazardous chemicals. STL, Inc., a lab with 62 employees in Austin, Texas, reduced the amount of methylene chloride needed by 35% by modifying their extractors and still adhering to EPA guidelines for sample preparation. They reduced use of methylene chloride by 5.5 tons per year, saved \$15,000 in 2002 and may potentially become an SQG. If they become an SQG, their regulatory burden (and associated costs) will be substantially reduced by fewer paperwork and training requirements.

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According to the American Chemical Society (ACS), 40% of the waste generated from laboratories is from unused chemicals. Implementing a purchasing and inventory control program to reduce unused chemicals at your laboratory can save you money for storing, packaging, transporting and disposing of unused chemicals. Additional costs are incurred to complete analytical testing on “unknown” chemicals when labels are missing or unclear.

Substitution of hazardous materials with less hazardous or nonhazardous materials can save money, reduce health and safety concerns and disposal costs. For example, chromic acid used for cleaning glassware is corrosive and contains hexavalent chromium. A specially formulated laboratory detergent may be just as effective and will reduce employee exposure to hazardous chemicals and disposal costs. Mercury thermometers may be replaced with alcohol, digital, or mercury-free thermometers.

Segregating waste can also save money. A little hazardous waste can contaminate a container of non-hazardous waste, causing the entire container to become hazardous waste. A lab in Arizona reduced hazardous waste generation by 87% in one year by training employees to segregate waste.

To find out more detailed information on waste minimization opportunities, resources on the web include:

[Less is Better Guide to Minimizing Waste in Laboratories](#), 9 pp, American Chemical Society, updated in 2002.

[Laboratory Pollution Prevention](#), Fact Sheet, Ohio EPA, OCAPP, 2005

Waste Minimization Fact Sheet No. 1 - [101 Ways to Reduce Hazardous Waste in the Laboratory](#) (11/98), University of Illinois at Urbana-Champaign, Division of Environmental Health and Safety, Chemical Safety Section. A simple list of ways to reduce hazardous waste in the laboratory, including eighteen possible chemical substitutions.

Where Can I Go For More Information?

If you have further questions pertaining to the proper management of the hazardous waste in your laboratory or if you wish to learn about ways to reduce the amount of waste your laboratory generates, please contact DHWM's [Regulatory Services Unit](#) at 614-644-2917 or visit the [section on laboratories](#) on our [Web page](#). You can also contact an inspector from one of our [District Offices](#).