Division of Environmental Response and Revitalization
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Large Quantity Generator Tank System Requirements

THIS POLICY DOES NOT HAVE THE FORCE OF LAW **Hazardous Waste Program**

This document is intended to provide guidance to large quantity generators (LQG) on the requirements for properly managing hazardous waste in tanks.

What is Regulated Under the Rules

Ohio Administrative Code (OAC) rule ***3745-52-17(A)(2)*** requires LQGs who treat or store hazardous waste in tanks to comply with the applicable standards in OAC rules ***3745-66-90*** through ***3745-66-99*** except paragraph (C) of rule ***3745-66-97***. The entire tank system (the tank plus the associated ancillary equipment and containment system), as defined in OAC rule ***3745-50-10(T)(2),*** is regulated under these rules.

Tanks

A hazardous waste tank (defined in OAC rule ***3745-50-10(T)(1)***) is any device that would meet all of the following criteria:

- is stationary;
- made primarily of non-earthen materials that provide structural support; and
- used to store or treat hazardous waste.

Ancillary Equipment

Ancillary equipment (defined in OAC rule ***3745-50-10(A)(11)***) means any device such as piping, fittings, flanges, valves, and pumps that is used to distribute, meter, or control the flow of hazardous waste from the point of generation to a tank, transfer between tanks, or to a point of disposal onsite or shipment offsite.

Containment System

Secondary containment systems must prevent any migration of wastes or accumulated liquid from the tank system to the soil, ground water, or surface water. General examples are liners, vaults and double walled tanks. These systems must be capable of detecting and collecting releases and accumulated liquids, according to OAC rule ***3745-66-93***.

Sumps

Hazardous waste sumps (defined in OAC rule ***3745-50-10(S)(12)***) may also be regulated under the tank rules. Sumps are pits or reservoirs that meet the definition of a tank and include the troughs or trenches connected to it which serve to collect the hazardous waste for transport. Sumps can be used as a tank or as part of a tank system. Sumps may be exempt as a wastewater treatment unit. Please contact ***DERR*** if you have questions on sumps and how they are regulated.

Requirements for LQGs Accumulating/Treating Hazardous Waste in Tanks

As an LQG, you can treat or accumulate your hazardous waste in a tank without a permit, provided you can document that the entire volume of the tank has either been emptied within 90 days or less; or that the entire volume of the tank is turned over completely before the end of the 90 days (commonly known as the flow through principle).

LQGs that store and/or treat hazardous waste in tanks are required to:

- label the tank "Hazardous Waste" when accumulating or treating hazardous waste on-site according to OAC rule ***3745-52-17(A)(5)(b)(i);***

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- mark or label the tanks with an indication of the hazards of the contents according to ***OAC rule 3745-52-17(A)(5)(b)(ii)***;
- inspect the tank and tank system once each operating day* according to OAC rule ***3745-66-95***;
- provide and maintain appropriate spill control equipment, according to OAC rule ***3745-66-94***;
- comply with applicable organic air emission standards as outlined in ***OAC rules 3745-256-30 to 3745-256-35, 3745-256-50 to 3745-256-64, and 3745-256-80 to 3745-256-90*** (known federally as the "AA, BB, CC" rules), see the ***Organic Air Emission Standards ("AA, BB, CC" rules) section*** for more information;
- have secondary containment for the entire tank system according to OAC rule ***3745-66-93*** unless exempted by OAC rule ***3745-66-90;***
- have leak detection according to OAC rule ***3745-66-93***, unless exempted by OAC rule ***3745-66-90***;
- have a written assessment by an independent qualified professional engineer according to OAC rule ***3745-66-92***; and
- follow the closure requirements when the tank system will no longer be used for hazardous waste according to OAC rule ***3745-52-17(A)(8)***.

Generators must also respond to spills, leaks and releases from their tank systems appropriately as described in OAC rule ***3745-66-93***.

*Ohio EPA interprets the requirement to inspect a tank "once each operating day" to be once each day that the tank system is being used to manage (accumulate or treat) hazardous waste. When employees are not present 7 days a week, there is a possibility to use a remote camera system, which could be used to inspect the tank system components required to be inspected each operating day. To satisfy the requirements of OAC rule ***3745-66-95(A)***, the inspections must be documented, even when using a remote camera system.

General Requirements for Tanks

Hazardous waste or treatment reagents may not be placed in a tank if they could cause the tank system to rupture, leak, corrode, or otherwise fail. There are special requirements for ignitable, reactive or incompatible wastes found in OAC rules ***3745-66-98*** and ***3745-66-99***. Tanks and ancillary equipment must be tested for tightness before being placed into use, covered or enclosed.

Appropriate controls and practices to prevent spill and overflow from tanks and secondary containment systems must be used, including at a minimum, all of the following, according to OAC rule ***3745-66-94***:

- spill prevention controls such as check valves and dry disconnect couplings;
- overflow prevention controls such as level sensing devices, high level alarms, automatic feed cutoff systems or bypass to a standby tank; and
- sufficient freeboard for uncovered tanks to prevent overtopping by wave or wind action, or by precipitation

A tank system or secondary containment system from which there has been a leak or spill, or which is unfit for use, must be removed from service immediately and the operator must satisfy the appropriate actions as required by OAC rule ***3745-66-96.***

General Requirements for Secondary Containment

In general, all tank systems are required to have one of the following types of secondary containment, according to OAC rule ***3745-66-93***:

- external liner (usually in conjunction with diking and curbing) – made of a flexible membrane or possibly clay, bentonite, soil, concrete or asphalt (a coating may be necessary); it must completely cover the surrounding area of the tank that is likely to come in contact with the waste if a release occurs; the area around the tank is to be sloped and operated to drain and remove liquids [Note that a liner made of clay, bentonite,

soil, etc. must be distinguished from the surrounding earth, design specifications should also show proper placement of the material];

- vault – an underground chamber that contains any released tank contents, generally made of concrete with a roof;
- double walled tank – a tank within a tank (jacket) with a vacuum, pressurized, or liquid-filled space between the inner and outer walls; or
- an equivalent device approved by the director [see OAC rule ***3745-66-93(D)***];
- designed to prevent lateral and vertical migration of wastes or accumulated liquid to the soil, groundwater, or surface water;
- able to contain 100% of the liquid of the largest tank within its boundaries in an event of a release. In the case where the tank system is located outdoors, the secondary containment must be able to contain all of the liquid from a 24-hour, 25-year storm in addition to the entire volume of the largest tank within the containment. A 24-hour, 25-year storm refers to one that statistically occurs once every 25 years, for a duration of 24 hours. Rainfall values can be found at the following links: ***NOAA's National Weather Service's Precipitation Frequency Data Server***; ***NOAA's Atlas 14 Precipitation-Frequency Atlas of the United States; Ohio DNR's Division of Water, Water Inventory;***
- constructed of impermeable materials;
- constructed of or lined with materials that are chemically compatible with the waste and have sufficient strength and thickness to prevent failure due to pressure gradients, physical contact with the waste, climatic conditions, and the stress of installation and daily operations;
- placed on a foundation or a base which can support the secondary containment system, resist pressure gradients above and below the system, and be capable of withstanding compression, settlement and uplift;
- provided with systems capable of detecting the presence of any release of hazardous waste or accumulated liquid in the secondary containment system within 24 hours (including days in which waste generating operations are not being conducted). (This can include visual inspection of the secondary containment); and
- sloped, designed, or operated to drain and remove liquids, spills, or precipitation. Any liquids, spills, or precipitation must be removed from the secondary containment system within 24 hours or in as timely a manner as is possible to prevent harm to human health or the environment.

Nothing prohibits a building from serving as a secondary containment for generator accumulation tanks if the building acts as a liner for the storage tanks and meets the applicable requirements for secondary containment.

The ancillary equipment of the tank system must also have secondary containment that meets the standards previously discussed in the guidance except in the following situations, according to OAC rule ***3745-66-93***:

- above-ground piping (not including flanges, joints, valves, and connections) does not require secondary containment if the piping is inspected once each operating day;
- welded flanges, welded joints, and welded connections do not require secondary connections if the flanges, joints, and/or connections are inspected once each operating day;
- sealless (valves or pumps that do not require the use of O-rings and Teflon packing/backup rings) or magnetic coupling pumps, and sealless valves do not require secondary containment if the pumps and/or valves are inspected once each operating day;
- pressurized aboveground piping systems with automatic shut-off devices do not require secondary containment if these systems are inspected once each operating day.

LQGs utilizing double walled tanks often overlook secondary containment for their ancillary equipment. Options for supplying secondary containment for ancillary equipment include jacketing, double walled piping and trenches, according to OAC rule ***3745-66-93***.

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Secondary Containment Leak Detection

Secondary containment systems must have a form of leak detection, according to OAC rule ***3745-66-93***. Leak detection and monitoring systems must be able to detect a release within a 24-hour period. Examples of leak detection and early-warning systems include the following:

- interstitial monitoring (for example, monitoring between the walls of a double walled tank or monitoring between the walls of a tank and its vault);
- daily visual inspections and monitoring;
- electrical-resistivity sensors;
- thermal-conductivity sensors; and
- vapor detectors.

In some cases a daily visual inspection may meet the leak detection requirements. For example, a daily visual inspection may be appropriate for completely above-ground tank systems.

Items to look for in inspections:

- staining showing evidence of leaks, spills or overflow events;
- signs of corrosion or rusting, weld breaks, punctures;
- scrapes in protective coatings, peeling/bubbling paint;
- cracked or uneven concrete in secondary containment structures/foundations;
- signs of damage to joints/water stops between concrete structures; and
- other structural damage.

Tank System Assessments

In general, both LQG and permitted tank systems must have an assessment attesting to the integrity of the tank system. The rules for LQG tank system assessments are found under OAC rule ***3745-66-92***. Tank system assessments are to be kept on file at the facility for the life of the tank. The assessment must be reviewed and certified by an independent, qualified, professional engineer (PE) registered to practice in the State of Ohio. Assessments may require certification by multiple engineers, depending on qualifications. Professional engineering registrations may be verified here: ***https://elicense.ohio.gov/OH_HomePage***.

This assessment must consider all of the following according to OAC rule ***3745-66-91***.

- tank design standards;
- hazardous characteristics of the waste;
- existing corrosion protection measures;
- documented age of the tank system (or an estimate);
- the results of a leak test, internal inspection, or other tank integrity exam; and
- the tank system foundation.

Nationally accepted tank design standards simplify the evaluations of adequacy. The standards present set tolerances and parameters for the use of the tank. Tank manufacturers typically will provide their customers with certificates that guarantee the tank's adherence to the design standards.

A quick comparison with the tank's actual dimensions and the design standards may present insight as to whether the tank is being used as designed. This would not replace the requirement to have an assessment reviewed and certified by a PE but may identify any discrepancies that may need a more detailed review.

A few examples of common standards used include:

- API 650: Welded Steel Tanks for Oil Storage;
- ASME BPVC-VIII-1: ASME Boiler and Pressure Vessel Code;
- ASTM D 3299: Filament-Wound Glass-Fiber Reinforced Resin Tanks; and
- UL 142: Steel Aboveground Tanks for Flammable and Combustible Liquids.

The tank system assessment should address the compatibility of the system with the wastes being stored and treated, according to OAC rule ***3745-66-92***. This information may be obtained from such sources as Perry's Chemical Engineering Handbook, National Association of Corrosion Engineers (NACE), or manufacturer's literature. Note that if a tank is to receive a new waste stream a new tank assessment may be required. A new assessment is not needed if the new waste stream has similar characteristics (pH, specific gravity, vapor pressure, etc.) to the old one.

The foundation the tank system sits upon should be addressed in the tank system assessment. Foundations should be capable of distributing the weight of the load evenly without over stressing the soil. Overloading the soil may cause settlement or displacement of the tank that may result in a release.

Assessments should contain any related support documents, such as, calculations, diagrams, drawings, and plans. The calculations verify that the design meets the applicable codes, rules, and standards. The diagrams (process flow diagrams, process control diagrams, process and instrumentation diagrams, etc.) show the operating procedures, (spill and overfill) controls, and leak detection abilities of the tank system. The drawings and plans clarify and reinforce the design calculations and show corrosion rates and limits.

For new tanks, information including the certifications of adequacy, construction in accordance to standards, and installation and repairs are to be included as part of the assessment. This information provides accountability for the facility by having the independent engineer to review and certify the safety of the tank system according to OAC rule ***3745-66-92.***

Organic Air Emission Standards ("AA, BB, CC")

Facilities that that store, treat, or dispose of hazardous waste in tanks subject to permitting, interim status, recycling units that store hazardous waste prior to recycling, or less than 90-day storage standards may be subject to the requirements for organic air emission standards, known federally as the "AA, BB, CC" rules.

Subpart CC (OAC rules 3745-256-80 to 3745-256-90) establishes organic air emission standards for owners and operators that treat, store, or dispose of hazardous waste in tanks, surface impoundments, or containers subject to permitting, interim status, or less than 90-day storage standards. For tanks, air emission controls may be required if the tank's hazardous waste is greater than or equal to 500 ppmw (parts per million by weight) volatile organics at the point of waste origination.

OAC rules 3745-256-85 to 3745-256-88 do not apply if:

- The hazardous waste has an average volatile organics concentration less than 500 ppmw; or
- The hazardous waste organic content has been reduced by one of the treatment standards outlined in OAC 3745-256-83 prior to placement in a hazardous waste management unit.

Further hazardous waste management unit exemptions can be found in OAC 3745-256-83(C).

Facilities to which subpart CC applies may have additional requirements in subparts AA and BB. Subpart AA (OAC rules 3745-256-30 to 3745-256-35) establishes the organic air emission controls for process vents associated with distillation, fractionation, thin-film evaporation, solvent extraction, or air or steam

stripping operations that manage hazardous wastes with organic concentrations of at least 10 ppmw. Subpart BB (OAC rules 3745-256-50 to 3745-256-64) establishes organic air emission standards for equipment leaks from equipment that contains or comes into contact with hazardous wastes with organic concentrations of at least ten percent by weight. If these rules apply, each piece of regulated equipment must meet the specific labeling, recordkeeping, reporting requirements, and equipment leak control requirements outlined in this subpart.

Subpart CC requirements include:

- Developing and implementing a written plan and schedule to perform inspections and monitoring of the required organic air emission control equipment (OAC 3745-256-84 to 3745-256-87 for permitted facilities, OAC 3745-256-85 to 3745-256-88 for interim status facilities);
- Managing hazardous waste in units that are closed so that emissions do not escape or are controlled (see the below table for applicable requirements for non-exempt tanks); and
- Following the applicable recordkeeping and reporting requirements (OAC 3745-256-89 and 3745-256-90)

Depending on the tank's capacity, maximum organic vapor pressure, and if waste stabilization occurs, tanks containing hazardous waste may be subject to either Tank Level 1 or 2 control standards under OAC 3745-256-80 to 3745-256-90 (40 CFR Part 265, Subpart CC). The following table outlines the qualifications for Tank Level 1 or 2 control standards.

Tanks: Which Subpart CC Tank Level of Control Applies?

Tank Design Capacity	Maximum Organic Vapor Pressure of HW in Tank	Does Waste Stabilization Occur in Tank?	Applicable Level of Control
<75 m^3 (20,000 gal)	≤76.6 kPa (11.1 psi)	Yes	Tank Level 2 Controls ***(OAC 3745-256-85(D))***
		No	Tank Level 1 Controls ***(OAC 3745-256-85(C))***
	>76.6 kPa	Yes	Tank Level 2 Controls
		No	Tanks Level 2 Controls
≥75 m^3 (20,000 gal) and < 151 m^3 (40,000 gal)	≤27.6 kPa (4.0 psi)	Yes	Tank Level 2 Controls
		No	Tank Level 1 controls
	>27.6 kPa	Yes	Tank Level 2 Controls
		No	Tank Level 2 Controls
≥151 m^3 (40,000 gal)	≤5.2 kPa (0.75 psi)	Yes	Tank Level 2 Controls
		No	Tank Level 1 Controls
	>5.2 kPa	Yes	Tank Level 2 Controls
		No	Tank Level 2 Controls

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In addition to meeting the subpart CC requirements outlined above, an owner or operator using Tank Level 1 Controls must also do the following:

- Use a fixed roof; and
- Determine the maximum organic vapor pressure for each hazardous waste placed in the tank (OAC 3745-256-85(C)).

Owners or operators using Tank Level 2 Controls can use one of the following control options, in addition to meeting the subpart CC requirements outlined above:

- External floating roof;
- Fixed roof with internal floating roof;
- Closed-vent system to control device;
- Pressure tank; or
- Closed-vent system to an enclosed combustion device.

Large Quantity Generator Closure Requirements

When a tank system is no longer used to store or treat hazardous waste, it must be closed. LQGs must ensure the closure requirements of OAC rule ***3745-52-17(A)(8)*** and the closure performance standard in OAC rule ***3745-66-11(A) and (B)*** and OAC rule ***3745-66-14*** are met. See DERR's on-line ***Generator Handbook***, the ***Closure Plan Review Guidance,*** and the ***Large Quantity Generator Closure Requirements guidance*** for more information.

Contact

For more information, contact the ***DERR Hazardous Waste Program Permitting Unit*** with questions about tank requirements and designs. To find a DERR staff member visit our ***web page*** or call 614-644-2924.

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References and Resources for LQG Tank Requirements

- ***DERR's Hazardous Waste Treatment, Storage and Disposal Facilities Web page***
- Tank Advisory ***https://epa.ohio.gov/static/Portals/32/pdf/tankdoc.pdf***
- Generator Handbook ***https://epa.ohio.gov/static/Portals/32/pdf/gen_handbook.pdf***
- Generator Treatment Guidance
  https://epa.ohio.gov/static/Portals/32/pdf/Generator_Treatment_Guidance.pdf
- State Board of Registration for Professional Engineers
  https://peps.ohio.gov/wps/portal/gov/peps/
- Closure Plan Review Guidance
  https://epa.ohio.gov/static/Portals/30/RCRA/docs/Closure+Plan+Review+Guidance.pdf
- RCRA Organic Air Emissions Resources

  https://epa.ohio.gov/divisions-and-offices/environmental-response-revitalization/guides-and-manuals/organic-air
- ***NOAA's National Weather Service's Precipitation Frequency Data Server***
- ***NOAA's Atlas 14 Precipitation – Frequency Atlas of the United States***
- ***Ohio DNR's Division of Water, Water Inventory***

OAC rule ***3745-50-10*** (definitions)

OAC rule ***3745-52-17*** (accumulation of waste)

OAC rule ***3745-52-17(A)(8)*** (closure)

OAC rule ***3745-66-90*** (applicability of rules)

OAC rule ***3745-66-91*** (existing tanks)

OAC rule ***3745-66-92*** (new tank design)

OAC rule ***3745-66-93*** (releases)

OAC rule ***3745-66-94*** (operating req.)

OAC rule ***3745-66-95*** (inspections)

OAC rule ***3745-66-96*** (responding to leaks)

OAC rule ***3745-66-98*** (ignitable/reactive waste)

OAC rule ***3745-66-99*** (incompatible wastes)

OAC rules ***3745-256-30 to 3745-256-35, 3745-256-50 to 3745-256-64, and 3745-256-80 to 3745-256-90*** (organic air emissions standards)