Managing Used Electronics and Components

Guidance for Electronics Collection, Storage, Transportation, Recycling and Reuse

PUB-WA-1307 2023

Table of contents

Many electronics and their components can be refurbished and reused after their original owner is done with them. Electronics that cannot be reused can be dismantled by knowledgeable professionals for recycling. Electronics contain a variety of recyclable metals, plastics and glass. Many of these components also contain harmful materials, such as lead, mercury, cadmium and flame retardants as well as batteries that can pose fire hazards if not correctly handled. Proper end-of-life management of these materials ensures worker and environmental protection.

There are several solid and hazardous waste requirements related to the collection, storage, transportation, recycling or disposal of electronics and components. Requirements are based on the types of electronics and components involved, how they are managed, and who is managing them. For some activities, there are conditional exclusions from hazardous waste regulations and exemptions from solid and hazardous waste licensing requirements.

Wisconsin regulations for electronics collection, transportation and processing changed in July 2023. Review this guidance to ensure you are meeting current requirements.

This document provides an explanation of requirements and best management practices for individuals, governments, businesses or other organizations that collect, store, transport, recycle or refurbish electronics. For questions about which requirements apply to a specific situation or activity, contact the Department of Natural Resources at DNRWIe-cycling@wisconsin.gov.

For businesses, institutions or governments that generate electronic waste (e.g., computers, printers and phones used by employees), refer to the DNR publication *Managing Used Electronics* (WA-420).

Definitions and background

Definitions are provided to help make this document easier to understand. A citation is provided when definitions are specified in law.

An **electronic device is** a device that requires electric current or electromagnetic fields to function and contains a circuit board but does not include a major appliance or a motor vehicle [s. NR 500.03 (71g), Wis. Adm. Code.]

Electronic waste is a general term used to describe electronics and components once they are no longer used for their original purpose.

Waste electronic device is a term used in administrative code to distinguish used electronics intended for recycling or disposal from new or refurbished electronics ready to be sold for use.

A **facility,** for the purpose of this document, generally includes any person, business or organization involved in collecting, storing, transporting, recycling or refurbishing electronics.

Wisconsin's electronics recycling law

Wisconsin's electronics recycling law (s. 287.17, Wis. Stats.) establishes a statewide program to collect and recycle certain electronics. Manufacturers of televisions, computers, including video game consoles or components that meet the definition of a computer, monitors and desktop printers must register with the DNR the brands they sell to Wisconsin households and schools. Those manufacturers also must recycle a target weight of electronics each year based on their sales. Manufacturers contract with registered recyclers and collectors to meet their targets. This manufacturer-funded recycling program is called E-Cycle Wisconsin.

It is not mandatory for electronics collectors and recyclers to register with E-Cycle Wisconsin unless they will be working on behalf of an electronics manufacturer. Collectors and recyclers that wish to register should contact the DNR for more information or visit **dnr.wi.gov** and search "ecycle."

Reuse as it relates to electronics means continued use of electronics and components for their originally intended purpose by someone else. Examples include donating or selling working electronics or components, and sending electronics or components to a refurbisher or repair shop for evaluation, testing or repair.

There are no specific state solid or hazardous waste requirements for managing used electronics and components destined solely for reuse, except for those relating to the export of cathode ray tubes for reuse.[1] Federal transportation requirements and data protection requirements may apply.

Recycling as it relates to electronics means processing electronics and components to recover usable materials. In many cases, those who are refurbishing electronics for reuse also do some recycling of components.

Electronics processing under s. NR 502.03 (71m), Wis. Adm. Code, means processing electronic devices for use in manufacturing processes or for recovery of usable materials and includes disassembling, baling, crushing, grinding and shredding electronics or their components. It **does not include** any of the following:

1. Destruction by incineration or other processes.
2. Land disposal of recyclable materials.
3. Reuse, repair, or any other process through which an electronic device is returned for use in its original form.
4. Removal of an electronic device from another device, such as from a major appliance or motor vehicle.

[1] Under s. NR 661.0041, Wis. Adm. Code, before exporting used, intact CRTs or CRT devices for reuse, the exporter must send a one-time notification to the U.S. Environmental Protection Agency. The exporter must retain records related to shipments for at least three years. EPA notification template: https://www.epa.gov/hwgenerators/template-notification-intent-export-cathode-ray-tubes-crts-reuse

5. Hand disassembly of an electronic device in an educational setting for educational purposes.
6. Hand disassembly of a waste electronic device generated by a household on the property where it is generated

Cathode ray tubes

Cathode ray tubes are vacuum tubes, made primarily of glass, that are the video display found in most televisions and monitors made before the mid-2000s. The CRT typically makes up about 60% of the device weight.

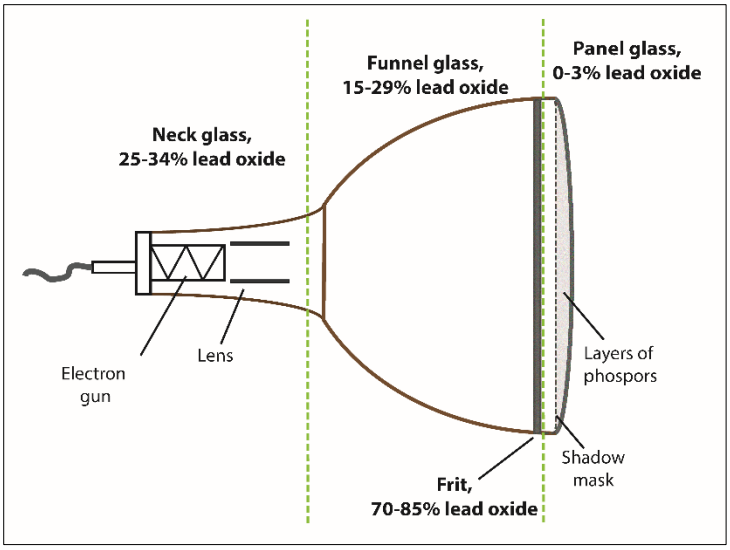

Figure 1: Cathode ray tube components and lead oxide content

The glass portion of CRTs consists of the panel, frit, funnel and neck (see Figure 1 for diagram and lead content of each component). The front panel has very low lead content, though it contains a phosphor coating that must be cleaned off before the glass can be safely reused in most situations. The funnel and neck portions have a higher lead content by weight, ranging from 15-34%. The frit is a thin line of material connecting the panel and funnel glass and is about 70-85% lead.

Under the definition in hazardous waste rules [s. NR 660.10 (9m), Wis. Adm. Code] a **used, intact** CRT means a CRT whose vacuum has not been released. A **used, broken** CRT means glass removed from its housing or casing whose vacuum has been released.

In this document, **bare CRTs** refers to CRTs with all plastic, metal or wood casings and components removed. **CRT glass** refers to broken pieces of funnel, neck and/or panel glass. **CRT devices** refers to whole devices (such as televisions or monitors) that contain a CRT.

Flat-panel displays

Flat-panel displays are video displays, including televisions, monitors, laptops, tablets and smartphones, with a thin screen. Most flat panels are either LCDs (liquid crystal displays) or LEDs (light-emitting diodes). LCD screens produced from the early 2000s through about 2014 were typically lit with small, thin lamps that contain mercury, called CCFLs (cold cathode fluorescent lamps). It may be difficult to determine if a flat-panel display is LCD or LED unless the device is dismantled.

Rear projection televisions

Rear projection televisions contain three CRTs (red, blue and green) within a large casing, and have a coolant (ethylene glycol and glycerin) that must be managed in the same manner as used oil under hazardous waste regulations.

Universal waste

Universal waste is a specific subset of hazardous waste with reduced requirements (found in ch. NR 673, Wis. Adm. Code) for collection and management of these widely generated wastes if they are properly managed. Reduced requirements

Batteries and fire risk

A wide variety of electronics use batteries. Some are removable; others are enclosed in the device and may be glued in. Many batteries in used electronics retain a charge, especially the lithium-ion batteries that power devices like smartphones and tablets. These batteries pose a significant fire risk, especially if damaged on their way to a recycling facility or during processing.

The DNR recommends those handling batteries make sure fire suppression systems are adequate and working properly, and staff are trained how to spot and address smoke and fires.

include allowing longer storage time limits and reduced recordkeeping. Electronic components classified as universal waste include batteries, lamps (light bulbs) and mercury-containing equipment (electronics with components such as mercury switches and relays). Go to **dnr.wi.gov** and search "universal waste" for more information.

Electronics disposal limitations and requirements

The following electronics are banned from incineration or landfill disposal in Wisconsin under s. 287.07 (5), Wis. Stats.:

- televisions;
- computers (desktops, laptops, netbooks and tablets);
- video game components that meet the definition of consumer computers;
- desktop printers (including those that scan, fax and/or copy, as well as 3-D printers);
- monitors and e-readers;
- other computer peripherals (including keyboards, mice, speakers, hard drives and flash drives);
- DVD players, VCRs and other video players (e.g., DVRs, Blu-ray players);
- fax machines; and
- telephones with a video display.

For devices not specifically listed above, disposal requirements depend on who generated the waste electronics and whether the electronics contain any components regulated as hazardous waste. Households are exempt from hazardous waste requirements and can dispose of electronics other than those listed above in the trash. However, this exemption does not apply once hazardous waste is separated for management at a collection facility regulated under subch. HH of ch. NR 666, Wis. Adm. Code (such as a household hazardous waste collection facility).

Section NR 662.011, Wis. Adm. Code, requires non-households (e.g., businesses and institutions) to determine if their waste is a hazardous waste. This requirement also applies to materials/components derived from electronics that a facility would like to dispose of. For information on making a hazardous waste determination, see the DNR's *Waste Determinations and Recordkeeping* (WA-1152).

If electronics used by a non-household—or materials derived from electronics, such as wood casings from console televisions—are not a hazardous waste and are not specifically banned from disposal, these items may be disposed of in a landfill or incinerator, though the DNR encourages recycling of all electronics and components whenever possible.

The DNR has specific guidance on requirements for landfill disposal of CRT glass: *Requirements for Landfill Disposal of Processed CRT Glass and E-Cycle Wisconsin Eligibility* (WA-1681).

If used electronics or components are destined for disposal, solid or hazardous waste licenses or other approvals may be required. Contact DNRWIe-cycling@wisconsin.gov with questions.

Identifying and managing hazardous components

Nearly all electronics contain hazardous components that must be managed properly to comply with hazardous waste laws. Mismanaging hazardous components can lead to serious consequences for workers and the environment. Later sections of this document will include specific requirements and recommendations for handling hazardous components.

Hazardous components to be aware of when handling used electronics include the following:

- CRTs, found in televisions and monitors, which contain lead, barium, cadmium and other heavy metals.
- Circuit boards, found in all electronics, which may contain lead solder, beryllium or other heavy metals.
- Non-alkaline batteries, found in laptop computers, tablets, cellphones, MP3 players, digital cameras and other portable electronic devices. There is a wide variety of battery chemistries. These batteries typically contain heavy metals, such as cadmium, mercury and nickel. Many battery chemistries, particularly lithium ion, also pose a significant fire risk.
- Lamps, found in flat-panel displays, including televisions and monitors, scanners and other imaging devices. Fluorescent lamps contain mercury vapor, while other light sources, such as LEDs, may contain heavy metals such as lead or arsenic.
- Mercury-containing equipment (e.g., electronics containing mercury relays and switches), including some appliances, telecommunications equipment and medical equipment.
- Antifreeze/coolant (ethylene glycol), found in rear projection televisions.

Refer to Appendix A for a table summarizing hazardous waste requirements for hazardous components found in electronics.

Note: Electronics and components that do not meet hazardous waste exclusions or are not managed according to exclusion requirements may be fully regulated as hazardous waste if they exhibit a hazardous waste characteristic identified in subch. C of NR 661, Wis. Adm. Code.

Collection and storage

Individuals or organizations that collect, consolidate or store used electronics destined for reuse or recycling must follow the conditions of any solid or hazardous waste exemptions or exclusions to avoid more stringent regulation.

Most sites do not need a hazardous or solid waste storage license for electronics destined for recycling. However, if a facility—such as an electronics processing facility—stores used electronics or components off-site (e.g., not in its main facility), it will likely need a solid waste storage license under s. NR 502.05, Wis. Adm. Code. Contact DNRWIe-cycling@wisconsin.gov with questions.

All collection sites, storage facilities and transfer facilities must follow the performance standards and closure requirements under s. NR 502.04 (1) and (3) (a) and (b), Wis. Adm. Code. These include not polluting the air, surface water or groundwater, not harming endangered or threatened species, and promptly and properly removing all waste from the facility or site after it closes.

For more details on collector requirements, refer to *Electronics Collection Requirements and Best Practices (WA-2030)*.

Requirements for electronics drop-off sites

The DNR regulates public drop-off sites where electronics are hand unloaded from vehicles that have a capacity of one ton or less under s. NR 502.07 (2), Wis. Adm. Code. To be exempt from needing a solid waste transfer facility license, sites must meet code requirements, including:

- Containers or packaging material holding electronics must be:
  - adequate to prevent breakage and spills;
  - compatible with the contents; and
  - made of material that will remain structurally sound for the length of time the contents are stored. For example, a site should not use unprotected cardboard Gaylords to store electronics long-term outdoors, because the containers will fall apart if soaked by rain or snow.

- Electronics must be stored in a manner that will prevent damage from weather, theft or vandalism. While this will look different for different sites, it generally means that all sites should store electronics in areas not accessible to the public, store valuable items In a locked area, and protect electronics from the elements using a building, covered outdoor storage, covered containers or tarping.
- Ship electronics off-site to a recycler at least once per year and label containers/keep records to demonstrate this.
- For any part of a site where mechanical equipment (e.g., a forklift) is part of the operation, limit public access to only times when an attendant is on duty.
- Clearly label the recycling area at the site.
- Keep the area clean and free of litter.
- Don't burn electronics or other solid waste.
- Provide means to control fires.
- Maintain an all-weather access road and parking.

Requirements for electronics consolidation points or transfer facilities not open to the public

A facility for the transfer of waste electronic devices intended for recycling that is not a public drop-off site does not need a solid waste transfer station license from the DNR if it is operated and maintained in a nuisance-free manner and complies with specific requirements. This may apply to facilities such as retailer distribution centers or facilities that consolidate electronics from public drop-off sites for events but are not open to the public themselves.

Requirements are similar to public drop-off sites, and include:

- Containers or packaging material holding electronics must be:
  - adequate to prevent breakage and spills;
  - compatible with the contents; and
  - made of material that will remain structurally sound for the length of time material is stored. For example, a site should not use unprotected cardboard Gaylords to store electronics long-term outdoors, because the containers will fall apart if soaked by rain or snow.
- Electronics must be stored in a manner that will prevent damage from weather, theft or vandalism. While this will look different for different sites, it generally means that all sites should store electronics in areas not accessible to the public, store valuable items In a locked area, and protect electronics from the elements using a building, covered outdoor storage, covered containers or tarping.
- Ship electronics off-site to a recycler at least once per year and label containers/keep records to demonstrate this.
- Keep the area clean and free of litter.
- Don't burn electronics or other solid waste.
- Provide means to control fires.
- Maintain all-weather access road and parking.

CRT devices, bare CRTs and CRT glass

Under ss. NR 661.0039 and 661.0040, Wis. Adm. Code, if CRT devices, bare CRTs and CRT glass are destined for specific types of legitimate recycling, they are conditionally excluded from full hazardous waste requirements—including the need to obtain a hazardous waste storage license—if they meet the requirements of those code sections and are not speculatively accumulated. If you have questions about whether a CRT end market qualifies for the exclusion, contact DNRWIe-cycling@wisconsin.gov.

Speculative accumulation limits

To meet the speculative accumulation limit under s. NR 661.0001 (3) (h), Wis. Adm. Code, the amount of CRT devices, bare CRTs or CRT glass recycled or transferred to a recycling facility during each

calendar year must equal at least 75% by weight or volume (e.g., filled containers, number of units) of the amount of CRT devices, bare CRTs or CRT glass accumulated on-site as of Jan. 1 that year. For example, a collector with 1,000 pounds of CRT televisions on-site as of Jan. 1must send at least 750 pounds off-site for recycling by the end of the year.

Moving CRTs from one site to a second site owned by the same individual or company for purposes of storage at the second site would not reset the calendar for speculative accumulation. In other words, CRTs stored at the second site would still be subject to the same speculative accumulation period that began at the first site on Jan. 1 of that year.

Under s. NR 661.0001 (3) (h), the individual or facility accumulating the used CRTs and CRT glass must also be able to show the material is potentially recyclable and has a feasible means of being recycled. In general, a material has a feasible means of being recycled if there is a known market for the material and an identified recycler will accept and recycle the material.

To demonstrate compliance with the speculative accumulation limit, sites handling CRTs must label all containers/pallets or similar storage units with the date when first CRT, CRT device or CRT glass was placed there. If the site isn't able to label the storage unit, it must use an inventory log or other appropriate method to demonstrate compliance with accumulation limits.

The DNR also recommends sites maintain records, such as contracts and bills of lading or other shipment details, to show CRTs are going to legitimate recycling activities within the appropriate timeframe and to show compliance with speculative accumulation limits.

For questions about meeting speculative accumulation limits, contact DNRWIe-cycling@wisconsin.gov.

Management of broken CRT glass
Section NR 661.0039, Wis. Adm. Code, requires sites to:

- store broken CRTs or CRT glass in a building with roof, walls and floor; or
- place the CRTs or CRT glass in a leak-proof container constructed, filled and closed to minimize potential for releases (e.g., a trailer sealed in accordance with U.S. Department of Transportation standards, or a closed 55-gallon drum).

Containers must be labeled "'Used cathode ray tubes – contains leaded glass" or "Leaded glass from televisions or computers," AND "Do not mix with other glass materials.''

Batteries and devices containing lithium batteries

For loose batteries or devices containing batteries, especially lithium-ion batteries, sites should follow packaging and storage requirements found in ch. NR 673, Wis. Adm. Code, and recommendations to prevent fires. Go to **dnr.wi.gov** and search "universal waste" for more information.

Transportation

Wisconsin solid waste or hazardous waste transporter licenses are not required if electronics are destined for **reuse** or recycling and the transporter meets the requirements outlined below. Beyond these requirements, the DNR recommends collectors and transporters work with recyclers and other receiving facilities to make sure electronics are packaged appropriately to minimize breakage and ensure worker safety.

Requirements to qualify for solid waste licensing exemptions

To qualify for the licensing exemption under s. NR 502.06 (2) (ag), Wis. Adm. Code, trucks carrying only waste electronic devices for recycling must meet all the following requirements:

- Transport electronics to a licensed processing facility or an acceptable location that is exempt from licensing.
- Use durable containers that will not cause electronics to spill out.
- Comply with the electronics disposal ban in s. 287.07 (5), Wis. Stats.
- Maintain cleanliness of electronics for recycling.
- Keep records showing recyclable materials were delivered to brokers, processors or end users.

Wisconsin electronics processing facilities must notify, in writing, any third-party haulers they contract with of these requirements, both when entering into the contract and annually after that [s. NR 502.08 (6) (p), Wis. Adm. Code].

Transporting CRT devices, bare CRTs and CRT glass

While Wisconsin does not require solid waste or hazardous waste licenses for transporting CRTs or CRT glass, shipping facilities and transporters should maintain records showing the materials are going to legitimate recycling activities [documenting compliance with ss. NR 661.0039, 661.0040 and 661.0041, Wis. Adm. Code]. The DNR also recommends shipping facilities and transporters package intact CRTs to minimize breakage. Broken CRTs/CRT glass must be transported in leak-proof containers labeled "'Used cathode ray tubes – contains leaded glass" or "Leaded glass from televisions or computers," AND "Do not mix with other glass materials'' [see s. NR 661.0039 (1)].

Refer to Appendix B for a table summarizing all requirements for transporting CRT devices, bare CRTs and/or CRT glass.

Transporting batteries, lamps and mercury-containing equipment

Some types of batteries contained in electronics present a fire risk, especially if damaged. The U.S. Department of Transportation has specific requirements for transporting lithium batteries and devices containing lithium batteries: www.phmsa.dot.gov/lithiumbatteries.

In addition, universal waste requirements under ch. NR 673, Wis. Adm. Code, apply to loose batteries, lamps and mercury-containing equipment, including electronics with mercury switches, relays or other mercury components. Go to **dnr.wi.gov** search "universal waste" for more information.

Hazardous materials transportation

In addition to specific battery-related requirements mentioned above, transporters should be aware of general requirements for transporting hazardous materials. Hazardous materials are substances or materials the U.S. DOT has determined can pose an unreasonable risk to health, safety and property when transported in commerce. Hazardous material, as defined in 49 CFR § 171.8, is subject to the applicable Hazardous Materials Regulations in 49 CFR Parts 171 to 180. Those regulations apply to the classification, packaging, hazard communication, incident reporting, handling and transportation of hazardous materials. Visit the U.S. DOT's Hazardous Materials Regulations webpage for more information: www.phmsa.dot.gov/standards-rulemaking/hazmat/hazardous-materials-regulations

Dismantling, sorting and processing

Processing electronic devices for use in manufacturing or for recovery of usable materials is a type of solid waste processing. Wisconsin facilities that process electronic devices or components derived from electronic devices by disassembling, baling, crushing, grinding, shredding or similar methods must obtain a solid waste processing approval and license from the DNR under s. NR 502.08, Wis. Adm.

Code, unless they meet one of the exemptions listed below. A facility must renew its processing license each year. There is no fee for the plan review or license.

Refer to the Definitions and background section for a list of activities that do not meet the definition of electronics processing and do not require a solid waste processing license.

Facilities that meet at least one of the following conditions may be exempt from licensing requirements. Exempt facilities must still comply with performance standards and closure requirements under s. NR 502.04 (1) and (3) (a) and (b), Wis. Adm. Code, and minimum operation requirements under s. NR 502.08 (6) (e), (g), (i), (k), (L), (n) and sometimes (h).

- Processing fewer than 25 electronic devices per year [s.NR 502.08 (2) (j), Wis. Adm. Code].
- Only hand sorting and packaging waste electronic devices, including removing cords, ink or toner cartridges, or batteries from electronic devices, for shipping or transport to an electronics processing facility without engaging in any additional electronics processing activities [s. NR 502.08 (2) (k), Wis. Adm. Code].

If used electronics awaiting processing are stored off-site (not in the processing facility), the off-site location will likely need a solid waste storage license under s. NR 502.05, Wis. Adm. Code. Contact the DNR with questions.

For more on solid waste requirements and applying for a DNR solid waste processing approval and license, refer to *Electronics Processing Facility Requirements and Licensing Process (WA-2031).*

The sections below have more details on how facilities can maintain compliance and avoid more stringent regulations for components that are hazardous waste. See also best management practices and CRT storage requirements under the "Collection and storage" section above.

CRT devices, bare CRTs and CRT glass

Before disassembly and/or processing, a facility must follow all storage and labeling requirements and speculative accumulation limits outlined above for intact and broken CRTs.

If the facility is stripping CRT devices down to bare tubes and then sending bare tubes to a processor, follow the requirements listed in Table 2, Appendix B.

Facilities going beyond simple dismantling of CRT devices should contact DNR staff to determine if any additional requirements apply. Exclusions and exemptions from hazardous and solid waste requirements are case-specific and depend on factors such as the end markets for the glass.

Section NR 660.10 (19) (j), Wis. Adm. Code, defines "CRT processing" as conducting **all** the following activities:

1. Receiving broken or intact CRTs;
2. Intentionally breaking intact CRTs or further breaking or separating broken CRTs; and
3. Sorting or otherwise managing glass removed from CRTs.

Under s. NR 661.0039 (2), Wis. Adm. Code, a facility's activities that meet the definition of CRT processing must be done in a building with a roof, floor and walls, and cannot be done at temperatures high enough to volatilize lead. Used, broken CRTs undergoing processing and processed glass are subject to the speculative accumulation limits under s. NR 661.0039 described above in the "Collection and storage" section.

If processed CRT glass is stored off-site (not at the processing facility) and in Wisconsin, the off-site location must have a solid waste storage license under s. NR 502.05, Wis. Adm. Code.

If any processed CRT glass will be sent for disposal in a hazardous waste or solid waste landfill, check with DNR staff to ensure any requirements for hazardous waste manifesting, testing or approvals for receiving landfills are in place before shipping the glass. Refer to the DNR's *Requirements for Landfill Disposal of Processed CRT Glass and E-Cycle Wisconsin Eligibility (*WA-1681).

Third-party certifications

There are several third-party certifications electronics recyclers can obtain to demonstrate responsible management of used electronics and components. Some of the most common certifications held by recyclers include:

- e-Stewards: e-stewards.org/
- R2: sustainableelectronics.org
- NAID (data destruction): www.naidonline.org/nitl/en/cert/history-purpose.html
- RIOS /www.rioscertification.org/

Devices containing batteries

The DNR recommends batteries be removed before devices are put into crushers, shredders or other machines to prevent the batteries from starting fires. Once removed, batteries may be handled as universal waste under ch. NR 673, Wis. Adm. Code, with proper labeling and storage, or they will be subject to full hazardous waste requirements under ch. NR 662, Wis. Adm. Code. Go to **dnr.wi.gov** and search "universal waste" for more information.

Electronics processing facilities should train staff how to handle fires caused by batteries and ensure fire suppression systems are working at all times.

Devices containing lamps

When handling flat-panel displays, the DNR recommends processors treat them as if every display contains mercury lamps, because there is no consistent labeling on the outside of devices to indicate whether the flat-panel displays contain mercury.

If a facility is dismantling flat-panel displays by hand, it should provide appropriate personal protective equipment for workers, have proper ventilation and train workers for dealing with broken mercury-containing lamps. Removed lamps must be managed as universal waste under ch. NR 673, Wis. Adm. Code, with proper labeling and storage requirements, or they will be subject to full hazardous waste requirements. Go to **dnr.wi.gov** and search "universal waste" for more information.

Processors should be aware that other devices, particularly scanners or similar imaging devices, may also contain lamps that should be managed according to universal waste requirements.

Facilities planning to shred whole flat-panel displays or other devices that contain lamps should contact the DNR. To maintain compliance with the NR 600 administrative rules and ensure worker safety, the facility should have proper air filtration systems in place to capture mercury.

Devices containing mercury switches, relays or other mercury components

Mercury switches, relays or other mercury-containing components should be removed before devices are put into crushers, shredders or other machines. Once removed, mercury-containing components may be handled as universal waste under ch. NR 673, Wis. Adm. Code, with proper labeling and storage, or they will be subject to full hazardous waste requirements under ch. NR 662, Wis. Adm. Code. Go to **dnr.wi.gov** and search "universal waste" for more information.

Circuit boards

Hazardous waste requirements do not apply to shredding circuit boards for legitimate recycling if the facility meets the following conditions in s. NR 661.0004 (1) (n), Wis. Adm. Code:

- remove batteries (nickel cadmium and lithium), mercury switches and mercury relays before shredding; and
- store and transport boards in containers that prevent releases to the environment.

Other requirements that may apply

Requirements for handling appliances with refrigerants

Collectors, transporters and processors that handle refrigerant-containing appliances, such as refrigerators, freezers, air conditioners and dehumidifiers, must follow state and federal regulations for safe transport and refrigerant recovery. Chapter NR 488, Wis. Adm. Code, requires anyone transporting salvaged refrigeration equipment to certify annually to the DNR's Air Management Program that they will transport items in a manner that prevents refrigerant releases. Any private or public entity responsible for recovering regulated refrigerants from any type of equipment being salvaged must register annually with the DNR.

For more information, visit DNR's refrigerant recovery program webpage:
dnr.wi.gov/topic/airquality/refrigerants.html

Stormwater regulations

Businesses storing scrap materials outside for long periods of time may fall under state stormwater regulations in ch. NR 216, Wis. Adm. Code, and may need a permit under the "Recycling of scrap and waste materials" general permit for facilities with bulk storage piles of scrap material. If unsure whether your location requires a permit, contact regional DNR stormwater staff:
dnr.wi.gov/topic/stormwater/contacts.html.

Occupational safety and health

The U.S. Department of Labor's Occupational Safety and Health Administration (OSHA) regulations in 29 CFR Part 1910 require private employers to protect their workers from safety and health hazards. The Wisconsin Department of Safety and Professional Services' Public Employee Safety and Health standards in ch. SPS 332, Wis. Adm. Code, require public employers to do the same.

Hazardous substance discharges (spills)

Wisconsin's hazardous substance spills law (ch. 292, Wis. Stats.) requires immediate notification to the DNR (by calling 800-943-0003) of all discharges of hazardous substances to the environment, and requires those responsible to properly contain, clean up and dispose of the substance and associated contaminated soil, water and other affected materials.

Visit dnr.wi.gov and search "spills" for more information.

Data protection

Facilities collecting and processing electronics, particularly from businesses, institutions or governments, should be aware of federal privacy requirements for health information under HIPAA (Health Insurance Portability and Accountability Act) and educational information under FERPA (Federal Educational Rights and Privacy Act), as well as other government regulations or customer privacy policies.

The following webpages have more information on these requirements.

- HIPAA: www.hhs.gov/hipaa/index.html
- FERPA: www2.ed.gov/policy/gen/guid/fpco/ferpa/index.html

More information

For more information on this subject, including other publications, staff contacts and administrative codes and statutes, go to **dnr.wi.gov** and search "ecycle." For more information about managing universal waste, go to **dnr.wi.gov** search "universal waste."

Mailing address: DNR Waste and Materials Management Program, PO Box 7921, Madison, WI 53707
Email: DNRWIe-cycling@wisconsin.gov

Appendix A: Applicable requirements for electronics with hazardous components

Table 1 summarizes requirements for hazardous components commonly found in electronics.

Please note: Electronics and components that do not meet the hazardous waste exclusions or are not managed according to the regulations are fully regulated as hazardous waste if they exhibit a hazardous waste characteristic identified in subch. C of ch. NR 661, Wis. Adm. Code.

Table 1: Applicable requirements for hazardous electronics components

Component	Found in	Requirements
Intact or broken CRTs	Televisions, computer monitors	Conditionally excluded from most hazardous waste requirements if managed according to ss. NR 661.0039 and 661.0040, Wis. Adm. Code
Circuit boards	All electronics	Shredded circuit boards managed according to s. NR 661.0004(1)(n), Wis. Adm. Code, are conditionally excluded from other hazardous waste requirements Whole, unused circuit boards are classified as an off-specification commercial chemical product and when reclaimed under s. NR 661.0002(3), Wis. Adm. Code, are not a solid waste under the NR 600 series Whole, used circuit boards are classified as scrap metal and are regulated under s. NR 661.0006(1)(c)2
Non-alkaline batteries	Laptop/notebook computers, tablets, cellphones, MP3 players, digital cameras, other portable electronic devices	Once removed, exempt from full hazardous waste requirements if managed as universal waste under ch. NR 673, Wis. Adm. Code U.S. Department of Transportation requirements apply for transportation of lithium batteries (including those contained in devices)
Lamps	Flat-panel displays, including televisions and monitors; scanners and other imaging devices	Once removed, exempt from full hazardous waste requirements if managed as universal waste under ch. NR 673, Wis. Adm. Code
Mercury-containing equipment (electronics with mercury -containing components such as relays and switches)	Appliances, telecommunications equipment, medical equipment	Once removed, exempt from full hazardous waste requirements if managed as universal waste under ch. NR 673, Wis. Adm. Code
Antifreeze/coolant (ethylene glycol)	Rear projection televisions	Once removed, can be managed as used oil under ch. NR 679, Wis. Adm. Code.

Appendix B: Requirements for shipping CRT devices, bare CRTs and CRT glass

Table 2 summarizes state and federal requirements for transporting CRT devices, bare CRTs and CRT glass. No solid waste transporter license is required for transporting CRTs or CRT glass. The DNR recommends shipping facilities and transporters ensure intact CRTs are packaged to minimize breakage.

Table 2: Requirements for shipping CRT-containing devices, bare CRTs and CRT glass

Material type	Destination	Requirements
CRT devices, bare CRTs or CRT glass	Storage, consolidation, sorting or CRT processing facility in the United States	Maintain records to show CRTs are going to legitimate recycling activities [documenting compliance with ss. NR 661.0039, 661.0040 and 661.0041, Wis. Adm. Code] Broken CRTs/CRT glass must be transported in leak-proof containers labeled "'Used cathode ray tubes – contains leaded glass" or "Leaded glass from televisions or computers." AND "Do not mix with other glass materials.'' [s. NR 661.0039(1)]
Intact CRTs/ CRT devices	Exporting for reuse	Submit one-time notification to U.S. EPA and maintain records demonstrating reuse. [s. NR 661.0041].
Intact or broken CRTs	Exporting for recycling	Comply with export requirements under ss. NR 661.0039 and 661.0040, Wis. Adm. Code, including: • Demonstrate CRTs are being exported for legitimate recycling s. NR 660.43, Wis. Adm. Code ○ Glass manufacturing or lead smelting [s. NR 661.0039 (3)] ○ Use as a fluxing agent at copper smelters. [U.S. EPA memo (RCRA Online #14835)] ○ Use as substitute for lead oxide in production of ceramic tile. [U.S. EPA Background Paper (RCRA Online #14855); s. NR 661.0002(5] ○ Other end uses must meet criteria for legitimate recycling in s. NR 660.43, Wis. Adm. Code; otherwise full hazardous waste/Resource Conservation and Recovery Act (RCRA) requirements apply • Notify U.S. EPA at least 60 days before export, receive acknowledgement of consent and notify EPA of changes. Include copy of acknowledgement of consent with all shipments • Submit Electronic Export Information to Protection and submit annual report to EPA • Regular renewals of notification and consent required • Broken CRTs/CRT glass must be transported in leak-proof containers labeled "'Used cathode ray tubes – contains leaded glass" or "Leaded glass from televisions or computers." AND "Do not mix with other glass materials.''

Material type	Destination	Requirements
Processed CRT glass	U.S. secondary processing/ end markets	Make sure facility receiving glass has all needed approvals or licenses For funnel glass, ensure end markets are eligible for hazardous waste exclusions; otherwise, hazardous waste transporter and manifesting requirements apply • Glass manufacturing or lead smelting. [s. NR 661.0039(3), Wis. Adm. Code] • Use as a fluxing agent at copper smelters. [U.S. EPA memo (RCRA Online #14835)] • Use as substitute for lead oxide in production of ceramic tile. [U.S. EPA Background Paper (RCRA Online #14855); s. NR 661.0002(5)] Transport funnel glass/frit in leak-proof containers labeled "'Used cathode ray tubes – contains leaded glass" or "Leaded glass from televisions or computers." AND "Do not mix with other glass materials.'' [s. NR 661.0039(1)] For panel glass, test regularly to ensure it is not hazardous waste [s. NR 662.011]
Processed CRT glass	Exporting to end market	No export notification required if processed glass is going to: • Glass manufacturing or lead smelting. [s. NR 661.0039 (3), Wis. Adm. Code] • Use as a fluxing agent at copper smelters. [U.S. EPA memo (RCRA Online #14835)] • Use as substitute for lead oxide in production of ceramic tile. [U.S. EPA Background Paper (RCRA Online #14855); s. NR 661.0002(5)] Other end uses must meet criteria for legitimate recycling in s. NR 660.43, Wis. Adm. Code; otherwise full hazardous waste/RCRA requirements apply Transport in leak-proof containers labeled "'Used cathode ray tubes – contains leaded glass" or "Leaded glass from televisions or computers." AND "Do not mix with other glass materials.'' [NR 661.0039(1)]

For more about requirements for exporting CRTs and CRT glass, refer to the U.S. EPA's website with FAQs: www.epa.gov/hw/frequent-questions-about-regulation-used-cathode-ray-tubes-crts-and-crt-glass