2015 Training

Universal Waste & Used Electronics

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Universal Waste Management

The following section covers:

- The history of the universal waste rule
- The streamlined requirements for and the benefits of the universal waste rule
- The EPA and VA DEQ goals for the universal waste rule

Background

In 1995, the Environmental Protection Agency (EPA) developed an alternate, streamlined management program to encourage the collection and recycling of commonly generated hazardous wastes. This is known as the Universal Waste Rule. The federal universal waste regulations can be found in 40 Code of Federal Regulations (CFR) Part 273. The Virginia Department of Environmental Quality (VA DEQ) has adopted the federal universal waste regulations by reference with a few additional requirements. The VA DEQ regulations can be found at 9VAC20-60-273.

Universal waste is a subset of hazardous waste and items of universal waste may contain heavy metals, such as mercury, lead, and cadmium, and other substances hazardous to human and environmental health. In addition, universal wastes may be physically harmful due to their corrosive or reactive characteristics. Universal wastes are generated by a wide variety of people (i.e., individuals, government agencies, hospitals, businesses, etc.) in a variety of settings.

Purpose

The universal waste rule provides a set of streamlined regulations to reduce the regulatory burden by extending the accumulation time for the storage of universal wastes, reducing record-keeping requirements, and allowing for consolidation off-site without a permit. Universal wastes are:

- Generated in a wide variety of settings.
- Generated by a vast community.
- Stored in significant volumes through proper universal waste management.

There are many advantages to the program. Universal waste generation and accumulation quantities are not included when determining hazardous waste generator status if the wastes are in fact recycled. This provides an opportunity to reduce generator status which in turn would reduce regulatory risk, burden, and cost. Universal waste can also be accumulated on-site for up to one year. A hazardous waste manifest is not required to accompany a universal waste shipment in Virginia or within any other state that recognizes the waste as universal. There are fewer recordkeeping requirements and shipments of universal waste can be self-transported or transported via a universal waste transporter rather than a hazardous waste transporter. All of these benefits lead to lower costs and alleviate much of the regulatory burden surrounding waste disposal.

Goals

There are three general goals of the Universal Waste Rule established by the EPA:

- To encourage resource conservation while ensuring adequate protection of human health and the environment.
- To improve implementation of the current hazardous waste regulatory program.
- To provide incentives for individuals and organizations to collect the unregulated portions of these universal waste streams and manage them using the same systems developed for the regulated portions, thus removing them from the municipal waste stream.

The VA DEQ has set up several goals that contribute to those developed by the EPA. These goals are:

- To encourage the recycling of the categories of waste designated as universal waste.
- To improve the management of certain types of hazardous waste.
- To reduce the amount of hazardous waste that ends up in solid waste landfills and waste-to-energy facilities.
- To ease the regulatory burden on facilities that manage these wastes, particularly by allowing more time for accumulation of waste in order to facilitate appropriate recycling or disposal.
- To ensure that these wastes go to appropriate treatment or recycling facilities.

Section Highlights

- Universal waste is a subset of hazardous waste which is regulated by the EPA and VADEQ
- Universal wastes are generated by every commercial, industrial, educational, and municipal facility
- The primary goal of the universal waste rule is to promote resource recovery and recycling

Categories of Universal Waste

The following section covers:

- The four categories of universal waste
- Hazards associated with universal waste batteries and lamps
- Common products for which universal waste handling rules apply

There are many items used at work that are hazardous when handled or disposed of improperly. For example, many cleaning chemicals, maintenance chemicals, and HVAC system chemicals meet the definition of regulated hazardous wastes when they are going to be disposed of. In addition, the following wastes contain substances that are hazardous to human or environmental health and cannot be thrown in the garbage. These wastes also meet the definition of regulated hazardous wastes and can be managed as universal waste:

- Mercury containing equipment
- Pesticides
- Batteries
- Lamps

This manual focuses on batteries and lamps. The end of this manual will also introduce the importance of properly recycling used electronics.

Lamps and batteries must be handled differently than municipal waste because they contain toxic materials including mercury, lead, cadmium, polychlorinated biphenyls (PCBs), and toxic fire-retardant plastics. State and federal regulations require that businesses properly manage this material as hazardous waste or universal waste under the Universal Waste Rule.

Batteries

There are four types of batteries that fall under the Universal Waste Rule:

- Nickel-Cadmium
- Nickel-Metal Hydride
- Lithium Ion
- Lead-Acid

These batteries are typically found in the following devices:

Cordless & Cell Phones	Laptop Computers	Digital Cameras	Cordless Tools	Toys
				

Due to the presence of lead, cadmium, mercury, corrosive chemicals, and reactive chemicals that can be found in these batteries, they must be disposed of in accordance with universal waste requirements. The Federal Battery Management Act of 1996 requires that all nickel-cadmium batteries be easily removable and labeled, and that all hazardous waste rechargeable batteries are managed under the provisions of the federal universal waste rule.

Lamps

Many lamps, bulbs, or tube portions of electric lighting devices contain mercury. Although certain lamps, bulbs, or electric lighting devices may not contain regulated materials, businesses are strongly encouraged to manage these items as universal waste. The following are examples of commonly used lamps:

Common Lamps

Type of Bulb	What it might look like...
Fluorescent tubes: this includes 4-ft, 8-ft, T-12s, and T-8s	
Low mercury "green tips"	
High intensity discharge (HID)	
Compact fluorescents	
Neon	
U-tubes	
Circulars	
Mercury vapor	

Type of Bulb	What it might look like...
High pressure sodium	
Low pressure sodium	
Ultraviolet	
Electronic ballasts	
LED Lamps/Bulbs	

Practical #1: Invisible Contaminants

Section Highlights

- The four categories of universal waste are: mercury containing equipment, pesticides, batteries, and lamps
- Common hazards for universal waste batteries include metals and corrosive or reactive chemicals
- Common hazards for universal waste lamps include mercury and other heavy metals and possibly Polychlorinated Biphenyls in the ballasts

Universal Waste Handler Requirements

The following section covers:

- The definitions of Small and Large Quantity Handlers of universal waste
- The requirements for the on-site collection and management of universal waste batteries and lamps
- The requirements for on-site universal waste lamp crushing

The universal waste regulations create two groups of generators or handlers of universal waste on-site. Depending on the amount of universal waste accumulated on-site, a generator can be either a Small Quantity Handler or a Large Quantity Handler. It is important to note that universal waste handlers are not just those that generate or produce universal waste, but also those who receive the universal waste from other handlers. A description of each, and the main requirements they must comply with, can be found below.

Small Quantity Handlers of Universal Waste (SQHUW)

SQHUWs accumulate less than 5,000 kilograms (11,000 pounds) of universal waste on-site at any one time. SQHUWs must comply with the following requirements:

- Label or mark universal waste to identify the type of universal waste (Example: “Universal Waste Batteries”).
- Manage universal waste in a way that prevents releases to the environment.
- Immediately respond to releases of universal waste and properly manage released material.
- Distribute basic waste handling and emergency information to employees to ensure that staff is aware of proper procedures regarding universal waste.
- Accumulate universal waste for no more than **ONE** year.

- Comply with export requirements for foreign shipments.
- Comply with U.S. Department of Transportation (DOT) shipping regulations for shipping hazardous material.

SQHUWs are not required to notify VA DEQ of their universal waste management activities, keep records of their universal waste shipments, or use hazardous waste manifests for off-site shipments of universal waste. However, VA DEQ and the NVRC recommend keeping these records as a best management practice (BMP). Also, if the material shipped is considered a Department of Transportation hazardous material, some form of a shipping paper will be required. See the section on Universal Waste Transporter Requirements for additional information on shipping hazardous materials.

Large Quantity Handlers of Universal Waste (LQHUW)

LQHUWs can accumulate 5,000 kilograms (11,000 pounds) or more of universal waste on-site at any one time. If a SQHUW accumulates more than 5,000 kilograms of universal waste they may be designated as a LQHUW. The designation as a LQHUW is maintained for the remainder of the calendar year in which the 5,000 kilogram threshold was exceeded. LQHUW must comply with the following:

- Label or mark each container as universal waste to identify the type of universal waste (Example: “Universal Waste Batteries”).
- Manage universal waste in a way that prevents releases to the environment.
- Immediately respond to releases of universal waste and properly manage released material.
- Ensure that all employees are familiar with proper waste handling and emergency procedures relative to their specific job function during normal facility operations and emergencies.
- Accumulate universal waste for no more than **ONE** year.
- Comply with export requirements for foreign shipments.

- Notify the VA DEQ of your handler status and obtain an EPA identification number (if one has not already been obtained as part of hazardous waste management).
- Maintain records of all universal waste shipments received by and sent from the facility and maintain these records for at least **THREE** years.
- Comply with U.S. Department of Transportation (DOT) shipping regulations for shipping hazardous material.

LQHUWs are not required to use a uniform hazardous waste manifest for off-site shipment of universal waste.

On-Site Management of Universal Waste

Each type of universal waste has specific management requirements designed to prevent releases to the environment. These regulations can be found in 40 CFR 273.13 for SQHUWs and 40 CFR 273.33 for LQHUWs.

Batteries:

A handler of universal waste batteries must manage universal waste batteries in a way that prevents releases to the environment. Handlers of universal waste batteries may conduct the following activities as long as the casing of each individual battery cell is not breached (cells may be opened to remove electrolyte):

- Sorting of batteries by type.
- Mixing of battery types in one container.
- Discharging batteries so as to remove the electric charge.
- Regenerating used batteries.
- Disassembling batteries or battery packs into individual batteries or cells.
- Removing batteries from consumer products.
- Removing electrolyte from batteries.

If a battery cell or casing is broken, it cannot be managed as a universal waste and will likely need to be managed as a hazardous waste. Be careful when handling the broken battery and/or any of its solid and liquid contents as they are commonly corrosive and toxic.

If a handler of universal waste removes electrolytes from batteries, or generates other solid waste as a result of the activities listed above, they must determine whether the electrolyte and/or solid waste exhibit a characteristic of hazardous waste identified in 40 CFR Part 261, subpart C. If it does, then the waste is subject to all applicable requirements of 40 CFR parts 260-272, Hazardous Waste Regulations.

Containers of universal waste batteries must be properly labeled, structurally sound, and compatible with the contents of the material being stored. It is recommended to add the date to the label since handlers of universal waste can only store material on-site for up to one year.

The safe storage and management of rechargeable batteries is important to minimize the risk of contamination or injury.

The NVRC provides the following information as a guideline to manage rechargeable batteries as universal waste:

- Survey how many items your business uses that require rechargeable batteries. If you have an equipment change-out planned, include that in your estimate.
- Check with the Rechargeable Battery Recycling Corporation (RBRC) to see when battery and cell phone collections are taking place.
- Explore other recycling options.
- Educate your maintenance and technical staff about how to implement the management strategy and inform them of the importance of recovering all batteries.
- Coordinate storage, packaging, and shipping logistics with appropriate staff (building engineers, information technology or audio-visual specialists, maintenance workers, custodial staff, etc.).

- Kick-off the management program with an informational meeting with participants to recruit their support.
- Periodically review the program to evaluate its effectiveness and to make improvements.

Not only do batteries contain chemicals which are harmful to human and environmental health, they also contain an additional hazard. This hazard is electrical energy. This stored energy can result in a fire if certain batteries are not stored properly. These batteries include the following:

- Batteries containing sodium
- Lead acid batteries
- Dry cell batteries (nickel-cadmium) > 9 volt rating
- Lithium ion batteries
- Lithium metal batteries

To prevent a fire, each of the above listed batteries must be protected from short circuit prior to being accumulated into a package. This can be done by either covering the battery terminals with a nonconductive tape or by placing each individual battery in a plastic bag or container. The intention of this practice is to adequately insulate each batteries positive (+) and negative (-) terminals so as to prevent battery to battery or battery to metal contact.

<u>Lamps:</u>

A handler of universal waste lamps must manage lamps in a way that prevents releases to the environment. Universal waste lamps must be kept in containers or packages that are structurally sound, adequate to prevent breakage, and compatible with the contents. Containers must remain closed and must be properly labeled. A handler of universal waste lamps must immediately clean up any lamp that is broken and place it in a container for proper disposal.

The NVRC provides the following management strategies for lamps:

- Estimate how many bulbs you generate from your building site(s) based on the estimated square footage of your building:

"The industry average for bulbs per square feet is one bulb per every three square feet and the projected life of the standard fluorescent bulb is twenty thousand burn hours or just over two years"--Source: OSRAM Sylvania

- Explore your light bulb disposal options.
- Research private recycling and disposal services to get estimates for cost of recovery.
- Select a contractor and ensure proper recycling.
- Educate your maintenance staff about how to implement the management strategy. If crushing lamps, document training of the staff that are responsible for this task.
- Coordinate lamp storage, shipping or crushing logistics with appropriate staff (building engineer, maintenance workers, custodial staff, etc).
- Kick-off the management program with an informational meeting with participants to recruit their support.
- Periodically review the program to evaluate its effectiveness and to make improvements.

If lamps are broken, the debris must be cleaned up with utmost care. As the lamps are made of glass and metal, the pieces are likely very sharp. Place this debris into a rigid container such as a 5-gallon pail. Although the mercury that was contained in the lamps was in a vapor form and was likely released when the lamp broke, there is a risk that the work area and debris may still contain trace amounts of mercury. As such, the debris may require testing to determine if it must be managed as mercury contaminated hazardous waste.

If your building generates only a small amount of universal waste lamps, recycling can be facilitated through a "box program." In a box program, a container is provided to the owner/manager who fills it. When the container is full, it can be sent to any recycler via a prepaid ground mail shipment program. Labels and shipping papers are provided to the building owner/manager by the recycling company.

If your building generates large amounts of universal waste lamps, recyclers can arrange "milk-run" pick-ups. Used lamps are picked up by a vendor on a scheduled basis and transported to a certified reclamation or recycling facility. If your building generates very large amounts of universal waste lamps, these can be picked up in trailer loads as needed.

A list of private recycling and disposal services can be found on the NVRC website: www.knowtoxics.com

Practical #2: Proper Storage

Universal Waste Lamp Crushing For Size Reduction

Currently the VA DEQ allows for the use of lamp crushing devices that meet specific standards of operation under the universal waste program. While there are proposed changes in the works regarding lamp crushing in the state of Virginia, the following reflects the current regulations. We advise all participants among DC, Maryland and Virginia to check with your state periodically for updates.

The VA DEQ requirements for bulb crushing can be found in 9VAC20-60-273B.3. Universal waste lamps may be crushed or intentionally broken on the site of generation to reduce their volume; however, breaking, crushing, handling, and storage must occur in a safe and controlled manner. These operations must minimize the release of mercury to the workplace and the environment and must comply with 29 CFR 1910.1000 of the Occupational Safety and Health Administration (OSHA) regulations on Toxic and Hazardous Substances.

The procedure for breaking, crushing, handling and storing of the lamps must be documented. A mechanical unit specifically designed for the process that incorporates the containment and filtration of process air flows to remove mercury-containing vapors and dusts must be used.

All handlers of universal waste (large or small quantity) who crush mercury-containing lamps under these universal waste regulations shall comply with the following regulatory provisions:

- The handler must use a mercury-containing lamp crusher indoors with air pollution controls that capture both particulate and vapor phase mercury. At a minimum, these controls must include, or must be equivalent to the protection provided by a HEPA filter, activated charcoal, and a negative air flow (vacuum) through the crusher unit. The crusher must have documentation from the manufacturer that demonstrates that the unit:

    1. Is capable of achieving the OSHA Permissible Exposure Limit (PEL) for mercury of 0.10 milligram per cubic meter in indoor ambient air (under individual site-specific use conditions)
    2. Achieves a particle retention rate of 99.97% in the HEPA filter (at a particle diameter of 0.3 microns).

- The handler must develop and implement a written procedure specifying how to safely crush universal waste lamps. This procedure must include:

    1. Type of equipment to be used to crush the lamps safely
    2. Operation and maintenance of the unit in accordance with written procedures developed by the manufacturer of the equipment

3. Proper waste management practices. The handler must document maintenance activities and keep records of maintenance. In addition, the unit operator must receive training in crushing procedures, waste handling and emergency procedures (training must be documented).

- Residues, filter media, or other solid waste generated as part of the crushing operation, which are not being reclaimed and which exhibit any characteristics of a hazardous waste, must be managed in accordance with all applicable hazardous waste management requirements.
- The handler must ensure that spills of the contents of the universal waste lamps that may occur during crushing operations are cleaned up in accordance with 40 CFR 273.13 (d)(2) or 40 CFR 273.33 (d)(2).
- The handler must store the crushed lamps in closed, non-leaking drums or containers that are in good condition. Transfer of the crushed lamps to other drums or containers is not permitted.
- Drums or containers used for storage of crushed lamps must be properly sealed and labeled. The label shall bear the words "Universal Waste-Lamp(s)" "Waste Lamp(s)" or "Used Lamp(s)".

Keeping light bulbs intact until they reach a qualified recycler is the safest method to prevent mercury exposure, however there are a number of private companies that produce and maintain drum-top bulb crushing equipment. The NVRC maintains a list of those private companies and that information can be found on their website.

Universal waste handlers may decide to send lamps to universal waste handlers or destination facilities in another state. As long as the receiving state recognizes the facility as a proper universal waste handler or destination facility within its regulatory scope, VA DEQ will also accept such facilities as proper receiving facilities for crushed universal waste lamps. Virginia handlers managing waste through facilities operating in other states are encouraged to contact the corresponding state agency for information on the facility's regulatory status. If a receiving state will not accept

crushed lamps as universal waste, the handler will be required to label and manifest the lamps in accordance with the receiving state's requirements at the time of off-site shipment. This does not however jeopardize a facility's hazardous waste generation status. Destination facility regulatory and compliance status can be obtained from http://www.epa-echo.gov/echo/index.html.

There may also be additional manifesting requirements for universal waste if the states that the waste is being transported through do not recognize that material being transported as a universal waste.

The following is an example of a uniform hazardous waste manifest. Section 14 of the uniform hazardous waste manifest allows for special handling instructions. In the space provided, facilities managing crushed bulbs may provide a comment such as "Managed as universal waste in state of generation, manifested for transportation purposes."

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Manifest Tracking Number

GENERATOR

5. Generator's Name and Mailing Address

Generator's Site Address (if different than mailing address)

Generator's Phone:

6. Transporter 1 Company Name — U.S. EPA ID Number

7. Transporter 2 Company Name — U.S. EPA ID Number

8. Designated Facility Name and Site Address — U.S. EPA ID Number

Facility's Phone:

No. HM	9a. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes
	1.					
	2.					
	3.					
	4.					

14. Special Handling Instructions and Additional Information

15. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name — Signature — Month Day Year

INT'L

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:

Transporter signature (for exports only): Date leaving U.S.:

TRANSPORTER

17. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name — Signature — Month Day Year

Transporter 2 Printed/Typed Name — Signature — Month Day Year

DESIGNATED FACILITY

18. Discrepancy

18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

18b. Alternate Facility (or Generator) — U.S. EPA ID Number

Facility's Phone:

18c. Signature of Alternate Facility (or Generator) — Month Day Year

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)

1.	2.	3.	4.

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a

Printed/Typed Name — Signature — Month Day Year

EPA Form 8700-22 (Rev. 3-05) Previous editions are obsolete.

DESIGNATED FACILITY TO DESTINATION STATE (IF REQUIRED)

Practical #3: The Good, The Bad, The Ugly

Section Highlights

- Facilities that accumulate < 5,000 kg of universal waste onsite at one time are designated as SQHUW
- Facilities that accumulate ≥ 5,000 kg of universal waste on-site at any one time are designated as LQHUW
- Requirements and best practices for accumulating and storing universal waste batteries and lamps on-site
- Proper development and implementation of a universal waste lamp crushing process on-site

Universal Waste Transporter Requirements

The following section covers:

- Options for the off-site shipment of universal wastes
- The overlap of Department of Transportation (DOT) hazardous material requirements for the off-site shipment of certain universal wastes
- DOT's regulatory exclusions for specific types and preparations of universal waste battery shipments.

Universal waste transporters are persons who move universal waste shipments from a handler to another handler, to a destination facility, or to a foreign destination. The universal waste transporter regulations can be found in 40 CFR Part 273, Subpart D.

Overlap of Hazardous Material & Universal Waste Requirements

A universal waste handler does not have to use a permitted hazardous waste transporter to ship their universal waste. They may self-transport. However, transporters are subject to the same prohibitions on disposal, dilution, and treatment as universal waste handlers and are required to follow all DOT shipping requirements for transportation of hazardous materials.

Hazardous waste manifests or bills of lading are only required for some universal waste shipments (depending on handler size), but transporters must comply with all applicable DOT shipping requirements if the universal waste is defined as a hazardous material under DOT regulations. Examples include:

- 1-lb or more of mercury in a container
- Lead-acid batteries
- Lithium batteries

Certain types of batteries can be excluded from hazardous material transportation regulations if specific conditions are met. These conditions include size limits, packaging, and hazard communication requirements. Each type of battery discussed below has a different set of conditions that will make transporting batteries easier.

Used or spent dry batteries of both non-rechargeable and rechargeable designs, with a marked rating up to 9-volt, that are combined in the same package and transported by highway or rail for recycling, reconditioning, or disposal are not subject to any DOT requirements.

Electric storage batteries containing electrolyte acid or corrosive battery fluid (wet batteries), as well as non-spillable wet batteries, are not subject to any transportation requirements if certain minimal conditions are met.

Lithium cells and batteries that are transported for disposal or recycling are excluded from many transportation requirements if they meet the following size limits: lithium content must be ≤ 5grams for a lithium metal cell, ≤ 25 grams for a lithium metal battery; ≤ 60 Wh for a lithium ion cell and ≤ 300 Wh for a lithium ion battery.

If the size and/or type of batteries being shipped are not excluded from more stringent requirements, the handler must comply with all applicable DOT requirements.

What to Expect

Once a transporter has been selected, a business may start disposing of universal waste. There are several options for disposal of universal waste. “Milk runs” or “box programs,” as described earlier, are the most common. Many haulers may also provide on-call services. Some haulers can even plan and operate one-day collection events through a community that may be targeted specially for universal wastes.

Universal waste haulers can assist in evaluating a handler’s unique needs, budgetary conditions, and program goals for the management and disposal of universal waste. This will help in determining what type of disposal makes the most sense for the handler. Many transporters will also be able to

support company universal waste programs with regulatory assistance at the local, state, provincial and federal levels, and may even alert companies of changes in existing regulations and in implementation of new regulations.

Proper management of paperwork is required in accordance with universal waste regulations for LQHUW. Transporters may provide completed paperwork such as manifests or bills of lading. It is recommended that the handler, regardless of their status, maintain copies of this paperwork for future reference. It is possible to obtain this paper work later from the transporter, but it is not a requirement that the transporter maintain a copy for reference.

It is important that the contract between the handler and the hauler identifies what types of services will be provided as part of the contract (e.g., milk run, box programs, on-call services).

Practical #4: Proper Storage and Transportation

Section Highlights

- There are many options for the off-site shipment of universal waste (milk runs, box programs, etc.)
- Several types of universal waste batteries are specifically regulated by the DOT when shipped off-site
- Self-transportation of universal waste to an off-site accumulation or recycling facility is not prohibited

Universal Waste Destination Facility

The following section covers:

- The regulatory requirements applicable to facilities that receive universal wastes
- The types of records a company will need from the destination facilities receiving their universal wastes

A destination facility is a facility that may treat, dispose, or recycle universal waste and is regulated under the universal waste program. If a destination facility only accumulates universal waste, they are subject to the handler requirements described in previous sections. Some destination facilities may accumulate a waste before recycling it or may accumulate one type of universal waste (as a handler) and recycle another type (as a destination facility). These facilities must comply with all applicable regulations under the universal waste program. If a destination facility recycles universal waste without prior storage, the facility is subject to 40 CFR 261.6(c)(2). This requires destination facilities to comply with the following:

- Notification requirements under 40 CFR Part 260-266, 270, 273, and 279.
- Proper manifesting and manifest discrepancy requirements found in 40 CFR Part 265.71 and 265.72.
- Proper permitting requirements with hazardous waste management requirements found in subparts AA, BB, 40 CFR Part 264, 265, or 267.

In general, a destination facility is subject to full hazardous waste regulations as a treatment, storage, and disposal facility (TSDF) which includes permitting, general facility standards, and unit-specific standards.

What to Expect

LQHUW and SQHUW will have different expectations from a destination facility. As discussed in the earlier sections, a SQHUW is not required to manifest or maintain records on-site for shipments of universal waste. Therefore, there may not be a manifest or bill of lading from a destination facility that tracks the shipment. LQHUW are required to maintain records of all universal waste shipments received by and sent from the facility. These records must identify the quantity and types of universal waste shipped off-site and identify the destination facility of the universal waste. This paperwork must be maintained for at least three years. A LQHUW may also receive signed paperwork from the destination facility certifying that the facility has received their shipment. This paperwork should also be maintained on-site for at least three years. Destination facilities are also required to retain records of all universal waste shipments received by and sent from the facilities for a similar period of time.

Section Highlights

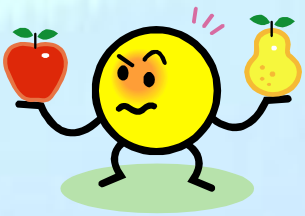
- The regulatory requirements applicable to universal waste destination facilities
- SQHUW are not required to maintain records for their off-site shipment of universal waste
- LQHUW must keep records identifying the quantity and type of universal wastes shipped off-site which must identify the destination facility

Vendor Selection

The following section covers:

- Finding a Vendor to assist with the off-site shipment and management of universal waste
- Comparing potential vendors based on price, services, and risk
- Additional methods for assessment of potential vendors

Vendor selection can be difficult, especially if there are several vendors involved. The VA DEQ and the NVRC have provided some recommendations to ensure businesses are obtaining the assistance they need and are in compliance with universal waste regulations.



How to Find a Vendor

When a company selects a vendor, it is important they find one that will provide them with assurance that their universal waste is properly managed. State and federal regulations hold the generator liable for proper reclamation and recycling.

The NVRC recommends reviewing the following as part of selecting a universal waste vendor:

- Pricing - Pricing is important. However, as with many services, one usually gets what one pays for. It is suggested that a company scrutinize the services a prospective contractor is offering and get more than one quote for their needs.
- Service - Important items for consideration when selecting a universal waste vendor include: responsiveness, timeliness, program flexibility and customization, contractor personnel, whether there will be intermediaries involved, the capabilities of the firm, and the

equipment they will be using.

- Risk Management - Recyclers, as Destination Facilities, are obligated to reduce or eliminate pollution risks for their clients. In order to remove the mercury from the used bulbs, recyclers must comply with numerous federal and state regulations.

Sometimes, the company that is contracted to transport a facility's universal waste is not the same company that will treat, store, or dispose of the material. If this is the case, it is important that a company choose a vendor that will provide them with assurance that their universal waste is being properly managed and that state and federal regulations are being followed. Factors to evaluate when selecting a destination facility include:

- Do they meet insurance requirements for general and pollution liability?
- Is the company financially healthy?
- What indemnities or other assurances do they offer clients?
- What is their environmental record and compliance history?
- Do they have government permits and approvals for facility operation or transportation?
- Are there operations and safety procedures and records?
- Are they using vapor control technology and monitoring records?
- Is there hygiene and medical surveillance information?
- What is the status of a facility closure plan?
- Do they have facility and environmental compliance audit reports?
- Is there information on regulatory contacts?

Helpful Hints

As the intention of these management practices and regulations is to protect our environment, it is of utmost importance to evaluate potential vendors' performance and credentials. It is useful to conduct a basic search to evaluate potential vendors' compliance standing. One way to acquire this information is to request a copy of a recently completed third party compliance audit report. Another option is to visit a couple different web sites to determine their current compliance metrics.

One useful web site is EPA Envirofacts. Their web address is http://www.epa.gov/enviro/facts/multisystem.html.This multi system search allows you to search multiple environmental databases for facility information, including toxic chemical releases, water discharge permit compliance, hazardous waste handling processes, Superfund status, and air emission estimates. One can search the Envirofacts database using any combination of the following criteria: facility name, geography, facility industrial classification, or pollutant.

Another great link is the EPA Enforcement and Compliance History Online (ECHO). ECHO provides fast, integrated searches of EPA and state data for 800,000+ regulated facilities. It accomplishes this by integrating inspection, violation, and enforcement information for the Clean Water Act, Clean Air Act, and hazardous waste laws. This service can be found at http://www.epa-echo.gov/echo/.

Not only should a potential vendors' compliance history be evaluated, but efforts should be made to see if potential vendors have qualified for any performance, quality, or management system certifications. Examples include:

- R2 Standard – sets of requirements relating to environmental, health, safety, and security aspects of electronics recycling
- ISO 14001 Environmental Management System – sets out criteria to which an environmental management system can be certified. This system maps out a framework for a program that a company or organization can follow to set up an effective environmental management system

Other useful links for finding and evaluating potential vendors include:

- DEQ Vendor Link and Directions for Due Diligence: http://www.deq.virginia.gov/Programs/PollutionPrevention/MercuryReduction/Fluorescents/LampRecyclingVendors.aspx
- NVRC Vendor List: http://www.novaregion.org/index.aspx?nid=815
- NVRC Third Party Certification Information: http://www.novaregion.org/index.aspx?NID=972
- Virginia Fluorescent Lamp Recycling Challenge: http://www.deq.virginia.gov/Programs/PollutionPrevention/MercuryReduction/Fluorescents/HowtoRecycleFluorescentLamps.aspx

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Section Highlights

- The ultimate responsibility for off-site shipment and management of universal waste remains with the generator
- When selecting a vendor, pricing, service, risk management and reputation are all important considerations.
- There are a variety of methods for evaluating potential vendors including public domain, active vendor lists, and organizational memberships

Used Electronics

The following section covers:

- Major examples of used electronics and their associated hazards
- Strategies for receiving, storing and recycling of used electronics
- The importance of and methods for selecting a reputable collection service

Used electronics are not regulated as universal waste under the universal waste rule. However, the EPA and VA DEQ recommend proper recycling of used electronics.

Electronic equipment may contain small amounts of heavy metals including lead, silver, barium, cadmium, gold, and mercury that can make the equipment a hazardous waste, thus it should be recovered and recycled. For example:

- Cathode ray tubes and glass found in computer monitors and television screens contain large amounts of lead (refer to 40 CFR Part 261.4(a)(22) for more information).
- Circuit boards and electronic wiring contain lead, chrome, and other metals.
- Relays and switches can contain mercury.
- Larger electronic equipment can contain PCBs.

The hazardous components listed above do not decompose in landfills, nor will they be destroyed if combusted in a waste-to-energy facility. If not disposed of properly, these hazardous substances could be released into the environment and potentially affect human health.

Generation to Disposal

A handler of used electronics should manage materials in a way that prevents releases to the environment. This could be through storage in a room with four walls, a ceiling and a roof, or in the cargo portion of a truck. Basically, used electronics can be stored anywhere that will prevent leakage or release to the environment. Items in the storage area should be properly labeled. A handler of used electronics should immediately clean up any spills or broken items and place materials in a container for proper disposal.

Although electronic waste is not considered a universal waste in the Commonwealth of Virginia, companies that generate used electronics should collect them for recycling, as the heavy metal may make the used equipment a hazardous waste if disposed. The NVRC provides the following recommendations for safe management of used electronics:

- Survey the electronic equipment that your business uses. If you have an equipment change-out planned, include that in your estimate.
- Explore your recycling options.
- Educate your maintenance and technical staff about how to implement the management strategy.
- Inform staff of the importance of recovering electronics.
- Coordinate storage, packaging, and shipping logistics with appropriate staff (building engineers, information technology or audio-visual specialists, maintenance workers, custodial staff, etc.).
- Kick-off the management program with an informational meeting with participants to recruit their support.
- Periodically review the program to evaluate its effectiveness and to make improvements.

If facilities have computers or other used electronic devices to recycle, several firms and organizations have been identified as serving the computer

and electronic recycling needs of the state. A complete list can be found on the VA DEQ website for Computer and Electronics Recycling.

Companies, governments, manufacturers, and individual purchasers are responsible for properly recycling their discarded materials in a safe and environmentally sound manner. In the absence of federal and state oversight, a company may want to consider a recycler that participates in an independent certification program in order to reduce their liability.

Transportation and Disposal of Used Electronics

Selecting a company for managing used electronics is an important step in recycling obsolete electronics. Companies specializing in proper recycling of obsolete electronics often voluntarily comply with a variety of policies, pledges, and practices to ensure that:

- Obsolete electronics are legitimately reused or their parts are recycled.
- Hazardous materials contained within these items are properly managed.
- Hazardous materials resulting from electronics recycling are not sent overseas without the proper documentation.

There are several existing frameworks for certifying that an electronics recycler is conducting the recycling efforts in compliance with all federal, state and local environmental laws and regulations. While none of them are required by federal or state law, voluntary compliance with any of them will

provide additional assurance that materials are being properly managed. The agencies or framework listed below can be found on the NVRC website:

- United States Environmental Protection Agency
- Institute of Scrap Recycling Industries
- e-Stewards
- International Organization Standardization

Section Highlights

- Known human health and environmental hazards associated with used electronics, including: lead, silver, barium, chrome, mercury and PCBs
- Methods for identifying, collecting, and storing used electronics
- Opportunities for selecting an appropriate service provider for the transportation and recycling of used electronics

Facilities/Maintenance Waste

The following section covers:

- Common facilities and maintenance wastes and the applicable hazards
- Regulatory requirements and Best Management Practices (BMPs) for the collection and storage of these wastes
- Requirements for the transport and disposal of these wastes

Surplus, excess, and expired facilities, maintenance and cleaning chemicals that contain corrosive, toxic, ignitable or reactive ingredients are considered to be hazardous waste. Included in this category are old paints and paint related products as well as cleaning products such as oven, toilet, tub, tile and shower cleaners. Even pool chemicals contain hazardous materials. If these types of material are disposed of improperly they may cause serious harm to the environment and human health.

Categories of Paint & Paint Related Material

Most types of paint and paint related material that are hazardous can be categorized as flammable, non-flammable and toxic. Flammable paint and paint related material may include the following:

- Oil based paint
- Stains
- Thinners
- Solvents

Non-flammable paint and paint related material may include the following:

- Latex based paints
- Acrylic paints

Toxic paint and paint related material may include the following:

- Lead based paints
- Paint strippers

Categories of Commercial Cleaning Chemicals

Most types of commercial cleaning chemicals can be categorized as flammable, corrosive, and toxic. Flammable commercial cleaning chemicals may include the following:

- Spray cleaner with flammable propellant (Lysol)
- Degreasers
- Rubbing alcohol
- Hand sanitizer
- Break cleaner

Corrosive commercial cleaning chemicals may include the following

- Powdered bleach such as Ajax or Comet
- Baking soda
- Floor stripper
- Drain cleaner

Toxic commercial cleaning chemicals may include the following:

- Pesticides
- Herbicides
- Rodenticides
- Mold cleaner

Regulatory Requirements

Improper disposal of hazardous wastes such as pouring them down the drain, on the ground, into storm sewers, and putting them in the trash may have a negative effect on human health and the environment. Certain types of hazardous waste have the potential to cause physical injury to sanitation workers, contaminate septic tanks, or wastewater treatment systems if

poured down drains or toilets and present health hazards to children or pets if stored in the home.

Hazardous waste regulations can be found in 40 CFR Subtitle C of the Resource Conservation and Recovery Act requirements set forth by the Environmental Protection Agency (EPA). There may also be state requirements for the management of hazardous waste which can be found in the Virginia Administrative Code as part of Virginia's Waste Management Board. It is important to determine if the waste is regulated either by the EPA or the VA DEQ prior to disposal to ensure that the material is disposed of properly.

Accumulation & Storage

Prior to disposal it is important to ensure that all hazardous wastes are accumulated and stored properly so as to avoid harm to human health or the environment. Containers of hazardous waste must be labeled, structurally sound, and compatible with the contents of the material being stored. There may also be specific accumulation and storage requirements for flammables, such as the use of a flammable cabinet for storage. It may also be important to check the local building code, or any permits to ensure proper storage and accumulation of flammables according to local standards.

Some helpful tips for the accumulation and storage of hazardous wastes can be found below:

- Do not mix chemical substances.
- Label each container with the words hazardous waste, a description of the waste and an accumulation start date
- Prevent the splashing of chemicals.
- Wear gloves and eye protection when pouring chemicals.
- Keep areas where the product is used and stored well ventilated.
- Secure lids tightly.
- Keep substances in original container.
- Be sure label is securely affixed to the container.
- If the original container is leaking, enclose it in a larger container that is labeled.
- Keep in a cool dry place.
- Keep incompatible products separated.

Additional Requirements

As stated previously hazardous waste has the potential to cause harm to human health and the environment so proper disposal of such waste is key. Federal law does not allow for the disposal of hazardous waste in the trash. Therefore, hazardous waste must be shipped off-site by a licensed transporter to a permitted hazardous waste treatment, storage, and disposal facility.

Listed below are some common requirements that apply to facilities that generate hazardous waste:

- Complete thorough waste determinations to identify the types of hazardous waste generated on-site
- Determine the amount of hazardous waste generated on-site each month
- Determine the applicable generator status; Conditionally Exempt Small Quantity Generator, Small Quantity Generator, or Large Quantity Generator
- Manage and accumulate waste in containers in a designated container storage area
- Complete inspections at least weekly to verify compliance with applicable hazardous waste requirements
- Ship hazardous wastes off-site with a reputable vendor through the use of the Uniform Hazardous Waste Manifest
- Determine the reporting and recordkeeping requirements that apply to the facility
- Provide applicable training to employees who generate and manage hazardous waste
- Develop and implement emergency procedures or plans as required

Other Opportunities or BMPs

Many communities will develop additional universal waste management opportunities or best management practices (BMPs) in the attempt to alleviate not only the regulatory burdens but the management costs upon facilities generating hazardous and solid wastes. Examples of these opportunities and best management practices are provided below:

- Aerosol spray cans - On-site puncturing and bulking without permitting.
- Latex paint – Collecting pour-able latex paint for re-use.
- Recording of specific practices – Keeping track of and recording how much material is being sent out as a universal waste.
- Used electronics – Reclamation of precious metals (1 ton of cell phones = 1,500.00 USD in gold).
- Exchange programs – Un-used or virgin products can be returned to the local waste storage facility and re-distributed.

Appendix A: Practical Demonstrations

Appendix A: Practical Demonstrations

Practical #1: Invisible Contaminants

The intention of this practical is to show how hazardous materials contained within universal waste batteries and lamps can easily spread. Participants will have an opportunity to recognize how these hazards can contaminate the environment and personnel managing the wastes even though the hazards cannot be seen.

The setting for this practical is a trash compactor or dumpster at a facility where universal waste batteries and lamps are being disposed of. This setting has been used for these wastes for a while and the universal waste batteries and lamps have been damaged or broken on a number of occasions within the trash compactor or dumpster. As such, employees have had to clean up the debris and mess from these occurrences a number of times throughout the history of their employment.

Materials & Equipment

Each group should receive:

- 1 x small tarp or plastic sheeting (4' x 4')
- 1-gallon x granular debris (saw dust, kitty litter)
- 12 x 12" latex balloons
- ¼ cup liquid laundry detergent
- 2 x pair work gloves
- 2 x pair nitrile gloves
- 2 x safety glasses
- 1 x tall kitchen plastic trash bag
- 1 x small dust pan
- 1 x small dust broom
- Battery powered black light

Liquid laundry detergent simulating a hazardous contaminant drips from a balloon.

Setting Up

Conduct this practical activity in an area that is large enough to spread out the small tarp or plastic sheeting and to accommodate space around the small tarp or plastic sheeting for participants to observe the practical. In addition, this activity will work best if conducted indoors, or protected from

the weather and wind if conducted outdoors. The defined area should have the ability to allow for adequate lighting to complete the activity, and have the ability to isolate or remove this lighting. This is a necessity as the method used to track the "invisible" contaminants must be conducted in a dark or poorly lit area. To begin:

1. Unfold and lay the small tarp or plastic sheeting on the floor.
2. Evenly scatter the granular debris onto the small tarp or plastic sheeting.
3. Inflate the latex balloons and evenly scatter onto the small tarp or plastic sheeting.
4. Spread ¼ cup of laundry detergent onto the small tarp or plastic sheeting covering some of the granular debris and latex balloons.
5. Select at least two (2) attendees to participate in the activity.
6. Provide the participants with a pair of nitrile gloves, work gloves, and safety glasses.
7. Have the participants put the provided equipment on (nitrile gloves should go on under the work gloves).
8. Provide the participants with the dust pans, dust brooms, and tall kitchen plastic trash bag.

Instructions

Inform the participants that they have been assigned to sweep up and collect all of the debris and garbage that has accumulated around the trash compactor or dumpster at their place of work. They are to use the provided dust pans and brooms to collect the granular debris and balloons off of the small tarp or plastic sheeting. All of the collected granular debris and balloons must be placed into the tall kitchen plastic trash bag. Once done, they are to remove their gloves and safety glasses and to place this equipment and the dust pans and brooms onto the cleaned tarp or plastic sheeting.

Once the participants have completed the cleanup activity, inform them of the following:

1. The granular debris is intended to simulate the visible waste which has accumulated around the trash compactor or dumpster.
2. The liquid laundry detergent is intended to simulate the small quantities of pollutant introduced into the waste such as heavy metals

(mercury, cadmium, lead) and battery electrolyte (sulfuric acid) from broken Universal Waste Batteries and Lamps.

3. The latex balloons assist with allowing the simulated pollutants to travel and move easily through the cleanup process. In addition, they simulate the small quantity of vapor that would be generated by the pollutants.

Instruct the participants to visually assess the small tarp or plastic sheeting, the dust pans and brooms, their hands and clothing, and the outside of the tall kitchen plastic trash bag to determine if any of the simulated pollutants (laundry detergent) are present.

The participants will likely only see, recognize, or comment that small quantities of the simulated pollutant is on the small tarp or plastic sheeting, the dust pans and brooms, and the outside of the tall kitchen plastic trash bag. They will likely not see, recognize, or comment that the pollutant is on their hands and clothing or on the floor around the small tarp or plastic sheeting.

Inform the participants that we cannot always see the effects of pollutants resulting from broken and damaged Universal Wastes. However, just because we cannot see them, does not mean that they are not present. To show the attendees the reality behind this statement, complete the following tasks:

1. Have the participants line up side-by-side near the area where the small tarp or plastic sheeting and equipment is staged.
2. Acquire and turn on the battery operated black light.
3. Turn off the lights and/or adequately shade the work area.
4. Place the black light near the small tarp or plastic sheeting, dust pans, brooms, tall kitchen plastic bag and show the attendees how the invisible pollutants (laundry detergent) illuminates or glows in the dark.
5. Screen the floor area immediately around the small tarp or plastic sheeting to see if there are any spots where the pollutant (liquid laundry detergent) is illuminating or glowing.
6. Screen the participants hands, face, clothes and shoes (especially the souls of the shoes) to see if there are any spots where the pollutant (liquid laundry detergent) is illuminating or glowing.

You will likely see that the pollutant (liquid laundry detergent) is illuminating or glowing on the floor around the small tarp or plastic sheeting, on the participants' hands and clothes, as well as other areas near the activity or on attendees around the area.

Cleanup

As the materials used in this activity are non-hazardous, the unusable materials can be managed as standard garbage. Some of the materials may be reusable (dust pans, brooms, etc.) so please feel free to distribute to the participants or to re-use as part of future training sessions.

Topics for Discussion

Take into consideration that the practical was simulating the outdoor storage of Universal Waste Batteries and Lamps where these items have been broken and damaged through poor handling and storage practices. In addition, this practice has been occurring for an extensive period of time. The following list highlights items to discuss with the attendees upon completion of this practical activity:

- It does not take a large quantity of pollutant to result in the recognizable spread of hazards and contamination to people and the environment.
- These pollutants would have ended up in a landfill or at an incinerator for disposal or destruction.
- The pollutants that were shown on the small tarp or plastic sheeting and around the practical area would have spread to the environment. Take into consideration that these activities may have been happening for a very long time.
- Think about the pollutants that ended up on the participants. They would have taken these hazards home to their family, contaminated their vehicle, work area, etc.
- Imagine if the pollutant was battery acid. How many of the attendees or participants would have suffered burns or have been exposed to this contaminant?

Practical #2: Proper Storage

The intention of this practical is to demonstrate the potential hazards when universal waste is not stored properly and how important it is to follow container management rules. Improperly stored universal waste could come into contact with other material and cause a reaction or harmful release. Participants will have an opportunity to recognize how easily fires may start when low-current dry cells are allowed to inadvertently complete a simple circuit.

The setting for this practical is a bucket full of used batteries stored in your facility. As this container is open, there are also food containers, coffee cups, and other trash that have been thrown in this bucket.

Materials & Equipment

- ABC fire extinguisher (as a precaution)

Each group should receive:

- 1 pair work gloves per participant
- 1 pair safety glasses per participant
- 1 battery (9 volt)
- 1 tuft of steel wool (ping pong ball sized)

Steel wool begins to burn, sparked by the terminals of a 9-volt battery.

Setting Up

It is important to conduct this practical activity in a paved, outdoor area that is sufficiently far from flammable structures and materials as this activity will result in smoldering steel wool. Provide each group with the required supplies and have them select an individual to put on the work gloves and safety glasses. Upon arriving at assigned area to conduct the practical, be sure to stage the ABC extinguisher is a secure and accessible location. Then provide each groups selected individual with a 9 volt battery and a tuft of steel wool. Be sure to instruct participants to keep the 9 volt battery and steel wool separated until they receive further instructions.

Instructions

Inform the participants of the potential dangers associated with this experiment and the importance of keeping the batteries and steel wool away from their bodies. Keep fire extinguisher close at hand.

1. Instruct the groups selected participant to touch a length of the steel wool to both contacts of the battery
2. Once the steel wool starts to glow and smolder instruct the participant to drop the wool to the pavement
3. In the event that the steel wool does not extinguish within a short period of time, you can smother it with some water or by covering the steel wool with your shoe

Cleanup

As the materials used in this activity are non-hazardous, the unusable materials can be managed as standard garbage assuming all embers have been verifiably smothered. The batteries and any substantially usable quantities of steel wool may be kept for future demonstrations or distributed to attendees for their use.

Topics for Discussion

Taking into consideration that this practical simulated an unprotected battery terminal coming in contact with debris in a bucket and starting a fire, ask the participants to consider the following:

- Even a “depleted” battery may retain enough charge to start a fire.
- How should a battery be stored to prevent a fire?
- Who is ultimately responsible if a battery fire occurs during over-the-road transit?
- What is the significance of a battery fire occurring in close proximity to mixed chemistry battery cells, e.g. automotive or lithium button cells?

Appendix A: Practical Demonstrations

Practical #3: The Good, The Bad, The Ugly

The intention of this practical is to show how important housekeeping is as it pertains to the proper on-site accumulation and management of universal waste lamp and batteries and used electronics. Participants will have the opportunity to see pictures of good, bad, and ugly accumulation and management practices for these waste streams.

The setting for this practical is totally up to you. You can either continue to use the pictures that are presented in this activity description or you can collect and insert pictures of actual accumulation and management practices within your facility or work area.

Instructions

Present the pictures to the participants as a hand out or projected to the group as a whole through the training presentation. Inform the participants that they are required to identify the issues or problems with the way that the wastes are being accumulated or managed. Based on the number of problems, the participants must then determine if the overall appearance of each picture is Good, Bad, or Ugly as follows:

- Good = Wastes shown in the picture are properly containerized, labeled, and in accordance with the requirements for managing the shown waste type
- Bad = Wastes shown in picture have a couple of minor issues such as an open container or missing label, but there is no real potential impact to the environment or public health
- Ugly – Waste shown in picture have serious gaps in meeting the accumulation and management requirements and there is a definite risk of impacting the environment or public health

Topics for Discussion

Example pictures with a description of the specific issues and topics for conversation are included in this instruction. If alternate pictures are inserted into this training, the provided information may not reflect the specific intention for the inserted pictures.

Ugly: Lamps in Trash Can

1. Container is too small and not closed
2. Container is not properly labeled
3. Container is stored outside unprotected from the weather and elements.
4. General poor housekeeping in work area

Bad: Lead Acid Batteries on Floor

1. Batteries are not properly labeled
2. If batteries are damaged acidic electrolyte will spill on floor
3. Might be nice to cover battery terminals as well

Ugly: Lamps, Batteries & Electronics

1. Lamps are not in sealed containers
2. If batteries are damaged acidic electrolyte will spill on floor
3. Nothing is labeled as required
4. Everything is stacked into a piles where wastes can easily get broken

Good: Lamps, Batteries & Electronics

1. Lamps and batteries are in sealed containers
2. Electronics are on a pallet and secured
3. All containers are labeled as required

Practical #4: Proper Storage and Transportation

The intention of this practical is to simulate what can happen when Facilities/Maintenance Waste is not properly stored and transported and demonstrates how gases can generate inside a sealed container of Facilities/Maintenance Waste. The gases can accumulate and force the drum to expand, causing a very hazardous situation.

The setting for this practical is a drum located in a warehouse or on the back of a transport vehicle where Facilities/Maintenance Waste have been consolidated into a closed drum. Because the drum was not properly labeled with its contents, two different employees added different chemicals to the drum at different times. Unknown to the employees, these chemicals react when mixed together, generating a gaseous byproduct and pressure to build up within the drum.

Materials & Equipment

Each group should receive:

- 2 x pairs of safety glasses
- 2 x pairs nitrile gloves
- 1 x empty 20 ounce plastic water bottle with screw cap
- ½ cup of vinegar
- 1 tablespoon baking soda
- 1 x latex balloon
- 1 x plastic tray at least 1 inch deep

A balloon sits atop a plastic water bottle, awaiting the air pressure following a chemical reaction.

Setting Up

This exercise may be performed inside a classroom with minimal site preparation. A large table by which at least three groups may participate directly would help to allow all workshop observers to see the demonstration from different angles.

1. Provide each group with the required materials and equipment
2. Place the plastic tray on a flat work surface

3. Have two members of each group put on safety glasses and nitrile gloves
4. Have these two members pour vinegar into plastic bottle and place bottle into plastic tray
5. Have these members put the tablespoon of baking soda into latex balloon
6. Have these members place opening of latex balloon over plastic bottle neck without dumping any baking soda into plastic bottle

Instructions

Inform the participants that they are about to see a demonstration of what can happen when incompatible Facilities/Maintenance Waste is mixed in a container and then the container is sealed. To perform the following steps properly, you may recommend that one person hold the bottle while another adds the appropriate ingredients. These two people should be wearing the safety glasses and nitrile gloves. Have one of the assigned people hold the base of the bottle while the other assigned person lifts the balloon so the baking soda pours into the plastic bottle with the vinegar.

As soon as the baking soda comes into contact with the vinegar a chemical reaction will occur which will generate a recognizable fizz and carbon dioxide gas. As the balloon is sealed onto the plastic bottle, the carbon dioxide will immediately inflate the balloon.

Inform the participants that this type of reaction would likely occur if incompatible Facilities/Maintenance Waste were mixed in a container. If this reaction happened immediately the employee mixing the chemicals would have been exposed to the chemicals as they were released from the unsealed drum. If this reaction was delayed and the drum was sealed, the drum would expand, break, and potentially explode.

Cleanup

The materials used in this activity are non-hazardous. The water bottle should be rinsed with water and the contents can be poured down a sanitary sewer drain. The balloon and plastic water bottle should be reused or recycled.

Topics for Discussion

Take into consideration that the practical simulated the mixing of Facilities/Maintenance Waste, having been ‘bulked’ or mixed together in a container. The following list highlights items to discuss with the attendees upon completion of this practical activity:

- Properly identifying chemicals placed together within a container is critical to their proper management and employee safety
- Imagine that a waste hauler was loading a container of universal waste batteries and the container appeared to be bulging and hot. How did this happen? Is this a problem?
- What would have happened to employees working in this area?
- A bulging drum that explodes can cause as much damage as a hand grenade when it detonates
- Imagine the shrapnel from the bursting drum
- What if the contents of the drum were also flammable, corrosive or toxic
- What would happen to other containers, chemicals or materials stored in the area where this drum exploded

Appendix B: Single Page Advisories

Appendix B:
Offsite Shipping of Universal Waste Batteries and Lamps

The following page provides quick-reference guidance for the proper offsite shipping of universal waste batteries and lamps.

Step 1 – Identify Destination Facility

Several options exist for facilities that may accept universal waste:

Commercial Establishments: Some retailers will accept spent batteries and lamps at no charge and may provide rebates towards the purchase of new batteries and lamps. Examples include: automotive parts stores that accept dead car batteries; major home improvement stores that accept used Christmas lights, particularly as they promote sales of new LED lights.

Local or Municipal Collection Centers: To explore this option search online to determine if a program is offered in your area for the collection of these wastes. Be sure to get a clear understanding of any limitations or restrictions on who can bring materials into these facilities and what the conditions are for accepting them.

Recognized Universal Waste Destination Facilities (UWDF): Also known as Treatment, Storage and Disposal Facilities (TSDF), these private companies specialize in the collection, management and/or recycling of universal waste lamps and batteries. You can find a list of approved facilities through your state's website.

Step 2 – Transporting your wastes

Several options exist for transporting your waste to a destination facility:

1. **Self-transport:** You can self-transport some universal wastes with less stringent requirements than fully regulated hazardous materials. Hazardous waste manifests are not required for universal waste shipments, but you must comply with applicable U.S. DOT hazardous materials requirements, which may include shipping papers. For more information on these requirements refer to the *Know Toxics Manual*.

2. **Contracted hauler:** You will want to find a vendor who meets the requirements established by the VA DEQ and US DOT requirements for Transporters. To locate vendors use the following links:

    a. DEQ Lamp Vendor Link and Directions for Due Diligence: http://www.deq.virginia.gov/Programs/PollutionPrevention/MercuryReduction/Fluorescents/LampRecyclingVendors.aspx
    b. NVRC Recycling and Vendor List: http://www.novaregion.org/index.aspx?nid=815
    c. NVRC Third Party Certification Information for E-Cyclers: http://www.novaregion.org/index.aspx?NID=972

You may also want to look into partnering with a number of sites that generate universal waste to see if there is opportunity to establish a service contract with a reputable vendor to support the collection, transport and disposal of batteries and lamps. This may drive down overall cost and will provide a vendor with the infrastructure to support the waste quantities.

Step 3 – Preparing Batteries and Lamps for Transport

In addition to applicable DOT requirements, there are Best Management Practices for packaging and transporting universal waste which include:

- Carriage in a vehicle capable of safely transporting waste
- Packages must be secured to prevent shifting within the vehicle
- Packages must be protected against damage (e.g., rainwater, other unsecured materials, etc.)

Dry Cell Batteries

- Batteries with a rating ≥ 9V must be packaged to prevent short circuiting (i.e., cover terminals with non-conductive material such as electrical tape)
- Batteries must be placed in a rigid outer container that is securely closed, secured against shifting, leak-proof, and protected against damage

Lamps

- Lamps must be placed into packaging where lamps are separated by dividers, or surrounded by cushioning material to protect the lamps
- Lamp packaging must be sealed to prevent broken glass from escaping in the event that a lamp is broken during transport

Appendix B:
Record Keeping for Universal Waste Batteries and Lamps

The following page provides quick-reference guidance for the record-keeping requirements for shipments of universal waste.

Large Quantity Handlers of Universal Waste (LQHUW) (those who accumulate ≥ 5,000 kilograms (11,000 pounds) of universal waste on-site at any time) must:

- Maintain records of all universal waste shipments (manifest, bill of lading, or similar type of document) received by and sent from the facility. These records must include the name and address of the destination facility, the quantity and type of universal waste shipped, and the date the shipment was received or shipped.
- Retain all shipment documents for at least three years.
- Maintain signed paperwork from any destination facility certifying the facility has received their shipment.

Small Quantity Handlers of Universal Waste (SQHUW) (those who accumulate < 5,000 kilograms (11,000 pounds) of universal waste on-site at any time) are not required to maintain records regarding universal waste shipments. However, it is recommended that SQH maintain similar records as LQH to document that their universal waste was properly disposed of.

Both LQHUW and SQHUW

If universal waste is shipped to a foreign destination, you need to document the shipment using a log, invoice, manifest, bill of lading or other shipping document. The records should include the following information:

- Name and address of facility generating the waste
- Name and address of the foreign destination facility
- Quantity of each type of universal waste shipped, and
- The date of shipment.

Appendix B:
Proper Storage of Universal Waste Batteries and Lamps

The following page provides quick-reference guidance for the proper storage of universal waste batteries and lamps.

Setting Up a Storage Area

Minimize the number of areas of your facility uses to store universal waste so you can easily keep track of what you have accumulated on site. This storage area should be:

- Large enough to store several months' worth of waste bulbs/batteries/etc. As a rule of thumb, you can expect to replace fluorescent lamps at a rate of one lamp/64 sqft/year.
- Located indoors, in a clean, dry area away from main travel areas.
- Provided with adequate aisle space around all containers and waste batteries to allow access of personnel and equipment. Ensure pick-ups are scheduled frequently enough to maintain proper spacing.
- Supplied with extra universal waste labels in the storage area to facilitate proper labeling.
- Provided with spill equipment to respond to small breakages or leaks, including a dust pan and broom, cut and chemical-resistant gloves, absorbent material for battery acid, and collection containers.

Select Appropriate Storage Containers

Waste lamps must be stored in a container. Waste batteries need only be stored in a container if they show signs of leaking or damage that could cause leaking. *Remember, damaged batteries with breached casings cannot be managed as universal waste!* It is strongly suggested that waste batteries are placed in a container so as to prevent breakage and to contain liquids within a battery in the event of a release.

In general, all containers must be:

- Structurally sound and compatible with contents. For lamps, cardboard containers are typically appropriate and for batteries plastic containers work great.
- Capable of preventing leakage, spillage, or damage.
- Kept securely closed unless adding or removing waste.

Battery Container Examples	Lamp Container Examples
	
	
	

Make sure to cap/insulate the battery terminals of all wet cell batteries and/or dry cell batteries *above 9 volts* to avoid electrical discharge during storage or transportation. Non-conductive tape can be placed over battery terminals or you can even place individual batteries into small plastic sandwich bags. *Do not use silver duct tape as this can cause a fire!*

Coordinate with your waste vendor to determine if your waste batteries are DOT regulated as they will likely be able to provide the required containers for the off-site shipment of these batteries. It would make sense to store these regulated batteries in these approved containers while being accumulated on-site as well.

Properly Label Universal Waste

Label each container of universal waste or individual battery with the words "Universal Waste – Battery(ies)" or "Universal Waste – Lamp(s)" as applicable. It is recommended that pre-printed labels be used to facilitate the labeling process.

Mark each label with an accumulation start date (the date the waste, or first piece of waste added to the container, became a waste). *Remember, universal waste can only be stored onsite for up to 1 year!*

Notes:

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