

Properly Managing E-Cigarettes & Vaping Waste Streams

NEWMOA-NERC WEBINAR

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Outline

- Status of e-cigarettes & components under RCRA
- Safety concerns related to e-cigarette batteries
- Residential disposal
- Non-residential disposal
- Disposal by schools
- Recycling e-cigarette batteries

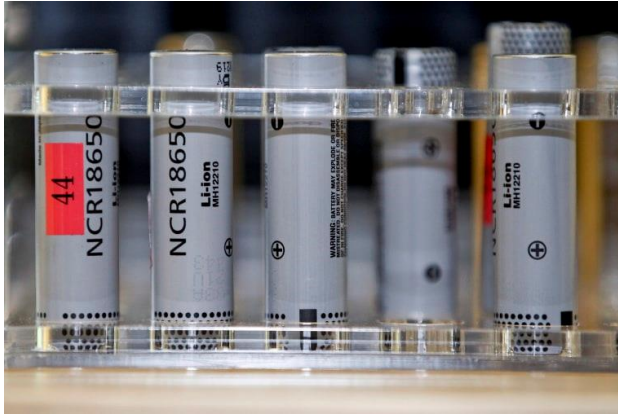
RCRA Status of E-cigarette Components



E-Liquids/E-juices with nicotine are RCRA hazardous waste

- Nicotine is an acute hazardous waste (P075)
- Nicotine is the sole active ingredient in e-liquids (see [RCRA Online 14850](#))
- Nicotine was listed for acute toxicity in 1980
- Acute toxicity of nicotine affirmed in 2019

RCRA Status of E-cigarette Components



Lithium batteries are likely RCRA hazardous waste as both

- Ignitable hazardous waste (D001)
- Reactive hazardous waste (D003)

RCRA Status of E-cigarettes

E-cigarettes are RCRA hazardous wastes



Nicotine (P075) & Lithium batteries (D001/D003)

Safety Concerns re: Batteries



From FEMA's U.S. Fire Administration*

- The combination of an electronic cigarette and a lithium-ion battery is a new and unique hazard. **There is no analogy among consumer products to the risk of a severe, acute injury presented by an e-cigarette**
- Fires or explosions caused by the batteries used in electronic cigarettes are uncommon; however, the consequences can be **devastating and life-altering for the victims**
- The shape and construction of electronic cigarettes can make them (more likely than other products with lithium-ion batteries) behave like **"flaming rockets"** when a battery fails

Lithium Batteries Can Cause Fires



Figure 10: Photo of the aftermath of an LIB fire in a garbage truck. An LIB fire in a garbage truck forced the driver to empty garbage onto the street to be extinguished, disrupting service for customers and creating a traffic hazard for community members and first responders. Photo courtesy of Bellevue Police Department.

Residential Disposal = HHW

- Disposal of e-cigarettes **at residences** is not regulated by EPA as hazardous waste
 - Exempt household hazardous waste (HHW)
 - HHW is still **hazardous**, so EPA recommends using a HHW collection program
 - Check with your county or municipality



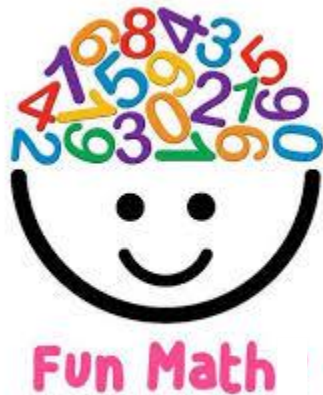
Some states are more stringent and regulate HHW

Non-Residential Disposal \neq HHW

- E-cigarettes and components are regulated as RCRA hazardous waste when discarded
- Lithium batteries: Calculate the amount of **non-acute hazardous waste**/calendar month
- E-liquids: Calculate the amount of **acute hazardous waste**/calendar month

	VSQG	SQG	LQG
Non-acute HW/month	≤ 100 kg	> 100 & < 1000 kg	≥ 1000 kg
Acute HW/month	≤ 1 kg	≤ 1 kg	> 1 kg

RCRA Generator Category



Back of the envelope calculations for e-cigs when determining RCRA generator category

- **E-liquids:** how much does it take to exceed 1 kg of acute HW and be an LQG?
 - > 1000 Juul pods
 - > 200 full 5-ml vials
- **Lithium batteries:** how many does it take to exceed 100 kg of non-acute HW and be an SQG?
 - \approx 2000 18650 lithium-ion batteries*

*CPSC has [issued a warning](#) against using single 18650s

How Does RCRA Apply to Schools?

- EPA does NOT consider a school to be a household
 - Schools are not eligible to use HHW exemption
- Like all generators:
 - Whether and how a school is regulated for the disposal of hazardous waste depends on how much hazardous waste the school generates per calendar month
 - When calculating their monthly generator category, a school must count ALL the hazardous waste that it generates each month
- Other sources of hazardous waste at schools
 - Laboratories
 - Auto maintenance
 - Shop/vocational classrooms
 - Cleaning supplies
 - Some paints and other art supplies
 - etc.

If Schools are VSQGs

- EPA expects that many smaller schools would be VSQGs
- Recommendations for schools that are VSQGs for disposing HW
 1. EPA encourages schools that are VSQGs to contact their local **small business collection program** to inquire about their policies
 - Do they collect e-cigarettes and their components?
 2. New regulations allows VSQGs to consolidate hazardous waste off-site at an LQG, provided
 - Certain conditions are met
 - This provision of the Generator Improvements Rule is in effect in your state

If Schools are Not VSQGs

- EPA expects that larger schools would **not** be VSQGs
- Small business collection days are not an option
- The confiscated e-cigarettes must be managed along with the rest of the school's hazardous waste
 - Cradle-to-grave management standards apply
 - School/school system should have a hazardous waste vendor

Safe Storage of Collected E-cigs



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- Given the hazards of e-cigarette components, it is imperative that collected e-cigarettes are **stored in a safe manner** prior to transportation and disposal
- EPA recommends
 - Following the Department of Transportation (DOT) regulations for lithium batteries during storage prior to transport
 - Wearing **chemical resistant gloves** when handling the e-cigarettes & components to prevent dermal absorption of nicotine (e.g., nitrile or latex gloves)

Safe Storage of Batteries

- Main goal for battery storage: Prevent fires
- How do you achieve that goal?
 - Avoid damaging the battery
 - Isolate the battery terminals

Safe Storage of Batteries

Methods for preventing damage to batteries	Methods for isolating battery terminals	Method for storing bulging/leaking batteries (DDR batteries)
Store away from heat source in a climate-controlled area	Place each individual battery or individual e-cigarette in a separate, clear plastic bag that is sealed (e.g. Ziploc bag)	Place in a bucket of water or sand to contain a potential fire
Do not put in trash or curbside recycling where the batteries can get punctured or crushed	Tape the terminals of the battery with a non-conductive tape such as electrical tape, duct tape or packing tape (do not use masking tape, painter's tape or gift-wrap tape)	

DDR Batteries



Swollen battery



Corroded battery



Discolored battery casing

Safe Storage of E-Liquids

- Goals for nicotine storage:
 - Prevent exposure to nicotine
 - Prevent release of nicotine
- How do you achieve those goals? Containment

Safe Storage of E-Liquids

Method for Containment to prevent exposures & releases

If pods or cartridges are **separate from** e-cigarette

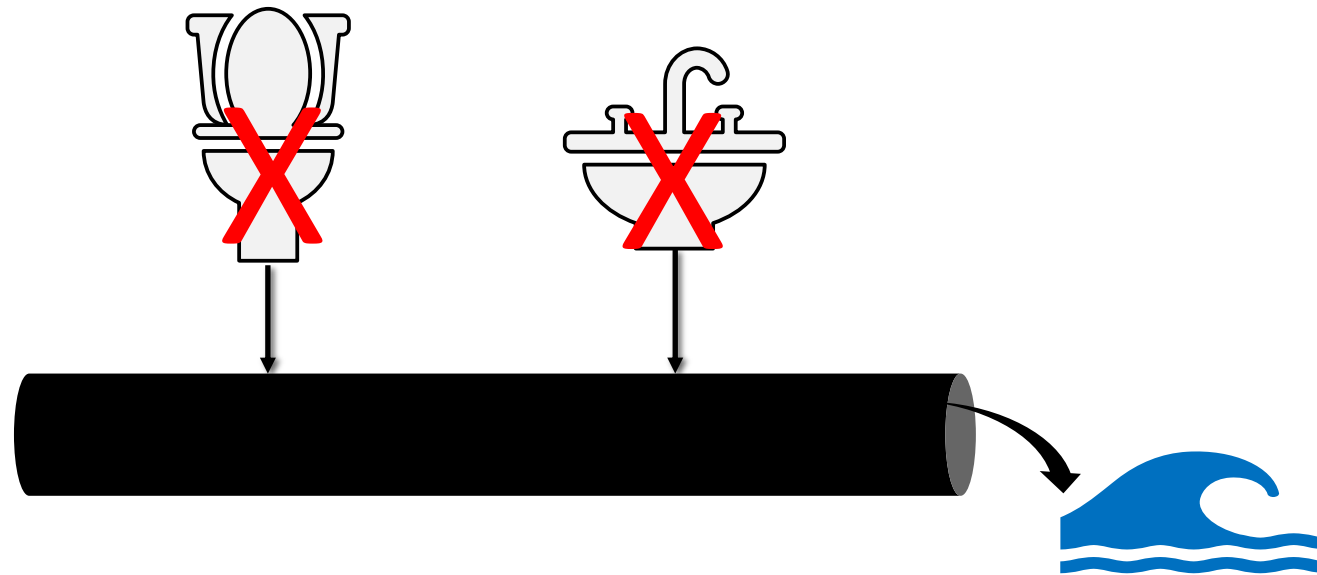
- Place pods, cartridges or vials in **clear plastic bag** that is sealed (e.g. Ziploc bag)
- No need to use individual bags

If pods or cartridges are **attached to** e-cigarette

- Place each individual e-cigarette in a **separate, clear plastic bag** that is sealed (e.g. Ziploc bag)

Do NOT Put E-Liquids Down the Drain

- Nicotine-containing e-liquids must not be poured down the drain
- E-cigarette pods, cartridges and tanks must not be rinsed to remove the nicotine-containing e-liquids



Safe storage?



Safe storage?



Safe Storage?

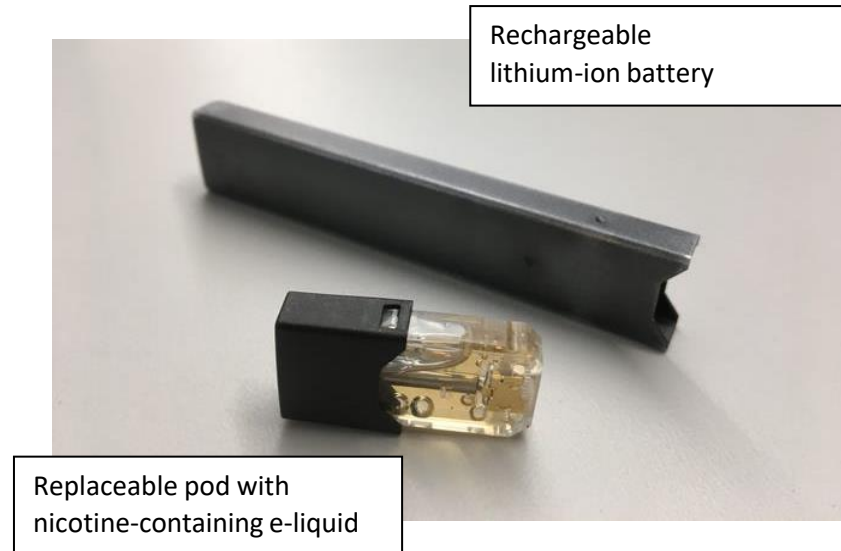


Recycling Lithium Batteries

- Lithium batteries are recyclable
 - Do **NOT** put any batteries in recycling bins
 - The batteries must be sent to a battery recycler
- Battery recyclers are only accepting batteries that have been removed from e-cigarettes
- Battery recyclers are **NOT** accepting entire post-consumer e-cigarettes
- Depending on the style of the e-cigarette, the batteries in e-cigarettes may not be easily accessible or removable, which makes recycling difficult

Recycling Lithium Batteries

- Some models of e-cigarettes have batteries that are intended to be removed or separated from the e-cigarette
 - Juul or other pod systems, the battery can be easily pulled apart from the pod



Recycling Lithium Batteries

Batteries can be
unscrewed
from some
styles of
e-cigarettes



Recycling Lithium Batteries

- In other models of e-cigarettes, the batteries are not designed to be removed or easily separated from the e-cigarette
- These are usually referred to as “disposable” or “single-use” e-cigs
- In this case, due to safety concerns, **we discourage anyone from disassembling e-cigarettes** in order to recycle the lithium battery



Recycling Lithium Batteries

- EPA encourages generators to explore commercially available options for recycling ALL their batteries as Universal Waste (not just e-cigarette batteries)
- When managed as Universal Waste, the batteries do not have to be counted toward determining RCRA generator category
- Battery collection boxes for recycling are
 - Sometimes FREE
 - Pre-addressed to the recycler
 - Postage-paid
 - DOT compliant
- Do not put DDR batteries in with other batteries for recycling



Contact
Information

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