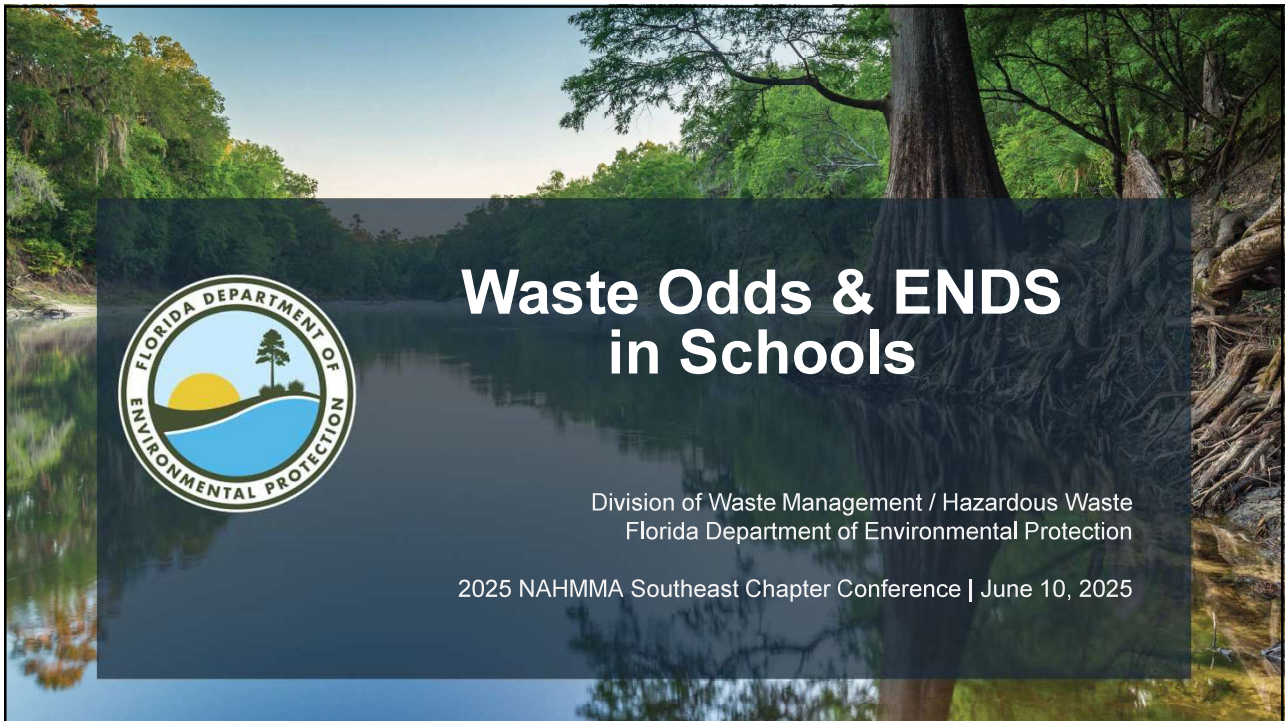


1



2



FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Objectives

- Overview of DEP regulatory basis and hazardous waste (HW) regulations.
- The emerging electronic nicotine delivery system (ENDS) waste.
- Breakdown of the components of ENDS.
- Guidance on the proper management and disposal of ENDS.
- Next steps discussion.


3



4


RESOURCE CONSERVATION AND RECOVERY ACT FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

The Resource Conservation and Recovery Act (RCRA) gives EPA the authority to control hazardous waste from cradle to grave.



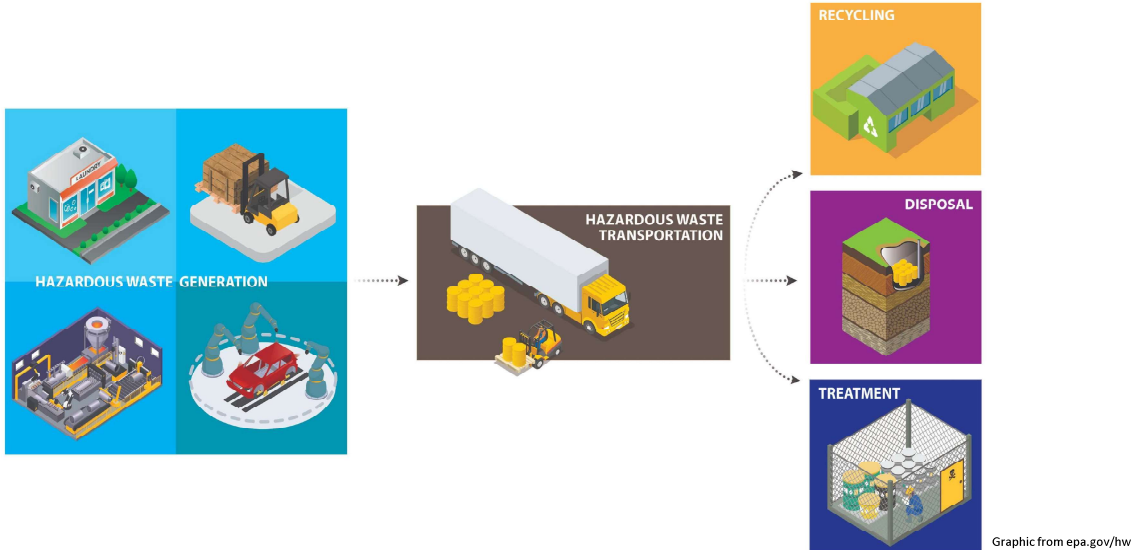
DEP Hazardous Waste Management is responsible for implementing the hazardous waste regulatory portion of RCRA.

On Feb. 12, 1985, EPA authorized Florida to administer its own hazardous waste program under RCRA. DEP oversees these operations.



5

CRADLE TO GRAVE (Resource Conservation & Recovery Act) FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION



HAZARDOUS WASTE GENERATION

HAZARDOUS WASTE TRANSPORTATION

RECYCLING

DISPOSAL

TREATMENT

Graphic from epa.gov/hw

6



CHARACTERISTIC HAZARDOUS WASTE

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

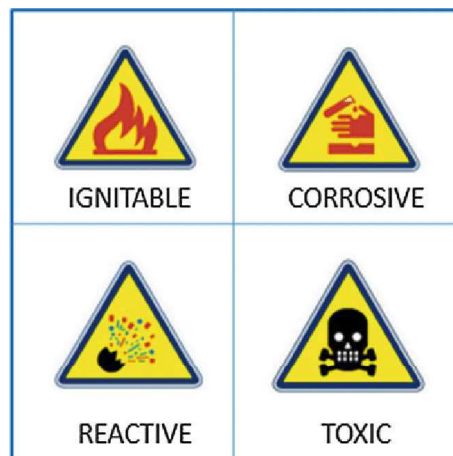
Characteristic hazardous waste:

Ignitable (D001) – Can create fires under certain conditions.

Corrosive (D002) – Acids or bases.

Reactive (D003) – Unstable under “normal conditions.”

Toxic (D004-D043) – Harmful or fatal when ingested or absorbed.



Graphic from https://www.researchgate.net/figure/Symbols-characteristics-of-Hazardous-Waste_fig2_337704548

7



LISTED HAZARDOUS WASTE

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Listed hazardous waste:

Wastes from **Non-Specific Sources:**

F List – F001-F028

Example: Spent solvents (F001-005)

Wastes from **Specific Sources:**

K List – K001-K172

Example: Sludge and distillation bottoms


Unused **Commercial Chemicals:**

P (*acutely toxic*) or **U** (*toxic*) **List**

Example: Nicotine (P075), Acetone (U002), Acetic Acid (U112)



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HAZARDOUS WASTE GENERATOR CATEGORIES

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

To determine your RCRA generator category, ALL hazardous waste that your school or business generates on site in a calendar month must be counted.

	VSQG Very small quantity generator <small>40 CFR 262.14</small>	SQG Small quantity generator <small>40 CFR 262.16</small>	LQG Large quantity generator <small>40 CFR 262.17</small>
Non-acute hazardous waste generated per calendar month	≤ 100 kilograms (220 pounds)	> 100 & < 1000 kilograms	≥ 1000 kilograms (2,200 pounds)
Acute hazardous waste generated per calendar month	≤ 1 kilogram (2.2 pounds)		> 1 kilogram (2.2 pounds)

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SCHOOLS AND HAZARDOUS WASTE


FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

What is your generator status?

Most schools are already VSQG generators and Healthcare Facilities as defined by RCRA.

Wastes may be generated or found in the following areas:

- Chemicals in science rooms and labs
- Art supply rooms
- Industrial arts and vocational shops
- Maintenance department
- Nurse's office – Biomedical/HWPs
- Electronic devices (e-waste)



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Section 2: The Emerging ENDS Waste Dilemma

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ENDS/ECs/VAPES EMERGENCE

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION


E-CIGARETTES

- Among youth who vape, **87.6%** used a flavored e-cigarette in the past month.
- In 2024, **5.9%** of middle and high school students reported current e-cigarette use.
- 43.1%** of youth reported using flavored e-cigarettes.
- Formaldehyde and acrolein, which can cause DNA damage and lead to cancer, are present in e-cigarette aerosols.
- 7x** Young people who had ever used e-cigarettes had **7x** higher odds of becoming smokers one year later compared with those who had never vaped.
- Disposable e-cigarettes increased nearly **3x** in nicotine strength, **5x** in e-liquid capacity, and dropped in price by nearly **70%** between 2017 and 2022.

Marketing targeted at youth and young adults

Graphics from Truth Initiative <https://truthinitiative.org/research-resources/emerging-tobacco-products/e-cigarettes-facts-stats-and-regulations> and <https://truthinitiative.org/research-resources/emerging-tobacco-products/bigger-stronger-and-cheaper-disposable-e-cigarettes>

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COMPONENTS OF VAPES

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

ENDS are RCRA hazardous wastes
Nicotine (P075) & Lithium Batteries (D001/D003)

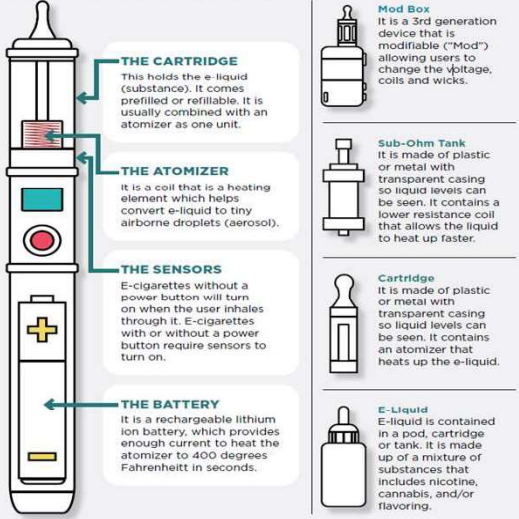
Cartridge, pod or reservoir
 - Container that holds the e-liquid.

Heating Element/Atomizer
 - vaporizes the e-liquid.

Sensor/PCB
 - required to "turn on" the device to activate the atomizer.

Battery
 - Lithium or Lithium-ion.

THE E-CIGARETTE



THE CARTRIDGE
This holds the e-liquid (substance). It comes pre-filled or refillable. It is usually combined with an atomizer as one unit.

THE ATOMIZER
It is a coil that is a heating element which helps convert e-liquid to tiny airborne droplets (aerosol).

THE SENSORS
E-cigarettes without a power button will turn on when the user inhales through it. E-cigarettes with or without a power button require sensors to turn on.

THE BATTERY
It is a rechargeable lithium ion battery, which provides enough current to heat the atomizer to 400 degrees Fahrenheit in seconds.

Mod Box
It is a 3rd generation device that is modifiable ("Mod") allowing users to change the spitage, coils and wicks.


Sub-Ohm Tank
It is made of plastic or metal with transparent casing so liquid levels can be seen. It contains a lower resistance coil that allows the liquid to heat up faster.

Cartridge
It is made of plastic or metal with transparent casing so liquid levels can be seen. It contains an atomizer that heats up the e-liquid.

E-Liquid
E-liquid is contained in a pod, cartridge or tank. It is made up of a mixture of substances that includes nicotine, cannabis, and/or flavoring.

Graphic: https://www.cdc.gov/tobacco/basic_information/e-cigarettes/pdfs/ecigarette-or-vaping-products-visual-dictionary-508.pdf

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COMPONENTS OF VAPES


FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

“Closed Systems”


Pod-Based, Pod Mod



Disposables




“Refillable Open Systems”



Sample of e-cigarette products. Images are not to scale.

From Connecticut Department of Energy & Environmental Protection "Vape Management and Disposal" March 25, 2025

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WHY IS THIS A PROBLEM?

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

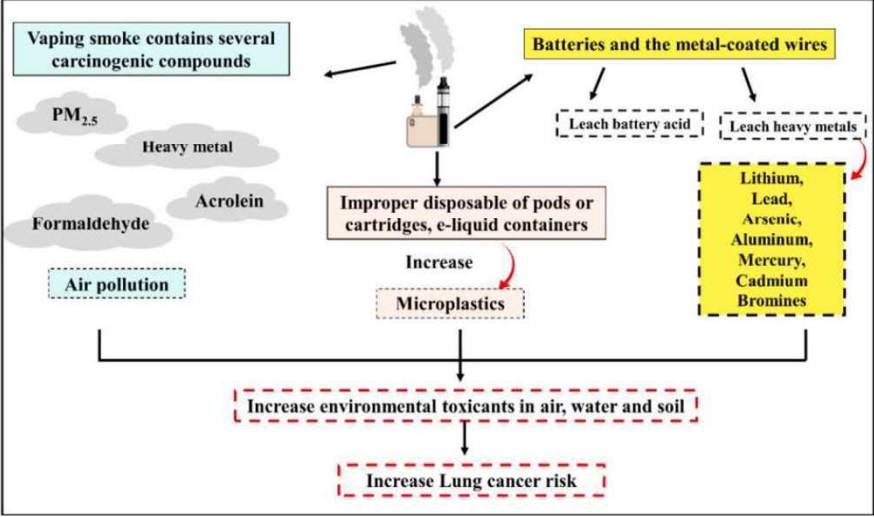
Waste Problems

Worldwide more than 100 billion pounds of e-waste is generated each year.

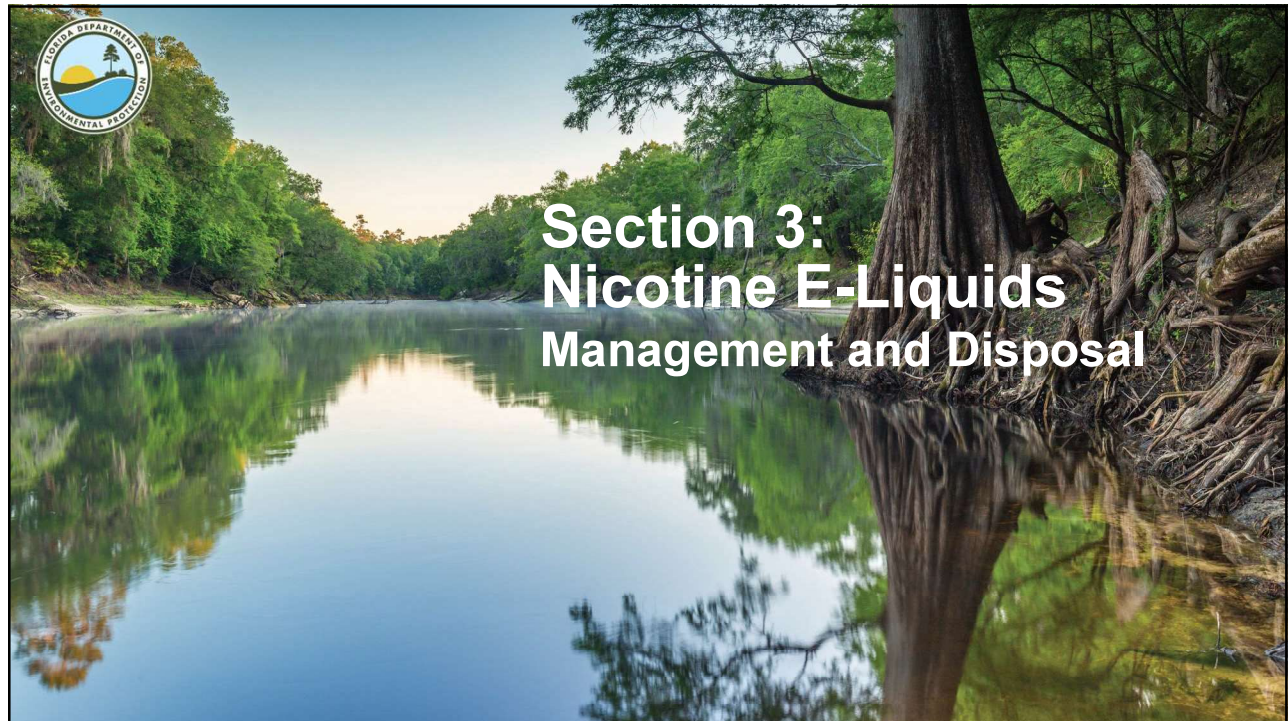
2/3 of ECs are trashed.

No safe product disposal guidelines are provided from EC companies.

(From Shehata et al., 2023)



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E-LIQUIDS

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

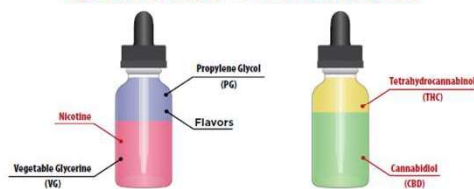
What is an E-Liquid?

E-liquid is the liquid that is converted into an aerosol by an e-cigarette or vaping product.

Composed of:

- Water.
- Non-regulated food grade flavoring.
 - Note: There are currently no regulations for the quality of additives in E-Liquids which are primarily imported from China.
- Nicotine (differing types of levels) or
- Cannabis (THC, CBD).
- Propylene glycol (PG) or;
- Vegetable glycerin (VG).

REGULAR E-LIQUID VS. CANNABIS E-LIQUID



Images: cdc.gov (https://www.cdc.gov/tobacco/basic_information/e-cigarettes/pdfs/ecigarette-or-vaping-products-visual-dictionary-508.pdf)

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NICOTINE-CONTAINING E-LIQUIDS

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION


Nicotine P-Listed Chemical – P075

To exceed one kilogram (2.2 pounds) of acute hazardous waste to be an LQG, it takes:

- Greater than 1,000 Juuls (there is less than one milliliter of e-liquid in each Juul pod), OR
- Greater than 76 Elfbar (13 milliliters of e-liquid in each Elfbar), OR
- Greater than 200 full 5-milliliter vials.



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WHY IS THIS A PROBLEM?

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Health Hazards

Accidental poisonings due to nicotine.


- Ingestion or skin contact with nicotine liquid.
- Inappropriate use or misuse.


(From CT DEEP)


Nicotine Poisoning


SYMPTOMS & PREVENTION


SYMPTOMS



RED HOT SKIN



DROOLING



DIZZINESS



NAUSEA



RESPIRATORY DEPRESSION


HEADACHES


VOMITING



SHORTNESS OF BREATH


LOW BLOOD PRESSURE


SEIZURES

Graphic: <https://www.sieda.org/2020/11/17/nicotine-poisoning-prevention-strategies/>

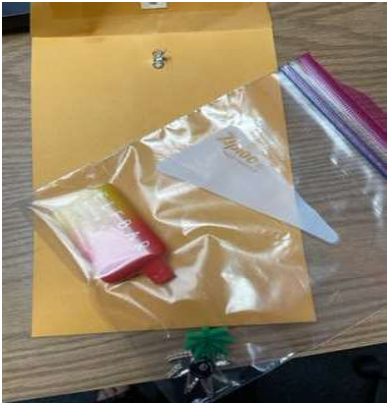
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MANAGEMENT AND DISPOSAL

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Management of E-Liquids




- Manage as HW based on generator category.
- According to discussion on a 1/21/25 EPA Pharms call, EPA said that the acute/non-acute components can be counted separately.
- 1 kg of nicotine = 1,000 Juul pods, 200 5-ml e-juice vials, or 76 Elfbars.
- [Knightshade](#) will only take e-liquids (not e-cigs or vape pens).
- Battery recyclers don't want them either.
- Most viable HW disposal option: HW incinerator.

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Section 4: Lithium Batteries Management and Disposal

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LITHIUM BATTERIES

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Lithium batteries are likely RCRA hazardous waste as both:

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

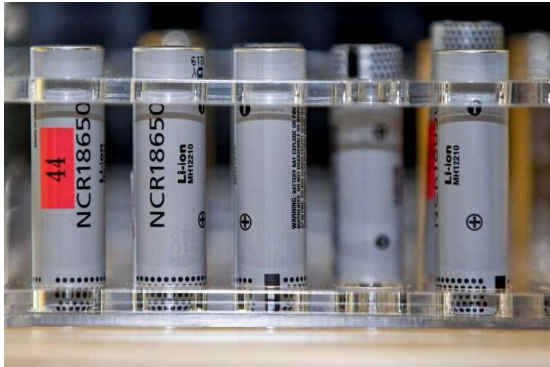


Image from "Properly Managing E-Cigarettes & Vaping Waste Streams", Newmoa-NERC Webinar, April 27, 2023 - Kristin Fitzgerald, US EPA

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DANGERS OF LITHIUM BATTERIES

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION



From Missouri Enquirer-11-1-2024 - Smoke billows out of the roof of Critical Mineral Recovery's lithium-ion battery recycling plant near Fredericktown, Missouri.

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DANGERS OF LITHIUM BATTERIES



FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION




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 MANAGEMENT AND DISPOSAL FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION		
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)	

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 MANAGEMENT AND DISPOSAL FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION	
	
<p>Batteries Disposal Options</p> <p>Hazardous Waste: D001/D003 – least preferred method.</p> <p>Universal Waste: Only applicable to removable batteries from refillable vapes.</p> <p>Recycle: Only applicable to pre-filled/refillable vapes -most preferred method.</p>	
<p><small>From EPA 11-27-2023 - 2023 Maui Wildfires - Damaged Lithium-Ion Battery Management Guide for Electric Vehicles & Mobility Devices</small></p>	

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MANAGEMENT AND DISPOSAL

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION


If the school is a VSQG and has an on-site healthcare facility (e.g. nurse's office):

- Contact the school district or parent company to find out if there is a healthcare facility that is owned by or under the control of the same entity or that is the supplier of the pharmaceuticals, that could temporarily consolidate the hazardous waste and manage and dispose of the hazardous waste in an environmentally protective manner.
- Refer to 40 CFR Section 266.504(b)(1) for requirements of a VSQG consolidating HWP to an LQG.
- Receiving facility must meet requirements of 40 CFR Sections 266.502(l) and 266.503(b).

If the school is not a VSQG and has an on-site healthcare facility (e.g. nurse's office):

- The school or business must manage their ENDS as hazardous waste pharmaceuticals under 40 CFR Part 266 Subpart P.
- The school must manage their other hazardous waste in accordance with the RCRA hazardous waste generator regulations for SQGs or LQGs.
- For LQGs, refer to EPA's Hazardous Waste Requirements for Large Quantity Generators.

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MANAGEMENT AND DISPOSAL

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Proper Disposal

1. Maintain generator accumulation limits.
2. Contract with a FL registered hazardous waste transporter.
3. Maintain records for a minimum of 3 years.



Florida Department of Environmental Protection

Currently Registered Commercial Hazardous Waste Transporters

This list provides general information on Hazardous Waste Transporters currently registered with the Florida Department of Environmental Protection (DEP) which have indicated that they transport hazardous waste commercially. To confirm registration and proper insurance of a specific company or if you have questions concerning a facility transporting hazardous waste please call the Hazardous Waste Management Section (850) 245-8778.

State	Epa Id	Facility Name	Address City	County	Contact Phone	Certificate Expires
AL	ALR000063990	AAA COOPER TRANSPORTATION	1751 KINSEY RD DOTHAN	NON-FL CNTY	706-728-4229	3/1/2023
AL	ALR000056689	ACTION ENVIRONMENTAL LLC	204 20TH STREET NORTH BIRMINGHAM	NON-FL CNTY	918-421-2420	9/30/2025
AL	ALR000007237	ACTION RESOURCES, INC	204 20TH STREET NORTH BIRMINGHAM	NON-FL CNTY	918-421-2420	9/30/2024
AL	ALD0000622464	CHEMICAL WASTE MANAGEMENT, INC	10964 ALABAMA HIGHWAY 17 N EMELLE	NON-FL CNTY	205-682-9144	11/1/2024
AL	ALR000046581	GREER ENTERPRISES LLC	PO BOX 191466 MOBILE	NON-FL CNTY	251-679-1867	12/9/2024

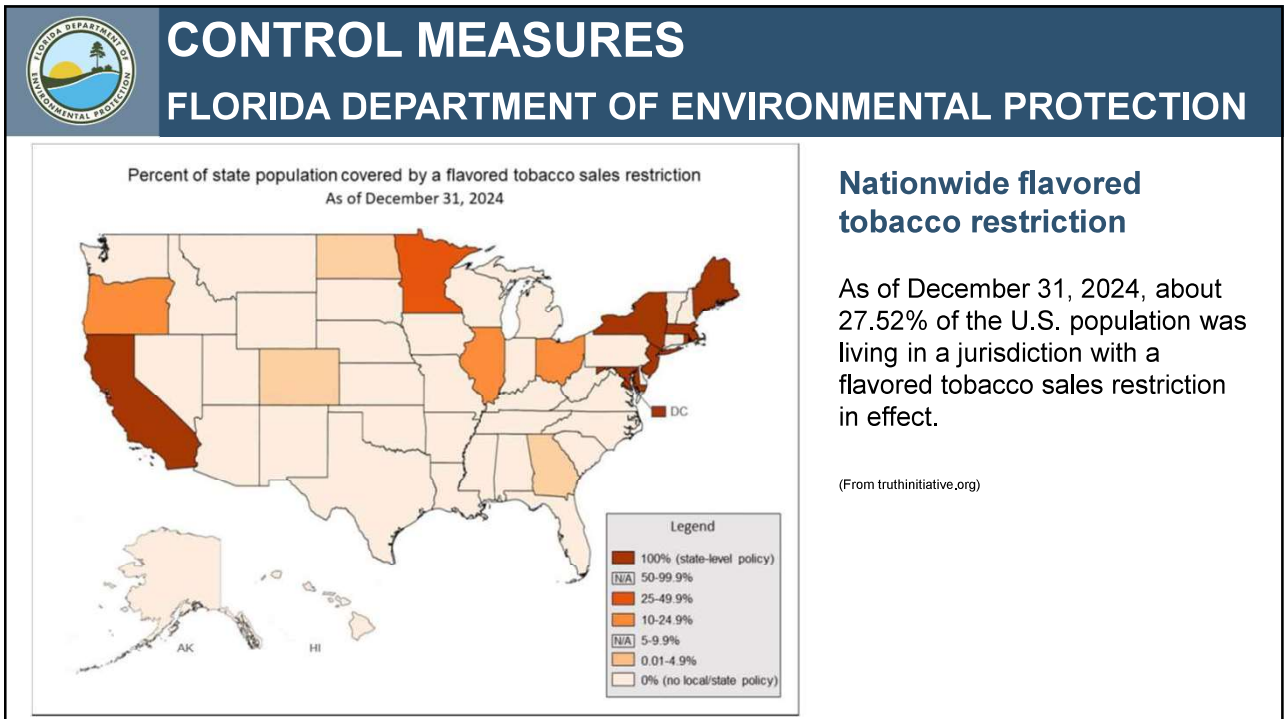
https://fldep.dep.state.fl.us/www_rcra/reports/CommHWTransport.asp

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Section 5: Control Measures and Initiatives

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CONTROL MEASURES

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

BE BATTERY SMART

LITHIUM-ION BATTERIES

Lithium-ion (Li-ion) batteries are everywhere. The most popular rechargeable battery comes in multiple sizes and shapes and powers everything from smart phones, laptops, and tablets to hand-held power tools and toys. Li-ion batteries, however, store a large amount of energy in a small space and are more easily damaged than other batteries.

If damaged or improperly stored, charged, or disposed of, they can catch fire or explode.

Seven Safety Tips for Lithium-Ion Batteries

- 1 Always follow the battery manufacturer's instructions.
- 2 Store properly - out of sight and reach of children in a cool, dry place.
- 3 Don't use batteries that are damaged.
- 4 Always charge your device where you can see it.
- 5 Do not overcharge devices or charge on a bed or under a pillow. Batteries may overheat, explode, and catch fire.
- 6 Check toys and devices regularly to ensure batteries are secure and in good condition.
- 7 Never put Li-ion batteries in your garbage or recycling cart. Recycle them at participating drop-off sites.

Scan the QR code for more information.

Check out "Transporting Lithium Batteries" PHMSA (dot.gov) to learn more about lithium-ion battery safety.

State and Federal Media Initiatives

- EPA - Reduce, Reuse, Recycle.
- FDEP – Battery Main page.
- FDEP – Take Charge Florida.
- DOT - Check the Box.
- DOT/PHMSA - Li Battery Guide.

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CONTROL MEASURES

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Innovative Initiatives

EPR/Product Stewardship

Boulder County Vape Aware Program

Boulder County Vape Aware

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Section 6: School Inspection Findings

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SOUTH DISTRICT FACILITIES

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

What We Learned

Areas with the potential to generate waste:

- Chemistry room.
- Outdoor maintenance.
- Art rooms.
- Nurse's office.
- Confiscated or discarded devices.




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SOUTH DISTRICT FACILITIES

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

What We Learned




ODDS WASTE

- Taken to a central consolidation facility for disposal.
- Picked up by a contracted environmental service provider for disposal.

ENDS WASTE

- Collected through confiscation or disposal.
- Items stored on-site until the School Resource Officer (SRO) takes them to the local precinct.
- Directly handed over to SRO on-site.

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SOUTH DISTRICT FACILITIES

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

What We Learned

- Local law enforcement takes possession of the majority of the confiscated devices.
- Waste from local law enforcement is taken to a municipal waste combustor for incineration.



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FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION OUTREACH


Future Goals




OUTREACH, OUTREACH, and more OUTREACH...

- Schools and school board associations.
- City and county law enforcement.
- City and county solid waste facilities, including county household hazardous waste facilities.

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Going Forward FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Future Goals

→

Policy Change

- Assist regulated community in creating educational brochures and media to educate staff, students, and the community.
- Provide guidance for implementing new policies to reduce and eliminate mismanagement of waste.



Division Rules and Rulemaking

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Section 7: DEP Assistance

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DEP CAN HELP YOU

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Compliance assistance: DEP helps residents and businesses comply with environmental regulations through site visits and technical support. DEP's six regulatory district offices review permit applications, inspect permitted facilities, respond to reports of environmental damage, and conduct compliance assistance and enforcement.

Education and information: Sign up for a variety of digital newsletters, updates and announcements about the DEP's programs, activities and events.

Recognizing environmental stewardship: DEP encourages sound environmental practices through its sustainable initiative programs, including Clean Marinas, Green Lodging, Green Schools Program, and Recycling Recognition.

FloridaDEP.gov
850-245-2118

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FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

DEP is the state’s lead agency for environmental management and stewardship, protecting our air, water and land. DEP is divided into three primary areas: Land and Recreation, Ecosystems Restoration, and Regulatory programs.



Land and Recreation




Ecosystems Restoration




Regulatory

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DEP DISTRICT DISTRIBUTION FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

- **Six District Offices:**
 - Pensacola.
 - Jacksonville.
 - Orlando.
 - Tampa.
 - Fort Myers.
 - West Palm Beach.
 - Additionally, four branch offices:
 - Marathon, Panama City, Tallahassee and Fort Pierce.
- **Over 100,000 regulated facilities and sites.**
- **168 permit types over 13 programs.**

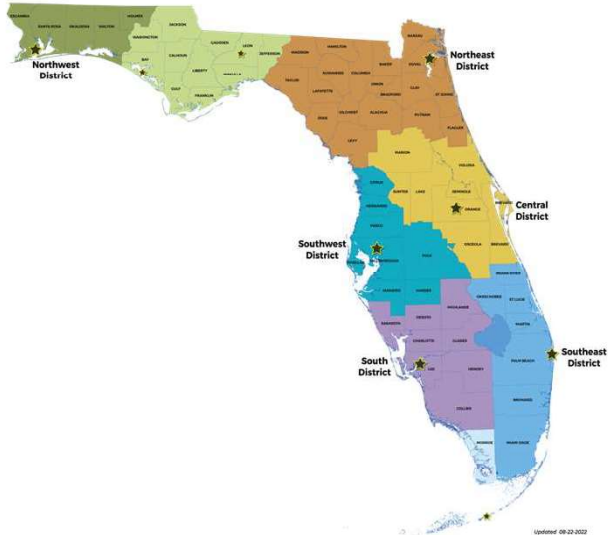


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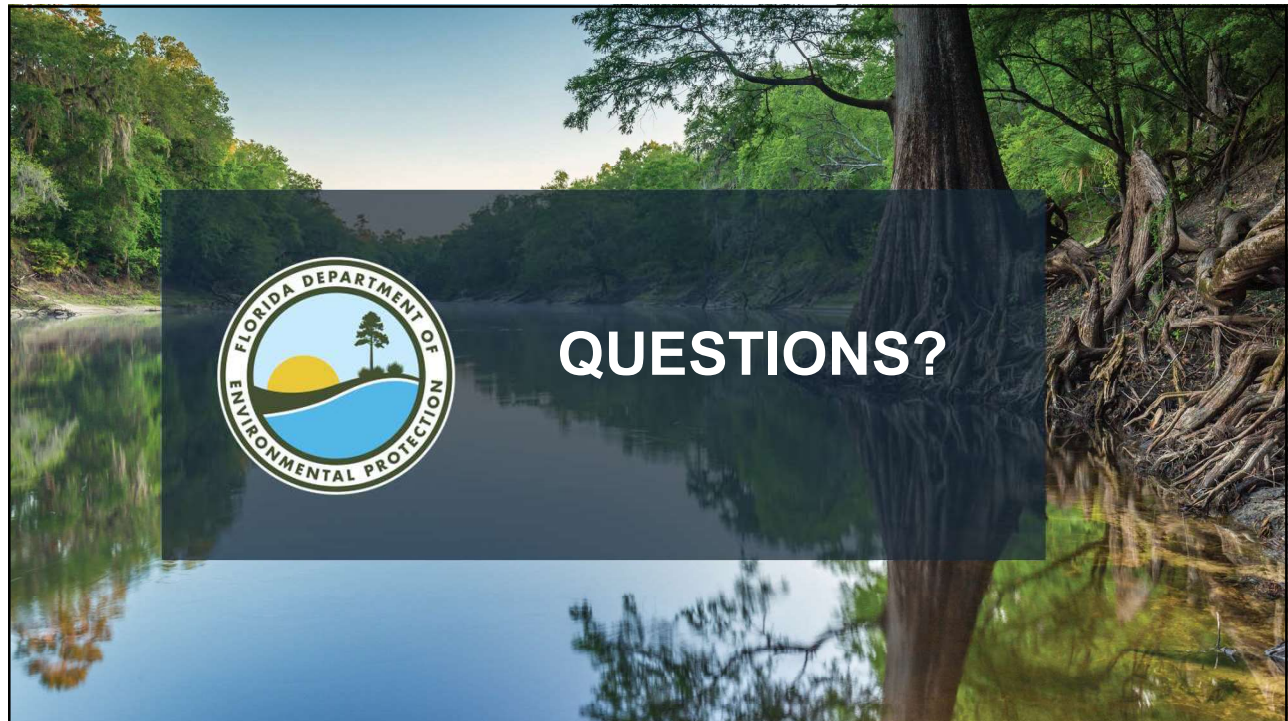
DEP DISTRICT JURISDICTION

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

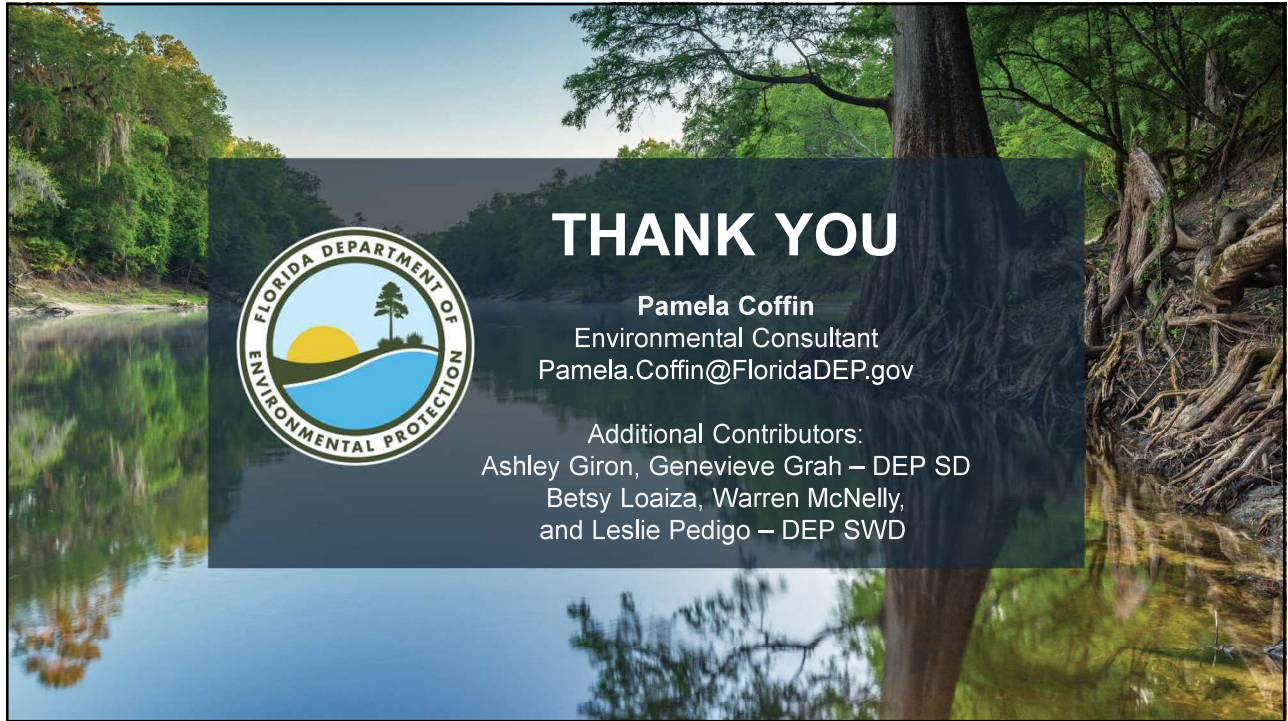


District Offices	
Northwest	850-595-8300
Northeast	904-256-1700
Central	407-897-4100
Southwest	813-470-5700
Southeast	561-681-6600
South	239-344-5600

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THANK YOU

Pamela Coffin
Environmental Consultant
Pamela.Coffin@FloridaDEP.gov

Additional Contributors:
Ashley Giron, Genevieve Grah – DEP SD
Betsy Loaiza, Warren McNelly,
and Leslie Pedigo – DEP SWD