

WELCOME!

**Welcome to DES
&
to Today's Workshop
“Universal Waste, Part II”**

WHY THIS WORKSHOP?

Universal Waste, Part II

- Provide you with more practical information on UW
- Reaffirm the concepts you learned in Basic Training
- Offer information on what is going on with the current market for CRTs



TODAY'S AGENDA

- **Universal Waste 101**
- **Activity**
 - **Managing Your Batteries**
 - **Why can't CRTs go into the Landfill**
 - **Mercury: Spills and the Basics**
- **Cathode Ray Tubes**
- **Debrief on the Training**

GROUP ACTIVITIES

Group 1 (a,b,c)

- Following this intro stay in the Auditorium
- Break
- Report to:
 - 1a: Room 110 (Batteries)
 - 1b: Room 112 (CRTs)
 - 1c: Room 114 (Mercury)
- Report back to Auditorium

Group 2 (a,b,c)

- Following this intro report to:
 - 2a: Room 110 (Batteries)
 - 2b: Room 112 (CRTs)
 - 2c: Room 114 (Mercury)
- Break
- Report to the Auditorium

Universal WASTES...

- Certain Pesticides
- Cathode Ray Tubes
- Automotive Antifreeze
- Certain Batteries
- Mercury-containing Devices
- Certain Lamps

WHAT DOES “UNIVERSAL WASTE” MEAN FOR YOU?

- This stuff might be hazardous, or it might not
- Options:
 - Take the time to prove it isn't hazardous, or
 - Just assume it's a hazardous waste and call it a universal waste
 - Easier regulations
 - Must be recycled

OVERVIEW

HAZARDOUS WASTES

“Typical” Hazardous Wastes

Managed under
Env-Hw 500

A TOLL ROAD
Typical
Haz-Waste

Universal
Waste

Universal Waste

Hazardous, but
usually managed
under Env-Hw 1100

Easier!



HOUSEHOLD UNIVERSAL WASTE

- Made by...households!
 - Not regulated by hazardous waste folks
- When a non-household accepts it, they become regulated
- The receiving party (Solid Waste Facility) becomes a “universal waste **handler**”



BUSINESS UNIVERSAL WASTE

- UNLIKE other hazardous wastes, you can legally accept universal waste from a business
 - Is it a good idea?
 - What is the recycling market?
 - Will taxpayers support it?
 - Will management support it?
- Also a “Handler”



WHAT/WHO IS A “HANDLER”?

- Someone who receives universal waste at their facility
- Someone who makes universal waste
- Someone who stores universal waste
- Someone who sends universal waste to another party

- Except Households

CLASSES OF HANDLERS

- “Small Quantity Handler”
 - Less than 11,000 pounds
- “Large Quantity Handler”
 - Between 11,000 and 50,000 pounds
- “VERY Large Quantity Handler”
 - More than 50,000 pounds
- Don't count lead-acid batteries



THINGS HANDLERS CAN'T DO



- Dispose of it
- Treat it – such as crushing lamps on purpose
- Give it to someone who isn't going to handle it legally



THINGS HANDLERS MUST DO

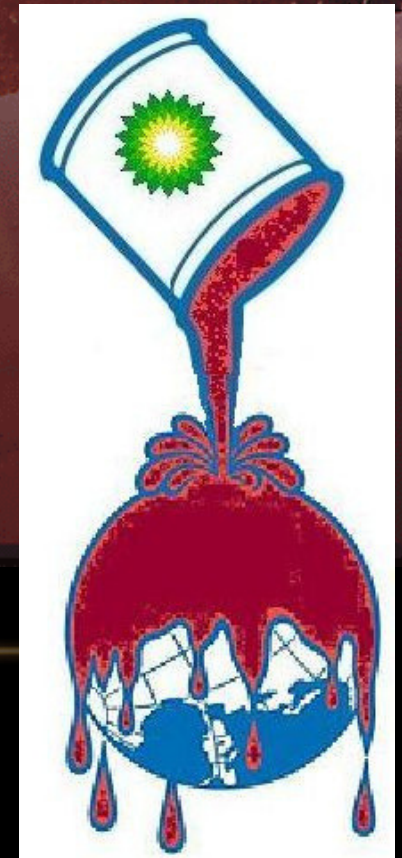


RULES FOR ALL UNIVERSAL WASTES

1. Any containers that hold universal waste must be:
 - Closed
 - Compatible with the universal waste it's holding
 - In good condition so it won't leak



WHEN IS A CONTAINER NEEDED?



Leaking or damaged batteries



All Pesticides





Leaking or damaged mercury devices

When glass vials are removed from mercury devices





Intact or broken lamps

BROKEN CRTs
(Glass)



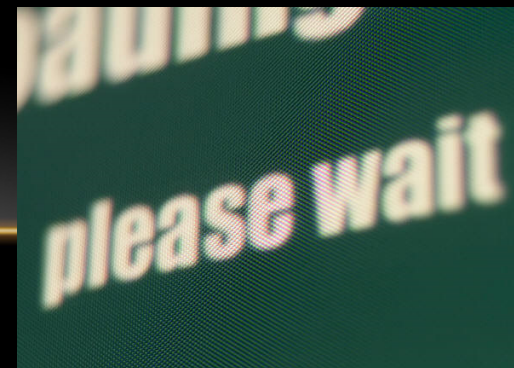
**USED
ANTIFREEZE**



All Automotive Antifreeze

2. STORAGE TIME REQUIREMENT

- Must store for 1 year or less
 - Date container, or
 - Date the item, or
 - Maintain an inventory
- More than one year only if it is necessary to allow proper recovery, treatment, disposal
 - Contract to prove it
 - Dating materials



FOR ALL UNIVERSAL WASTES

3. Outside storage must be covered



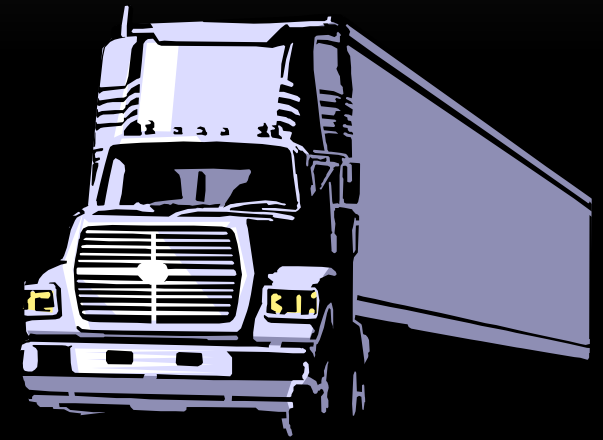
4. Respond to leaks and other releases

- Immediately contain
- Clean up in 24 hours
- If human health or the environment are threatened, notify local fire company and NHDES (271-3899)

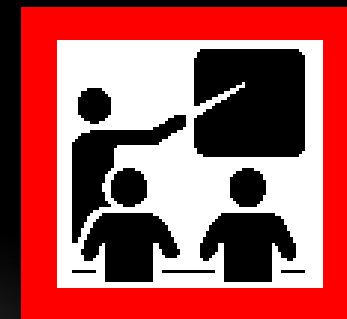


ALL UNIVERSAL WASTES

5. Ship in compliance with DOT
- Use a bill of lading
 - Not required to use a registered hazardous waste transporter



6. Handlers must be trained to recognize risks of waste, be familiar with waste handling and emergency procedures



FOR ALL UNIVERSAL WASTES

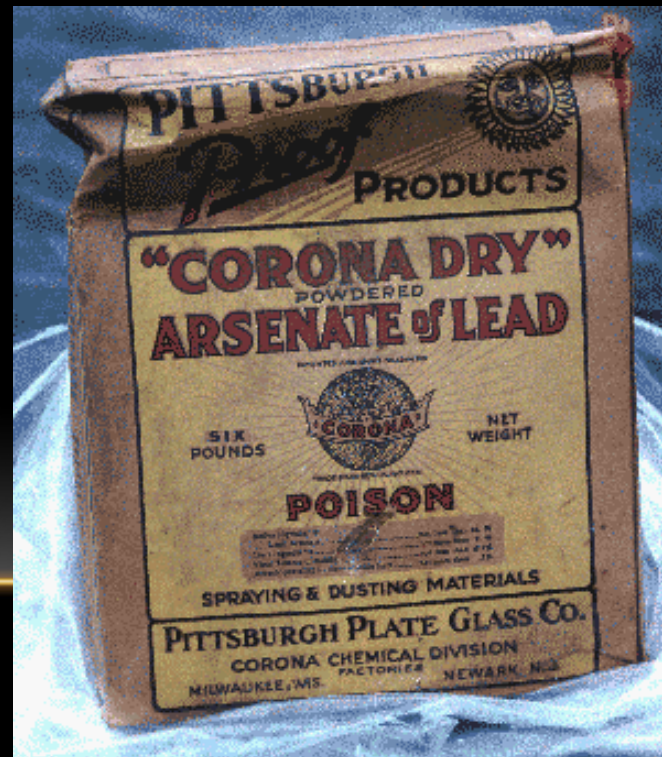
7. If you have $\geq 11,000$ pounds of universal waste on-site
 - Tell NHDES
 - 271-2921
 - Don't include the weight of batteries
 - Keep shipping records for 3 years



PESTICIDES

PESTICIDES ARE THE TOUGHEST UNIVERSAL WASTE TO MANAGE

- Designed to intentionally kill
- In a form that can easily get:
 - Moved
 - Inhaled
 - Ingested
 - Dissolved



PESTICIDES ARE THE TOUGHEST UNIVERSAL WASTE TO MANAGE

- More likely to be destroyed than recycled
- Rules are designed more for large-scale collections
 - Major recalls



RULES FOR CERTAIN PESTICIDES

Which Ones?



RULES FOR CERTAIN PESTICIDES

Which ones?



Those that are suspended or recalled under
“Federal Insecticide Fungicide Rodenticide Act”
(EPA’s FIFRA)

Contact NH Dept. of Agriculture for most up-to-date
list

- 271-3550

RULES FOR CERTAIN PESTICIDES

1. Must be in a container (closed!)



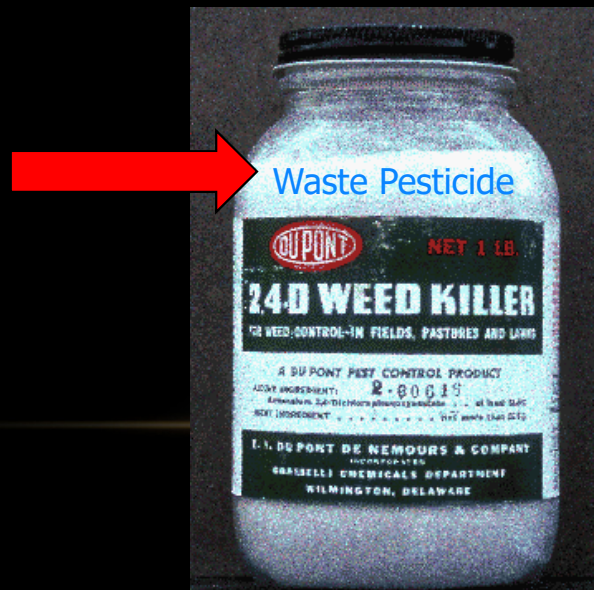
Do better than this!



RULES FOR CERTAIN PESTICIDES

2. Label with:

- The label originally on the package AND
- “Universal Waste Pesticide” or
- “Waste Pesticide”



PESTICIDE STORAGE

2. Stored on an impervious surface
 - Secondary containment near floor drains or manholes



RULES FOR CERTAIN PESTICIDES

4. Equipment required near pesticides

- Fire control equipment
- Spill control equipment
- Decontamination Equipment



RULES FOR CERTAIN PESTICIDES

5. Adequate aisle space

- to respond to emergency
- To find problems!



RULES FOR CERTAIN PESTICIDES

6. Telephone posting

- Local fire dept., 911, or both
- Local police, 911, or both
- DES (271-3899)
- DOS (223-4381)
- Local response team #
- **Steps to take in an emergency**



RULES FOR CERTAIN PESTICIDES

7. Outdoor Storage Requirements

- A barrier (fence, wall) surrounding waste
- Controlled (gated) entry
- Posting that says:

“Danger – Unauthorized Personnel Keep Out”



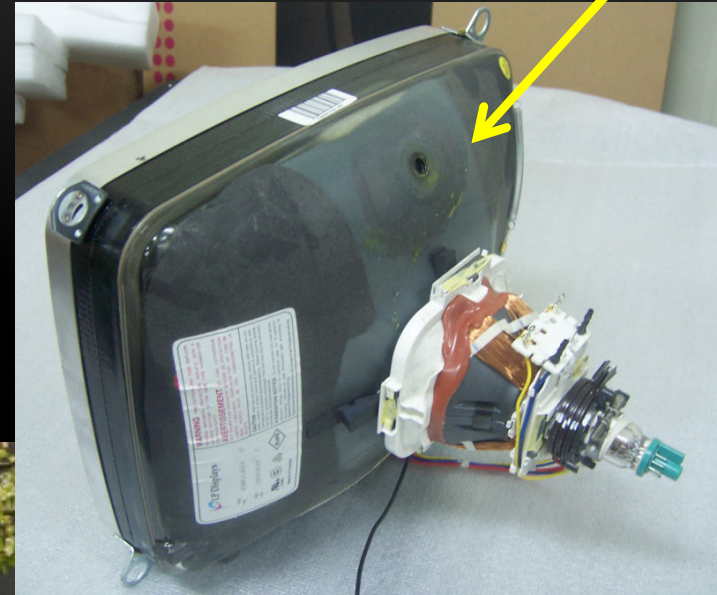
RULES FOR CERTAIN PESTICIDES

8. Personnel Training!!!

- A formal –written training plan that tells who, what and when
- Trained in hazardous waste management within 6 months
- Can't handle pesticides until trained
- Receive training again every 6 months
- Strict documentation of training records

RULES FOR CATHODE RAY TUBES

1. Broken/damaged cathode ray tubes that could release glass particles must be in a container that is closed, impermeable, and prevents releases
2. DO NOT BREAK OR CRUSH on purpose

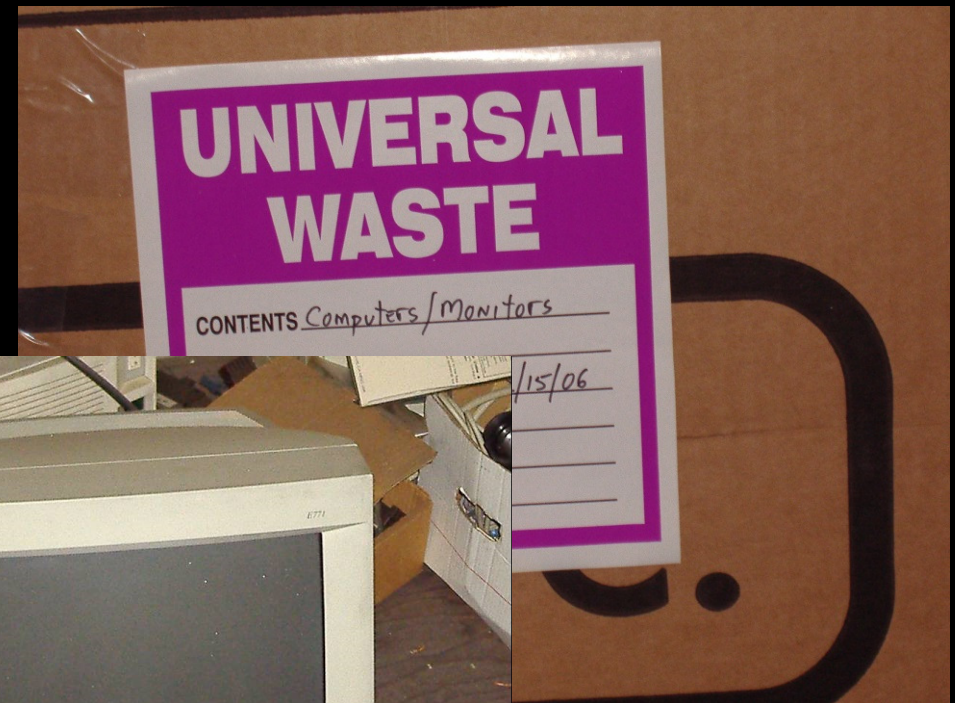


Cathode Ray Tubes (CRTs) contain lead.

CATHODE RAY TUBES

3. Label:

- “Universal Waste – Cathode Ray Tubes”
- “Waste Cathode Ray Tubes”
- “Used Cathode Ray Tubes”



NOTICE OF CONTRACT

COMMODITY: Electronic Waste Removal & Recycling

CONTRACT NO.: 8001834

NIGP: 926-7700

VENDOR: Electronix Redux Corp. **VENDOR # :** 226720
 282 Dedham St.
 Unit 2
 Norfolk, MA 02056

CONTACT PERSON(s): Casey Sawyer
Tel. No.: 508-384-1112
Fax No.: 508-384-3459
E-Mail: caseysawyer@electronixredux.com

EFFECTIVE FROM: July 28, 2015 **Through:** September 30, 2018

TERMS: Net 30

PRODUCTS & PRICES:

<u>Description</u>	<u>Cost/LB</u>	<u>Rebate/LB</u>
Unsorted Electronic Equipment		\$0.04
CRT Televisions	\$0.05	
CRT Monitors	\$0.05	
LCD Televisions and Monitors		\$0.10
Computer Equipment (CPU, laptops, servers, etc.)		\$0.20

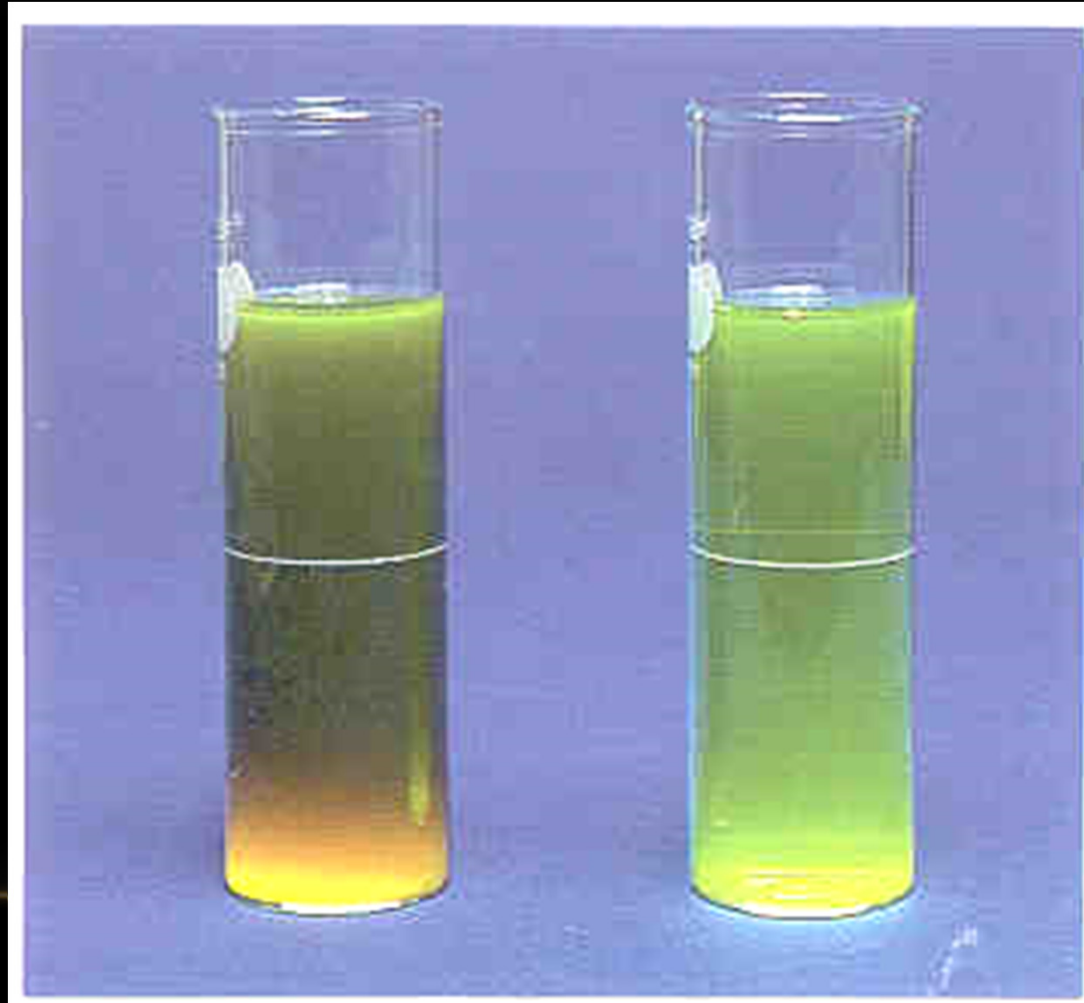
RULES FOR AUTO ANTIFREEZE

1. Store in a container or tank (closed!)
2. Label the container or tank:
 - “Universal Waste Antifreeze”
 - “Waste Antifreeze”
 - “Used Antifreeze”

May contain heavy metals and cancer-causing benzene



**THROUGH USE ANTIFREEZE
BECOMES CONTAMINATED.**

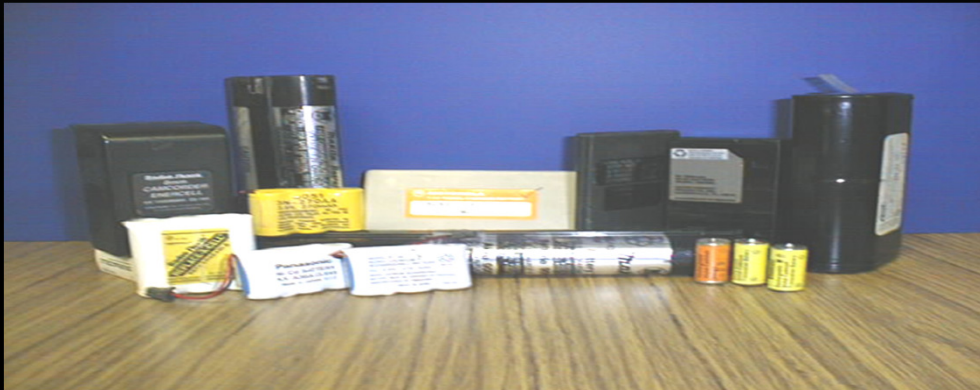


RULES FOR CERTAIN BATTERIES



BATTERIES

Nickel-Cadmium (Ni-Cd)



Lithium



Button cell



Lead-acid



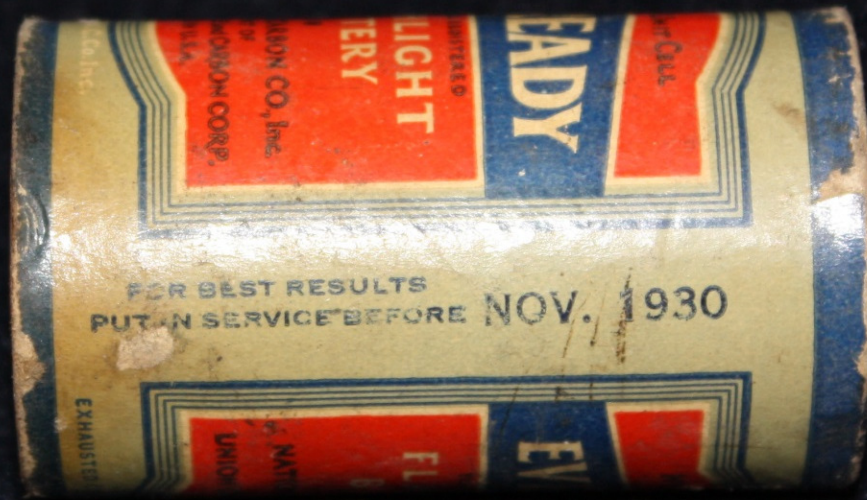
Dangerous for Heavy Metals, fire hazard, and sometimes acids

Alkaline and Carbon Zinc

Non-hazardous



In 1996, Federal law is adopted (Mercury Containing and Rechargeable Battery Act) that prohibits addition of mercury to batteries (except for button cells).



LITHIUM BATTERIES



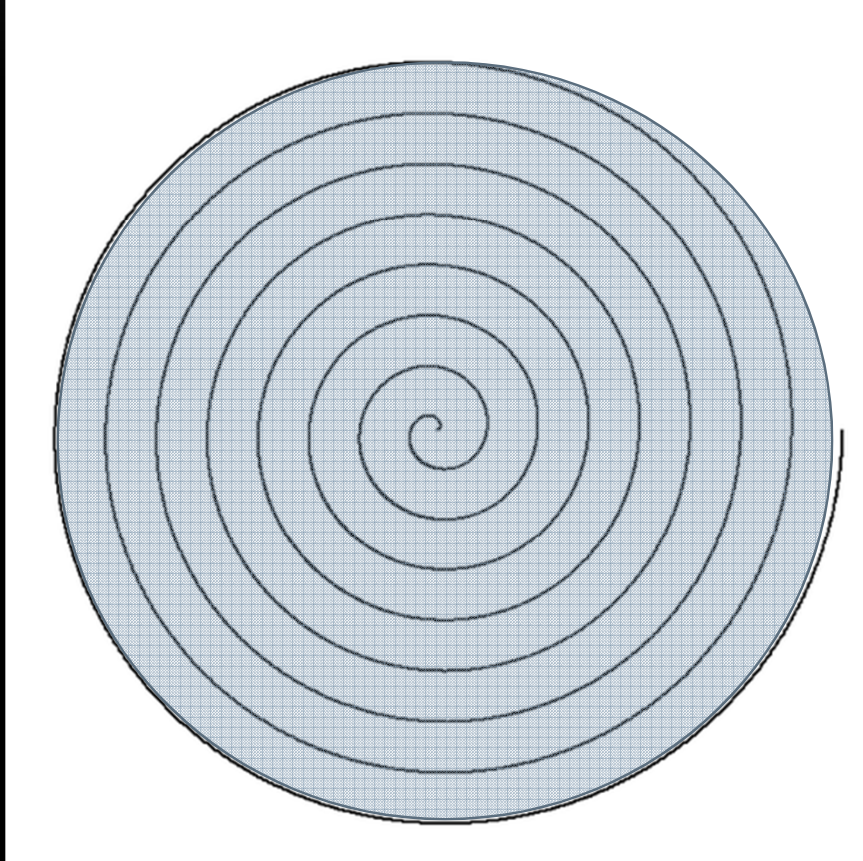
HOW LITHIUM BATTERIES ARE MADE

- <https://www.youtube.com/watch?v=GKvqj3wOL7E>

5 min



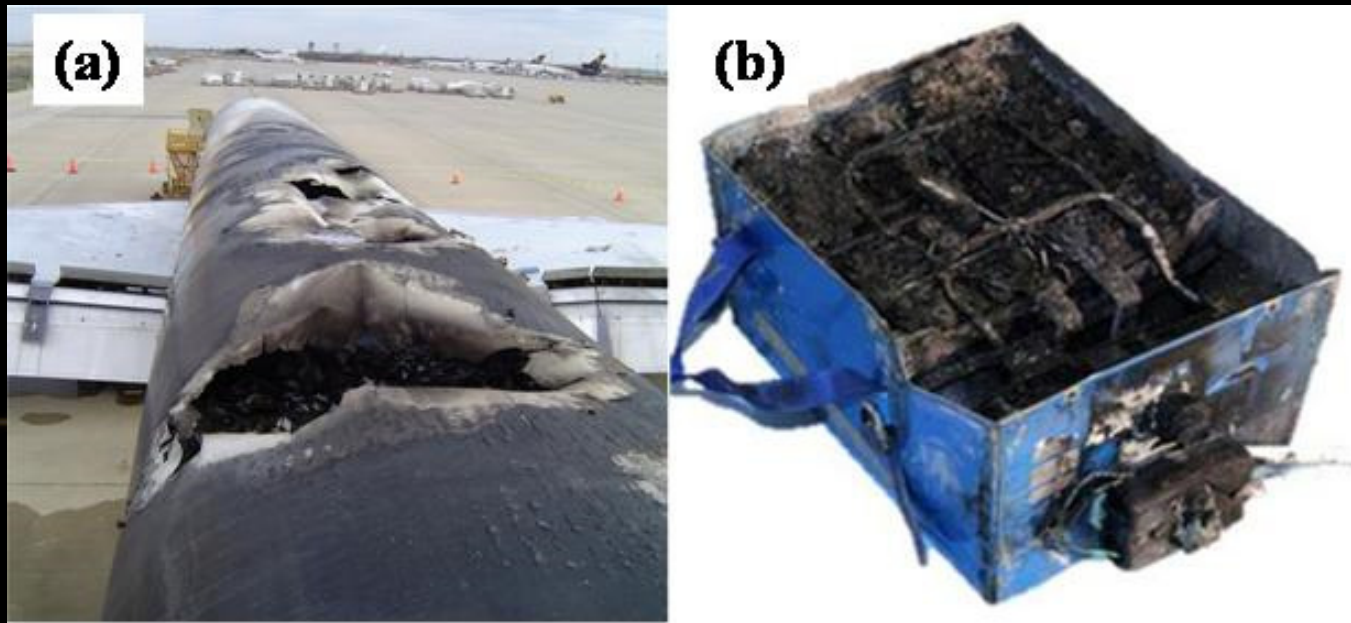
LITHIUM-ION BATTERY CONSTRUCTION



- “jelly roll”
- “+” side coated with lithium electrolyte
- “-” side coated with lithium electrolyte too
- High-tech separator in between two layers

LITHIUM-ION

- Safety concerns
 - Potential for fire from overheating
 - Shorting, cheap charger, damaged separator, damaged regulating circuit
 - Storage of large numbers together create a greater hazard



LITHIUM-ION

- Safety Concerns
 - Some Lithium batteries look like lead-acid batteries and end up in lead-acid recycling system
 - Bad news.

Lithium Ion Battery Entering Lead Battery Recycling Stream



LITHIUM-ION

- Recycling Concerns
 - Changing technology – resistance to start up company if technology will change
 - The parts of the battery most valuable for recovery may be phased out in favor of better, but less valuable ones
 - Burning, leaching to recover Cobalt
 - Lithium in slag – not recovered!

RECYCLING ALKALINE BATTERIES

- Vendors will take them for you – for a price
- Ask for documentation that they are truly recycled and not disposed of



RULES FOR UNIVERSAL WASTE BATTERIES

1. Any battery leaking, or at risk of leaking, goes into a container (closed! And compatible with the stuff that's leaking!)
2. Label containers holding batteries:
 - “Universal Waste Batteries”
 - “Waste Batteries”
 - “Used Batteries”



LEAD ACID BATTERIES ANOTHER OPTION!

**May be managed under the Universal Waste
Rule (Env-Hw 1100) or Env-Hw 809**



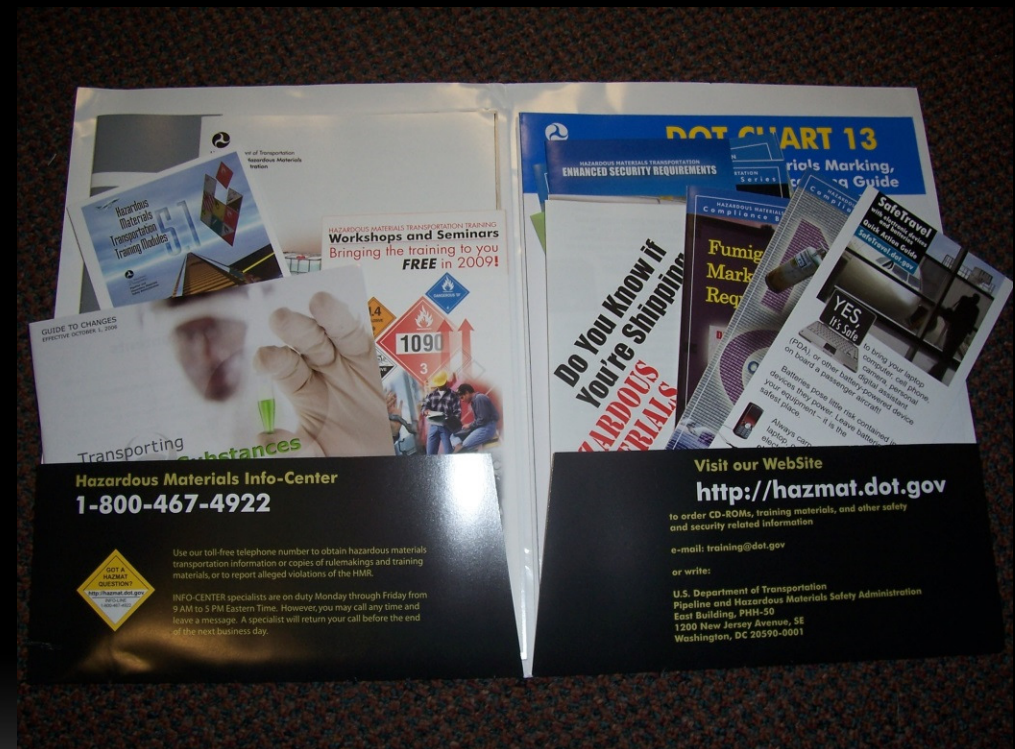
LEAD-ACID BATTERY OPTION - ENV-HW 809

- Requirements for Collectors (handlers)
 - “Store in a manner designed to ensure that the battery housings do not break or leak acid onto the soil or into any ground-waters or surface water”



ENV-HW 809

- Transporters
 - Load and brace to prevent damage or short circuits
 - Comply with State and Federal shipping regulations



LEAD-ACID BATTERIES

- Additional Best Management Practices
 - Stack on leak-proof surface
 - On pallet advised
 - No more than 5 layers high
 - Stored inside or under cover
 - Keep any container lids loose to prevent build-up of dangerous gases or fumes
 - Store away from sparks or flames

LEAD-ACID BATTERY CLEANUP

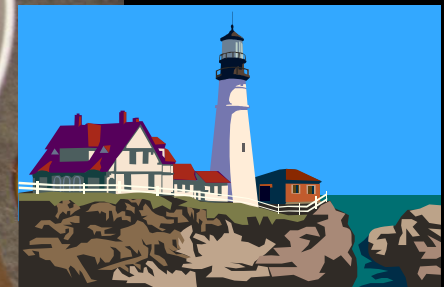
- Put on acid-proof gloves and eye protection at a minimum
- Put leaking battery in a 5-gallon bucket
 - Put baking soda or lime in bucket to neutralize acid that leaks out
 - Do NOT put baking soda or lime directly on battery
 - May spatter (“AAA”)
 - Recycler will probably still accept it with advanced notice

LEAD-ACID BATTERY CLEANUP

- Neutralize acid on ground with baking soda
- Collect neutralized acid and put in a compatible container
 - Still has lead in it
- Save contaminated soil and debris for HHW event

MERCURY-CONTAINING DEVICES

- What are they?



MERCURY-CONTAINING DEVICES

1. Put any leaking devices into a closed & compatible container
2. Do not remove glass vials except in compliance with Env-Hw 1111.03(b)
3. Label:
 - “Universal Waste” – Mercury-containing Devices”
 - “Waste Mercury-containing Devices”
 - “Used Mercury-containing Devices”

LAMPS



Metal halide



Mercury vapor



THEY ALL CONTAIN MERCURY!

METAL HALIDE AUTOMOTIVE LAMPS

“XENON”

- Blue tinted light
- Three older models had mercury

- “D1”
- “D2”
- “9500”



HOW FLUORESCENT TUBE LAMPS ARE MADE

- <https://www.youtube.com/watch?v=diltf327LKU>

10:30 min

FLUORESCENT LAMP RECYCLING

- Step 1. lamps are sent into a breaking machine under a vacuum-controlled atmosphere



FLUORESCENT LAMP RECYCLING

- Step 2. Heavy parts (glass and metal end caps) fall down a chute and move to the next step. Dust from the breaking, which contains phosphor and much of the mercury, goes up to a dust collection system



dust

Heavier solids

FLUORESCENT LAMP RECYCLING

- Step 3. The dust is collected using a baghouse filter and carbon collection. This material is sent to a separate facility to recover the phosphor (which has value) and mercury it contains.

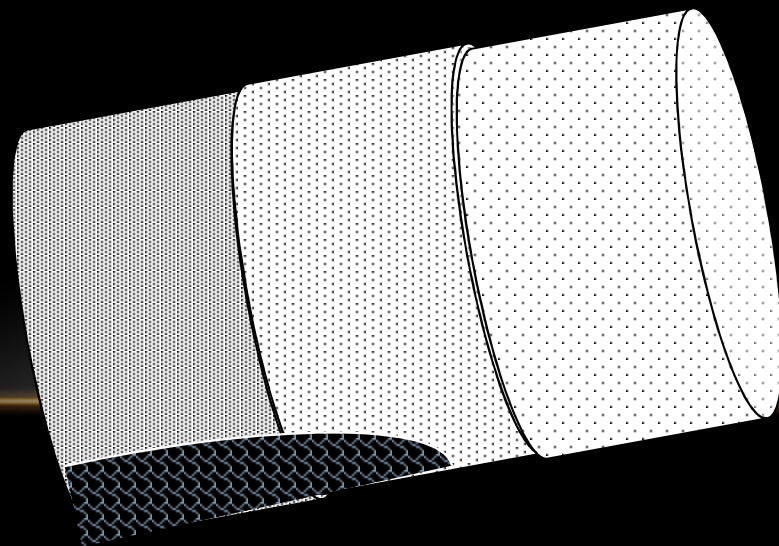


FLUORESCENT LAMP RECYCLING

- Step 3a. The heavier solids that fell out previously travel through a rotating drum with holes of various sizes. As the material enters the drum, physical tumbling and abrasion knock off more of the phosphor/mercury which falls through the first small holes.

FLUORESCENT LAMP RECYCLING

- As the remaining material travels through the rotating drum, the glass is broken into increasingly smaller pieces until it falls through the second set of holes (medium sized)



FLUORESCENT LAMP RECYCLING

- Finally, at the other end of the drum, the metal end caps are collected.

FLUORESCENT LAMP RECYCLING

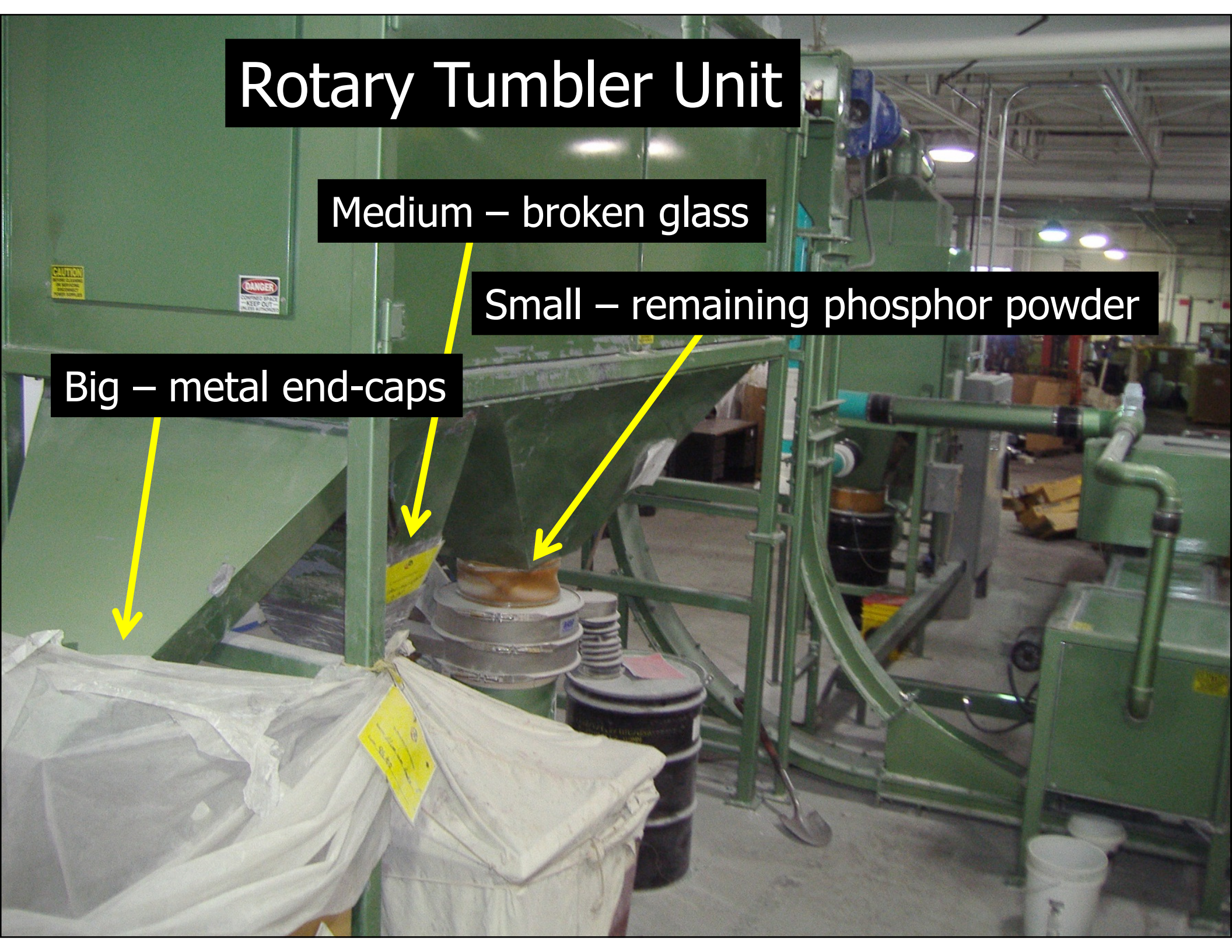
- The phosphor/mercury collected here is also sent to a separate facility for recovery.

Rotary Tumbler Unit

Medium – broken glass

Small – remaining phosphor powder

Big – metal end-caps



FLUORESCENT LAMP RECYCLING

- The broken glass is sent to a facility that uses it in aggregate



FLUORESCENT LAMP RECYCLING

- The metal end caps go for metal recycling

CONTRACT: SERVICES-RECYCLE LAMPS, BALLASTS, DRY CELL BATTERIES AND MERCURY DEVICES

CONTRACT NO.: 8001660

NIGP CODE: 926-7777

CONTRACTOR: COMPLETE RECYCLING SOLUTIONS, LLC. ID# 169536 B001
1075 AIRPORT ROAD
FALL RIVER, MA 02720

CONTACT PERSON: KEITH BOYEA
Telephone No.: 508-402-7700
Facsimile No.: 508-300-0362
E-mail: kboyea@crsrecycle.com

EFFECTIVE FROM: December 20, 2014 through November 30, 2017

Questions: Alan Hofmann, Purchasing Manager
Telephone: 603-271-2550
Facsimile: 603-271-2700
E-Mail: alan.hofmann@nh.gov

HOW YOU HANDLE LAMPS

1. Intact and broken lamps stored in CLOSED containers
2. DO NOT CRUSH THE LAMPS
Permit required



LAMPS

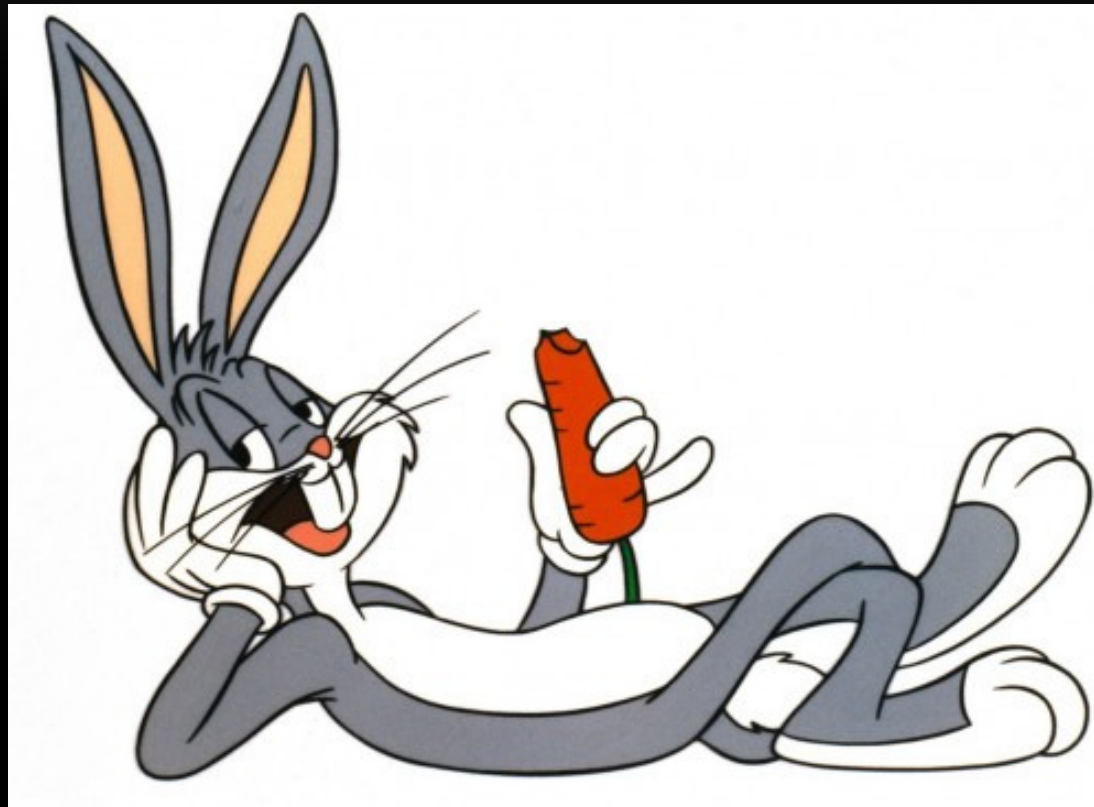
- Label:
 - “Universal Waste – Lamps”
 - “Waste Lamps”
 - “Used Lamps”
- Do not tape lamps together

LED LAMPS

- Not considered universal wastes
- Some versions have regulated lead and arsenic in them
 - Majority don't
 - Don't know if they would fail the test for hazardous waste



That's all folks! Thanks for watching!
Any questions?



Cathode Ray Tubes

Presented by:

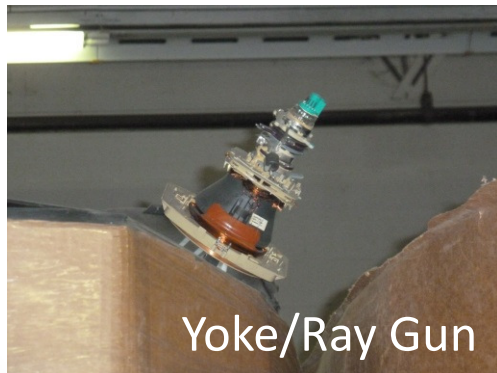
Zach Lorch

DES Hazardous Waste Permit Engineer

CRT Components

They consist of:

- Panel Glass
- Funnel Glass/Frit
- Casing/Stand
- Yoke/Ray Gun



Unwanted CRTs

- ~~CRTs~~ vs. Flat Screens TVs
 - Customers enjoy the sleeker design and higher resolution



- People may not know how to dispose of them



Pb

- CRT funnel glass contains lead
- Cannot be managed as solid waste



Management of CRT Waste

- CRTs are regulated both by the federal and state government
- CRTs are required to be managed similarly to hazardous waste



UNIVERSAL WASTE
Leaded CRT GLASS FOR RECYCLING

GROSS WEIGHT	710
TARE WEIGHT	70
NET WEIGHT	
DATE	2-11-15

CONTAINS LEADED (Pb) GLASS FROM TELEVISIONS OR COMPUTER MONITORS
DO NOT MIX WITH OTHER GLASS MATERIALS
40CFR 261.39 (a) (2)

Downstream Management

- Electronic components are recycled
- Panel glass is non hazardous and managed as nonleaded glass
- Funnel glass and frit go to:
 - Smelters
 - Tile Manufacturers
 - CRT Manufacturers
 - Concrete Manufacturers
 - Mineable Cell
 - Recovery of Lead



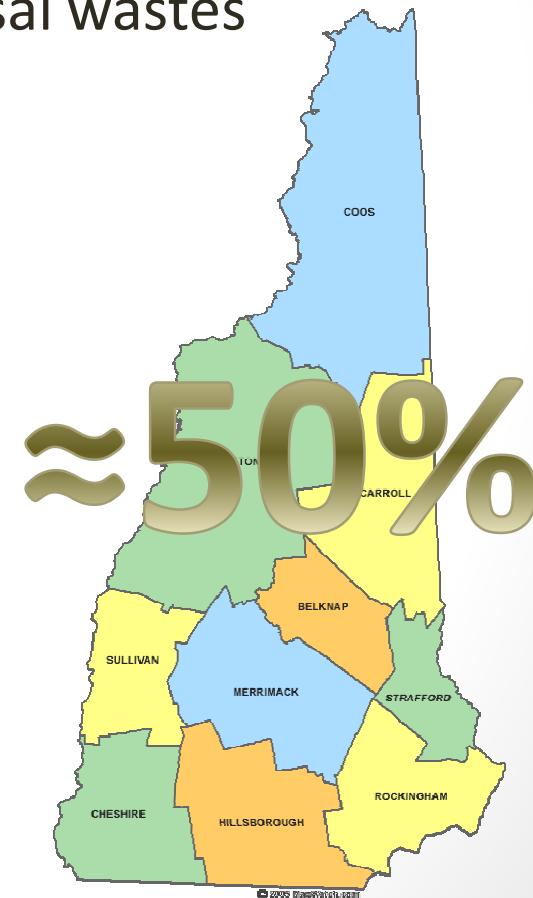
Market Crash

- In the past two years the commodities market has decreased
- This lead to increased disposal costs and stockpiling
- Increased disposal cost also lead to companies like Best Buy abandoning their free take back program this year



What DES Has Seen

- Very few business want CRTs
- CRTs are the bulkiest/heaviest of the universal wastes
- Widespread non-compliance



Impact

- The following factors make the proper disposal of CRTs difficult:

- High and continuing demand for disposal
- Limited disposal options
- The cost of disposal



- These factors lead to people abandoning CRTs and trying to dispose of them as solid waste



- This also leads to the improper management of CRTs by businesses that handle them

Looking Forward

- Through education we can prevent CRTs from being mismanaged
- CRTs are not going away anytime soon

6,200,000 tons



Questions

