

# E-Waste Management Standards January 26, 2009

Department of Toxic Substances  
Control



# Introductions

- Rich Hubbell, DTSC E-Waste Team
  - 20 years with DTSC
    - 8 years HW inspections
    - 2 years Site Mitigation
    - 11 years Emergency Response
    - We have witnessed great progress in how we manage hazardous waste

# Introductions

- Jessica Rodriguez – DTSC E-Waste Team
  - 3 years DTSC
    - Hazardous waste compliance inspections
    - E-Waste Team
    - Compliance Assistance
    - Environmental Justice
    - Plating Shops
    - Complaint Hotline

# Background – Why We're Here

- 2001 – Greenpeace documented pollution in China caused by e-waste recycling
- 2001 – US EPA promulgated E-Waste regulations focusing on export requirements
- 2003 – California passed the Electronic Waste Recycling Act
- 2008 – 60 Minutes and USA Today have documented the e-waste pollution in China is worse than in 2001 and some of the e-waste is coming from local government sponsored collection events in Colorado

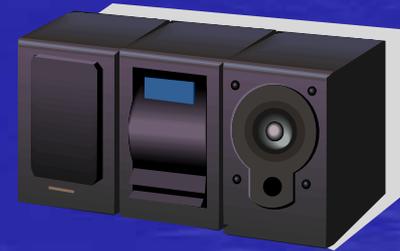
# What's Coming

- New recycling technologies are coming on-line in California which separate metals from electronic devices
- Enabling legislation is being considered for recycling leaded glass from cathode ray tubes (CRTs)
- Greater scrutiny of exported e-waste by NGOs, US EPA & DTSC

# What We'll Cover Today

- A. Types and Hazards of Electronic Wastes
- B. Different Levels of E-Waste Treatment
- C. Hazardous Wastes Generated as a Result of UWED Treatment
- D. Electronic Waste Collection Events
- E. DTSC's Relationship with the California Integrated Waste Management Board's (CIWMB's) Covered Electronic Waste Payment Program
- F. Changes Imposed by the Final E-Waste Regulations
- G. Inspection Jurisdiction and Referring Complaints to DTSC

# A. Types and Hazards of Electronic Wastes



# Universal Waste Electronic Devices

- Computers
- Computer peripherals
- Telephones
- Answering machines
- Radios
- Stereo equipment
- Tape players/recorders
- Phonographs
- Video cassette players and recorders
- Compact disc players and recorders, calculators
- Some minor appliances.



# Covered Electronic Devices

1. Cathode ray tube (CRT) devices, CRTs, and TVs and computer monitors with CRTs
2. LCD desktop monitors
3. Laptop computers with LCD displays
4. LCD televisions
5. Plasma televisions
6. Portable DVD players with LCD screens

# What is SB 20?

- A bill passed in 2004 that
  - Created a statewide collection and recycling program (the Covered Electronic Waste, or CEW program) for covered electronic devices (CEDs)
  - Imposed fees on the sale of new covered electronic devices (the \$6-\$10 you pay when you buy a new laptop, LCD TV, etc. – known as an ARF, or Advanced Recycling Fee)

# SB 20 Isn't for Everyone

- While SB 20 concerns e-waste, it is not synonymous with all e-waste recycler activities
  - About half of all recyclers choose **not** to participate in the CEW program that SB 20 created

# Two “Universes” of E-Waste Recyclers

- Those that participate in the SB 20 program and those who don't
- However, **all** facilities must follow Ch. 23 requirements and all must submit annual reports and notifications
- If they aren't participating in IWMB's CEW program, we don't have to inspect them
  - However, we may in the future, to ensure a level playing field and that the entire universe is being monitored for compliance

# SB 50 – Inspection Requirement

- In order for a CRT/UWED recycler or dismantler to receive payment, they must be inspected on a yearly basis
- Payment granted only to facilities operating in compliance with all applicable hazardous waste laws and regulations.

# What is E-Waste Hazardous for?

- Lead
- Mercury
- Copper
- Cadmium
- Chromium
- Zinc
- Other heavy metals
- Research still to be done on plastics

# CRTs

- Can regard the glass components as falling into one of **four** categories:
  1. Face (aka panel) glass
  2. Funnel glass
  3. Solder glass (aka "frit"); used to seal the CRT, and can average 85% lead
  4. Neck glass
- Most of the lead in a CRT is in the **funnel** glass, although it does not have the highest *concentration* of lead

# CRT Glass

- The screen glass (aka panel or face glass) normally contains the least amount of lead among the various types of glass in the CRT
- In general, lead cannot be released until the glass is broken, and the glass must be heated or solvated to release lead
  - This should not undermine the potential seriousness of lead exposure, which is hazardous in very small quantities

# CRT Glass Applications

What happens to the glass once it leaves the facility?

- Leaded CRT glass cannot be used in construction materials (as a sand substitute), *or*
  - As blasting grit or other abrasive material, *or*
  - In making tiles and other ceramics, *or*
  - Used to make container glass!
- 
- The CRT glass must go to a *lead smelter*, specifically to a *CRT glass furnace*
    - Any other destination is a violation

# Destinations: CRT Glass

- A large share of California shredded cullet currently goes to
  - Samsung in Korea or Malaysia
  - Doe-Run in Missouri
  - Thomson Displays Mexicana, Mexicali, Baja California
  - Brazil



# CRT Glass: The Future

- California currently has much of the national and international CRT glass market to ourselves
  - As more states come out with their own e-waste recycling programs, this may change

# CRTs: What About the Non-Glass Components?

- Who's going to buy the plastic?
  - Dell won't buy plastic with PBDEs
- Currently poor market value
  - However, a company in Richmond, CA (MBA Technologies) developed a process to recycle plastics with resins
- Recycling options, if any, still have to be explored

# E-Waste Literacy: Acronyms

- CCFL: Cold Cathode Fluorescent Lamp
  - Component found particularly in copiers, faxes, digital scanners
  - Almost always hazardous for mercury
- MCE: Mercury-Containing Equipment
  - New term: consolidates eleven different types of mercury wastes into *one* category/definition in 66273.9
- VDD: Video Display Device
  - Basically, a device that has a CRT or LCD screen
  - Not all VDDs are CEDs. VDDs include a vast number of non-CEDs such as MME or those that are part of a motor vehicle

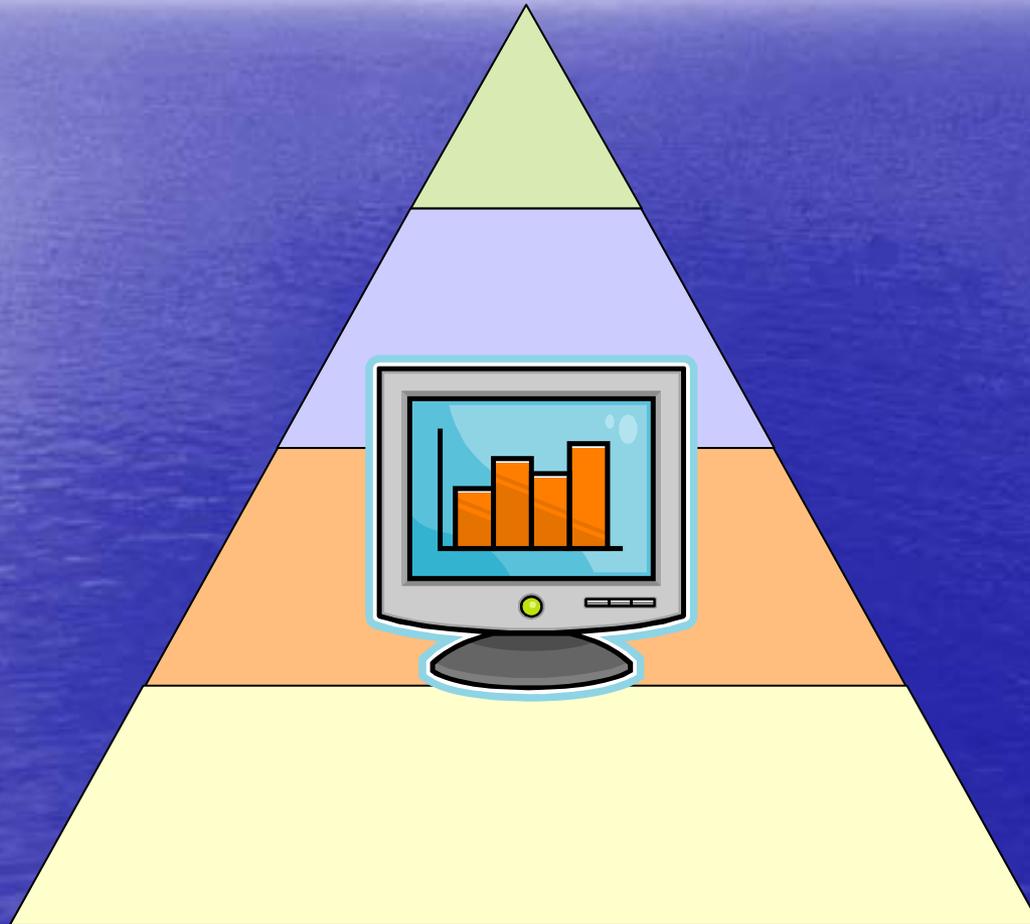
# E-Waste Literacy: Acronyms

- AMS: Alternative Management Standard
  - All of Ch. 23 is an “AMS” – allowing e-waste to be managed under more relaxed requirements than other HW!
- RoHS: Restriction on the Use of Certain Hazardous Substances
  - Contains requirements for manufacturers on what heavy metals they can put in their electronic devices
- NPF: Non-Participating Facility (a DTSC term)
  - An e-waste facility subject to Chapter 23, but not participating in the SB 20/50 CEW system

# E-Waste Literacy: Technical Terms

- White Waste: general term for appliances
- Chops: industry term for scrap metal
- Fines: industry term for residuals dust
- Ingot: Metal in a shape for convenient storage or shipment ("brass ingots," "aluminum ingots," etc.)
- Electron Gun (aka electrode): contained within the CRT neck glass

## B. Different Levels of E-Waste Treatment



# UWED Recyclers (Level A)

- Activities are limited to those in the device owner's manual
- These are activities that consumers normally do when *maintaining* their devices:
  - Remove batteries, toners, etc.
- Of minimal concern to us as inspectors

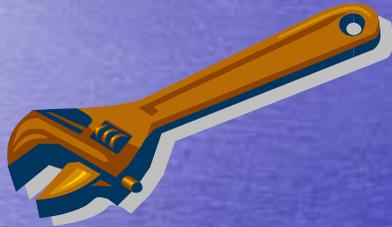
# Cutting Cords off VDDs

- Cutting cords off a device is considered *treatment*
  - A facility might treat cords as scrap, but the cords may be hazardous due to the toxicity of the *insulation* on the cords
    - Most *old* CRT cords (i.e., old television cords) are hazardous for lead
  - If the cords are in fact hazardous, and they are not being managed as a HW, the facility would be in violation

# UWED Recyclers (Level B)

- Handlers who *disassemble* and/or *dismantle* consumer electronic devices
- These handlers separate UWEDs into their *component parts* (called residuals)
- Resultant materials:
  - Wood
  - Plastics
  - Metals (drives, fans, power supplies, etc.)

# Level B Components/Treatment Residuals



... Use simple hand tools



CPU power supplies



UWED circuit boards



plastic casings (dark)

# Level B Components/Treatment Residuals



hard drives



plastic casings (lights)



boxes of various components



copper ribbon wires

# UWED Recyclers (Level C)

- Handlers who conduct treatment *other than* manual disassembly, and generate only scrap metal or other hazardous waste exempt from full regulation (e.g., universal wastes)
- These handlers disassemble or dismantle devices to separate plastics, wood, metals, UW batteries and UW lamps. Metals or whole devices may be *shredded* into chunk-size pieces

# Scrap Metal: Up Close and Personal



**Chunks of metal that qualify as exempt scrap metal if recycled.**

# B vs. C and D Treatment

- Remember: the level of treatment (for UWEDs) **also** has to do with disassembly methods
  - B treatment can use manual disassembly only
  - C and D treatment is performed by other than manual disassembly methods

# UWED Recyclers (Level D)

- Small/large quantity handlers who conduct treatment and produce treatment residuals that are characteristic *hazardous waste* under Chapter 11 and that are not scrap metal or UW
- In simple terms: UWEDs or components are processed
  - The processed materials include one or more hazardous wastes that are not scrap metal, such as baghouse and/or HEPA filter dusts!

# C vs. D Processing

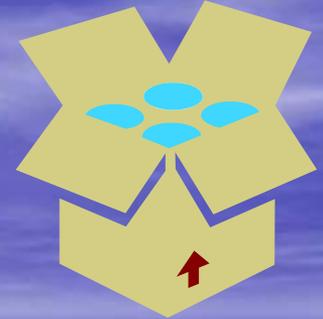
- In general:
  - Shredder running at low speed: C treatment
  - Shredder running at high speed: D treatment
- Level C requires *notification* to DTSC of closure, but
- Only D requires FA/FR, closure, and inspection by DTSC to verify closure

# E-Waste that is Not Recycled...

- Universal waste that is not recycled cannot be managed under Title 22, Ch. 23 regulations, and must be managed as HW



# Practical Packaging



- It can be difficult to tightly package CRTs in Gaylord boxes since they're usually all different sizes
  - No excuse for throwing CRTs into Gaylord boxes (serious violation)
- Face glass is strongest, so it is generally packaged to face the outside of the box
- Industry has resisted including packaging materials in their boxes of CRTs, since receiving facilities (e.g., lead smelters) often will not accept with packaging materials
  - Problem addressed in proposed regs

# Outlawed Processing

- The regs specifically prohibit processing UWEDs containing:
  - PCB ballasts,
  - Medical or biohazardous wastes,
  - Radioactive materials,
  - Reactive materials, or
  - Ignitable materials
- Simple advice: remove, then process!



# Prohibited Dilution/Treatment

- A facility cannot dilute or treat UWEDs by allowing them to be mixed with other scrap material, where they could be crushed or bailed
  - Concern is that a UWED's hazardous components (e.g., capacitors) could be crushed/bailed along with everything else (the scrap metal)

# Vacuum Release and Yoke Removal

- Vacuum release (aka *aeration*) is done by:
  - Squeezing the glass nipple (often under a rubber cover) with pliers, or
  - Piercing/puncturing the evacuation seal plug with a sharp item (often a screwdriver) and a hammer
  - Other methods possible
  - Will hear a hissing sound when accomplished
- Inconsistency in industry: removing the yoke before releasing the vacuum
  - Twisting off a yoke without first relieving the vacuum can invite an implosion!

# CRT Recyclers

- What are the categories of CRT recyclers?
  - Dismantlers
  - Yoke removal
  - Crushers

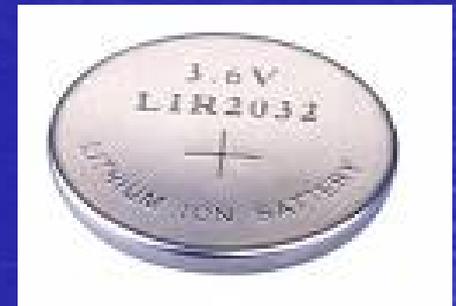


# C. Hazardous Wastes Generated as a Result of UWED Treatment



# Button Batteries

- Found in very small electronics
- Highly flammable (lithium), but still UW
- Dangerous if the contacts touch one another
  - Should be individually placed on tape to keep them separate from each other



# Cold Cathode Fluorescent Lamps (CCFLs)

- CCFLs come from Fax Machines and Digital Scanners
- CCFLs would qualify as *treatment residuals* once they are removed.
  - While CCFLs meet the definition of a hazardous waste due to their concentration of *mercury*, they also meet the definition of a *universal waste lamp* and can be managed as such.

# Toner Cartridge



- Used printer toner cartridges are commonly found in UWEDs
  - Toner cartridges can be removed from UWEDs in accordance with the universal waste regulations. Once removed, they are considered *treatment residuals*.
    - They may be classified as ***exempt empty containers*** if they are empty. As empty containers, the toner cartridges may be sent for disposal or refill. Toner cartridges that are not empty may be hazardous wastes and, if so, must be managed accordingly.

# Coolant Removed from Projection TVs

- DTSC is aware of two coolants commonly used in projection TVs: mineral oil and glycol solutions
  - Once removed, these *treatment residuals* must be properly classified
    - Generally speaking, mineral oil will be *used oil* and would be regulated as a non-RCRA hazardous waste, whereas the glycol solutions should be evaluated to determine if they are hazardous wastes (due to toxicity)

# Capacitors with PCBs

- Many UWEDs contain capacitors that must be removed before the devices can be further processed
  - A capacitor containing PCBs will have a marking on the back indicating such
  - PCBs were banned in products after 1978, but existing stocks were allowed to be sold, so products through 1980 should be assumed to contain PCBs (unless marked as not containing PCBs)
    - If there are no markings on the back of the capacitor, the operator should set it aside for a hazardous waste determination, or assume that they contain PCBs in order to avoid misclassifying a hazardous waste as non-hazardous

# Classification of Treatment Residuals

In almost every case, a recycler will produce residuals that fall into one of the four following categories:

1. **UW**

*Example:* fluorescent UW lamp removed from a fax machine

2. **Scrap Metal**

*Example:* printed circuit board removed from a CPU

3. **Non-Hazardous waste**

*Example:* plastic frames of devices

4. **Hazardous waste**

*Example:* toner cartridge ink that meets the toxicity characteristic

# UWEDs and Treatment Residuals

- Components of electronic devices (e.g., circuit boards) are *not* UWEDs
  - The term UWED is meant to capture a whole device
    - That term does not include the batteries, screens, circuit boards, lamps, plastics, steels, power supplies, etc. that are removed from devices
    - However, these components *are regulated* under Ch. 23 as materials produced *from the treatment of* UWEDs
      - ❖ The regulation of these components/residuals boils down to *containing them* (66273.33(d)(3)(F)(2) and making a *waste determination* (66273.33(d)(3)(F)(5)



# What *Isn't* Universal Waste?

- Automotive lead-acid batteries
  - These are hazardous wastes that are managed according to Title 22 (§66266.80 - §66266.81)
- What about small, sealed gel-pack batteries containing acid?
  - Still considered UW batteries, not HW (as long as not disposed)
- Lamps not destined for an authorized recycling facility are considered HW
- In general, UW destined for disposal (or disposed to a Class I landfill) are HW (Title 22, §66261.9)

# Baghouse Dust

- Baghouse dust may be classified as a HW
  - Since it is generated from air pollution control, baghouse dust is a *sludge*
    - Sludges exhibiting a characteristic of HW that are being reclaimed are *non-RCRA hazardous wastes*
      - As a non-RCRA HW, the baghouse dust may be eligible for the *recycling exclusion* under HSC §25143.2(d)(6)



# Baghouse Dust Management

- If a facility is not recycling their hazardous baghouse dust at a primary smelter, it must be managed as a hazardous waste



# Baghouse Dust: Labeling and Destination

- Baghouse dust should be labeled with either:
  - an ERM label indicating HW characteristics (if recycled); or
  - a HW label if it won't be recycled
- For baghouse dust that will be recycled, make sure the receiving site is actually using the baghouse dust as required to be excluded via 25143.2
- Baghouse dust can vary greatly in metals composition (e.g., from 10-50% concentration), complicating use at a site that will recycle it

# Baghouse Dust and Recycling

- Regular testing of the baghouse dust should be performed to make sure it meets the specs of the facility that plans to recycle it
- Pressure is on recyclers to find someone who can use the baghouse dust as a commodity, since proper disposal can be expensive

# Baghouse Filters and Bags

- Filters are likely hazardous waste
- One baghouse can have hundreds of bags
- Shredder baghouses are technically 90/180 day accumulation units
  - However, shredder baghouse bags are often changed only once a year because of the satellite accumulation allowance

# Closure of E-Waste Processors

DTSC oversees closure of e-waste processors

Involved:

Closure inspection, including verification of sampling results

Once DTSC is satisfied that no contamination exists at the site, it releases the FA/FR money back to the company

DTSC aims for consistency, fairness, and promptness in requesting sampling and cleanup and in releasing FA/FR funds back to the facility



# D. Electronic Waste Collection Events

“Collection Event Guidance Document”





**E.** DTSC's Relationship with the California Integrated Waste Management Board's (CIWMB's) Covered Electronic Waste Payment Program



# IWMB Mission

- Distribution of recovery and recycling payments to qualified entities covering the cost of electronic waste collection and recycling...

...in a timely manner



# IWMB's Relationship with their CEW Participants

- The facility must have been inspected within the last twelve months and found to be “in conformance” with laws and regulations
  - Inspections usually coincide with the facility's application renewal cycle, but not always (depends on whether there was a reinspection date, etc.)
- IWMB approves a CEW application in about 30 days
- IWMB averages 24 days to process a payment claim
  - Additional time is added through accounting and at the State Controller's office

# What does IWMB Care About?

1. How a facility tracks eligible items for payment vs. ineligible items  
Especially how California CEDs are separated from non-California sources
2. How a facility tracks materials that come in (how recorded, tabulated, etc.) – also known as “source documentation”
3. Processing claims in a timely manner

# Collector-Recycler Relationship

- Collectors submit an application (and Net Cost Reports) directly to IWMB, but receive their *payment money* from the processor
- Only recyclers get money **directly** from IWMB
- For approved claims, recyclers receive \$0.39/lb from IWMB;
- Then, recyclers give collectors a “recovery payment” of \$0.16/lb for the e-waste they bring in

# F. Changes Imposed by the Final E-Waste Regulations





# What the Regs Do

Finalize existing emergency regulations that:

- Identify the EDs that are CEDs as defined by SB 50
- Establish guidelines for submittal of a *manufacturer's notice* to retailers that sell these CEDs in California
- Establish the prohibition on sale of CEDs that contain heavy metals (mercury, lead, cadmium, chromium) in accordance with *RoHS provisions*



# Categories of UW

## Current Categories:

- 11 different types of mercury-containing wastes
- UWEDs
- CRT Materials
  - Catch-all for CRTs, CRT devices, glass
  - Powdered glass fits into this category

# Categories of UW

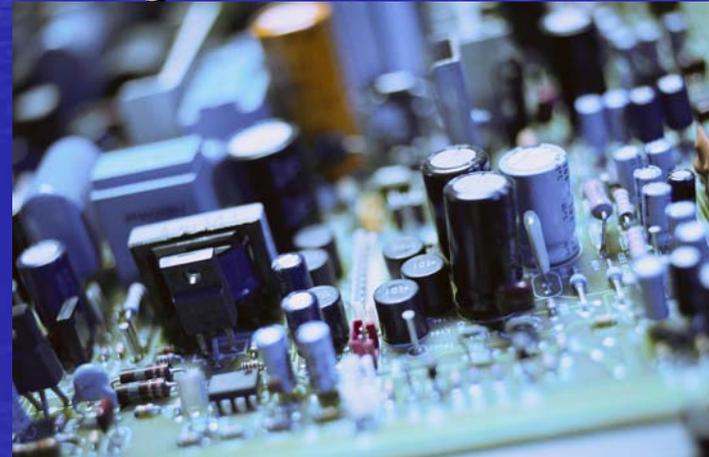
## Proposed:

- A single category called “mercury-containing equipment” (MCE) – consistent with term used in the federal UW rule
- The definition of electronic device will include CRT devices
  - This means that CRT devices will be considered UWEDs!
- CRTs and CRT glass will be *separate* UW categories



# Printed Circuit Boards

- New, relaxed standards for PC board treatment
- Might overlap with PBR
- It's the potential HW residuals from circuit board treatment that may fall under PBR, not the actual circuit board treatment



# EPA ID#s

- All e-waste handlers who accumulate more than 5,000 kg of UW at any one time will need to obtain an EPA ID#
- We currently exclude CRTs and UWEDs from the count of 5,000 kg of UW needed to require an EPA ID#



# EPA ID#s

- What type of EPA ID# will handlers need?
  - If they exceed 5,000 kg of federally regulated UW (batteries, lamps, MCE), they must obtain a federal EPA ID# from U.S. EPA
  - If they stay below that threshold of federally regulated UW, and accumulate more than 5,000 kg of UWEDs and CRTs, they can get by with a California EPA ID# issued by DTSC
- This requirement may surprise many facilities who are unfamiliar with the EPA ID# process
  - On the other hand, most of the larger processors already have California or U.S. EPA ID#s
- CUW and CFI faux numbers will no longer be needed, except for very small collectors (less than 5,000 kg of total UW)



# Household and CESQUWG Drop-Offs

- Proposed §66273.39 will remove the requirement to record the name and address of every resident and CESQUWG who drops off e-waste
  - Collectors have been complaining for years that the current requirement, to record the name and address of all residents and CESQUWGs, is inconsistent with IWMB's DAC requirement

# Household and CESQUWG Drop-Offs

- Instead of recording the names and addresses of drop-offs, proposed §66273.39 will allow a handler to simply list “household generator” or “CESQUWG” instead
  - Will be a big relief for many collectors, but may open the door up for more fraud
  - May also decrease illegal drop-offs by residents who don't want to give their name and address

# Packaging Requirements for CRTs

- Current regs require that CRTs be containerized with “sufficient” packaging
- The proposed regs will state that CRTs be containerized with “adequate” packaging
  - No one knew exactly what “sufficient” meant
- Goal is to accommodate existing practices (in many cases, facilities don’t use any “packaging” in their Gaylord boxes at all) while still maintaining the performance standard to “prevent” breakage

# LCD Projectors and Plasma Projection TVs

- Appendix X of Ch. 11 will be modified to clarify that LCD projectors and plasma projection TVs are not covered in the listing of covered electronic devices that are presumed to be hazardous wastes
  - They cannot be included at this time because DTSC has not tested these devices, and therefore do not have the data to prove they are presumed to be hazardous wastes (and universal wastes when recycled)

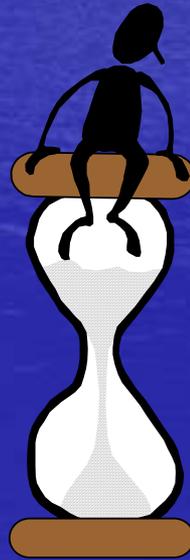


# Other, Smaller Changes

- The §66260.20 definition of “hazardous waste” will be amended to officially include universal waste
- Current §67100.2 of Title 22 will be amended to clarify that universal waste does not have to be included in an SB 14 report

...Effective Date of New Regs

***March 2009!***



# G. Inspection Jurisdiction and Referring Complaints to DTSC





# CUPA Inspection Jurisdiction

- Generators of universal waste who do not accept universal waste (including e-waste) from offsite sources
  - Dismantlers of UW other than e-waste
  - Repair personnel generating UW (i.e., TV repair)
  - HHW facilities accepting UW under PBR
  - Universal wastes placed in an unstaffed collection box (considered generated in the box)
  - Building owner, occupant, or maintenance contractor (i.e., on a corporate or educational campus)
- “CUPA vs. DTSC Inspection Authority” letter on our EPANet site home page*

# DTSC Inspection Jurisdiction

- Electronic waste collectors (e.g., offsite collectors) or recyclers, **regardless** of participation in the SB 20/SB 50 program
- Destination facility – a recycler or disposal facility
- Retailers participating in a “take-back” program: (accepting universal wastes when selling products)
- Household hazardous waste facilities accepting universal wastes as a handler: (This would primarily be from generators > 100 kg/month)



# DTSC Inspection Jurisdiction Cont'd

- Universal waste transporters
- Complaints against electronic waste collectors (e.g., offsite collectors) **or** recyclers, **regardless** of participation in the SB 20/SB 50 program
- Commercial universal waste handlers: (offsite collectors and accumulators)

*Taken from the "CUPA vs. DTSC Inspection Authority" letter on our EPANet site home page*



# Referring Complaints to DTSC

- CUPAs should respond to complaints against universal waste generators, including those who generate (but do not receive offsite) electronic waste.
- CUPAs who receive a complaint regarding an offsite collector or recycler of electronic waste should refer the complaint to DTSC using the Cal/EPA Environmental Complaint Form at [http://www.dtsc.ca.gov/database/CalEPA\\_Complaint/index.cfm](http://www.dtsc.ca.gov/database/CalEPA_Complaint/index.cfm) or by referring the complainant directly to the Form.



Thank you!