

Recycling & Risk Management of End-of-Life Lighting Products

Topics

- What Lamps are Covered
- Collection Options
- Lamp Recycling Process
- Downstream Process
- Due Diligence & End Markets
- UW Training & Spill Kits



John Chilcott, President
Earth Protection Services, Inc.

What Lamps are Covered

- As of February 8th, 2006, in California, **all fluorescent lamps and tubes** must be recycled, taken to a household hazardous waste disposal facility, or taken to a universal waste handler or an authorized recycling facility.
- Hazardous waste lamps are regulated under Title 22, Division 4.5, Chapter 11, Section 66261.50 as well as the federal Resource Conservation and Recovery Act (RCRA) and The Comprehensive Environmental Response Compensation and Liability Act (CERCLA)
- A typical fluorescent lamp is composed of a Phosphor-coated glass tube with electrodes located at either end. The lamp contains Mercury, of which a very small amount is in vapor form.
- When voltage is applied, electrodes energize the mercury vapor, causing it to emit UV energy. Phosphor coating absorbs the UV energy, causing phosphor to fluoresce and emit visible light.



Lamp Collection Options

- Recycler Pickup
- Customer Delivery to Recycler
- Municipal Collection Events
- Pre-Paid Shipping Containers



All Collection Options must comply with DOT / UW requirements regarding storage, packaging and transportation.

Lamp Recycling Process

- Materials transported to EPSI
- Items are disassembled & separated
- Any hazardous materials are safely removed & handled
- Virtually all parts are recycled
 - Sold for re-use (cardboard boxes)
 - Melted down (glass, aluminum, copper, steel)



Lamp Recycling Process

Separate glass,
phosphor & metals



Phosphor is “retorted”
and dried into a powder



Lamp Recycling Process

Mercury is removed from the lamps & purified



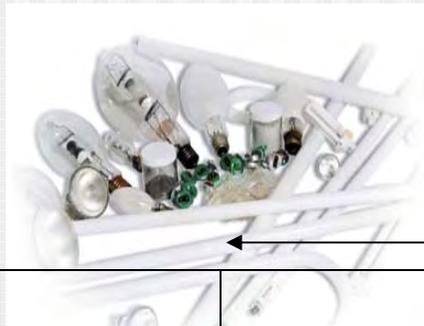
Metal parts are separated & sent to be melted & reused



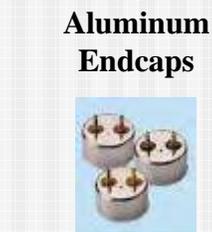


Spent Lighting Materials Flowchart

Customer / Generator Whole Lamps
Transported to EPSSI Demanufacturing Facility



Lamp Recycling Process



Secondary Metals Market



Mercury

Mercury & Phosphor Powder
Retort



Disposed As Non Hazardous Waste



*Certified Destruction
Completes
Audit Trail
& Chain of Custody*

Downstream Process

Downstream
Vendors
Audited
Every Three
Years

Liquid Lamp Mercury

- Triple-Distillation by Permitted Environmental Company

Phosphor Powder

- TCLP Analysis for Mercury
- Class I Permitted Secure Landfill

Lamp Glass

- Mercury Free
- Used in Manufacture of Fiberglass

Aluminum End Caps

- Secondary Metals Market

The recovery service provider must perform due diligence and have documentation regarding end-use markets.

Due Diligence & End Markets



Are you sure how your E-Waste is recycled?

Due Diligence & End Markets

A service provider should be able to provide an overview of their procedures for:

- Demanufacturing
- Disposal and waste handling
- Storage

Due Diligence & End Markets

Things to Look For in A Recycling Service Provider:

- Experience & Expertise
- Chain of Custody
- Environmental Protection
- Financial Safeguards
- High Levels of Insurance

Due Diligence & End Markets

Things to Look For in A Recycling Service Provider:

- Recycler or broker of materials
- Regulatory adherence
- Properly permitted facilities
- Materials tracking systems for transportation, processing and reclamation
- Cradle-to-grave accountability
- Closure Plans (if required)
- High levels of insurance

Due Diligence & End Markets

Things to Look For in A Recycling Service Provider:

- Knowledge of Regulations
(Retain an Environmental Attorney and Certified Environmental Consultant)
- Employee Training and Certification
(Hazardous Materials Communication Program, OSHA, Hazmat, Haswopper, Monthly Safety Meetings at Branches)
- Medical Monitoring of Employees
- Consulting Support & Subcontractor Training on Proper Lamp Handling Procedures

Due Diligence & End Markets

Things to Look For in A Recycling Service Provider:

- Recycling Permits (Federal / State)
- Clean Compliance Record
- Chain of Custody Documentation
- Mercury retort at EPA Approved Locations

Due Diligence & End Markets

Things to Look For in A Recycling Service Provider:

- Customer Indemnification
- Facility Closure Plans Where Required
- Strong Financials
- \$5,000,000 Pollution Liability Insurance Naming Customer as Additionally Insured

Universal Waste Training

Procedure for handling unbroken fluorescent lamps for recycling:

Employee will wear the following safety equipment.

- Gloves made of leather, or equivalent.
- Safety glasses with side shields or full face shield.
- Safety toed shoes or boots.

Place lamps into new or used lamp boxes (the original egg crate material does not have to be placed back into the boxes) and tape the ends shut.

- Broken or crushed lamps should be packaged in an approved container, (55 gallon drum).
- Badly damaged boxes, wet boxes, etc. will not be accepted for transport.
- Boxes must be kept in a secure, dry area.
- Palletize lamp boxes to a maximum height of 6 feet.
- Secure boxes to pallet with shrink wrap or stretch film.

All pallets need to be labeled as Used Mercury Lamps or Universal Waste Mercury Lamps.

Employee's shall wash his/her hands with soap and water when beginning a work shift, before a break, and upon completion of the work shift.

- The proper use of the prescribed safety equipment will protect the employee from the potential dangers of contamination from mercury.
- No tobacco materials, food, or beverages will be permitted while working with mercury lamps.

Spill Kits

- Generators of toxic and hazardous materials are financially responsible for proper disposal and for cleaning up improper disposal.
- Mercury containing lamps have hazardous and toxic materials that pose a risk to public health and the environment.
- A release of mercury vapors requires immediate cleanup. The EPA regulations allow the residue to be managed as a universal waste.

The EPSIPAK SPILL KIT offers customers the tools to handle the clean up of broken mercury containing lamps. The materials may be placed in a sealed plastic bag and sent to EPSI in the standard EPSIPAK lamp recycle box. The EPSIPAK recycling program offers a cost effective solution for complying with all federal and state regulations.

