UNIVERSITY of NORTHERN COLORADO

ENVIRONMENTAL HEALTH AND SAFETY

Bulb Crushing and Disposal Procedure

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Appendices

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I. Purpose

This procedure will serve as a guide to all personnel who will be performing or assisting with the crushing and disposal of the bulbs. It is the responsibility of each department/supervisor to ensure that their employees are properly trained on the bulb crushing equipment, appropriate personal protective equipment (PPE) and that all affected personnel receive a copy of these procedures.

II. General Information

At the University of Northern Colorado, lighting upgrades and routine maintenance entail the removal of bulbs/lamps. Fluorescent and high-intensity discharge (HID) bulbs have the potential to contain a mercury substance. Bulbs containing mercury are considered a hazardous (universal) waste and must be disposed of according to Federal and State regulations. A universal waste bulb containing mercury must either be recycled or disposed of in a hazardous waste landfill, they cannot be incinerated. A verified non mercury or low-level mercury bulb must be disposed of properly in a designated waste receptacle.

Colorado Department of Health and Environment, Solid and Hazardous Waste Regulation 273.13 allows for fluorescent bulbs to be crushed in a completely enclosed system designed to prevent the release of waste or a mercury containing substance. This regulation requires a procedure for crushing universal waste bulbs. Facilities Management manages the operation of crushing mercury containing bulbs/lamps. The equipment used to crush bulbs/lamps is called “The Bulb Eater”. This unit is manufactured by Air Cycle Corporation, Model number BE-55-VRS. The crusher mounts on top of a 55 gallon drum and has a dual filtration system.

III. Location

Universal waste is stored at Parsons Hall in the lower level garage. There is a designated storage area for waste bulbs (crushed and non-crushed). Bulb crushing activities are conducted in this area.

IV. Risk Identification

Individuals who may conduct or assist with the crushing of waste bulbs shal follow these procedures. Individuals shall receive proper training in order to operate the bulb crusher.

The potential risk associated with the crushing of waste bulbs, is the possibility of having a mercury vapor release. If a bulb is broken, it can contain mercury that may release levels of mercury vapor, posing a risk to any personnel involved in the process. The permissible exposure limit (PEL) for mercury is a ceiling limit of 0.1 milligrams per cubic meter of air (mg/m3), enforced over an 8-hour time-weighted average.

V. Personal Protective Equipment (PPE)

During bulb crushing activities, the operator or assistants shall use the following PPE:

- Leather gloves
- Ear plugs
- Tyvek Suit with hood and boots
- Face shield (for operator only)
- Safety goggles
- Respirator with mercury vapor filter cartridges (North Cartridge N750052)

All reusable PPE shall be thoroughly cleaned after the completion of any crushing operations and before storing the equipment.

VI. Procedure of Operations

The following is a list of requirements for employees who handle or assist with the crushing of universal waste bulbs.

A. All employees participating in bulb crushing operations shall wear the appropriate PPE. (see Section V)

B. The operator will ensure a properly filled out label is placed on the drum. The labels will be provided by the Environmental Health and Safety Department (EHS). This label should be filled out in the following manner by the bulb crusher operator:

    Shipper: University of Northern Colorado
    Address: 411 20th St, Greeley CO 80639
    Contents: Universal Waste-Crushed Bulbs
    Accumulation Date: fill in the date that the drum started being filled with crushed bulbs.

C. Employees must segregate the mercury containing bulbs and the non-mercury or low-level mercury containing bulbs before crushing. Non-mercury or low-level mercury containing bulbs/lamps can be placed gently into a trash dumpster for disposal. (See section VII for additional information on low-level mercury containing bulbs).

D. If a bulb does not fit into the bulb crusher, it should be packaged in a way to prevent breaking, properly labeled with “Universal waste-uncrushed bulb” and the date of generation, and then stored in the designated Universal Waste, uncrushed bulb area.

E. The bulb crusher operators are responsible for maintaining the cleanliness of the bulb crushing area. Place any bulb glass into the bulb crusher drum. Do not place trash, such as bulb boxes, paper, plastic or miscellaneous debris that may surround the bulb crushing area into the drum. These items should be disposed of through regular trash or recycling.

F. Two filters are used in the bulb crushing system, a heavy duty filter bag and a HEPA filter. The heavy duty filter bag captures large particles and the HEPA filter is designed to capture mercury emissions.

- The heavy duty filter bag is changed after each 55 gallon drum is filled. The HEPA filter is changed after ten 55 gallon drums have been filled. The spent filter(s) should be sealed and placed inside the drum on top of the crushed bulbs for disposal.
- Follow the manufacturer’s directions for inserting the filters into the bulb crusher.
- Replacement of filters will be tracked using the Bulb Eater Filter Change Tracking Log form (see Appendix A). The log shall be kept with the bulb crushing equipment. When complete, the log form shall be turned into EHS so that new filters are ordered. Filters can be ordered through Air Cycle Corporation.
- Once a 55 gallon drum has been filled, the bulb crusher will be removed from the top of the barrel and the lid will be immediately placed on the drum and sealed. The bulb crusher will then be placed on an empty drum.

G. If a bulb containing mercury breaks outside of the drum follow the spill clean-up procedures in section VIII of this document.

H. The EHS department will dispose of universal waste.

I. Disposable PPE, such as Tyvek suits, shall be removed after each operation and cleanup has occurred. These items may be disposed of in the regular trash.

VII. Low-Level Mercury Containing Bulbs

Low-level mercury or non-mercury containing lamps that are utilized by the University campus can be disposed of in the dumpster. Low-level mercury lamps can be identified by the “Ecolux”, “Ecologic”, “ECO”, or “ALTO” designation printed on the bulb typically with either a green tip or a silver tip with green printing. Always verify that the bulb is a non-mercury or low-level mercury bulb before disposal. See Appendix B for a pictorial

reference guide of the low-level mercury containing bulbs that may be found on campus. Low-level mercury bulbs that could be used on campus include the following:

- General Electric Bulbs
  - Ecolux
  - Ecolux Starcoat
  - Ecolux UltraMax
  - Ecolux Biax
  - Ecolux Lucalox
  - Ecolux Mod-U-line
- Sylvania Bulbs
  - Ecologic
  - OCTRON Ecologic
  - PENTRON Ecologic
  - Lumalux (Plus) Ecologic
  - ICETRON Ecologic
  - Powerball CRI Ecologic
- Phillips Bulbs
  - ALTO
  - Ceramalux ALTO
  - Universals ALTO
  - U Bent ALTO
  - PL-C Cluster ALTO
  - PL-S Short ALTO
  - PL-T Triple ALTO
  - MasterColor CDM ALTO
  - Dim Alto

VIII. Spill Clean Up

In the event that bulbs are accidentally broken during crushing operations outside of the bulb eater, the following clean up procedures shall be followed:

- Air out the bulb crushing area for 5-10 minutes by opening the garage doors if they are closed
- Carefully scoop up glass fragments and powder and place debris into the crushed bulb drum using designated floor squeegees and dust pans.
  - Do Not use a broom as this could spread the spill and stir up additional vapors
  - Do Not use a vacuum
  - Remove any none bulb/lamp materials and dispose of these in the trash
  - After use, non-disposable cleanup equipment should be cleaned.

Note: A spill cleanup kit is intended for elemental mercury spills and does not need to be utilized for a broken mercury containing bulb.

IX. Training and Recordkeeping

Employees who handle universal waste lamps/bulbs during segregation and crushing may receive annual training. Training records will be retained by the Environmental Health and Safety office for a minimum of three years.

Appendix A

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Bulb Eater Filter Change Tracking Log

NAME	TYPE OF FILTER	DATE FILTER CHANGED
	HEPA filter	
	Heavy Duty bag	
	Heavy Duty bag	
	Heavy Duty bag	
	Heavy Duty bag	
	Heavy Duty bag	
	Heavy Duty bag	
	Heavy Duty bag	
	Heavy Duty bag	
	Heavy Duty bag	
	Heavy Duty bag	

Return this form to EHS once it has been filled out completely to indicate new filters should be ordered

Appendix B

Low-level Mercury Bulb Picture Reference Guide

General Electric Bulbs

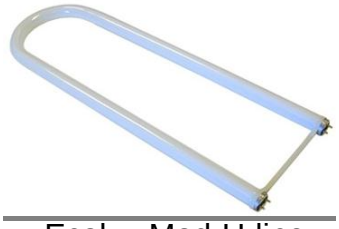
Ecolux

Ecolux Starcoat

Ecolux Ultramax

Ecolux Biax

Ecolux Lucalox



Ecolux Mod-U-line

Sylvania Bulbs

Ecologic/OCTRON Ecologic

PENTRON Ecologic

Lumalux (Plus) Ecologic

ICETRON ecologic

Powerball CRI Ecologic

Phillips Bulbs

ALTO

Ceramalux ALTO

Universals ALTO

U Bent Alto

PL-C ALTO

PL-S ALTO

PL-T ALTO

MasterColor Alto

Dim Alto