

# ***EPA Materials Handling Guidelines***



United States  
Environmental Protection  
Agency

May 2004  
EPA530-K-04-004  
[www.epa.gov/osw](http://www.epa.gov/osw)

*Plug-In to eCycling*  
**Guidelines for Materials Management**

## **Purpose**

As part of an effort by EPA to develop national guidance for the management of “end-of-life” electronics, the Agency has drafted the following guidelines for use in the Plug-In To eCycling Campaign. The Campaign and its pilots will be used by the Agency to “test” these guidelines and allow the Agency to have real world information about what practices will most effectively protect human health and the environment, while at the same time enabling practicable programs for management of end-of-life electronics.

These guidelines are intended to be used as a framework for considering the acceptance of partners to the Plug-In Campaign. The Agency developed these guidelines based on what we believe, on a general basis, to be the most important elements for protection of human health and the environment in managing end-of-life electronics. However, the Agency is open to the possibility that not all aspects of these guidelines are critical in all cases of end-of-life management. That is, the Agency recognizes that, on a facility-specific basis, there may be practices that do not conform with every element of these guidelines, yet these practices may also ensure the protection of human health and the environment.

Vital to the success of the Campaign, as well as any program for improved management of end-of-life electronics, is the availability of adequate markets for reuse and recycling. Thus, these guidelines are not intended to be a barrier to delivering reusable equipment or industrial feedstock materials to legitimate markets and environmentally sound facilities, wherever they exist.

## **Applicability of Guidelines**

These guidelines are applicable to all Plug-In partners who, through contracts or other arrangements, utilize reuse, refurbishment, recycling or disposal services. Plug-In partners take appropriate due diligence measures to ensure that downstream facilities and operations use practices that are consistent with these guidelines. The guidelines are applicable to all activities undertaken by a Plug-In partner, not just those that are undertaken as part of a Plug-In To eCycling pilot.

The guidelines are not written to directly address collection activities. Rather, the guidelines address activities that ensue following collection: reuse, refurbishment, recycling and disposal, as well as the responsibilities of the Plug-In partner to ensure that such activities are conducted consistent with these guidelines.

Companies or other entities that perform recycling or related processing activities (other than collection) are not eligible to become Plug-In partners at this time. In order for the Agency to form Plug-In partnerships directly with processors and recyclers, the Agency would specifically request certain data and other information from these entities and/or request that such information be kept at the facility that would document the consistency of their operations with these guidelines. In order to minimize the burden on the public for information gathering pursuant to federal activities, the Paperwork Reduction Act of 1995 requires that the Agency obtain approval from the Office of Management and Budget (OMB) for such information gathering activities. Unfortunately, development of such an information gathering request by EPA, as well as the OMB approval process, would require 6 months to a year to complete. Thus, the Agency is not now in a position to request, receive and review information from processors and recyclers regarding the consistency of their operations with these guidelines. As an alternative, it is the intent of the Agency to work towards the establishment of a third-party organization to function as an entity for review and recognition of processors and recyclers of end-of-life electronics. The Agency also will not accept as Plug-In partners entities who are primarily engaged in the landfill or incineration of end-of-life electronics, as these disposal operations are not the primary focus of the Plug-In To eCycling program.

### **Due Diligence**

The guidelines call for due diligence efforts on the part of Plug-In partners regarding the handling and disposition of end-of-life electronics. However, the guidelines do not incorporate the same level of due diligence under all circumstances. Rather, the level of due diligence recommended is commensurate with the risk of the activities involved, as well as being aimed at fulfillment of certain waste and material management goals under Plug-In. For example, the guidelines call for due diligence to provide assurance that incineration and landfill of any form of e-waste is minimized and, if utilized, is safe; whereas, the due diligence steps for reuse, refurbishment and recycling focus on only those used electronics that contain or consist of materials that, if mismanaged, are most likely to present hazards to human health or the environment. Thus, reuse is the most favored management option, followed by recycling and, least desirable, landfilling or incineration.

Guidelines 1-4 below pertain to all end-of-life electronics for which Plug-In partners have responsibility. Among other things, guidelines 1-4 call for due diligence regarding any electronic products or components that are sent to incineration or land disposal. However, guideline 5, regarding reuse and refurbishment, and guideline 6, regarding recycling, only pertain to certain “designated materials,” as defined in the relevant footnote. Designated materials are those that are of concern because they contain or consist of materials that, when mismanaged, may present hazards to human health or the environment.

Thus, no guidelines beyond those of 1-4 apply to the reuse, refurbishment or recycling of end-of-life electronics that, either in processed or unprocessed form, do not contain or consist of designated materials. The Agency encourages the processing (including sorting) of used

electronics to enhance the value of output streams, often resulting in the generation of multiple commodity streams that do not contain or consist of designated materials.

Because equipment for reuse often contains designated materials, guideline 5 will be applicable to many reuse markets. However, to maximize reuse, the elements of guideline 5 are relatively simple--the Plug-In partner ensures that equipment meets legitimate reuse specifications, is packaged to protect its value, and that proper business records are kept of the transaction. The only other guideline having relevance to reuse is guideline 4(a)—the Plug-in partner ensures that export of reusable equipment is in conformance with the laws of importing and transit countries. Guidelines 1-5 are applicable to equipment for refurbishment.

## **GUIDELINES for MATERIALS MANAGEMENT**

### **All electronics**

1. The Plug-In partner<sup>1</sup> ensures that reuse, refurbishment and recycling techniques are used to the full extent practicable, i.e., recognizing technical and economic feasibility, in an effort to minimize incineration and land disposal of electronic equipment and components. The Plug-In partner ensures that proper business records are kept demonstrating that incineration and land disposal are minimized.

2. Where incineration or land disposal is unavoidable, the Plug-In partner ensures that:

a. Consideration is first given to whether the waste has value for energy recovery. For certain wastes, such as plastics, incineration with energy recovery is preferable over incineration without energy recovery or landfill. For wastes that have value for energy recovery, but for which energy recovery is technically or economically infeasible, the Plug-In partner ensures that a reasonable case of infeasibility has been made.

b. The wastes (including those generated at refurbishment and recycling operations, smelters, etc.) are managed safely at facilities that are fully licensed for treatment and disposal purposes by all appropriate governing authorities. The Plug-In partner ensures that there is written evidence substantiating this.

c. Landfills and incinerators have an environmental management system in place, as is described in guideline 6(b) below for certain recycling facilities.

3. The Plug-In partner ensures that all applicable federal and state requirements pertaining to the transport, processing and management of electronic products and components are complied with.

4. In the case of export of any electronic products and components, the Plug-In partner ensures that:

a. Any applicable requirements of the U.S., as well as applicable requirements of

importing and transit countries, are complied with, and proper business records are kept documenting such compliance.

b. Prior to export, the materials listed below are removed and handled separately, unless:

- i. The export is for purposes of reuse or refurbishment, or
- ii. The Plug-In partner has documented and regularly monitored controls in place to assure that the materials will be removed in member countries of the OECD:

(1) Batteries.

(2) Mercury- and PCB-containing lamps and devices.

(3) Circuit boards, unless they are contained in hand-held electronic equipment, such as cellular phones, PDAs, etc. (Note: Under U.S. rules, minimal quantities of mercury and batteries that are protectively packaged to minimize dispersion of metal constituents do not need to be removed from whole circuit boards).

(4) CRTs and CRT glass, both of which are adequately processed for use as an industrial feedstock material prior to export.

*Note: The U.S. is not currently a party to the Basel Convention, although the U.S. is a member of the OECD. International trade in hazardous wastes is governed by existing agreements under both OECD and Basel, as well as by the laws of exporting, importing and transit countries. Trade in end-of-life electronics that are considered hazardous wastes intended for recovery between the U.S. and any OECD country are governed by the OECD control system, as implemented through the laws and regulations of the member countries. Because the U.S. is not a party to the Basel Convention, federal law does not yet include obligations for U.S. exporters of end-of-life electronics that are considered hazardous wastes under the Basel Convention. However, U.S. exporters should be cognizant that Basel Convention requirements could affect them, as implemented by the laws of importing and transit countries. In addition, the importing and transit countries may have other laws and regulations that could affect U.S. exporters and their transactions. Until such time as the U.S. becomes a party to the Basel Convention, no country that is a party to Basel but not a member of OECD can legally accept hazardous waste exported from the U.S. absent a bilateral agreement between the governments under Article 11 of the Basel Convention. At this time, the U.S. has no bilateral agreements with any countries outside of the OECD that provide for the export of hazardous waste. Current U.S. rules regarding the export of hazardous wastes can be found at 40 CFR Part 262, Subparts E and H.*

#### **“Designated materials” for reuse or refurbishment**

5. This guideline applies to designated materials<sup>2</sup> that are directed to reuse or refurbishment.<sup>3</sup> However, it is only intended to apply to those shipments of designated materials (such as the following intact equipment: monitors, televisions, CRT bulbs, CPUs, laptops, printers and cell phones) that have been prescreened to meet legitimate reuse or refurbishment specifications. Unscreened shipments for evaluation of reuse/refurbishment potential and shipments containing some reusable (or refurbishable) and some non-reusable (or non-refurbishable) equipment are

considered shipments for recycling and are addressed in guideline 6. In the case of refurbishment, guidelines 1-4 and 6 apply to any components that are subsequently determined to be unusable.

For designated materials that are directed to reuse or refurbishment, the Plug-In partner ensures that:

- a. All items in the shipment meet legitimate reuse or refurbishment specifications.
- b. All items in the shipment meet the specifications of the consignee.
- c. All items in the shipment are packaged in a manner that is consistent with preservation of the used equipment for reuse or refurbishment. That is, the packaging protects the used equipment in storage and transport, such that the value of the used equipment for reuse or refurbishment is not diminished.
- d. Proper business records are kept that document the transfer of the used equipment to the consignee for reuse or refurbishment purposes, including:
  - i. Name and address of consignee.
  - ii. Description of shipment content and conformance with consignee product specifications.
  - iii. Product specifications of consignee.
  - iv. If for-profit transaction, amount paid for the consigned material.

#### **“Designated materials” for recycling**

6. The Plug-In partner ensures that all designated materials that are directed to recycling<sup>4</sup> are processed by facilities that meet the guidelines herein. The Plug-In partner ensures that proper business records are kept that demonstrate that all downstream processing and recycling operations, including smelters, that receive designated materials, use practices that are consistent with these guidelines. For any processing and recycling facilities that receive designated materials, the Plug-In partner ensures that:

- a. Facilities are fully licensed by all appropriate governing authorities. The degree of licensing necessary will vary depending upon the particular jurisdiction, as well as the size and nature of the facility. In some cases, extensive environmental permitting may be required by the governmental authorities, whereas in other cases perhaps only a business license is needed.
- b. Facilities have an environmental management system (EMS) in place. EPA recognizes that flexibility for small businesses is necessary and that, in some cases, a fully developed and certified EMS may be unnecessary. In lieu of a fully developed and certified EMS (e.g., using ISO, EMAS or industry standards, such as those of the IAER), a facility has a written plan describing the facility’s risk management objectives for environmental performance and compliance and its plans for attaining these objectives based on a “plan-do-check-act” continual

improvement model. Regular re-evaluation of environment, health and safety (EH&S) objectives and monitoring of progress toward achievement of these objectives is conducted and documented at all facilities. EPA also recognizes that a fully developed EMS may not yet be in place for many facilities. In any case, a written plan describing risk management objectives and plans for attainment based on a “plan-do-check-act” model is in place.

c. Facilities take sufficient measures to safeguard occupational and environmental health and safety. Such measures may be indicated by local, state, national and international regulations, agreements, principles and standards, as well as by industry standards and guidelines. Except as noted below, such measures for all facilities include:

- i. EH&S training of personnel.
- ii. An up-to-date, written hazardous materials identification and management plan that specifically addresses at least the following: lead, mercury, beryllium, cadmium, batteries, toner, phosphor compounds, PCBs, and brominated flame retardants and other halogenated materials, with particular focus on possible generation of by-product dioxins and furans.
- iii. Where materials are shredded or heated, appropriate measures to protect workers, the general public and the environment from hazardous dusts and emissions. Such measures include adaptations in equipment design or operational practices, air flow controls, personal protective devices for workers, pollution control equipment or a combination of these measures.
- iv. An up-to-date, written plan for reporting and responding to exceptional pollutant releases, including emergencies such as accidents, spills, fires, and explosions.
- v. Liability insurance for pollutant releases, accidents and other emergencies.
- vi. Completion of an EH&S audit, preferably by a recognized independent auditor, on an annual basis. However, for small businesses, greater flexibility may be needed, and an audit every three years may be appropriate.

d. Facilities have a regularly-implemented and documented monitoring and recordkeeping program that tracks key process parameters, compliance with relevant safety procedures, effluents and emissions, and incoming, stored and outgoing materials and wastes.

e. Facilities have an adequate plan for closure. The need for closure plans and financial guarantees is determined by applicable laws and regulations, taking into consideration the level of risk. Closure plans should be updated periodically, and financial guarantees should ensure that the necessary measures are undertaken upon definite cessation of activities to prevent any environmental damage and return the site of operation to a satisfactory state, as required by the applicable laws and regulations.



---

<sup>1</sup> “Plug-In partner” means a manufacturer, retailer, government agency, non-profit, or other entity who (1) is not a recycler nor performs recycling activities (other than collection), (2) through contracts or other arrangements, utilizes reuse, refurbishment, recycling or disposal services, and (3) has a Plug-In To eCycling partnership agreement with EPA.

<sup>2</sup> “Designated materials” means any electronic products and components containing or consisting of circuit boards, shredded circuit boards, CRTs, batteries, and mercury- and PCB-containing lamps and devices. However, this definition does not include circuit boards that have been processed to the point where they no longer are readily identifiable as circuit boards or shredded circuit boards (such as after burning/melting), as well as CRT glass that has been adequately processed for use as an industrial feedstock material. In these cases, the economic value of the material has been enhanced significantly through processing; thus, commodities of value have been created and concern for the subsequent environmental mismanagement of this material is greatly decreased.

<sup>3</sup> “Refurbishment” means the repair, reconditioning or upgrading of an end-of-life product or component for the purpose of equipment reuse. Refurbishment of end-of-life electronics includes replacement of components or parts that are part of a larger piece of electronic equipment, aesthetic improvements, such as polishing and removal of scratches, and upgrading of the equipment by installation of new operating systems, memory, or software.

<sup>4</sup> “Recycling” facilities include any non-disposal facilities that receive designated materials under conditions that do not conform with guideline 5 above for legitimate reuse or refurbishment.