

Text # 1-Act 1410 of 2001







**sections 4-11 and 13 have been deleted to save paper and reading time**

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<http://www.arkleg.state.ar.us/assembly/2001/R/Acts/Act1410.pdf>

Text #2-Exerpt from Wikipedia

Electronic waste

Excerpts from From Wikipedia, the free encyclopedia

For the entire content visit <http://en.wikipedia.org/wiki/Electronic_waste>

**Electronic waste**, **e-waste**, **e-scrap**, or **waste electrical and electronic equipment** (**WEEE**) describes discarded electrical or electronic devices. There is a lack of consensus as to whether the term should apply to resale, reuse, and refurbishing industries, or only to a product that cannot be used for its intended purpose. Informal processing of electronic waste in developing countries may cause serious health and pollution problems, though these countries are also most likely to reuse and repair electronics.

All electronic scrap components, such as CRTs, may contain contaminants such as [lead](http://en.wikipedia.org/wiki/Lead), [cadmium](http://en.wikipedia.org/wiki/Cadmium), [beryllium](http://en.wikipedia.org/wiki/Beryllium), or [brominated flame retardants](http://en.wikipedia.org/wiki/Brominated_flame_retardant). Even in developed countries [recycling and disposal of e-waste](http://en.wikipedia.org/wiki/Electronic_waste_recycling) may involve significant risk to workers and communities and great care must be taken to avoid unsafe exposure in recycling operations and leaching of material such as heavy metals from [landfills](http://en.wikipedia.org/wiki/Landfill) and [incinerator](http://en.wikipedia.org/wiki/Incinerator) ashes. Scrap industry and USA EPA officials agree that materials should be managed with caution

**Definitions**

"Electronic waste" may be defined as discarded computers, office electronic equipment, entertainment device [electronics](http://en.wikipedia.org/wiki/Electronics), [mobile phones](http://en.wikipedia.org/wiki/Mobile_phones), [television sets](http://en.wikipedia.org/wiki/Television_set) and [refrigerators](http://en.wikipedia.org/wiki/Refrigerator). This definition includes used electronics which are destined for reuse, resale, salvage, recycling, or disposal. Others define the re-usables (working and repairable electronics) and secondary scrap ([copper](http://en.wikipedia.org/wiki/Copper), [steel](http://en.wikipedia.org/wiki/Steel), [plastic](http://en.wikipedia.org/wiki/Plastic), etc.) to be "commodities", and reserve the term "waste" for residue or material which is dumped by the buyer rather than recycled, including residue from reuse and recycling operations. Because loads of surplus electronics are frequently commingled (good, recyclable, and non-recyclable), several public policy advocates apply the term "e-waste" broadly to all surplus electronics. [Cathode ray tubes](http://en.wikipedia.org/wiki/Cathode_ray_tube) (CRT) are considered one of the hardest types to recycle.[2]

CRTs have relatively high concentration of lead and [phosphors](http://en.wikipedia.org/wiki/Phosphor#Cathode_ray_tubes) (not to be confused with phosphorus), both of which are necessary for the display. The [United States Environmental Protection Agency](http://en.wikipedia.org/wiki/United_States_Environmental_Protection_Agency) (EPA) includes discarded CRT monitors in its category of "hazardous household waste"[3] but considers CRTs that have been set aside for testing to be commodities if they are not discarded, speculatively accumulated, or left unprotected from weather and other damage.

Debate continues over the distinction between "commodity" and "waste" electronics definitions. Some exporters are accused of deliberately leaving difficult-to-recycle, obsolete, or non-repairable equipment mixed in loads of working equipment (though this may also come through ignorance, or to avoid more costly treatment processes). Protectionists may broaden the definition of "waste" electronics in order to protect domestic markets from working secondary equipment.

The high value of the [computer recycling](http://en.wikipedia.org/wiki/Computer_recycling) subset of electronic waste (working and reusable laptops, desktops, and components like [RAM](http://en.wikipedia.org/wiki/RAM)) can help pay the cost of transportation for a larger number of worthless pieces than can be achieved with display devices, which have less (or negative) scrap value. In A 2011 report, "Ghana E-Waste Country Assessment",[4] found that of 215,000 tons of electronics imported to Ghana, 30% were brand new and 70% were used. Of the used product, the study concluded that 15% was not reused and was scrapped or discarded. This contrasts with published but uncredited claims that 80% of the imports into Ghana were being burned in primitive conditions.

**Environmental Impact of Electronic Waste**

The processes of dismantling and disposing of electronic waste in the third world lead to a number of environmental impacts as illustrated in the graphic. Liquid and atmospheric releases end up in bodies of water, groundwater, soil and air and therefore in land and sea animals – both domesticated and wild, in crops eaten by both animals and human, and in drinking water.[35]

 One study of environmental effects in Guiya, China found the following:

* Airborne dioxins – one type found at 100 times levels previously measured
* Levels of carcinogens in duck ponds and rice paddies exceeded international standards for agricultural areas and cadmium, copper, nickel, and lead levels in rice paddies were above international standards
* Heavy metals found in road dust – lead over 300 times that of a control village’s road dust and copper over 100 times[36]

|  |  |  |
| --- | --- | --- |
| **E-Waste Component** | **Process Used** | **Potential Environmental Hazard** |
| Cathode ray tubes (used in TVs, computer monitors, ATM, video cameras, and more) | Breaking and removal of yoke, then dumping | Lead, barium and other heavy metals  leaching into the ground water and release  of toxic phosphor |
| Printed circuit board (image behind table - a thin plate on which chips and other electronic components are placed) | De-soldering and removal of computer chips; open burning and acid baths to remove final metals after chips are removed. | Air emissions as well as discharge into rivers  of glass dust, tin, lead, brominated dioxin,  beryllium cadmium, and mercury |
| Chips and other gold plated components | Chemical stripping using nitric and hydrochloric acid and burning of chips | Hydrocarbons, heavy metals, brominated  substances discharged directly into rives  acidifying fish and flora. Tin and lead  contamination of surface and groundwater.  Air emissions of brominated dioxins,  heavy metals and hydrocarbons |
| Plastics from printers, keyboards, monitors, etc. | Shredding and low temp melting to be reused | Emissions of brominated dioxins, heavy  metals and hydrocarbons |
| Computer wires | Open burning and stripping to remove copper | Hydrocarbon ashes released into air,  water and soil. |

**The environmental impact of the processing of different electronic waste components (chart above).**

An estimated 50 million tons of E-waste are produced each year.[6] The USA discards 30 million computers each year and 100 million phones are disposed of in Europe each year. The Environmental Protection Agency estimates that only 15-20% of e-waste is recycled, the rest of these electronics go directly into landfills and incinerators.[7]

According to a report by UNEP titled, "Recycling - from E-Waste to Resources," the amount of e-waste being produced - including mobile phones and computers - could rise by as much as 500 percent over the next decade in some countries, such as India.[8] The United States is the world leader in producing electronic waste, tossing away about 3 million tons each year.[9] China already produces about 2.3 million tons (2010 estimate) domestically, second only to the United States. And, despite having banned e-waste imports, China remains a major e-waste dumping ground for developed countries.[9]

Electrical waste contains hazardous but also valuable and scarce materials. Up to 60 elements can be found in complex electronics.

In the United States, an estimated 70% of heavy metals in landfills comes from discarded electronics.[10][11]

While there is agreement that the number of discarded electronic devices is increasing, there is considerable disagreement about the relative risk (compared to automobile scrap, for example), and strong disagreement whether curtailing trade in used electronics will improve conditions, or make them worse. According to an article in *Motherboard*, attempts to restrict the trade have driven reputable companies out of the supply chain, with unintended consequences.[12]

**Recycling**

Today the electronic waste recycling business is in all areas of the [developed world](http://en.wikipedia.org/wiki/Developed_country) a large and rapidly consolidating business. Part of this evolution has involved greater diversion of electronic waste from energy-intensive downcycling processes (e.g., conventional recycling), where equipment is reverted to a raw material form. This is recycling is done by sorting, dismantling, and recovery of valuable materials [40] This diversion is achieved through reuse and refurbishing. The environmental and social benefits of reuse include diminished demand for new products and virgin raw materials (with their own environmental issues); larger quantities of pure water and electricity for associated manufacturing; less packaging per unit; availability of technology to wider swaths of society due to greater affordability of products; and diminished use of landfills.

Audiovisual components, televisions, [VCRs](http://en.wikipedia.org/wiki/Videocassette_recorder), [stereo equipment](http://en.wikipedia.org/wiki/Sound_recording_and_reproduction), [mobile phones](http://en.wikipedia.org/wiki/Mobile_phone), other handheld devices, and [computer components](http://en.wikipedia.org/wiki/Computer_hardware) contain valuable elements and substances suitable for reclamation, including [lead](http://en.wikipedia.org/wiki/Lead), [copper](http://en.wikipedia.org/wiki/Copper), and [gold](http://en.wikipedia.org/wiki/Gold).

One of the major challenges is recycling the printed circuit boards from the electronic wastes. The circuit boards contain such precious metals as gold, silver, platinum, etc. and such base metals as copper, iron, aluminum, etc. One way e-waste is processed is by melting circuit boards, burning cable sheathing to recover copper wire and open- pit acid leaching for separating metals of value. [41] Conventional method employed is mechanical shredding and separation but the recycling efficiency is low. Alternative methods such as [cryogenic decomposition](http://en.wikipedia.org/w/index.php?title=Cryogenic_decomposition&action=edit&redlink=1) have been studied for printed circuit board recycling,[42] and some other methods are still under investigation.

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<http://en.wikipedia.org/wiki/Electronic_waste>

Text #3-UofA

**E-Waste Facts and Statistics**

E-waste describes electronic equipment that has reached its end of life in the hands of its current user. Between 20 and 50 million tons of e-waste world-wide are generated each year. On average, people discard computers every two to four years.

The EPA estimated that 29.9 million desktops and 12 million laptops were discarded in 2007, totalling over 112,000 computers discarded each day. Overall, a total of 157 million computer products — including CPUs, monitors, notebooks, keyboards, mice, printers, faxes, and copiers — were discarded, with only 18% recycled. Approximately 126 million cell phones were also discarded in 2007, with only 10% recycled.

Disposal Risks

* Up to 85% of discarded electronics were disposed of in landfills in 2007. E-waste represents 2% of trash in American landfills, but it equals 70% of the overall toxic waste in landfills, and is the fastest growing municipal waste stream in the U.S.
* Electronic items considered to contain hazardous materials include:
  1. CRT televisions and computer monitors
  2. LCD desktop monitors and laptops with LCD displays
  3. LCD televisions
  4. Plasma televisions
  5. Portable DVD players with LCD screens
* Flat panel monitors and notebooks contain small amounts of mercury and CRT monitors can contain up to seven pounds of lead.
* Incineration of electronic waste releases heavy metals such as lead, cadmium, and mercury into the ashes and air.
* Leaked mercury can accumulate in fish, which is a major route of exposure for humans to high levels of mercury. The extreme amounts of lead found in electronics can cause damage to the nervous systems, blood, and kidneys when humans are exposed.
* It is estimated that 50 to 80% of waste is exported from the U.S. to developing countries, 25% of which is e-waste.
* In developing countries, recycling is done by hand in scrap yards, often by children. Electronic waste recycling sites in developing countries lack the controls designed to protect workers and the environment that are found in developed countries.

This information was collected from various resources, which can be found at [E-Waste Resources](http://ecycle.uark.edu/ewaste_resources.php).

Citation:

Article Title: E-Waste Facts and Statistics

Website title: University of Arkansas Information Technology Services *eCycle*

Publisher: University of Arkansas

Accessed May 18, 2013

<http://ecycle.uark.edu/ewaste_facts.php>

Text #4-San Diego

E-Waste Facts and Statistics

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The EPA estimated that 29.9 million desktops and 12 million laptops were discarded in 2007, totalling over 112,000 computers discarded each day. Overall, a total of 157 million computer products — including CPUs, monitors, notebooks, keyboards, mice, printers, faxes, and copiers — were discarded, with only 18% recycled. Approximately 126 million cell phones were also discarded in 2007, with only 10% recycled.

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* In developing countries, recycling is done by hand in scrap yards, often by children. Electronic waste recycling sites in developing countries lack the controls designed to protect workers and the environment that are found in developed countries.

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Citation:

Article Title: E-Waste Facts and Statistics

Website title: University of Arkansas Information Technology Services *eCycle*

Publisher: University of Arkansas

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<http://ecycle.uark.edu/ewaste_facts.php>

**Text #5-CalRecycle**

**CalRecycle** (used with permission)

**What Is E-Waste?**

E-waste is a popular, informal name for electronic products nearing the end of their "useful life." Computers, televisions, VCRs, stereos, copiers, and fax machines are common electronic products. Many of these products can be reused, refurbished, or recycled.

With the passage of the **Electronic Waste Recycling Act of 2003** , certain portions of the electronic waste stream are defined and the systems to recover and recycle them will be administratively regulated beyond the [universal waste rules](http://www.dtsc.ca.gov/HazardousWaste/EWaste/) that apply to material handling. Please review [CalRecycle's efforts to implement the Act](http://www.calrecycle.ca.gov/electronics/Act2003/) for more information.

**E-FAQs**

**Is "e-waste" clearly defined?** The term "e-waste" is loosely applied to consumer and business electronic equipment that is near or at the end of its useful life. There is no clear definition for e-waste; for instance whether or not items like microwave ovens and other similar "appliances" should be grouped into the category has not been established.

**Is "e-waste" considered hazardous?** Certain components of some electronic products contain materials that render them hazardous, depending on their condition and density. For instance, California law currently views nonfunctioning CRTs (cathode ray tubes) from televisions and monitor as hazardous.

**What should I do with my electronic discards?** The mantra of " **Reduce, Reuse, Recycle** " applies here. **Reduce** your generation of e-waste through smart [procurement](http://www.calrecycle.ca.gov/electronics/Procurement/) and good maintenance. **Reuse** still functioning electronic equipment by donating or selling it to someone who can still use it. [**Recycle**](http://www.calrecycle.ca.gov/electronics/ReuseRecycle/) those Products that cannot be repaired. To find an organization that will manage your electronics for recycling, [search the directory](http://www.calrecycle.ca.gov/electronics/Act2003/Recovery/Approved/Default.htm).

**How can I learn more about this topic?** For more information, explore the [resources](http://www.calrecycle.ca.gov/electronics/Resources/default.htm) available within this site. Two outstanding overviews include:

* The U.S. EPA's [WasteWise Update on Electronics Reuse and Recycling](http://www.epa.gov/wastes/conserve/smm/wastewise/pubs/wwupda14.pdf), a comprehensive overview of the issue (PDF, 1.4 MB). ( **Note** : if you decide to print the document, we suggest you do so in black and white--not color.)
* The Institute for Local Self-Reliance published [Plug Into Electronics Reuse](http://www.ilsr.org/plug-into-electronics-reuse/) to help expand the reuse infrastructure for electronics. Included in the publication are profiles of 22 model electronics reuse operations in the United States.

Last updated: October 26, 2012

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Accessed: May 15, 2013

<http://www.calrecycle.ca.gov/Electronics/WhatisEwaste/>

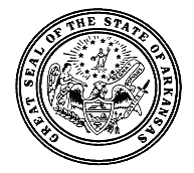
Text #6-ADEQ

DO NOT copy this text for students. Show it and summarize it for them.

In my opinion, this basically says that “household” consumer used electronics are not a hazardous waste.

**Pollution Control & Ecology Commission # 014.00-023**

**ARKANSAS POLLUTION CONTROL AND ECOLOGY COMMISSION**





**REGULATION No. 23**

**HAZARDOUS WASTE MANAGEMENT**

**Adopted by the Arkansas Pollution Control & Ecology Commission June 22, 2012**

EFFECTIVE DATE: AUGUST 12, 2012

**PUBLISHED BY**

Arkansas Department of Environmental Quality 5301 Northshore Drive North Little Rock, Arkansas 72118-5317

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***§ 273.6 Applicability – Consumer electronic items.***

*(a) Consumer electronic items covered under this Section 273. The requirements of this section apply to persons managing consumer electronic items as described in § 273.9, except those listed in paragraph (b) of this section.*

**§ 273.9 Definitions.**

“Ampule” means an airtight vial made of glass, plastic, metal, or any combination of these materials.

“Battery” means a device consisting of one or more electrically connected electrochemical cells which is designed to receive, store, and deliver electric energy. An electrochemical cell is a system consisting of an anode, cathode, and an electrolyte, plus such connections (electrical and mechanical) as may be needed to allow the cell to deliver or receive electrical energy. The term battery also includes an intact, unbroken battery from which the electrolyte has been removed.

*“Cathode ray tube” or “CRT” means a vacuum tube, composed primarily of glass, which is the video display component of a television or computer monitor. An intact CRT means a CRT remaining inside the monitor whose vacuum has not been released. A broken CRT means glass removed from the monitor after the vacuum has been released.*

*“Consumer electronic item” means an electronic item or other electronic waste containing an intact or broken cathode ray tube, (e.g., television, computer monitor, or other cathode ray tube monitor or display device), personal computer or computer component, audio and/or stereo player, videocassette recorder/player, digital videodisk (DVD) recorder/player, video camera, telephone, facsimile or copying machine, cellular telephone, wireless paging device, or video game console.*

“Destination facility” means a facility that treats, disposes of, or recycles a particular category of universal waste, except those management activities described in subparagraphs (a) and (c) of sections 273.13 and 273.33. A facility at which a particular category of universal waste is only accumulated, is not a destination facility for purposes of managing that category of universal waste. “FIFRA” means the Federal Insecticide, Fungicide, and

Rodenticide Act (7 U.S.C. 136 - 136y). “Generator” means any person, by site, whose act or process produces hazardous waste identified or listed in § 261 of this Regulation or whose act first causes a hazardous waste to become subject to regulation.

“Lamp”, also referred to as “universal waste lamp” is defined as the bulb or tube portion of an electric lighting device. A lamp is specifically designed to produce radiant energy, most often in the ultraviolet, visible, and infra-red regions of the electromagnetic spectrum. Examples of common universal waste electric lamps include, but are not limited to, fluorescent, high intensity discharge, neon, mercury vapor, high pressure sodium, and metal halide lamps.

“Large Quantity Handler of Universal Waste” means a universal waste handler (as defined in this section) who accumulates 5,000 kilograms or more total of universal waste (calculated collectively) at any time. This designation as a large quantity handler of universal waste is retained through the end of the calendar year in which 5,000 kilograms or more total of universal waste is accumulated.

“Mercury-containing device” means a device or a part of a device (including thermostats, but excluding batteries and lamps) which contains elemental mercury integral to its function.

“On-site” means the same or geographically contiguous property which may be divided by public or private right-of- way, provided that the entrance and exit between the properties is at a cross-roads intersection, and access is by crossing as opposed to going along the right of way. Non-contiguous properties owned by the same person but connected by a right-of-way which he controls and to which the public does not have access, are also considered on-site property.

“Pesticide” means any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest, or intended for use as a plant regulator, defoliant, or desiccant, other than any article that:

(a) is a new animal drug under FFDCA section 201(w), or

(b) is an animal drug that has been determined by regulation of the Secretary of Health and Human Services not to be a new animal drug, or

(c) is an animal feed under FFDCA section 201(x) that bears or contains any substances described by paragraph (a) or (b) of this section.

“Small Quantity Handler of Universal Waste” means a universal waste handler (as defined in this section) who does not accumulate more than 5,000 kilograms total of universal waste (calculated collectively) at any time.

“Thermostat” means a temperature control device that contains metallic mercury in an ampule attached to a bimetal sensing element, and mercury-containing ampules that have been removed from these temperature control devices in compliance with the requirements of § 273.13(c)(2) or § 273.33(c)(2).

“Universal Waste” means any of the following hazardous wastes that are subject to the universal waste requirements of § 273:

(a) Batteries as described in § 273.2; (b) Pesticides as described in § 273.3; (c) Mercury-containing devices as described in §

273.4; (d) Lamps as described in § 273.5; *(5) Consumer electronic items as described in §*

*273.6.*

“Universal Waste Handler”: (a) Means:

(1) A generator (as defined in this section) of universal waste; or

(2) The owner or operator of a facility, including all contiguous property, that receives universal waste from other universal waste handlers, accumulates universal waste, and sends universal waste to another universal waste handler, to a destination facility, or to a foreign destination.

(b) Does not mean: (1) A person who treats (except under the

provisions of § 273.13(a) or (c), or § 273.33(a) or (c)), disposes of, or recycles universal waste; or

(2) A person engaged in the off-site transportation of universal waste by air, rail, highway, or water, including a universal waste transfer facility.

“Universal Waste Transfer Facility” means any transportation-related facility including loading docks, parking areas, storage areas and other similar areas where shipments of universal waste are held during the normal course of transportation for ten days or less.

“Universal Waste Transporter” means a person engaged in the off-site transportation of universal waste by air, rail, highway, or water.

*(b) Consumer electronic items not covered under this Section 273. The requirements of this section do not apply to persons managing the following consumer electronic items:*

*(1) Consumer electronic items that are not yet wastes under section 261 of this regulation as provided in paragraph (c) of this section.*

*(2) Consumer electronic items that are not hazardous waste. A consumer electronic item is a hazardous waste if it exhibits one or more of the characteristics identified in section 261, subsection C of this regulation.*

*(c) Generation of consumer electronic items.*

*(1) A used consumer electronic item becomes a* *waste on the date it is discarded.*

*(2) An unused consumer electronic item becomes a waste on the date the handler decides to discard it.*

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