



# WRATT

WASTE REDUCTION AND  
TECHNOLOGY TRANSFER  
FOUNDATION

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## Pollution Prevention in Schools - Electronic Waste

### *The Growing Problem*

With today's constantly changing technology, new innovations can quickly make existing equipment obsolete. This is especially true with electronic components such as computers and related equipment.

Recent studies by the Silicon Valley Toxics Coalition and the National Safety Council estimate that at least 315 million computers are expected to become obsolete by the year 2004, and that by 2007, this number is expected to rise to 500 million. Although much of this electronics waste (or 'e-waste') comes from households, large portions are also generated by businesses and school systems.

### *Toxics in E-Waste*

Computer and related electronic equipment contain materials that are not a problem when consumers use the products, but have the potential to cause serious harm when they eventually enter the environment after disposal (through burning, or crushing and subsequent leaching at landfills, for instance). As an example, the 315 million obsolete computers mentioned above will contain, in addition to other hazards, about 1.2 billion pounds of lead, 2 million pounds of cadmium, 1.2 million pounds of chromium, and 400,000 pounds of mercury. These obsolete computers will also contain about 4 billion pounds of plastic waste, more than 25% of which is polyvinyl chloride (PVC), which creates more environmental and health hazards than most other types of plastics used. The plastic cases, circuit boards, and cables in most of these computers will also contain brominated flame-retardants which can have neurotoxic and endocrine disruption effects, and have been associated with cancers of the digestive and lymph systems.

Waste electronics can cause serious problems for landfill operators. A study by the New Jersey Institute of Technology showed that while consumer electronics accounted for only about 1 percent of landfill contents by volume, they contributed up to 70% of their toxic content. For these reasons, many municipalities have banned the disposal of computer and television equipment in their landfills.

### *How is E-Waste Regulated?*

Currently in the State of Alabama, electronic equipment generated by businesses, industries, or school systems is a solid waste and subject to a hazardous waste determination. If a representative sample of e-waste fails the Toxicity Characteristic Leaching Procedure (TCLP) test, it is regulated as hazardous waste. Most discarded electronic equipment is considered to be potentially hazardous when disposed, and a hazardous waste determination must be performed before the equipment can be disposed of in a landfill. As an example, cathode ray tubes (CRTs) used in computers and televisions are known to contain significant amounts of lead (between five and eight pounds per CRT!). While it is up to the business, industry, or school system generating the waste to make the hazardous waste determination, it is likely that CRTs contain enough lead to cause a computer monitor or television to fail the TCLP, making them hazardous waste when disposed. Other electronics equipment that should be managed appropriately include: printers, fax machines, copiers, computer peripherals, VCRs, radios, microwave ovens, and video games.

Waste electronics are not considered to be construction/demolition waste and should not be collected curb-side and disposed of in a C/D landfill. Industrial landfills equipped with a liner system, leachate collection, and a groundwater monitoring system may be allowed to accept e-waste on a case-by-case basis if the waste determination is non-hazardous and the Alabama Department of Environmental Management (ADEM) approves the waste stream.

For more information on the status or interpretation of Alabama regulations regarding e-waste, contact ADEM at (334) 279-3050.

### *What Options Do You have?*

**Adopt a Total Life Cycle Approach to Computer Purchasing.** Be aware that the purchase price of computers and peripherals is only part of the total life-cycle cost of this equipment. All equipment purchased must eventually be disposed of. In most circumstances the disposal costs (and associated liability) can be minimized if a conscious decision is made to deal with them at the time of purchase.

**Vendor Recycling.** Contact your original computer manufacturer or vendor. Manufacturer return programs are becoming more common and many have a business sector return/recycling program. For new purchases, buy only from vendors who will commit to a return, recycling, or take-back program. Most major computer equipment manufacturers now offer some type of recycling, take-back, or asset recovery services. A few useful links are:

- **Hewlett-Packard**  
<https://warp1.external.hp.com/recycle/>
- **Dell**  
<http://www1.us.dell.com/content/topics/global.aspx/services/en/assetrecovery?c=us&cs=555&l=en&s=dhs>
- **Gateway**  
[http://www.gateway.com/work/services/index.asp?seg=qv?cmpid=biz\\*GV\\*btn2\\*services\\*/work/gv/index--shtml](http://www.gateway.com/work/services/index.asp?seg=qv?cmpid=biz*GV*btn2*services*/work/gv/index--shtml)
- **IBM**  
<http://www-132.ibm.com/search/computer-disposal-1.html>

The lifespan of computers is decreasing. In 1997, the average life of a computer was 4-6 years ; this will fall to 2 years before 2005. Investigate the possibility of leasing computer equipment instead of buying it outright, so your organization won't be stuck with the eventual disposal problem.

**Donating to Others.** Donate your usable equipment to a non-profit or charitable organization. Organizations such as Goodwill, The Salvation Army, or local charities may accept, refurbish, or resell used electronic equipment. If you intend to dispose of no-longer-needed computer equipment by donation, it is important to donate it as quickly as possible before it becomes truly obsolete. Charitable organizations may have no more need of truly obsolete machines than does your organization.

**Local County or City Recycling.** Contact your local county or city waste coordinator, city hall, or other local agency to see if they have a recycling or collection program for computer equipment. They may also be of help in identifying local charities that may accept your equipment.

**Auctioning of Surplus Equipment.** Many school systems conduct local auctions to dispose of surplus electronic equipment. Be aware that if the individual or organization that takes possession of the equipment fails to dispose of it properly, the school system may share liability for any environmental cleanup or disposal costs that may become necessary.

**Commercial Electronics Recyclers.** A number of organizations may help you identify commercial recycling opportunities in your area. These include:

- the **National Recycling Coalition's Electronics Recycling Initiative** <<http://www.nrc-recycle.org/resources/electronics/index.htm>>
- the **Electronics Industries Alliance's** Consumer Education Initiative <<http://www.eiae.org/>>
- the **International Association of Electronics Recyclers**  
<<http://www.iaer.org/search/iaersearch.cfm>>

- the U.S. EPA's '**Plug Into Recycling**' program <<http://www.epa.gov/epaoswer/osw/conserve/plugin/index.htm>>

These invaluable sources of information also provide databases of commercial electronics recyclers. However, some care is required in selecting a commercial recycler. The electronics recycling business is very volatile and many companies are listed which are no longer in business. In addition, be aware that if you transfer equipment to a recycler that ultimately closes and which did not manage its e-waste appropriately, your organization may be liable for environmental cleanup or other disposal costs, if they are necessary. Established recycling firms can provide a list of references, which should be checked.

During calendar 2004, the WRATT Foundation, under contract with the U.S. EPA and ADEM, sponsored a series of demonstration electronics collection events for Alabama schools in Cherokee, Etowah, Baldwin, and Colbert counties, and for city schools in Gadsden, Red Bay, Pell City, Eufaula, and Oneonta. During these events, over 50,000 pounds of e-waste was diverted from landfills. Commercial recyclers that cooperated with the WRATT Foundation in these recycling events included:

- **5R Processors**, Memphis, TN, (865) 457-1621
- **C-Mac Environmental**, Glencoe, AL, (256) 492-8340
- **Onyx Electronics Recycling**, Tallahassee, FL, (850) 877-8299
- **SE Recycling**, Johnson City, TN, (770) 426-5000

The collection, aggregation, or packaging requirements of commercial recyclers vary, as do the prices they charge. As a general rule, recyclers charge one price per pound for surplus equipment containing CRTs and another for equipment which does not. Some companies levy a separate charge for mileage to the pickup site while others bundle this cost into their total charge. Some recyclers require that equipment to be recycled be palletized or boxed prior to pickup. Some charge a separate labor charge for this activity if they are required to do it. Some will pick up equipment from numerous locations while others prefer to pickup from a central aggregation point. School systems are encouraged to contact recyclers directly to determine which providers best satisfy the systems' individual needs.

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