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# IT Asset Disposition

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## ABSTRACT

*In 2008, we generated 3.16 million tons of electronic waste in the U.S. alone. It is estimated that between twenty to fifty metric tons of e-waste is disposed of worldwide on an annual basis. As technology rapidly changes, there will be more and more technology e-waste. This paper presents what to do to help solve the e-waste problems; a survey of e-waste disposal; and methods of fully cleaning hard drives to avoid potential identify theft.*

**Keywords**: e-waste, environment, green computing, identity theft

## INTRODUCTION

Imagine that you've got a few computers in your home. Do you use them anymore? Do you use your iPhone for a majority of your internet transactions? What do you do with your old computers? Throw them in the garbage? Give them away? Who wants them?

Electronic waste (or e-waste) is the term for discarded electronic or electrical devices. E-waste may contain hazardous materials like lead, cadmium, beryllium and others (even gold). Plus the quantity of e-waste generated puts more demand on landfills and recyclers. [e-waste, *Wikipedia*]. The often cited Moore's Law talks how new technologies that are faster for about the same price can be blamed for the generation of e-waste. After all, who wants a computer or a phone that doesn't function at the speed and with all the advantages of a newer model?

This paper is designed to make you think about what to do with all your old and outdated IT equipment (e-waste). Think about the waste generated by one person, by one family, by one household unit. You might have two computers and an old VCR player you'd like to get rid of. Then think about your neighbors, your family, your friends, and your employer? The likelihood that all of these have outdated equipment lying around is quite high. But … it poses an issue – how to dispose of such e-waste and will it cost you anything to dispose (after all, it is just trash to you)? This paper specifically focuses on the disposition of computers and corporate responsibilities.

The second section of this paper will review legislation regarding the disposal of equipment as well as the data that resides on the equipment. Do you have private information on those computers? Does it go away if you throw it in the garbage? If you think so, think again! Any information that is on a computer can be retrieved and potentially used against you in harmful ways.

## THE BIG PICTURE

Do you have any old computers lying in your house or your work? If you're like most people, you probably do. That's the problem. There is a huge amount of stockpiled e-waste that is now starting to find its way into landfills. In addition, the rate at which the amount of e-waste is increasing is staggering. The downside of the rapid advances in technology is that products become obsolete more quickly as well. In 2008, we generated 3.16 million tons of electronic waste in the U.S. alone ("Facts and Figures," 2010). It is estimated that between twenty to fifty metric tons of e-waste is disposed of worldwide on an annual basis. The Environmental Protection Agency (EPA) has stated that e-waste is the fastest growing waste stream in America today (United States Environmental Protection Agency (EPA), 2012). Right now, wherever you are, state and federal agencies are working to address the issue through regulations and/or other initiatives. For the remainder of this document, we will focus on computer recycling but the general principles remain the same for most e-waste.

## UNDERSTANDING THE CONCERN

It seems more and more people spend time in front of a PC. Between work and the home PC, many of us even find it hard to imagine what it would be like to go a day without logging in. So how can these benign little productivity tools and entertainment centers do us any harm? Let's start by taking a look at what is inside your friendly PC (Conger, n.d.).

- **Barium** - Found in CRT's and used to block radiation. Barium is suspected to cause reproductive, developmental, neurological and respiratory problems.
- **Cadmium** – Found in batteries, printed circuit boards, and some plastics. Cadmium is considered among the most hazardous chemicals by the EPA. It is a known carcinogen that can cause reproductive and developmental problems.
- **Hexavalent Chromium** – Another carcinogen used to protect against corrosion. Hexavalent Chromium may also cause respiratory problems.
- **Lead** – By far the largest toxin within a PC System and is classified as hazardous by the EPA. There are approximately 7 pounds in the CRT glass alone and a great quantity in the printed circuit boards.
- **Mercury** – Found in LCD backlighting, switches, and circuit boards, mercury is also classified as hazardous by the EPA. Mercury is known to cause birth defects and heart problems.
- **Phosphorous** – Also found in CRTs. Phosphorous is a possible toxin and classified as hazardous under the Clean Air Act.
- **Plastics** – Plastics are ubiquitous throughout the PC. They will release Dioxin, a carcinogen, when burned.

So you may be asking, "If I come in contact with all these things on a daily basis, why am I still breathing?" It's because the toxins that come from these systems affect people when they are ingested or inhaled and that's why the EPA is concerned. Based on the fact that more and more electronics are disposed of improperly either by ending up in landfills, being illegally incinerated, or being shredded improperly, the chances of ingesting the toxins in drinking water and through the air are increased. Comprehensive solutions that are available nationally are years away, despite growing efforts by government and industry to solve the problem. Right now, regulations and procedures vary by state, each of which has its own standards of compliance.

Later in this document, the authors will take a look at the laws and penalties for improper disposal of old electronics. For now, let's take a look at how companies retire old equipment and some of the challenges they face.

## WHAT ARE YOUR CHOICES WHEN IT COMES TO REMOVING OLD EQUIPMENT?

Companies will usually retire equipment through one or more of the following methods:
1. Donations – Popular for the ability to write off some residual value and the desire to contribute to the community; positive public relations.
2. Employee Buy Backs – Perk for employees.
3. Retail Sales – Usually through auction sites like eBay. Viewed as a way to capture some of the residual asset value.
4. Wholesale Sales – Primarily through brokers.
5. Total Destruction – usually for equipment with no residual value.
6. Give Away – Someone picks up the old equipment for free.
7. Trade In – Can offset the cost of new equipment.
8. Redeploy – Cost savings measure compared to buying all new equipment that extends the useful life of the system (National Center for Electronics Recycling, 2007).

Each method of asset retirement or sale has advantages and disadvantages. The one thing they have in common is the liability the original owner maintains after the equipment leaves their building. What happens to the material after it leaves your possession? Will it be disposed of properly? These factors are addressed later in this document but for now it is sufficient to say that you must be aware that what happens to your old equipment downstream can affect you.

**What Does it Really Cost You to Remove a PC**?

Estimates vary for the typical costs of retiring old equipment. Depending on the manner in which the equipment is retired, estimates range between $85 and $405 per PC. There are two general areas you should focus on when determining the costs of asset retirement. They are the costs associated with administering the program of your choosing and the actual costs of getting the equipment out of the building (Rahman & Subramanian, 2012).

**Administrative Considerations**

Regardless of the method of disposition you choose, there will be some administrative costs. Some things you may wish to consider include:

- **Pricing research** – You may need to research and determine a fair market value for your equipment prior to a sale.
- **Auction management** – eBay style.
- **Locating brokers** – Desirable for selling bulk lots.
- **Locating charities for donations** – Could be easy or difficult depending on the amount and type of material you have to donate.
- **Responding to questions** – Any sales to the general public or employees will require some type of response mechanism.
- **Processor search**- If you decide to outsource, finding a good source or multiple sources that can meet your needs can take time.
- **Shipping** – Managing logistics for a recycling program can be very time consuming (Besious, Georgiadis, & van Wassenhove, 2011).

## COSTS ASSOCIATED WITH REMOVING A PC SYSTEM

Due to security and legal requirements there is a great deal of work involved to get a PC removed from your building. Some activities can be outsourced but most cannot be eliminated.

- **Internal Asset Tracking and Administrative Tasks** – Someone has to manage the project and keep track of what material will be replaced, when it will happen, and who is doing the work. (Labor Costs)
- **Triage and Staging Equipment** – Old equipment is usually triaged and staged as a first step. (Space and Labor Costs)
- **Backing Up data** – Usually required. (Labor Costs)
- **Disk Erasure** –Techniques vary from simple wipe to complete drive destruction. (Space and Labor Costs)
- **Reload Operating System (OS)** – Sometimes required if computer is being sold to employees or donated to charities. (Space and Labor Costs)
- **Testing** - Sometimes required if computer is being sold to employees or donated to charities. (Space and Labor Costs)
- **Tech Support**- Sometimes required if computer is being sold to employees or third parties, or donated to charities. (Space and Labor Costs)
- **Processing Payments** - Required for any type of sale; some types of sales are easier to manage than others. (Space, Labor, and possibly some other costs of sale)
- **Documentation** – Required for any type of disposition method. (Space and Labor Costs)
- **Packing and Shipping** - Required for some equipment sales; it can also be outsourced. (Space and Labor Costs)
- **Warranties:** Required for some types of sales. (Space and Labor Costs)
- **Outsourcing Costs** – Expense (EPA, 2012)

**Don't Forget Logistics**

There are usually a set of conflicting goals when approaching the logistics of recycling or asset recovery. You will be faced with trying to balance the cost of shipping considerations with the quality of processing, and the quality of reporting. In a perfect world all of your old electronics would reside in one state, in one building, with a processor next door. In addition you might have sufficient volume that you need to load a tractor trailer full of material each time you shipped (even if it was just across the parking lot). How different is your situation from the perfect world? Most companies don't come close to the perfect world scenario. In addition, many companies are the exact opposite with multiple satellite offices that have small equipment recycling needs. The cost of shipping can easily surpass the cost of processing your old electronics.

Companies approach this challenge in different ways. One solution is to have the local offices deal with the problem. This may or may not be a good solution depending on the quality of the local processor they choose. It also creates problems with EPA compliance and record keeping since everyone has their own way of keeping track of what equipment left the building. Another approach to the problem is to have old material shipped back to one central location within the company to have some work performed on it, such as data erasure, and then ship the product out to a processor. This option gives a degree of control of the data erasure process and inventory management but adds cost because of double handling, the added distance of shipping, plus the overhead of administering the program. Another option is to have all material sent to a single processor at a single location. This solution works well if you have enough volume but becomes cumbersome as volumes decrease. It also adds to shipping costs because the point of origin for the equipment may be far away from the processor's facility (Besious et al., 2011).


## WHAT HAPPENS WHEN YOUR OLD COMPUTER LEAVES THE BUILDING?

Let's take a moment to look at what happens to a PC when it leaves your possession.
- **Employee Buy Backs** – PC is sold to the employee. Often times there are technical support services or warranties provided with the system. When the employee is done with the computer there are typically no restrictions on how they dispose of the equipment.
- **Charitable Donations** – Similar to employee buy backs. When the charity is done with the computer there are typically no restrictions on how they dispose of the equipment. Companies typically do not provide a means for the charity to recycle after they are done with the equipment. This can lead to problems with proper disposal because charities, almost by definition, struggle with finding the money to accomplish their primary tasks, let alone incurring the costs associated with the disposal of electronics.
- **Remarketing Channels** – For some companies the goal is to recover as much residual value from their assets as possible. Assuming that the equipment has some marketable worth, there are several channels that will allow for that. Asset Recovery companies will either buy the equipment outright from you as a lot or sell the items one by one for you and take a percentage of the resale price. Brokers will also buy and resell your items in bulk. Some of these services provide value added options like disk erasure and reporting.

The main concern of these companies is maximizing return on the asset. They will sell to anyone who gives them the best price with no thought given to where the equipment will finally reside.

- **Recycling Channels** – Electronics recyclers vary widely in terms of size, types of services provided, and quality of service. In most cases there will be charges for processing. Charges are incurred on either a per pound or per unit basis. (Note: If there are no up-front charges you can be sure the recycler is planning on making money from the resale of the material after it leaves its facility. The trouble starts if the equipment that was expected to have value turns out to be of little or no value.) Some recyclers offer value added services such as data erasure and asset recovery. Recyclers typically dispose of incoming material based on where they believe they will move it after they are done processing. Products will end up in one of three categories:
  - Recyclers will resell products as whole units in bulk
  - De-manufacture and resell components, or
  - Separate plastics, glass and metal and sell as scrap.

The waste stream created after a recycler is done with their internal processing is not necessarily regulated by the state in which the processor resides or by the Federal Government. You've probably heard stories about material ending up in third world countries or discarded in violation of state law. States typically do not have the time, resources, or desire to monitor the downstream waste processes of their Electronics Recyclers. Consequently, there is an opportunity for the e-waste recycler to turn a blind eye to possible ethical or legal violations in an attempt to maximize profit or minimize loss on the back end ("Facts and Figures," 2010).

Most states require registration for Electronics Recyclers. Some are more stringent than others. As a result, the industry, generally speaking, does a good job of reporting because they are required to do so by law and to maintain their licenses. Keep in mind that in-state licensing typically is concerned with proper record keeping, in-house pollution violations, and worker safety. It is not necessarily designed to prevent downstream violations after it leaves the recyclers' facilities.

## UNDERSTANDING THE LAW AND INDEMNIFICATION

Environmental law is extremely complex and remediation is vast. Laws are also being added on a continual basis. The purpose of this section is to give you a high level view of laws that pertain to e-waste and some thoughts on what you may wish to consider when developing e-waste management policies.

**Waste Designations**

Most electronics fall under the Solid Waste definition in that they are discarded material resulting from industrial and commercial activities. Electronics are further regulated under Resource Conservation and Recovery Act (RCRA) statutes which provide standards for disposal. The purpose of RCRA is to track hazardous wastes from cradle to grave. Although electronics are not specifically mentioned as hazardous waste, their components meet the qualifying criteria

of toxicity. That means if you have a violation it can be treated as a hazardous waste violation. A company that disposes of electronics must take the proper steps to insure compliance with RCRA. RCRA states that a business must determine the following regarding the disposal of materials:

- Are the materials Solid Waste?
- If they are Solid Waste, are they classified as hazardous waste?
- If they are Hazardous Waste, what is the generator status of the company? This is based on the quantity of material generated per month.
  - Large scale generators of hazardous waste (>2200 pounds in a given month) are required to obtain an EPA number before they store, transport and dispose of the material as well as meet other hazardous material requirements.
  - Small quantity generators range from between 220 and 2200 pounds of waste in a given month and have somewhat less demanding requirements.
  - Conditionally exempt small quantity generators have less than 220 pounds in a month and are exempt from most of the requirements associated with the previous categories.
- If they are Hazardous Waste, is the company in compliance with their record keeping responsibilities ("Facts and Figures," 2010)?

## UNIVERSAL WASTE AND ELECTRONICS

The government has another classification for some electronics called Universal Waste. This classification for electronics would allow an organization to defer some of the restrictions of handling traditional hazardous waste with the caveat that once a piece of equipment is retired it must be disposed of within one year. The net effect is to try to make it easy to recycle electronics from a general compliance, record keeping, and material handling perspective.

**Comprehensive Environmental Response Compensation and Liability Act (CERCLA) –** also known as the Superfund law. Under CERCLA, the EPA identifies contaminated sites, manages cleanup operations, identifies responsible parties and seeks compensation for the cleanup costs. If you are targeted for fines under this act you can either pay the fines or contest the EPA. Contesting the claim will most likely result in a costly, expert-intensive litigation over your company's environmental impact on soil and drinking water as well as the toxicity of its waste. The burden will be on you to prove your innocence. The Superfund law also states that all contributors to a contaminated site are jointly liable for the entire cost of the cleanup. This means that you may be burdened with much more than your share of the cleanup costs because you or your company has the ability to pay. Those most able to pay will be targeted with the majority of the responsibility for payment.

**Health Insurance Portability and Accountability Act (HIPAA)** – in the context of computer recycling, the HIPAA regulations pertain to the protection of confidential information of patients. This means that adequate methods of disk erasure must be employed. Disk reformatting is not an adequate means of destroying patients' personal records. Department of Defense (DOD) level erasure is the recommended procedure for data erasure to be in compliance with HIPAA regulations. Proper record keeping for all retired assets is also mandatory.

**Sarbanes Oxley / Gramm Leach Bliley** – Similar to HIPAA, the Sarbanes Oxley and Gramm, Leach, Bliley Acts seek to protect confidential information of clients. This act requires that financial audit records are adequately protected. DOD erasure is recommended to insure compliance with these laws as well as proper record keeping. Violations can lead to both civil and criminal penalties.

**How Does this Translate in the e-Waste World?**

Electronics are accumulating in landfills and other areas at an alarming rate and the environmental community is alarmed. The EPA and local governments are struggling with the issue on a constant basis. The only avenue they have for cleanup is through business violators because individuals are exempt. When they find a violation, they go after the organizations with the deepest pockets. No paper trail can prevent your organization from being named in an EPA lawsuit if there is a violation that includes your old electronics. Most pollution insurance policies only cover violations that occur on your premises. Liability and Errors and Omission insurance are not designed to cover pollution violations. Letters of indemnification are only as good as the issuer's willingness and ability to defend them.

**How do you protect yourself and your company?**
Risk Management is not a new concept for many companies but in the context of electronics recycling, it is somewhat new because companies are generally unaware of their liability. To help mitigate some of the risk you may encounter, the following list of questions should be asked of a potential recycler or asset recovery company followed by a list of what services to look for.

**The best questions to ask a recycler:**
- What level of Errors and Omissions insurance do you maintain?
- What level of General Liability Insurance do you maintain?
- What level of Pollution Insurance do you maintain?
- What level of Property and Goods Insurance do you maintain?
- Where does recycled material go?
- What steps do you take to manage your downstream processors?
- Where does transfer of title occur?
- Will you investigate a claim without client involvement?
- Will you litigate a claim without client involvement?
- Will you settle a claim without client involvement?
- Will you pay a claim without the client?
- Can vendor handle a civil claim?
- Can vendor protect client from reputation damage (Computer Recycling USA, n.d.)?

**Standard services to look for:**
- On-site consolidation and load preparation services
- Recycling/Processing/Reporting
- Data wipe-clean of hard drives, based on DOD standards
- Tracking/reporting of components resold
- Revenues for items resold when applicable

- Revenues for components reused when applicable
- Revenues for positive-value scrap metals

## DATA COLLECTION AND ANALYSIS

To better understand consumers' views on e-waste and disposal of technology, the authors developed a three question survey. One of the authors developed an electronic survey and sent the link to approximately 300 graduate students. The response was 96 or approximately 30% response rate.

The questions were:
1) What did you do when you last disposed of a computer (or printer)?
2) In the future, how will you dispose of technology?
3) Did you know that the hard drive might still have personal information on it?

**The results of the survey**
1. What did you do when you last disposed of a computer (or printer)?

| | |
|---|---|
| I donated it to a school, charity, Goodwill, or similar | 10.80% |
| I gave it to a friend / relative/ other | 33.70% |
| I thought about donating it, but then I didn't | 6.00% |
| I sold it (like e-Bay, Craigslist, want ads, other) | 9.60% |
| I put it out for the trash (or I took it to a landfill / trash disposal site) | 26.50% |
| I haven't needed to dispose of such technology | 25.30% |



What did you do when you last disposed of technology?

- I donated it to a school, charity, Goodwill, or similar
- I gave it to a friend / relative/ other
- I thought about donating it, but then I didn't
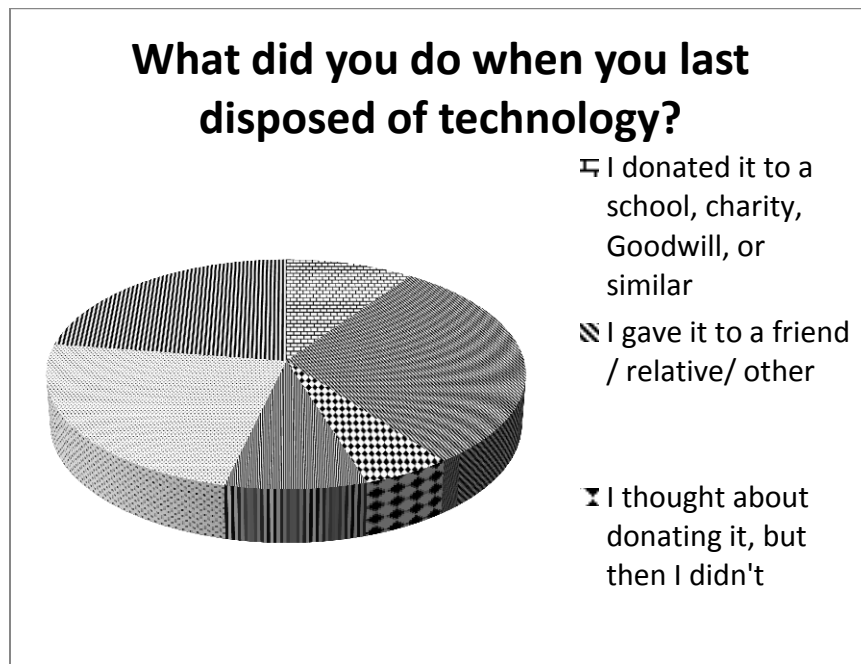
We see that many of the respondents (26.5%) simply just put their e-waste out for the trash.

2.  In the future, how will you dispose of technology?

| | |
|---|---|
| I will donate it to a school, charity, Goodwill, or similar | 21.60% |
| I will give it to a friend / relative/ other | 26.10% |
| I will think about donating it, but not sure where | 27.30% |
| I might try to sell it (like e-Bay, Craigslist, want ads, other) | 29.50% |
| I will just put it out for the trash (or I take it to a landfill / trash disposal site) | 11.40% |
| I haven't needed to dispose of such technology | 2.30% |

The respondents were less likely in the future to just put it out for the trash.

3.  Did you know that the hard drive might still have personal information on it?

| | |
|---|---|
| Yes, but I don't have any personal information on my hard drive | 6.50% |
| Yes, I will want to make sure that the information is totally wiped clean | 80.60% |
| No, I didn't know that, but it won't make any difference when I dispose of computer next time | 0.00% |
| No, I didn't know that, but I will want to make sure the information is wiped clean. | 12.90% |

There were many comments to our survey. Here are some: For disposal:

*   I recycled it at Best Buy
*   I took out my hard drive and ran over it with my car
*   My town hosts a trash day especially for electronics
*   I took it to Best Buy on the day they take in old computers, TVs and technology
*   Took it to a company that recycles old computer. http://www.e-reclaim.com/
*   It depends upon the parts for me. Generally, any unwanted parts would be sent to a recycling center (if hard drive is being given, I would place a magnet or reformat in case)... It depends upon usage and value. If it has usage, I give to family or friends or donate.
*   I will use Gazelle.com
*   I will put it with the others under the counter
*   I'm not sure anyone will want the archaic technology!
*   Take it to Staples

For the last question, we had these comments:

*   Yes I always erase drives using 35-Pass Erase, that uses the Gutmann algorithm which means 35 patterns are written to the disk to overwrite data.
*   I am happy you reminded me of this. I am an identity theft victim and could have had my PI compromised because of the way I disposed of my last computer.
*   Yes - hence my PC tower still sitting dead in my closet.
*   I personally removed and destroyed the drive.
*   The group that disposed of them destroyed the hard drives in front of me so they could not be read.

The authors sensed from the responses and the comments that there was an increased awareness of e-waste and a probable change from what they have done in the past (throw out computers, etc.) to what they would do in the future (take e-waste to special recycling days at Best Buy, Staples, or their local landfill – or donate it to an appropriate place).

## CONCLUSION

This paper has suggested many ways to dispose of e-waste with a focus on old computer equipment. An emphasis was placed on how users should dispose of equipment properly or consider alternate uses before just junking it. There may be places and people that can utilize the old equipment, even though newer and faster technology has caused it to become obsolete.

It is essential that users make sure that when disposing of e-waste, they do so responsibly and with the assurance that the data that is on the computer(s) has been erased. The last thing a user or company wants is to have a computer or the personal data that resides on it, land up in the wrong place or in the wrong hands of others who might use the equipment or the data for inappropriate usage.

In conclusion, there should be a logical process to get rid of older computing equipment. If total disposal is the accepted alternative, be sure that the hard drive doesn't contain personal information or financial information that could become a liability in the wrong hands.

## REFERENCES

Besiou, M., Georgiadis, P., & van Wassenhove, L. N. (2011). Official recycling and scavengers: Symbiotic or conflicting? *European Journal of Operational Research, 218*(2), 563-576. doi: 10.1016/j.ejor.2011.11.030

Computer Recycling USA. (n.d.). *Secure computer recycling and asset recovery programs computer recycling: What happens to my old computer?* Retrieved April 20, 2012, from http://www.computerrecyclingusa.com/htm/whtm_old_computer.htm

Conger, C. (n.d.). C*an my computer poison me?* Retrieved April 16, 2012, from http://computer.howstuffworks.com/computer-poison.htm

*Facts and figures on e-waste and recycling.* (2010). Retrieved April 20, 2012, from http://www.electronicstakeback.com/wp-content/uploads/Facts_and_Figures

National Center for Electronics Recycling. (2007). *How do I recycle electronics?* Retrieved from http://www.electronicsrecycling.org/public/ContentPage.aspx?PageId=82

Rahman, S., & Subramanian, N. (2012). Factors for implementing end-of-life computer recycling operations in reverse supply chains. *International Journal of Production Economics, 140, 239-248.* doi: 10.1016/j.ijpe.2011.07.019

United States Environmental Protection Agency (EPA). (2012). *Science and technology: Land, waste and cleanup.* Retrieved April 20, 2012, from http://www.epa.gov/gateway/ science/land. html