# Issue Paper #7
# Household Hazardous Waste and Electronics Recycling

## 7.1 Overview

### 7.1.1 Household Hazardous Waste

Household hazardous waste (HHW) typically makes up a small portion of the municipal solid waste (MSW) stream by volume (less than 1%),[1] however HHW contains potentially hazardous ingredients that warrant their diversion from landfills, transfer stations, waste-to-energy facilities, water supplies, etc. Collection programs for these materials play an important role in the integrated solid waste management systems of communities throughout the country.

HHW includes household products that contain corrosive, toxic, flammable, or reactive ingredients such as, but not limited to: cleaners, pool chemicals, herbicides, pesticides, automotive supplies, paints, stains, glue, batteries, fluorescent bulbs, mercury thermometers, etc.

Broome County hosted annual HHW collection events for residents prior to the County opening a permanent HHW collection facility (Facility) in March of 1996. The Facility, located at the Broome County Landfill (Landfill), is open three days per month (on average) from 7:30 a.m. to 11:30 a.m. Residents from both Broome and Tioga Counties may drop-off HHW materials for free without an appointment on the scheduled dates. The County has an inter-municipal agreement with Tioga County. The County charges Tioga County $400 per month to manage/operate the program, plus $0.75 per pound for all HHW and electronic waste collected from Tioga residents.

The County contracts with a hazardous waste management and disposal/recycling company for the packaging, transport and disposal of the HHW. County staff does some processing of waste such as bulking latex and oil-based paints into 55-gallon drums. (The latex paint is solidified and landfilled.) The County has several hazardous materials storage lockers to contain the materials until there is enough for a full truckload, at which time the contracted vendor is called to service the Facility.

Materials not accepted in the County's program include radioactive materials, smoke detectors, medical or infectious waste, explosives, and compressed gas cylinders.

[1] Source: Waste Age/Recycling Times' Recycling Handbook by John Aquino, 1995.

Commercial hazardous waste is accepted at the County's Facility for a fee and by appointment only, from small businesses in Broome and Tioga Counties that have gone through a permit process and have registered with the County. Eligible businesses are those that produce less than 220 pounds of hazardous waste, and less than 2.2 pounds of acutely hazardous waste per month. These businesses are considered conditionally exempt small quantity generators (CESQGs).

## 7.1.2 Electronic Waste

Used electronics or "e-waste" includes discarded computers, cell phones, televisions and other electronic products. Those with cathode ray tubes (CRTs), such as color computer monitors and televisions, are considered hazardous when discarded because of the presence of lead in the CRT. Televisions and computer monitors contain, on average, four pounds of lead (the exact amount depends on size and make).[2] Lead is not considered an environmental problem while the monitor or television is intact; however the lead can leach when compacted or broken and create an environmental hazard.

In addition to lead, electronics can contain chromium, cadmium, mercury, beryllium, nickel, zinc, and flame retardants. When electronics are not disposed of or recycled properly, these toxic materials can present environmental threats. Based on studies conducted by the United States Environmental Protection Agency (EPA), the CRTs and LCDs are likely to fail the Toxicity Characteristic Leaching Procedure (TCLP) test for heavy metals.

The EPA estimates that consumer electronics make up only 2% of the MSW stream, however the quantities of these materials being disposed has been steadily increasing for the past decade.[3]

The County accepts certain electronics from residents at its HHW Facility including computers, monitors, printers, laptops, keyboards, radios, stereos, modems, televisions, VCRs, fax machines, mobile phones and pagers. There is a limit of three televisions and three monitors per resident, per visit. The County also accepts e-waste from small businesses that have gone through the permit process and have registered with the County. Businesses are charged $0.75 per pound for electronic waste.

In addition to the permanent Facility disposal option for e-waste, the County also provides e-waste collection events throughout the year. In 2007, the County held seven collection events and in 2008, the County held six events throughout the County. The events are free to residents, no business waste is accepted, and small household appliances are not accepted (e.g., telephones, answering machines, vacuum cleaners, etc.). The County collects and prepares the e-waste for transport and then it is picked up at the HHW Facility by Eco International, based in Vestal, New York (located in Broome County) for recycling and proper disposal.

[2] Source: "Electronics: A New Opportunity for Waste Prevention, Reuse, and Recycling," EPA, 2001. http://www.epa.gov/osw/conserve/downloads/elec_fs.pdf

[3] Source: EPA website. http://www.epa.gov/epawaste/conserve/materials/ecycling/manage.htm

# 7.2 Rules and Regulations

## 7.2.1 Federal Requirements

### 7.2.1.1 HHW

Hazardous waste is regulated under the federal Resource Conservation and Recovery Act (RCRA), Subtitle C. Per this federal law, hazardous waste exhibits at least one of four characteristics – ignitability, corrosivity, reactivity, or toxicity. Household-generated hazardous waste (such as automotive products, cleaners, pesticides, herbicides, paints and solvents), is exempt under RCRA rules of the Code of Federal Regulations (40 CFR Part 261.4)[4].

Also exempt under the Federal rules are conditionally exempt small quantity generators. CESQGs are small businesses that generate 100 kilograms or less (approximately 220 pounds or 25 gallons) of hazardous waste per month.

The federal Universal Waste regulations (40CFR Part 273) streamline collection requirements for certain hazardous wastes in the following categories: batteries, pesticides, mercury-containing equipment (e.g., thermostats) and lamps (e.g., fluorescent bulbs). The rule is designed to reduce hazardous waste in the MSW stream by making it easier for universal waste handlers to collect these items for recycling or proper disposal.

### 7.2.1.2 Electronics

Currently there are no Federal laws regarding recycling of e-waste. However, used CRTs exported for recycling must comply with requirements that are specified in 40 CFR 261.39(a)(5).[5] Exporters must notify the EPA and receive written consent from the receiving country before shipments can be made.

In August 2005, the EPA made a ruling that added mercury-containing equipment (e.g., thermostats, barometers, mercury switches, etc.) to the federal list of Universal Waste.[6] In July 2006, the EPA amended its regulations to include CRTs as Universal Waste.[7] Under these regulations, used, unbroken CRTs are not regulated as hazardous waste unless they are stored for more than a year. The EPA set these more manageable standards for unbroken CRTs because "the risk of lead releases from them is very low. Since the risk is so low, the storage limitation on unbroken CRTs applies only to collectors or recyclers."[8]

---

[4] Source: Electronic Code of Federal Regulations. http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr;sid=4990e762d7b81851bef18f82dc851826;rgn=div5;view=text;node=40%3A25.0.1.1.2;idno=40;cc=ecfr#40:25.0.1.1.2.1.1.4

[5] Source: EPA website. http://www.epa.gov/epawaste/hazard/recycling/electron/index.htm

[6] Source: Federal Register, August 5, 2005. http://www.epa.gov/fedrgstr/EPA-WASTE/2005/August/Day-05/f15437.pdf

[7] Source: Federal Register, July 2006. http://www.epa.gov/epawaste/hazard/recycling/electron/crt-final.pdf

[8] Source: EPA Fact Sheet: Easier Recycling of Cathode Ray Tubes. http://www.epa.gov/epawaste/hazard/recycling/electron/crt-fs06.htm

## 7.2.2 State Requirements

### 7.2.2.1 HHW

The New York State Department of Environmental Conservation (NYSDEC) adopted the EPA's 1999 rule that added hazardous waste lamps to the Universal Waste Rule. This includes fluorescent, high-intensity discharge (HID), neon, mercury vapor, high pressure sodium, and metal halide lamps. The NYSDEC lists these materials as Special Wastes and requires special handling procedures and disposal methods to protect human health and the environment.[9]

In July 2004, New York passed a law that bans the sale of mercury-added novelty products and mercury-fever thermometers in the state. Disposal of these products (thermostats, thermometers, switches, medical and scientific instruments, lamps and batteries, excluding button batteries) is not allowed in the regular garbage, but must be managed separately by a recycling facility, an authorized hazardous waste facility, or at a municipally-sponsored HHW collection program.

### 7.2.2.2 Electronics

Many states have instituted mandatory electronics recovery, recycling or producer take-back programs. New York has only mandated that all wireless telephone service providers that offer phones for sale must accept cell phones for reuse or recycling under the New York State Wireless Recycling Act that went into effect January 1, 2007.[10]

The City of New York passed a producer responsibility law in April of 2008 which requires manufacturers to submit plans for collection, transportation and recycling of computers, monitors, printers and televisions. Recycling programs must be implemented by July 1, 2009, or when specified in final Department of Sanitation (DSNY) regulation.[11] Effective July 1, 2010, it will be illegal for any person in New York City to discard any covered electronic equipment as trash.[12]

The NYSDEC offers guidance for handling used electronic equipment.[13] Because some electronics contain hazardous materials, including mercury, they must be handled as hazardous waste. The NYSDEC is in the process of developing proposed rulemaking for used electronic equipment. The plan is to amend current regulations in an effort to streamline the management of used electronics so that collection and recycling becomes safer and more efficient.

[9] Source: NYSDEC website. http://www.dec.ny.gov/chemical/8787.html
[10] Source: NYSDEC website. http://www.dec.ny.gov/chemical/8818.html
[11] Source: National Electronics Recycling Infrastructure Clearinghouse website. http://www.ecyclingresource.org/ContentPage.aspx?Pageid=28&ParentID=0
[12] Source: New York City website. http://www.nyc.gov/html/nycwasteless/html/in_business/electronicslaw_reqs.shtml#whats_accepted
[13] Source: NYSDEC website. http://www.dec.ny.gov/chemical/8788.html

# 7.3 HHW Program Expansion Considerations

Program parameters to consider when evaluating the County's HHW program include:

- Program Convenience;
- Participation Rates;
- Quantity and Types of Materials Collected/Managed; and
- Scope of Services Offered.

Each of these program parameters, and its application to Broome County, is discussed in detail below.

## 7.3.1 Program Convenience

Currently, the County's HHW Facility is open three days per month (on average) from 7:30 to 11:30 a.m. From R. W. Beck's research and experience with other HHW programs, most municipally-owned HHW permanent facilities in other parts of the country have more accessible hours and are open several days per week. From R. W. Beck's interviews with Broome County stakeholders in July of 2008, one suggestion for improving the program was to expand the hours of the HHW Facility so that it is open more hours and/or more days per month.

By extending the hours/days of operation, the County would most likely collect increased quantities of HHW materials. Depending on the details of the agreement with the contracted vendor, it is possible the County could benefit from increased economies of scale by collecting more materials.

Other collection options that the County may want to consider, in an effort to increase convenience to residents, include:

- Satellite collection system;
- Mobile collection unit;
- Curbside collection; and
- Other alternative options.

Each of these collection options is discussed in detail below.

### 7.3.1.1 Satellite Collection System

Satellite HHW collection facilities are designed to support a permanent processing site. Satellite facilities serve as permanent drop-off locations for program participants that typically would not travel the distance to deliver HHW materials to the central or main facility. To provide a full service program, the same HHW materials that are accepted at the permanent site should be collected at the satellite facilities. HHW materials are regularly collected from the satellites and transported to the "hub" permanent facility where materials are sorted, bulked and lab packed for recycling or disposal, or the site may be serviced directly by a hazardous materials vendor.

Depending on the needs and the budget of the County, a satellite facility could be as basic as a seasonal, open-air collection site with a hazardous materials storage locker (as shown in Figure 7-1), or it could include a fully enclosed building designed to be open year-round.

Figure 7-1. Satellite HHW Facility, Sarasota County, Florida

A year-round satellite facility design might include:

- A pre-engineered metal building to house a small office, a product exchange or re-use room, a mechanical room, and one unisex bathroom;
- A metal canopy attached to the building to cover two drive-through lanes of traffic and provide shelter for staff while they unload HHW materials from the vehicles;
- Adequate parking for up to four vehicles at one time for staff persons working at the facility; and
- A pre-engineered hazardous materials storage locker, enclosed with a chain-link fence and gate. The entire satellite facility property should also be surrounded by a chain-link fence that can be locked.

The County may also consider using an existing County-owned facility as an HHW (and electronics) collection facility. The size of the facility would determine if it would strictly be used as a collection and storage site or if any preliminary processing could be done on-site (such as bulking oil-based paints into 55-gallon drums). At least one hazardous materials storage locker (see Figure 7-2) would be required to store the waste. The storage locker would require electricity and most likely require a concrete slab be poured for its placement. The storage locker should be enclosed with a chain-link fence for safety reasons, as should the entire facility if possible. This may deter, but probably not eliminate, illegal dumping of HHW and electronics at the site.

Figure 7-2. Hazardous Materials Storage Locker

Limited hours of operation would be preferable when operating a satellite program, keeping staffing costs to a minimum. County staff operating the facility would need to be trained under the Occupational Safety and Health Administration's (OSHA) guidelines, including 40 hours of Hazardous Waste Operations and Emergency Response (HAZWOPER) training, and/or other requirements as determined by the State of New York.

The County could either transport the HHW materials to its permanent Facility or the County's contracted vendor could be scheduled for quarterly, semi-annual, or on-call collections to package, transport, and dispose and/or recycle the HHW and electronics materials.

The County would need to review local zoning ordinances to ensure this type of use would be allowable in a building/location chosen by the County. Depending on the facility, the County may also be required to apply for a solid waste management facility permit.

From R. W. Beck's stakeholder interviews, it was recommended that the County allow municipalities to collect HHW from their residents and then allow the municipality to bring consolidated loads to the HHW Facility. The County may consider working with one or more municipalities to provide satellite HHW collection sites. However, the County would need to provide guidance to the municipality(ies) wishing to establish a satellite collection site and assist in coordinating collection activities.

#### 7.3.1.2 Mobile Collection Unit

In addition to its permanent HHW collection Facility, the County could also consider providing mobile collection events for communities located beyond a defined distance or radius from the permanent Facility located at the Landfill. A collection vehicle, such as a box truck and/or a trailer would be needed to conduct the mobile events (see example in Figure 7-3) and transport the materials to the main HHW Facility for processing. The County could coordinate the events and perhaps provide two or three staff persons to help with the collection, and request that the host community be responsible for providing volunteers to assist with the traffic and unloading of the vehicles. To provide a full service program, the same HHW materials that are accepted at the permanent site could be collected at the mobile events, however it may

be more feasible for the County to only accept certain items such as paint, used motor oil, etc. that are less hazardous and easier to transport.


Figure 7-3. Mobile HHW Trailer, Becker County, Minnesota

When the City of Kansas City, Missouri built its permanent facility in 1996, the staff originally considered satellite collection sites, however they opted for mobile collections instead because the staff considered this approach more manageable and cost effective. The City currently conducts 10 to 12 mobile collection events per year in cooperation with the Mid-America Regional Council (MARC). MARC arranges the mobile collection events to be held on certain Saturdays from April through October[14]. Each community pays its share of the cost of the event. Collection events usually take place at a park or a public facility with a large parking lot. Only antifreeze, batteries, motor oil and paint are accepted at the mobile collection events.

### 7.3.1.3 Curbside Collection

Another option for collecting HHW materials is to offer curbside collection to residents. (This may be more feasible in communities with higher population densities.) This option could be implemented in conjunction with mobile collection events or limited to only the elderly and disabled residents of a community, who may not be able to drive to the permanent facility.

The City of Denver, Colorado (population 588,000) has been offering free curbside collection of HHW to residents for approximately eight years through a contract with a vendor called Curbside, Inc. The program is funded through the City's stormwater management program.

Residents call the vendor's toll-free customer service phone number to schedule a pick-up and can only use the service once per year. The contractor then sends the resident a collection kit which contains a heavy duty clear plastic bag, instructions, labels, and a cable tie that cannot be re-opened once it has been secured. The bag of

[14] Source: MARC website. http://www.marc.org/Environment/SolidWaste/HHW/hhwevents.htm

materials set out for collection cannot exceed 125 pounds. If the resident has more HHW than will fit in the bag, they may choose to set out the extra materials and pay for its collection. Residents also have the option of dropping off HHW materials at the vendor's facility, by appointment.

The City pays the contractor $114 per curbside stop and $106 per resident using the drop-off option. The City budgets about $212,000 annually for the HHW program however, it has gone over budget the past two years, spending approximately $258,000 in 2007 and $265,000 in 2008 according to City of Denver staff. Approximately 1.5 percent of the City's population (that are customers of the City's Solid Waste program) currently participate in the program. For example, in 2007 and 2008, about 2,500 households out of the 165,000 households the City serves, participated in the program. In 2008, the average pounds per curbside stop was 77, and the average drop-off amount was 123 pounds. The City of Denver opted for this type of program as an alternative to building a permanent HHW collection facility.

The City of Laguna Beach, California (population 24,000) also contracts for the curbside collection of HHW as well as electronics. The residents do not pay the contractor directly for the service; the City pays the contractor monthly based on the number of stops and the types and quantities of materials collected. (There is a reduced cost to collect certain items such as antifreeze, batteries, used motor oil, and paint.) The City subsidizes this program through a solid waste fee incorporated into the residential refuse bill. Commercial businesses may also take advantage of the program, although they are required to pay the contractor directly.

Another option is to offer curbside collection of only certain HHW items. For example, municipalities in Sarasota County, Florida have been offering collection of used motor oil from the curb for several years with great success. The County (population 372,000) contracts with private haulers for the collection of residential municipal solid waste, including motor oil and electronics. As part of the regular refuse collection service, all residents of the County have the opportunity to set out used motor oil, oil filters, and electronics for collection at the curb.

#### 7.3.1.4 Other Alternative Options

Listed below are other alternative program management approaches for the County to consider that could result in a more cost-effective collection program, and may enable the County to implement another collection option within the current budget. The potential savings realized from these alternative options could be allocated for additional advertising and/or additional collection events.

- **Establish collection events or facilities for recyclable HHW such as antifreeze, batteries, oil, and paint (also referred to as ABOPs).** These four materials typically compose about 25 percent of a municipality's total HHW disposal costs. ABOP collection sites have been used successfully in other portions of the United States. Many communities have ABOP collection sites located at municipal buildings such as maintenance facilities, public works buildings, fire stations, etc. These collection sites are staffed and are usually opened a limited number of hours

per month. In Kansas City, ABOP collection events are scheduled annually in which just those four material types are collected.

- **Contract separately for fluorescent bulb collection/recycling.** Currently the County crushes fluorescent bulbs at the HHW Facility and the material is recycled through the contracted vendor. The County may want to consider comparing the cost of crushing (including equipment, maintenance, and labor costs) and disposal costs to contracting out for the recycling of fluorescent bulbs through a lamp recycling company (that only handles fluorescent bulbs) for collection and disposal. A separate Request for Proposals (RFP) or Request for Bids (RFB) could be issued for recycling the bulbs. The competitive bid process may result in a lower per unit recycling cost than what the current vendor is charging, as well as save the County staff time in crushing the lamps. (Instead of being crushed, the lamps would need to be kept whole and placed in cardboard boxes or drums provided by the vendor.)
- **Continue to instruct residents to take certain items to various retailers.** Many retailers already accept certain HHW items at their place of business. For example, most automotive battery retailers take old batteries from customers in exchange for new auto battery purchases. Certain automotive repair businesses and retailers in New York are required to accept waste oil free of charge[15] and all New York wireless telephone service providers that offer phones for sale must accept cell phones for reuse or recycling. In addition, local retailers Wegman's in Johnson City and Lowe's Home Improvement Warehouse in Vestal partner with the County in collecting dry-cell batteries at no charge. The County provides the collection drums, picks up the full drums and pays for the recycling of the material. Also, Home Depot in Binghamton accepts compact fluorescent lamps (CFLs) for recycling from residents and the County promotes the program in an effort to further divert CFLs from being brought to the HHW Facility. Over thirty retailers in Broome County are listed as accepting rechargeable batteries through the Rechargeable Battery Recycling Corporation's "Call 2 Recycle" program.[16]

  Other materials that may currently be accepted by retailers or in which drop-sites could be established include: latex paint, antifreeze, explosives, fire extinguishers, propane tanks, and electronics. Diverting these materials through other outlets may save the County money in disposal and recycling costs.

## 7.3.2 HHW Participation Rates

The number of Broome County residents that reportedly used the County's HHW Facility from 2004 through 2008 is shown in Table 7-1. While the numbers seem to fluctuate from year to year, it appears the average number of participants is about 1,800 per year.

[15] Source: NYSDEC website. http://www.dec.ny.gov/chemical/8786.html
[16] Source: RBRC website. http://www.rbrc.org/start.php

Table 7-1
HHW Residential Participation Data[1]
Broome County

| | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Broome County | 1,867 | 1,601 | 1,967 | 1,687 | 1,868 |

[1] Data does not include the number of participants that bring material to the HHW Facility on non-collection days. The County only recently began collecting this data.

In R. W. Beck's experience, we find that most permanent HHW collection facility participation rates are in the 1 to 5 percent range. When the number of Broome County participants is divided by the number of occupied housing units in the County, the participation rate is calculated to be between 1.98 and 2.43 percent, as shown in Table 7-2. The average participation rate for the Facility over the last five years is 2.23 percent.

Table 7-2
HHW Facility Participation Rates
Broome County

| | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Broome County Participants[1] | 1,867 | 1,601 | 1,967 | 1,687 | 1,868 |
| Number of Occupied Housing Units – Broome County[2] | 80,800 | 80,800 | 80,800 | 80,800 | 80,800 |
| Participation Rate | 2.31% | 1.98% | 2.43% | 2.09% | 2.31% |

[1] Data does not include the number of participants that bring material to the HHW Facility on non-collection days. The County only recently began collecting this data.
[2] Source: U.S. Census Bureau. The 2005-2007 estimate was 80,870. The 2000 census was 80,749. An average of 80,800 was used for this analysis.

The number of businesses participating in the County's CESQG program for the past five years is shown in Table 7-3.

Table 7-3
Broome County CESQG Participation Data

| | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Number of CESQGs | 58 | 94 | 98 | 94 | 65 |

Per the U.S. Census Bureau, the number of businesses in Broome County in 2002 (the most recent available data) was 12,642.[17] While it is not known how many businesses

[17] Source: U.S. Census Bureau, State and County Quick Facts.
http://quickfacts.census.gov/qfd/states/36/36007.html

are considered CESQGs of hazardous materials, the number of CESQGs participating in the County's program appears low.

### 7.3.3 Quantities and Types of HHW Materials Collected and Managed

The total quantities of HHW materials collected at the County's permanent Facility are shown in Table 7-4.

Table 7-4
Estimated Quantities of HHW & CESQG Waste Collected per Year (in Pounds)[1]
through Broome County's HHW Program

| | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Dry-cell Batteries | 11,900 | 11,500 | 13,600 | 11,100 | 36,989 |
| Automotive Batteries | 50,680 | 48,240 | 54,780 | 48,800 | 22,140 |
| Used Motor Oil | 71,328 | 62,968 | 65,344 | 43,504 | 50,464 |
| Used Antifreeze | 9,896 | 11,496 | 9,840 | 8,520 | 7,824 |
| Fluorescent Lamps | 8,780 | 5,100 | 18,600 | 3,600 | 19,716 |
| Latex Paint | 45,780 | 76,000 | 101,020 | 74,450 | 70,900 |
| Oil-based Paint | 18,000 | 35,640 | 35,640 | 32,340 | 36,456 |
| HHW - Broome | 80,619 | 60,628 | 37,228 | 40,998 | 64,955 |
| Total Pounds | 296,983 | 311,572 | 336,052 | 263,312 | 309,444 |
| Total Tons | 148 | 156 | 168 | 132 | 155 |

[1] The following conversion factors were used to convert some of the original quantities from gallons to pounds:
Motor Oil – 1 gallon = 8 lbs
Latex Paint – 1 gallon = 10 lbs
Oil-based Paint – 1 gallon = 12 lbs
Antifreeze – 1 gallon = 8 lbs

The pounds collected per participant were not calculated for this analysis because the quantities reported by the County include both residential and CESQG waste combined.

The quantities of dry-cell batteries collected by the County for recycling are quite high. County staff stated that alkaline batteries are included in this category. From R. W. Beck's research, most HHW programs direct residents to place spent alkaline batteries in the regular trash, as they are no longer manufactured with mercury and are not considered hazardous. The County has an outlet for recycling alkaline batteries, so it is a more environmentally-sound option compared to landfilling. A detailed cost analysis was not performed for this issue paper, so it is uncertain what expenses are incurred by the County for alkaline battery recycling. If the recycling costs are high, the County may consider removing alkaline batteries from its list of materials accepted

at the HHW Facility. While it may take several years to educate the public about what types of batteries are hazardous, it has been accomplished in other communities. For example, the link below from Hennepin County, Minnesota's website provides battery education via the county's "Household Battery Fact Sheet":

http://hennepin.us/portal/site/HCInternet/menuitem.3f94db53874f9b6f68ce1e10b1466498/?vgnextoid=c8dfbbf4099fc010VgnVCM1000000f094689RCRD&vgnextfmt=default

### 7.3.4 Scope of Services Offered

One recommendation for the County to consider is to create a product exchange or re-use room at the permanent Facility. The County could dedicate a segment of the permanent HHW Facility to a product reuse area in which Facility staff would place usable products on shelves for residents to take free of charge. Likely items in a reuse program include paint, household cleaners, and automotive products. By offering these materials for reuse, the County would realize savings from avoided disposal costs. Most product reuse programs require the resident or "customer" to sign a liability waiver that states they are over the age of 18 and they will use the product for its intended purpose. The County's legal counsel should be consulted to provide indemnification language. A list of municipal HHW product reuse programs is included in Section 7.12.2, Resources.

## 7.4 Electronics Collection Program Expansion Considerations

Program parameters to consider when evaluating the electronics recycling program include:

- Program Convenience;
- Participation Rates;
- Quantity of Materials Collected/Managed; and
- Scope of Services Offered.

Each of these program parameters, and its application to Broome County, is discussed in detail below

### 7.4.1 Convenience

The County currently provides two options for the collection of used electronics, free of charge to residents: the permanent HHW Facility and off-site collection events held throughout the County. In addition, County staff routinely recommend to residents a list of alternate recyclers that service the area. The recyclers require an appointment and charge a fee. As the quantities of discarded e-waste increases, the County may want to research other options for the disposal and recycling of used electronics, as described below.

#### 7.4.1.1 Offer Curbside Collection of Electronics

As mentioned previously, some communities offer curbside collection of not only HHW, but also used electronics. This service is usually provided by garbage haulers, for a fee, and by appointment or scheduled pick-up only. The haulers typically send out a separate, dedicated collection vehicle (such as a box truck or pick-up truck) for these materials.

The County may want to consider inviting local licensed haulers to a work session to discuss this growing portion of the waste stream, provide resources for recycling, and gauge the interest of haulers in providing curbside collection service.

A list of cities and counties throughout the country that provide curbside collection of e-waste is provided in Section 7.12.3, Resources.

#### 7.4.1.2 Provide Information to Residents and Businesses on E-Waste Take Back Programs

Nationally, as the quantity of used electronics in the waste stream continues to grow, there is more and more pressure being placed on the producers of electronic equipment to play some role in the proper disposal of the items they manufacture. Product stewardship has grown in recent years and some of the larger computer and electronics manufacturers as well as large retailers have implemented "take-back programs."

(It should be noted that product stewardship not only considers the end of a product's life, but also takes into consideration the entire life-cycle impacts of a product and its packaging to reduce the amount of energy, toxins, air and water emissions, etc. that go into making a product and its packaging. This will be discussed in more detail in the Zero Waste Issue Paper.)

The EPA has partnered with many electronics manufacturers and retailers to develop the "Plug-In To eCycling" program in an effort to make it easier to reuse and recycle used electronics. Some of the participating partners include Best Buy, Dell, Hewlett-Packard, Sony, Sprint, Staples, and Verizon, just to name a few.

It is recommended that the County keep up-to-date on take-back programs and make this information available to residents and businesses via the County's website, periodic County newsletters, mailings and other correspondence. Residents and businesses should be encouraged to use manufacture take-back programs first, before bringing used electronics to the County's HHW Facility or to County-sponsored drop-off events.

### 7.4.2 E-Waste Participation Rates

The number of residents that participated in the County's electronics collection program from 2004 through 2008 is shown in Table 7-5. While there was a decrease in the number of participants in 2007 (compared to 2006), overall the numbers show an upward trend.

Table 7-5
Electronics Collection Program - Participation Data
Broome County

| | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Broome County Participants | 836 | 676 | 1,967 | 745 | 871 |
| CESQGs | 1 | 4 | 0 | 0 | 0 |
| Off-Site Collection Event Participants | 0 | 0 | 0 | 585 | 1,282 |
| Total Number of Participants | 837 | 680 | 1,967 | 1,330 | 2,153 |

When the number of Broome County participants plus the off-site event participants is divided by the number of occupied housing units in the County, the participation rate is calculated to be, on average, 0.84 to 2.66 percent, as shown in Table 7-6.

Table 7-6
Electronics Collection Program – Participation Rates
Broome County

| | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Broome County Participants | 836 | 676 | 1,967 | 745 | 871 |
| Off-Site Collection Event Participants | 0 | 0 | 0 | 585 | 1,282 |
| Total Participation | 836 | 676 | 1,967 | 1,330 | 2,153 |
| Number of Occupied Housing Units – Broome County | 80,800 | 80,800 | 80,800 | 80,800 | 80,800 |
| Participation Rate | 1.03% | 0.84% | 2.43% | 1.65% | 2.66% |

## 7.4.3 Quantities of E-Waste Collected/Managed

The total quantities of used electronics collected at the County's permanent Facility and at the off-site collection events are shown in Table 7-7. The tons collected have steadily increased each year.

Table 7-7
Quantities of Used Electronics Collected per Year (in Tons)
Broome County

| | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Broome County | 45.92 | 53.98 | 55.95 | 55.32 | 65.03 |
| CESQGs | 0.16 | 1.07 | 0 | 0 | 0 |
| Off-Site Collection Events | 0 | 0 | 0 | 34.77 | 69.50 |
| Total Tons | 46.08 | 55.05 | 55.95 | 90.09 | 134.53 |

The overall amount of used electronics in the waste stream is difficult to estimate. The EPA commissioned two reports that took different approaches to analyzing the amount of electronics in the waste stream – one relied on market research data on sales of electronics and one relied on government statistics on sales of electronics.[18]

By looking at waste characterization studies conducted between 1998 and 2004, the EPA estimated that the average pounds of consumer electronic discards (e.g., computer-related electronics and CRTs) per person, per year was 9.4.[19] (That number is likely to be higher now due to more people purchasing electronic equipment and more equipment becoming obsolete faster than in past years. Also, the EPA estimate does not include cell phones.)

Applying the EPA estimate of 9.4 pounds per capita per year to the U.S. Census Bureau's 2008 population estimate for Broome County of 195,018, the result is approximately 917 tons of e-waste discarded per year. In 2008, 135 tons of e-waste was collected, as shown in Table 7-7, or approximately 15 percent of the e-waste stream.

When the tons of e-waste collected from the County were converted to pounds, the average number of pounds collected per participant ranged from 57 to 160 pounds as shown in Table 7-8. This appears to be in the range of other programs researched by R. W. Beck including:

- Buck's County, Pennsylvania – 108 pounds per participant (2008)
- Iowa – 81 pounds per participant (2006)
- Kansas – 92 pounds per participant (2007)
- Wisconsin – 65 pounds per participant (2008)

[18] Source: EPA website, Statistics on the Management of Used and End-of-Life Electronics. http://www.epa.gov/epawaste/conserve/materials/ecycling/manage.htm
[19] Source: "Electronics Waste Management in the United States - Approach 1," EPA, July 2008. http://www.epa.gov/epawaste/conserve/materials/ecycling/docs/app-1.pdf

Table 7-8
Used Electronics Collected - Pounds per Participant per Year
Broome County

| | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Tons | 45.92 | 53.98 | 55.95 | 55.32 | 65.03 |
| Total Pounds | 91,840 | 107,960 | 111,900 | 180,180 | 269,060 |
| Number of Participants | 836 | 676 | 1,967 | 1,330 | 2,153 |
| Pounds per Participant | 110 | 160 | 57 | 135 | 125 |

### 7.4.4 Scope of Services Offered

The County's collection program for used electronics is fairly comprehensive. However, as the quantities of e-waste continues to grow, it may become more critical that the County offer more collection events or increased days/hours for accepting e-waste at the HHW Facility. If the state of New York eventually bans e-waste from landfills, the County will need to expand the collection program. It is likely that more producer take-back programs will emerge, so it is recommended the County monitor this issue in order to provide its residents with the most current information.

## 7.5 Capital and Operating Expenses

Any expansion considerations that require large capital expenditures would most likely need to be presented to the County Legislature for approval. The capital and operating expenses related to expanding the County's current HHW and/or electronics recycling program would be dependent on what, if any, options or recommendations the County chooses to implement.

Depending on how the County chooses to expand the programs, there may be capital and operating costs to consider. Capital expenditures could include, but not be limited to:

- Purchasing, leasing or constructing a satellite collection site;
- Purchasing or leasing a mobile collection vehicle;
- Purchase of rolling stock equipment; and/or
- Retrofitting or renovating the current HHW Facility to accommodate a product reuse room.

Expanding the County's current HHW and/or electronics recycling program may require additional staff or contracted labor to collect, manage, and process additional volumes of materials in preparation for their ultimate disposal or transportation to a processing or disposal site. (The County currently has one full-time Solid and Hazardous Waste Facility Technician.) Also, any type of expansion would require increased staff time to develop, coordinate and implement expanded public information, outreach, and marketing programs, as well as additional data tracking,

program management, etc. (The County currently has one full-time Materials Recovery Manager.) Any additional staff or staff time would result in an increase in operating expenses.

## 7.6 Evaluation of Public/Private Ownership and Operation Options

Public-private partnerships provide an option for municipalities to consider when expanding their HHW and/or electronics recycling program. Typically, such partnerships would utilize the financing advantages of the public sector entity (i.e., lower cost of capital) and the operational expertise of the private sector.

The public/private approach might be considered for an electronics collection and recycling program or if the County ever chose to NOT be involved in the operations side of the HHW collection program.

An approach to a public/private partnership is to distribute a Request for Interest (RFI) to hazardous waste management companies with capabilities and interest in providing collection, processing, packaging and/or transportation services for HHW and/or used electronics. If the County considered this option, staff time would be needed to develop and distribute an RFI to companies with capabilities and interest in providing the services of an expanded HHW and/or electronics recycling program.

The approach could include an incentive in which the County provides the land for use at a minimal cost and then contracts with a private firm to operate the collection/processing facility. One example of a successful HHW program partnership is provided below.

### 7.6.1 Dakota County, Minnesota

Forming a public-private partnership may provide a means to decrease program costs and increase flexibility. An example of a successful public-private partnership is Dakota County, Minnesota. Part of the Minneapolis/Saint Paul metropolitan area, the County is largely suburban in nature, with a 2008 population estimate of 392,755 (and approx. 153,326 households). The County held its first HHW collection event in 1985 and by 1987, the County was sponsoring multiple (three to four) collection events per year. In 1991, Dakota County implemented a permanent collection system at two sites in the County, together with occasional off-site collection events. In 1996, the County chose to consolidate operations and issued a Request for Proposals (RFP) for HHW management services. The RFP stated that the vendor would be responsible for siting, constructing, operating and staffing a permanent HHW collection facility. The RFP excluded HHW material recycling/disposal services.

Gopher Resources, a local private lead smelting and plastics recycling company, contracted with the County to provide HHW services. Services included operation, maintenance and management of the County's Eco-Site (HHW facility). The private contractor pre-sorts delivered materials into general categories, bulks liquids, and selects usable materials to be placed in the reuse center.

Located near the County's population center, the permanent HHW facility is approximately 3,000 square feet. It has a product reuse area, which allows residents to choose HHW materials for their use, free of charge. The HHW facility is housed in the same building as the plastics recycling company and adjacent to the lead smelting facility. As part of this partnership, the County provides all of the movable fixtures within the facility, including waste processing equipment, shelving, drum dolly, drum scale, and office equipment and oversight of facility activities. The HHW facility is staffed by Gopher Resources employees and includes one primary manager, two technicians, and up to twelve additional trained part-time staff.

In addition to offering HHW services at the permanent collection facility, the County hosts four collection events per year in order to increase customer convenience by decreasing distance to HHW services. The collection events are held in cooperation with cities, who are responsible for advertising the event, locating a temporary collection event site, and providing labor for the day-long event. At the conclusion of each collection event, County staff transport materials to the permanent collection facility.

## 7.7 HHW and E-Waste Recycling Education

The County provides information on HHW and electronics disposal and recycling options on its website, has developed an "HHW and Electronics Recycling" brochure, and publishes print ads announcing electronics collection events. In addition, the County's Division of Solid Waste Management office and the HHW Facility field calls throughout the year regarding proper disposal options for HHW and used electronics.

Recommendations to expand on education efforts include:

- Send an annual letter to small businesses in the County that explains the basics of the County's CESQG program, including what materials are accepted in the program, what the costs are for disposal, and how to prepare the items for delivery to the HHW Facility. Work with the local Chamber of Commerce to obtain contact information for small businesses. Because this could be a large mailing, the County could consider sending letters to one-fourth or one-third of the businesses one year and send the remaining letters in subsequent years and continue with the rotation.
- Expand/re-arrange the HHW and e-waste information section of the County's website. Currently on the Solid Waste Management home page, there are three options: Recycling, Landfill, and Hazardous Waste & Electronics. There is some HHW-related information on the side bar of the webpage that is not on the Hazardous Waste main page. It is recommended that the HHW-related brochures (e.g., Paint Tips & Disposal; Compact Fluorescent Bulb Disposal & Handling; Mercury in the Home; and Cleaning Mercury Spills) be moved from the "Brochures" section of the side bar to the Hazardous Waste & Electronics page.

  Also, the Recycling web page lists "battery only drop-off sites." The County may want to consider adding this information to the Hazardous Waste page and

expand it by providing retail locations that accept other materials such as used motor oil, automotive batteries, rechargeable batteries, electronics, cell phones, etc.

Lastly, there is other information on the side that may get more attention if placed on the main Hazardous Waste page including:

- Transport of HHW;
- Alternative Products; and
- FAQ for residents.

- Provide a description of environmental and health hazards of improper use and disposal of HHW products on the County's website.
- Continue to partner with the County's Environmental Management Council (EMC) for dissemination of public education and outreach information. The EMC is the County's citizen advisory board for local environmental matters. Each year the EMC budgets for staff support, technical assistance, planning, and research and development assistance to the County's Solid Waste Management Division.[20] As part of the Department of Planning and Economic Development, the EMC conducts reviews of land-use proposals as part of the 239 land use laws. Currently during a review, if the EMC staff notice hazardous materials are generated as part of a businesses' operations, they will inform the business of proper disposal options and inform them of the County's CESQG program.
- Continue to partner with Cornell Cooperative Extension (CCE) for direct educational outreach. Currently, CCE includes hazardous waste information in its recycling outreach for the County. Keep CCE informed of any new e-waste legislation or take-back programs that might develop in the future.
- Consider distributing promotional items such as pens, magnets, calendars, etc. to promote the County's HHW and electronics recycling programs. These inexpensive marketing tools have the potential for the County's message to be seen over and over again.

## 7.8 Revenue Options

HHW and residential e-waste recycling programs are typically not revenue-generating programs for cities and counties. More often, they are justified expenses to ensure these hazardous materials are managed properly and kept from harming the environment. Generally, these programs are funded out of a municipality's general fund. CESQG programs however, should be structured to generate enough revenue to cover the capital and operating costs of managing the hazardous waste from the small business sector. It is recommended the County continue to charge CESQGs for the management of hazardous materials and charge small businesses for the collection and recycling of used electronics.

[20] For 2009, the EMC's proposed budget to assist the Solid Waste Management Division was slightly less than $10,000, a portion of which is allocated for planning and technical assistance.

The number of businesses that have participated in the County's CESQG program over the last five years is low, as shown in Table 7-3. It is recommended the County make a concerted effort to increase the awareness of the CESQG program in an attempt to increase the number of CESQGs using the Facility.

## 7.9 Addressing Stakeholder Concerns

The stakeholders most impacted by changes to the County's HHW and electronics recycling programs would be the local haulers if the County decided to implement curbside collection of used oil, antifreeze, and/or used electronics.

As mentioned previously, the County would need to research this option and conduct work sessions with local licensed haulers to discuss the implications of offering expanded collection services and gauge the interest of haulers in providing curbside collection service of these materials.

If the County chose to expand its HHW collection program to include a satellite facility or a mobile collection unit, the residents of certain cities, towns and villages within the County should benefit greatly from this service. If the satellite facility or mobile collection unit was a joint venture between a municipality and the County, any concerns related to financing, staffing and operations would need to be resolved before such a project could move forward.

## 7.10 Implementation Requirements

In order to expand the current HHW and/or electronics recycling program, County staff would need to evaluate each expansion option as it relates to:

- Federal and State rules and regulations;
- Local permitting;
- Storage issues;
- Handling of materials;
- Staffing requirements;
- Health and Safety issues;
- Capital expenditures and operating costs; and
- Other program-specific considerations.

## 7.11 Benefits and Drawbacks

Implementing an expanded HHW and/or electronics recycling program has benefits as well as drawbacks, as outlined below.

### 7.11.1 Benefits

The benefits to the County may include, but not be limited to, the following:

- A potential increase in HHW and e-waste collection participation from both residents and businesses;
- A potential increase in the quantities of materials collected;
- A potential decrease in the amount of HHW and e-waste disposed at the Broome County Landfill, thus increasing the life of the Landfill and reducing liability exposure to the County;
- Avoided disposal costs if consumer electronic take-back programs were promoted so less e-waste would come through the County's program;
- Environmental benefits from diverting materials from being improperly disposed, by offering more convenient disposal and recycling options for HHW and e-waste; and
- Overall increased health & safety of the communities located within the County.

### 7.11.2 Drawbacks

The drawbacks to implementing an expanded HHW and/or electronics recycling program would most likely be financial. Most program additions or enhancements would require the County to increase funding for additional staff and expenses.

By increasing the quantities of HHW and electronics collected, the County would incur increased collection, processing, transportation, disposal and recycling fees. However, any fees incurred are likely to be less expensive collectively when compared to the cost of landfill disposal on a per ton basis or per cubic yard of air space, or when compared to remediation costs due to a hazardous waste spill or incident.

As stated in previous issue papers, when considering the "cost" of recycling or diversion programs there are both "economic" considerations and "non-economic" considerations. Under economic considerations, the County must compare the cost of recycling programs with the cost of landfill disposal, including transportation costs and long term disposal obligations after the landfill is closed (post-closure obligations). For "non-economic" considerations there are factors such as environmental sustainability, carbon footprint, public desire for and participation in recycling, and New York State Rules and Regulations. These factors should all be considered as the County formulizes its integrated solid waste management planning efforts.

## 7.12 Resources

Provided below is a list of program information supporting R. W. Beck's analysis which may assist the County.

- Product Stewardship Institute
  http://www.productstewardship.us/
- U.S. Environmental Protection Agency, eCycling website:
  http://www.epa.gov/epawaste/conserve/materials/ecycling/index.htm
- U.S. EPA's Plug-In To eCycling program:
  http://www.epa.gov/epawaste/conserve/materials/ecycling/donate.htm#local

### 7.12.1 HHW Curbside Collection Programs

- City of Denver, Colorado – HHW Curbside Collection Program
  http://www.denvergov.org/rechhw/CollectionProgram/tabid/425374/Default.aspx
- City of Laguna Beach, California – HHW and Electronics Curbside Collection Program
  http://www.lagunabeachcity.net/government/departments/publicworks/services/hazwaste.htm
- Sarasota County, Florida – Curbside Collection of Used Motor Oil and Electronics
  http://www.co.sarasota.fl.us/EnvironmentalServices/SolidWaste/MotorOil.asp
  http://www.co.sarasota.fl.us/EnvironmentalServices/SolidWaste/Electronics.asp

### 7.12.2 Product Re-Use Programs

- Kansas City, Missouri
  http://www.kcmo.org/water.nsf/web/swapshop
- City of Fargo, North Dakota
  http://www.cityoffargo.com/Residential/CityServices/Householdhazardouswaste/Productreuseroom/
- Hennepin County, Minnesota
  http://www.co.hennepin.mn.us/portal/site/HCInternet/menuitem.3f94db53874f9b6f68ce1e10b1466498/?vgnextoid=d4d8bbf4099fc010VgnVCM1000000f094689RCRD
- Sarasota County, Florida

  ReUzIt Shop:
  http://www.co.sarasota.fl.us/EnvironmentalServices/SolidWaste/HazardousWaste/ReUzitShop.asp

  Recycled Paint:
  http://www.co.sarasota.fl.us/EnvironmentalServices/SolidWaste/HazardousWaste/RecycledPaint.asp

### 7.12.3 Electronics Curbside Collection Programs

- Town of Cary, North Carolina
  http://www.townofcary.org/depts/pwdept/recycling/computers.htm
- City of Centerville, Minnesota
  http://www.centervillemn.com/index.asp?Type=B_BASIC&SEC={B9958A9F-F7B1-41C4-BEE0-31E5E48841C3}
- Cleveland Heights, Ohio
  http://www.clevelandheights.com/citydept_works_refuse_recycling.asp
- Contra Costa County, California
  http://www.wastediversion.org/specialcleanups.htm#reuse
- San Mateo County, California
  http://www.recycleworks.org/cgi-bin/bin/user/details_company_aq.pl?id_company=213&id_subcategory=54&ActualType=where
- Sarasota County, Florida
  http://www.co.sarasota.fl.us/EnvironmentalServices/SolidWaste/Electronics.asp
- City of Solon, Ohio
  http://www.solonohio.org/PublicWorks/serviceInfo.html#recycle