

Mr. Don Blakesley Mercer County Solid Waste Authority 2491 Highland Road Hermitage, PA 16148

Subject: Mercer County Technical Assistance Report

Dear Mr. Blakesley:

The Mercer County Solid Waste Authority is interested in expanding its recycling program to provide opportunities for residents to recover "non-traditional;" recyclables such as:

- Electronics;
- Household hazardous wastes (HHW);
- Tires;
- Appliances and,
- Illegally disposed waste.

To assist the Mercer County Solid Waste Authority (Authority) achieve this objective, R. W. Beck evaluated data from other counties in Pennsylvania and the United States that have diverted "non-traditional" recyclables into their solid waste management system to identify:

- How the material(s) are diverted;
- Cost of the program(s);
- Amount of each material collected:
- Number of households served;
- Whether commercial entities are able to participate,
- How the County manages the final disposition of the materials (and at what cost); and,
- How the County pays for the program, including whether user fees are assessed.

Introduction

As part of this project, R. W. Beck facilitated a work session with Authority board members in June 2005. Based on the comments that were generated at this work session, R. W. Beck researched the feasibility of the Authority establishing programs to divert the following "non-traditional" recyclables:

- Electronics;
- Household hazardous waste;
- Tires; and,
- Appliances.

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In addition, the Authority requested R. W. Beck to evaluate whether a program that addresses illegal dumping could be established, as well as an annual education/advertising campaign.

ELECTRONICS

OVERVIEW

A recent study by the National Recycling Coalition estimates that over 20 million personal computers became obsolete in the United States in 1998. Between 1997 and 2007, nearly 500 million personal computers will become obsolete -- almost two computers for each person in the United States. Some studies predict that a large number of televisions will be disposed when high definition television becomes widely available. Many used televisions, monitors, printers, and other types of electronic equipment are finding temporary shelter in attics, basements, and warehouses. Businesses and households keep these products because they believe that they may still be valuable, but the longer equipment remains in storage, the less useful it becomes. While end-of-life electronics currently comprise only a small amount (1 to 2 percent by weight) of the municipal waste stream, that percentage is expected to grow dramatically in the next few years.

Many state and local government agencies are concerned about how to ensure proper management of older electronic equipment. Local authorities around the country are exploring options to shift the cost for end-of-life management from the taxpayer to the consumers, retailers, and manufacturers. Electronics manufacturers produce better, faster, and more affordable products to meet consumer demand but are not responsible for their environmental impacts and final disposal costs. Electronic products often contain hazardous and toxic materials that pose environmental risks if they are not properly landfilled or incinerated. Televisions and video and computer monitors use cathode ray tubes (CRTs), which have significant amounts of lead. Printed circuit boards contain primarily plastic and copper, and most have small amounts of chromium, lead, nickel, and zinc. In addition, many electronic products have batteries that often contain nickel, cadmium, and other heavy metals. Relays and switches in electronics, especially older ones, may contain mercury. In addition, capacitors in some types of older and larger equipment that is now entering the waste stream may contain polychlorinated biphenyls (PCBs). Finally, the environmental impact of flame retardants used in plastics, namely polybrominated biphenyl (PBB) and polybrominated diphenyl ether (PBDE) are being questions. Another serious concern associated with end-of-life management is the export of electronic scrap to developing countries that may lack adequate worker safety and environmental standards.

Development of a national recovery system has been underway for several years by the National Electronics Product Stewardship Initiative (NEPSI) that promotes a product stewardship approach, whereby all parties share responsibility for environmental impacts resulting from the manufacture, use, and disposal of obsolete electronics. The NEPSI collaborative proposes implementation of a sustainable financing system for a national electronics product stewardship plan, utilizing an up-front fee system or cost-internalized model, where the cost for recycling is included in the purchase price of the electronic product. The electronics manufacturers pledge to develop a viable funding model for this national recovery system. Some individual states are exploring similar legislation to address this important waste management issue.

Although a national initiative for managing electronic is gaining momentum, the short-term outlook indicates that local governments will need to manage this particular waste stream.

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ELECTRONICS CASE STUDIES

Saint Louis-Jefferson Solid Waste Management District

Through a grant from the St. Louis-Jefferson Solid Waste Management District, the Waste Management Program and four co-sponsors¹ (project co-sponsors) are developing a regional collection and processing system for the economical and environmentally sound management of consumer electronics. To promote program sustainability, this proposed regional system will adopt a product stewardship, or cost-share approach among all of those responsible for the proper management of unwanted electronics and seeks to expand the local used electronics reuse and recycling infrastructure. Currently, in the St. Louis metropolitan area, there are several private businesses offering electronics recycling services and non-profit organizations that refurbish reclaimed electronics to provide affordable technology to those in need. To supplement this infrastructure, this regional consumer electronics collection system is expected to prepare the region for implementation of a national recovery system or introduction of voluntary industry recycling systems in the area by offering:

- A comprehensive network of reuse and recycling outlets for consumer electronics;
- Favorable regulatory guidelines for collection, processing, and reuse or recycling of consumer electronics; and
- Government-supported public education, market development, and community collection efforts.

As part of the project, a regional Task Force of seventeen members has been established that represents various organizations (municipalities, public regulatory agencies, the solid waste industry, recycling companies, non-profit organizations, citizens, etc.) to design a pilot collection program serving the counties of St. Charles, Saint Louis and Jefferson, as well as the City of St. Louis. The Task Force will develop legislative policies to strengthen product stewardship principles.

The project co-sponsors and the Task Force are currently developing a year-long pilot collection program for recycling electronics according to the following guidelines:

- Establish a permanent regional collection system with convenient locations, open on a regular and predictable schedule (at least four permanent drop-off locations with at least one in each jurisdiction);
- Approve host collection sites through a due diligence auditing process to ensure environmentally sound management of used electronics and regulatory compliance;
- Charge a user fee in the amount to cover all collection and processing costs. Select host sites committed to collecting residential electronics after the pilot collection program is completed. Host site(s) that received grant funding for start-up costs shall continue to offer affordable service to residents after completion of the pilot collection program;
- Select host sites that will divert through reuse and recycling as much collected material as possible, in accordance with regulatory guidelines and pilot program goals and objectives;
- Prohibit export of hazardous electronic waste for repair, recycling, or disposal to developing countries that may lack adequate worker safety and environmental standards;

¹ City of St. Louis Refuse Division, St. Peters Health & Environmental Services, Jefferson County Waste Management Program – Code Enforcement, and St. Charles County Department of Community Health and Environment.

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- Develop local infrastructure for cost effectiveness; and
- Establish a model for other regional solid waste management issues.

The year-long pilot program commenced in the spring of 2005.

Centre County, Pennsylvania Solid Waste Authority

The Centre County Solid Waste Authority (Centre County) initially began collecting used electronics as part of a pilot program for the Untied States Environmental Protection Agency (USEPA). Centre County has continued to collect used electronics through special collection events, which are typically held every other year. Through a competitive bidding process, Centre County contracts with a private company to and recycle the used electronics. Centre County employees and boy scouts staff the event. In recent years the events have been held at the Centre County transfer station, and the contactor has been Envirocycle, Hallstead, Pennsylvania. Participants are limited to Centre County residents, and some non-profit organizations. Businesses are referred to a local, private recycling firm – Reclamare, Tyrone, Pennsylvania.

Centre County proactively promotes their used electronics recycling events through mechanisms such as:

- Radio station interviews and remote broadcasts at the events;
- Wrap-around banners on the recycling drop-off containers;
- News flashes on their website:
- County and Penn State payroll inserts;
- Intranets at local businesses; and,
- Newspaper and community newsletter inserts.

During 2005, Center County received 247,000 pounds of electronics and paid Envirocycle 17.5 ¢ per pound to process the used electronics. Center County offsets a portion of the processing costs through funding from PADEP and donations. In 2006, Centre County will be finished modifying their transfer station and will evaluate the institution of a permanent electronics recycling drop-off at this facility during operating hours, as well the a minimal user fee.

FINANCIAL IMPACT OF ELECTRONICS DIVERSION IN MERCER COUNTY

Based on the averages from Pennsylvania collection programs for electronics, approximately one percent of the target population attends the event and each participant brings 75 pounds of used electronics. Applying these averages to Mercer County's population (119,895), an estimated 89,921 pounds will be received at an event. Most electronics processors charge between \$0.15 to \$0.25 per pound to process these materials, which means that an electronics recycling program could cost the Authority between \$13,000 and \$23,000 annually.

HOUSEHOLD HAZARDOUS WASTE

As with electronics, household hazardous waste (HHW) comprises a relatively small percent of the waste stream. However, improper disposal of household hazardous wastes can include pouring them down the drain, on the ground, into storm sewers, or in some cases putting them out with the trash. The dangers of such disposal methods might not be immediately obvious, but improper disposal of

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these wastes can pollute the environment and pose a threat to human health. Many communities in the United States offer a variety of options for conveniently and safely managing HHW.

Consequently, R.W. Beck evaluated the following three HHW options for implementation in the Mercer County:

- Special collection events
- A permanent collection center
- Curbside collection

OPTION 1: HOUSEHOLD HAZARDOUS WASTE COLLECTION EVENTS

Some counties and municipalities conduct annual collections of household hazardous wastes. Household hazardous waste collection events are usually limited to residents of the county or municipality that sponsors the event or facility. Proof of residency is usually required before wastes will be accepted. There may also be a fee associated with collections to help defray the costs of the collection activities.

Most household hazardous waste collection events accept painting and automotive maintenance wastes. Some also accept unwanted pesticides, solvents, fertilizers, household cleaning products, and other chemicals or substances found in the home. Household hazardous waste collection facilities normally do not accept biological wastes, radioactive wastes (smoke alarms), compressed gas cylinders (propane canisters/tanks), PCBs, or ammunition/explosives. Most events are operated by a private contractor, does some consolidation of materials on-site and final consolidation and processing at an enclosed, off-site facility.

OPTION 2: PERMANENT COLLECTION CENTER

Option 2 would be comprised of an Authority-owned and contractor-operated permanent HHW collection facility. The facility would be centrally located and supplemented with mobile collection events to serve residents in the outlying areas. Option 2 would also include an on-going education component that would:

- Promote existing network of retail outlets accepting recyclables;
- Expand awareness of ways to reduce HHW generation; and
- Advertise permanent collection program availability.

Finally, Option 2 would promote the development of local markets for HHW materials by:

- Supporting local retailer take-back for motor oil, batteries, etc.; and
- Establishing a cost-effective collection infrastructure for household paint, computers, electronics, and possibly business-generated Universal Wastes².

² To encourage business recycling of certain hazardous materials defined as "Universal Wastes," such as fluorescent lamps, products containing mercury and certain pesticides, Pennsylvania regulations require less stringent regulations for manifesting and disposal.

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OPTION 3: DOOR-TO-DOOR COLLECTION

Option 3 would entail contracting with a private licensed hazardous material company to provide "door-to-door" residential HHW collection service. Under this system:

- Residents in designated areas would set an appointment for collection with the Authority by calling a reservation hotline;
- Residents would place materials in secure, leak-proof containers for pick-up at the curb;
- Senior and disabled residents would be provided additional assistance in packaging their materials required by contractor;
- No permanent facility or collection events would be required; and
- This option would include the same on-going education component as Option 2 and similarly promote the development of local markets for HHW materials.

A summary of R. W. Beck's assessment of each strategy's strengths and weaknesses are provided below in Table 1.

Table 1 HHW Strategies

	HHW Collection Events	Permanent HHW Collection and Processing Facility	Curbside Collection of HHW
Strengths	 Popular with the public. Fills a need. No year-long management required Minimal capital investment required 	 Potential to reduce transportation and disposal costs by shipping consolidated loads. Also, by offering a product exchange program, the Waste Management Program could avoid the disposal costs for some materials. More convenient for residents to have the opportunity to dispose of HHW materials year-round. Provides an option to offer satellite sites and/or mobile collection events to reach all areas of the County. Partnerships for the design, construction, and/or operations of the facility could reduce the financial burden on the Waste Management Program. 	 Convenient for residents. If the service is provided by a private company, the Waste Management Program would not be involved in the handling of HHW materials.

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Table 1 HHW Strategies

	HHW Collection Events	Permanent HHW Collection and Processing Facility	Curbside Collection of HHW
Weaknesses	 Inconvenient for residents to store HHW material until the next collection event. To date, nearly a half a million dollars is spent on collection events each season. By paying the contractor on a per-event basis, the Waste Management Program is not realizing economies of scale for transportation and disposal costs. 	 Initial capital costs could be high. May require additional staff or re-scheduling of current staff to accommodate hours of operation, including weekends. 	Could require additional customer service by the Waste Management Program, depending on how the program is structured. (Although most curbside programs require the resident to call the private company directly for service and inquiries.)

HHW BENCHMARKING

As part of the analysis, R. W. Beck conducted a limited benchmarking analysis of HHW programs in other communities. These communities have permanent facilities, collection events, and some have a combination of both. The result of this benchmarking is presented in Table 2.

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Table 2 HHW Benchmark Summary

	Hamilton County, OH	Crawford County, PA	Jackson County, MO	Dakota County, MN	Summit/Akron SWMA	Denver, CO	Solid Waste Authority of Central Ohio
Type of HHW Program(s)	HHW collection events held every 3 years. (Currently evaluating a permanent facility.)	One collection event per year.	Through MARC ¹ , the residents have access to 2 permanent facilities and various mobile events held April – October each year.	One permanent collection facility, plus 3-4 annual collection events.	One permanent collection facility, plus collection events as requested and coordinated by communities in the County.	One permanent facility and curbside collection.	Eighteen special collection events per year.
Tons collected	528	19	499	630	494	72	344
Cost per ton ²	\$853	\$2,016	\$1,200	\$1,040	\$1,200	\$2,083	\$1,132
Population	845,268	90,366	654,484	373,311	542,899	758,630	1,088,944
Pounds per capita collected	1.25	2.37	1.52	3.38	1.82	0.28	0.63

¹ Mid-America Regional Council

² This is calculated by dividing the total program costs by the number of pounds collected or the number of participants. However, each community may calculate total program costs somewhat differently (i.e., which expenses are charged to the HHW program, such as administration, public education, etc.).

³ Does not include capital costs.

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FINANCIAL IMPACT OF HHW DIVERSION IN MERCER COUNTY

Based on the results of the benchmarking analysis, the potential financial impact for each of the three HHW options is as follows:

- Special Collection Events
 - 1.25 to 1.36 pounds per capita
 - \$0.56 to \$0.62 per pound
 - **\$84,000** to \$100,000 per year
- Permanent Facility
 - 1.52 to 1.82 pounds per capita per year
 - **\$0.21** to \$0.60 per pound
 - **\$39,000** to \$130,000 per year
- Curbside Collection
 - 0.28 pounds per capita
 - \$1.04 per pound
 - **\$125,000** per year

Tires and Appliance Recycling

APPLIANCES

According to the Appliance Recycling Information Center (ARIC), the average American family owns half a dozen major appliances. Nearly every household has a refrigerator and range. More than 90 percent own clothes washers and dryers. Many have dishwashers, microwave ovens, freezers and dehumidifiers.

Major home appliances have a life expectancy of 10 to 16 years. When they finally reach the end of their life, the scrap steel can be processed and re-melted repeatedly to manufacture new products.

End-of-life major appliances can be picked up by municipal waste collection services or delivered to solid waste facilities or government-sponsored special collection events. However, haulers sometimes charge \$15.00 to \$20.00 per major appliance. Because of this, some white goods are illegally disposed. For residents who do not have affordable curbside collection available the appliances, some communities offer appliance collection days to prevent open dumping.

TIRES

According to the Pennsylvania Department of Environmental Protection, waste tires present a number of environmental, health and safety hazards to the public and represent a serious public nuisance. About 12.5 million scrap tires are generated each year in Pennsylvania, about one per capita, and approximately 12.5 million scrap tires remain in large stockpiles scattered throughout the state, and 23.5 million tires have been cleaned up within the past six years.

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Tire piles have the potential to create environmental and health hazards for residents in neighboring communities. Rainwater accumulates in tire piles creating an ideal environment for mosquitoes, which are known to transmit disease to humans. Another hazard is the tendency for tire piles to catch fire. A massive tire fire under an Interstate 95 in Philadelphia cost millions of dollars in damage and affected hundreds of thousands of commuters and businesses in the region over the course of several months. Experience has shown that large tire fires can burn for weeks causing the rubber to decompose into oil, which may pollute ground and surface water, as well as gas and carbon black.

Thus, similar to appliances, many communities have established tire collection programs to deter the illegal disposal and stockpiling of waste tires

APPLIANCE/TIRES RECYCLING CASE STUDY

The Solid Waste Authority of Cumberland County deters illegal dumping and promotes waste reduction and recycling through its appliance recycling events. Under this program, Cumberland County residents can drop off unwanted and unused tires and appliances. The materials are consolidated and taken to a facility where they are shredded for recycling. All CFC containing appliances are de-serviced before shredding. Following is a list of items that can be dropped off at the events:

- Passenger car tires, light truck tires and rims (Tires must be removed from rims for acceptance, and a limit of 12 tires per household)
- Microwaves
- Stoves
- Hot water heaters
- Clothes washers and dryers
- Dishwashers
- De-humidifiers
- Air conditioners
- Refrigerators
- Freezers

Cumberland County has the following restrictions for participating in the program:

- No businesses
- Cumberland County residents only
- Limit of 12 tires per household
- No household trash
- No household recyclables
- No furniture or mattresses
- No yard waste
- No construction debris

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No household hazardous waste

Table 3-3 summarizes the tire and appliance program results from 2001 through 2004.

Table 3
Cumberland County Tire and Appliance Program Results

Year	Number of Vehicles	Tons of Appliances	Tons of Tires
2001	450	38.55	28.90
2002	356	24.99	20.94
2003	982	71.30	76.82
2004	770	45.33	75.93

FINANCIAL IMPACT OF APPLIANCE AND TIRE DIVERSION IN MERCER COUNTY

Based on Cumberland County's data, the quantity of appliances delivered to their collection event was 0.002 tons per capita and tires were 0.03 tons per capita. Based on these statistics and the population of Mercer County, 119,000, approximately 240 tons of appliances and an estimated 42 tons of tires would be delivered to an Authority collection event. In general, appliance recycling does not cost communities money because the cost of staffing the event and removing Freon from refrigerators, freezers and air conditioners is typically off set by selling appliances to scrap metal dealers. With respect to tires, most tire processors charge between \$1.00 and \$1.25 per tire to load the tires into transportation vehicles, transport, and process the tires. Using an average of 20 pounds per tire, a Mercer County tire collection event could receive 4,100 tires, which could cost the Authority between \$4,100 and \$5,100 per year to manage.

LITTERING AND OPEN DUMPING

In recent years, there has been increased awareness with regard to littering and illegal dumping, and the impact it has on both rural and urban areas in the United States. Mercer County is not exempt from littering and illegal dumping challenges, and requested R. W. Beck to estimate the cost of a comprehensive program for addressing these issues. Therefore, R. W. Beck provided the Authority with information on Clark County, Ohio since it contains all of these components.

LITTERING AND ILLEGAL DUMPING CASE STUDY

Clark County, Ohio is a semi rural community with one large population center, the City of Springfield. The County has a population similar to Mercer County. The county is served by five waste haulers, and the entire county has subscription based waste collection. Due to this subscription waste collection system, illegal disposal of waste is a significant problem. To address the program, the County has hired two full-time environmental enforcement officers who are authorized to arrest individuals who illegally dispose waste.

The County also has the PRIDE program, Providing Responsibilities for Inmates through Duties for the Environment. The PRIDE program allows select individuals from the County jail to work towards reducing their sentences by helping pick up litter and care for public areas.

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The County has also established a 24-hour hotline to report illegal waste disposal, which is advertised throughout the County on billboards and newspapers. Finally, the County funds the clean-up of illegal dumpsites. This program costs Clark County approximately \$230,000 per year.

FINANCIAL IMPACT ON MERCER COUNTY

Although the Clark County litter and illegal dumping program is successful, R. W. Beck recommends that the Authority introduce a more limited program and provided grant funds to existing Mercer County organizations that address open dumping and litter abatement. For financial analysis purposes, R. W. Beck assigned an annual budget of \$25,000 to this program.

EDUCATION/AWARENESS

As previously discusses, the Authority instituted and extensive and comprehensive education/awareness program in 2004, which contributed to a substantial increase in the quantity of recyclables collected. The Authority does not currently have a budget for on-going education/awareness, which R. W. Beck considers essential for optimizing the performance of the "Recycle 2000" program. Thus, a budget of \$50,000 has been included in our financial analysis to fund education/awareness initiatives such as:

LIMITED NEWSPAPER ADVERTISING

Newspaper advertising is a traditional component of most outreach initiatives and should be used to promote 'Recycle 2000".

REFRIGERATOR MAGNETS

Residents will need to be constantly reminded about what and where to recycle and how materials should be prepared to facilitate the success of Authority's program. R. W. Beck recommends that the Authority use 3" x 5" refrigerator magnets to accomplish this because they are:

- 1) Durable;
- 2) Large enough to provide material and preparation information;
- 3) Provide graphics of what can be recycled; and,
- 3) Regularly seen by the intended target audience.

PUBLIC OUTREACH

The Authority could also engage in other activities that are fun, inexpensive, and bring attention to the recycling program through public outreach. Some potential public outreach activities for consideration might include:

Obtain Commitments

Research has shown that individuals who make either a written or oral commitment to recycle will recycle more frequently and in larger quantities than those who were merely informed of the recycling program. To illustrate, one study asked individuals to sign a pledge to recycle newspapers during a two-week period. Not only did the majority of individuals who signed the commitment recycle their

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newspapers during that time frame; but these same individuals continued their recycling behavior after the two-week period.

It may not be possible for the Authority to individually solicit written commitments to recycle from every household. Therefore, the Authority may want to target venues where large numbers of residents gather. However, simply asking residents to commit to recycling is not enough. The "salesperson," as with any selling situation, must be able to persuade and overcome objections to recycling.

Establish Block Leader Programs

The Authority could establish a "block leader program" to enlist community support to promote recycling throughout the Authority and to engage in friendly competition designed to boost recycling. In this program, individuals could be identified either by block or within established zones. These individuals could be responsible for setting an example for the rest of their area, visiting neighbors to personally encourage recycling and other waste reduction activities, and to distribute materials on behalf of the Authority.

In order to encourage people occupying rental units to recycle, it may be useful to not only have a block leader program, which would catch most new residents, but also have the landlords of rental properties be responsible for disseminating information about the Authority's recycling program to their tenants.

Promote Goals

The Authority could bring attention to recycling goals by developing a visual method of showing progress. The Authority could create a sign that could be placed in a highly visible location. The sign would show a graphical depiction of the progress toward achieving the goal (a thermometer, a recycling truck traveling to a materials recovery facility, a pie chart etc.) will help residents see where they are in relation to the goal and encourage them to recycle more to meet the goal.

EDUCATION IN THE SCHOOLS

Educating students in grades K-12 may be a very effective way of reaching Authority residents both now and for the future. Students often become the strongest advocates of recycling, and will ensure that recycling is happening in their homes.

The Authority may want to work cooperatively with the adjacent counties to educate students and promote recycling. Of course, teachers often struggle just to teach their traditional curriculum, so the Authority must be sensitive to this and be willing to assist in school-based efforts. Activities that have been used in other areas include:

- An Authority sponsored art show and/or "inventions" using recycled materials. This could also take a seasonal form, such as recycled Christmas ornaments. Student creations could be displayed at a local shopping center or other heavily traveled location. It would be particularly helpful to have a local sponsor or sponsors—including a media outlet—to provide funding, awards, and publicity. A jury of art teachers and community leaders could be used to judge the entries, and could determine what is actually shown to the public if there are too many entries.
- Several performing groups have delivered the recycling message very successfully to schools throughout the Commonwealth. These groups include The Illusion Maker, Timothy Wenk Magic,

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and the KidsMatter National Theatre. These groups will come into the schools and perform at student assemblies.

Some schools have used recycling as an opportunity to promote exchanges between older and younger students. In Plum Borough (Allegheny County), high school students were trained to teach primary school students about recycling and waste reduction.

CONCLUSIONS

As demonstrated by the previous text, communities throughout the United States, as well as Pennsylvania have implemented programs to recover "non-traditional" recyclables. Beyond providing an outlet to mange materials that present unique environmental hazardous if mismanaged, the recovery of these materials in Mercer County could increase recycling quantities by 405 tons per year.

I can be reached at (513) 936-8955 if you have any questions or need any additional information regarding the attached invoice. Thank you for your attention.

Sincerely,

R. W. BECK, INC.

Karen Luken Project Manager

KL:ls