Final Report

Wyoming County
RECYCLING CENTER ANALYSIS

Pennsylvania Department of Environmental Protection

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R·W·BECK

Wyoming County
RECYCLING CENTER ANALYSIS

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Introduction

Since the adoption of Act 101 in 1988, the Pennsylvania Department of Environmental Protection (DEP) has provided grant-funding opportunities for recycling programs and processing facilities throughout the Commonwealth. Numerous municipalities and counties have benefited from the materials recovery facilities (MRFs) that have been established in various urban, suburban, and rural areas in Pennsylvania with financial support provided by DEP.

Wyoming County residents have had the opportunity to recycle since the early 1990s, when Endless Mountains Recycling Service, a private waste hauling group, converted a maintenance garage in Tunkhannock Borough into a materials recovery facility (MRF) to process materials collected by their collection vehicles, as well as materials dropped off by residents. In the mid-1990s, the County assumed operation of the facility. The original MRF was shut down in 1999, due to state road construction. Prior to construction of the new facility, Wyoming County officials discussed the possibility of a joint operation with Susquehanna County officials. However, the location preferred by Susquehanna County would have been inconvenient for Wyoming County residents, businesses, and haulers. The present facility was constructed in 2000, and was largely funded with DEP grants. There have been no upgrades to the facility since its construction.

Wyoming County has a population of 28,000. None of the municipalities within the County is mandated to recycle under Act 101. The Recycling Center serves primarily drop-off sites and those residents and commercial entities that deliver recyclables to the facility. No municipalities in the County have organized collection of recyclables. Wyoming County does not charge resident and commercial businesses to drop off recyclables, but charge haulers $15 per ton to deliver recyclables (haulers are reimbursed $5 per ton to go toward their County licensing fees, in order to encourage them to deliver recyclables to the Center).

Most curbside materials come into the Center sorted into fiber and commingled materials. Incoming fiber is further sorted to prepare newspaper (ONP #8), domestic and imported old corrugated cardboard, white office paper, and magazines. Commingled containers primarily enter the facility in film plastic bags and are sorted by laborers on a sort line. About half of the materials processed at the Center are delivered to the drop-off area by residents and commercial entities.

The Recycling Center is a 14,040 square foot building on 2.4 acres. The Center can process five tons per day, based on a five-sorter, 10-hour workday. The facility is currently processing just over two tons per day, on average. The facility includes the following space allocations:

- 1,662 square feet for incoming materials;
- 4,362 square feet for processed material storage;
- 6,896 square feet for processing equipment; and
- 1,120 square feet for offices/break rooms.

Assessment Results

Overall, the Wyoming County Facility is a well-run, extremely clean facility, whose employees appear to be hard-working and efficient in the use of their time, as well as self-directed. The main issue facing the facility is that it is underutilized – receiving under 550 tons per year, which is less than 10 percent of capacity. In addition, the Center is in a rural area where recycling is voluntary, and not close to main highway interchanges, which can have a negative impact on commodity pricing. Still, there are potential activities that the Center can undertake to improve its situation.

Recommendations

Recommendations for enhancing Center operations, based on the site visit and subsequent analysis, are presented below for consideration.

General Operations

- ***Increase the tonnage of materials coming into the Center.*** The Center should work to expand the types and numbers of entities involved in recycling and the types of materials it accepts although not necessarily in a way that results in more types of materials sold (perhaps marketing a soft mixed paper or sorted office paper grade rather than market white ledger). The County might, for example:
    - *Meet with businesses and haulers to help increase recycling, and identify the best role for the County to take.* The County should develop a two-year action plan detailing how they will increase recycling tonnages coming into the Center. Soliciting input from local businesses, municipalities, and haulers, will better enable the County to develop strategies that attract additional material suppliers and will help the County move forward with the support of local stakeholders. Issues/questions to be explored include:
        - What factors are keeping businesses and municipalities from recycling?
        - How can the County encourage haulers and businesses to deliver recyclables to their facility?
        - What entities (commercial/industrial/institutional) are not currently recycling that should be?
        - What is the most businesses and municipalities are willing to pay to recycle?

- Should the County pro-actively collect recyclables (using the Center's pickup truck and towing Haul-All containers) from entities, for a charge?

- *Develop a competition among schools and/or municipalities to deliver the highest amount of recyclables per-capita or per-student.* Local businesses could be asked to provide prizes, and they could receive free advertising on the County's web site and/or local newspaper for providing incentives.

Ideally, the County's services should complement versus compete with those provided by private haulers. It is important for the County to develop a positive rapport with commercial haulers, in order to encourage them to supply the Center with recyclables. In addition, it may be possible for the County and private haulers to develop a public-private partnership to increase recycling among commercial and institutional entities.

- ***Consider modifying the County's recycling ordinance.*** The County could modify its recycling ordinance to stipulate that haulers providing trash collection service in the County to residents must include recycling collection services at no additional cost to the resident. Although haulers' rates would likely increase slightly, they would find their recycling routes to be more cost-effective, as they would be collecting more material while their disposal fees would decrease.

- ***Add another sorter to the sort line.*** Although the facility itself is understaffed, the sort line is designed for at least three sorters, not two. Operating with three sorters would allow the Center to sort more efficiently.

- ***Hire another employee that can bale materials.*** The Center should look into hiring an additional employee, perhaps another Senior Aide Employee, whose salary would not come from the Center's budget, to bale materials. This would free the Recycling Coordinator's time for more strategic activities.

- ***Move the HDPE bin to the far left, and make this the first material removed from the sort line.*** In general, it is most efficient to remove large items from the sort line first, as they tend to block other items. This would also reduce the number of times the sorters have to cross each other's path to tip 35-gallon drums of plastic containers to the appropriate storage bunkers below.

- ***Further sort and market HDPE plastics into natural and colored grades.*** The Center should bale the materials separately and gain the higher price ($0.08-$0.10/lb.) for natural HDPE. During the site visit, a majority (more than 75 percent) of the separated HDPE plastic containers visually observed were natural HDPE. This change in sorting and product could increase annual revenues by $3,500 to $4,500 per year. The most simple way for the Center to do this, given the limited number of sorters and the challenge that would be faced in dividing the HDPE storage bunker, would be to continue to sort all HDPE bottles into the HDPE bunker. When baling the HDPE, sorters could pull the colored. This would require slowing the conveyor speed. Another alternative would be to place a divider in the HDPE storage bunker, such that colored HDPE bottles could be stored in the back section of the bunker, and natural in the front.

- ***Improve signage to the Recycling Center.*** Provide more directional signs along the approach route as well as a new entrance sign placed at an angle in order to improve visibility of the Recycling Center in the community.
- ***Improve signage on the bins used at the Center for drop-off, as well as on the municipal drop-off containers.*** The signage on the drop-off bins contains text only. While the lettering is relatively large, research has shown that the best visuals include pictures of what should be placed in the container.
- ***De-bag recyclables before processing.*** Because this facility processes a relatively low tonnage of material, and has limited space on the tip floor, a trommel or bag-breaking machine is not recommended. Instead, employees could be equipped with letter-openers to rip bags open upon their delivery to the tip floor, then shake the materials directly onto the tip floor. Once materials have been de-bagged, they can be pushed onto the incline feed conveyor. The sort line should then be able to be operated at a more rapid and consistent speed, as materials will travel up the incline belt more consistently (e.g., not tumble back down the conveyor) and therefore will be fed onto the sort conveyor more consistently. In addition, sorters will not have to sort to remove bags, or to de-bag materials. This may also help reduce contaminants, as some recyclable materials are likely being trapped in plastic bags and therefore deposited into the trash compactor.
- ***Consider recycling green glass.*** Although the Center is not set up to recover a third glass color, and green glass is the least cost-effective, the Center should recover green glass from incoming material. An enclosed ramp leading into a two cubic-yard bin could be rigged from the sort platform to a bin below where green glass could be deposited upon sorting. The ramp would have to be positioned such that it does not hinder the sorters' ability to exit the platform quickly in the event of an emergency. Center staff could empty the glass into the spare roll-off container outside with a forklift. Current prices for green glass are -$20 to -$5 per ton. Assuming the Center can receive a "price" of -$10 per ton, and a full-load is 17 tons, the Center would have spent $645 ($475 pull fee + $170 "price") to recycle the glass instead of $986 to dispose of the glass, for a net savings of $341 per load. This is likely a conservative scenario, as nearby counties are receiving $4 and $5 per ton for green glass. If the glass were stored in other types of containers that do not specifically require a vehicle with a large pulley hoist system for collection, the Center would have more end markets available to them, and could likely find improved pricing. By recovering the green glass the Center would increase the tonnage recycled, which could increase DEP Recycling Performance Grants. It would not make sense, however, for the facility to advertise that they recycle green glass, as it is still a cost. The break-even point (the point at which it no longer makes sense to recover green glass), excluding performance grants and assuming pull fees remain constant at $475, is -$30 per ton.

Education and Outreach

- Implement an "all bottles" education campaign for plastics. Much of the residue coming into the facility appears to be non-recyclable plastic containers, such as yogurt and other food tubs. An "all bottles" campaign is one way to simplify the recycling message. Residents are taught that all plastics bottles with a neck can be recycled – thus residents perceive the program as more simple (no need to look at numbers on the bottom), enticing higher participation levels and less contamination (e.g., fewer non-recyclable #1 and #2 plastics are delivered to the MRF).
- ***Encourage residents to use a container other than plastic bags for recycling.*** The Recycling Coordinator indicates that residents prefer to use plastic bags to contain their recyclables. At least two haulers operating in the area are known to operate collection vehicles that do not have separate containers for different materials. Thus, prohibiting the use of plastic bags entirely would mean that those haulers would have to reconsider the manner in which they collect recyclables. For example, haulers with a single-body collection vehicle could collect commingled containers one week, and fiber materials the next. Another alternative would be for the haulers to use containers within their vehicles to separate fibers from commingled containers. Currently Waste Management and Tunkhannock Borough have multi-compartment collection vehicles for recyclables, and at a minimum, those customers should be encouraged to use reusable containers to set out their recyclables. Similarly, residents at drop-off sites should be encouraged to deposit materials unbagged into the containers. Signs could be placed at the drop-offs instructing residents to deposit loose materials only into the bins. Municipalities could be asked to provide a trash bin for plastic bags at the drop-off site, or a sign could instruct residents to take their bags with them. To reduce the likelihood of contamination, the County might also improve the signage on the drop-off containers to include pictures indicating what should be placed in each compartment.
- ***Simplify the educational information available on the County's web site.*** The current information on the web site is wordy, and has too much description telling residents what **not** to include in each commodity stream. This message could be simplified using pictures and more brief descriptions. Similarly, most residents are likely unaware of the difference between U.S./Canadian and imported cardboard. The information on the County's web site describes white ledger recycling to residents and businesses, but discourages recycling of other types of paper including magazines, newspaper and cardboard, which are commodities marketed by the Center.

Materials Marketing

- ***Investigate markets for plastic bags***. If the Center continues to receive a considerable amount of recyclable materials in plastic bags, the Center should explore potential markets for these bags. Although it often takes a long time to collect a full load of these materials, demand for the material is high. The Center

should contact end markets for this material to assess the viability of such a market. If the County elects to pursue marketing its bags, the County could also work with local grocery stores to collect bags, thereby enabling the Center to produce truckload quantities more rapidly. As part of the research for this project, one end user of this material, AERT (of Springdale, Arizona), was contacted (479-756-7406). The contact there indicated that baled HDPE and LLDPE blends are currently bringing $0.17 to $0.21 per pound. This is a range of $340 to $420 per ton. Before embarking on such a project, the Center should produce a test bale to ensure that it can make bales to the specified density, and that the bags recovered from the MRF are suitable for recycling. Bale specifications for mixed loads are available at the following web site: http://www.aertinc.com/MIX%20Specifications.pdf.

- ***Target additional paper grades in lieu of high value white grades***. Although white ledger is generally a high-value product, the Center is not receiving full price for white ledger. Also, at seven bales per year, the Center's marginal revenues for high-grade would likely be relatively insignificant if it were receiving a better price. Instead, the Center should target higher quantities of all paper, and market a mixed paper bale, as well as work to capture more OCC. Sorted office paper, for example, currently has a regional price of $95 to $105 per ton, but consists of "white and colored groundwood free paper, free of unbleached fiber that may include a small percentage of groundwood computer printout and facsimile paper." The definition of sorted white ledger is "baled, uncoated, printed or unprinted sheets, shavings, guillotined books and cuttings of white groundwood free ledger, bond, writing, and other papers that have similar fiber and fiber content."
- ***Investigate additional OCC markets that are more forgiving of imported cardboard.*** The County is currently receiving $65 per ton for cardboard and is still being asked to remove most imported cardboard from this product. Nearby counties are not being asked to remove imported cardboard, but are also receiving lower pricing of $50 and $55 per ton. It is likely more cost-effective to market some lower grade cardboard bales for $50 or $55 per ton than pay $58 per ton for disposal of imported cardboard. Currently the Recycling Coordinator is trying to sell strictly imported OCC bales. He should conduct a cost-benefit analysis to see if this makes sense, as opposed to incorporating the imported cardboard in regular OCC bales and selling to a less strict market at a slightly lower price.
- ***Continue to monitor market pricing.*** One way to monitor pricing is by reading trade journals and publications such as *Recycling Today* and *Waste News*, or by subscribing to services such as *Waste News Pricing*. Although the Recycling Center is in a more remote area and may be further from some markets, it is beneficial to know the direction the market is taking, and the magnitude with which pricing is moving.
- ***Routinely contact at least three or four end markets to check pricing when ready to sell a commodity***. Although it is wise to be cautious with new vendors due to the risk of non-payment, calling several vendors will provide for a check

on prices being obtained from existing markets and may help the Center obtain better materials pricing.

- ***Periodically market each material to more than one market.*** Although this takes additional effort, and despite the fact that markets are currently strong, it is important to have an established relationship with more than one broker or market for each commodity should something happen to the predominant market.
- ***Recycle rigid plastics through Susquehanna County's Recycling Center.*** The Recycling Coordinator should contact the Susquehanna County Recycling Coordinator to see if he would accept rigid plastics from the Wyoming County Center. If so, Wyoming County could save disposal costs on rigid plastics, and Susquehanna County could market the rigid plastics on a more regular basis. Initially it would make sense simply to set aside what is being delivered to the Recycling Center unsolicited (e.g., as contaminants), and not to advertise to the community that the Center is accepting rigid plastics for recycling. If the program is successful and both counties agree, it might be beneficial to advertise that these materials can be accepted at some point in the future.

Safety/Loss Prevention

- ***Consider installing a surveillance camera or, at a minimum, installing a sign indicating that there is a surveillance camera at the Center.*** This would discourage residents from illegally dumping refuse at the Center.
- ***Encourage municipalities to post signs on their drop-off containers indicating that there is a surveillance camera at the drop-off site.*** During the site visit, one municipality indicated that their doing so greatly decreased the amount of trash left at their site. This would likely help decrease the facility's 12 percent residue rate.

Section 1
INTRODUCTION

1.1 Introduction

Since the adoption of Act 101 in 1988, the Pennsylvania Department of Environmental Protection (DEP) has provided grant-funding opportunities for recycling programs and processing facilities throughout the Commonwealth. Numerous municipalities have benefited from the materials recovery facilities (MRFs) that have been established in urban, suburban and rural areas of Pennsylvania.

In order to further the financial sustainability of Pennsylvania's MRFs, the DEP sponsored operational efficiency and cost evaluations in selected materials recovery facilities in order to identify potential:

- Processing system improvements;
- Revenue enhancements;
- Collection program improvements; and
- Opportunities for recycling centers to work together.

Identifying such opportunities will help DEP maximize the return on investment of recycling grant funds. The DEP sponsored two such studies in 2005, and three in 2006. The Wyoming County Recycling Center was one of three facilities that were evaluated in 2006. This report presents the results of that study.

Objectives

The primary objectives of this project are to:

- Identify opportunities to improve operations and increase the efficiency of the Wyoming County Recycling Center;
- Identify opportunities to increase revenues and/or decrease risk from recyclables marketing;
- Identify best practices and potential solutions and improvements that may benefit other facility managers in Pennsylvania, such that they too can enhance their centers' operations.

Approach

The study approach included three project tasks:

- Task 1 – MRF Data Request;
- Task 2 – Conduct MRF Field Observation; and

- Task 3 – Prepare Report and Recommendations.

Prior to conducting the kickoff meeting and field evaluation, R. W. Beck submitted a formal data request to the Wyoming County Recycling Coordinator. The data request encompassed the following operational and financial items:

- General facility information;
- Material quantity reports and material markets;
- Financial information;
- Operational data;
- Equipment data;
- Employee data;
- Residue and material contamination rates;
- Contracts/Ordinances; and
- Future plans.

On March 27-28, 2006, R. W. Beck's project team reviewed the Recycling Center operations and interviewed/queried the County Recycling Coordinator and employees at the Recycling Center.

Field observations included all aspects of processing, and visiting a municipal drop-off site.

Section 2
RECYCLING CENTER

2.1 Background Information

The Wyoming County Recycling Center is located in Tunkhannock Township, PA. The facility has been in operation since January, 2001.

Wyoming County is a rural community of approximately 28,000 residents comprising 10,700 households. Tunkhannock Borough offers curbside collection of recyclables using their own multi-compartment collection vehicle; however, they are the only municipality in the County to do so. Some residents subscribe for curbside collection of recycling and refuse with private haulers. Haulers generally provide collection services for a flat fee, as opposed to charging rates that vary with the amount of waste generated (e.g., pay-as-you-throw). Several municipalities have drop-off containers on trailers to collect recyclables from residents, generally located at their municipal building or other convenient location. Municipalities deliver these containers to the facility when full.

Wyoming County is served by 19 licensed private haulers. Licensed haulers in the County are required to offer recycling collection for most items, with the exception of office paper. Haulers must pay a per-vehicle licensing fee based on the average number of vehicles operating in the County on a weekly basis. Licensing fees range from $50 to $500 per vehicle per year, depending on the type and size of the collection vehicle. Publicly owned and operated vehicles are charged a fee of $25 per year.

Some residents choose to burn their solid waste in backyard barrels, as the nearest disposal facilities are two landfills in Scranton area, about 25 miles away. Wyoming County does not have an ordinance banning backyard burning. No communities in Wyoming County are mandated to recycle. Thus, all recycling taking place in the communities is on a voluntary basis. Wyoming County's estimated the recycling rate for 2005 is approximately 5 percent.

Table 2-1 provides a summary of basic background information for the facility.

Table 2-1
Wyoming County Recycling Center Background Information

Facility Address	440 SR 92 South, Tunkhannock, PA 18657
Facility Owner	Wyoming County
Facility Operator	Wyoming County
Hours of Operation	7:00 am – 3:30 pm Monday – Friday
Number of Bays	1 Receiving 2 Loading
Number of Scales	1 Truck scale 1 Bale (5,000-pound) scale
Facility Operating Capacity	5 tons per day
Major Equipment	Sort belt conveyor, incline belt conveyor, and horizontal baler Pit inclined conveyor and main sort line conveyor Belt magnet Flint glass belt conveyor and crusher Amber glass belt conveyor and crusher Residue conveyor and compactor 2 Skid steer loaders 2 Forklift
Types of Materials Received	Newspaper Corrugated cardboard Magazines White office ledger HDPE plastic bottles PET plastic bottles Tin cans Aluminum cans Flint and amber glass bottles and jars

2.2 Description of the Recycling Center

The Wyoming County Recycling Center is on a site of 2.4 acres, and covers approximately 14,040 square feet. The average daily throughput of the facility is just over 2 tons. The square footage of the Center is allocated as follows:

- 1,662 square feet – incoming material storage;
- 4,362 square feet – processed material storage;
- 6,896 square feet – processing equipment; and
- 1,120 square feet – offices/break rooms.

The Recycling Coordinator estimates that there is enough incoming material storage space for approximately two weeks of incoming material, which is adequate, and for approximately two months of processed material storage, which is also adequate.

The Center appeared to be extremely clean during the site visit. The lighting on the sort line was good; however, the propane-powered heating and ventilation system above the sort line does not function properly. The Center has called the original vendor several times and a repair was attempted without success. The County plans to replace the system in the near future. The building is otherwise in excellent condition, and has heat sensors that trigger an alarm, in the event of a fire.

The Recycling Center indicates on its web site that they accept the following materials for processing:

- Plastic-only bottles and jars that are numbered 1 & 2 on the bottom;
- Clear and brown glass beverage and food containers;
- Steel cans;
- Aluminum cans/pie pans;
- Old corrugated cardboard (OCC) – from the U.S. & Canada only;
- Old newspapers and brown paper bags;
- Magazines - stapled and glue-bound are acceptable; and
- White office paper – (in a separate bag from other recyclables).

Items specifically **not** accepted at the facility, per the Center's web site, include:

- Lids and caps from plastic and glass bottles;
- Plastic tubs, trays, toys, furniture, and buckets;
- Green glass;
- Dishes;
- Light bulbs;
- Glass cups;
- Window panes;
- Dirty, rusty, and aerosol cans;
- Aluminum foil;
- Chipboard;
- Imported cardboard;
- Wax-coated cardboard;
- Junk mail;
- Wet newspapers; and
- Carbon paper.

The Center does not accept scrap steel including white goods. A scrap dealer that accepts materials from the public is located along State Route 92 in very close proximity to the Center and the Tunkhannock Township Building. The Recycling Coordinator believes that this scrap metal recycler, as well as others in the area, is providing adequate outlets for scrap metal generated in the County.

2.3 Equipment

Table 2-2 summarizes the equipment utilized at the Wyoming County Recycling Center below.

Table 2-2
Equipment Utilized at the Recycling Center

Equipment Type	Manufacturer/Model/(Year)	Materials Handled	Condition
Baler	Excel EX62 (2000)	All baled materials	Good
Baler Inclined Conveyor	Excel 4815 (2000)	All baled materials	Good
Baler Main Sort Line	HBC36X18	All baled materials	Good
Truck Scale	Thurman 465 (2000)	Incoming/ outgoing loads	Good
Small Scale	Pennsylvania 7600/4 (2000)	All baled materials	Good
Pit Inclined Conveyor	C.S. Bell IC-48X30 (2000)	All containers	Good
Main Sort Line Conveyor	C.S. Bell HSC -36x40 (2000)	All containers	Good
Clear Glass Crusher	C.S. Bell HMG-40 (2000)	Clear glass	Good
Clear Glass Conveyor	C.S. Bell GC 18X23 (2000)	Clear glass	Good
Brown Glass Crusher	C.S. Bell HMG-40 (2000)	Brown glass	Good
Brown Glass Conveyor	C.S. Bell GC18X23 (2000)	Brown glass	Good
Trash Conveyor	C.S. Bell TC-18X20 (2000)	Residue from container line	Good
Trash Compactor	Marathon RJ-225-VL04 (2000)	Residue from container line	Good
Skid Steer Loader	Mustang 2042 (2000)	Unprocessed materials	Good
Skid Steer Loader	Bobcat 743 (1988)	Unprocessed materials	Good
Forklift	Komatsu 15STLP-16 (2000)	Baled materials	Good
Forklift	Komatsu FG15-14 Type-LP (1985)	Baled materials	Good

During the site visit, the recycling coordinator was also organizing an electronics-recycling event through AERC, held at the Recycling Center on April 21 - 22. Table 2-3 summarizes the electronic equipment accepted at this event, and associated fees.

Table 2-3
Electronics Recycling Event Items Accepted and Cost

Item	Cost/Unit	Item	Cost/Unit
Answering Machine	$1.00/ea.	Microwave	$1.00/ea.
Batteries	$0.75/lb.	Modem	$1.00/ea.
Cell Phone	$1.00/ea.	Monitor	$1.00/ea.
Copier	$5.00/ea.	Other	$1.00/ea.
Console T.V.	$7.00/ea.	Pager	$1.00/ea.
CPU	$1.00/ea.	Printer	$1.00/ea.
Fax Machine	$1.00/ea.	Radio/Stereo	$1.00/ea.
Fluorescent Lamps	$0.25/ea.	Telephone	$1.00/ea.
Keyboard	$1.00/ea.	T.V. (no console)	$5.00/ea.
Laptop	$1.00/ea.		

The Recycling Coordinator was also planning a week-long waste tire collection event for May 1 through May 6. Residents with waste tires are asked to register at the Recycling Center. There is no charge for tires, and the County can accept up to 20 tires per resident. Only clean residential (not commercial) tires are acceptable. This program is possible through County and DEP funding.

Wyoming County plans to add waste motor oil and antifreeze recycling at the Recycling Center in the future.

2.4 Labor

Employees at the Wyoming County Recycling Center include a full-time Recycling Coordinator and two full-time employees (sorters/equipment operators). A Senior Aide Program employee previously worked part-time (20 hours per week) and recently resigned. The County is pursuing a replacement through the Senior Aide Program. The County did not incur any cost for the Senior Aide Program worker. In the past, the Center has not been successful in using low-cost County prison laborers. The Recycling Coordinator and the other two sorters/equipment operators are certified weighmasters. The employees' duties are described below.

Recycling Coordinator

- Coordinate all paperwork with DEP, including grant applications, annual reports, tire recycling and electronics recycling projects;
- Help haulers, townships, borough and the general public with questions relating to recycling;
- Supervise the daily operation of recycling center (including maintenance and repair and safety);

- Bale materials;
- Assure quality of processed materials to acquire the best market price;
- Develop and prepare public relations materials (e.g., newsletter, news releases, flyers, etc., to promote recycling efforts);
- Negotiate best market prices for materials;
- Interact daily with general public and haulers;
- Complete required production and inventory documentation and forms, including timesheets, bills of lading and monthly tonnage reports;
- Maintain and repair equipment and purchase supplies;
- Manage all day-to-day activities of the Center, including budget, employee timesheets, inventory, production marketing, weighing of trucks, employee relations, helping on sort line when needed, baling, loading trucks, and monthly paperwork of production totals.

Sorters/Equipment Operators

- Assist with unloading materials;
- Sort materials into proper material grades;
- Keep work areas clean;
- Assist residents and commercial entities with deliveries, as needed;
- Load baled materials onto vehicles:
- Move baled and loose materials to proper areas, using skid steer loader or forklift;
- Weigh bales; and
- Weigh vehicles and provide weigh slip to drivers.

The Senior Aid employee was trained to bale materials. His departure means that the Recycling Coordinator now is the only employee who can operate the baler.

Training

The Recycling Coordinator participates as much as possible in the Professional Recyclers of Pennsylvania (PROP) training courses. However, his current duties are also very valuable for day-to-day operations, so he is not always able to attend such events. The Recycling Coordinator provides hands-on training for the other employees.

2.5 Incoming Material Streams

Material streams delivered to the MRF in 2005 included:

- Residential drop-off materials from the following municipalities;
  - Eaton Township,

- Washington Township,
- Clinton Township/Factoryville Borough, and
- Northmoreland Township.

These municipal drop-offs are available to residents 24 hours per day, seven days per week. The Recycling Coordinator would like to add recyclable drop-off locations in the following three municipalities:

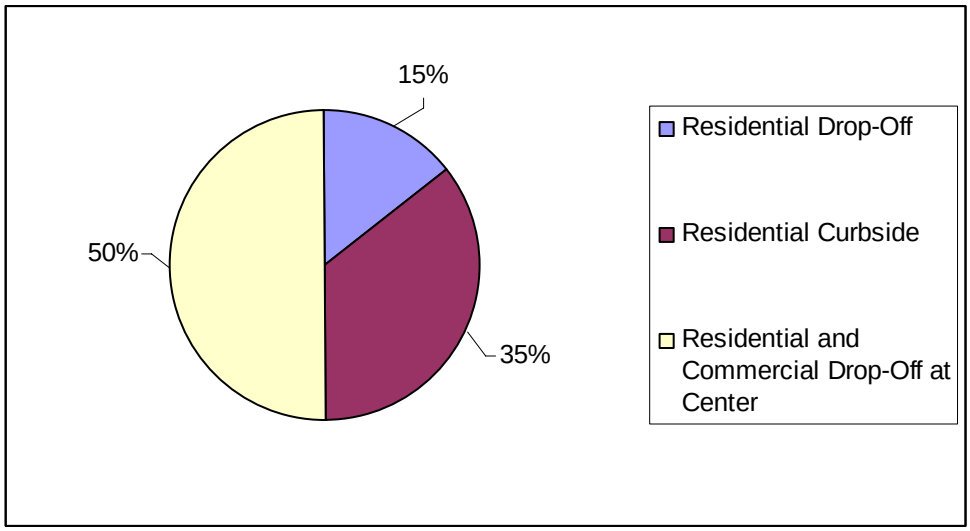
- Monroe Township,
- Nicholson Borough, and
- Windham Township.

- Residential Curbside Materials from the following municipalities;
  - H&D Waste (Delivers sporadically – relatively new hauler, using pickup truck);
  - Waste Management (Delivers the first two weeks of the month, using multi-compartment vehicle);
  - Searles (Delivers every week, alternating between ONP and commingled containers, using a dump-body truck); and
  - Tunkhannock Borough (Two loads every Tuesday, using multi-compartment vehicle); and
- Residential and commercial materials dropped off at the Center.

Ron Brown's Disposal provides solid waste and recyclables collection in the western end of the County, but delivers the materials to the Northern Tier Solid Waste Authority in adjoining Bradford County.

Figure 2-1 shows the portion each of these material streams contributed to the 529.44 tons delivered to the Center in 2005. As Figure 2-1 shows, half of the incoming materials were delivered to the facility by residents and businesses. Thirty-five percent of the materials processed at the facility in 2005 were from residential curbside programs (three private haulers plus Tunkhannock Borough), and 15 percent of the materials delivered were from the municipal drop-off sites. After the closure of the old recycling facility in 1999, Tunkhannock Township ceased curbside collection of recyclables, due to budgeting issues. The Recycling Coordinator has noticed a significant decrease in tonnage overall due to this change.

Figure 2-1
2005 Incoming Material Streams



2.6 Processing

Processing at the Wyoming County facility consists of unloading, sorting, and baling materials.

2.6.1 Unloading

Remote Drop-Off Materials

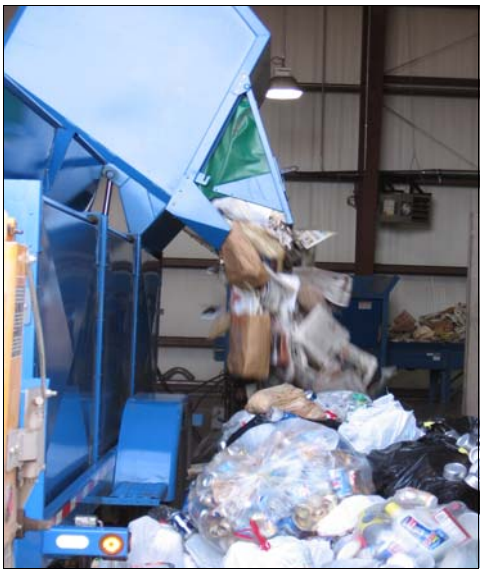
Residential drop-off materials from the four municipal drop-off sites are delivered by the municipalities. The drop-off containers are Haul-All systems, which are positioned on trailers, and are therefore easily transported with a pickup truck or any other available truck with a trailer pull. Once at the facility, the trailer is weighed and sorters/equipment operators or the recycling coordinator attach a portable hydraulic lift to each compartment and tip them, individually, in front of the appropriate material storage area. Haul-All containers are configured to have compartments for the following material types:

- Commingled containers (8 cubic yards with three compartments);
- Corrugated cardboard (4 cubic yards with one compartment); and
- Newspaper (4 cubic yards with one compartment).

The trailer is then weighed again after tipping.

Figure 2-2 shows a Haul-All trailer tipping at the facility.

Figure 2-2
Municipal Haul-All Container Tipping at Recycling Center



Recycling Center Drop-Off Materials

Residents place recyclables directly into labeled containers that are located adjacent to the Center. During the weekend, the drop-off containers are placed outside of the chain-link fence that encloses the entrance. If a commercial entity delivers a large load of recyclables, typically corrugated cardboard, the load is weighed and then the materials are tipped inside the facility. Drop-off containers are available for the following material types:

- Commingled (PET and HDPE bottles and jars; clear and brown glass beverage and food containers; aluminum cans; pie pans; and steel cans);
- Newspaper;
- Magazines; and
- Corrugated cardboard.

The Center does not accept green glass bottles. Commercial businesses generally deliver sorted materials directly to the facility, with the exception of some loads of mixed paper.

The 2-cubic-yard bins used in the residential drop-off area are loaded onto a forklift when full, and tipped directly into the appropriate sorted material storage bunker or into the commingled receiving area. Figure 2-3 shows the residential drop-off area during the weekdays near the office at the Center.

Figure 2-3
Drop-Off Area at Center

Residential Curbside Materials

Residential curbside materials are often delivered in two streams – fiber and commingled containers. In this case, collection trucks tip fibers close to the corrugated cardboard and newspaper storage bunkers and tip commingled containers, often bagged, near the commingled container receiving area at the base of the inclined feed conveyor. Vehicles delivering curbside materials are weighed once before and once after tipping.

2.6.2 Sorting

Commingled Containers

Commingled containers, many of which are bagged, are pushed onto the incline conveyor and sorted by sorters standing on one side of the raised platform (the other side is not accessible) above four storage bunkers. During the site visit, it was noted that the bagged materials sometimes roll back down the cleated conveyor. Due to the lack of a third sorter, as well as the fact that materials had to be de-bagged while on the sort conveyor, the line was stopped frequently. Figure 2-4 shows bagged materials rolling back on the inclined infeed conveyor. Concrete walls on three sides and a dual-swing chain link gates form a storage bunker. The four bunkers store PET plastic, mixed HDPE plastics, tin cans, and aluminum cans. There were only two sorters running the sort line during the site visit. Their roles were as follows:

Figure 2-4
Bagged Material Falling Back on the Inclined Commingled Infeed Conveyor

Sorter 1 – With a stick, the first sorter pulls items onto the horizontal sort conveyor, removes plastic bags enclosing commingled materials, and places the empty bags in a barrel. In addition, the sorter pulls screw caps off glass and plastic items and other trash, placing the contaminants into a barrel. The sorter then tosses PET plastics forward into the storage bunker below and tosses clear glass items forward, placing them on the clear glass belt conveyor, which proceeds to the glass crusher and storage container dedicated to clear glass outside the building.

Sorter 2 – The sorter tosses mixed HDPE plastics forward into the storage bunker below and tosses brown glass items forward, placing them on the brown glass belt conveyor that proceeds to the glass crusher and storage container dedicated to brown glass outside the building. An overhead belt magnet removes steel cans, dropping them into the storage bunker below. Sorter 2 moves down past the magnetic separator to pull aluminum cans, which are tossed forward into the aluminum can storage bunker below. The residue remains on the sort line conveyor, until it is deposited onto a perpendicular conveyor belt that takes the residue outside to a 42-cubic-yard trash compactor.

Mixed Fibers

Residents are asked to bag their different types of fiber materials separately – for example if delivering white ledger paper, they are asked to place that in a separate bag from other recyclables. Mixed fiber materials are sorted on the tipping floor and pushed either by broom or skid steer loader into the appropriate fiber storage bunker. Moveable concrete barriers form three storage enclosures with open ends. The three bunkers store corrugated cardboard, newspaper, and magazines. Figure 2-5 shows the sorted newspaper storage bunker.

Figure 2-5
Sorted Newspaper Storage Bunker

2.6.3 Baling

The following materials are baled at the Wyoming County MRF using the Excel horizontal baler:

- Domestic corrugated cardboard,
- Imported corrugated cardboard,
- Old newspaper,
- White office paper,
- Magazines,
- HDPE plastic bottles,
- PET plastic bottles,
- Steel cans, and
- Aluminum cans.

Fiber Materials

To bale fiber materials, a skid steer loader operator loads the fiber onto the sort conveyor. The baler operator can further sort the fiber as it travels along the baler sort conveyor. The baler sort conveyor discharges onto a cleated incline infeed conveyor to the baler. Bales are manually tied with bale wire.

Containers

When baling steel cans, aluminum cans, and plastics, the materials are delivered via a skid steer with a bucket loader attachment, and are dropped into the hopper above the

conveyor sort line. Materials are checked for contaminants as they are loaded into the baler. Bales are manually tied with bale wire.

Table 2-4 provides a summary of bale production characteristics at the facility.

Table 2-4
Recycling Center Bale Characteristics

Material	Weekly Bale Production Rate	Baler Cycle Time (Minutes)	Bale Density (Lb./Cubic Yard)	Average Weight Per Shipment 2005 (Tons)
#8 Newspaper	16-20	75	1,400	21.2
Corrugated Cardboard	1	75	1,200	21.7
Magazines	1	80	2,000	17.2
Office Paper	1 per 2 months	20	1,100	1.7
PET Plastic	2	45	800	9.5
HDPE Plastics	2	75	1,200	9.5
Steel Cans	1	35	1,200	20.4
Aluminum Cans	1	25	600	2.5

After materials are baled, forklift operators stack the bales inside the roofed enclosure attached to the main building. Figure 2-6 shows this storage area.

Figure 2-6
Covered Storage Area for Baled Materials

2.7 Loading Processed Materials

Baled materials are stored in a covered storage area and are loaded by forklifts onto trailers. There is a loading bay off of the material storage area. There is no need to load glass, as crushed glass falls directly into roll-off containers that are hauled by the end market when they are full. Center employees monitor the level of these roll-off containers, as they must be hauled when the glass level reaches a line marked inside the container, so that the load does not exceed weight limitations.

2.8 Materials Processed by Commodity Type

Table 2-5 shows the amount of each commodity processed in 2005 based on material sales.

Table 2-5
2005 Amounts of Materials Processed

Material	Tons Processed	% of Material by Weight
Aluminum Cans	12.3	2.4%
Steel Cans	40.8	7.9%
HDPE	24.9	4.8%
PET	28.6	5.5%
Flint	70.1	13.6%
Brown Glass	17.5	3.4%
Magazines	51.6	10.0%
Corrugated Cardboard	43.4	8.4%
Office Paper	4.9	1.0%
Newspaper	221.5	43.0%
TOTAL	515.6	100.0%

2.9 Residue Management

The negatively sorted residue discharges off the sort conveyor onto a perpendicular belt conveyor, which delivers residue to a 42-cubic-yard trash compactor outside. Waste Management pulls the compactor every six weeks on average and hauls it to Alliance Landfill near Scranton. The facility pays $58 per ton for disposal and $160 per pull. The compactor is pulled about once every six to eight weeks.

During 2005, the Center generated 61.5 tons of residue, which is equivalent to 0.24 tons per day based on a five-day work week. Having processed 529 tons of material in 2005, this is a residue rate of approximately 12 percent. This residue contamination

rate is slightly higher than average. The relatively high contamination rate is likely due to three factors:

- The prevalence of plastic bags, which can be significant in weight themselves, but can also trap other recyclables and liquids; and
- The Center does not recycle green glass bottles, so they are contaminants; and
- Municipal drop-off sites are unstaffed; therefore, there is opportunity for residents to place bags of trash in the recycling containers.

The Center spent approximately $4,200 on residue disposal in 2005 for a total per-ton cost of $68.30.

Figure 2-7 shows residue at the end of the sort line. As the figure shows, much of the residue appears to consist of plastic bags and non-recyclable plastic containers.

Figure 2-7
Residue at End of Sort Conveyor

Section 3
RECYCLABLES MARKETING

3.1 Materials Markets

Wyoming County relies strictly on spot markets to sell their materials – no marketing contracts are in place. The Recycling Coordinator sells most materials through a broker, but sells aluminum cans and glass directly to the end markets. Aluminum cans are sold to Fiegelman's Recycling in Scranton (approximately 25 miles from the Center) and the glass is sold to Todd Heller, Inc., located in Northampton (approximately 80 miles from the Center). The Recycling Coordinator indicates that he calls several brokers before agreeing upon a sale price for a commodity. Some recent transactions are summarized in Table 3-1.

Table 3-1
Summary of County Markets

Material	How Shipped	Most Recent Price	Region Price[2]
Aluminum Cans	Baled, flat bed truck	.70/lb (1/17/06)	$0.70 - $0.71/lb.[3] (12/20/05)
Steel Cans	Baled, tractor trailer	$92.40/ton (9/19/05)	NA
Clear Glass	Crushed, 17-ton loads, roll-off	$20/ton[1] (10/13/05)	$20 - $30/ton[3] (10/17/05)
Brown Glass	Crushed, 17-ton loads, roll-off	$0/ton[1] (10/31/05)	$10.00 - $15.00[3] (10/31/05)
HDPE	Baled, tractor trailer	$.30/lb. (1/24/06)	$0.32 - $0.35 (1/27/06)
PET	Baled, tractor trailer	$.15/lb. (1/24/06)	$0.16 - $0.19 (1/27/06)
ONP #8	Baled, tractor trailer	$65/ton (1/19/06)	$85 - $90/ton (1/21/05
OMG	Baled, tractor trailer (with Office paper)	$55/ton (12/21/05)	$85.00 - $95.00 (12/22/05)
OCC	Baled, tractor trailer	$65/ton (10/17/05)	$65.00 - $75.00 (10/31/05)
White Ledger	Baled, tractor trailer (with OMG)	$60/ton (12/21/05)	$185 - $200 (12/22/05)

[1] Heller charges a transportation fee of $475 per pull.
[2] Price is freight on board (FOB), unless otherwise noted.
[3] Published price is delivered, not picked up.

As Table 3-1 indicates, the Center's pricing for aluminum, clear glass, and OCC are within the regional average, although they are on the low side. Because the published pricing is for delivered aluminum cans, however, and the Center's pricing includes transportation, the Center is actually receiving favorable pricing for aluminum cans. HDPE and PET prices are just slightly below the low end of the regional prices. ONP #8 prices are nearly 25 percent below the low end of the region's prices, and brown glass is well below market as well. Although the published pricing is for delivered glass, the Center is charged $475 per pull to collect the roll-off containers of crushed glass.

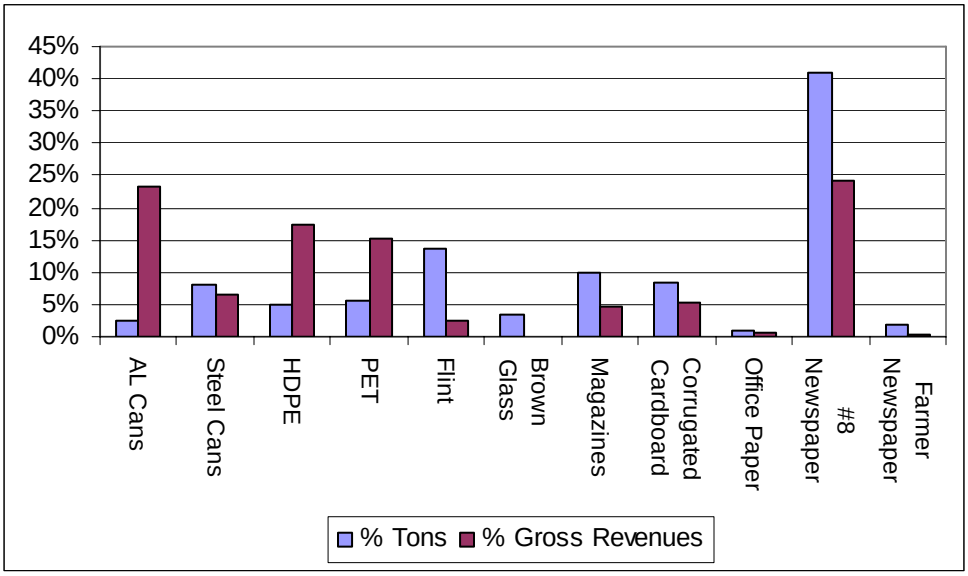
Published pricing is not available for steel cans for September 2005; however, data for November 7, 2005 indicated that the region's prices ranged from $145 to $150 per ton, delivered. Because pricing is for delivered items, it is expected that the Center's pricing might be somewhat lower to cover transportation costs. However, it is expected that this would result in a pricing differential of a few cents per pound – thus there may be room for the Center to negotiate better pricing for steel cans.

The Center is selling white ledger (computer and white office paper) for $60 per ton. The average price for this commodity for the region is $185 to $200 per ton. The facility also receives some colored office paper, which they are selling to farmers (in lieu of newspaper) for $15.00 per ton, which they shred for animal bedding. The material sold to farmers is sold loose. The Recycling Coordinator notes that he sees this as a more cost-effective means of selling mixed paper as it does not require electricity, bale wire, and sort time. He also notes that the Center's relationship with the farmers is important, as the farmers have historically supported the Center by purchasing fiber materials when prices are low.

The Center's pricing for magazines is below the regional average – $55 per ton, as opposed to the regional average of $85.00 to $95.00 per ton.

Figure 3-1 shows the percent by weight and by revenue, each marketed commodity comprises, per 2005 data.

Figure 3-1
Percent Marketed – By Weight and By Gross Revenues
2005



Because the Center crushes its amber and clear glass and deposit the glass directly into roll-off containers, the Center has limited glass markets. Waste Management hauls the glass roll-off containers to Todd Heller, for a charge of $475 per pull (earlier in 2005 the charge was $465 per pull). Table 3-2 provides a summary of gross and net revenues from the sale of flint and amber glass.

Table 3-2
Summary of Gross and Net Revenues from Glass Sales
2005

	Tons Sold	Avg. $/Ton (Gross)	Gross Revenue	Number of Loads	Transport-ation Costs	Net Revenues	Net $/Ton
Flint	70.08	$22.50	$1,575.40	4	$1,880.00	$(304.60)	$(4.35)
Brown Glass	17.52	$0.00	$0.00	1	$475.00	$(475.00)	$(27.11)

As Table 3-2 indicates, when transportation costs for glass commodities are taken into account, the facility loses money on both amber and flint glass The facility is not set up to accept green glass – as the basic facility design (with separate conveyors, crushers, and roll-off bins for each color) only allows for two glass streams. Green glass is even less cost-effective to process, as its value has most recently been in the $(20.00) to $(5.00) range, according to *Waste News*. The Recycling Coordinator

contacted Todd Heller to see if this market would allow some green glass in with the brown, but was told that this would not be acceptable.

Because the sort line is located on a platform, the only potential means to recycle green glass materials would be to construct some sort of enclosed slide to a storage container on the ground floor. This arrangement, however, would have to be constructed so as not to impede foot traffic on the sort platform, or foot and equipment traffic on the ground floor. The only benefit to recycling green glass would be reducing disposal costs. These savings would be offset by the transportation and negative price of the glass.

The Recycling Coordinator explored having pre-crushed glass delivered to an alternative market in Port Allegheny, McKean County. Because the vehicles would have been of lower weight, his net costs would have been higher to recycle glass. It would require higher transportation costs to deliver the glass to the end market, which more than offset the higher price the alternative market was willing to pay.

Section 4
OBSERVATIONS AND RECOMMENDATIONS

4.1 Observations

The following observations were made during the site visit, or gleaned from the data provided.

4.1.1 General Operations

- The Recycling Center is exceptionally clean, and based on observations during the site visit, the material handlers/sorters are very hard-working, efficient, and self-directed.
- Most of the commingled containers coming into the facility are bagged. The materials are not de-bagged before entering the sort line, and bags of material do not flow in a continuous fashion on the incline feed conveyor.
- The laborers are operating the sort line with only two sorters, although it is designed for a minimum of three. This is an additional factor that makes it necessary for the sorters to stop the line periodically.
- The laborers are hard-working, and sort at a quick pace when the flow of materials allows them to do so. Unfortunately, the fact that so many materials are bagged impedes this ability, and the sorters have to stop the line frequently to rip bags open, etc.
- The Recycling Coordinator is extremely busy with day-to-day operations, such as baling, weighing vehicles, etc. He does not have adequate time to develop educational materials to increase the amount of materials coming to the facility, etc. Despite the fact that this facility is underutilized, the Center needs an additional employee that can bale materials in order to free up the Recycling Coordinator to plan and conduct more strategic activities.
- The facility is underutilized. The Center processes approximately 529 tons of material per year. The Center is designed to process 25 tons per day (6,500 tons per year with five operating days), thus the facility is operating at less than 10 percent of capacity.

4.1.2 Materials Marketing

- The Center strives to collect and sort fiber materials into the highest quality grade possible. While this increases revenues somewhat, it may not be worthwhile, considering the small increase in revenues to do so. For example, white ledger/computer paper is sorted separately for a price of approximately $60 per

ton. The facility was only able to make seven bales of white ledger in 2005. This material is shipped along with magazines. The price being paid for this commodity is far below market value – likely because the Center is unable to ship full loads of the commodity (e.g., $60 per ton when average regional market price range was reportedly $ 185 - $200 per ton).

4.2 Recommendations

4.2.1 General Operations

- ***Increase the tonnage of materials coming into the Center.*** The Center should work to expand the types and numbers of entities involved in recycling and the types of materials it accepts although not necessarily in a way that results in more types of materials sold (perhaps marketing a soft mixed paper or sorted office paper grade rather than market white ledger). The County might, for example:
  - Meet with businesses and haulers to help increase recycling, and identify *the best role for the County to take*. The County should develop a two-year action plan detailing how they will increase recycling tonnages coming into the Center. Soliciting input from local businesses, municipalities, and haulers, will better enable the County to develop strategies that attract additional material suppliers and will help the County move forward with the support of local stakeholders. Issues/questions to be explored include:
    - What factors are keeping businesses and municipalities from recycling?
    - How can the County encourage haulers and businesses to deliver recyclables to their facility?
    - What entities (commercial/industrial/institutional) are not currently recycling that should be?
    - What is the most businesses and municipalities are willing to pay to recycle?
    - Should the County pro-actively collect recyclables (using the Center's pickup truck and towing Haul-All containers) from entities for a charge?
  - *Develop a competition among schools and/or municipalities to deliver the highest amount of recyclables per-capita or per-student.* Local businesses could be asked to provide prizes, and they could receive free advertising on the County's web site and/or local newspaper for providing incentives.

  Ideally, the County's services should complement versus compete with those provided by private haulers. It is important for the County to develop a positive rapport with commercial haulers, in order to encourage them to supply the Center with recyclables. In addition, it may be possible for the County and

private haulers to develop a public-private partnership to increase recycling among commercial and institutional entities.

- ***Consider modifying the County's recycling ordinance.*** The County could modify its recycling ordinance to stipulate that haulers providing trash collection service in the County to residents must include recycling collection services at no additional cost to the resident. Although haulers' rates would likely increase slightly, they would find their recycling routes to be more cost-effective, as they would be collecting more material while their disposal fees would decrease.
- ***Add another sorter to the sort line.*** Although the facility itself is understaffed, the sort line is designed for at least three sorters, not two. Operating with three sorters would allow the Center to sort more efficiently.
- ***Hire another employee that can bale materials.*** The Center should look into hiring an additional employee, perhaps another Senior Aide Employee whose salary would not come from the Center's budget, to bale materials. This would free the Recycling Coordinator's time for more strategic activities.
- ***Move the HDPE bin to the far left, and make this the first material removed from the sort line.*** In general, it is most efficient to remove large items from the sort line first, as they tend to block other items. This would also reduce the number of times the sorters have to cross each other's path to tip 35-gallon drums of plastic containers to the appropriate storage bunkers below.
- ***Further sort and market HDPE plastics into natural and colored grades.*** The Center should bale the materials separately and gain the higher price ($0.08-$0.10/lb.) for natural HDPE. During the site visit, a majority (more than 75 percent) of the separated HDPE plastic containers visually observed were natural HDPE. This change in sorting and product could increase annual revenues by $3,500 to $4,500 per year. The most simple way for the Center to do this, given the limited number of sorters and the challenge that would be faced in dividing the HDPE storage bunker, would be to continue to sort all HDPE bottles into the HDPE bunker. When baling the HDPE, sorters could pull the colored HDPE bottles from the conveyor. This would require slowing the conveyor speed. Another alternative would be to place a divider in the HDPE storage bunker, such that colored HDPE could be stored in the back section of the bunker, and natural in the front.
- ***Improve signage to the Recycling Center.*** Provide more directional signs along the approach route as well as a new entrance sign placed at an angle in order to improve visibility of the Recycling Center in the community.
- ***Improve signage on the bins used at the Center for drop-off, as well as on the municipal drop-off containers.*** The signage on the drop-off bins contains text only. While the lettering is relatively large, research has shown that the best visuals include pictures of what should be placed in the container. Figure 4-1 shows the signage on the drop-off containers.

Figure 4-1
Signage on Drop-off Containers at Center

Figure 4-2 shows signage from Ashland Borough's (Schuylkill County) drop-off containers.

Figure 4-2
Ashland Borough Recycling Signs

Photo Source: PA DEP

- ***De-bag recyclables before processing.*** Because this facility processes a relatively low tonnage of material, and has limited space on the tip floor, a trommel or bag-breaking machine is not recommended. Instead, employees could be equipped with letter-openers to rip bags open upon their delivery to the tip floor, then shake the contents directly onto the tip floor. Once materials have been de-bagged, they can be pushed onto the incline feed conveyor. The sort line should then be able to be operated at a more rapid and consistent speed, as materials will travel up the

incline belt more consistently (e.g., not tumble back down the conveyor) and therefore will be fed onto the sort conveyor more consistently. In addition, sorters will not have to sort to remove bags, or to de-bag materials. This may also help reduce contaminants, as some recyclable materials are likely being trapped in plastic bags and therefore deposited into the trash compactor.

- ***Consider recycling green glass.*** Although the Center is not set up to recover a third glass color, and green glass is the least cost-effective, the Center should recover green glass from incoming material. An enclosed ramp leading into a two cubic-yard bin could be rigged from the sort platform to a bin below where green glass could be deposited upon sorting. The ramp would have to be positioned such that it does not hinder the sorters' ability to exit the platform quickly in the event of an emergency. Center staff could empty the glass into the spare roll-off container outside, with a forklift. Current prices for green glass are -$20 to -$5 per ton. Assuming the Center can receive a "price" of -$10 per ton, and a full-load is 17 tons, the Center would have spent $645 ($475 pull fee + $170 "price") to recycle the glass instead of $986 to dispose of the glass, for a net savings of $341 per load. This is likely a conservative scenario, as nearby counties are receiving $4 and $5 per ton for green glass. If the glass were stored in other types of containers that do not specifically require a vehicle with a large pulley hoist system for collection, the Center would have more end markets available to them, and could likely find improved pricing. By recovering the green glass the Center would increase the tonnage recycled, which would help with their DEP Recycling Performance Grants. It would not make sense, however, for the facility to advertise that they recycle green glass, as it is still a cost. The break-even point (the point at which it no longer makes sense to recover green glass), excluding performance grants and assuming pull fees remain constant at $475, is -$30 per ton.
- ***Continue to monitor market pricing.*** One way to monitor pricing is by reading trade journals and publications such as *Recycling Today* and *Waste News,* or by subscribing to services such as *Waste News Pricing*. Although the Recycling Center is in a more remote area and may be further from some markets, it is beneficial to know the direction the market is taking, and the magnitude with which pricing is moving.
- ***Routinely contact at least three or four end markets to check pricing when ready to sell a commodity***. Although it is wise to be cautious with new vendors due to the risk of non-payment, calling several vendors will provide for a check on prices being obtained from existing markets, and may help the Center obtain better materials pricing.
- ***Periodically market each material to more than one market.*** Although this takes additional effort, and despite the fact that markets are currently strong, it is important to have an established relationship with more than one broker or market for each commodity, should something happen to the predominant market.

4.2.2 Education and Outreach

- Implement an "all bottles" education campaign for plastics. Much of the residue coming into the facility appears to be non-recyclable plastic containers, such as yogurt and other food tubs. An "all bottles" campaign is one way to simplify the recycling message. Residents are taught that all plastics bottles with a neck can be recycled – thus residents perceive the program as more simple (no need to look at numbers on the bottom), enticing higher participation levels, and less contamination (e.g., fewer non-recyclable #1 and #2 plastics are delivered to the MRF). Figure 4-3 shows contaminants going to the trash compactor – many of which are non-recyclable yogurt containers.

Figure 4-3
Contaminants at the Recycling Center

- ***Encourage residents to use a container other than plastic bags for recycling.*** The Recycling Coordinator indicates that residents prefer to use plastic bags to contain their recyclables. At least two haulers operating in the area are known to operate collection vehicles that do not have separate containers for different materials. Thus, prohibiting the use of plastic bags entirely would mean that those haulers would have to reconsider the manner in which they collect recyclables. For example, haulers with a single-body collection vehicle could collect commingled containers one week, and fiber materials the next. Another alternative would be for the haulers to use containers within their vehicles to separate fibers from commingled containers. Currently Waste Management and Tunkhannock Borough have multi-compartment collection vehicles for recyclables, and at a minimum, those customers should be encouraged to use reusable containers to set out their recyclables. Similarly, residents at drop-off sites should be encouraged to deposit materials unbagged into the containers. Signs could be placed at the drop-offs instructing residents to deposit loose materials only into the bins. Municipalities could be asked to provide a trash bin

for plastic bags at the drop-off site, or a sign could instruct residents to take their bags with them. To reduce the likelihood of contamination, the County might also improve the signage on the drop-off containers to include pictures indicating what should be placed in each compartment.

- ***Simplify the educational information available on the County's web site.*** The current information on the web site is wordy, and has too much description telling residents what **not** to include in each commodity stream. This message could be simplified using pictures and more brief descriptions. Similarly, most residents are likely unaware of the difference between U.S./Canadian and imported cardboard. Figure 4-4, for example, provides information from the County's web site. The following information seems to be intended to describe white ledger recycling to residents and businesses, but discourages recycling of other types of paper, including magazines, newspaper and cardboard, which are commodities marketed by the Center.

Figure 4-4
Recycling Information on Wyoming County Web Site

White Paper to Recycle

Many Kinds of White paper used in offices can be recycled.

- Letterhead Stationery
- Xerox, IBM or other Bond Copies
- Business Forms
- Memo Pad Paper
- Bulletins & Circulars
- Computer Printout (carbonless)

Do Not Include

The success of our program depends on quality as well as quantity. Do not put materials, which will contaminate the paper in the collection boxes.

- Magazines and books
- Glossy paper
- Envelopes
- Carbon paper
- Paper clips and rubber bands
- Plastics
- Cellophane
- Colored Paper
- Newspaper
- Cardboard
- Fax paper

4.2.3 Materials Marketing

- ***Investigate markets for plastic bags***. If the Center continues to receive a considerable amount of recyclable materials in plastic bags, the Center should explore potential markets for these bags. Although it often takes a long time to collect a full load of these materials, demand for the material is high. The Center should contact end markets for this material to assess the viability of such a market. If the county elects to pursue marketing its bags, the County could also work with local grocery stores to collect bags, thereby enabling the Center to produce truckload quantities more rapidly. As part of the research for this project, one end user of this material, AERT (of Springdale, Arizona), was contacted (479-756-7406). The contact there indicated that baled HDPE and LLDPE blends are currently bringing $0.17 to $0.21 per pound. This is a range of $340 to $420 per ton. Before embarking on such a project, the Center should produce a test bale to ensure that it can make bales to the specified density, and that the bags recovered from the MRF are suitable for recycling. Bale specifications for mixed loads are available at the following web site: http://www.aertinc.com/MIX%20Specifications.pdf.

- ***Target additional paper grades in lieu of high value white grades***. Although white ledger generally is a high-value product, the Center is not receiving full price for white ledger. Also, at seven bales per year, the Center's marginal revenues for high-grade would likely be relatively insignificant, if it were receiving a better price. Instead, the Center should target higher quantities of all paper, and market a mixed paper bale, as well as work to capture more OCC. Sorted office paper, for example, currently has a regional price of $95 to $105 per ton, but consists of "white and colored groundwood free paper, free of unbleached fiber and may include a small percentage of groundwood computer printout and facsimile paper." The definition of sorted white ledger is "baled, uncoated, printed or unprinted sheets, shavings, guillotined books and cuttings of white groundwood free ledger, bond, writing, and other papers that have similar fiber and fiber content."

- ***Investigate additional OCC markets that are more forgiving of imported cardboard.*** The County is currently receiving $65 per ton for cardboard and is still being asked to remove most imported cardboard from this product. Nearby counties are not being asked to remove imported cardboard, but are also receiving lower pricing of $50 and $55 per ton. It is likely more cost-effective to market some lower grade cardboard bales for $50 or $55 per ton than pay $58 per ton for disposal of imported cardboard. Currently the Recycling Coordinator is trying to sell strictly imported OCC bales. He should conduct a cost-benefits analysis to see if this makes sense, as opposed to incorporating the imported cardboard in regular OCC bales and selling to a less strict market at a slightly lower price.

- ***Continue to monitor market pricing.*** One way to monitor pricing is by reading trade journals and publications such as *Recycling Today* and *Waste News*, or by subscribing to services such as *Waste News Pricing*. Although the Recycling Center is in a more remote area and may be further from some markets, it is

beneficial to know the direction the market is taking, and the magnitude with which pricing is moving.

- ***Routinely contact at least three or four end markets to check pricing when ready to sell a commodity***. Although it is wise to be cautious with new vendors due to the risk of non-payment, calling several vendors will provide for a check on prices being obtained from existing markets and may help the Center obtain better materials pricing.
- ***Periodically market each material to more than one market***. Although this takes additional effort, and despite the fact that markets are currently strong, it is important to have an established relationship with more than one broker or market for each commodity should something happen to the predominant market.
- ***Recycle rigid plastics through Susquehanna County's Recycling Center.*** The Recycling Coordinator should contact the Susquehanna County Recycling Coordinator to see if he would accept rigid plastics from the Wyoming County Center. If so, Wyoming County could save disposal costs on rigid plastics, and Susquehanna County could market the rigid plastics on a more regular basis. Initially it would make sense simply to set aside what is being delivered to the Recycling Center unsolicited (e.g., as contaminants), and not to advertise to the community that the Center is accepting rigid plastics for recycling. If the program is successful and both counties agree, it might be beneficial to advertise that these materials can be accepted at some point in the future.

4.2.4 Safety/Loss Prevention

- ***Consider installing a surveillance camera or, at a minimum, installing a sign indicating that there is a surveillance camera at the Center.*** This would discourage residents from illegally dumping refuse at the Center.
- ***Encourage municipalities to post signs on their drop-off containers indicating that there is a surveillance camera at the drop-off site.*** During the site visit, one municipality indicated that their doing so greatly decreased the amount of trash left at their site. This would likely help decrease the facility's 12 percent residue rate. Figure 4-5 shows this sign.

Figure 4-5
Warning on Drop-Off Recycling Container

Section 5
FINANCIAL SUMMARY

5.1 Annual Operating Costs

Table 5-1 provides a summary of annual operating costs for the Wyoming County Recycling Center.

Table 5-1
2005 Recycling Center Operating Cost Summary

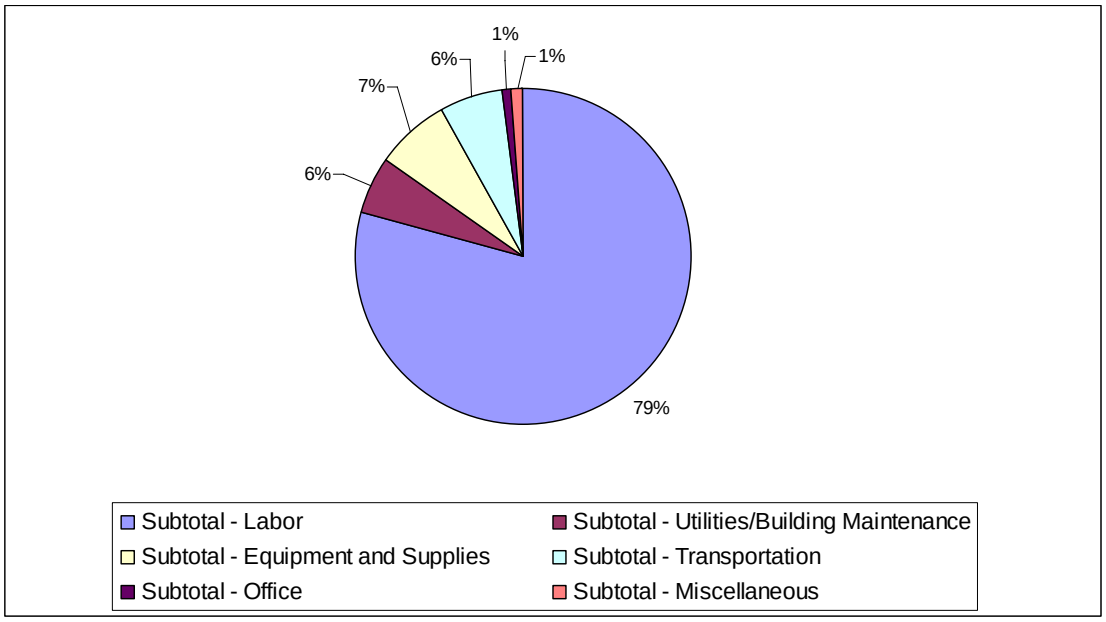
Item	Amount
Labor:	
Employee Salaries & Benefits	$101,110
Subtotal – Labor	$101,110
Utilities/Building Maintenance	
Electric	$ 7,092
Fire Inspections	$ 21
Subtotal - Utilities/Building Maintenance	$ 7,113
Equipment and Supplies:	
Repairs	$ 5,352
Supplies	$ 2,665
Diesel Fuel	$ 672
Truck Maintenance/Fuel	$ 701
Subtotal - Equipment and Supplies	$ 9,391
Transportation:	
Truck Maintenance/Fuel	$ 701
Hauling	$ 2,708
Residue Disposal/Transport	$ 4,200
Subtotal – Transportation	$ 7,609
Office:	
Postage	$ -
Telephone	$ 796
Advertising	$ 238
Subtotal – Office	$ 1,034

Item	Amount
Miscellaneous:	
Scale Master Licenses	$ 180
Other Miscellaneous Expenses	$ 1,061
Subtotal - Miscellaneous	$ 1,241
TOTAL ANNUAL OPERATING COSTS	$127,499

Labor costs include the salaries and benefits for the recycling coordinator and the two laborers. Diesel fuel costs include the fuel cost for the skid steer loaders and forklifts. Hauling costs are primarily for transporting glass to the end market, as well as some fuel surcharges. With annual operating costs of $127,499, and processing 529 tons per year, the Center's operating cost is $241.02 per ton.

Figure 5-1 shows the primary operating cost areas for the Wyoming County Recycling Center. As Figure 5-1 indicates, labor costs comprise 79 percent of the Center's operating costs.

Figure 5-1
Primary Operating Cost Areas for Recycling Center



5.2 Annualized Capital Costs

To estimate annualized capital costs, the original purchase price of the Recycling Center and its equipment, where available, were escalated by 2.5 percent per year from the original purchase date, to estimate 2005 equipment purchase prices (replacement cost) for each capital item. The estimated current purchase price for the Recycling Center and its equipment were then individually divided by the expected

lifespan of each capital item. The total annualized capital cost for 2005 is estimated to be $65,470. Table 5-2 shows the results of this analysis.

Table 5-2
2005 Estimated Annualized Capital Costs

Capital Equipment	Estimated 2005 Purchase Price	Lifespan in Years	Annualized Cost
Building	$ 877,700	30	$ 29,257
Roadways	$ 60,757	20	$ 3,038
Processing Equipment	$ 327,918	15	$ 21,861
Rolling Stock	$ 113,141	10	$ 11,314
TOTAL ANNUALIZED CAPITAL COSTS	$ 1,379,516		$ 65,470

Total annualized costs reflect the estimated annual cost of ensuring that capital equipment is replaced, as appropriate. The annualized costs reflected in Table 5-2 assume that the Center would pay 100 percent of the cost of the items. The Center has been fortunate to have some equipment "handed down" from the prior Recycling Center, and 90 percent of much of the equipment and the building paid for with DEP recycling grants. If DEP recycling grants paid for 90 percent of all of the capital, the Center's share of annualized capital costs would be $6,547 per year. Although grants for equipment have been available in the past, the potential exists for availability to some time in the future. Examining annualized capital costs excluding the impact of DEP recycling grants gives the Recycling Center an indication of the level of revenues that would be required to make the Center financially sustainable if DEP recycling grants were not available to help pay for capital. Factoring out DEP grants, the County would need to establish a reserve fund for equipment replacement. These figures apply to current-day pricing and would have to be adjusted for inflation over time. Note that revenues required to offset the capital costs shown in the above table would be considerably lower if:

- DEP grants are available in the future for capital equipment replacement; or
- Service life of the equipment and facility is prolonged past the lifespan indicated (which is common with public facilities).

For example, factoring out these DEP grants for capital equipment, total annual costs (operating and annual capital) would be $192,969 per year, or $364.78 per ton (based on 2005 tons). However, if DEP grants are available in the future and if they cover 90 percent of capital costs, annual capitalization costs in current dollars would be an estimated $6,547 per year. Total annual costs (operating and capital) would then be $134,046 per year or $253.40 per ton.

5.3 Revenues

Facility revenues attributable to the Recycling Center operations consist of:

- DEP recycling performance grants;
- DEP county recycling coordinator grants;
- County hauler licensing fees;
- Sale of recyclable materials; and
- Tipping fees from private and municipal haulers.

From an accounting standpoint, grants for equipment are also considered revenues, but they are excluded here because they have been discussed with capital costs above. Wyoming County is also considering implementing a $2-per-ton administrative fee, which would add another revenue source.

Based on the above analysis, the Center's revenues for 2005 are summarized in Table 5-3 below.

Table 5-3
2005 Recycling Center Revenues Summary

Item	Amount	% of Total Revenues
Material Sales	$ 59,690	60.1%
Hauler Licensing Fees	$ 7,441	7.5%
DEP Recycling Coordinator Salary Grant	$ 25,000	25.2%
DEP Recycling Performance Grants	$ 4,647	4.7%
Tipping Fees from Haulers	$ 2,469	2.5%
TOTAL REVENUES	$ 99,247	100.0%

5.4 Recycling Center Profitability

Based on the costs and revenues described above, the Recycling Center profitability is as summarized in Table 5-4.

Table 5-4
2005 Estimated Recycling Center Profitability

Item	Amount
Revenues	$ 99,247
Operating Costs	$ 127,499
Net Operating Revenue (Expenses)	$ (28,252)
2005 Recapitalization Requirement	$ (65,470)
Net Surplus (Shortfall)	$ (93,722)

As shown by the figures in the table above, the Center is operating at a loss with respect to net operating costs versus revenue. Further, if the Center desires to provide for recapitalization of equipment, it will need to find other sources of revenue to cover the costs of doing so. Implementing the recommendations identified in this report will help to improve operational efficiency and address some loss prevention concerns that currently appear to put the Center at risk; however, these recommendations are not expected to result in substantial operational cost savings, if any. Increasing tonnage of materials being processed at the Center would increase revenues from the sale of materials, and spread costs among tons, improving per-ton net costs.