

Final Report

Goodwill Industries Material Recovery Facility Evaluation



PA Department of Environmental Protection

December 2004



GOODWILL INDUSTRIES RECYCLING CENTER EVALUATION

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Executive Summary

The Pennsylvania Department of Environmental Protection sponsored the operational efficiency and cost structure evaluation of the Goodwill Industries Recycling Center in order to identify ways that the facility, and others like it, could be made more financially sustainable over the long term. This report presents the results of that evaluation.

Assessment Results

The Goodwill Recycling Center serves two purposes — it provides a community service by processing and marketing recyclables while fulfilling Goodwill's primary mission, which is to provide opportunities for their clients to develop job skills and experience, and improve their lives through work opportunities. Because Goodwill's mission is to serve their clients, operating the Recycling Center in the most efficient manner possible is a secondary consideration, particularly if efficiency improvements would result in fewer job and work opportunities.

The Recycling Center receives two-stream recyclables from residential collection programs and glass bottles and corrugated containers from commercial recyclables collection, primarily local restaurants and bars. Incoming materials are sorted and densified for economical shipment to market. Much of the equipment at the Recycling Center is only a few years old. The main sorting line and some of the balers, however, are over ten years old. The Recycling Center's processing system and layout have been modified over time in piecemeal fashion, such that equipment additions were made when funds were available and the equipment was fit into available space rather than as the result of a macro-level design. This has resulted in some inefficiencies in the sorting and processing performed at the facility.

The MRF is operated by the Goodwill organization as one of several enterprises and not as a stand-alone, self-sustaining operation. Although our specific analysis of the Goodwill MRF's financial condition indicates that the MRF's operating revenues are insufficient to cover operating expenses, funds from Goodwill's other operations have kept the facility in operation.

Recommendations

Operational Recommendations

- It is recommended that the facility investigate the cost of realigning the sort line and processing equipment, including:
 - Changing the order of the sorts;

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- Adding another sort cage and extending the length of the sort line (if needed) so HDPE natural bottles can be sorted as a separate grade; and
- Adding an overhead transverse magnet to the sort line so that steel cans are removed automatically — this would eliminate one of the can sorting positions, saving at least \$7,400 per year and have a payback period of less than two years. A can sorting position would still be required for manually pulling aluminum cans.
- Conduct a pilot test using the sort line to sort newspaper instead of manually handling the material on the tipping floor. If quality is not impacted, it is suggested that they continue with this method, as they will greatly enhance efficiency.
- Clean the facility more frequently than is currently done to reduce the threat of fire and provide a safe working environment for clients and employees.
- Contract with a waste hauler for waste removal rather than baling and self-hauling the facility residue. Based on this recommendation, facility management is already arranging for contracted collection of the waste using a 30 cubic yard roll-off container. The facility anticipates saving as much as \$8,000 per year by implementing this recommendation.
- Cut away a portion the wire mesh on the side of the HDPE bottle storage cage where the takeaway conveyor is located so that there is a larger discharge area to minimize material bridging.
- When the sort line is not operating (normally late afternoons) employees should sweep, de-case glass, and conduct other essential functions to ensure that time is spent productively.
- The facility should consider charging processing fees so that revenues more closely approach the cost of processing. Ideally, revenues should exceed operating costs so that an equipment replacement fund could be established for long-term sustainability of the Recycling Center. Processing fees could be in the form of a tip fee charged to haulers who deliver residential recyclables or payments by communities who benefit from the Recycling Center's service.

Education/Outreach Observations and Recommendations

- The facility receives a considerable amount of trash in plastic bags. The Recycling Center management and/or the County Recycling Coordinator should work with municipalities to ensure that a small trash can is located at each drop-off site for plastic bags and other contaminants. Trash dumpsters are not recommended as they can attract illegal dumping. Furthermore, the location of recycling sites should be in visible high-traffic areas to discourage illegal dumping.
- The Recycling Center management should request more frequent patrols by County or Municipal law enforcement to reduce illegal dumping that occurs outside of the Recycling Center. Some communities have also found that

searching through the dumped material for envelopes with names and addresses, installing lighting, and installing real or fake video surveillance cameras can reduce illegal dumping.

- It is recommended that the County consider improving education and outreach efforts to ensure that residents are aware of which materials are recyclable and which are not. Pictorial signs on drop-off containers have been used by other counties to help residents understand what is accepted and what is not.
- In particular, plastics education seems to be inadequate. The County and municipalities should consider changing their education programs to request "all plastic bottles." The plastics recycling industry recommends this as a best management practice, without using the numbering system. Research has shown that desired PET and HDPE bottle recovery increases while contamination decreases with this change.

Materials Marketing Recommendations

- The facility should consider alternative markets for steel cans. Revenues could be increased by as much as \$6,000 per year.
- Facility management should investigate market alternatives for plastics. At a minimum, PET and HDPE will likely need to be sold to separate markets. Facility management should also ensure that plastics perforators and the plastics baler are adjusted and maintained to result in maximum bale weights. Facility management should also ensure that 53-foot trailers are requested and that those trailers are properly loaded so that the maximum number of bales fit in them. Annual revenues could increase by as much as \$3,600 per year. Even more revenues (estimated at \$2,100 per year) could be obtained if the facility is retrofitted so that natural HDPE bottles can be sorted from pigmented bottles and baled as a separate and more valuable grade of HDPE.

Goodwill Industries Recycling Center Evaluation

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 that have been established in urban, suburban and rural watersheds within Pennsylvania.

In order to further the financial sustainability of Pennsylvania's materials recovery facilities, the DEP sponsored operational efficiency and cost structure evaluations in selected materials recovery facilities for the purpose of identifying processing system improvements, revenue enhancements, and collection program improvements that can maximize the return on investment of recycling grant funds. The Goodwill Recycling Center was one of the facilities that was evaluated and this report presents the results of that evaluation.

1.2 Facility Description

The Goodwill Industries Recycling Center is a relatively small facility of 10,000 square feet that is located on a 4.56 acre site in Uniontown, PA. The facility, which was constructed in 1991, operates 52 weeks per year, five days per week, operating one eight-hour shift. In 2003 the facility processed approximately 3,000 tons of recyclables, or an average of 11.5 tons per day. The laborers at the facility are a combination of regular staff and Goodwill Industries clients. The Goodwill Industries client base is made up of individuals in the local community who have workplace disadvantages or disabilities and are in need of job training and placement services. The Recycling Center provides many positions where clients can train and learn productive work habits and expectations, which is valuable to the local community beyond the recycling that takes place at the facility.

Materials from residential curbside and drop-off programs are generally collected and delivered to the facility in two streams – commingled containers and newspapers. Commercial recyclables are also processed by the facility.

Goodwill Industries provides residential recyclables collection services for 15 municipal programs in Fayette County and delivers those materials to the Recycling Center for processing. An additional 17 other municipalities' residential recyclables are delivered to the facility by municipal crews and private haulers for processing. Most communities collect both paper and commingled containers; however, some only offer recycling of commingled containers at the curb, with newspaper collection

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through drop-off sites. Two municipalities only recycle newspaper. Residents can also bring materials to the Recycling Center themselves.

Goodwill Industries also collects glass and corrugated containers from commercial generators and delivers those materials to the Recycling Center. Goodwill operates a “bar run” to collect glass bottles and old corrugated containers (OCC) from restaurants and pubs in the area. In addition, an individual delivers materials to the Recycling Center from his own “bar run.” Material from these bar runs is unloaded manually and processed when time allows. Bottles that arrive loose are tipped in the commingled material area. The OCC is delivered to the OCC processing area.

Goodwill Industries also operates an OCC collection route four days per week using a rear loading waste collection truck. This route primarily serves businesses in Uniontown and South Union Township. Goodwill also receives a significant amount of OCC (about 15 percent of all OCC processed at the facility) via drop-off – primarily by businesses. Some is delivered already baled from a local hospital.

The Recycling Center has two receiving bays and three outgoing loading dock bays. Only two of the three outgoing bays are used for shipping processed recyclables, while the third is used for an equipment storage trailer. The Recycling Center has one truck scale, located on the west side of the building.

In addition to processing standard recyclables, the facility accepts and stores used motor oil for reuse. This oil is from a countywide “hard to recycle” day program, as well as from individuals who drop off the material throughout the year. The facility uses the used oil to help heat the building in the winter. The Recycling Center also serves as a storage and shipping point for baled clothing from an off-site Goodwill retail outlet. This operation is separate from the Recycling Center and baling expenses and revenues from the sale of the textiles are not included in the analysis of this report. The baled textiles do, however, occupy a portion of the facility's indoor storage space.

Table 1 lists the major processing equipment used by the Goodwill Recycling Center.

Table 1
Summary of Recycling Center Processing Equipment

Equipment	Make	Model	Purpose	Year
Baler	Marathon	6030	Bale Trash	1980+
Baler	Excel	E4823	Bale OCC, and sometimes ONP	2001
Baler	International	5028108101B	Bale ONP	1990
Baler	International	1B1272	Bale Plastics	1990
Loader	Mustang	NA	Commingled Tip Floor	1999
Fork Lift (on loan)	Hyster	NA	Move Processed Materials	1990
Fork Lift	Daewoo	G20S-3	Move Processed Materials	2000
Can Densifier	Dens-O-Can	DAC 1200	Densify Aluminum and Steel Cans	2003
Glass Crusher			Crush Clear Glass	2000
Glass Crusher			Crush Green Glass	2000
Perforator		PERFMECH	Perforate bottles	2000
Perforator		PERFMECH	Perforate bottles	2000

Table 1 shows that most of the Recycling Center's equipment is relatively new, except for three of the balers and the loader, which are near the end of their normal life.

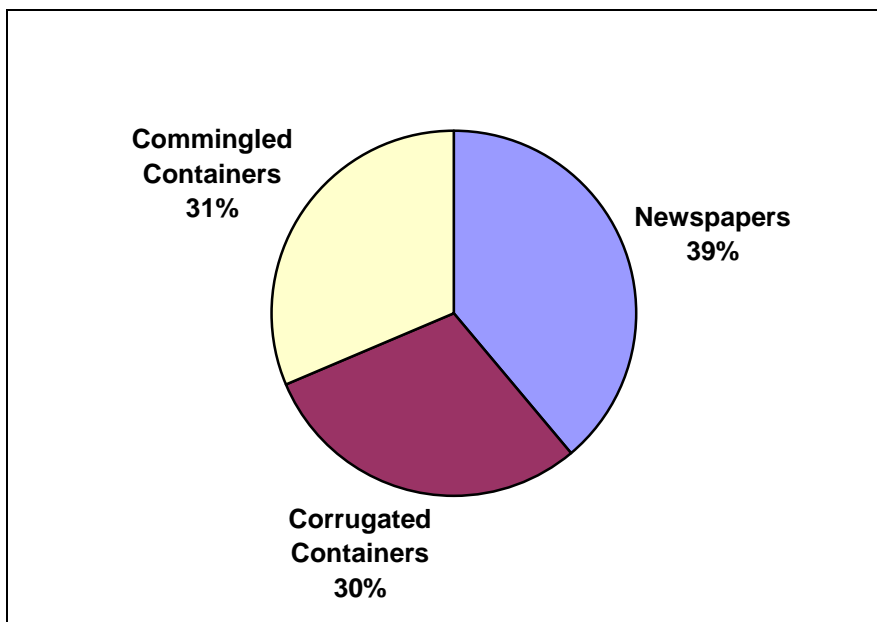
1.3 Materials Accepted

The materials received at the facility for processing include:

- Newspapers;
- Corrugated containers;
- Aluminum cans;
- Steel cans;
- PET and HDPE plastic bottles; and
- Clear, brown, and green glass containers.

In 2003 the facility processed 1,166 tons of newspaper, 892 tons of corrugated containers, and 942 tons of commingled containers, for a total of 3,000 tons of material. Figure 1 shows the breakout of incoming materials.

Figure 1
Breakout of Incoming Materials
Tons Received, 2003



1.4 Materials Processing

1.4.1 Incoming Material Handling

Incoming old corrugated containers (OCC) are delivered to the incoming materials bay located on the west side of the building. The OCC is tipped outside, and is pushed inside using a front end loader when the Recycling Center is ready to process the material. There is a pit area where OCC is loaded, and from there goes onto an incline conveyor directly into the OCC baler.

Old Newspaper (ONP) is typically collected bundled or bagged and arrives source-separated. On arrival, ONP is tipped inside the incoming materials bay located on the west side of the building, which is the same area used for OCC processing. After it is tipped, newspaper is normally manually loaded directly onto the ONP incline feed conveyor that leads to the ONP baler. Contaminants are removed during this manual handling process. If the tip floor is needed for OCC processing, a skid steer scoops up the newspaper and deposits it in wire bins for processing at a later time.

In addition to receiving OCC and newspapers, the west tip area is also where individuals go to drop off any materials they might have. Self-delivered materials are handed to an employee as there are no drop-off bins. Facility management indicates that they receive from 20 to 25 drop-offs by residents each day. Figure 2 shows the west tip area entrance. As Figure 2 shows, the west tip area is not conducive as a drop-off area, particularly when truck traffic is considered.

Figure 2
West Tip Area for ONP, OCC, and Drop-Off Materials



The OCC/ONP floor sort area inside of the bay entrance is approximately 100 square feet, and there is an additional 300 square feet or so outside the building where OCC is initially tipped. Generally, OCC is processed by the end of the day, and therefore does not stay outside over night. Upon occasion the OCC does remain outside, however moisture has not been problematic.

Commingled materials and any other types of containers that arrive (such as “bar run” glass bottles) are tipped in the incoming materials bay located on the north side of the building. A front-end loader then pushes the containers into a commingled materials pit area that is 12 feet long by 10 feet wide by 5 feet deep. The entire tip area including the pit is approximately 25 feet by 15 feet. This is enough to store one to three days’ worth of incoming materials. The facility manager indicates that this is not sufficient, and that there have been times in the past when the facility had been unable to operate due to equipment malfunction, or in the case of holidays, that incoming materials had to be tipped outside of the facility. Figure 3 shows the north entrance leading to the commingled containers tip area.

Figure 3
North Entrance to Commingled Container Tip Area



Goodwill Industries plans to expand the Recycling Center by 5,000 square feet. The addition will be on the north side (commingled tip floor) of the building, which will eliminate tip floor and processed material storage space deficiencies. After the addition is complete, delivery vehicles will be able to drive into the facility, close the door, then tip their materials. Currently there is only enough space for vehicles to back partially into the facility, one at a time, to tip their loads, which makes it uncomfortably cold inside the facility during the winter months and costly to heat the space. The area outside the expansion will also be paved to reduce dust levels and graded to make maneuvering easier for trucks.

1.4.2 Material Sorting

Contaminants are manually removed from ONP and OCC while they are on the tip floor. Because they arrive at the Recycling Center pre-sorted, there is no need to sort the materials into different grades — only contaminants need be removed. Normally one or two paper sorters remove contaminants from OCC, whereas up to six paper sorters debag, untie, remove contaminants, and load newspapers by hand onto the conveyor that feeds the newspaper baler.

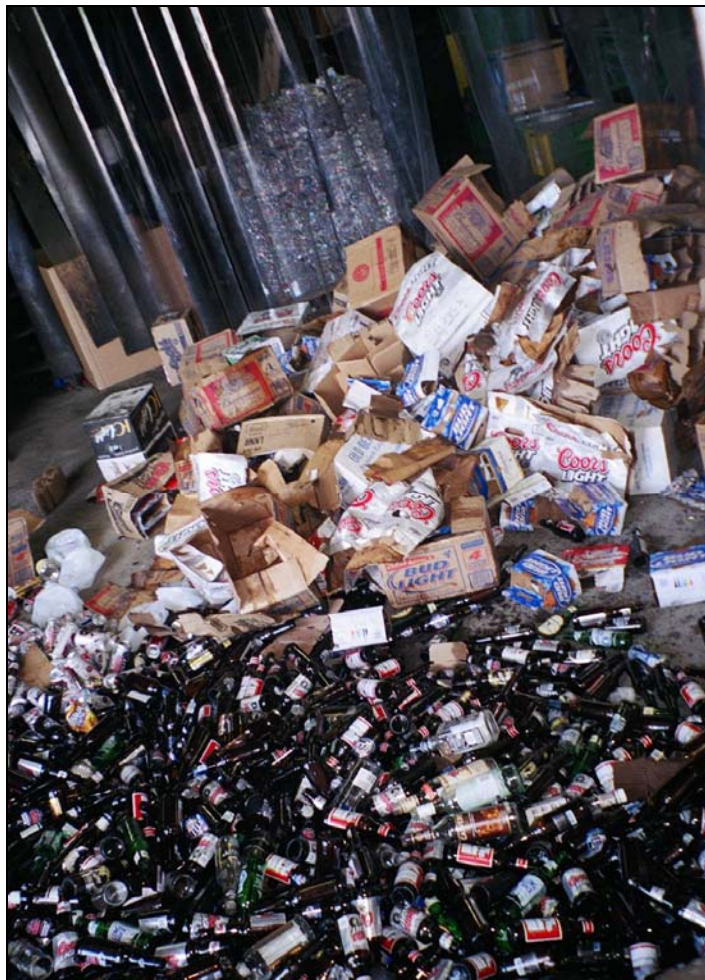
A total of nine people are used for processing commingled containers. One employee pushes materials into the feed pit with a front end loader after a second employee removes OCC and other oversize contaminants and opens any bags of materials. Commingled containers are transferred out of the feed pit by an incline conveyor. One or two people are also working along the incline belt to meter materials (using rakes) and to pick out large contaminants. The feed conveyor deposits the recyclables onto a 60-foot long conveyor where six people positively sorted the recyclables by hand.

Steel and aluminum cans are removed from the sort line first (generally by one, but in busier times by two sorters) and tossed into a chute that leads to a can separator. The can separator contains a magnet to separate steel from aluminum cans and each are deposited into separate wire mesh storage hoppers. Green glass is removed next from the stream of commingled containers, followed by HDPE plastic bottles, clear glass, brown glass, and finally PET bottles. Residue that remains on the conveyor travels to the end of the sort line where it falls into a self dumping hopper.

The chutes for the clear and green glass lead to glass crushers, which crush the glass and deposit the material into eight cubic yard containers. The glass containers are periodically emptied into 30 cubic yard outdoor roll-off containers for each color of glass. The plastic bottles are tossed into chutes that channel the bottles into perforators that flatten and perforate them so that the bales that are made from them have higher density than they otherwise would have. After being perforated, the plastic bottles travel up incline conveyors that deliver separated PET and HDPE to separate elevated wire cages.

Glass that arrives in cases from "bar runs" is processed as time allows. The bottles that are in cases and are already color sorted are supposed to be manually dumped into the appropriate roll-off container of processed clear, brown, or green glass. This does not happen routinely because of inclement weather, the fact that some cases have mixed colors of glass in them, the inefficiency of de-casing next to the roll-offs (which are tall), and the fact that the empty cases need to be carried inside the facility for baling. Instead bottles are often de-cased indoors where they are dropped into a pile, contributing to mixed color cullet that is disposed, and presenting spurts of glass for the sorting line to deal with. Instead a de-casing area should be set aside inside the facility with self-dumping hoppers for each color of glass. Space has been too limited in the past for this to occur indoors; however, with the facility addition there should be sufficient indoor space to implement this recommendation in the future. Figure 4 shows de-cased bar glass being tipped on the commingled container tip floor.

Figure 4
De-Cased Bar Glass



1.4.3 Residue Handling

Residue from the containers sort line is negatively sorted at the Recycling Center, falling off the end of the sort line into a two cubic yard hopper. Contaminants from the paper side of the facility are positively sorted off the tip floor into similar dumpsters. Approximately three to four dumpsters are filled in a day. The hoppers are brought to the southeast side of the building, where the loose trash is manually loaded into an old vertical downstroke baler using a shovel. The facility decided to bale residue so that it would not blow away and become litter. The resulting bales of trash are moved outside, using a forklift, and stored there until a landfill run is made. Figure 5 shows the trash baler.

Figure 5
Trash Baler



Once or twice per week two facility employees use a dump truck to deliver trash to the Onyx Chestnut Valley Landfill, which is located approximately six miles from the facility. A recent invoice indicates that the trash loads going to the landfill weigh between 1.3 and 3 tons. In 2003, the facility spent \$15,776.92 on trash disposal tipping fees, which does not include the cost of the time spend handling the material. Assuming the tip fee in 2003 was the same as it was when this study was conducted (\$43.30 per ton) the facility disposed of 364.36 tons of residue. The facility processed 3,000 tons of material in 2003, or a residue rate of 12 percent. This is considered to be a relatively high residue rate.

Recycling Center management indicates that they are working with the County to reduce the amount of residue that will be disposed by half. They hope to do this by obtaining a glass pulverizer that would be used to grind mixed color cullet into a sand-like substance that could be used by municipalities for traction control in the winter.

Some of the facility's "residue" is waste that is illegally dumped outside the gates of the facility. Despite posting signs, waste is still illegally dumped as shown in Figure 6, and law enforcement assistance should be pursued.

Figure 6
Trash Disposed Illegally Outside of the Recycling Center



1.4.4 Baling/Densifying and Storage

Corrugated containers are baled using an Excel model E4823 horizontal manual tie baler. A skid steer feeds the baler by pushing OCC from the tip floor onto a sub-floor feed conveyor after contaminants have been manually removed. A second person operates the baler. It takes an average of 23 minutes to make to a bale of OCC. This baler is also used to bale ONP when all OCC has been baled. Newspapers are baled using an International Baler model 5028101B horizontal manual tie baler that is equipped with a fluffer. Baling newspaper requires five to six people to remove Kraft bags and twine and load the ONP manually onto the incline conveyor that feeds the baler. It takes between 20-30 minutes to make a bale of ONP.

Separated aluminum and steel cans are processed with a Dens-O-Can densifier (model DAC 1200). This densifier was purchased new in 2003. It takes approximately five minutes to make a biscuit of densified cans using one laborer. The biscuits are then stacked into separate aluminum and steel piles and strapped to make bundles.

When HDPE and PET plastics are to be baled they are bottom discharged from their storage cages to feed conveyors that discharge into an International Baler model 1B1272 horizontal manual tie baler. It takes approximately 25-30 minutes to make an HDPE or PET bale.

Baled/densified materials are moved with a forklift to the southwest corner of the building where they are stored until a sufficient quantity is accumulated for shipment to market. Baled newspapers are not stored in the building — instead, newspaper bales are loaded directly into a trailer at one loading dock bay. That newspaper trailer fills and is replaced with an empty trailer on a weekly basis. Approximately one third

of the square footage of the building, or 3,300 square feet, is available for processed material storage. This is an adequate amount of space as it can accommodate approximately two shipments worth of each baled material, or two weeks' worth of all baled materials. As was mentioned previously, glass is stored outside in 30 cubic yard roll-off containers. The moisture content in these materials has not been problematic.

In order to evaluate the effectiveness of the Recycling Center's balers and densifier, R.W. Beck analyzed shipping records for processed materials. Based on this analysis, the Recycling Center's paper balers appear to be adequately producing sufficiently dense bales so that shipped load weights for paper are at or close to their legal over-the-road limit. This is not the case for plastics, for which shipping weights varied from 15-22 tons in 2003 with most of the loads at 17 tons or less. Most plastics markets assess a freight penalty for loads lighter than 17.5 tons. A further analysis of plastics shipping records revealed that PET bales weigh approximately 700 pounds each and HDPE bales weigh approximately 800 pounds each. The HDPE bales are sufficiently dense to avoid low-weight freight penalties if Goodwill requests 53-foot long trailers and properly loads the trailers in such a manner to maximize the number of bales in the trailer. Alternatively, PET bale weights are marginal if low-weight freight penalties are to be avoided on loads consisting only of PET bottles.

The Recycling Center should seek to improve PET bale density by keeping the PET perforator and plastics baler well-maintained and adjusted for optimal performance. The Recycling Center has also experienced problems with PET bale breakage when bale weights are increased. Other MRFs have found that using a heavier gage bale wire or adding extra bale wires to each bale has helped to avoid this problem. As these solutions will increase the cost of securing each bale, they should only be done for plastics bales rather than for all materials.

1.4.5 Labor

The facility began as a way to blend the community's need for a recyclables processor and marketer, with the needs of Goodwill Industries' clients to develop job skills and experience, and improve their lives through work opportunities. Figure 7 shows Goodwill Industries' mission statement, which must be kept in mind when considering any potential efficiency or operational change at the facility.

Figure 7
Goodwill Industries' Mission Statement



Labor at the Goodwill Industries Recycling Center consists of “staff” and “clients.” Goodwill clients are generally paid minimum wage, which is \$5.15 per hour. Federal and state grants provide \$18.00 to \$20.00 per client per-day of additional funds, which helps offset the cost of their labor and training (generally by about 67 percent). The clients often have staggered shifts and their work hours are determined by factors other than operations of the Recycling Center, including class and/or training times, therapy times, physical limitations, transportation constraints, etc. The staggered shifts and varying schedules occasionally results in processing inefficiencies when not enough laborers are available to perform sorting of commingled containers. Clients tend to stay employed at the facility for many years. One has been there for 13 years. Clients also help collect recyclables. At the time of this study, 17 clients were working at the facility, not including those who collect recyclables. Clients are all part-time, generally working a 5.5 hour day, five days per week.

There were 14 “regular staff” members working at the facility at the time this study was conducted, including a full-time manager and assistant manager.¹ Of the other regular staff working at the Recycling Center, seven are part-time, working an average of 32 hours per week, and the remaining five are full-time, working 35 to 37 1/2 hours per week. Staff wages generally range from \$7.50 to \$8.00 per hour, plus benefits. There is no overtime. Turnover of regular staff is not a significant issue at the facility and many employees have been working at the facility for a number of years.

1.5 Materials Marketing

End markets for the materials processed at the facility are described in Table 2. Full loads are normally shipped for most materials — steel and aluminum cans are exceptions because those markets are either local (steel) or because revenues are needed for cash flow purposes (aluminum). Except for glass, markets make freight arrangements and pay the cost of the freight.

¹ An additional seven regular staff members are drivers who perform recyclables collection.

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Table 2
Summary of Material End Markets

Material	Form Sold	Market	Annual Tonnage (2003)	Avg. Price \$/Ton (2003)	Benchmark Price per Ton ¹	Goodwill Price Relative to Benchmark
Steel Cans	Densified	Platts Scrap – local dealer (End market is in Pittsburgh)	148.3	\$20.00	\$68.33	-70%
Aluminum Cans	Densified	Metalife Resources, Carnegie, PA Toby Brothers	20.8	\$1,000.00	\$1,010.80	-1%
Clear Glass	Crushed (roll-off)	Carry All Products, Connellsville, PA	232.0	\$35.00	\$25.00	+40%
Brown Glass	Crushed (roll-off)	Carry All Products, Connellsville, PA Brandish Glass, Greensburg, PA	259.6	\$20.00	\$11.00	+82%
Green Glass	Crushed (roll-off)	Carry All Products, Connellsville, PA	74.1	\$25.00	\$5.00	+400%
Mixed PET	Baled	Ensley Corporation (Reidsville, NC)	86.2	\$200.00	\$251.67	-21%
Mixed HDPE	Baled	Ensley Corporation		\$200.00	\$231.67	-14%
OCC	Baled	NCB Commodities (Broker) – End market is in VA Northstar Recycling Group (Broker) Ace Paper	701.5	\$85.00	\$63.54	+34%
ONP	Baled	Bowater Pulp and Paper, Quebec (by Contract)	1,113.0	\$65.00	\$67.92	-4%

¹ Source: Recycling Manager 2003 for the Philadelphia region.

As Table 2 indicates, Goodwill Industries receives an excellent price for its glass, particularly green glass, relative to area market averages. They are also obtaining relatively good prices for aluminum cans and OCC.

Goodwill Industries' price for steel cans is well below the market average. The market in the Pittsburgh area is generally a relatively strong market, and regional prices averaged \$68.33 per ton in 2003. In June the facility manager indicated that

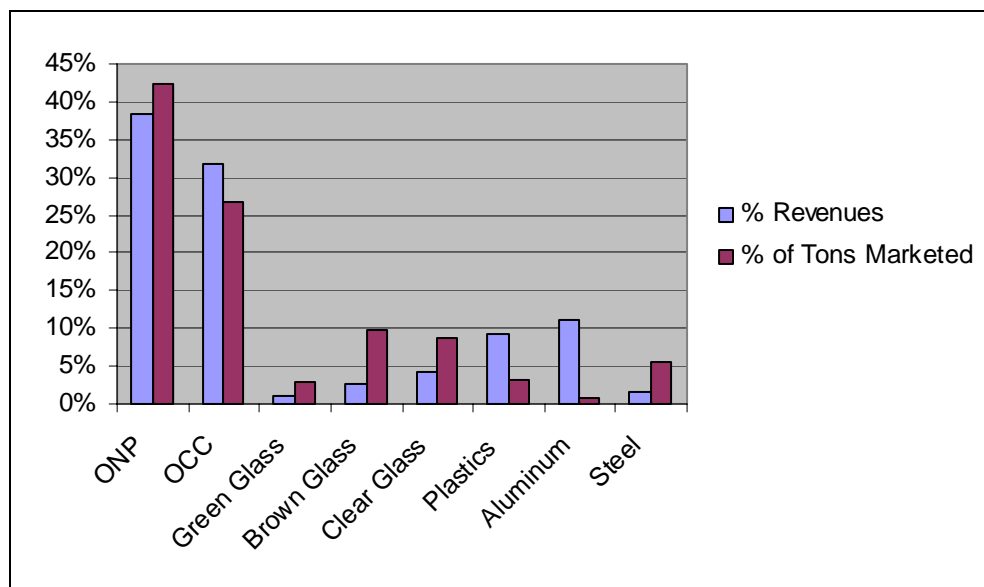
they were earning \$40 per ton (\$.02 per pound) on steel, which is still 33 percent below the average regional price of \$60 per ton in June.

Prices for HDPE and PET bales are also below industry average by about 14 and 20 percent respectively. Goodwill's plastics market only reclaims HPDE and so the company must reship the PET that it receives to other markets. This fact, in combination with low shipping weights, may be the reason why the company pays less than market prices for Goodwill's plastics.

Goodwill Industries and Bowater have a contract in place for ONP. Goodwill Industries is paid \$5.00 per ton over Buffalo Region Official Board Markets (OBM) high side, or the OBM high side when the OBM high side is greater than \$100 per ton. There is a floor price of \$45 per ton. The facility agrees to provide Bowater with 90 tons per month of ONP (one shipment per week). Based on outgoing materials reports, the facility averages nearly 93 tons per month. Although the terms of the contract appear to be good, the resulting average price was slightly below average for the area in 2003. This is likely due to slight differences in the Buffalo Region prices relative to the Philadelphia area prices that were used as the benchmark.

Figure 8 provides a summary by material indicating portion of incoming materials each material comprises, and the portion of revenue associated with each material.

Figure 8
Materials Processed at Goodwill Industries Recycling Center in 2003



As Figure 8 shows, the majority of tons and revenues for the Recycling Center comes from newspaper and corrugated containers.

1.6 Financial Review

1.6.1 Annual Operating Costs

Table 3 provides a summary of annual operating costs for the Recycling Center.

Table 3
Summary of Annual Recycling Center Operating Costs in 2003

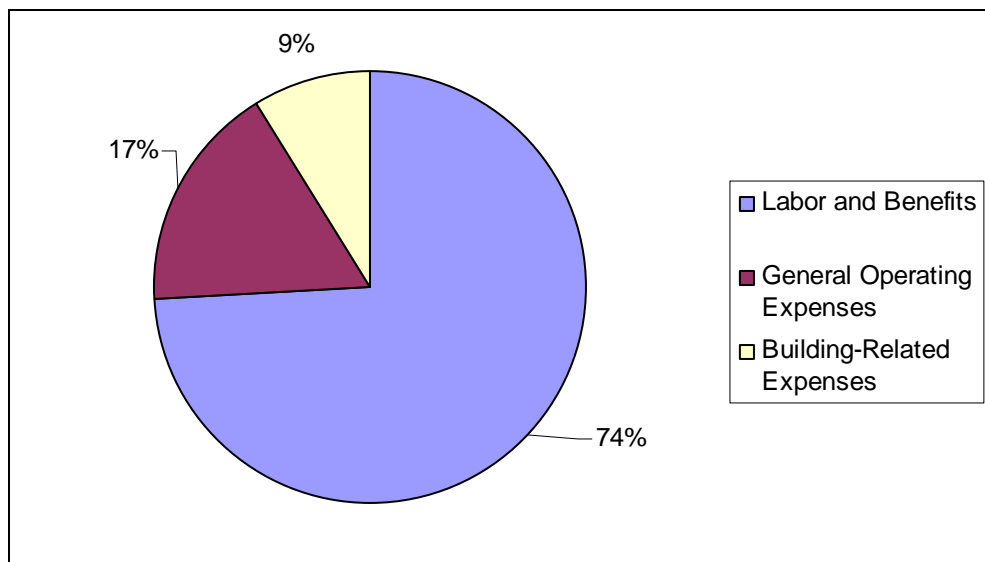
Item	Amount
Labor:	
Client Salaries	\$59,138
Employee Regular Salary	\$116,774
Employee Benefits	\$44,827
Contract Labor	\$2,419
Total Annual Labor Cost	\$223,158
General Operating Expenses:	
Contractor Expenses (Maintenance)	\$5,715
Supplies	\$8,926
Equipment Maintenance	\$16,047
Shipping/Freight	\$571
Fuel	\$1,675
Other Expenses	\$2,292
Trash/Dump Fees	\$15,777
Total General Operating Expenses	\$51,003
Building-Related Expenses:	
General Insurance	\$7,107
Maintenance Supplies	\$ 898
Maintenance Repairs	\$ 2,829
Electricity	\$ 5,516
Licenses/Permits	\$57
Service Contracts	\$960
Natural Gas (Heat)	\$8,246
Water/Sewage	\$1,277
Total Building-Related Expenses:	\$26,890
TOTAL ANNUAL OPERATING COSTS	\$301,051

Because the Recycling Center employees and clients operate as a team, pitching in to do whatever collection or processing work needs to be done, it is difficult to pinpoint the exact amount of labor and associated costs that are attributable to Recycling Center

operations. Facility management, however, estimates that 70 percent of regular staff hours are spent conducting Recycling Center operations and that 80 percent of clients' hours are attributable to Recycling Center operations, with the remaining time spent on collection activities. These ratios were used to allocate Goodwill's total labor and benefit expenditures to the Recycling Center shown in Table 3.

With annual total operating costs of \$301,051 and 3,000 annual tons, the facility's operating cost is \$100.35 per ton of incoming materials. Figure 9 compares the primary operating cost areas for the Recycling Center.

Figure 9
Goodwill Industries' Primary Operating Cost Areas



Note: based on 2003 annual operating costs.

1.6.2 Annualized Capital Costs

To estimate annualized capital costs the original purchase price of the Recycling Center and its equipment was escalated by 2.5 percent per year from the original purchase date, to estimate "current day" equipment purchase prices (replacement cost) for each capital item. This total of all items was \$1,011,060. The estimated current purchase price for the Recycling Center and its equipment were then individually divided by the expected lifespan of the each piece of equipment and the facility itself per Goodwill's amortization schedule to obtain an estimate of the current year capital cost, regardless of how each capital item was purchased/financed in the past. Table 4 shows the results of this analysis.

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**Table 4
Annual Capital Costs**

Capital Equipment	Estimated Current Purchase Price ¹	Lifespan ²	Annualized Cost
Building-Related Capital			
Building	\$226,869	28	\$14,411
Oil Heater	\$6,876	9	\$764
Oil Heater	\$6,876	9	\$764
Air Monitoring Equipment	\$2,393	5	\$266
Total Building-Related Capital	\$243,014		\$16,205
Equipment-Related Capital			
Conveyor Belts	\$3,415	5	\$683
Repair to Door	\$1,046	5	\$209
Repair to Compactor	\$1,766	5	\$353
New Breaker – Densifier	\$1,040	5	\$208
Forklift	\$20,290	7	\$2,899
Forklift	\$17,000	7	\$2,429
Front End Loader	\$45,256	7	\$6,465
Excel Baler (OCC)	\$74,305	12	\$6,192
Int'l Baler (ONP)	\$56,519	12	\$4,710
Int'l Baler (Plastics)	\$56,519	12	\$4,710
Marathon Baler (Trash)	\$34,431	12	\$2,869
Can Densifier	\$43,865	5	\$8,773
Glass Crusher	\$4,733	7	\$676
Glass Crusher	\$4,733	7	\$676
Perforator	\$3,974	7	\$568
Perforator	\$3,974	7	\$568
Wire Cages (46)	\$7,790	12	\$649
2-CY Dumpsters (24)	\$17,488	12	\$1,457
Conveyors/Storage Hoppers	\$370,000	20	\$18,500
Total Annual Equipment Capital	\$768,146		\$63,594
Total Annual Capital	\$1,010,160		\$79,799

¹ Based on purchase year and price, escalated by 2.5 percent per year, except in case of building, which assumes an interest rate of 4.5% and 28-year amortization schedule.

² Based on Goodwill depreciation schedule, if available, or industry standards, if not available.

As Table 4 shows, the current annual estimated total capital cost is approximately \$79,799. Because of DEP grants and the donation of the building from the Robert Eberly Foundation, the subsidized actual annual capital cost that Goodwill has paid for the facility to date is \$9,274. In other words, DEP and other grants have provided for

88 percent of capital costs, which has enabled recycling processing infrastructure development in Fayette County.

Although grants have been available in the past, they may not be available in the future. Annualizing capital cost totals and excluding the impact of grants gives the facility an idea of revenues that are required to ensure the Recycling Center can be financially sustainable for the long term if grants are not available in the future for the purchase of replacement equipment. This revenue requirement includes payments on existing plant and equipment that has been financed or leased and contributions that should be made to a renewal and replacement fund for all other plant and equipment that have been purchased outright. Future year adjustments will need to be made to the annual capital cost figure to account for inflation. It should be noted that revenues required to offset the capital costs shown in the above table could be significantly lower if: (1) DEP grants are available in the future for capital equipment replacement; or (2) if the service life of the equipment and facility is prolonged past the lifespan shown in the table because of intensive maintenance and repair or lower than average use. For example, if DEP grants are available in the future to the extent that the Recycling Center has benefited in the past, the current annual capital requirement would only be an estimated \$9,274 instead of \$79,799.

Total annual costs, including both operating and capital costs, are \$380,850, or \$126.95 per ton. As was mentioned above, annual capital costs could be significantly lessened if future grants are available or if capital equipment life can be prolonged. At the subsidized rate, total costs are \$310,320 per year, or \$103.44 per ton.

1.6.3 Revenues

Facility revenues attributable to Recycling Center operations consist of the sale of recyclable materials, which was estimated to be \$188,104 per year, and federal and state training grants that are received for clients. Federal and state training grants are approximately \$35,000 per year, 80 percent of which is attributed to Recycling Center sorting operations, and 20 percent of which is attributable to collection activities. Total 2003 revenues for the Recycling Center, excluding grants for collection activities, are \$216,104.

Goodwill Industries also received approximately \$8,000 per month, or \$96,000 per year, in revenues from the communities that receive collection services from them. This is based on a \$0.30 per household charge for monthly collection. These revenues are assumed to cover the costs of collection and may also offset some processing costs as well. No similar fees, however, are assessed for servicing drop-off sites, nor are tip fees charged to private haulers who deliver materials to the facility.

1.6.4 Recycling Center Profitability

Table 5 shows 2003 revenues and expenditures for Recycling Center operations only (e.g., excluding collections and other non-Recycling Center functions).

Table 5
Recycling Center Profitability

Revenues	\$216,104
Operating Costs	<u>\$301,051</u>
Net Operating Revenue (Expenses)	(\$84,947)
2004 Recapitalization Requirement	<u>\$79,799</u>
Net Surplus (Shortfall)	(\$164,746)

Note: revenues and operating costs are based on 2003 data.

As the results in Table 5 indicate, the Goodwill Recycling Center had an operating revenue shortfall of \$84,947 in 2003. This shortfall was offset by revenue surpluses in other areas of Goodwill's operations. The table also shows that the Recycling Center lacks sufficient net operating revenues to recapitalize the facility so that it is sustainable in the long term in the absence of grants.

If the Recycling Center is to operate as an enterprise that does not require operating subsidies, charging a tipping fee of as much as \$28.30 would be required. If the facility is to ensure that sufficient funds are available for both operations and recapitalization (without the need for grants), charging a tipping fee of as much as \$54.90 would be appropriate. Of course, lower tipping fee levels would be required if the Recycling Center implements the recommendations of this report that result in reduced costs or increased revenues.

Alternatively, the facility could consider increasing the collection fees it charges for providing curbside collection services to cover both collection and processing, as these services can be considered to be "bundled" services.

1.7 Observations and Recommendations

1.7.1 General Operational Observations and Recommendations

- Newspaper sorting and baling could be streamlined, as the current method involves manually removing contaminants from newspaper and then manually loading the newspaper onto the feed conveyor for the ONP baler. It is recommended that the facility pilot test sorting newspaper on the sort line, which would include positively removing contaminants and depositing them into trash cans next to each sorter, while allowing the clean newspaper to go to the end of the belt at which point it would fall into a newspaper hopper. If the pilot tests show that processing rates increase and quality is maintained, this change in processing practices should be permanently implemented. Making this change may require the Recycling Center to either bale all ONP with the OCC baler or add a hopper to the feed belt for the newspaper baler so that processed newspaper is not manually loaded onto the feed belt.

- The processing system and layout has been modified and added to over time so that equipment additions were made where they could be fit into available space. The result is that sorting of containers is not done in the most efficient sequence of largest and most voluminous to smallest and least voluminous. Using this criterion, HDPE bottles should be sorted first, followed by PET bottles, cans, clear glass, brown glass, and finally green glass last. Instead, the current sorting order is cans, green glass, HDPE bottles, clear glass, brown glass, and finally PET bottles. The processing line is also operated at a speed that is slow compared to other MRFs. Although this is an intentional accommodation to the abilities of Goodwill's clients, it is recommended that facility management continually monitor the belt speed to see if it could be increased without detriment to the sorters. It is recommended that the facility investigate the cost of realigning the sort line and processing equipment, including:
 - Changing the order of the sorts;
 - Adding another sort cage and extending the length of the sort line (if needed) so HDPE natural bottles can be sorted as a separate grade;
 - Adding an overhead transverse magnet to the sort line so that steel cans are removed automatically — at least one can sorter position can be eliminated and aluminum cans would be still be manually removed — this change would save at least \$7,400 per year and have a payback period of less than two years, and should be implemented regardless of whether the whole line is realigned or not; and
 - Modifying the end of the line if newspaper is to be permanently sorted on it so that processed newspaper could fall onto a new conveyor that would deliver the newspaper to the newspaper baler (this would require the installation of a short reversible belt that could send residue from containers one direction and processed newspapers in the opposite direction).
- During the site visit, there was a significant amount of debris on the sort platform, floor, and around processing equipment. Some parts of processing equipment can get quite hot, particularly bearings, and flammable debris can ignite and cause a fire. Loose debris on the floor and platforms can also become a safety hazard. It is recommended that the facility management ensure that the facility is cleaned more frequently than is currently done.
- During the process of conducting this study, R. W. Beck recommended that the facility replace baling and self-haul of residue with roll-off container service by a local waste hauler. The facility subsequently investigated that option and decided to implement the recommendation. A local waste hauler agreed to service a 30 cubic yard roll-off for \$75 per pull, which will cost \$3,900 per year assuming a once per week pull. The waste hauler is also able to offer a reduced tip fee of \$32.00 per ton compared to the self-haul tip fee of \$43.30 that Goodwill was charged at the landfill. The \$11.30 per ton tip fee reduction will save the facility \$4,100 per year in tip fees at current residue levels. The net cost savings, therefore, is estimated at \$200 per year. Additional savings of approximately \$7,800 are projected from eliminating:

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- The cost of two employees delivering waste to the landfill twice per week;
- One client position as trash will no longer need to be baled; and
- The electricity, baling wire, and maintenance associated with using the baler.

Net annual savings of having trash serviced by Onyx is therefore estimated at \$8,000.

- The HDPE storage hopper has a bridging issue. During the site visit materials were frequently becoming jammed, making it necessary for an employee to “unclog” the hopper with a broom handle. It is recommended that the facility cut away a portion the wire mesh on the side where the incline conveyor feeds the baler so that there is a larger discharge area for the hopper.
- Due to staggered shifts, the facility manager stops running the sort line fairly early in the afternoon (2:30 p.m.). During the site visit, the remaining employees were not all making optimal use of their remaining time at work. It is suggested that employees use the time when the sort line is not operating to sweep and conduct other essential functions.
- The cost of processing recyclables exceeded materials revenues by \$84,947 in 2003. The Recycling Center also lacks a renewal and replacement fund to recapitalize the facility so that it can be sustainable in the long term in the absence of grants. It is recommended that the Recycling Center consider charging processing fees. These fees could either be a tip fee that is charged to private haulers who deliver residential recyclables or direct payments by local governments who benefit from the processing service that the facility provides.

If the Recycling Center is to operate as an enterprise that does not require operating subsidies, charging a tipping fee of \$28.30 would be required to cover the operating deficit of \$85,000 — lower fees would be required if the deficit is able to be reduced by implementing the other recommendations of this report. If the facility is to ensure that sufficient funds are available for both operations and recapitalization (without the need for grants), charging a tipping fee of as much as \$54.90 would be required. However charging such a high fee would place the cost of tipping at the Recycling Center higher than the landfill tipping fee, which would prove to be a disincentive to recycling.

1.7.2 Education/Outreach Observations and Recommendations

- The facility receives a considerable amount of trash in plastic bags. The Recycling Center management and/or the County Recycling Coordinator should work with municipalities to ensure that a small trash can is located at each drop-off site for plastic bags and other contaminants. Trash dumpsters are not recommended, as they can attract illegal dumping. Furthermore, the location of recycling sites should be in visible high-traffic areas to discourage illegal dumping.
- The Recycling Center management should request more frequent patrols by County or Municipal law enforcement to reduce illegal dumping that occurs

outside of the Recycling Center. Some communities have also found that searching through the dumped material for envelopes with names and addresses, installing lighting, and installing real or fake video surveillance cameras can reduce illegal dumping.

- It is recommended that the County consider improving education and outreach efforts to ensure that residents are aware of which materials are recyclable and which are not. Pictorial signs on drop-off containers have been used in other counties to help residents understand what is recyclable.

In particular, plastics education seems to be inadequate. At least one drop-off site's collection container listed "#1 and #2 plastics" as accepted whereas only #1 and #2 plastic **bottles** can be marketed by the Recycling Center. Because there is significant contamination from non-desired plastics (including plastics that may be labeled with a #1 or #2 that are not bottles), the County should consider changing its education program to request "all plastic bottles."

The plastics recycling industry recommends as a best management practice the use of an "all plastic bottles" education approach, without the numbering system, to reduce public confusion, reduce non-bottle contamination, and increase recovery amounts of PET and HDPE bottles. Research has shown that desired PET and HDPE bottle recovery increases by about thirteen percent on average after making this switch in education and awareness program materials. A drawback is that undesired plastic bottles collected compose approximately five percent of collected bottles and would likely be disposed.

1.7.3 Materials Marketing Observations and Recommendations

- The facility should consider alternative markets for steel, including marketing material directly to steel mills and/or foundries. The Recycling Center will likely need to store steel until a truck-load quantity is accumulated if it chooses to implement this recommendation. The expansion of the facility will make this recommendation more practical to implement. If the facility were to earn \$60 per ton, as published sources indicate that they should (and which is earned by other facilities in Pennsylvania), they would increase revenues by nearly \$6,000 per year.
- Facility management should investigate alternate markets for plastics. At a minimum, PET and HDPE will likely need to be sold to separate markets as nationwide only a couple of plastic reclaimers recycle both materials. Facility management should also ensure that plastics perforators and the plastics baler are adjusted and maintained to result in maximum bale weights. Facility management should also ensure that 53-foot trailers are requested and that those trailers are properly loaded so that the maximum number of bales fit in them. If industry average prices are able to be obtained for these materials, annual revenues would increase by \$3,600 per year, assuming a 50-50 split between PET and HDPE. Even more revenues (estimated at \$2,100 per year) could be obtained if the facility is retrofitted so that natural HDPE bottles can be sorted from pigmented bottles and baled as a separate and more valuable grade of HDPE.