

Final Report

# Lycoming County Material Recovery Facility Evaluation



PA Department of Environmental Protection

December 2004



# LYCOMING COUNTY MATERIALS RECOVERY FACILITY EVALUATION

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# Executive Summary

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The Pennsylvania Department of Environmental Protection sponsored the operational efficiency and cost/revenue evaluation of the Lycoming County Materials Recovery Facility (MRF) 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 MRF receives pre-separated recyclables, primarily from drop-off sites and commercial recyclables collection routes so processing primarily entails removing contaminants from most materials, sorting plastic bottles by type, and baling materials for more economical shipment to market. Material is received from Lycoming and surrounding counties and the facility serves as a regional processing center.

The MRF was less than one year old when it was evaluated and the facility and its equipment were found to be in good condition. The MRF was found to have sufficient space, equipment, and labor to effectively process the recyclables that it receives. In fact, significantly greater amounts of recyclables could be processed by the facility as it was only processing approximately ten percent of its design capacity when this evaluation was conducted. The MRF also appeared to be well managed. Table ES-1 shows the financial situation of the facility.

**Table ES-1**  
**2004 Pro Forma**

2004 Estimated Revenues	\$702,550
2004 Estimated Operating Costs	<u>\$407,532</u>
Net Operating Revenue	\$295,018
2004 Recapitalization Requirement <sup>1</sup>	<u>\$570,680</u>
Recapitalization Surplus (Shortfall)	(\$275,662)

<sup>1</sup>Without DEP grants

As the results in Table ES-1 indicate, the Lycoming County MRF has positive annual operating revenues of approximately \$295,000. The table also shows that the MRF does not currently appear to have sufficient net operating revenues to recapitalize the MRF so that it is sustainable in the long term in the absence of grants.

# Recommendations

## General Processing/Facility Management

- The MRF needs to fix a bridging problem that occurs in the newspaper and magazines sloping bunkers. This could be considered to be a design flaw so that correcting the problem could be accomplished at no cost to the MRF. Efficiency improvements would result.
- The MRF should install a mirror and/or utilize radios so that the sort supervisor can tell when a different stream of materials is being loaded onto the conveyor that leads to the sort line. The cost to make this change is minimal.
- Lycoming County Resource Management Services (LCRMS) should continue in its efforts to source more materials for processing at the facility as it was significantly underutilized at the time this study was conducted. Increasing throughput will make the facility more efficient.
- The MRF should consider means to “flatten” newspapers and magazines that enter the sort line. A removable bar could be utilized to flatten piles of newspaper and magazines, such that the materials are more evenly dispersed along the sort conveyor, improving sorter efficiencies.

## Contamination Reduction

- Incoming materials, especially from drop-off programs, appear to be heavily contaminated. LCRMS should work with collection program operators to improve educational materials and signage and provide for waste disposal at drop-off sites. Drop-off technologies that are specifically designed to reduce contamination should also be promoted and expanded.
- Incoming drop-off plastics are heavily contaminated. LCRMS should consider changing its education program to request "all plastic bottles." The plastics recycling industry recommends this as a best management practice, without using the numbering system, which can be misleading and confusing. Research has shown that desired PET and HDPE bottle recovery increases while contamination decreases with this change.

## Materials Marketing/Targeting

- The County should expand their effort to target more high-grade office paper and corrugated containers for recovery and processing at the facility as processing these materials is profitable.
- The County should consider collecting newspaper, magazines, and plastics curbside. As only 2 percent of incoming materials are from curbside collection programs, there is likely a great potential to increase recovery via offering residents convenient access to newspaper and plastics recycling.

- The newspaper and corrugated containers brokerage contracts do not appear to benefit the MRF. The price ceiling of the newspaper contract in particular caused the MRF to lose significant revenues in 2003. The MRF should only deliver the minimum tonnages required under the contracts and should market as much material as it can to other purchasers. When the contracts expire, the MRF should evaluate whether it still needs the contracts. If the decision is yes, the contracts should have a higher floor price and the MRF should request proposals from several markets so that the proposal with the most favorable terms can be selected.
- The MRF should investigate alternate markets for PET bottles and steel cans. As much as \$9,000 per year of additional revenues could be obtained if average regional prices were obtained for these materials.
- The MRF should try to track all costs associated with PVC grinding, including electricity and maintenance costs, to more accurately measure this activity's profitability. Based on available data, the activity is profitable, with net earnings of \$35 per ton. The MRF should also focus on developing more PVC grinding business, as this will make the operation more cost-effective, improving net revenues per ton.





# Lycoming County Materials Recovery Facility Evaluation

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## 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 wastesheds 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 improvements, increasing throughput and recovery rates, and maximizing the return on investment of recycling grant funds. The Lycoming County Materials Recovery Facility was one of the facilities that was evaluated and this report presents the results of that evaluation.

## 1.2 Facility Description

The Lycoming County materials recovery facility (MRF) is a 60,000 square-foot facility that was constructed in 2003 and became fully operational in October of that year. The facility serves all 12 municipalities in the County, as well as other communities located in the region (materials are received from Montour, Columbia, Snyder, and Union Counties). In-County materials come from the County's 24 drop-off programs (most of which are available 24 hours per day) and municipal curbside collection programs (there are 12 curbside programs in the County – most of which are bi-monthly, however some are three times per month, and some are monthly). The facility also accepts recyclables from commercial sources.

The facility accepts the following post-consumer materials: glass containers, plastic bottles, aluminum cans, steel cans, corrugated containers, office paper, magazines, and mixed computer/office paper from businesses. The facility also accepts some post-industrial materials, such as PVC (sheet and pipe), which they grind on-site. The facility also accepts and markets processed newspapers, magazines, corrugated containers, mixed office paper, and glass from other counties. A maintenance facility is also located on-site, which serves the County landfill (located next door) as well as the MRF. In addition, there is a concrete pad which is used for processing clean wood waste located beside the facility.

## MATERIALS RECOVERY FACILITY EVALUATION

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Materials arrive pre-sorted, with the exception of plastic bottles, which arrive commingled (HDPE natural, HDPE pigmented, and PET all combined). Sorting is performed by hand using low-risk County prison laborers.

Figure 1  
Loading Bays at Lycoming County MRF



The MRF has eight receiving bays, and six shipping bays. There is one inbound and one outbound scale, which are located next to each other on the north side of the building. The facility operates one shift per day, processing materials Monday through Friday from 7:00 a.m. to 3:30 p.m. Recyclables are received during normal processing hours plus on Saturdays from 7:00 a.m. to 12:00 noon. The facility operates 52 weeks per year.

Aside from its typical “MRF” operations the Lycoming County facility also accepts PVC pipe and occasionally sheet PVC for grinding on-site. The County sells the ground material to plastic product manufacturers. Wood grinding is also performed on site. An additional grinder is available for off-site use, which is typically rented by municipalities in the area.

The major equipment used by the Lycoming County MRF to process recyclables is described in Table 1. This equipment excludes the conveyors and storage bins, which are considered to be part of the building, and are therefore not included on the asset inventory list.

Table 1  
Summary of MRF Equipment

Equipment	Number of Items	Purpose
Loaders	5	Move materials, particularly unprocessed materials
Fork Lift	1	Move processed materials
American Economy Horizontal Baler	1	Bale corrugated containers
Marathon Baler with Fluffer	1	Bale other fibers, steel cans, and plastics
Dens-O-Can Densifier	1	Densify aluminum cans
Trailer	1	Baled material storage
Cumberland Granulators	2	Grind PVC pipe and sheet

### 1.3 Sources and Composition of Materials Accepted

The Lycoming facility accepts the following pre-sorted materials from curbside, drop-off, commercial, and industrial recyclables programs (combined):

- Steel cans;
- Aluminum cans;
- Plastic bottles (mixed PET and HDPE);
- Green glass containers;
- Brown glass containers;
- Clear glass containers;
- Newspapers;
- Magazines;
- Office paper; and
- Corrugated containers.

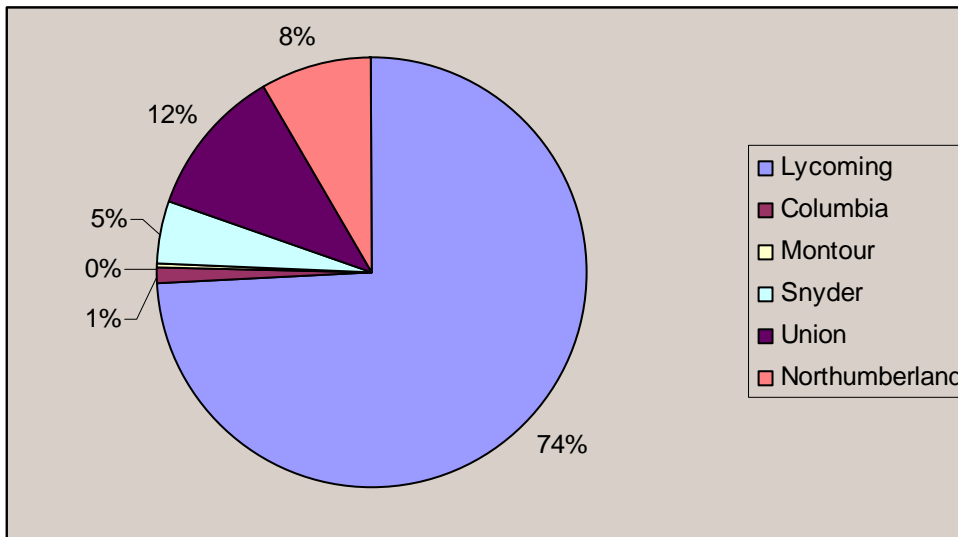
In addition, some materials arrive directly from area businesses, already processed, such as baled corrugated containers and processed glass. If at least a ton of a material is delivered to the MRF each month, then the MRF pays the hauler, business or County for the material.

The Lycoming County MRF receives a very large portion of its incoming materials from the Lycoming County drop-off recycling program. Drop-off receptacles require residents and/or businesses to place recyclable materials into the proper compartment, such that materials arrive at the MRF pre-sorted. It also receives drop-off materials from Snyder and Union Counties. In addition the MRF receives some curbside materials from Lycoming, Columbia and Montour Counties, and commercial materials from Lycoming, Cumberland, Montour, Snyder, and Union Counties. Industrial materials, such as magazines collected from industrial locations and old corrugated containers (OCC), are received from Lycoming, Union, and Northumberland Counties. Some materials are also delivered to the MRF that are already processed,

# MATERIALS RECOVERY FACILITY EVALUATION

such as processed glass and corrugated containers from Lycoming, Columbia, Snyder, Union and Northumberland Counties. Figure 2 shows the relative amounts of materials received by the MRF by county of origin.

Figure 2  
County of Origin of Recyclables Received at the MRF  
(2003 Data) \*

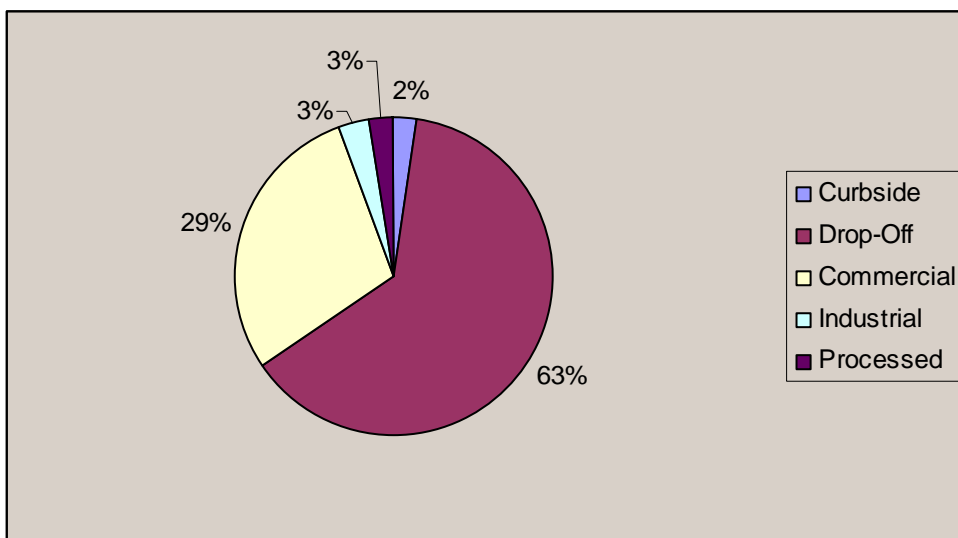


\*Includes "typical" MRF materials only, excluding industrial PVC, white goods, wood waste, etc.

As Figure 2 indicates, nearly three fourths of the recyclables processed at the MRF originate in Lycoming County.

Figure 3 illustrates the proportion of incoming materials by program type.

Figure 3  
Proportion of Recyclables Received by Program Type  
(2003 Data) \*

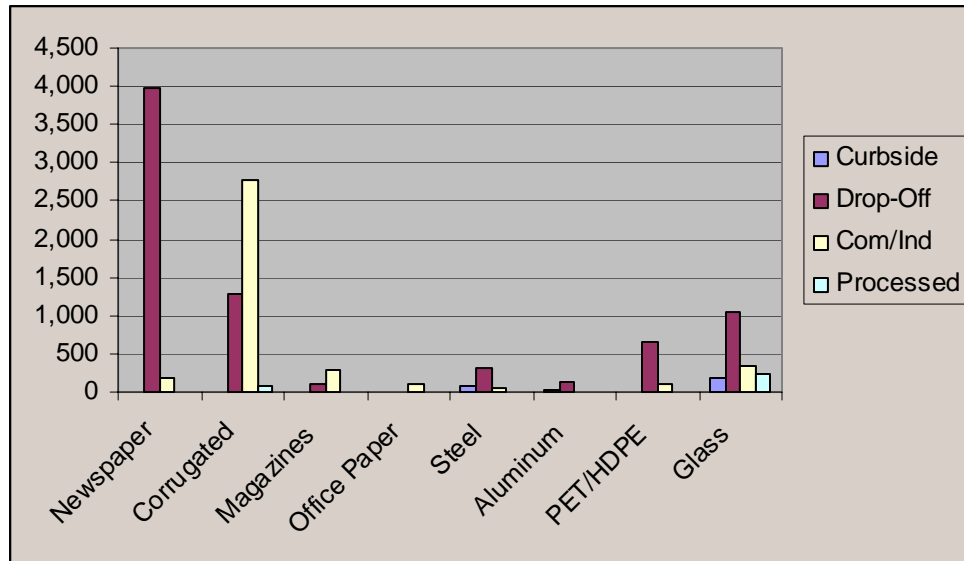


\*Includes "typical" MRF materials only, excluding industrial PVC, white goods, wood waste, etc.

As Figure 3 indicates, 63 percent of materials coming into the MRF are from drop-off programs. Only 2 percent of incoming materials are generated via curbside collection programs. The commercial sector generates 29 percent of materials delivered to the MRF for processing.

Figure 4 shows the type of recyclables program that each commodity type delivered to the MRF originates from.

Figure 4  
Tons Received By Each Recycling Program Type (2003 Data)



As Figure 4 illustrates, only glass containers and steel and aluminum cans are included in Lycoming County curbside programs. Clearly, drop-off old newspaper (ONP) is the single largest commodity received, followed by commercial/industrial corrugated containers. The majority of glass, steel cans, aluminum cans, and plastic bottles come from drop-off programs. The office paper program supplies a relatively small amount of material compared to the other recovery programs.

## 1.4 Material Processing

### 1.4.1 Material Receiving

When vehicles arrive, drivers weigh in at the scalehouse. The weigh master records where the materials are from, and records the gross vehicle weight. The collection vehicles then enter the tip floor area where they empty their first compartment, after which they drive back to the scales at the front of the building to be re-weighed — the weigh master then records the type of material and weight tipped. The driver subsequently pulls around to the side of the building to re-enter the tip floor area and tip the second compartment. This process is repeated until each compartment of the collection vehicle is emptied. Vehicles normally are able to back into the incoming materials storage bunkers and tip materials directly into the bunkers. The incoming

## MATERIALS RECOVERY FACILITY EVALUATION

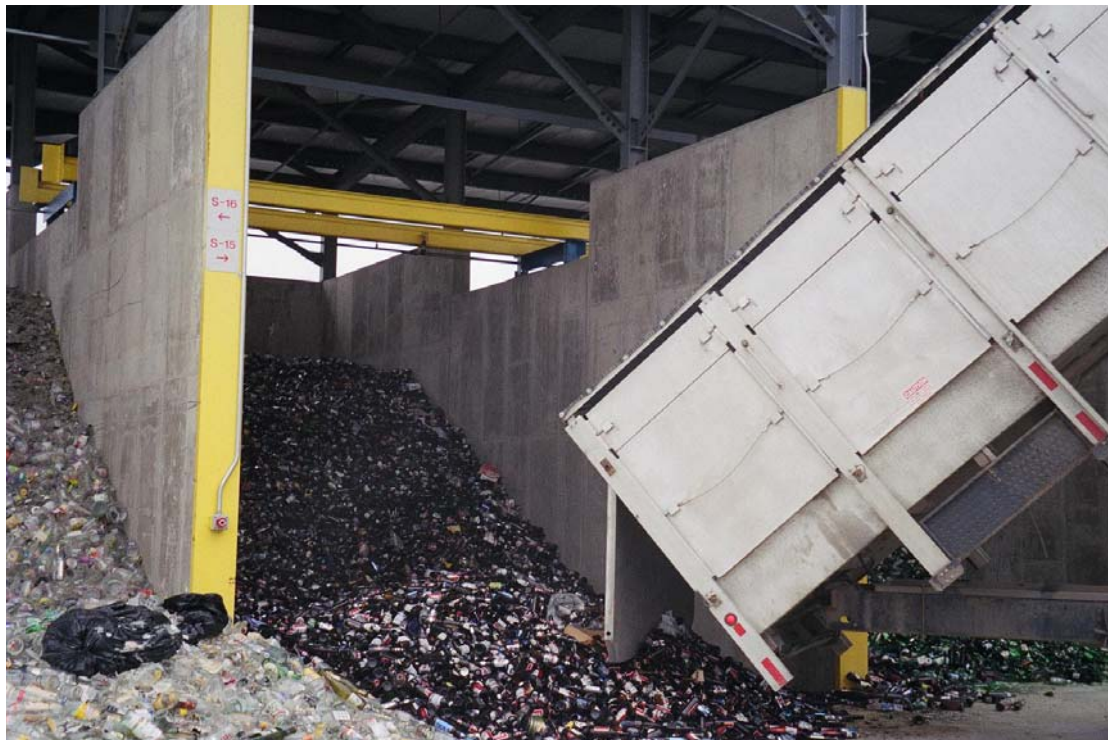
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material storage bunkers are approximately 12 feet wide, 25 feet deep and 20 feet high.

There are 11 bunkers for incoming materials. Six of the bunkers for incoming materials are located directly in front of the infeed sort line conveyor. Two bunkers are used for mixed plastic bottles, one for aluminum cans, one for steel cans, and one for overflow materials (this bunker was empty at the time of the site visit). There is another opening that is less deep, which is used for feeding materials, such as newspaper, onto the conveyor. When materials are ready to be fed onto the sort line, steel doors are opened, via controls from the sort line room, to allow the materials to flow onto the infeed conveyor. There are five additional incoming material storage bunkers located to the left of and perpendicular to the infeed conveyor line. Fiber materials are stored in these bunkers. Three are used for newspaper, one for magazines, and one for office paper. These materials must be fed onto the infeed sort line conveyor using a front end loader. There is a separate open floor tip area for corrugated containers.

There are three bunkers in the rear of the building (outside) for processed brown glass, green glass, and clear glass. Curb-sorted glass collected by Lycoming County vehicles is tipped directly into the appropriate processed glass storage bin outside of the facility to await shipment, as it is free of debris. Glass loads from other, non-Lycoming County curbside collection vehicles are sampled for quality. If the loads are clean, then they are tipped directly in the appropriate outdoor bin. If they are not clean, they are tipped in an incoming materials bunker to be processed.

Figure 5  
Clean Brown Glass Being Tipped in Outdoor Bunker



The facility has 10,384 square feet of storage space for incoming material. According to the MRF manager, this is sufficient space to accommodate three days worth of incoming materials.

## 1.4.2 Material Sorting

Because most materials arrive separated, the primary function of sorting is to separate out residue (trash). Materials are therefore batch processed – one type of material at a time. The MRF operations manager decides which material will be sorted, based upon quantity of materials in the storage bunker, and anticipated material arrivals. There is no set schedule, as materials received vary greatly by season, and sorting speed varies depending upon labor issues and other factors. Nearly all materials that enter the sort line are negatively sorted, meaning that contaminants are removed from the sorting conveyor belt. An exception is plastic bottles, which are positively sorted, meaning that they are removed from the sorting conveyor belt and deposited into an appropriate bunker. By far, the facility spends more time processing newspaper and plastic bottles than the other materials. Details regarding the processing line are below.

### 1.4.2.1 Negative Sorting

Aluminum cans, steel cans, and glass bottles (from drop-off centers, which are pre-sorted by color), newspapers, magazines, and office papers are negatively sorted. When it is time to process the material, the steel gate in front of the infeed conveyor is lifted if the material is located in a bunker located directly in front of the infeed conveyor. If the material is not located in such a bunker, it is loaded, via a four-wheeled loader, into the incoming material bunker I-7, which is the left-most incoming material bunker located along the infeed conveyor. This bunker is less deep than the others, allowing for better maneuverability of the loader.

Materials travel along the infeed conveyor past a belt magnet, which removes any steel cans, then travel up a 40 degree incline and onto the sort line conveyor. The sort line conveyor (which is 149'8" long) is elevated 20 feet above the floor. The sort line is located directly above sorted material storage bunkers. As materials travel along the conveyor, there are 8-12 sorters along the sort line that pick trash and other residue, as well as other recyclable materials, off of the sort line. Trash is picked and dropped into trash chutes, which go to a trash takeaway conveyor. There are also several trash cans located along the sort line conveyor, which are used for oversized trash. These are manually emptied into the trash chute at the end of the sort line from time to time by one of the laborers. Other recyclable materials are placed into plastic containers located along the sort line, or placed directly into chutes that empty into the sorted storage material bunkers below. Clean materials travel to the end of the sort conveyor where they fall onto a transverse reversing conveyor which can either direct the material to a baler or which can direct material the opposite direction to a processed material conveyor that can transport the material into the appropriate storage bunker.

When the newspaper was observed being processed, there were eight sorters (usually there are 10 to 14). All sorters appeared to be looking for trash. The main recyclable



materials being picked off the sort line were corrugated containers and Kraft paper and magazines. There appeared to be very few containers mixed in with the newspaper. There were, however, several bundles of newspaper that had to be removed from the sort line, to be unbundled later. The depth of burden varied from one inch to approximately six inches. It was noticed that the materials were passing along in a sporadic manner – there were moments when sorters were extremely busy and would sometimes swoop materials back down the conveyor whereas other times they were awaiting material. This is due to the way in which the material is loaded onto the infeed conveyor. The sorting belt speed ranges from 30 to 90 feet per minute, depending on the setting. It was observed to be running at 40 feet per minute, which appeared appropriate given the irregular flow of material.

### 1.4.2.2 Positive Sorting

Plastic bottles are the only material that is positively sorted on the sort line at the Lycoming County facility. The steel gate leading to the infeed conveyor is lifted, and plastic bottles flow out onto the infeed conveyor. At times a four wheel loader operator helps push materials onto the infeed conveyor, or the sort line supervisor lowers and raises the gate to help meter the flow of plastics. Again, materials go onto the incline conveyor up to the elevated sort line conveyor. There are 8-12 sorters that positively sort plastic bottles into pigmented HDPE, natural HDPE, and mixed color PET bottle categories, in that order. As the bottles are manually picked off the line they are tossed directly into chutes leading to the bunkers. Trash is allowed to travel to the end of the line, where it is deposited in the outdoor covered trash bunker, which is located next to the processed glass storage bunkers.

As the plastics are dropped into their chutes leading to the appropriate storage bunker, they go through a “twister” that flattens the bottles somewhat, reducing their volume such that more bottles can be stored in each bunker prior to baling.

There are two bunkers for HDPE natural, each with a twister above, and one for HDPE colored, also with a twister above it. There are two storage bunkers for PET – one of which has a twister, and one does not. This second PET bunker is used on occasion for overflow material in times of heavy volume; however, it was not being used at the time of the site visit.

As positively sorted materials are placed into their hoppers, they are dropped through a chute into a storage bunker. Negatively sorted materials are sent directly to a baler or to their storage bunker. The storage bunkers are 12 feet wide, approximately 20 feet deep and approximately 15 feet tall. The two ONP and one magazine bunkers have sloped walls, which drop to a conveyor that delivers the materials to the storage bunker. There have been some issues with newspaper and magazines getting stuck on the conveyor and not moving along the conveyor as they should. A series of steel beams have been welded below the opening of the chute in order to “break up” the material as it drops onto the conveyor, however they are still not functioning optimally, as materials sometimes bridge across the bunker above the conveyor, and do not fall onto the conveyor until they are manually cleared.

A lift gate on the storage bunkers release each material to a conveyor that takes materials to a baler, when it is time to bale (or densify) the particular material.

### 1.4.2.3 Corrugated Containers Sorting

Loads of corrugated containers (OCC) are delivered to a separate entrance on the south side of the building. OCC is pushed into piles where it is stored until it is floor-sorted (contaminants are removed manually), by two or three sorters.

### 1.4.2.4 Glass Sorting

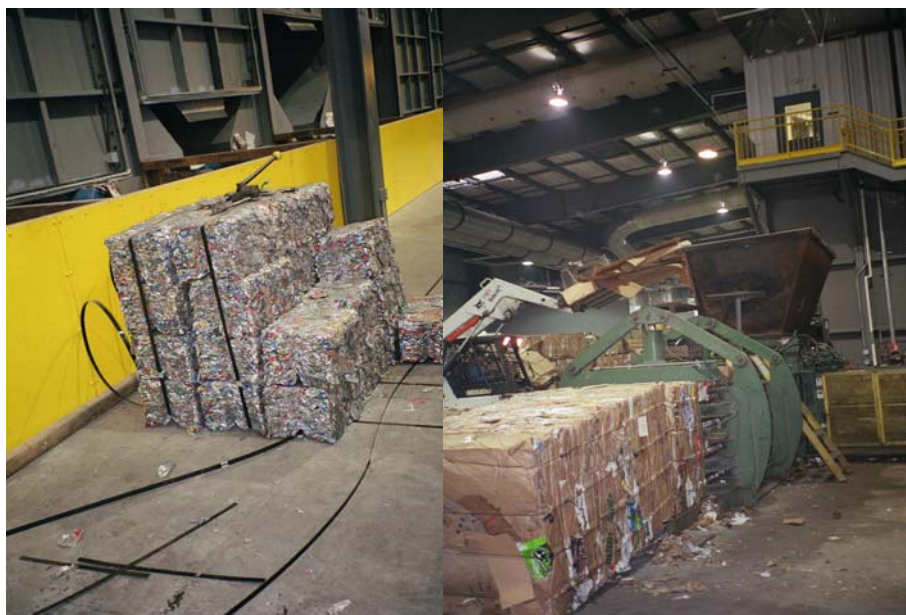
When glass from drop-off sites is delivered to the facility, it is stored in extra roll-off containers for each color. When time permits, the glass is processed. Each color of glass travels separately over the sort belt, where contaminants are removed. The glass is then conveyed directly to one of the three outdoor processed glass storage bunkers, depending on color, to await shipping.

## 1.4.3 Material Baling/Densifying and Storage

Except for glass, all other materials processed at the MRF are baled or densified for economical shipment to market. Aluminum cans are processed using a Stanko Dac 3000 Densifier that produces high-density biscuits of 11" x 17" x 9". These small biscuits are stacked into 4 x 4 x 4 bundles, which are manually strapped together using steel strapping.

Corrugated containers are baled using an American Economy horizontal baler that is dedicated to baling OCC. A bobcat is used to load the corrugated containers into the baler. Once baled, the OCC is loaded into a trailer for storage until ready for shipment.

Figure 6  
Densified Aluminum Cans and Baled Corrugated Containers



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All other materials (newspapers, magazines, office paper, natural HDPE bottles, pigmented HDPE bottles, PET bottles, and steel cans) are baled using a Marathon horizontal baler. Materials are fed onto the baler infeed conveyor, and are baled by a baler operator. Bales are tied automatically, after which they are moved to the baled material storage area.

Figure 7  
Baled Newspapers



Although the facility itself is relatively new, the two balers were moved from the previous processing site. The MRF is considering replacing one or both of the balers. Although the balers function adequately, the MRF manager indicates that the MRF could operate more efficiently with a baler that has doors.

In order to evaluate the effectiveness of the MRF's balers and densifier, R.W. Beck weighed and measured several bales of each baled or bundled material. Shipping records were also reviewed to obtain the average weight per load shipped. This data is summarized in Table 2.

Table 2  
Average Bale Weights, Densities, and Load Weights

Material	Avg. Bale Weight (Pounds)	Avg. Bale Density (Pounds per Cubic Foot)	Avg. Pounds/Load (2003)
ONP	1,285	28	44,040
OMG	1,793	35	44,159
PET	851	15	41,855
HDPE Nat.	1,313	21	41,491
HDPE Pig.	1,378	25	
Steel Cans	1,558	35	43,183
Aluminum Cans	2,096	35	44,156
Office Paper	1,189	27	41,092
OCC	1,996	24	43,031

The values in Table 2 demonstrate that the MRF's balers and densifiers are producing sufficiently dense bales and the MRF's equipment operators are properly loading trailers so that shipped load weights are at or close to their legal over-the-road limit.

There is 6,064 square feet of indoor space and 1,920 square feet of covered outdoor storage space for storing baled materials. This space is adequate and can store over two truckloads of each material.

## 1.5 Residue

Residue is positively sorted when most materials are processed, as they arrive separated, and the goal of the sort line is to pick out contaminants. When rejects are “picked off” the line they are deposited down chutes to a lower conveyor which conveys the material to an outdoor bunker. When plastics are processed, however, residue is negatively sorted and travels to the end of the sort line where it too is conveyed into the outdoor bunker. The MRF periodically loads the rejects and residues into a walking floor trailer and transports the material to the adjacent landfill, which is owned by the Lycoming County Resource Management Services. There, the facility only pays the \$4.00 per ton state-imposed fee to dispose of the residue.

The MRF manager indicated that residue is a more significant issue with drop-off sites compared to curbside recyclables, and in particular he indicated that OCC drop-off sites seem to be the largest offender. Typical contaminants include plastic bags and paperboard, including strengthened paperboard containers used to hold soda cans. While conducting the site visit, R. W. Beck also observed a considerable amount of residue in the incoming plastics. Noticeable contaminants were bags of trash, large plastic items, and non-recyclable plastic items such as yogurt containers and plastic clam-shell style “to go” food containers.

In 2003 Lycoming County disposed of 1,180 tons of residue. During that timeframe it processed 11,957 tons of materials, for a residue rate of nearly 10 percent. The

residue rate for Lycoming County declined after processing moved into the new MRF in the fall of 2003 as 406 tons were disposed from September 2003 through February 2004. Residue now averages 55-65 tons per month, for a facility residue rate of 6 percent. The reduction in residue is attributed to the ability to conduct better sorts and protect materials from the elements.

### 1.6 Labor

The Lycoming County Resource Management Services' Recycling Division includes recyclables collection, wood waste processing, and PVC grinding operations that are not common functions performed by MRFs. For this reason, recyclables collection and wood waste processing were not evaluated for this project. Because PVC grinding is a processing function, it is included in this report; however, it is treated as a separate stand-alone venture so as to allow the results of the MRF evaluation to be compared to other MRFs in the commonwealth.

#### 1.6.1 MRF Staff

The MRF has the following full-time staff (or portions of full-time staff positions) dedicated to typical MRF operations:

- 1 Weighmaster
- 1 Sortline Supervisor
- 1 Corrugated Container Baler Operator
- 1 Inbound Material Equipment Operator
- 1 Processing Supervisor
- 0.5 Mechanic
- 0.25 Administrative Staff for Materials Marketing

The facility also hires contract laborers as needed, to operate equipment, for example.

#### 1.6.2 Prison Labor

In addition to the regular MRF staff described above, there are 10-14 sorters (12 on average), who are all low risk pre-release work crew from the County Prison. These sorters earn \$0.30 per hour, eight hours per day.

There are tremendous financial advantages from using prison laborers for sorting recyclables; however the MRF manager notes that there are also some drawbacks. The laborers are required to be supervised while on break and at lunch. In addition, an hour of supervisor overtime is spent each day transporting prison laborers to and from the MRF, resulting in overtime expenses of \$8,333 per year. Also, there are times when prison laborers are not available due to meetings or other obligations at the prison, or when tension has been high at the prison and all prisoners are kept in lockdown. Finally, because the prisoners are in a pre-release status, they generally are available for several weeks at the most before they are released and must be replaced by another inmate.

The net economic benefit of using inmate labor (after deducting the \$0.30 per hour that is paid to prison laborers, and the required overtime for regular staff) is estimated to be \$179,000 per year, based on twelve sorters, with benefits, earning \$5.90 per hour. The labor budget would increase by nearly 75 percent if regular employees were used as sorters.

## 1.6.3 Training

The MRF general manager and processing manager receive training through PROP. They are certified as professional recyclers through PROP and must take ten hours worth of courses each year to maintain certification. Other supervisors attend SWANA classes, and all equipment operators receive in-house training offered by the vendor when new equipment is purchased. New sorters receive training on the job and close supervision by the sort line supervisor. The overall level of training at the MRF seems to be very good.

## 1.7 Materials Marketing

The Lycoming County MRF markets its commodities on the spot market, except for OCC and newspaper (marketed as Paper Stock Institute grade #8 Old Newspapers, or ONP#8), for which they have contracts. Markets pay freight on all commodities that are sold, except for glass, which the MRF delivers itself.

The MRF's newspaper contract is with the brokerage firm of Staiman Brothers, Inc. of Williamsport, PA. The contract is for 44,000 pounds of ONP#8 per week, and is a renewal of an existing contract for a two-year term starting on May 13, 2004. According to the contract, Staiman Brothers will base the price for ONP#8 on the Official Market Boards, first issue of the month for Southeast #8 News, high side of the range, less \$4.00 per ton, with a floor price of \$42.50 per ton and a ceiling price of \$70.00 per ton. Over the five-year period prior to this MRF assessment the price of ONP#8 had not fallen below \$42.50 per ton often, and when it did so it was only for a short duration of a few months. Alternatively, the ceiling price has reduced the MRF's revenues significantly in 2004 compared to spot market prices. When the market risk analysis and \$4.00 per ton fee are considered, the Staiman contract does not appear to provide a significant benefit to the MRF.

The OCC contract is with the brokerage firm of Accurate Recycling Corporation of Lansdowne, PA. The contract stipulates that the MRF will sell up to 280 tons of Paper Stock Institute Grade 11 OCC to Accurate Recycling. Further, in the event that the MRF receives more than 280 tons of OCC in any one month, the contract stipulates that Accurate Recycling will have the first option to purchase any excess OCC. The County is not obligated to provide Accurate Recycling with a particular minimum quantity of OCC. The contract was enacted on March 5, 2002, and runs through March 2005. The price to be paid by Accurate Recycling is the Grief Brothers' paper mill standard market price less \$5.00 per ton for commission. In addition, Accurate Recycling guarantees a floor price of \$35.00 per ton.

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The spot market price for OCC has not fallen significantly below \$35.00 per ton and remained there for a significant period of time in the ten years prior to this MRF assessment. When the market risk analysis and \$5.00 per ton fee are considered, the Accurate Recycling contract does not appear to provide a significant benefit to the MRF.

Principal end markets for materials processed at the Lycoming County MRF are summarized in Table 3.

**Table 3**  
**Summary of Lycoming County MRF End Products and Markets**

End Product	How Sold	End Market	Tons/Year	Avg. Price \$/Ton 2003	Benchmark Avg. 2003 Price <sup>1</sup>	Lycoming Price Relative to Benchmark
OCC	Baled	Accurate Recycling	3,679 (280 tons/month under contract)	\$57.21	\$63.54	-11%
#8 News	Baled	Staiman Brothers <sup>2</sup> Fox Run Recycling Bristol Paper Accurate Recycling Continental Paper	2,996	\$58.18	\$67.92	-17%
Mixed Office/Computer	Baled	Staiman Brothers Continental Paper	103	\$108.51	\$111.67	-3%
Magazines	Baled	Accurate Recycling Staiman Brothers Continental Paper Perry Koplick	1,347	\$67.76	\$62.92 <sup>3</sup>	+7%
Clear Glass	Not crushed, roll offs	PA Cullet <sup>4</sup>	779	\$45.00	\$25.00	+44%
Brown Glass	Not crushed, roll-offs	PA Cullet <sup>4</sup>	466	\$30.00	\$11.00	+63%
Green Glass	Not crushed, roll-offs	PA Cullet <sup>4</sup>	336	\$2.33	\$5.00	-115%
Steel/Tin Cans	Baled	Conti Group Staiman Recycling Hilltop Enterprises	410	\$63.17	\$68.33	-8%
Aluminum Cans	Densified/ Baled	Penn Recycling/ Staiman Recycling	110	\$1,074.42	\$1,010.80	+6%
PET	Baled, mixed	CT Metals Conti Group Hilltop Enterprises	251	\$221.87	\$251.67	-13%
Colored HDPE	Baled	Conti Group Ensley Corp Berou Int'l	116	\$237.90	\$231.67	+3%

## MATERIALS RECOVERY FACILITY EVALUATION

End Product	How Sold	End Market	Tons/Year	Avg. Price \$/Ton 2003	Benchmark Avg. 2003 Price <sup>1</sup>	Lycoming Price Relative to Benchmark
Natural HDPE	Baled	Conti Group Ensley Corp Berou Int'l	113	\$323.30	\$328.33	-2%

<sup>1</sup> Source: Recycling Manager 2003

<sup>2</sup> Contract through April 2006

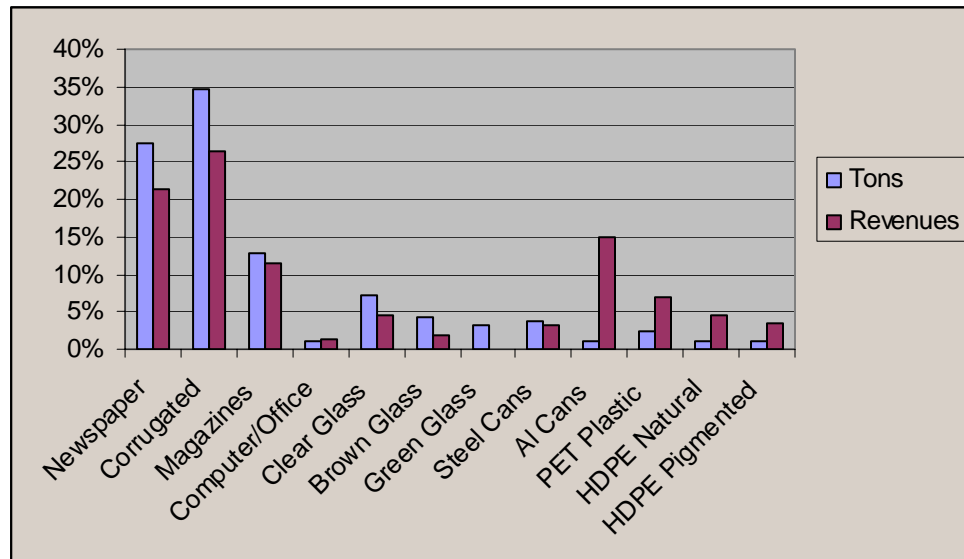
<sup>3</sup> Based on price being \$5.00 per ton less than ONP #8.

<sup>4</sup> PA Cullet has since closed, and glass is therefore being delivered to Recycle All, a less advantageous market due to increased transportation costs and increased sorting time required for flint.

As Table 3 shows, the average prices received for materials sold by the MRF are generally within several percentage points of benchmark market prices. Notable exceptions are newspapers and OCC, which are well below, and which unfortunately represent the largest tonnage grades sold. Although pricing for green glass is also below benchmark, pricing for clear and brown glass are well above and no changes need be considered for glass marketing. PET pricing is also well below the benchmark and the MRF should consider alternative markets. The MRF may also be able to obtain better pricing for its steel cans if it markets material directly to steel mills.

Figure 8 provides a summary of the percent each “typical MRF material” (e.g., excluding wood, ground PVC, appliances and electronics) constituted of all MRF materials that were shipped from the MRF in 2003, in terms of both tonnage and revenues.

**Figure 8**  
**MRF Materials Shipped in 2003**



In the past year the MRF has had no rejections of shipments, but has had a few downgrades. These downgrades were:

- One newspaper load downgraded due to too many magazines;



# MATERIALS RECOVERY FACILITY EVALUATION

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- One OCC load downgraded due to poor (loose) bales. (These were bales that had been processed off site, as they were secured using metal bands.)
- One aluminum load downgraded due to 8 percent moisture. (Due to aluminum biscuits being stored outdoors — this was prior to moving into the new facility, which has adequate indoor storage space.)
- One glass load downgraded due to the presence of ceramics in the load.

The MRF appears to perform a good job of quality control as the number of downgrades is very small compared to the total number of loads shipped.

## 1.8 Financial Review

R. W. Beck requested information pertaining to costs incurred at the facility. Operating and capital costs were examined.

### 1.8.1 Annual Operating Costs

Because the facility is new, operating costs for 2004 were estimated, as heating and cooling costs in particular are expected to be higher in 2004 than they were in 2003. The MRF manager has adjusted budget figures during the year, however, so he expects them to be close to actual costs. To the greatest extent possible, estimated costs include typical MRF processing activities only – collection activities are not included, as recyclables collection is not a typical “MRF” function, nor are costs associated with wood grinding costs included. PVC grinding is also excluded from the general MRF analysis, however a separate analysis of the PVC processing is provided later in the report. Table 4 summarizes the facility’s annual operating costs.

Table 4  
Summary of MRF 2004 Budgeted Operating Costs

Item	Amount
<b>Labor:</b>	
Prison Labor	\$7,488
Employee Regular Salary	\$155,480
Employee Benefits	\$49,754
Overtime	\$7,700
Contract Labor	\$9,620
<b>Total Annual Labor Cost</b>	<b>\$230,042</b>
<b>Materials and Supplies:</b>	
Purchased Recyclables (OCC and Glass )	\$67,600
Baler Supplies	\$14,500
Other Supplies/Equipment	\$2,279
<b>Total Materials and Supplies</b>	<b>\$84,379</b>

## MATERIALS RECOVERY FACILITY EVALUATION

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Item	Amount
<b>General Operating Expenses:</b>	
Electricity	\$36,000
Uniforms/Clothing	\$690
Security Monitoring	\$433
Heating Oil	\$2,200
Propane (Forklift operation; Ignitor for landfill gas)	\$1,000
Methane (To heat building)	\$9,000
Waste Disposal	\$3,100
Telephones/Internet Access	\$2,160
<b>Total General Operating Expenses:</b>	<b>\$54,583</b>
<b>Maintenance and Repairs:</b>	
Heavy Equipment Maintenance	\$1,240
Other Equipment Maintenance	\$4,300
Other Equipment Repair	\$18,888
Tires Tubes Repair	\$4,000
Structure Maintenance and Repairs (Scales)	\$6,100
High Sulfur Heavy Equipment Fuel	\$4,000
<b>Total Maintenance and Repairs:</b>	<b>\$38,528</b>
<b>TOTAL ANNUAL OPERATING COSTS</b>	<b>\$407,532</b>

When the total operating cost figure of \$407,532 is divided by the incoming tons of the facility, the operating cost per ton is \$34.08.

### 1.8.2 Annualized Capital Costs

Capital costs were examined in two ways -- to both include and exclude the impact of DEP grants. First, the original purchase price of the MRF's capital equipment was escalated by 2.5 percent per year from the original purchase date to estimate "current day" purchase prices (replacement cost). This total was \$8.7 million, of which DEP grants represented \$7.3 million and Lycoming purchases represented \$1.4 million. These figures show that DEP grants significantly enabled recycling processing infrastructure development in the Lycoming County region.

The estimated current purchase price for the equipment was then divided by the expected lifespan of the each piece of equipment, or the amortization period. The annual cost for the facility was estimated based on a 30-year loan at 4.5 percent. The resulting capital costs are an estimate of the current year capital cost, regardless of how each capital item was purchased/financed in the past. Annualizing capital costs in this manner gives the facility an idea of revenues that are required to ensure that the MRF can be financially sustainable for the long term if DEP 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

## MATERIALS RECOVERY FACILITY EVALUATION

and contributions that should be made to a renewal and replacement fund for all other plant and equipment that has been purchased outright. As Table 5 shows, this current annual cost is approximately \$570,680 (future year costs will need to be adjusted for inflation).

Table 5  
Annual Capital Costs

Capital Equipment	Estimated Current Purchase Price <sup>1</sup>	Lifespan <sup>2</sup> (Years)	Annual Cost
Case Skid Steer (Load 05)	\$42,807	6	\$7,135
Yale (Fork 7)	\$18,900	10	\$1,890
Komatsu Loader (Load 11)	\$98,197	6	\$16,366
Bobcat 963 Skid Steer Loader (Load 14)	\$40,762	6	\$6,794
Bobcat Loader (Load 03)	\$38,038	6	\$6,339
Case 9XLT Skid Steer Loader (Load 19)	\$43,432	6	\$7,239
Marathon Baler/Conveyor (Baler 02)	\$230,367	12	\$19,197
Horizontal Baler (Baler 04)	\$113,038	12	\$9,420
Stanko Dac 3000 Can Densifier	\$54,687	10	\$5,469
1977 Fruehauf Trailer	\$951	20	\$48
<b>Subtotal Capital Equipment</b>	<b>\$681,180</b>	<b>NA</b>	<b>\$79,897</b>
<b>Building<sup>3</sup></b>	<b>\$7,994,323</b>	<b>30</b>	<b>\$490,784</b>
<b>TOTAL<sup>4</sup></b>	<b>\$8,675,504</b>		<b>\$570,680</b>

<sup>1</sup> Based on purchase year and price, escalated by 2.5 percent per year.

<sup>2</sup> Based on MRF replacement cycle, if available, or industry standards, if not available.

<sup>3</sup> Assumes an interest rate of 4.5% – 30 year amortization schedule.

<sup>4</sup> Sum may not equal total exactly, due to rounding.

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 because the facility is operating far below its design capacity (as is the case). For example, if DEP grants are available in the future to the extent that Lycoming has benefited in the past, the current annual capital requirement would be approximately \$109,924 instead of \$570,680.

Total annual costs, including both operating and capital costs, are \$570,680 (excluding annual grants), or \$47.73 per ton. As was mentioned above, annual capital costs could be significantly less to the extent that future grants are available or capital equipment life can be prolonged.

### 1.8.3 Annual Revenues

The Lycoming County facility's sole revenue stream is the sale of materials processed. It does not charge a tipping fee or require intergovernmental transfers from other local governments that deliver materials to the facility. The facility's MRF-related (e.g., excluding wood grinding, tire disposal fees, white goods fees, and wood disposal fees) revenues for 2003 were \$794,937, which is an average of \$66.49 per ton.

### 1.8.4 MRF Profitability

Table 6 summarizes 2004 estimated revenues and expenditures for MRF operations only (e.g., excluding collections and other non-MRF functions).

Table 6  
MRF Expenditures Vs. Revenues (2004)

	Operating Costs	Capital Costs <sup>1</sup>	Total Costs	Revenues	Net Revenues (Costs)
Total	\$407,532	\$570,680	\$978,212	\$794,937 <sup>3</sup>	(\$183,725)
\$ per Ton <sup>2</sup>	\$34	\$48	\$83	\$66	(\$17)

<sup>1</sup> Includes annualized capital costs of all equipment and building, such that equipment replacement funds could be established.

<sup>2</sup> May not sum to total due to rounding.

<sup>3</sup> Based on 2003 revenues, which are less conservative than 2004 revenue estimates.

Table 7 shows the estimated 2004 Pro Forma, based on conservative revenue estimates.

Table 7  
2004 Pro Forma

2004 Estimated Revenues	\$702,550
2004 Estimated Operating Costs	<u>\$407,532</u>
Net Operating Revenue	\$295,018
2004 Recapitalization Requirement <sup>1</sup>	<u>\$570,680</u>
Recapitalization Surplus (Shortfall)	(\$275,662)

<sup>1</sup> Without DEP grants

As the results in Table 7 indicate, the Lycoming County MRF receives positive annual operating revenues of approximately \$295,000, in large part because of the use of prison labor. If regular employees were utilized, instead of prison laborers, operating revenues would exceed operating costs by \$116,433 per year. As Table 6 shows, the MRF does not currently appear to have sufficient net operating revenues to recapitalize the MRF so that it is sustainable in the long term in the absence of grants.

## 1.8.5 PVC Processing

Grinding of polyvinylchloride (PVC) is performed using two Cumberland plastics granulators. One is for grinding pipe PVC and the other is for grinding sheet PVC. Grinding of PVC takes 58 hours per month (or one-third of a full-time employee's time). Mixed PVC regrind is sold in Gaylord boxes to KJ Plastics, Inc. and Wiltshire Plastics. In 2003 the facility processed 187 tons of PVC, which were sold at an average market price of \$276 per ton.

Table 8 summarizes the costs and revenues associated with PVC processing.

**Table 8**  
**Annual Costs and Revenues Associated with PVC Processing (2003 Data)**

Item	Amount
<b>Costs:</b>	
Labor and Benefits	\$12,012
Cost of Goods Sold	\$16,000
Equipment Supplies	\$1,535
Capital Costs <sup>1</sup>	\$15,637
<b>Total Costs</b>	<b>\$45,184</b>
<b>Total Costs/Ton</b>	<b>\$242</b>
<b>Revenues:</b>	
Sale of Processed Materials	\$51,717
<b>Total Revenues/Ton</b>	<b>\$277</b>
<b>Net Revenues</b>	<b>\$35</b>

<sup>1</sup> Based on 15-year amortization schedule

Although some additional costs should be allocated to the process, such as electricity and maintenance, PVC grinding is a profitable operation for the MRF. According to the data available, the MRF is earning net revenues of \$35 per ton on PVC grinding. Assuming prices remain as they are, the more PVC that can be processed at the MRF, the more profitable the operation will become.

## 1.9 Conclusions and Recommendations

### 1.9.1 General Processing/Facility Management

- The MRF needs to find an economical solution to the bridging problem that is experienced in the newspaper and magazines sloping bunkers. Correcting this problem would allow sorting of one material while another material is baled simultaneously. Currently, ONP and magazines are being baled immediately after processing and the sorted storage bins are therefore not being utilized. This could be considered to be a design flaw so that correcting the problem could be accomplished at no cost to the MRF. Efficiency improvements would result.

- It is difficult from the sorting line to see what materials the loader operator is placing onto the horizontal feed conveyor, which feeds the sort line. The sort crew, therefore, do not know when processing is being switched to a new material. The MRF should install a mirror that could be seen from the sort room, and/or utilize radios so that the crew supervisor could tell his sorters what material they will be receiving. The cost to make this change is estimated to be approximately \$250.
- The facility is designed to process approximately 50 tons per hour. Currently, the facility is processing about 40 tons per day, on average. The facility is currently underutilized – operating at about 10 percent of its capacity (assuming one shift). The facility would operate more efficiently if its throughput were increased. The MRF should therefore focus on increasing the amount of incoming materials from within Lycoming County as well from neighboring counties.
- The MRF should consider means to “flatten” newspapers and magazines that enter the sort line. A removable bar could be utilized to flatten piles of newspaper and magazines, such that the materials are more evenly dispersed along the sort conveyor, improving sorter efficiencies.
- The facility is to be commended for paying close attention to housekeeping. This ethic contributes to producing high-quality processed materials, which supports market stability, and lessens the risk of workplace injuries.
- In general, the facility manager is in tune with all operations at the facility. He clearly has a good rapport with other employees, and works with them to manage any issues that arise.

### 1.9.2 Contamination Reduction

- Incoming materials, especially from drop-off programs, appear to be heavily contaminated. Residue handling and disposal costs can be reduced by enhancing education efforts to make residents aware of what can and can not be recycled. Signage may be able to be improved or staff can periodically monitor drop-off sites in order to educate drop-off participants. Other counties have found that drop-off contamination can be reduced significantly by using new drop-off center technologies, such as the V-Quip System, which is designed to minimize contamination.
- The County should consider working with municipalities to ensure that trash bins are located at drop-off sites so that people can dispose of trash instead of placing it in the recycling containers.
- The County should consider re-emphasizing that only container glass is accepted in the program and ceramics and plate glass must be disposed.
- Four samples of incoming drop-off plastics were sorted as part of a concurrent study with this MRF evaluation. The samples showed contamination of 8 to 18 percent in drop-off plastics. Because there is significant contamination in the incoming plastics, much of it due to residents trying to recycle all types of plastics

that may be labeled with a #1 or #2 when only #1 and #2 plastic bottles are requested, 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.

### 1.9.3 Materials Marketing/Targeting

- The County should expand their effort to target more high-grade office paper from local businesses and county/municipal offices. Currently high grade office paper accounts for less than one percent of the material coming into the facility, by weight. In 2003 high-grade office paper prices ranged from \$95 to \$125 per ton, making it a relatively high-value commodity. The County has indicated that this is one of their goals, moving forward. The County should also work with area schools to solicit recyclables from them. Schools are excellent sources of OCC, mixed office paper, steel cans, and sometimes aluminum cans. These are all relatively high-value products.
- The County should consider collecting newspaper, magazines, and plastics curbside. As only 2 percent of incoming materials are from curbside collection programs, there is likely a great potential to increase recovery via offering residents convenient access to newspaper and plastics recycling.
- The County should try to increase the amount of OCC targeted, as OCC is a relatively high-value commodity, with prices in the \$60 per-ton range.
- The ONP brokerage contract does not appear to benefit the MRF. This was particularly the case during 2004 when the ceiling caused the MRF to lose significant revenues that it otherwise would have received. The MRF should only deliver the minimum weekly tonnage required under the contract and should market all additional ONP tonnages to other purchasers. When the contract expires, the MRF should evaluate whether it still needs a contract. If the decision is yes, the contract should have a higher floor price and the MRF should request proposals from several markets so that the proposal with the most favorable terms can be selected.
- The OCC brokerage contract does not appear to benefit the MRF. When the contract expires, the MRF should evaluate whether it still needs a contract. If the decision is yes, the contract should have a higher floor price and the MRF should request proposals from several markets so that the proposal with the most favorable terms can be selected.

- It appears that the MRF may be able to improve their market prices for PET bottles and steel cans (this may require selling direct to mills instead of through brokers). If average market pricing is received, as much as \$9,000 per year of additional revenues could be obtained.
- The MRF should try to track all costs associated with PVC grinding, including electricity and maintenance costs, to more accurately measure this activity's profitability. Based on available data, the activity is profitable, with net earnings of \$35 per ton. The MRF should also focus on developing more PVC grinding business, as this will make the operation more cost-effective, improving net revenues per ton.