

September 8, 2006

Mary Alice Krebs
Manager
Coal Township
805 W. Lynn Street
Coal Township, PA 17866

Subject: Pennsylvania Technical Assistance Project to Improve Coal Township Recycling Facility

Dear Ms. Krebs:

I am please to submit to you this letter report addressing how to enhance the performance of the Coal Township Recycling Facility (Recycling Facility). This project was completed by R. W. Beck through a technical assistance program sponsored by PA DEP and the Solid Waste Association of North America (SWANA).

Executive Summary

Coal Township's material processing facility (MRF), processes recyclable materials (approximately 5 tons in 2005) at a cost of approximately \$213.00 per ton (a net cost of about \$94.00 per ton). The Township is interested in making the facility operate on a more cost-effective basis. As part of this project, R. W. Beck examined the operations of the facility, the programs generating recyclables processed at the facility, and the physical characteristics of the facility. R. W. Beck then developed short-term and long-term recommendations and strategies to improve operational efficiencies. Some of the recommendations include:

Short Term Recommendations

- Do not purchase a third baler as planned, but instead take steps to ensure the two balers being used are operating as effectively as possible, and that critical spare parts are on hand;
- Consider purchasing a vehicle scale to weigh vehicles on site;
- Use the largest roll-up door on the north side of the building to receive source-separated recyclables delivered by municipal collection vehicles;
- Install 8-inch bollards on the outside and inside of the roll-up door on the north side of the building to protect the building, and mount warning signs to remind drivers to lower trailers before exiting the building;
- Install replaceable rubber wear pads on the bottom of the front end loader buckets to prevent damage to the facility's concrete floor;
- Expand capacity for glass bottle storage by replacing highway median barriers with 8-foot high concrete barriers. Also, improve the flooring of the glass storage area;
- Store processed steel cans inside the building;

- Install an outdoor concrete ramp to load glass bottles easily into dump trailers, if the facility decides to market glass to a different market;
- Improve and increase the amount of signage leading to the facility;
- Investigate the feasibility of installing three-phase electrical service at the Center; and
- Develop a site plan to indicate traffic movement, incorporating the truck scale and other planned outdoor improvements.

Long-Term Recommendations

- Connect the recycling facility to the public sewer service or install a sanitary septic system, and construct employee restrooms in the facility;
- Drill and on-site groundwater well to provide potable and process water to the facility;
- Add mixed paper (magazines, junk mail, etc.) to the list of acceptable recyclable materials;
- Consider installing outdoor lighting and video monitoring at the entrance, for increased security.

Details about the operation of the facility, and regarding the recommendations are provided in the full report.

Background

In 2005, Coal Township opened the Recycling Facility, which accepts clear, brown and green glass, newspaper, corrugated cardboard, PET and HDPE bottles, aluminum and steel cans. The facility is open to the public 20 hours per week. Coal Township contracts with the local fire company to collect source-separated recyclables curbside in a multi-compartment trailer manufactured by Eager Beaver. Coal Township is divided into four recycling collection zones. The fire department collects one zone each Saturday. Coal Township pays the local fire department a fixed fee of \$10,000 annually and allows the fire company to keep the revenue from the collected aluminum and steel cans.

During 2005 the facility processed 55.21 tons of recyclables at a cost of \$11,795, or approximately \$213 per ton. Including the Township's revenues of \$6,719 (e.g., revenues earned on materials other than aluminum and steel cans), the net processing cost per ton for 2005 was \$93.91. Therefore, the Township would like to increase the performance of the facility by increasing the annual tonnage processed and enhancing its operating efficiency.

To help the Township achieve their objectives, R.W. Beck was retained to assist in this process through the DEP/SWANA technical assistance program. Results of this project are summarized in this report, and include the following components:

- Recycling Facility design description;

- Recycling Facility operations description;
- A summary of 2005 Recycling Facility performance;
- Recommended short-term design and operating modifications; and,
- Recommended long-term design and operating modifications.

Facility Design

Coal Township has operated the Recycling Facility since early January 2005. The Recycling Facility serves as a recycling drop-off and consolidation center with limited processing. Residents primarily deliver separated recyclables. A small number of commercial businesses drop off recyclables at the Recycling Facility.

Coal Township leases the approximate five- to six-acre site from the Northumberland County Area Vocational – Technical School Authority and the Mount Carmel School District. In addition to the Recycling Facility, Coal Township composts yard waste, including grass, leaves, and brush at the site. The composting operation occupies the southern half of the site and the Recycling Facility is located on the northern half.

A chain link fence is located along the site frontage on Venn Access Road, which restricts access. The Center is a 170-foot long by 70-foot wide pre-engineered metal building that covers 11,900 square feet. The insulated building encloses a concrete floor and an office with concrete block walls. Four-foot high plywood sheets were installed around the base of the building walls to protect the insulation. The site does not have a truck scale.



Figure 1
West Side of Coal Township Recycling Center from Venn Access Road

The electrical service entrance is located at the southwest corner of the building. Pennsylvania Power & Light (PP&L) does not have three-phase power service available at the site. PP&L was going to charge the Township \$30,000 to provide the three-phase service to the site. Due to the cost, the Township decided instead to install four-phase converters to power the two balers. No floor drains or sump pumps exist on the concrete floor. Propane-fired units provide heat during the winter. A horizontal propane tank is located outside the northwest corner of the building. Elevated exhaust fans ventilate the building during the summer to provide cool air, and control dust and odor. An office with a glass window facing inside is located in the southwest end of the building. The site does not have potable water or sanitary wastewater service. A pumper truck provides process water to the Center when needed. A portable toilet is located outside the building. The original plans provided for future restrooms in the southeast building corner.

Two 8-foot wide by 10-foot high roll-up doors are located on the south side of the building. Vehicle parking is provided along the southwest side of the building. The parking area consists of an asphalt-paved strip and a concrete pad designated for handicapped patrons. The remaining roadway area surrounding the building is gravel-covered. A loading dock with two 8-foot wide by 10-foot high roll-up doors is located on the west side of the building. One of the two roll-up doors has a load leveler on the loading dock. A larger single 10-foot wide by 10-foot high roll-up door is located on the east side of the building.



Figure 2
South Side of Building

The processing equipment consists of a 5,000-pound GSE platform scale (Model No. GSE 350) with digital readout, Excel horizontal baler (Model No. EX66) with feed conveyor (Model No. 4815), and a manually loaded refurbished Marathon vertical baler (Model No. 60308YD). The platform scale is used to weigh bales. The feed conveyor to the horizontal baler is an elevated, cleated 48-inch wide conveyor. The rolling stock consists of a propane-fueled Toyota forklift

and a diesel-fueled Bobcat front-end loader with several bucket attachments. The composting operation shares use of the Bobcat front-end loader. The forklift is used to stack bales on pallets at the west end of the building.



Figure 3
Product Bales Stacked on Pallets inside the West End of the Building

Four outdoor bunkers are located on an asphalt-paved area on the east side of the building. The bunkers are constructed of 4-foot high highway median concrete barriers on an asphalt-paved surface and are approximately 20 feet square. The four bunkers store clear glass bottles (two bunkers), brown glass bottles, and steel cans. Not crushing the glass bottles increases the storage volume required. Due to limited storage, the green glass is stored in two self-dumping hopper bins inside the building. When the two bins are near full, the Township Street Department laborers load the green glass bottles into a truck for transport to Jo-Ma Recycling in nearby Paxinos. Several portable vertical wire cages inside the building store plastics and steel cans received. The portable wire cages have sloping floors and releasing doors for easy emptying. Gaylord boxes are used to store the aluminum cans received.



Figure 4
Outdoor Glass and Tin Can Storage Bunkers

Operational Description

Operating hours for the Recycling Facility are:

- Tuesday through Friday – 9:00 a.m. to 12:45 p.m.
- First and third Saturdays each month – 9:00 a.m. to 12:45 p.m.
- Second and fourth Mondays each month – 9:00 a.m. to 12:45 p.m.

Residents and small businesses park their vehicles along the southwest side of the building. They carry their separated recyclables and deposit the materials into the designated 2-cubic yard self-dumping hopper bins inside the center area of the building. The Center accepts the following materials:

- Aluminum cans;
- PET (#1) plastic bottles;
- HDPE (#2) plastic bottles;
- Tin cans;
- Clear glass bottles;
- Brown glass bottles;
- Green glass bottles;
- Brown corrugated boxes; and,
- Newspaper.



Figure 5
Recyclable Drop-Off Bins

When the bins are full, the forklift is used to raise the self-dumping hopper bins and release the bottoms to unload the contents into vertical and horizontal balers. The vertical baler compacts the paper products, and the horizontal baler compacts the plastic bottles and metal cans. Several Township Street Department laborers operate the balers.. The bales are manually tied with wire. Typical bale densities (pounds/cubic yard) by material are shown in Table 1:

Table 1
Typical Bale Densities

Material	Bale Density (lbs./cubic yard)
Aluminum Cans	400 – 500
PET (#1) Plastic Bottles	750 – 850
HDPE (#2) Plastic Bottles	1100
Steel Cans	1100 – 1200
Corrugated Boxes	900 – 1000
Newspaper	1100 – 1200

Based on our recent experience for similar equipment, the bale densities are lower than expected for these materials.

On average the Recycling Facility ships one 35,000-pound bale of each material – mixed plastic, mixed paper, and mixed metal cans, to Brandywine Recyclers each month. Brandywine Recyclers, a broker in Lebanon, PA, provides the trailer and hauls a typical load of 42 – 44 bales. Jo-Ma Recycling (formerly Reidingers), a broker near Sunbury, receives the glass bottles. Jo-Ma Recycling is buying clear glass bottles at \$10 per ton delivered. They accept brown and green glass bottles for no revenue. The observed quality of the baled products and glass bottles was extremely high with minimal contamination.

2005 Facility Performance

The facility operator was hired through the Senior Aid program and the state paid his salary for the first half of 2005. The Township is now paying his entire salary. The following 2005 Recycling Facility cost summary does not consider labor costs for part-time sharing of several Township Street Department employees, glass transportation costs to Jo-Ma Recycling or the \$10,000 the township pays to the Fire Department to collect residential recyclables curbside. Table 2 summarizes the 2005 economic performance of the Recycling Facility.

Table 2
2005 Expenses and Revenues

Expenses:	
Operator Salary and Taxes	\$ 3,375.92
Building Heat (Propane)	\$ 3,810.93
Electric	\$ 3,708.84
Portable Toilet	\$ 900.00
Total Expenses	\$11,795.69
Revenues:	
Brandywine Recyclers	\$ 6,673.48
Glass	\$ 45.88
Total Revenues	\$ 6,719.36

Table 3 provides a summary of the quantity of recyclables marketed in 2005:

Table 3
2005 Recyclables Marketed

Material	Quantity Sold (tons)
Aluminum cans	1.44
PET (#1) plastic bottles	3.00
HDPE (#2) plastic bottles	2.46
Tin cans	5.04
Corrugated boxes	20.31
Newspaper	17.91
Glass	5.05
TOTAL	55.21

The quantities above do not include the metal sold by the local fire department collecting recyclables curbside.

Short-Term Center and Operating Modifications

Coal Township may select Recycle All, a glass end user from Port Allegany, PA, to receive revenue for all colors of glass bottles. Recycle All will provide a dump trailer to load a short load (8 – 10) tons monthly. To allow a front-end loader to access effectively the dump trailer, the Township must construct a concrete ramp near the glass storage bunkers.

Secondly, the Township has been working with three municipalities (Shamokin, Mount Carmel Borough, and Zerbe Township) to deliver curbside separated recyclables to the Facility. The City of Shamokin, which collects recyclables in a multi-compartment trailer, plans to begin delivering materials to the Facility in the near future.. Zerbe Township is in the planning stage of starting a curbside recycling program. Mount Carmel Borough will not use the Center until weighing of the materials is provided to ensure obtaining Section 904 performance grants from DEP. According to the 2005 Northumberland County annual recycling report, the two municipalities with active programs estimated delivering the following quantities of recyclables the Center:

Table 4
Estimated Recycling Quantities from New Communities

Municipality	Estimated 2005 Recyclables (tons)
City of Shamokin	129
Mount Carmel Borough	680
TOTAL	809

Third, the Township hired a second part-time employee to assist residents and businesses properly unload and deposit recyclables.

Finally, the Township applied for and received a Section 902 Grant and on May 19, 2006, the state announced approval of \$310,035 in Section 902 grants for the Coal Township Yard Waste and Recycling Center. For the Recycling Center, the grant application included:

- Six portable wire cages;
- Five self-dumping hopper bins;
- 2,500 residential curbside buckets;
- One horizontal baler with conveyor;
- Recyclables market study;
- Multi-compartment collection trailer;
- Trailer for product bale storage;
- Articulated wheel front-end loader¹; and,
- Other recycling program development costs.

To further improve the performance of the Recycling Facility, R. W. Beck recommends the following short-term (within one year) design and operating changes, based on a site visit to the Facility, and an analysis of data provided:

- At this time, the Center does not operate the two balers sufficient hours to warrant the need for an additional, third baler. Furthermore, as the processing rate at the Center increases, installing a third baler will decrease indoor storage available for baled products. As opposed to purchasing a third baler, the Township should buy spare parts of critical components for the two existing balers to minimize unscheduled downtime. In addition, the Township

¹ The Recycling Center will share the new articulated loader with the composting operation.

should investigate a service contract for the two balers. Since the vertical baler is a refurbished unit, a service contract may not be available.

- The Township may want to contact the baler manufacturers to review operating procedures and equipment settings to increase bale densities. As the Recycling Facility receives more material, the floor space to store product bales will increase.
- Because the Recycling Facility does not have a vehicle scale, the Township has arranged for municipal collection vehicles delivering recyclables an option for weighing their vehicles. Vehicles may weigh in at the vehicle scale at Shamokin Filler, a nearby (0.25 miles from the Facility) coal operation. Shamokin Filler will weigh 10 trucks at no cost to Coal Township. Coal Township needs to determine the cost for additional weighings during a month. In addition, multi-compartment trailers will need to make several trips to the scale to determine individual weights of the various materials collected, which will be time-consuming and a deterrent against more communities using the Recycling Facility. In addition, municipalities need to report recycling quantities by material type in order to receive Section 904 performance grants. This will not be able to be accomplished at the Shamokin Filler truck scale. In addition, the Township should weigh outgoing trailers of baled products. Therefore, the Township needs to install a truck scale on-site to weigh incoming recyclable vehicles. Possibly the 902 grant funds that are not necessary for an additional baler could be redirected to a scale.
- The Township should use the largest roll-up door on the north end of the building to receive source-separated recyclables delivered by municipal collection vehicles. The door height is too low for regular commercial collection vehicles. In addition, this arrangement would be more user-friendly for more small businesses to deliver source-separated recyclables to the Center. The Township should also install 8-inch diameter bollards on the outside and inside of the roll-up door to protect the frame. At a minimum, warning signs should be mounted to remind drivers to lower the municipal multi-compartment trailers before exiting the building.
- The practice of storing recyclables in the vertical cages inside the building should be abandoned. The building does not have sturdy push walls (plywood) for a front-end loader to move and stockpile materials on the floor. Instead, a series of 8-foot high moveable concrete barriers should be placed on the concrete floor to segregate the materials, except glass bottles, into bunkers.
- Replaceable rubber wear pads should be installed on the bottom of the front-end loader buckets to prevent damage to the concrete floor.
- Along the south side of the building, the Township should add an overhang extension or a stand-alone roofed structure to relocate the recyclable drop-off bins from inside the building. This will reduce the time required for residents to be on-site, and increase useable floor space inside the Facility. Additional signage on the drop-off bins will be required to

assure that recyclables are deposited into the correct bin, and that non-recyclables are not deposited into recycling bins.

- Outdoor storage capacity for glass bottles could be expanded by increasing the area (width and depth of bunkers). Replace the shorter highway median barriers with 8-foot high concrete barriers. In addition, the surface underneath the bunkers should be on a concrete pad that is more durable than an asphalt-paved area.
- Steel can storage should be provided inside the building because food residue remaining in the un-baled cans may represent a risk for vermin.
- As previously discussed, the Township should install an outdoor concrete ramp to load glass bottles easily into dump trailers, if they decide to market their glass to Recycle All. The Bobcat front-end loader would likely be unable to effectively reach the dump trailer provided by the possible new glass end user, Recycle All.
- Signage leading to and at the Center should be increased, and a facility entrance sign along Venn Access Road should be installed. In addition, directional signage along State Route 125 and the following intersections should be established:
 - State Route 125 at Bear Valley Road
 - Bear Valley Road at Venn Access Road
- The Township may want to contact PP&L to investigate providing three-phase electrical service to the Center.
- Finally, a site plan to indicate traffic movement, and incorporating the truck scale and other planned outdoor improvements should be developed.

Long-Term Center and Operating Modifications

R. W. Beck recommends the following long-term (twelve to twenty-four months) design and operating modifications, based on the site visit and analysis of data provided:

- Permit and connect the Recycling Facility to public sewer service or install a sanitary septic system. The public sewer has the advantage of accepting wastewater (wash water from the tipping floor), while both systems can handle sanitary wastewater. Employee restrooms should be constructed inside the building. If public sewer service is not readily available on-site, the Township should install an underground storage tank to collect tipping floor wash water from a sump pump constructed on the tipping floor.
- The Township should permit and drill an on-site groundwater well to provide potable and process water needs.

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- Mixed paper (magazines, junk mail, etc.) should be added as a material in the recycling programs for the participating municipalities.
- Finally, to increase security at the Facility, site lighting and video monitoring should be added at the entrance.

I thank you for the opportunity to work on this project with you. Please do not hesitate to call if you have any questions.

Sincerely,
R. W. BECK, INC.

Karen Luken
Senior Director