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**Recycling Technical Assistance
Project #441
City of Sunbury,
Northumberland County, PA**

**Evaluating the Cost/Benefit
to Expand Curbside
Collection Program**

April 2009



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Introduction

The Recycling Technical Assistance Program is sponsored in partnership by the Pennsylvania Department of Environmental Protection (DEP) through the Solid Waste Association of North America (SWANA), the Pennsylvania State Association of Township Supervisors (PSATS) and the Department of Community and Economic Development (DCED) Governor's Center for Local Government Services. Qualifying municipalities wishing to enhance their recycling, composting, and waste reduction programs are provided with professional support to assist them achieve their goals and objectives.

On behalf of the City of Sunbury, Northumberland County, the Sunbury Municipal Authority requested technical assistance to evaluate the cost/benefit of expanding their current monthly curbside collection program in lieu of continuing with a supplemental drop-off program. An expanded program would be considered one that a) collect additional materials at the curb and/or b) collected materials at the curb more frequently. Additionally, the City desired to compare other collection equipment and methods than those currently utilized.

As the consultant selected to manage the project, Nestor Resources, Inc. is pleased to submit to the City of Sunbury our findings and recommendations. This report includes background data, resources and references, as well as explanations and justifications for the consultant's suggestions.

Background

The Municipal Waste Planning, Recycling and Waste Reduction Act of 1988, Act 101 requires larger municipalities in the Commonwealth to implement mandatory residential curbside collection programs for recyclables and leaf waste and to ensure that commercial, institutional, and government establishments also manage recyclables and leaf waste accordingly. Municipalities with populations over 10,000 and those with populations between 5,000 and 10,000 that also have a population density of 300 persons per square mile must comply. Additionally, mandated communities are subject to the provisions of Act 140, which specifies conditions for receiving and utilizing Section 904 Performance Grant funds. The City of Sunbury qualifies as an Act 101 mandated community.

The Municipal Authority of the City of Sunbury is the agency responsible for residential curbside collection of recyclables. Collection is provided to each home once per month. Materials collected at the curb are limited. A greater variety of materials is accepted for recycling at the City's transfer station. Waste collection occurs through subscription services between homeowners and a variety of local haulers. Additionally, residents may dispose of waste at the City's transfer station.

Fees are charged by the bag or by weight depending on volume. Commercial and institutional establishments also contract directly with local haulers, however, unlike residents, recycling is required to be included in that service.

Project Scope of Work

Task #1: The consultant made casual field observations of both the curbside and drop-off collection systems. The consultant had a brief discussion with Authority officials regarding the current operation.

Task #2 The Authority provided copies of its annual reports, performance grant applications, local ordinances, and any other information demonstrating the recovery performance of the collection programs. The consultant reviewed the City's current performance in comparison to national and regional trends. Any anomalies were identified with potential resolutions where possible.

Task #3: The Authority provided all pertinent information regarding the cost to operate the curbside program as well as the drop-off center. Additionally, documentation of revenues generated by the program was included. The consultant reviewed the data and utilized it to conduct a cost comparison analysis of potential alternative collection options. The analysis explored different equipment, collection frequencies, and combinations of materials in a variety of options.

Task #4: The consultant met with the Authority to discuss the results of the analysis and to answer any questions.

Task #5: Nestor Resources, Inc. prepared and submitted to the Pennsylvania Department of Environmental Protection (PADEP) for review and comment, a draft project report, which summarizes the consultant's findings and recommendations. Based on the PADEP's input, the consultant revised and finalized the report. Both the Authority and the Department were provided with the report in electronic format. In addition, a hard copy of the document was provided to the Township.

Summary of Recommendations

Like most municipalities, it is important for the City of Sunbury to provide services in the most cost effective and productive manner. The purpose of this project was to help the City's Municipal Authority determine if its current system of curbside collection, coupled with the availability of a drop-off location, offered the best value for the resulting level of recovery. More specifically, the project was to examine the efficiency and costs that could be realized by operating a more comprehensive curbside collection system. Lastly,

the project was to offer a comparison of various curbside methods and the affect on costs.

Nestor Resources, Inc. conducted a cost analysis of five curbside collection systems, including the current program. All of the scenarios assume that the supplemental drop-off collection site at the Municipal Authority's transfer station will remain. All of the options were selected based on their compatibility with local processing or market outlets. Detailed projections of material that could be available for recovery based on national trends were used to determine the route productivity, equipment capacity and frequency of service requirements. The consultant offered commentary on additional factors that could have an effect on the ultimate cost effectiveness of the featured options.

The following is a summary of the consultant's findings and suggestions:

- That recycling services are offered to residents via the transfer site does not preclude the City from meeting the minimum requirements of Act 101.
- Although, it is not the municipality's responsibility to provide such services, the Authority does collect glass from several commercial outlets, primarily bars. It is unclear why the Authority assumes this cost for some businesses and yet not others, particularly for a commodity that provides no revenue.
- Based on Sunbury's population, the reported tonnage indicates that the current drop-off program is very successful, approaching or exceeding expected values. However, there is some suspicion that the reports do not necessarily provide an accurate assessment of the City's performance.
- Evidence of outside sources of material is reflected in the recovery of magazines and plastics. Results for plastics are three times what would be expected for Sunbury's population base. For magazines the results are more than 5 times higher than anticipated.
- A contributing factor in the recovery of these materials both from Sunbury and outside sources is the prevalence of Pay-As-You-Throw programs in which residents pay by the bag to dispose of waste.
- Further clouding the recovery results are the materials from select commercial establishments collected in the curbside program. For example, 67% of the glass reported from curbside collection was brown as opposed to 26% of the glass reported as brown from drop-off. The drop-off statistics more closely reflect the proportion of brown glass typically found nationwide.
- The current origin of the drop-off material is uncertain. If that material is primarily from Sunbury residents, it could be shifted to curbside collection. If the volumes are shifted to curbside, the Authority would incur collection costs for revenue generating commodities it once received at no cost.

- Currently less than 20% of residents place materials at the curb for collection. A leap to 65% is a substantial increase. There is no guarantee that Sunbury’s residents will participate at the levels estimated in the analysis. Because the City’s residents do not have to contract for garbage collection, but are permitted to utilize the transfer station the habit of placing material at the curb for collection is not a weekly routine for many individuals.
- Using a constant set of assumptions for all scenarios, it was demonstrated that the Authority’s current monthly curbside collection meets the minimum requirements of Act 101 in the most cost effective manner.
- Based on the current economic conditions, market commodity pricing, and the existing infrastructure established within the City, Nestor Resources, Inc. does not recommend that the Authority increase either the frequency of collection or the materials accepted at the curb at this point in time.
- The Authority should monitor the origin of customers periodically to determine if, in fact, the results attained at the drop-off site are attributable to the City or its neighboring communities. Such data would confirm the level of risk or benefit anticipated in any potential future transition.

The City and Its Services

Since 1772, the City of Sunbury has served as the seat of Northumberland County. It now hosts approximately 11,000 residents and nearly 5,000 homes. Billed as “The Heart of the Susquehanna River”, it is typical of most Pennsylvania river valley towns in its struggle to reinvent itself for the 21st century. Once a major intersection for industry and commerce, Sunbury’s job opportunities have dwindled in recent years. Remnants of the town’s elegant past can be seen in structures that line the well organized grid of spacious and easily navigable streets. Renovation of



many of these architecturally significant buildings in conjunction with the riverfront park development, hints at the promise of tourism as a new core industry.

The wealth of their predecessors is witnessed in the City’s Victorian era mansions, but today’s residents face

great economic challenges. Sunbury households now report average incomes of less than \$25,893, well below the national average of \$41,000. Thus, purchasing power for goods and services is less than in many communities. Like the citizens, municipal government has equal difficulty covering expenses in a soft economy. Factory closings and population migration have weakened the City's tax base. During these times, constituents have lower tolerance for inefficiencies and wasteful spending. Therefore, examining ways to improve and potentially decrease the cost of municipal services is of great importance to the City of Sunbury.

Solid waste management is among the services traditionally offered by local governments. This is true to some extent in the City of Sunbury. Located within the municipality is a solid waste transfer station, which is operated by the Sunbury Municipal Authority. The facility receives municipal waste from residents, businesses, contractors, and local waste transporters. Also located at the site is a well maintained drop-off collection area for recycling. An extensive array of materials is accepted. These include: newspaper, steel cans, magazines/catalogs/glossy inserts, corrugated cardboard, aluminum cans, glass bottles & jars. Use is not limited to City occupancy for any of the services. A steady stream of users can be observed coming and going from the facility on any of the four days of operation.

While the Authority is involved in the collection and transfer of municipal waste received at the facility, it does not provide residential curbside collection of waste, nor does it service the waste collection needs of businesses. Residents and businesses who opt not to transfer waste directly to the transfer station contract directly with a local hauler or it is suspected, have no service at all.

On the other hand, the Authority does offer residential curbside collection of recyclables. The items collected are limited to glass bottles and jars and aluminum cans. The service is infrequent, once per month. Participation is poor according to the Authority and from field observations.

The decision to offer one form of collection and not another stems from the City's obligation to comply with the Municipal Waste Planning, Recycling and Waste Reduction Act of 1988, Act 101. This important piece of legislation has mandates for Pennsylvania municipalities with populations of 10,000 or more, and also those with populations of 5,000 or more with a population density of greater than 300 people per square mile. These municipalities must implement mandatory residential curbside collection programs for recyclables and leaf waste and ensure that commercial, institutional, and government establishments also manage recyclables and leaf waste accordingly. Additionally, mandated communities are subject to the provisions of Act 140, which specifies conditions for receiving and utilizing Section 904 Performance Grant funds.

In general, mandated municipalities must provide for the collection of residential recyclables at the curb at least once per month. A minimum of three recyclable

materials designated in the Act must be accepted. Additionally, Act 101 requires these municipalities to collect leaf waste curbside once per month. Alternatively, twice per year collection is allowable in mandated communities that provide a supplemental drop-off collection area for leaf waste. Provisions of the Act are inclusive of commercial, institutional and municipal establishments, which are located in mandated municipalities. These entities must recycle and separate leaf waste for composting. Although, it is not the municipality's responsibility to provide such services, the Authority does collect glass from several commercial outlets, primarily bars. It is unclear why the Authority assumes this cost for some businesses and yet not others particularly for a commodity that provides no revenue.

That recycling services are offered to residents via the transfer site does not preclude the City from meeting the minimum requirements of Act 101. Over the years, the curbside program has gone through dramatic transformation. Service was originally provided via a contract with a local service provider. At that time, newspaper was part of the list of materials accepted for curbside collection. Eventually, the Authority assumed this responsibility. During this same timeframe, the transfer facility was developing, including the drop-off collection area for recycling. It once took collection crews three days per month to service the City using two crews/vehicles. Up to seven crew members, working eight hour shifts per day were dispatched to provide the service. At some point in time newspapers were eliminated from the curbside program and relegated solely to the drop-off area. Finally, participation became so low that one four person crew/vehicle could service the entire City residential area on one day per month in an eight hour shift. Additionally, approximately four crew members work another four hours collecting from the commercial establishments.

Discussions have occurred weigh the options of returning to either an increased frequency and/or an expanded list of materials for the curbside program. The situation presents somewhat of a "chicken or egg first" dilemma. Critics argue that the currently poor curbside participation, versus the apparently exceptional drop-off participation and recovery, does not warrant the extra expense of expanding the program. Proponents counter that poor curbside participation and recovery results from the infrequent collection, thus driving users to the drop-off location.

The Authority sought Technical Assistance to bring more clarity to the factors that could influence a decision.

Local Performance Trends

Before alternative methods of collection can be considered, it is important to determine the current level of performance in any given program. Thus, establishing some baseline criteria to use in a comparative analysis was the first step in the project. Materials currently collected at curbside and/or drop-off were evaluated to determine the effectiveness of the collection methodology

based on expected recovery. The characteristics of the community were also taken into consideration. Street design and layout; housing density; volume of materials; and travel times to facilities all were factored into the analysis.

Sunbury's Current Collection System

The City of Sunbury is relatively compact with 5,072 homes situated within 2.2 square miles. Like many local communities the streets are laid out in a general grid pattern. Larger main streets alternate with smaller streets or alleys. Assuming that homes could be serviced for recycling pickup on both sides of the smaller streets or alleys, the total route miles required to service all residences is about 12 miles. The Authority reports that it travels approximately 21 miles to service all homes, indicating that multiple passes on the same street and/or multiple tipping trips to unload probably occur. Traffic patterns, on-street parking, and accessibility all have impact on route efficiencies. Additionally, that the Authority also services select commercial outlets could factor into the extra reported mileage. As indicated previously, approximately 48 labor hours per month are dedicated to the curbside collection program.

The current curbside recycling program collects glass containers separated by color (brown and mixed) and aluminum cans. Materials are collected once a month on the third Thursday. It is estimated that less than 1 of every five homes places material at the curb on any given collection day. A drop-off program is available for recycling other materials, including bimetal cans, plastic bottles and jugs, newspapers, magazines and old corrugated cardboard.

Based on conservative fuel costs of \$3.50 per gallon and \$28 per hour for labor, including benefits, the current annual cost of fuel and labor, dedicated to the curbside program is at a minimum \$16,245. This includes the cost of servicing some commercial establishments. This does not include the cost of equipment replacement, maintenance, material handling, processing, delivery to market, or tipping fees, etc. Many of these costs are likely shrouded in the overall expense of the transfer station operation. Based on market prices for clear glass and aluminum cans in March 2009, the value of materials collected at the curb would average approximately \$172 annually. Colored glass reportedly is a cost to the Authority rather than a source of revenue.

Table 1 compares expected recovery with that reported for the existing curbside and drop-off programs if materials were collected at the national average.

**Table 1 Reported Curbside and Drop-off Performance
City of Sunbury 2007 Annual Tons of Recovered Recyclables**

| Material | Expected Recovery | Current Curbside Recovery | Current Drop-off Recovery |
|---------------|-------------------|---------------------------|---------------------------|
| Glass | 72 | 90.8 | 147.46 |
| Aluminum | 20 | 0.53 | 4.73 |
| Bimetal Cans | 48 | 0 | 40.07 |
| Mixed Plastic | 21 | 0 | 69.96 |
| Newspapers | 327 | 0 | 236.9 |
| Magazines | 24 | 0 | 185.76 |
| OCC | 80 | 0 | 145.36 |

Based on Sunbury's population, the reported tonnage indicates that the current drop-off program is very successful, approaching or exceeding expected values. However, there is some suspicion that the reports do not necessarily provide an accurate assessment of the City's performance. The City is contiguous to other large bases of population from which the transfer facility draws its customers. Sunbury population was 10,610 at the 2000 census. Sunbury is the largest principal city of the Sunbury-Lewisburg-Selinsgrove CSA, a Combined Statistical Area that includes the Sunbury (Northumberland County), Lewisburg (Union County), and Selinsgrove (Snyder County) micropolitan areas, which had a combined population of 173,726 at the 2000 census. Sunbury is located in the center of the CSA. It is well documented that individuals from surrounding communities and counties frequent the Sunbury site. Users have been identified from the following communities: Danville, Shamokin, Mount Carmel Borough, Mount Carmel Township, Selinsgrove, Northumberland, Lewisburg, and beyond. Thus the reported drop-off tonnage is skewed and not necessarily representative of true recycling activity attributable to individuals and businesses residing within the City limits.

Evidence of outside sources of material is reflected in the recovery of magazines and plastics. Results for plastics are over three times what would be expected for Sunbury's population base. For magazines the results are more than seven times higher than anticipated. A contributing factor in the recovery of these materials both from Sunbury and outside sources is the prevalence of Pay-As-You-Throw programs in which residents pay by the bag to dispose of waste. In these pay by the bag programs, the discount realized by recycling is immediate to residents that subsequently buy fewer bags for waste disposal. Therefore, it is likely that people are willing to travel to the facility to deliver recyclables.

Further clouding the recovery results are the materials from select commercial establishments collected in the curbside program. For example, 67% of the glass reported from curbside collection was brown as opposed to 26% of the glass reported as brown from drop-off. The drop-off statistics more closely reflect the proportion of brown glass typically found nationwide. Residential sources typically generate a higher amount of clear glass. Because of the nature of their

business, bars and clubs generate more brown glass. The fact that these commercial sources are included in the curbside program most likely has a direct impact on this disproportionately high volume of brown glass reported.

Expanding the Collection System

To compare the current curbside collection program in the City of Sunbury to a potentially expanded scenario, it was necessary to establish a series of assumptions that would serve as equalizers in all situations. These items include things such as labor and fuel costs, service times, distances, material volumes, material commodity values, etc. Some of the assumptions are based on actual costs or statistics provided by the Municipal Authority. Others are based on industry standards in similar situations.

Material Recovery

Table 2 shows the expected annual quantity of the materials that might be collected in an expanded curbside recycling program, if the materials were collected at the same rate as the national average. Also shown is the expected recovery in pounds per pickup per home and tons per collection event, assuming 26 collection events per year and recovery at the national average rate. A collection event is considered to be the full circuit required to service all of the homes in the City. Therefore an event may require several days and/or multiple crews to complete. Lastly, the estimated yield per day per collection crew is shown in tons and cubic yards.

Table 2 Anticipated Route Performance

City of Sunbury Estimated Recovery per Collection Route Circuit and Route Day

| Material | Expected Recovery tons/year | Expected Recovery per Household lbs/pickup* | Expected Recovery per Event tons/event | Expected Recovery per Collection Day **tons | Expected Recovery per Collection Day loose cubic yards |
|---------------|-----------------------------|---|--|---|--|
| Glass | 72 | 1.09 | 2.77 | 0.44 | 2.93 |
| Aluminum | 20 | 0.30 | 0.77 | 0.12 | 0.80 |
| Bimetal Cans | 48 | 0.72 | 1.85 | 0.30 | 2.00 |
| Mixed Plastic | 21 | 0.33 | 0.84 | 0.13 | 8.35 |
| Newspapers | 327 | 4.97 | 12.60 | 2.01 | 10.10 |
| Magazines | 24 | 0.36 | 0.91 | 0.15 | 0.75 |
| OCC | 80 | 1.21 | 3.07 | 0.51 | 10.20 |

* tpy x 0.0151662 e.g. [2000/(5072 x 26)], includes all homes not just those participating.

** Values shown are yearly averages. Actual values in a particular event may be significantly greater.

Route Productivity

The time required to collect recyclables from all homes in the City was assessed using a 65% set out rate and 6 hours of actual collection time. The other two hours in an 8 hour shift would be dedicated to pre and post collection responsibilities, travel time to and from the route, lunch and other breaks, and unloading time. A 65% set out rate means that for an average collection day, about 2 out of every 3 homes will have material to be collected. At a collection rate of 1.5 homes per minute, a collection crew consisting of one driver and one helper could service 90 homes per hour. At a 65% set out rate, a total of 135 homes (participating and nonparticipating) would be included per hour, which is 2.66% of the total homes in the City. Thus, in 6 hours of collection time a crew would service 810 homes, or 16% of the City. To service all of the homes would require 37.6 hours, or 6.26 days. The average route distance traveled per collection day would be about 2 miles. Because working 7 days per week is not an option, it is necessary to use more than one crew to collect the entire City. It is estimated then that two crews each with a driver and a helper will be utilized in the collection scenarios.

Experience with other existing curbside programs in equally population dense areas would indicate that these estimates are conservative. However, based on performance information provided by the Authority these projections might be considered aggressive. In any case, the additional handling of more materials, more frequent unloading of the collection vehicle(s), the variation in the quantities collected, and crew performance are all factors that could impact collection efficiency.

Vehicle Capacity

In curbside collection programs, where multiple materials are collected on the same vehicle, capacity is critically important in achieving cost effectiveness. The vehicle or trailer must be able to provide for a balanced load even when some materials are generated in greater volumes than are others. Compaction units for one or more materials can greatly increase the capacity and therefore the distance a vehicle can travel before having to unload. The Sunbury Municipal Authority currently owns at least one and possibly two 14 cubic yard trailers. Therefore, currently available equipment was used in the route expansion estimates.

Program Criteria

While there were many variables to consider, the project focused on two goals heard most often in discussions. The first issue was to examine the feasibility of increasing the frequency of collection. The second issue was the potential to add more materials to the curbside program. Although endless variations exist for collection, only those that were compatible with the geography and the capabilities of the processing facilities were considered. Because labor and fuel represent two major factors in collection costs, alternative

scenarios focused on crews consisting of the least amount of personnel and/or completion of the route circuit within the constraints of a five day work week.

Therefore, the constants in the alternative collection options presented include:

| | |
|--|--|
| Service to 135 homes per crew per hour with a 65% set-out rate | Route circuit = 5 miles per crew per day including to and from route |
| Labor consisting of two crews each with a driver and a helper | Use of one compartmentalized 14 cubic yard capacity trailer per crew |
| Labor costs of \$28 per hour based on the Authority's current wages and estimated benefits | Curbside routes and recovery reflect only residential service and not service to those select commercial establishments |
| Fuel costs of \$3.50 per gallon | Material values based on March 2009 Philadelphia market rates, except for glass, which is based on local market value for only clear glass |
| Fuel usage of 7.50 miles per gallon based on the Authority's current estimates | |

The differences are reflected in the types and volumes of materials collected at curbside and the frequency of collection.

Option A Glass, Aluminum and Newspapers (Bi-Weekly Collection /All Materials)

In both weight and volume, newspapers represent a significant portion of the residential waste stream. Therefore, it has been suggested that the Authority once again collect newspapers at the curb. This scenario adds newspapers to the glass bottles and jars and aluminum cans currently collected curbside. Collection would occur every other week for all three materials in the program. In one day, a pair of two-person crews, with six hours of actual collection time, would each collect 5.5 loose cubic yards of newspaper if residents participated at the assumed level and recycled at the national rate. Aluminum cans would yield approximately .40 loose cubic yards per 6 hour collection day per crew, if recovered at the national rate, and therefore require a 1 cubic yard capacity bin on a trailer or vehicle. 1.46 combined loose cubic yards of glass, inclusive of colored and clear, would be collected if recovery rates were consistent with national averages. Based on typical residential generation, it is estimated that 1 cubic yard of vehicle capacity would be required for clear glass and approximately .50 cubic yard for mixed colored glass. Therefore, in one six hour collection day, each two-person crew would collect 6.96 loose cubic yards of material if Sunbury residents participated at the projected level and recycled at the national average rate. The materials in each trailer would weigh an estimated 1.28 tons.

Currently, the Authority provides collection with a trailer that could hold an estimated 14 cubic yards of material fully loaded. The trailer compartments would have to be reconfigured to accommodate the newspaper. The estimates for

collecting this combination of materials results in a slightly lesser volume than the full capacity of the trailer and allows some room for fluctuations in participation and or volumes. If 65% participation per collection day was achieved and recovery occurred at the national rates collection could be accomplished without multiple unloading trips. It is unlikely then that crews could experience additional collection time in their overall eight hour shift. If each crew added 30 to 60 minutes to a collection day, an average of 90 to 180 extra homes per day could be collected. Volumes and participation vary from route to route on any given day. Typically crews are able to provide back-up for one another when one route runs slower or exceeds capacity. Therefore, adding newspaper to the two crew's routes could probably be accomplished in a 3 day work week without resulting in overtime.

Annual Costs and Materials Sales (based on March 2009 market)
 Labor \$69,888 Fuel \$364 Revenue \$7,508

Option B Glass, Aluminum, Bi-Metal and Newspapers (Bi-Weekly Collection Alternating Material Weeks)

In this optional scenario, rather than collect all materials on the same collection day and week, collections would be alternated. Bi-metal cans would also be added to the curbside materials. In other words, glass bottles and jars, and aluminum and bi-metal cans would all be collected on one week with the following week having no collection. Then newspapers would be collected the next week with no collection the following week. The circuit would repeat every four weeks. A pair of two person crews would perform the collection.

Volumes of material would theoretically increase in this option because although collection occurs every other week, each material is actually being collected only once per month. Therefore, glass volumes would increase to 5.86 loose cubic yards or 2.93 loose cubic yards per crew, if recovered at the national rate. Aluminum would result in 1.6 loose cubic yards following national trends, or .8 loose cubic yards per crew. Four total loose cubic yards or 2 loose cubic yards per crew of bi-metal cans could be collected if residents participated at assumed levels and recycled at the national rate. The first alternating six hour collection day would then realize an overall recovery of 11.46 loose cubic yards or 1.72 tons or 5.73 loose cubic yards or .86 tons per crew.

Based on the 14 cubic yard capacity of the Authority's trailers, the collection of the glass bottles and jars, and aluminum and bimetal cans material could easily be accomplished using two crews in an alternating week or once per month collection without multiple unloading. It is unlikely then that crews could experience additional collection time in their overall eight hour shift. Therefore, the two crew's routes could probably be accomplished in a 3 day work week without resulting in overtime.

On the second alternating week 20.20 loose cubic yards, 10.10 per crew or 4.02 tons, 2.01 per crew, of newspapers could be collected per six hour day if recovered

at the national rate. Because the Authority's trailer has 14 cubic yard capacity overflow would not occur resulting in only one trip per crew to unload. As mentioned previously crews tend to provide back-up for one another when one route runs slower or exceeds capacity. Although newspapers will consume considerable volume on each trailer, the capacity and labor provided by two crews should allow newspaper collection once per month in this alternating week scenario to be accomplished in a 3 day work week without resulting in overtime.

Annual Costs and Materials Sales (based on March 2009 market)

Labor \$69,888 Fuel \$364 Revenue \$11,348

Option C Glass, Metal and Plastic Containers (Bi-Weekly Collection/ All Materials)

In this scenario, residents would be provided with the curbside collection of glass bottles and jars, aluminum and bi-metal cans, and plastic bottles and jugs. Collection would occur every other week using two crews each with a driver and a helper. In a six hour day, the crews would collect approximately 2.93 combined loose cubic yards of glass, inclusive of colored and clear, if recovery rates were consistent with national averages, or 1.465 loose cubic yards per crew. Based on typical residential generation, it is estimated that 1 cubic yards of trailer capacity would be required for clear glass and approximately .5 cubic yard for mixed colored glass. Aluminum cans would yield approximately .80 loose cubic yards per 6 hour collection day or .40 loose cubic yards per crew, if recovered at the national rate, and therefore require a .50 cubic yard capacity bin on a trailer. Bi-metal cans would result in 2 loose cubic yards or 1 loose cubic yard per crew, if recovered at the national rate, and require similar capacity. Plastic bottles and jugs would provide an additional 8.35 loose cubic yards or 4.175 loose cubic yards per crew and require 5 to 6 cubic yards of bin capacity in a trailer or vehicle, if consistent with the national recovery trends. Overall, two crews could collect an estimated 1 ton and 14.08 loose cubic yards of material in a single collection day. Each crew would collect approximately .5 tons and 7.4 lose cubic yards.

Operating the Authority's trailers that hold an estimated 14 cubic yards of material fully loaded, crews would not exceed available capacity and thus not require multiple trips for unloading. Similar to the other alternatives, these routes could be accomplished in 3 days with both crews providing support to one another.

Annual Costs and Materials Sales (based on March 2009 market)

Labor \$69,888 Fuel \$364 Revenue \$4,871

Option D Glass, Aluminum, Bi-Metal, Plastics and Newspapers (Weekly Collection/ Alternating Material Weeks)

This option provides for the recovery of five types of materials. Collection would occur weekly using two crews each with a driver and a helper. Not all materials would be collected each week. Instead plastic bottles and jugs and glass bottles and jars would be collected one week. The following week newspapers and

aluminum and bi-metal cans would be collected. The circuit would repeat beginning with the next week.

On the first alternating week, the crews would collect 2.93 loose cubic yards of glass, 1.465 per crew and 8.35 loose cubic yards of plastic, 4.175 per crew if material was recovered at the national rate. This amounts to a total of 11.28 loose cubic yards and .57 tons. With 14 cubic yards of capacity in the Authority's trailer, the crew would not require multiple unloading trips and could likely expand its collection day by 30 to 60 minutes thus servicing an average of 45 to 90 more homes per day without having a negative impact on capacity.

On the second alternating week, if residents achieved the assumed participation levels and national recovery rate, the crew would collect .80 loose cubic yards of aluminum cans; 2.00 loose cubic yards of bi-metal cans; and 10.10 loose cubic yards of newspapers for a total of 12.90 loose cubic yards or 2.43 tons. Based on the Authority's trailer capacity of 14 cubic yards, the route would not require multiple trips for unloading. Although the crew could likely expand its collection day by 30 to 60 minutes thus servicing an average of 45 to 90 more homes per day it could come close to having a negative impact on capacity if recovery occurred at the national average.

Annual Costs and Materials Sales (based on March 2009 market)

Labor \$139,776 Fuel \$728 Revenue \$ 11,411

Table 3 provide a comparative glimpse of the current program along with the four alternatives.

Table 3 Cost Comparison of Collection Options

| City of Sunbury Curbside Collection Options | | | | | | | | |
|--|--|---|-------------------|------------------|------------------|-----------------|-----------|--------------|
| Option | Materials Collected | Frequency | Residential Labor | Residential Fuel | Commercial Labor | Commercial Fuel | Revenue | Net Cost |
| Current Program | Glass, Aluminum | Monthly All Materials | \$10,752 | \$67.20 | \$5,376 | \$49.80 | \$172 | \$16,073 |
| Option A | Glass, Aluminum and Newspapers | Bi-Weekly All Materials | \$69,888 | \$364 | \$5,376 | \$49.80 | \$7,508 | \$69,169.80 |
| Option B | Glass, Aluminum, Bi-Metal and Newspapers | Bi-Weekly Collection Alternating Material Weeks | \$69,888 | \$364 | \$5,376 | \$49.80 | \$11,348 | \$64,329.80 |
| Option C | Glass, Metal and Plastic Containers | Bi-Weekly Collection All Materials | \$69,888 | \$364 | \$5,376 | \$49.80 | \$4,871 | \$70,806.80 |
| Option D | Glass, Aluminum, Bi-Metal, Plastics and Newspapers | Weekly Collection/ Alternating Material Weeks | \$139,776 | \$728 | \$5,376 | \$49.80 | \$ 11,411 | \$134,518.80 |

Influencing Factors and Other Variables

The options presented use basic assumptions, which may or may not all hold true in actual field operating conditions. However, the assumptions serve as an equalizer that allows one to compare which alternatives will likely have the least net cost. Many variables exist that could positively or negatively affect the representative costs in any of the scenarios.

- ❑ An important factor that is difficult to incorporate into the analysis of recycling activities is the direct savings to the residents of Sunbury realized thru the avoided cost of disposal. Although the City does not benefit from the effect of these efforts, because City residents pay by the bag for disposal, many of them could experience a savings by recycling more. Curbside recycling could increase these opportunities.
- ❑ There is no guarantee that Sunbury's residents will participate at the estimated level. This particularly true because the City's residents do not have to contract for garbage collection, but are permitted to utilize the transfer station instead. Thus the habit of placing material at the curb for collection is not a weekly routine for many individuals. Currently less than 20% of residents place materials at the curb for collection. A leap to 65% is a substantial increase. Lower participation could mean routes could be collected faster. It would also mean less material and thus less revenue.
- ❑ The current origin of the drop-off material is uncertain. If that material is primarily from Sunbury residents, it could be shifted to curbside collection. If the volumes are shifted to curbside, the Authority would incur collection costs for revenue generating commodities it once received at no cost.
- ❑ Discontinuing drop-off collection of materials that are collected at curbside would likely have an affect on shifting the volume to collection crews. However, as mentioned previously, it would increase collection costs and not necessarily generate more revenue. In fact, discontinuation of any of the drop-off materials would serve to cut-off volumes from residents of other municipalities and thus reduce overall revenue.
- ❑ Distances traveled to and from the route in Sunbury are minor. The unloading site is the same point of origin as the collection crew. Therefore, actual collection hours may be as great as 7 to 7.5 hours per day, which could potentially decrease the number of route days required depending on participation levels.
- ❑ In some of the scenarios, depending on a combination of all variables, it could be possible to run one two-person crew five days per week and a swing crew

on Saturdays. Crew productivity would have to be optimal. This could potentially be achieved in conjunction with the commercial collection.

- Because collection time had a greater impact on routing potential than did capacity, a vehicle with a compaction unit was not considered. With lesser participation however, a compaction unit might make the difference between the numbers of crews required to service the City.

Conclusions and Recommendations

This project provides the Sunbury Municipal Authority with an overview of comparative costs and services for a residential recycling program. Using a constant set of assumptions for all scenarios, it was demonstrated that the Authority's current monthly curbside collection meets the minimum requirements of Act 101 in the most cost effective manner. The existence of recycling drop-off collection at the transfer station and the uncertain origin of most of the material collected there presents a high monetary risk in transitioning many of these materials to curbside collection.

Based on the current economic conditions, market commodity pricing, and the existing infrastructure established within the City, Nestor Resources, Inc. does not recommend that the Authority increase either the frequency of collection or the materials accepted at the curb at this point in time. However, Nestor Resources does advise the Authority to monitor the origin of customers periodically to determine if, in fact, the results attained at the drop-off site are attributable to the City or its neighboring communities. Such data would confirm the level of risk or benefit anticipated in a potential future transition.

Nestor Resources is confident that the analysis of the collection options, and the discussions of factors influencing program performance, will bring clarity to the Sunbury Municipal Authority on the interrelated issues of curbside and drop-off collection. The findings will also help the Authority justify future adjustments in its collection system.



Nestor Resources, Inc.