June 15, 2004

Mr. Etienne Ozorak
Executive Director
Crawford County Solid Waste Authority
231 Chestnut Street, Suite 310
Meadville, PA

Subject: **Optimizing the Crawford County Solid Waste Authority's Drop-off Recycling Program**

Dear Etienne:

This letter is to provide an approach to optimize the performance of the Crawford County Solid Waste Authority's (The Authority) drop-off recycling program. This assessment was performed under the Recycling Technical Assistance program sponsored by the Pennsylvania Department of Environmental Protection (DEP) and the Solid Waste Association of North America (SWANA).

The report is divided into the following sections, which correspond with the Tasks provided in the scope.

- Description of Current Recycling System;
- Issues With Current Recycling System;
- Recommendations for Improving the System; and,
- The Impact of the Proposed System on Recycling Quantities

Description of The Authority's Current Recycling System

The Authority currently operates a drop-off recycling program, which is comprised of 11 V-Quip sites and 32 roll-off sites. The V-Quip sites are "permanent" sites, meaning they are available for use at all times. The roll-off sites are "temporary" sites – a roll-off container is delivered to the site, and available for a day or two per month only. Residents receive a schedule indicating when each site will be available. Table 1 identifies the locations of these sites.

Table 1
Drop-off Site Locations

Site Number	Site Type	Drop-off Site Location
1	V-Quip	Cambridge Springs Boro/Twp
2	V-Quip	Conneautville Boro
3	V-Quip	Giant Eagle
4	V-Quip	Hayfield Twp
5	V-Quip	Hydetown
6	V-Quip	Pine Twp/Lineville Boro

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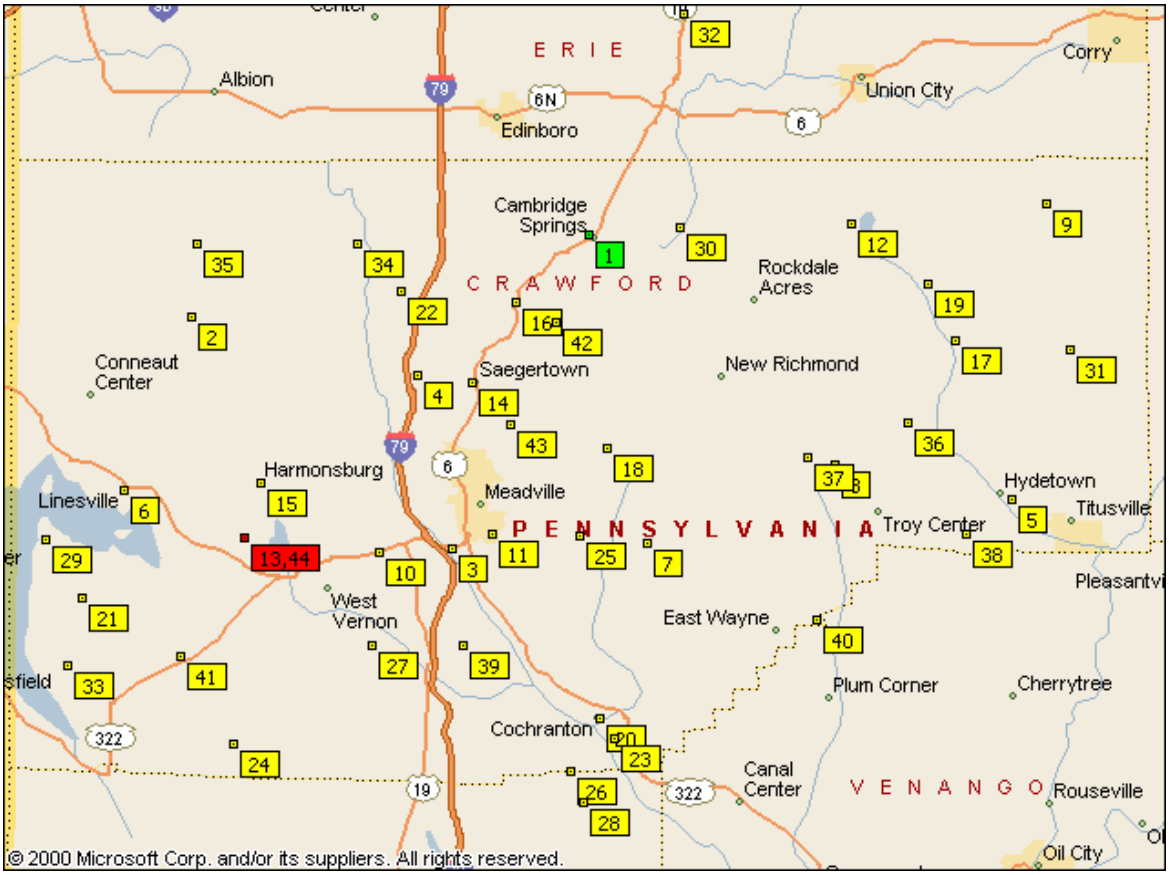
Site Number	Site Type	Drop-off Site Location
7	V-Quip	Randolph Twp
8	V-Quip	Richmond Twp
9	V-Quip	Sparta Twp/Spartensburg
10	V-Quip	Wal-Mart
11	V-Quip	West Meade Twp
12	Roll-off	Bloomfield Township
13	Roll-off	Sadsbury Twp
14	Roll-off	Saegertown
15	Roll-off	Summit Twp
16	Roll-off	Venango Boro/Twp
17	Roll-off	Athens Township
18	Roll-off	Blooming Valley
19	Roll-off	Centerville
20	Roll-off	Cochranton
21	Roll-off	Conneaut Twp
22	Roll-off	Cussewago Twp
23	Roll-off	East Fairfield Twp
24	Roll-off	East Fallowfield Twp
25	Roll-off	East Mead Twp
26	Roll-off	Fairfield Twp
27	Roll-off	Greenwood Twp
28	Roll-off	Milledgeville
29	Roll-off	North Shenango Twp
30	Roll-off	Rockdale Twp
31	Roll-off	Rome Twp
32	Roll-off	Saint Marks Church
33	Roll-off	South Shenango Twp
34	Roll-off	Spring Twp
35	Roll-off	Springboro
36	Roll-off	Steuben Twp
37	Roll-off	Townville
38	Roll-off	Troy Twp
39	Roll-off	Union Twp
40	Roll-off	Wayne Twp
41	Roll-off	West Fallowfield Twp
42	Roll-off	Woodcock Borough
43	Roll-off	Woodcock Twp

Figure 1 is a map that shows the locations of the V-Quip and roll-off sites.

Figure 1
Existing Drop-Off Site Locations



Each V-Quip drop-off site is comprised of five or six containers. Individual containers are used for plastic bottles, glass containers, metal cans and old corrugated cardboard (OCC). In addition, each V-Quip site has at least one container for fibers. This container is divided into two sections; two-thirds of the container is for newspapers (ONP) and the other one-third is for magazines.

All of the containers are dumped directly into the V-Quip collection vehicle. The RP235 collection vehicle has two compartments and is used to transport the ONP, magazines, metal cans, and glass containers. This vehicle is used to collect ONP and magazines on Monday, Thursday and Friday. It also is used to collect metal cans on Tuesday and glass containers on Wednesday. The OCC and plastic bottles are collected by the "Twister" vehicle, which is a single-compartment vehicle with an auger attachment that "densifies" the material. The

"Twister" is used to collect plastic bottles on Monday, Thursday, and Friday mornings. OCC is collected on Tuesday and Friday afternoons using this vehicle.

For the roll-off sites, the Authority transports the roll-off container to a site one day per month and returns to collect the container and transport the material back to the processing center the next day, or as soon thereafter as possible. The roll-off system uses 25 cubic yard compartmentalized containers for ONP, glass, and metal cans. Plastic bottles are collected in a separate wire basket container which is carried on a trailer behind the roll-off truck. If the containers are more than 25 percent full, they are transported to the recycling facility and emptied before delivery to the next locations. Containers that are less than 25 percent full may be transported to the next location without being emptied.

All collected recyclables are delivered to the Crawford County Recycling Facility, which is located at 1152 Morgan Village Road, Meadville, PA 16335. The Authority is currently developing a new recycling processing facility that is scheduled to open in July 2004. This site will be located approximately two miles east of the current facility at 11010 McHenry Street.

Current Recycling System Issues

While there are over 40 drop-off sites in Crawford County, the vast majority are only available to residents and businesses once per month, and many are located in remote locations. These conditions are contributing factors for underutilization of the facilities and high overtime costs.

Under utilization of Existing Drop-Off Sites

In 1999, R. W. Beck conducted a study to determine the utilization rate of drop-off sites located in Crawford County.[1] At that time it was determined that one third of all containers were being filled during the 24-hour period when they are on site and available for public drop-off. The remaining containers were collected half full or less, with approximately 20 percent of all containers being minimally utilized.

Also at that time, an analysis was performed of the correlation of fill rates with two different variables--population and location with respect to major roads. Table 2 provides a comparison among the sites using municipal populations, and Table 3 provides a comparison of utilization among sites with respect to location.

Table 2
Volume of Materials Collected by Population

Township	Population	Level
Vernon Township	5,605	Full
Cambridge Springs Boro/Twp.	3,327	Full

[1] At this time, the Crawford County Solid Waste Authority did not operate the drop-off system.

Township	Population	Level
Hayfield Township	2,937	Full
Sadsbury Township	2,575	Full
Woodcock Township	2,412	Half-Full
Oil Creek Township	2,069	Full
North Shenango Township	2,069	Half-Full
Sparta Twp./Spartansburg	1,957	Full
Summit Township	1,890	Full
Bloomfield Township	1,839	Full
Randolph Township	1,661	Full
Pine Twp./Linesville Boro	1,621	Half-Full
Spring Township	1,561	Half-Full
South Shenango Township	1,556	Minimal
Rome Township	1,491	Minimal
East Mead Township	1,441	Half-Full
Cussewago Township	1,409	Half-Full
Wayne Township	1,401	Minimal
Conneaut Township	1,399	Half-Full
Richmond Township	1,370	Full
Greenwood Township	1,361	Half-Full
East Fallowfield Township	1,280	Half-Full
Summerhill Township	1,264	Half-Full
Troy Township	1,235	Minimal
Cochranton	1,174	Half-Full
Saegertown	1,066	Full
Rockdale Township	1,045	Half-Full
Venango Borough/Twp.	1,018	Full
Fairfield Township	997	Half-Full
Union Township	895	Minimal
East Fairfield Township	890	Half-Full
Conneautville Borough	822	Full
Steuben Township	820	Half-Full
Milledgeville	789	Minimal
Conneaut Lake	699	Full
Athens Township	699	Minimal
West Fallowfield Township	693	Half-Full
Hydetown	681	Half-Full
Springboro	471	Half-Full
Blooming Valley	391	Half-Full

Township	Population	Level
Townville	358	Full
Centerville	249	Half-Full
Woodcock Borough	148	Half-Full
AVERAGE POPULATION MINIMAL	1,152	Minimal
AVERAGE POPULATION HALF-FULL	1,113	Half-Full
AVERAGE POPULATION –FULL	1,946	Full

Table 3
Volume of Container Collected by Location

Township	Level	Proximity to Major Roads [1]
Cambridge Springs Boro/Twp.	Full	1
Conneautville Borough	Full	1
Bloomfield Township	Full	1
Sadsbury Township	Full	1
Saegertown	Full	1
Summit Township	Full	1
Venango Borough/Twp.	Full	1
Conneaut Lake	Full	1
Oil Creek Township	Full	1
Hydetown	Half-Full	1
Pine Twp./Linesville Boro	Half-Full	1
Centerville	Half-Full	1
Cochranton	Half-Full	1
East Fairfield Township	Half-Full	1
Springboro	Half-Full	1
Summerhill Township	Half-Full	1
Hayfield Township	Full	2
Randolph Township	Full	2
Richmond Township	Full	2
Sparta Twp./Spartansburg	Full	2
Townville	Full	2
Vernon Township	Full	2

Township	Level	Proximity to Major Roads [1]
Blooming Valley	Half-Full	2
East Mead Township	Half-Full	2
Greenwood Township	Half-Full	2
Rockdale Township	Half-Full	2
West Fallowfield Township	Half-Full	2
Woodcock Borough	Half-Full	2
Woodcock Township	Half-Full	2
Milledgeville	Minimal	2
Rome Township	Minimal	2
Troy Township	Minimal	2
Wayne Township	Minimal	2
Conneaut Township	Half-Full	3
Cussewago Township	Half-Full	3
East Fallowfield Township	Half-Full	3
Fairfield Township	Half-Full	3
North Shenango Township	Half-Full	3
Spring Township	Half-Full	3
Steuben Township	Half-Full	3
Athens Township	Minimal	3
South Shenango Township	Minimal	3
Union Township	Minimal	3
TOTAL MINIMAL		1=0%; 2=57%; 3=43%
TOTAL HALF-FULL		1=33%; 2=33%; 3=33%
TOTAL FULL		1=60%; 2=40%; 3=0%

1 indicates that major roads include Rts. 322, 8, 6, 18, 19;

2 indicates that facility is close to secondary roads including other numbered roads;

3 indicates site is located on minor roads that do not have a number designation.

As Tables 2 and 3 illustrate, higher population and locations near major roads appear to be the best predictors of the volume of material collected at any given site. Nine of the 15 sites with containers that are generally full at pickup are in the top third sites as ranked by population. With regard to fill level as related to location, there are no sites located on major roads that were found to be in the "minimal" category, and no sites on minor roads considered to be in the "full" category. As for containers considered to be "half full" at pickup, the results are less definitive, and these results could be related to any of a number of factors. Table 4, for example, suggests that Friday and Saturday sites appear to have the best results, with no containers classified as

"minimal" at pickup. These are sites where containers are available during the weekend when residents may have more of an opportunity to drop off their recyclables.

Table 4
Container Fill Levels by Collection Day

Day	Number of Sites with Indicated Utilization Level			Totals
	Full	**Half-Full**	**Minimal**	
Monday	0	3	1	4
Tuesday	2	4	0	6
Wednesday	3	1	4	8
Thursday	2	4	2	8
Friday	3	5	0	8
Saturday	4	4	0	8
Continuous	1	0	0	1
Totals	15	21	7	43

Costs Associated with Maintaining the Current System

The Authority has two full-time drivers who service the 43 drop-off sites. Maintaining these sites requires an average of approximately 18 hours of overtime per pay period (470 hours annually), which costs the Authority $16,500 per year. The 2003 operating costs associated with the Authority's drop-off program are provided in Table 5.

Table 5
2003 Operating Costs

Item	Cost
Labor	
2 Drivers (Including Overtime)	$71,683
Benefits	$18,687
Other	$1,560
Subtotal Labor	*$91,930*
O&M	
Vehicle Repair	$12,763

Fuel	$8,529
Supplies	$900
Uniforms	$1,300
Licensing	$165
Other	$500
Subtotal O&M	*$24,157*
Total	**$116,087**

Note: Excludes annualized capital costs

Beyond operating costs, the current system requires that the Authority maintain a separate vehicle for transporting the roll-off containers, and that vehicle is nearing the end of its useful life. Thus, if the Authority is going to convert its drop-off recycling program, it should do so before purchasing another vehicle for transporting roll-off containers.

Proposed System

R. W. Beck believes the Authority could achieve the following goals by modifying the current drop-off recycling system:

- Provide residents and businesses with convenient access to drop-off recycling 365 days a year;
- Collect containers that are 75 percent full or greater;
- Decrease operating costs; and,
- Increase recycling quantities.

Specifically, we recommend an enhanced County-wide drop-off site configuration that reduces the number of drop off sites from 32 once-a-month and 11 permanent drop-off locations to 20 permanent drop-off locations. Based on utilization rates and proximity to major thoroughfares, R. W. Beck recommends that the locations listed in Table 6 host a drop-off site. These sites are also shown on Figure 2.

Table 6
Proposed Drop-Off Site Locations

Map Number	Drop-off Site
1	Cambridge Springs Boro/Twp
2	Conneautville Boro
3	Giant Eagle
4	Hayfield Twp

Map Number	Drop-off Site
5	Hydetown
6	Pine Twp/Lineville Boro
7	Randolph Twp
8	Richmond Twp
9	Sparta Twp/Spartensburg
10	Wal-Mart Store
11	West Meade Twp
12	Bloomfield Township
13	Sadsbury Twp
14	Summit Twp
15	Venango Boro/Twp
16	Cochranton
17	Rome Twp
18	West Fallowfield Twp
19	Woodcock Twp
20	Future Wal-mart Store

Figure 2
Proposed Drop-Off Locations

Each of the 20 sites will have five bins to accept the following materials:

- ONP and Magazines;
- OCC;
- Plastic Bottles;
- Clear Glass; and,
- Tin and Aluminum Cans.

Four sites will have an extra container to help with the ONP & magazine overflow. These sites are:

- Giant Eagle Site #3;
- Wal-Mart Site #10;
- Cambridge Springs Site #1; and,
- Future Wal-Mart Store #20.

The majority of the nineteen sites will require Authority crews to service them once per week. Six of the ONP bins that are collected by the RP235 Packer will need to be serviced twice weekly, and six of the OCC and plastic bins that are collected by the Twister will need to be serviced twice per week. Table 7 provides an overview of the collection requirements associated with this proposed system.

Table 7
Collection Statistics for Proposed Drop-Off Sites

Route	Materials	Number of Locations	Number of Bins	Collections per Week	Total Weekly Hours
RP235 #1	Magazines	4	1	1	10.33
	ONP	14	1	1	9.00
	ONP	6	1	2	14.00
	Tin	20	1	1	13.33
	Glass	20	1	1	10.33
	Subtotal				46.67
Twister #1	OCC	14	1	1	10.77
	OCC	6	1	2	9.80
	Plastic	14	1	1	10.30

Route	Materials	Number of Locations	Number of Bins	Collections per Week	Total Weekly Hours
	Plastic	6	1	2	9.40
	Subtotal				40.27

Based on these collection statistics, 20 permanent sites could be adequately serviced without increasing crew size. In fact, overtime costs will be reduced from approximately 472 to 260 hours per year. A summary of the operating costs associated with the proposed system is provided in Table 8.

Table 8
Estimated Annual Operating Costs of Proposed Recycling System

Item	Annual Cost
Labor	
Two Drivers (Incl. OT)	$60,996
Benefits	$19,000
Other	$1,600
Subtotal Labor	*$81,596*
O&M	
Vehicle Repair	$10,000
Fuel	$7,500
Supplies	$900
Uniforms	$1,300
Licensing	$165
Other	$500
Subtotal O&M	*$20,365*
TOTAL	$100,961

Note: Excludes annualized capital costs

As shown by Table 8, the Authority will be able to operate the proposed system for approximately $16,000 less per year than the existing system.

Although the V-Quip system will yield the Authority savings in annual operating costs, there are capital purchases that must be made. The Authority will need to purchase 47 additional V-Quip recycling bins, for a total of 100 V-Quip bins. These bins cost approximately $7,000 each;

therefore the capital requirements associated with the bins would be $329,000. R. W. Beck also recommends that the County purchase an additional RP235 Packer to serve as a back up vehicle since this vehicle has the ability to collect both fibers and mixed containers[2]. This vehicle costs approximately $125,000, which, combined with the recycling bins, requires an estimated capital cost of $454,000.

To assist Crawford County evaluate whether to convert to a permanent V-Quip drop-off system, Tables 9 through 11 show both capital and operating costs of the V-Quip system amortized based on financing the V-Quip containers and vehicles for 10 years at 5 percent interest. These tables also show the cost to the Authority if grant funding from PADEP is obtained as well as without grant funding. Operating costs are inflated at 3 percent annually. These estimates are then compared to projected costs if the Authority retains the current system Because the Authority will need to purchase a new recycling vehicle regardless of whether the system is modified, the $125,000 vehicle cost was not included in the financial analysis.

Table 9
Status Quo

	Year 1	Year 5	Year 10
Operating Costs	$119,570	$134,577	$156,011
Capital Costs	$0	$0	$0
TOTAL	$119,570	$134,577	$156,011

Table 10
V-Quip System with 90 Percent Grant Funding of Capital Purchases

	Year 1	Year 5	Year 10
Operating Costs	$103,990	$117,041	$135,683
Capital Costs	$3,290	$3,290	$3,290
TOTAL	$107,280	$120,331	$138,973

[2] The Twister can not effectively collect fibers combined ith glass containers.

Table 11
V-Quip System without 90 Percent Grant Funding of Capital Purchases

	Year 1	Year 5	Year 10
Operating Costs	$103,990	$117,041	$135,683
Capital Costs	$32,900	$32,900	$32,900
TOTAL	$136,890	$149,941	$168,583

As shown in Tables 9 through 11, the Authority's total program costs will be almost $15,000 per year less if the Authority converts to the V-Quip System and receives grant funding for vehicle and container purchases from DEP. If the Authority does not receive grant funding, the total program cost could be approximately $15,000 greater per year. However, this analysis does not include the cost of any replacement roll-off containers that would need to be purchased during this ten-year period. Finally, by converting to a V-Quip system could yield additional recycling revenue for the Authority due to the higher quantity of recyclables and the lower residue rates that could be achieved through this system.

Impact on Recycling and Revenue

Approximately 3,830 tons of recyclables were processed at the Crawford County recycling facility during 2003. This tonnage reflects the recyclables recovered through both the drop-off program and the municipal curbside collection programs in Crawford County, was well as recyclables from Mercer County. The County does not quantify recyclables collected exclusively through the drop-off program. However, based on data provided by Dan Grow, Recycling Coordinator for Schuylkill County, converting from a temporary drop-off recycling system with roll-offs to a permanent V-Quip program has positive impacts on recycling quantities and residue rates.

Prior to instituting the V-Quip system, Schuylkill County was collecting approximately 1,200 tons of recyclables through their temporary drop-off recycling system. After replacing the temporary roll-off containers with permanent V-Quip containers, collected recyclables increased to 1,800 tons per year or by 34 percent. Additionally, residue rates are at less than two percent, which Schuylkill County attributes to the design of the containers and the ability to locate them in high visibility areas.

For comparison purposes, R. W. Beck also obtained operating data from Schuylkill County. As shown in Table 10, The Authority's estimated costs per site and route are comparable to Schuylkill County.

Table 10
Comparison of County Drop-off Programs

	Schuylkill County (Actual 2003)	Crawford County Projected
Population	150,336	86,169
Square Miles	798	1,038
Drop-off Sites	27	19
Total Bins	156	114
Total Trucks	4	3
Routes/Drivers	3	3
Truck Hours/Week	135	120
Operational Cost	$153,115	$100,048
Annual Tons	2,683	Unknown
Pounds per Capita	35.7	Unknown
Avg. Population per Site	5,568	4,535
Avg. Square Miles per Site	29.56	54.63
Avg. Sites per Route	9.0	6.3
Op. Cost per Site	$5,671	$5,266
Op. Cost per Route	$51,038	$33,349
Cost per Ton	$57.07	Unknown

Although there are not sufficient data to estimate the precise increase in Crawford County's diversion quantities that will be obtained by upgrading its recycling system, we can use the experience of Schuylkill County as a basis for estimation. Crawford County's 20 proposed drop-off sites serve slightly smaller population as Schuylkill County's sites, but a larger geographic area. Assuming the Crawford County Solid Waste Authority achieves Schuylkill County's per capita diversion rate, the new drop-off program will divert 1,538 tons. Assuming this represents a 34 percent increase over the current system, Crawford County will have diverted an additional 390 tons of recyclables with the new system.

Etienne, I hope you find this information useful in redesigning your drop-off recycling system. If you have any questions or I can be further assistance, please do not hesitate to contact me (513) 936-8955.

Sincerely,

R. W. BECK, INC.

Karen M. Luken
Senior Director

cc: Carl Hursh, DEP
Brent Dieleman, SWANA

Project Contact ***(Complete section or attach Technical Assistance Request Form)***

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Crawford County currently operates a drop-off recycling program, which is comprised of 11 V-Quip sites and 32 roll-off sites. The V-Quip sites are "permanent" sites, meaning they are available for use at all times. The roll-off sites are "temporary" sites – a roll-off container is delivered to the site, and available for a day or two per month only.

While there are over 40 drop-off sites in Crawford County, the vast majority are only available to residents and businesses once per month, and many are located in remote locations. These conditions are contributing factors for underutilization of the facilities and high overtime costs.

Thus, the Authority has evaluated reducing the number of drop off sites from 32 once-a-month and 11 permanent drop-off locations to 20 permanent drop-off locations. Initial results indicate that the Authority could achieve the following objectives by modifying the existing drop-off recycling system:

- Provide residents and businesses with convenient access to drop-off recycling 365 days a year;
- Collect containers that are 75 percent full or greater;
- Decrease operating costs; and,
- Increase recycling quantities.