



November 8, 1999

Mr. Thomas E. Marshall
Recycling Coordinator
City of Bethlehem Recycling Program
10 E. Church Street
Bethlehem, PA 18018

Subject: Evaluating Decline in Recycling Rate for Bethlehem Recycling Program

Dear Tom:

This letter is to provide the City of Bethlehem with the results of R.W. Beck's efforts to evaluate the City's recycling program to determine reasons for a decline in recycling tonnage and to consider approaches to boost the tonnage in future years.

The City provides curbside collection of containers (glass, aluminum, steel, and plastic) for its residents, and also operates a drop-off recycling center that takes these materials plus newsprint, corrugated cardboard/paperboard, magazines, telephone books, mixed paper, books, and scrap metal. The program has reported concern that the tonnage collected for recycling has declined by nearly 750 tons since 1993, mostly from the curbside collection program. It is not known whether this decline is a result of lower participation, a change in the mix of materials, or some other factor.

EVALUATING DECLINE IN RECYCLING RATE FOR BETHLEHEM RECYCLING PROGRAM

This report assumes the following:

- The City of Bethlehem contracts for curbside collection of glass, aluminum, steel and plastic containers for its residents.
- The City operates a drop-off center that accepts all the materials collected at the curb, plus newsprint, corrugated cardboard/paperboard, magazines, telephone books, mixed paper, books, and scrap metal.
- The City's recycling tonnage declined by nearly 750 tons from 1993 to 1998.
- The City has reported that there have been no significant changes to the program since 1993.

R.W. Beck reviewed and analyzed recycling data from the City's program for the years 1993 through 1998. The analysis was conducted on total tonnage (both curbside and drop-off) and separately for curbside tonnage and drop-off tonnage, and included the percentage of change from year to year for each material, and the total percentage change and total tonnage change from 1993 through 1998.

This report presents some of the possible reasons for the declines in tonnage since 1993, and provides suggestions for approaches that might help to boost tonnage.

DATA ANALYSIS

To analyze the data provided by the City of Bethlehem, Beck set up three tables, broken down by material: (1) all materials collected in both the curbside and drop-off programs; (2) all materials collected in the curbside program; and (3) all materials collected in the drop-off program. These are presented in this report as Tables 1, 2 and 3 respectively.

Examination of this data, plus some discussion with City recycling staff, yielded some interesting observations that may explain, at least in part, the reason for the decline in tonnage.

One hypothesis considered prior to analyzing the data was that there was a significant shift from glass to other lighter containers. The data suggests that this may in fact explain most of the decline. Significant findings are presented below:

- The total decline in tonnage from 1993 through 1998 was 744.35 tons (11.35 percent). Most of this decline (530.89 tons, or 71 percent) occurred in the curbside program. Of the total decline, 704.84 tons was glass (nearly 95 percent).
- There were also significant declines in newsprint (260.19 tons) and commingled materials (216.97 tons). Commingled materials include glass, aluminum, steel and plastic containers.
- The percentage declines in these categories are as follows:
 - Glass 35.26 percent
 - Newsprint 13.43 percent
 - Commingled 48.35 percent
- All other categories of materials increased from 1993 through 1998. The materials that experienced the greatest increases were:
 - Aluminum 81.54 percent
 - Plastics 49.19 percent
 - Mixed paper 36.72 percent
 - Magazines/telephone books/books 20.70 percent
 - White goods 18.88 percent
- The relative tonnages of other materials, with the exception of newsprint, are small when compared to glass. Therefore, while percentage increases were great, tonnage increases were

relatively small. The total increase in tonnage for all materials that experienced an increase was 437.66 tons, compared to a total decrease in glass, newsprint and commingled of 1,265.16 tons.

- There was a significant decline in fibers (newsprint, corrugated cardboard, phone books and mixed paper) from 1994 to 1995:
 - Newsprint 28.82 percent
 - Corrugated cardboard 21.04 percent
 - Phone books 34.53 percent
 - Mixed paper 2.62 percent

All of these materials started to increase again after 1995, and all but newsprint reached and exceeded their pre-1995 totals.

There are several possible explanations for the numbers presented above:

- Residents have shifted from glass containers to aluminum and plastic containers in large numbers. While there is a tremendous variation in tonnages, with the decline in glass tonnage far outstripping the increased tonnage of aluminum and plastics, the dramatic percentage of increase in aluminum and plastics indicates that most residents are recycling as much as ever. It would be useful if there was a mechanism to measure volume. Given the large percentage increases in aluminum and plastics, it is possible, perhaps likely, that the volume of material has increased over time, even though weight has declined.
- In discussing the decline in newsprint, recycling program staff reported that the size of the local newspapers (Allentown *Morning Call*, Easton *Express*) has decreased with the use of thinner paper and less advertising. This may account for at least a portion of the decline in newsprint.
- Another theory as to why newsprint tonnage may still be low goes back to the 1995 boom in paper markets. One member of the recycling program staff reported that local haulers asked customers to set newsprint out separately so that the haulers could collect it separately for recycling. When the markets declined, haulers then told their customers that the newsprint could no longer be recycled and to include it with their trash. At least some of these customers may have taken their newsprint to the Illicks Mill Drop-off Center prior to that time and never resumed this practice, or may have thought it was simply no longer possible to recycle newsprint at all. Of course, it is impossible to determine the validity of this theory without some type of survey to gather data on recycling habits before and after 1995.

The heaviest contributor to the decline in tonnage is likely to be the first explanation, given the clear evidence presented in the data in Tables 1, 2 and 3, with the other contributing to the decline. A survey of residents might shed some light on the extent to which residents may have shifted from purchasing products in glass containers to those in aluminum and plastic, but conducting a statistically significant survey would require significant time and cost, and it is doubtful that it would yield much more information than the data presented in the tables would indicate.

TABLE 1
CITY OF BETHLEHEM RECYCLING PROGRAM
ANALYSIS OF ANNUAL CHANGES BY MATERIAL – 1993–1998
RECYCLABLES COLLECTED IN CURBSIDE AND DROP-OFF PROGRAMS

MATERIAL	1993	1994	% Change 1993-1994	1995	% Change 1994-1995	1996	% Change 1995-1996	1997	% Change 1996-1997	1998	% Change 1997-1998	% Change 1993-1998	Tonnage Change 1993-1998
OCC	398.53	427.08	7.16%	337.23	-21.04%	334.90	-0.69%	381.70	13.98%	451.61	18.32%	13.32%	53.08
ONP	1,937.20	2,104.30	8.63%	1,497.89	-28.82%	1,486.07	-0.79%	1,667.28	12.19%	1,677.01	0.58%	-13.43%	-260.19
Steel cans	379.66	371.29	-2.20%	397.36	7.02%	408.41	2.78%	388.74	-4.82%	384.64	-1.05%	1.31%	4.99
Aluminum	101.47	98.77	-2.66%	142.47	44.24%	177.86	24.84%	186.55	4.89%	184.21	-1.26%	81.54%	82.74
Glass	1,999.24	1,947.47	-2.59%	1,647.16	-15.42%	1,466.92	-10.94%	1,300.97	-11.31%	1,294.40	-0.50%	-35.26%	-704.84
Office paper	153.34	177.96	16.06%	173.30	-2.62%	163.70	-5.54%	193.99	18.50%	209.64	8.07%	36.72%	56.31
Magazines	572.52	565.01	-1.31%	589.15	4.27%	--	--	--	--	--	--	--	--
Plastics	177.60	175.85	-0.98%	221.32	25.86%	249.87	12.90%	260.91	4.42%	264.97	1.55%	49.19%	87.37
Scrap metal	232.12	248.79	7.18%	234.62	-5.69%	233.63	-0.42%	226.67	-2.98%	237.61	4.83%	2.37%	5.50
Textiles	28.52	20.26	-28.96%	24.03	18.61%	25.02	4.12%	30.12	20.38%	32.49	7.87%	13.92%	3.97
Phone books	41.92	42.91	2.34%	28.09	-34.53%	--	--	--	--	--	--	--	--
White goods	87.55	96.83	10.60%	123.21	27.24%	103.96	-15.62%	80.63	-22.44%	104.08	29.08%	18.88%	16.53
Commingled	448.77	340.73	-24.07%	142.74	-58.11%	179.20	25.54%	214.98	19.97%	231.80	7.83%	-48.35%	-216.97
OMG/OTD/Books*						604.54	-2.06%	643.98	6.52%	741.61	15.16%	20.70%	127.17
TOTALS	6,558.42	6,617.24	0.90%	5,558.56	-16.00%	5,434.07	-2.24%	5,576.51	2.62%	5,814.07	4.26%	-11.35%	-744.35

*The percent change from 1995 to 1996 compares the total of the separate categories of magazines and phone books with the OMG/OTD/Books category.

TABLE 2
CITY OF BETHLEHEM RECYCLING PROGRAM
ANALYSIS OF ANNUAL CHANGES BY MATERIAL – 1993–1998
RECYCLABLES COLLECTED IN DROP-OFF PROGRAM

MATERIAL	1993	1994	% Change 1993-1994	1995	% Change 1994-1995	1996	% Change 1995-1996	1997	% Change 1996-1997	1998	% Change 1997-1998	% Change 1993-1998	Tonnage Change 1993-1998
OCC	398.53	427.08	7.16%	337.23	-21.04%	334.8975	-0.69%	381.70	13.98%	451.61	18.32%	13.32%	53.08
ONP	1,937.20	2,104.30	8.63%	1,497.89	-28.82%	1,486.07	-0.79%	1,667.28	12.19%	1,677.01	0.58%	-13.43%	-260.19
Steel cans	24.52	25.15	2.55%	23.32	-7.26%	22.70	-2.66%	17.93	-21.01%	18.54	3.42%	-24.38%	-5.98
Aluminum						12.25		10.11	-17.49%	11.32	12.02%		-0.93
Glass	92.71	96.51	4.10%	83.27	-13.72%	85.33	2.48%	75.26	-11.81%	67.25	-10.64%	-27.46%	-25.46
Office paper	153.34	177.96	16.06%	173.30	-2.62%	163.70	-5.54%	193.99	18.50%	209.64	8.07%	36.72%	56.31
Magazines	572.52	565.01	-1.31%	589.15	4.27%	--	--	--	--	--	--	--	--
Plastics						3.63	--	13.27	265.93%	21.26	60.27%		17.64
Scrap metal	232.12	248.79	7.18%	234.62	-5.69%	233.63	-0.42%	226.67	-2.98%	237.61	4.83%	2.37%	5.50
Textiles	28.52	20.26	-28.96%	24.03	18.61%	25.02	4.12%	30.12	20.38%	32.49	7.87%	13.92%	3.97
Phone books	41.92	42.91	2.34%	28.09	-34.53%	--	--	--	--	--	--	--	--
White goods	87.55	96.83	10.60%	123.21	27.24%	103.96	-15.62%	80.63	-22.44%	104.08	29.08%	18.88%	16.53
Commingled	448.77	340.73	-24.07%	143.24	-57.96%	179.20	25.11%	214.98	19.97%	231.80	7.83%	-48.35%	-216.97
OMG/OTD/Books*						604.54	-2.06%	643.98	6.52%	741.61	15.16%	20.70%	741.61
TOTALS	4,017.69	4,145.51	3.18%	3,257.34	-21.42%	3,254.91	-0.07%	3,555.90	9.25%	3,804.23	6.98%	-5.31%	-213.46

*The percent change from 1995 to 1996 compares the total of the separate categories of magazines and phone books with the OMG/OTD/Books category.

TABLE 3
CITY OF BETHLEHEM RECYCLING PROGRAM
ANALYSIS OF ANNUAL CHANGES BY MATERIAL – 1993–1998
RECYCLABLES COLLECTED IN CURBSIDE PROGRAM

MATERIAL	1993	1994	% Change 1993-1994	1995	% Change 1994-1995	1996	% Change 1995-1996	1997	% Change 1996-1997	1998	% Change 1997-1998	% Change 1993-1998	Tonnage Change 1993-1998
Aluminum	101.47	98.77	-2.66%	142.47	44.24%	165.62	16.25%	176.45	6.54%	172.89	-2.02%	70.39%	71.42
Steel	355.14	346.15	-2.53%	374.04	8.06%	385.71	3.12%	370.81	-3.86%	366.10	-1.27%	3.09%	10.96
Plastics	177.60	175.85	-0.98%	221.32	25.86%	246.24	11.26%	247.65	0.57%	243.71	-1.59%	37.22%	66.11
Glass	1,906.53	1,850.96	-2.91%	1,563.89	-15.51%	1,381.58	-11.66%	1,225.71	-11.28%	1,227.15	0.12%	-35.63%	-679.38

TOTALS	2,540.73	2,471.73	-2.72%	2,301.72	-6.88%	2,179.16	-5.32%	2,020.61	-7.28%	2,009.84	-0.53%	-20.90%	-530.89
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BOOSTING DIVERSION/TONNAGE IN BETHLEHEM

Bethlehem's recycling program still appears strong, as evidenced by the increases in all material categories except for glass, newsprint and commingled. While it appears that the decline may have resulted from a shift from glass to lighter weight containers, reduced tonnage is cause for concern because it reduces the overall recycling rate and the funds that can be recovered through the Section 902 Performance Grant program. With a new goal of 35 percent diversion, it is important to find mechanisms that can help to increase the tonnage diversion of materials in the Bethlehem program.

Recycling staff reported most concern over the decline in materials collected in the curbside program. While this decline appears to be the most significant both in terms of tonnage and the percent of decline, it is also the area that is least likely to contribute much more tonnage without some substantial changes.

There are a variety of approaches that could contribute to an increase in tonnage, but the best strategy is one that focuses on diverting the materials that stand to contribute the most to tonnage with the least cost. Some approaches include:

- **A campaign delivered directly to residents to encourage them to make wiser purchases and to recycle more.** Messages may include buying recycled, buying products with less packaging, buying products with recyclable packaging, and reducing waste in general. These messages could be incorporated into the City's existing media efforts, but it may be beneficial to put them directly into the hands of City residents through a flyer, door hanger, magnet, or similar vehicle. This effort would probably have some effect on increasing tonnage, but given the current mix of materials collected at the curb, results will probably be limited. Because curbside collection includes glass, aluminum, steel and plastic containers only, it would probably take a shift back to using more glass containers to boost the tonnage significantly.

Some type of recognition/award program that involves those who participate in the curbside recycling program may increase participation if residents are required to place materials at the curb in order to be considered for such a program.

It might also be useful to develop a traveling display that can be moved among locations, such as schools, local shops/businesses, and other well-traveled places. The display should cover acceptable materials, preparation, processing/marketing, and buying recycled. Information needs to reach people where they are. This could serve to promote both the curbside and drop-off recycling programs.

- **Adding paper to the curbside mix.** The City has never collected newsprint or any other fiber products from residents at the curb, instead relying on residents delivering these materials to the Illicks Mill Drop-off Center. The recycling staff reported that this has been considered, but was not done because the cost to add newsprint at the curb is prohibitive. Adding newsprint to the curbside program would almost certainly add tremendously to the tonnage collected at the curb, perhaps as much as doubling it (some Pennsylvania municipalities have reported that newsprint makes up around half of the weight collected at the curb). Of course, this would

probably reduce the amount of newsprint collected at the drop-off center as residents begin placing this material at the curb, but would probably increase the overall tonnage of newsprint collected. Making this change may not be justified, however, based on the cost to add newsprint to the mix. Some negotiation might be possible if the City had a waste collection contract, but does not seem as likely under the current scenario.

- **Working with the local papers and/or other businesses to promote newsprint (and other) recycling.** The City could extend its ability to promote newsprint recycling without adding it to the curbside mix by working with the local newspapers and other businesses to promote newsprint recycling. This would require recycling staff to negotiate with one or both of the papers that serve the Bethlehem area to enlist their support by finding a strategy or strategies that would benefit the newspapers. The newspapers could help by providing free promotional information about the benefits of recycling (particularly newsprint) and how and where to do it. Local businesses could help as well by sponsoring the effort. For grocery stores in particular, printing on paper bags with instructions for recycling newsprint is an inexpensive method of promoting newsprint recycling.
- **Further promotion of commercial and institutional recycling.** There is nearly always greater potential to recover more materials from commercial and institutional establishments. The City may want to look into ways to do more promotion in these settings. One example that might draw further attention is to develop a “Recycling Business (Institution) of the Month” program or similar. Criteria could be established to qualify, as well as a selection process. These businesses and institutions might get some small award (a plaque, certificate, etc.) and recognition in the local paper and at City Council meetings.

Another idea is to identify particularly enthusiastic local businesses and institutions that might act as “champions” to promote recycling and good waste management practices.

- **Further promotion of the Illicks Mill drop-off center.** Residents and businesses might be encouraged to use (or make further use of) the center through some other promotional efforts. Some examples include:
 - Developing a “Recycling Family of the Month” program, similar to the idea presented above for businesses and institutions.
 - Encouraging more drop-offs by offering prizes to every 1,000th (or other number to be determined) customer who comes through the center as an incentive to get people to come. This could be promoted through newspapers, radio, schools, businesses/Chamber of Commerce, institutions, etc.
 - Drawing attention through a visible goal program, possibly by developing a visual method of showing progress. Something like a thermometer, a recycling vehicle traveling along a road to the MRF, etc. that shows progress toward the goal would be useful. It would be nice to have it in a location that is highly visible (a la United Way).

The best strategy for promoting recycling is to engage a variety of approaches, particularly making use of creative promotions that capture the imagination and recognize businesses, institutions and individuals, as these are approaches that will probably lead to greater media coverage as well.

CONCLUSIONS

- The City of Bethlehem has experienced a nearly 750 ton decline in the amount of recyclables collected through its curbside and drop-off recycling programs since 1993.
- The most significant declines in tonnage have been in glass, newsprint, and commingled materials.
- The City has also experienced significant percentage increases in some recyclable materials, including aluminum, plastics, mixed paper, magazines/phone books/books, and white goods, though these have contributed little additional tonnage because they are either lighter weight materials or collected in smaller quantities.
- Possible explanations for the decline in tonnage include shifts from glass to lighter weight plastic and aluminum containers, reduced newspaper size, and changes in behavior concerning newsprint recycling after the 1995 paper market boom. A survey might help to identify reasons for the decline, but the time and cost involved to conduct such a survey may not yield significantly better information than the analysis of data presented in this report.
- Boosting recycling diversion/tonnage is expected to require that the City focus on increasing the higher weight materials, increasing participation in both the curbside and drop-off programs, and increasing commercial recycling.
- Bethlehem has a strong recycling education program, but the decline in tonnage has led recycling staff to question whether or not other educational vehicles should be considered to boost tonnage.

RECOMMENDATIONS

- The City should consider adding newsprint to the curbside recycling program if it can be done in a cost-effective manner. If not, the City should implement an education program to increase the amount of newsprint delivered to the Illicks Mill Drop-off Center.
- The City should review its public education program and consider implementing new approaches that include creative promotions that capture the imagination and make use of individual and business/institutional recognition as a means of increasing media coverage and encouraging greater participation in both the curbside and drop-off programs.

The City of Bethlehem already has an excellent recycling program and an effective public education program. Considering some of the suggestions in this report and implementing those that make sense for the City can only help to boost the tonnage of recyclables and improve the City's recycling rate.

Sincerely,

Sandra L. Strauss
Environmental Analyst

cc: Kathleen Kilbane, SWANA
Carl Hursh, DEP
Debbie Miller, R.W. Beck