FINAL

NEW YORK CITY METALS, GLASS AND PLASTICS RECYCLABLES CHARACTERIZATION STUDY

OCTOBER 2002

Prepared for:

CITY OF NEW YORK
DEPARTMENT OF SANITATION

Prepared by:

ecology and environment, inc.

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1 Introduction

New York City is faced with tremendous logistical challenges in managing its solid waste stream. Recent Census data estimates the year 2000 New York City population at about 8 million.[1] On any given day, up to 13,000 tons of solid waste can be generated citywide. The city lacks landfill space and consequently must export solid waste to other states at significant cost.

Because of the recent economic slowdown and the economic and social impacts of September 11th, the city also is faced with unique fiscal challenges. Consequently, the city is looking to rationalize certain programs and spend taxpayer dollars more efficiently. In view of recent proposals to suspend a portion of the city's residential recycling program, the New York City Department of Sanitation (NYCDOS) is attempting to obtain a more accurate assessment of the composition of the Metals, Glass, and Plastics (MGP) waste stream in order to make more prudent fiscal decisions.

Ecology and Environment, Inc. (E & E) was tasked to design and implement a waste characterization study that would focus exclusively on the residential MGP waste stream. The goals of the study were to provide NYCDOS management with recent information that would aid the decision-making process. The information also would be used to help the city's recycling managers to understand recycling behavior and form policies and educational programs.

The study adds significant information to the NYCDOS's inventory of primary solid waste data. Primary data is information generated by original research. In contrast, secondary data is published information that may or may not pertain to the research question at hand. Primary regional data is time consuming and costly to create but can yield more meaningful insights into the region's solid waste stream than can hasty extrapolations made from secondary data sources based on different underlying populations.

The portion of the waste stream being considered for suspension is the MGP component. Reports from the city's Office of Management and Budget (OMB)

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[1] Data Source: U. S. Census Bureau, 2000 Census Public Law 94-171 File and 1990 STF1; Population Division -- New York City Department of City Planning.

suggest that up to 40% of recyclables collected are contaminated with non-targeted materials and other residuals, such as various types of other solid waste.

E & E was asked to design and implement a three-week characterization study that would provide a statistically significant picture of the components of the MGP waste stream from representative collection districts throughout the city. The districts were selected on the basis of strata organized by population density and income.

This report is organized as follows: Section 2 describes the methodology and study design; Section 3 discusses the implementation; Section 4 provides the MGP recyclable characterization results and analysis; Section 5 presents the summary and conclusions; and Section 6 provides references to materials used to prepare this report.

2 Methodology

The method used to design this study is called stratified random sampling. E & E was provided with monthly data on the tonnage of metal, glass, and plastic (MGP) recyclables collected by the residential curbside and containerized recycling program. The data, which were provided for the most recent fiscal year, were evaluated for each collection district at the borough level and citywide. Presenting the annual data by month also allowed E & E to examine seasonal patterns within a calendar year.[2]

E & E also was provided with actual weekly MGP tonnages for February 2001 to January 2002. This data was organized by sanitation collection district, income, and housing density strata.[3] This weekly data also was annualized in order to estimate a more recent annual total tonnage of MGP collected citywide. In addition, past waste and recycling composition studies were reviewed for pertinent information that would provide workable assumptions or hypotheses that would aid in drawing a representative sample.

The study used probability-based survey techniques to obtain data that could be considered statistically representative for the city as a whole. The basic method was to use stratified random sampling of MGP tonnages within predetermined strata. A sample size was determined that would allow conclusions to be drawn that would reflect the district, strata, and citywide MGP recyclables compositions by weight.

2.1 Study Design

A top-down approach was used to determine the sample size. First, a total sample size of n was chosen by applying statistical criteria. Next, the sampled tonnage required, or units, were assigned or allocated to the various strata. The following sections describe this procedure in more detail. Individual recyclable collection districts that were representative of their individual strata were selected for sam-

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2 The source of this data was a memo entitled, "Fiscal 2000 Recycling Information" from A. Etergineoso, Director, to L. Cipollina, Assistant Commissioner, Planning and Budget, July 20, 2000.

3 The data was provided courtesy of Joanann Chimes, Deputy Director, Planning and Budget – OMD.

pling. Within collection districts, truck routes were evaluated across a given week and collection street assignments were randomly selected. A sufficient number of alternate routes were selected as backups to ensure that the targeted sampled tonnage for each district and stratum were reached.

2.1.1 Stratified Random Sampling

In stratified random sampling, the population is first divided into H number of groups called strata. Then for each stratum h, a simple random sample of size n_h is selected. The data from the H simple random samples are combined to produce an estimate of a population parameter such as the population mean, total, or proportion. Stratified random sampling results in greater precision or narrower interval estimates of the population parameters.[4]

2.1.2 Strata Definitions

E & E used predetermined strata that were based on the 1990 Census. This data was provided by the NYC Sanitation Department. At the time of the study, the most recent income and population density data had not yet been released for the 2000 Census. Table 2-1 shows the income and population density criteria that were used to stratify the sanitation collection districts.

Table 2-1 1990 Census Categories Used to Stratify NYC Sanitation Collection District Areas

Stratification Category	Low	Medium	High
Income			
Median Household Income	< $25,072	>= $25,072 <= $33,365	> $33,365
Housing/Population Density			
Percentage of 1- to 2-unit buildings	> 67 %		
Percentage of buildings with 10 or more units			> 67%
Otherwise		√	

Source: NYC Department of Sanitation, Census 1990.

The MGP recyclable collection districts were parsed into a matrix of seven strata, with the first attribute being median household income and the second being housing density. For each collection district, the frequency distribution of buildings or building inventory breakdown by units was calculated for three categories. Where the percentage of 1- to 2-unit buildings within a district was greater than 67%, the district was considered low density. Where the proportion of buildings with 10 or more units within a district was greater than 67%, the district was classified as high density. Where the low- and high-density thresholds were not met, the density was classified as medium.

[4] A population parameter is a numerical value used as a summary measure for a population of data (e.g., mean, variance, standard deviation).

The seven strata contained a mix of collection districts across the five boroughs that met the stratum definition criteria. The seven stratum used are defined in Table 2-2 and indicated on Figure 2-1.

Table 2-2 Definition of Seven Strata Used in Recycling Composition Study

Stratum Abbreviation	Median Income Group	Housing/Population Density Group
HH	High	High
HM	High	Medium
HL	High	Low
MH	Medium	High
MM	Medium	Medium
LH	Low	High
LM	Low	Medium

It is acknowledged that shifting demographic patterns since the 1990 Census may have influenced the stratum boundaries. To partially address this observation, the study also evaluated an additional measure of variation within each stratum. The pounds of MGP collected per capita were calculated for each district within a stratum using more recent collection district population estimates. This per capita collection rate was calculated by dividing the annual tonnage of MGP collected for each district by the intra-censal population estimate. By examining the per capita MGP collection for each district within each stratum, an additional layer of information could be used to provide greater precision in the selection of representative districts within each stratum for sampling purposes. This procedure is discussed in Section 2.1.5.

2.1.3 Determination of Sample Size

A top-down approach was used to select a sample size, or amount of MGP in tons, that would be targeted for the study. The sample size was chosen by balancing the required sufficient tonnage necessary to ensure reliable population parameter estimates with the costs and constraints of implementing the program. Such balancing is often done in applied survey research because of budget and time limitations. The sorting task was originally scheduled to be performed over a three-week period based on available manpower requirements, sorting speed per worker, and the city's timeframe. These program design factors operated as constraints on the overall sample size.

Since the goals of the study were to classify all MGP tonnage collected into discrete categories, previous studies were examined to obtain information on similar classifications by weight. These studies were useful in estimating a sample size. In particular, the Staten Island Study[5] contained data on the proportion of non-

[5] See Draft for Internal Review, Report on Staten Island Collection District 3 - Waste Composition Analysis - August 11, 1997, p. 5.

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L:\Buffalo\NYC-DOS\Maps\BaseMap.mxd 06/18/02 - GIS

Source: New York City Department of Sanitation, 2002

Figure 2-1

MGP Collection Districts Sampled

Legend

- Collection District
- 1990 Census Tracts

0 1 2 4 6 Miles

0 1 2 4 6 8 10 Kilometers

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recyclable MGP contained within the total MGP recyclables collected. This data was used to estimate the percentage of recyclables within the MGP collection. This ratio was then used as a planning-level estimate to calculate a sample size for an interval estimate of a population proportion, called $\bar{p}$. Table 2-3 illustrates how this proportion was estimated and used as a planning value.

Table 2-3 Data Used to Estimate a Planning Value ($\bar{p}$) for Estimating Sample Size Using an Interval Estimate of a Population Proportion

Targeted Components (MGP)	Recyclables (total pounds)
HDPE	343.30
Deposit PETE	93.53
Non-deposit PETE	103.17
Deposit Aluminum	55.56
Non-deposit Aluminum	31.32
Ferrous	623.40
Deposit Glass	347.73
Non-deposit Glass	1,129.09
Bulk Household Metal	727.03
Total	**3,454.13**
Non-targeted Components	
Non-recyclable MGP	809.00
Total (Targeted + Non-targeted)	4,263.13
Percent Recyclables in Recyclables Collection ($\bar{p}$):	81%

Source: Draft for Internal Review, Report on Staten Island Collection District 3 - Waste Composition Analysis - August 11, 1997, p. 5

The following formula was used to determine how large the sample size should be to obtain an estimate of the population proportion at a specified level of precision. In the following formula, *n* represents an estimate of the sample size for an interval estimate[6] of a population proportion:

$$n = \frac{(z_{\alpha/2})^2 p(1-p)}{E^2}$$

E represents the value of the sampling error that is specified by the user, while $\bar{p}$ represents the proportion, or planning value, used.[7] The confidence level, $z_{\alpha/2}$, is

[6] An estimate of a population parameter that provides an interval believed to contain the value of the parameter.

[7] The sampling error represents the difference between the value of an unbiased point estimator, such as a sample mean, and the value of the population estimator it estimates, such as the population mean.

also specified by the user. The above formula was used to estimate how large a sample (tons of MGP) should be used if we want to estimate the population proportion of interest shown in Table 2-3 with a sampling error of 0.10 or less at a 90% confidence interval. Using E= 0.10 and $Z_{.05/2} = 1.645$, p = 0.81, and n = 41.6 tons.

E & E also estimated the sample size using the formula applied in stratified random sampling to determine a sample size when estimating the population mean. This formula is presented below:

$$n = \frac{\left(\sum_{h=1}^{H} N_h s_h\right)^2}{N^2\left(\frac{B^2}{4}\right) + \sum_{h=1}^{H} N_h s_h^2}$$

In the above formula, B represents the bound on the sampling error. Specifying a bound on the sampling error of 586 tons results in an estimate of n = 41.6 tons. The above formula was used in order to make use of the data assembled on total tonnage of MGP collected in a given year (N), per individual stratum ($_h$), as well as the variance, or standard deviation (s_h), within each stratum.

2.1.4 Allocation of the Total Sample (n) to Individual Stratum

The sample size estimate was assigned to the individual stratum using the Neyman allocation.[8] The formula for this allocation is as follows:

$$n_h = n\left(\frac{N_h s_h}{\sum_{h=1}^{H} N_h s_h}\right)$$

Table 2-4 shows how the total sample size, n, was allocated to the seven strata.

The above allocation formula shows that the number of tons allocated to a stratum (n) increases with the stratum size (N) as well as the standard deviation (s).

2.1.5 Random Selection of Collection Routes and Individual Truck Street Assignments (ITSAs)

As mentioned in Section 2.1.2, E & E examined an additional descriptive dimension of each stratum in determining which collection districts would be selected as representative of that stratum. In theory, districts in each stratum should exhibit similar attributes and there should be little variation between districts. However, given the size and complexity of certain strata, it is recognized that there will still be variation amongst districts within strata. By examining the per capita MGP

[8] The Neyman allocation is an efficient method for allocating the total sample (n) to the various strata.

Table 2-4 Allocation of Sample Size (n) to Strata Using the Neyman Allocation

Strata	(N) Total Tons Collected	Percent of Total Tons	(s) Standard Deviation	(Ns)	(n) Tons
HH	39,452	13%	2,898	114,337,955	8.0
HM	39,406	13%	2,256	88,898,053	6.2
HL	53,451	17%	1,562	83,475,958	5.8
MH	9,880	3%	1,446	14,282,528	1.0
MM	95,940	31%	1,627	156,109,887	10.9
LH	46,181	15%	2,079	95,988,563	6.7
LM	30,139	10%	1,358	40,928,205	2.9
Total:	**314,449**	**100%**		**594,021,149**	**41.6**

collection rate, it was determined that sampling precision could be improved by selecting a few additional districts within certain stratum. This is particularly true for stratum that contained broader demographic information and potential for more variation.

Representative districts were selected for sampling based on the following factors. The largest districts with high concentrations of population and MGP tonnage within the stratum were selected. In addition, natural breaks across districts within a stratum or differences in the MGP collection rate were also examined. Where a given district diverged significantly from the stratum average, this district also was selected for sampling. To ensure geographic representation across the strata and boroughs, district location was also considered.

Table 2-5 shows the selected districts and their respective stratum used in the study. In addition, Table 2-5 represents the target processing schedule that was initially decided upon for the study.

For each stratum, E & E also was provided with a weekly schedule identifying the individual district within the stratum and the number of trucks deployed for collection purposes out of the total trucks deployed on a given day.[9] Each truck corresponded to a given collection route on that particular day. This data also could be used to randomly select routes at the truck deployment level before individual streets along the collection routes were randomly selected. Table 2-5 shows that all days of the week are represented in the study with the exception of Sunday, when there is no MGP collection.

[9] This data was provided by NYCDOS Operations Management via fax on 4/22/2002.

Table 2-5 MGP Recyclables Characterization Study Selected Districts Within Strata and Study Load Delivery Schedule

	Day	Date	Dist 1	Dist 1-tons	Dist 2	Dist 2-tons	Daily Total	Cumulative Total	Strata
1	Monday	29-Apr	BX07	0.8			0.8	0.8	LH
2	Tuesday	30-Apr	BX04	1.1			1.1	1.9	LH
3	Wednesday[a]	1-May	MN12	3.53			1.76	3.7	LH
4	Thursday[b]	2-May					1.76	5.5	LH
5	Friday	3-May	MN03	1.3			1.3	6.8	LH
6	Saturday	4-May	BKN01	2.9			2.9	9.7	LM
7	Monday	6-May	QE12	2.5			2.5	12.2	HM
8	Tuesday	7-May	QE07	2.9			2.9	15.1	HM
9	Wednesday	8-May	QW09	0.8			0.8	15.9	HM
10	Thursday	9-May	SI03	0.9	SI02	2.0	2.9	18.8	HL
11	Friday	10-May	BKS18	3.0			3.0	21.8	HL
12	Saturday	11-May	MN04	1.0			1.0	22.8	MH
13	Monday	13-May	BX12	3.8			3.8	26.6	MM
14	Tuesday	14-May	BKS12	3.5			3.5	30.1	MM
15	Wednesday	15-May	QW01	3.6			3.6	33.7	MM
16	Thursday	16-May	BX08	2.1			2.1	35.8	HH
17	Friday[c]	17-May	MN08	6.0			3.0	38.8	HH
18	Saturday[b]	18-May					3.0	42	

Notes:
[a] Wednesday's delivery of 3.5 tons is also processed on Thursday.
[b] No delivery required on this day.
[c] Friday's delivery of 6 tons is also processed on Saturday.

In addition, E & E was provided with Section Route Sheets from the Department of Sanitation. These sheets showed the Individual Truck Street Assignment (ITSA) numbers, route number, section number, street side, street, and collection route street parameters (from and to). E & E used this data to randomly select a subset of ITSAs from out of the total list of ITSAs. Program drivers were instructed to pick up the study materials from these ITSAs. To ensure that sufficient tonnage was picked up by each driver, alternate ITSAs also were provided to the program supervisors.

Randomly selected ITSA assignments were faxed to study program managers in advance of the scheduled pickups. The sample schedules were then provided to the select drivers on the routes. Appendix A provides a list of the randomly selected ITSAs that were used in the study.[10]

Collection management safeguard procedures were implemented by the New York City Sanitation Department management to ensure that the study was suc-

[10] The cooperation and assistance of Chief SanMarco and District Superintendent Franzese (NYC Dept. of Sanitation) in enabling the random selection of collection routes and ITSAs is gratefully acknowledged.

cessfully implemented.[11] On the day the designated MGP tonnage from the targeted districts was collected, pre-determined collection crews accompanied by an Operations Assistance Unit (OAU) supervisor were deployed. The OAU supervisor was trained to work with the collection crew to ensure that the targeted materials were correctly collected and that the weight of the materials placed into the trucks closely matched the estimated sample tonnage. The OAU supervisor weighed a representative piece of material (i.e., MGP in a plastic bag) and then estimated how many pieces were needed to satisfy the tonnage target. Because the targets were estimated and due to such factors such as weather conditions influencing the district tonnage sample estimates, the OAU supervisor erred on the conservative side by collecting slightly more tonnage than was needed. NYC Department of Sanitation uses trucks with a 25-cubic-yard capacity in their recyclables collection program.

2.1.6 Study Site Selection

The Greenpoint Marine Transfer Station (MTS) was selected because of its availability, size, and geographic location relative to the five boroughs of New York City. The NYCDOS considered this location to be easily accessible, thus ensuring that operational delays would not occur as a result of the delivery of sample loads collected throughout the city.

The study site is located within the borough of Brooklyn, directly south of Newtown Creek, a narrow body of water that separates the borough of Queens from Brooklyn (see Figure 2-2). Vehicular access to the site is facilitated by two major thoroughfares—the Long Island Expressway, which run east to west, and the Brooklyn Queens Expressway, which runs north to south.

The Greenpoint MTS was formerly used as a barge transfer station for municipal solid waste collected by the City of New York. The tipping floor area of the transfer station (approximately 8,000 square feet) is currently vacant. The coarsely paved tipping floor area was used to store samples from each district and stratum and to house the sorting tables and weigh stations for the NYCDOS Recyclable Waste Characterization Study (see Figure 2-3).

[11] We are grateful to Chief Nati (OMD) for ensuring that this aspect of the study was successfully implemented.

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Fig2-2.CDR-6/13/02-GRA

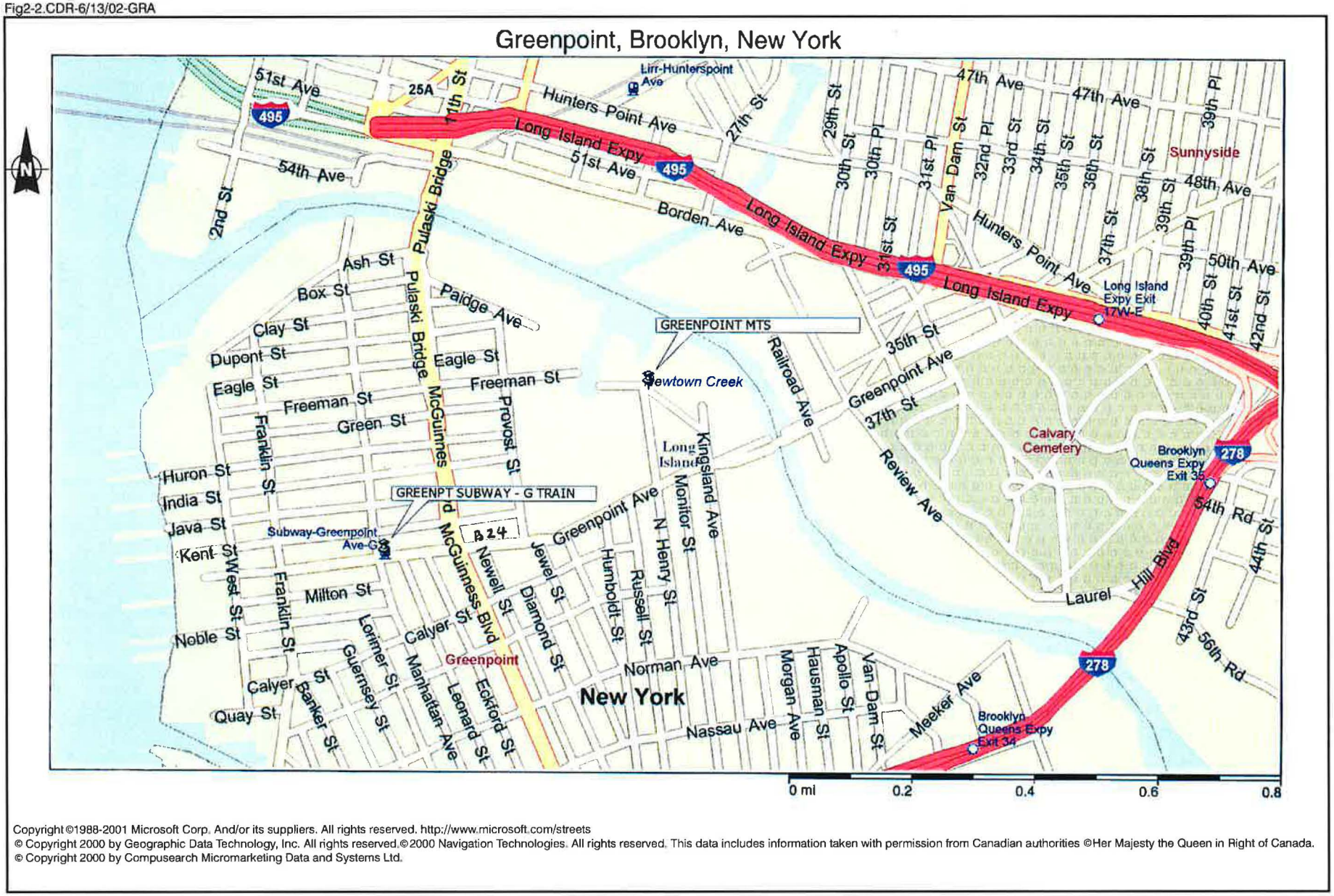
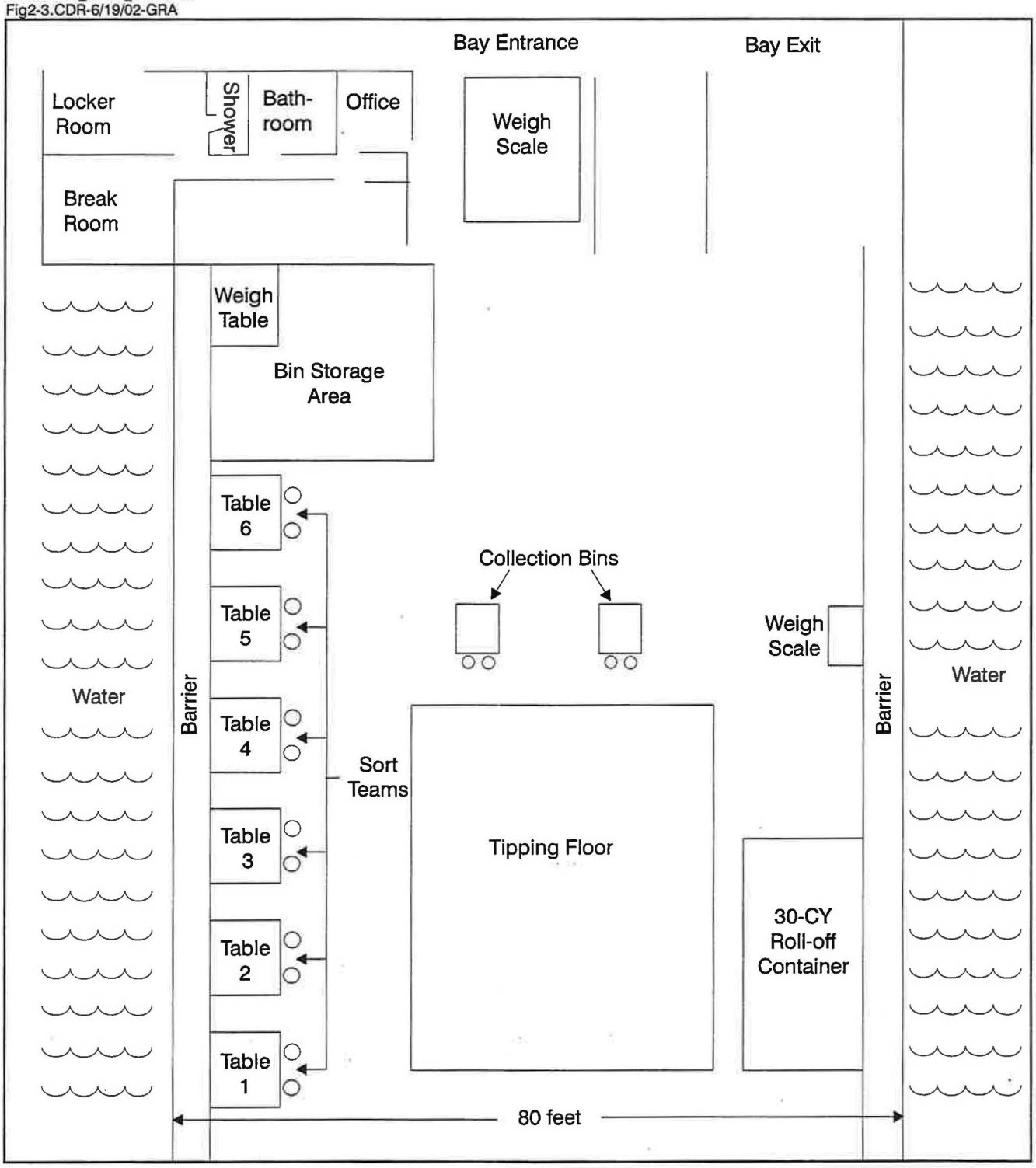


Figure 2-2 LOCATION OF GREENPOINT MARINE TRANSFER STATION, BROOKLYN, NEW YORK

02:000961_UN11_04-B0967
Fig2-3.CDR-6/19/02-GRA



SOURCE: Ecology and Environment, Inc., 2002

SCALE
0 20 40 Feet

Figure 2-3 GREENPOINT MARINE TRANSFER STATION SORTING FACILITY LAYOUT

2.1.7 Health and Safety Protocols

A site-specific health and safety (H & S) plan and an exposure control plan for blood-borne pathogens (see Appendices B and C) were developed by E & E's health and safety professionals to identify the necessary safety precautions to be followed during the study. A Power Point presentation developed by the consultant was used to provide multiple H & S training sessions to the sorters. During the presentations, the physical, chemical, and biological hazards associated with sorting recyclable waste materials were identified and recommended precautionary measures were provided. Upon completion of the H & S training presentation, the workers were given the opportunity to ask questions.

The pictures below show the biohazard receptacle provided by E & E and the eyewash solution, first aid kit, and station. The biohazard receptacle was used on several occasions during the study period to dispose of medical waste.

2.1.8 Sorting Categories

Categories were determined by working with officials from the New York City Department of Sanitation (DOS), obtaining an understanding of the processing issues faced by recycling processors, and considering comments concerning the processing of select materials within the MGP waste stream. As a result, the following 10 categories were selected for this Recycling Characterization Study: (1) Ferrous Metals, (2) Aluminum, (3) PETE plastic bottles, (4) HDPE plastic bottles, (5) Non-targeted Plastics, (6) Aseptic, (7) Glass, (8) Non-targeted Glass, (9) All Other Residues, and (10) Contaminated Targeted Recyclables. These 10 categories were based on similar category groupings from past studies, and it was determined that they would provide an accurate picture of the recyclables MGP stream obtained through the curbside and container pickup program. In addition, the category groupings enabled sorting or processing economies to be realized in balancing a fixed number of manual sorters versus the anticipated projected tonnage. Each of the categories is described in detail below, along with examples of what was typically encountered throughout the study.

Ferrous Metals

This category consists of metal containers or other household items that are made primarily or exclusively of steel, tin-plated steel, or composite steel. Examples

included primarily metal cans and miscellaneous household items, but also items such as dried paint cans, wire clothes hangars, and an occasional car muffler.

Aluminum

The majority of aluminum consisted of aluminum beverage containers. Other sources included pie pans, baking containers, and aluminum foil.

PETE Plastic Bottles

These polyethylene terephthalate (PETE) plastic bottles were identified by the number "1" in the recycling symbol on or near the bottom of the container. Typical examples include soft drink bottles, juice bottles, water bottles, dishwashing liquid squeeze bottles, and some food containers.

Non-targeted Plastics

This category consists of all other numbered plastic recyclables (i.e., nos. 3 through 7), as well as items that cannot be identified as a specific type of plastic. These included the plastic bags in which the recyclables are collected, nos. 3 to 7 plastics, styrofoam, yogurt tubs, plastic caps, cooking oil bottles, children's toys, milk crates, folding chairs, and blinds.

Aseptic

This category consists of milk cartons, juice cartons, drink boxes, soy beverage containers, and instant breakfast product containers.

Glass

Targeted recyclable glass included either intact glass or glass fragments that could be identified as having come from a bottle. The waste handling, compacting, and transferring of recyclables results in many broken bottles. At the individual tables, colored and refundable glass items were at first commingled. To determine the distribution by weight of glass by color across districts, a secondary sort was then performed (see following picture).

Non-targeted Glass

This category includes primarily glass fragments that could not be unidentified. Glassware or items that are intact but are not bottles or jars (e.g., mirrors, plate glass, windshields, and glass cups) also would belong in this category.

Contaminated Targeted Recyclables

This category was added after the first day of sorting. It consisted of targeted recyclables that belonged in one of the other nine categories but were severely contaminated with residue. Examples of items that would fall into this category are glass jars of mayonnaise that are still partly filled or metal cans of soup that are unopened and full. If these items were empty and clean, they would be considered recyclables, but in their existing condition they were too contaminated to be acceptable.

All Other Residues

This category consisted of items that are not considered recyclables under the MGP recycling programs and do not fall into one of the other nine categories.

These items include papers and boxes that are recyclable in the paper and cardboard recycling program run by the City of New York. However, the paper component of New York City's recycling program was not part of this study. Other items that commonly filled the residue containers included a variety of electronic equipment (e.g., VCRs), computer components, and household items such as vacuums. The range of solid waste showing up in this category was very broad.

Additional Categories for Further Analysis

Several items were selected for further analysis based on the New York State Bottle Bill (i.e., refundable bottles) and information from recycling processors as to what type of recyclable segregation is more valuable or more highly desired than others. The categories that were selected for further analysis were Aluminum, PETE Plastics, and Glass. Because the study findings can be extrapolated to the entire MGP waste stream, it would be informative to estimate the revenues from discarded items that are placed out for collection rather than redeemed by the users. The categories that were selected for this additional sorting were aluminum, PETE plastics, and refundable glass.

Aluminum. After weighing the aluminum category as it was sorted at the tables, the sorters were instructed to separate out any New York State refundable cans into a new container. Because of processing constraints concerning the introduction of more detailed categories, the sampled weights gathered from this separation process were tracked only by district and not by individual table.

PETE Plastic Bottles. The No. 1 PETE plastic bottles were handled in the same fashion as aluminum cans. After weighing the PETE plastic bottles at each sorting table, the PETE was set aside and the sorters were instructed to separate out any New York State refundable bottles into a new container. The second set of weights for these material classifications were tracked only by district and not by table because of processing constraints.

Glass. The main glass category was weighed and then went through two additional sorting procedures. First, glass was separated by color into clear, green, or brown glass. After the weights were gathered by color, further separation was performed whereby all of the New York State refundable glass bottles were isolated and weighed separately. All refundable bottles were mixed in color, and both sets of glass data were tracked for each district within a particular stratum.

Additional sorting of micro-categories allowed E & E to determine a citywide revenue estimate and to obtain a better understanding of the potential revenues in the aluminum, plastics, and glass recyclables that are disposed of in the curbside program rather than being redeemed by the user.

In addition, the report contains data on the proportion of glass recyclables (by color) that should be of interest to the recycling community and processors.

3 Study Implementation

3.1 Collection and Delivery of Materials

Based on the randomly selected ITSAs described above, the NYCDOS collected recyclable waste from residents throughout the city. A total of seventeen districts were chosen to represent the citywide collection program in accordance with the stratified random sampling technique. The quantity (tonnage) of recyclable waste collected from each district was statistically derived as described above in Section 2.

Beginning on April 29, 2002, the NYCDOS dispatched compact trucks to collect the targeted tonnage of recyclable waste originating from the selected districts. Once the required tonnage had been obtained, the loaded trucks were sent to the Greenpoint MTS facility. The weight of each district sample, stratum, origin of waste, weather, and other pertinent information was recorded on database form sheets (see Appendix D). The recyclable waste tracking forms served as a chain-of-custody sheet for each district sample. In addition, a NYCDOS Operation Assistant Supervisor was present during the waste collection and delivery period to ensure that the sample was not compromised and that it was properly deposited on the tipping floor. Custody sheets were then transferred to the consultant during the beginning of each sorting shift, which began at 8:00 A.M.

As indicated by the following sort flow diagram, each district load was sorted into one of the designated sort categories. Stratum loads were sorted one district at a time. The sorting tables were cleared in accordance with the sorting process described in Section 2 and the flow diagram when the desired tonnage for each stratum had been collected.

SORT PROCESS FLOW DIAGRAM

1. NYCDOS collects recyclables from randomly selected ITSAs in each collection district

2. NYCDOS truck enters Greenpoint facility, stops on the scale to be weighed, and then proceeds toward the tipping floor to unload collected recyclable waste. Before going to the tipping floor area, data recorders stationed near the scale house record attribute information (i.e., driver's name, truck number, type of truck, container size, route number, collection route reference address, collection district, gross weight) for each truck. NYCDOS trucks return to scale to have their tare weights recorded and then exit the facility.

3. Sort team personnel (two people) proceed to the tipping floor area and begin to spread waste on tipping floor using a rake and shovel provided by NYCDOS. Sort team collects recyclables from the tipping floor using a shovel and places the recyclables into a pre-weighed waste collection container. This container is then taken to the weigh scale area next to the tipping floor to be weighed and recorded by data collectors.

4. Sort team personnel stationed at table area (two people per table) receive the collection containers mentioned in step 3 and begin to sort recyclable waste from container. As the quantity of waste material diminishes, the sort team spreads the waste onto the table. Each table is lined with bins for each of the 10 sort categories. The sort team is trained to distinguish each sort category with the aid of handouts used in prior training.

5. The sort team supervisor provides quality control to ensure that materials stored in each sort category bin are properly segregated and the materials are securely brought to the weigh scale area located next to the offices of the Greenpoint MTS. Data recorders stationed near the office record the weights of each pre-weighed container (sorted recyclable waste). Whenever necessary, the sort team supervisors provide assistance in making a sort category determination.

6. Steps 3, 4, and 5 are repeated until desired sample size is reached

7. The data recorder takes custody of certain sort category containers (glass, PET plastics, and aluminum) for further analysis, and the remainder is dumped into the 30-CY roll-off container for disposal.

8. Glass, PET plastics, and aluminum are saved after their initial weighing coming off the sort tables. Materials in these sort categories then undergo a secondary sort into what are referred to as 'micro categories.' These micro categories involve the sorters separating and weighing the glass bin contents by colors - green, amber, and clear. Then all glass, plastics and aluminum are sorted and weighed according to what is refundable in New York State.

3.1.1 Extension of Sorting Period

The collection and delivery of recyclable waste materials ended on May 22, 2002. It should be noted that original sampling days of the week were used even on the few instances where the original targeted sample loads dropped off at the MTS facility were shy of sample targets. The shortfall amounts were collected on the same day for the subsequent week. This adjustment and manpower turnover were the principal reasons why the study sorting exercise component extended beyond the planned for three-week period.

3.2 On-Site Staffing

Staffing consisted of rotating project and on-site managers and coordinators from E & E, sorters who were hired from a pool of temporary workers from Urbitran Associates, Inc., and workers obtained through a temporary-help agency.

To meet the target schedule of sorting 42 tons of materials within 3 weeks (an average of 14 tons/week, or 2.3 tons/day based on a 6-day week), it was estimated that a minimum of 15 to 18 people would be required to sort and weigh the materials for 8 to 10 hours daily. For several reasons, it was difficult to maintain a steady, sufficient pool of workers. First, during the Health and Safety training, some people were intimidated by the need for vaccinations against tetanus and hepatitis. Second, within the first week, an exceptionally "bad load" was received that had been drenched in paint and which contained syringes, hypodermic needles, and other medical wastes; this drove half the sorters away for several days. Finally, while the concept of recycling tends to have positive connotations, some people simply found the job of sorting through other peoples' garbage less savory than the job descriptions presented during the hiring process, especially at the relatively low wages that were offered. As a result, the number of sorters ranged from 5 to 12 and the sorting period had to be extended by 10 days.

3.3 Training: Identification of MGP Material Categories

On the first day of the Recycling Waste Characterization Study, a presentation was made to the sorters outlining the types of recyclables they would most likely encounter and how to properly identify and sort these items. It was also necessary to provide on-site training to additional sorters who arrived at various times throughout the study. A Power Point slide presentation was presented that described the sorting process and provided a description of the items belonging in each of the 10 categories. In the presentation, it was assumed that the best study results would be obtained by providing a generic picture and description of the items in each category, and by giving a variety of examples of what may be the sources of these items.

E & E also provided pamphlets and materials authored by the New York City Recycling Education Program to educate the sorters concerning the types of materials that would most likely be encountered. These materials were supplemented by additional information concerning the properties of various targeted and non-

targeted items. For example, for PETE No. 1 plastics, the presentation contained a generic picture of a PETE water bottle, indicated how to identify the PETE No. 1 plastics by a physical description and finding the number "1" within the recycling symbol, and gave examples of items composed of PETE No. 1 plastics, such as soft drink bottles, juice bottles, and water bottles.

The final points stressed in the training were "Goals and Items to Remember." These included outlining the importance of organization, accuracy of item identification and weights, and tracking of data. It was made clear that questions were welcomed, that there is a learning curve associated with the sorting process, and that it was necessary to remedy any problems early in the process.

The presentation provided an introduction for the sorters, after which they were taken to the tables where the process of collection and itemization was reviewed in a more hands-on fashion. The field instruction clarified a majority of the questions, and very few new issues arose during the study. Most of those that did arise related to unique items such as electronics, large plastics/toys, and contaminated items.

3.4 Health and Safety Training

At the start of the recyclable waste characterization study, E & E held a one-hour H & S training session for the prospective workers at the NYCDOS Central Repair Service (CRS) facility in Woodside, New York. All physical, chemical, and biological hazards that might occur during the course of the recyclable waste characterization study were identified and discussed in detail. The workers were also informed of the precautionary measures that would be implemented to minimize any risks of accident or harm from the exercise.

These mitigative measures included the use of personal protection equipment and clothing, engineering controls (i.e., safety fence), safe work practices, good housekeeping, and immunization for Hepatitis A and B and Tetanus/Diphtheria. Two physician's assistants from the health clinic administered the immunization vaccines. The NYCDOS kept a log of all training session attendees and the individuals that have been vaccinated for Hepatitis A and B and Tetanus/Diphtheria. The picture below shows a prospective worker/sorter being immunized.

3.5 Physical Setting and Set-up (day-to-day procedures)

The Greenpoint MTS facility is located in an industrial section of Brooklyn atop a hill facing Newtown Creek. The building has high ceilings and is fabricated with metal siding material on all sides except the south side. The south entrance of the Greenpoint MTS has a large bay door opening for trucks of all sizes to enter the facility. An electronic weigh scale is embedded on the tipping floor entrance to register vehicle weights as they enter the facility.

The interior of the facility is a large, 8,000-square-foot open-space area paved with asphalt. A water pit that provides barge access to the creek is located on the east and west sides of the facility, approximately 20 feet below the tipping floor, where trucks used to dump down directly onto barges when the facility was in operation. The floor layout for the recyclable waste characterization study included six sorting tables, a 2,400-square-foot tipping floor area, one 30-cubic-yard (CY) roll-off storage container, and two weigh stations (see Figure 2-3). Safety fencing was erected along the east and west sides of the facility to restrict access to the water pits. Each district sample load was identified with clear markings, placed on a 3-mil plastic sheet, and covered with netting material. Diligent care was exercised to avoid commingling of waste loads across districts.

Sorting operations varied depending on the number of workers (sorters) available. Four to six sorting tables were used throughout the study period. One weigh station was used to weigh the mixed recyclable waste stored on the tipping floor, while the other was used to measure the weights of the sorted recyclable and non-recyclable wastes. Differently colored bins and containers were used to facilitate the tracking of each load.

The sorting process entailed collecting recyclable waste into a green, 45-gallon container, recording its weight, and sending the loaded container to the sorting tables for division into subsample material loads.

At the sorting tables, the workers sorted through each container and placed the recyclable waste into the appropriate category.

Sort category items that were stored in rectangular blue bins were weighed at weigh station No. 2 whenever the bins were full. The tare weight of these sample bins was 3.44 pounds. These blue bins were used for all categories except HDPE, which was weighed in 5.85-pound bins. Larger bins were used for HDPE in order to speed up the sorting and weighing process due to the bulk of these items.

The sorting and categorizing process was repeated until the desired sample tonnage was reached. Afterwards, the recyclable waste remaining at each sorting table was assembled for proper weighing. Secondary and tertiary sort items were also sorted through to completion. Secondary and tertiary sorts were conducted to further segregate and isolate glass by color and refundable glass, aluminum, and plastic bottles.

3.6 Coordination with NYCDOS Staff and Submission of Progress Reports by Completed District

E & E frequently submitted deliverables to the NYCDOS staff after the raw data for a given collection district was entered into the database, proofread, and reviewed by the data analyst. The raw data was entered into a Microsoft Access form/table from hard copy forms. These forms contained the individual weighings for a given subload category that was processed by one of the tables used in the sorting exercise.

The following screen capture shows the table structure of the data that was regularly sent to Ms. Joanann Chimes, Deputy Director of Planning and Budget - OMD. E & E also faxed copies of the hard copy forms containing the original recorded data for each material. In addition, E & E calculated the net weight in a separate field. The net weight was calculated by netting out the tare weight for each bin from a recorded gross weight record. By summing the net weight for all materials at the district level, the target sample size could be viewed. The table was designed to facilitate any further data summaries and manipulations that the NYCDOS may perform at a district level.

The screen capture shows the fields that were submitted to the NYCDOS at regular intervals throughout the engagement using district QW01 as an example. This regular cooperation enabled the NYCDOS to be engaged and informed on a regular basis and to keep track of recorded weights for each district for each material. The NYCDOS also had the ability to keep track of sampled targets for each district.

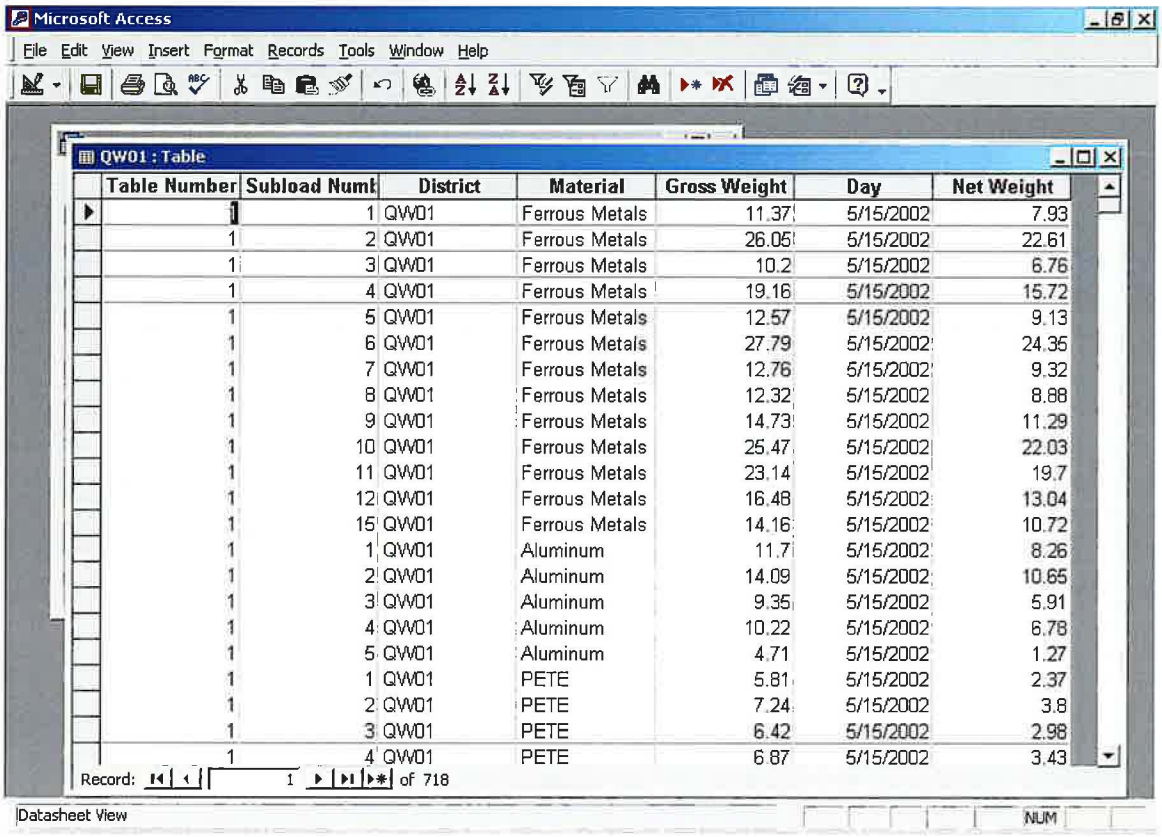


Table Number	Subload Numb	District	Material	Gross Weight	Day	Net Weight
1	1	QW01	Ferrous Metals	11.37	5/15/2002	7.93
1	2	QW01	Ferrous Metals	26.05	5/15/2002	22.61
1	3	QW01	Ferrous Metals	10.2	5/15/2002	6.76
1	4	QW01	Ferrous Metals	19.16	5/15/2002	15.72
1	5	QW01	Ferrous Metals	12.57	5/15/2002	9.13
1	6	QW01	Ferrous Metals	27.79	5/15/2002	24.35
1	7	QW01	Ferrous Metals	12.76	5/15/2002	9.32
1	8	QW01	Ferrous Metals	12.32	5/15/2002	8.88
1	9	QW01	Ferrous Metals	14.73	5/15/2002	11.29
1	10	QW01	Ferrous Metals	25.47	5/15/2002	22.03
1	11	QW01	Ferrous Metals	23.14	5/15/2002	19.7
1	12	QW01	Ferrous Metals	16.48	5/15/2002	13.04
1	15	QW01	Ferrous Metals	14.16	5/15/2002	10.72
1	1	QW01	Aluminum	11.7	5/15/2002	8.26
1	2	QW01	Aluminum	14.09	5/15/2002	10.65
1	3	QW01	Aluminum	9.35	5/15/2002	5.91
1	4	QW01	Aluminum	10.22	5/15/2002	6.78
1	5	QW01	Aluminum	4.71	5/15/2002	1.27
1	1	QW01	PETE	5.81	5/15/2002	2.37
1	2	QW01	PETE	7.24	5/15/2002	3.8
1	3	QW01	PETE	6.42	5/15/2002	2.98
1	4	QW01	PETE	6.87	5/15/2002	3.43

Figure 3-1 Database Screen Capture 1

Field No. 1 shows the table number that was used by the individual sorters to process the materials into their respective categories before they were weighed. Field No. 2, "sub load number," represents a given weighing that took place over the course of the day. These weighings were tracked in sequential order for a given material in the database. This order corresponded to the data entry order on the hard copy forms and thus enabled manual quality control and quality assurance to be conducted efficiently. Field No. 3 shows the collection district code name. Field No. 4 shows the material category grouping, and Field No. 5 shows the entry for the gross weight that was entered into the database from the hard copy forms.

The hard copy forms were kept at each weigh station on the tipping floor and were safeguarded from wind and moisture in a padded, waterproof loose-leaf binder. When the forms for a sub-sample portion of a load were completely filled out, the forms were delivered to E & E's database systems technician, who was stationed in the common room area of the MTS facility. This technician was equipped with a laptop computer and a Microsoft Access form on which to record the data. The hard copy forms were also copied and faxed to E & E's headquarters on a daily basis for backup safety and archiving purposes. Field No. 6 shows the date of the target sample and represents the date that the MGP materials were collected by the designated driver for study purposes. Field No. 7 shows the net weight, or weight of the materials less the tare weight of the individual bins. As mentioned above,

the bin weight was 3.44 pounds for each material category except HDPE, which was put into bins weighing 5.85 pounds. Due to the bulkiness of HDPE materials, the larger bin was used to reduce the number of weighings needed to process the target sample tonnage.

3.7 Observations and Adjustments Made During the Study

The staffing level varied daily. To maintain the workforce at a reasonable level, the NYCDOS trained new workers on an as-needed basis. Despite the constant flux of new workers, the rapport between the supervisors and workers, as well as among the sorters themselves, was generally favorable. Communication amongst the workers and supervisors was maintained at a high level throughout the study period. Positive interaction facilitated daily operations, especially when changes were instituted or whenever emphasis was placed on specific instructions relating to the sorting process.

Table 3-1 provides some information on the average number of sorters on-site throughout the course of the study.

Table 3-1 Summary of MGP Sorter Manpower at MTS Facility For Monday, April 29, 2002 through Thursday May 30, 2002

Time Period	Number of sorters						Weekly Average
	M	T	W	Th	F	S	
Week No. 1	8	5	8.5	11	7.5	3.25	7.21
Week No. 2	8	10.5	10.5	11	13	6	9.83
Week No. 3	14	6	7	8	9	8	8.67
Week No. 4	8	10.5	18	13.5	13	11	12.33
Week No. 5	Holiday	12	14.5	11			12.50
Daily Average:	9.5	8.8	11.7	10.9	10.6	7.1	

Notes: Fractional number of sorters refers to sorters that did not work a full 8 or 10 hour shift.

Table 3-1 shows that sorter availability tapered off on the weekends. In addition, the problems associated with some of the initial loads contributed to fewer workers on average being mobilized at the outset of the study. The qualitative waste characteristics of the loads at the early stages of the study are documented elsewhere in the report. Some of these loads contained medical waste and paint saturated materials.

Based on quality control observations, NYCDOS made the following adjustments after the first couple days of sorting:

- The sorters were given specific instructions to pay close attention to the distinction between targeted recyclable glass and non-targeted glass. Sort category determination of the broken glass fragments (shards) present in the samples was emphasized. The sorters were instructed to look for any visual evidence that would indicate the origin of the glass fragments. Broken glass fragments from beverage bottles or perishable food jars/containers were con-

sidered targeted recyclable glass whenever the neck, labeling, or base molding of a bottle and/or jar was recognized. The use of this origin-recognition threshold to make a sort category determination on the broken glass fragments clarified and facilitated sorting operations. In cases where the origin of the glass fragments were inconclusive, the sorters were instructed to sort them as non-targeted glass.

- The sorters were given specific instructions on what constitutes an "all other residue" sort determination. Apart from the obvious non-recyclable waste (e.g., paper products, fabric cloth, putrescible waste materials), household items that consisted of some metallic and/or plastic material was prevalent throughout the district samples. The sorters were instructed to sort any of these household items (e.g., toaster oven, microwave, videocassette recorder, stereo, radio, etc.) as "all other residue." The electrical components inside these items were the main impetus for that sort category determination. In cases involving a mixture of metallic and plastic material, the sorters were also instructed to sort these items as "all other residue." The rationale for this sort determination is based on the recycling vendors' needs. The presence of these materials in their recycled product would introduce contamination issues, resulting in increased cost for isolating the targeted recyclable material. Finally, sample loads that were laced with paint or any other opaque/gooey material also were considered "all other residue."

- The sorters were reminded to remove the caps from the recyclable bottles and jars because the caps should be sorted differently. For example, the plastic cap from a 2-liter plastic soda bottle is a non-targeted plastic, whereas the rest of the bottle is PETE plastic.

- The sorters were instructed to create a new sort category for "mixed glass shards" during the secondary color sorting process because it would have been inefficient to segregate each individual glass fragment.

For the most part, quality control observations from the sorting tables were satisfactory. Team members from each of the sorting tables (up to six) adhered to the instructions provided on the identification of MGP material categories.

3.8 Weather Conditions

The weather conditions during the recyclable waste characterization study period were generally fair. The NYCDOS encountered several rainy days; however, the temperature remained at a moderate level for the most part. The implications from these observations are that the sample loads were not tainted by excessive amounts of water that would skew the weights. In addition, the moderate temperatures limited the presence of odors and vectors; insects, flies, maggots, and rodents from the waste loads and tipping floor. This enabled the sorting process to continue with limited interruptions and difficulties.

3.9 Qualitative Observations by District/Strata

As one would expect from a random sampling of the city's recyclable waste stream, the composition of the recyclable waste stream varied among the 17 districts that were sampled as part of the study. It should be noted that the observations below pertain to MGPs delivered and visible on the tipping floor for a given day. Because of manpower shortages on some earlier days of the study, some loads had to be rescheduled for the subsequent week. This decision was made to avoid throughput problems and the risk of commingling waste from various districts that would have compromised the findings of the study. However, the same ITSA and day was used for this follow-up collection in a subsequent week. In addition, during the initial stages of the study, some of the truck estimates conducted at the collection/street level were short of the target sample. Consequently, some districts were required to make up this tonnage "shortfall" the following week. These are the principal reasons the study extended slightly beyond its projected three-week duration.

The following stratum load observations are noted at the district level and associated stratum:

1) Monday, April 29th – BX07-LH
   Typical load; however, one medical syringe was found.

2) Tuesday, April 30th – BX04-LH
   Typical load; however, one medical syringe was found.

3) Wednesday, May 1st – MN12-LH
   The load was laced with white paint. Numerous beer bottles and unrecognizable glass shards were present in the load; therefore, glass fragments that were laced with paint were sorted as "all other residue." In addition, 46 medical syringes and four enteral nutrition feeding tubes were discovered. Only one medical syringe had a sharp needle attached to it. A detective from New York City's Environmental Police Hazardous Materials Unit was summoned to the site to observe the medical waste findings. The detective took custody of the medical waste sharps container. Furthermore, the sorters informed the consultant that the load contained some unconfirmed quantity of mouse droppings. A slight odor was detected.

4) Friday, May 3rd – MN03-LH
   A large number of beer bottles were present in the load. Some food waste also was observed.

5) Saturday, May 4th – BKN01-LM
   Some food waste was present in the load.

6) Tuesday, May 7th – QE07-HM
   Typical load; load was relatively clean.

7) Wednesday, May 8th – QW09-HM
Typical load; load was relatively clean.

8) Thursday, May 9th and 16th – SI03-HL
The first delivery load was relatively clean. The outer surface of the sample pile was fluffy. The second delivery load came in because the first delivery did not meet the targeted tonnage. Medical syringes with sharp needles and enteral nutrition feeding tubes were found in the load. A large amount of free water was observed being emptied onto the tipping floor while the dual bin packer truck from the Staten Island collection route unloaded its contents.

9) Thursday, May 9th and 16th – SI02-HL
The first delivery load was relatively clean. The outer surface of the sample pile was fluffy. The second delivery came in because the first delivery did not meet the targeted tonnage. Medical syringes with sharp needles and enteral nutrition feeding tubes were found in the load.

10) Friday, May 10th and 17th – BKS18-HL
Some bulk items were found in the load. In addition, some medical syringes with sharp needles were found in the load.

11) Saturday, May 11th – MN04-MH
Numerous intact wine and liquor bottles were present in the load. Some beer bottles also were present. A large quantity of crushed glass was found in the center of the pile. The load was relatively clean.

12) Monday, May 13th – BX12-MM
Numerous bulk items were found in the load. Many of the bulk items from sample pile were removed and discarded into the 30-CY roll-off container.

13) Thursday, May 16th – BX08-HH
Some bulk items were found in the load.

14) Friday, May 17th – MN08-HH
The outer surface of the sample pile was fluffy. Numerous wine bottles and other glass containers were present in the load. The center of the pile had a large amount of food waste and crushed glass. In addition, medical syringes with sharp needles were found in the load. A strong odor emanated from the center of the pile.

15) Monday, May 20th – QE12-HM
Some bulk items were present in the load. Medical syringes with sharp needles were discovered in the load.

16) Tuesday, May 21st – BKS12-MM
Medical syringes with sharp needles and enteral nutrition feeding tubes were found in the load. A large quantity of bulk items and food waste were present in the load. A strong odor emanated from the pile. The center of the pile had a lot of glass shards.

17) Wednesday, May 22nd – QW01-MM
The load was relatively clean. Some bulk items were present. A moderate odor was detected in the center of the pile. Maggots were found in the load.

The above observations show that medical waste was found in nine out of the 17 districts sampled. Six out of the nine districts were within the high income strata. These qualitative observation underscore the need for education and enforcement in these areas.

4 Recyclable Characterization Results and Analysis

This section summarizes the data that were recorded for each district and stratum. As shown on Table 4-1, the sampling and sorting analysis was successful in that the actual tonnage sampled slightly exceeded the target tonnages across strata. In general, the larger the sample size, the more confident we can be in the accuracy of the results and the conclusions that we draw concerning the underlying population parameters. These parameters describe the MGP waste composition measures of central tendency and dispersion (means, standard deviation, etc.) across material categories.

4.1 Summary of Samples Collected and Tonnages Processed

Table 4-1 Sort Samples Obtained by Residential Strata

Strata Number	Strata Code	Strata Definition	Number of Samples	Target Sample (tons)	Actual Sample (tons)
1	LM	Low Income/Medium Density	548	2.9	3.0
2	LH	Low Income/High Density	1,244	6.7	6.8
3	MM	Medium Income/Medium Density	2,049	10.9	11.1
4	MH	Medium Income/High Density	217	1.0	1.1
5	HL	High Income/Low Density	1,539	5.8	6.0
6	HM	High Income/Medium Density	1,299	6.2	6.6
7	HH	High Income/High Density	1,549	8.0	8.3
		Total	**8,445**	**41.6**	**43.0**

In the above table, a sample (or more precisely, a subsample category load) is defined as the amount (in pounds) of MGP materials contained within one 3.44-pound, blue recyclable bin for all categories except HDPE. For HDPE, the bin tare weight was 5.85 lbs. Table 4-1 shows that a total of 8,445 subsamples were collected and processed during the course of the study.

Table 4-2 displays a count, or tally, of the sort samples by district as well as the pounds and tonnages sampled per district within the stratum. A total of 85,977 pounds, or approximately 43 tons, of MGP materials was sorted and processed during the study.

Table 4-2 Sort Samples Obtained by Residential Sampling by Stratum and District

No.	Strata Code	Collection District	Number of Samples	Sampled Pounds	Sampled Tons
1	LM	BKN01	548	6,064.7	3.0
2	LH	BX07	195	1,594.3	0.8
3	LH	BX04	209	2,208.4	1.1
4	LH	MN12	545	7,091.2	3.5
5	LH	MN03	295	2,789.4	1.4
6	MM	BX12	705	7,805.5	3.9
7	MM	BKS12	626	7,147.6	3.6
8	MM	QW01	718	7,217.9	3.6
9	MH	MN04	217	2,178.3	1.1
10	HL	SI02	550	4,077.6	2.0
11	HL	SIO3	274	1,837.7	0.9
12	HL	BKS18	715	6,169.1	3.1
13	HM	QE12	488	5,378.8	2.7
14	HM	QE07	629	5,993.2	3.0
15	HM	QW09	182	1,849.9	0.9
16	HH	BX08	401	4,242.9	2.1
17	HH	MN08	1,148	12,330.2	6.2
	Total		**8,445**	**85,977**	**43.0**

4.2 Summary of MGP Characterization Results

Table 4-3 shows the total tonnages sampled and processed by material category. The materials are divided into targeted and non-targeted components. Targeted components are considered recyclable materials.

Table 4-3 shows that targeted components represent 58.7%, by weight, of the total MGP collected citywide, while non-targeted components represent 41.3%, by weight, of this waste stream. The heaviest categories of targeted components are Glass and Ferrous Metals. The heaviest categories of non-targeted components are All Other/Residues and Non-targeted Plastics.

Table 4-3 Summary of Results by Material Category (sum of all strata)

Material Category	Total MGP Sorted (pounds)	%	Total MGP Sorted (tons)
Targeted Components			
Aluminum	1,917.5	2.2	0.96
Aseptic	1,601.5	1.9	0.80
Ferrous Metals (HH Metals)	13,839.2	16.1	6.92
Glass	22,071.1	25.7	11.04
HDPE	6,570.0	7.6	3.29
PETE	4,477.5	5.2	2.24
Subtotal	**50,476.8**	**58.7**	**25.24**
Non-targeted Components			
Contaminated Targeted Recyclables	2,732.0	3.2	1.37
Non-targeted Glass	5,813.3	6.8	2.91
Non-targeted Plastics	8,380.0	9.7	4.19
All Other/Residues	18,574.9	21.6	9.29
Subtotal	**35,500.1**	**41.3**	**17.75**
Total	**85,977**	**100.0**	**43.0**

Table 4-4 presents the results of the MGP recyclables composition by percent of total weight. Percent of total weight was calculated for each district's daily total tonnage sampled. Table 4-4 shows the calculated confidence intervals that were constructed around the estimated population parameters (i.e., statistical mean fraction for each material category). The confidence interval brackets the value of the population parameter.

The parameter in this case is the mean fraction of each material by weight, on average, for the city as a whole. Since the population standard deviation is unknown, the sample standard deviation, s, is used to estimate this population parameter, and the appropriate confidence interval is based on the probability distribution known as the *t* distribution.[13] The following formula was used to calculate the confidence interval.

$$\bar{x} \pm t_{\alpha/2} \frac{s}{\sqrt{n}}$$

[13] A *t* distribution is a family of probability distributions that can be used to develop interval estimates of a population mean whenever the population standard deviation is unknown and the population has a normal or near-normal probability distribution.

In the above formula, s is the sample standard deviation, and $t_{\alpha/2}$ is the t value corresponding to a two-tailed 95% confidence level coefficient test.[13] In this calculation, n is the total number of days sampled, 27. The student t statistic used was 2.056, corresponding to a two-tailed 95% confidence level test.

Table 4-4 Summary Table of Characterization Statistics in Percent Across all Strata

	Statistical Mean	Variance	Standard Deviation	Standard Error	Lower Confidence Interval	Upper Confidence Interval
Targeted Components						
Aluminum	2.2	0.007	0.83	0.16	1.9	2.6
Aseptic	1.9	0.014	1.17	0.23	1.4	2.3
Ferrous Metals (HH Metals)	16.1	0.304	5.51	1.06	13.9	18.3
Glass	25.7	1.211	11.01	2.12	21.3	30.0
HDPE	7.6	0.023	1.52	0.29	7.0	8.2
PETE	5.2	0.018	1.36	0.26	4.7	5.7
Subtotal	**58.7**					
Non-targeted Components						
Contaminated Targeted Recyclables	3.2	0.019	1.39	0.27	2.6	3.7
Non-targeted Glass	6.8	0.064	2.52	0.49	5.8	7.8
Non-targeted Plastics	9.7	0.058	2.41	0.46	8.8	10.7
All Other Residues	21.6	0.974	9.87	1.90	17.7	25.5
Subtotal	**41.3**					
Total	**100.0**					

In Table 4-4, the lower and upper confidence intervals bracket, or bound, the range within which we would expect future samples of data drawn from stratified random samples across the city to fall. This expectation assumes that similar samples would be drawn and processed in a like manner and that other factors influencing weight (e.g., the weather) also would be similar. For example, in 95 out of 100 trials, or samples, of MGP waste, we would expect the mean fraction of aluminum vis a vis the entire MGP stream to be between 1.9% and 2.6% of the total weight sampled.

In interpreting Table 4-4 it should be noted that the data represents a citywide average. For districts and stratum within the city, these fractions will vary, as the following section illustrates.

Table 4-5 shows the composition of MGP materials, in percent, across all sampled districts within strata. The standard deviation measure in Table 4-4 showed that for the targeted program components, the greatest variation across the 17 districts occurred within the Glass and Ferrous Metals categories. For the non-targeted

[13] The confidence level is the confidence associated with an interval estimate. If the interval estimation procedure provides intervals such that 95% of the intervals formed using the procedure will include the population parameter, the interval estimate is said to be constructed at the 95% confidence level.

components, the greatest variation by weight occurred within the All Other Residual category. Appendix E presents the data that was used to construct the ratios in Table 4-5.

Appendix F presents the underlying data used to perform the individual calculations at the district level, including the individual confidence intervals for each material category per district. Appendix F also presents the tally counts, by table, for each sample that was recorded and weighed. These counts were used to construct confidence intervals around statistical means calculated across the individual sorting tables.

4.3 Comparisons of Waste Characterization Statistics by District and Strata Demographics

Combining the waste composition statistics with the Census data on household income and housing density allowed certain patterns to be observed across the various districts. These patterns are important in obtaining a better understanding of recycling behavior and the propensity to recycle amongst residents using the available layers of demographic information, income, and housing density.

Figure 4-1 presents a scatter plot of the proportion of non-targeted program components out of the total components (non-targeted plus targeted) versus income.

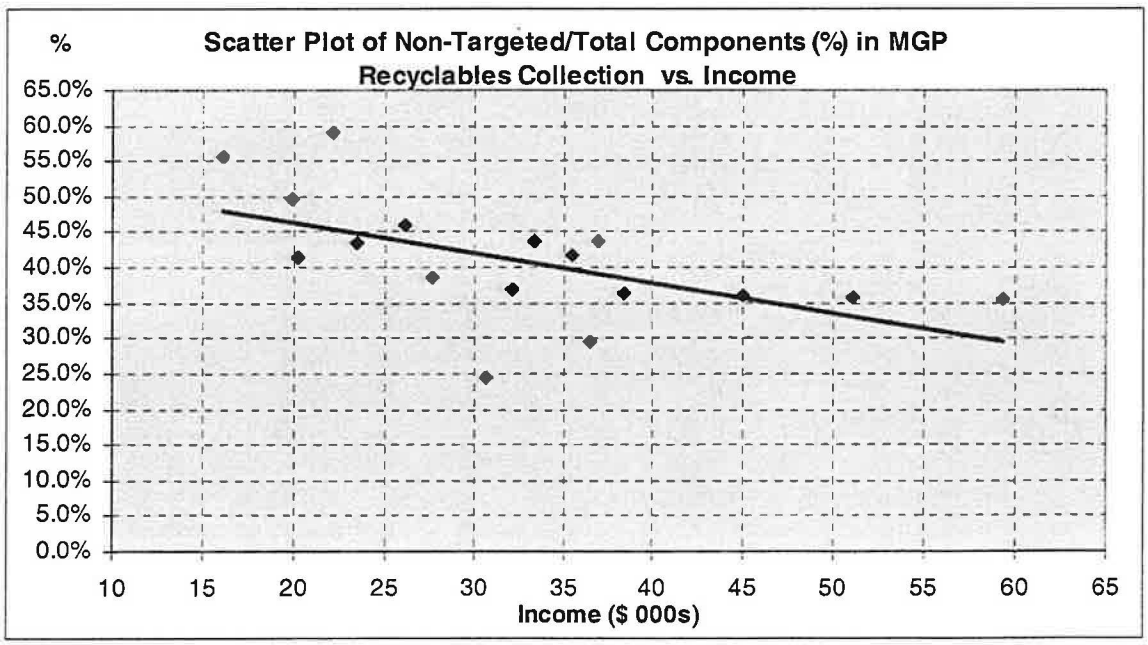


Figure 4-1

Table 4-5 MGP Recyclables Stream by Characterization: Material Categories as a Percent of Total MGP Net Weight Processed Per District

Material	1 LH BX07	2 LH BX04	3 LH MN12	4 LH ME03	5 LM BKN01	6 HM QE12	7 HM QE07	8 HM QW09	9 HL SIO3	10 HL SIO2	11 HL BKS18	12 MH MN04	13 MM BX12	14 MM BKS12	15 MM QW01	16 HH BX08	17 HH MN08	Statistical Mean
Aluminum	1.6	0.8	1.0	2.2	1.7	2.3	3.3	2.5	2.8	2.9	3.4	1.5	2.0	3.6	2.4	2.0	1.5	2.2
Aseptic	0.8	0.4	0.6	5.5	1.4	1.3	2.1	1.5	1.3	1.0	2.5	2.0	1.5	1.7	3.1	2.5	1.9	1.9
Contaminated Targeted Recyclables	4.5	4.3	4.9	2.9	2.2	3.9	2.9	1.9	5.7	6.1	4.1	3.9	2.4	2.5	2.9	1.3	2.1	3.2
Ferrous Metals (HH Metals)	16.9	16.5	16.4	15.4	5.4	19.2	18.5	28.1	14.6	13.6	22.0	9.3	24.1	17.7	18.5	12.3	10.1	16.1
Glass	25.4	13.0	9.8	25.3	28.7	19.8	20.0	13.3	28.5	29.9	22.2	52.6	21.5	18.4	24.2	41.4	40.3	25.7
HDPE	8.0	10.1	10.3	5.8	8.8	7.4	7.1	8.1	8.5	9.2	7.6	4.8	8.2	7.5	8.2	6.6	5.3	7.6
Non-targeted Glass	3.4	6.1	1.9	3.8	9.3	7.7	6.1	7.2	7.1	3.5	3.1	5.4	6.4	7.3	6.6	7.7	12.2	6.8
Non-targeted Plastics	9.4	13.1	6.1	7.0	4.0	11.1	8.8	8.8	11.0	9.9	11.0	7.5	12.3	12.3	11.5	9.6	10.2	9.7
All Other Residues	26.1	32.1	46.1	27.8	34.2	21.0	26.0	23.8	11.9	16.5	18.1	7.5	15.9	23.8	17.5	10.9	11.1	21.6
PETE	3.9	3.8	2.9	4.3	4.3	6.2	5.1	4.8	8.6	7.4	6.0	5.6	5.6	5.1	5.1	5.8	5.3	5.2
Total:	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Total Residue Ratio = non-targeted components/ targeted + non-targeted components	**43.4**	**55.5**	**58.9**	**41.5**	**49.7**	**43.7**	**43.8**	**41.7**	**35.8**	**36.1**	**36.3**	**24.3**	**37.0**	**45.9**	**38.6**	**29.5**	**35.6**	**41.3**

The figure shows that, on average, higher fractions of non-targeted components are more prevalent in relatively poorer districts, all else equal within the MGP waste stream. However, there are some exceptions. In Figure 4-1, district MN04 (MH), represented by the outlier with an income of $30,700 and a residual rate of 24.3%, shows that even within a densely populated district characterized by medium income, targeted components may comprise larger fractions of the MGP waste stream. At this point, we can only speculate about the reason(s) for this occurrence. Cultural factors, education, or other variables acting in concert may be the cause of this phenomenon. Lower residual rates are more prevalent in wealthier districts. However, Figure 4-1 shows that the proportion of non-targeted materials within the MGP waste stream is invariant among districts characterized by income levels between $38,000 and $60,000. Table 4-6 is provided so that Figure 4-1 can be interpreted in terms of housing density.

Table 4-6 Non-targeted MGP Components as a Proportion of Total MGP Components and Stratum Criteria by District

Strata	District	Non-targeted Components/Total Components %	Income	Density Percentage of Units Low	Med	High
LH	BX07	43.4	23.4	6	6	88
LH	BX04	55.5	16.1	4	7	89
LH	MN12	58.9	22.1	1	3	96
LH	ME03	41.5	20.2	1	11	88
LM	BKN01	49.7	19.9	14	50	37
HM	QE12	43.7	33.4	64	8	28
HM	QE07	43.8	37.0	44	13	42
HM	QW09	41.7	35.5	57	16	28
HL	SIO3	35.8	51.1	91	5	4
HL	SIO2	36.1	44.9	81	9	10
HL	BKS18	36.3	38.4	72	13	15
MH	MN04	24.3	30.7	1	12	87
MM	BX12	37.0	32.1	44	20	35
MM	BKS12	45.9	26.1	36	27	38
MM	QW01	38.6	27.7	26	32	43
HH	BX08	29.5	36.5	10	4	86
HH	MN08	35.6	59.3	1	6	93

Figure 4-2 plots the residual rate (or ratio of non-targeted components to total components) against the last column of Table 4-6.

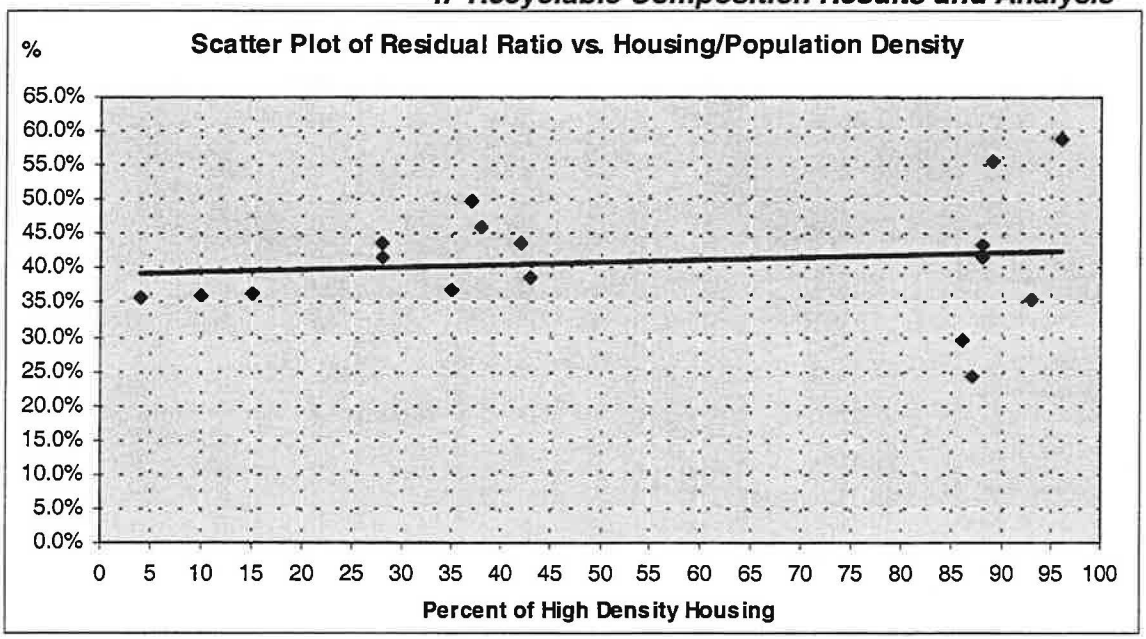


Figure 4-2

While higher residual rates are associated with higher housing density, the relationship depicted in Figure 4-2 is not as close as the association or correlation exhibited between incomes and non-targeted residual rates. Figure 4-2 and Table 4-6 show that some of the densest districts have the lowest fractions of non-targeted components within their respective MGP streams. (These districts are identified on Table 4-6.) MN04 (MH) is characterized by a relatively low residual rate despite high density, as is BX08. The highest ratios of non-targeted to total MGP components are found within the LH stratum. BX04 and MN12 have the lowest incomes and highest densities of any of the districts sampled.

4.4 MGP Material Categories by District and Strata

The following figures present each material category component as a percent of total weight across the sampled districts, allowing the components of the individual residual rates across areas to be viewed. These figures can assist recycling policymakers in their educational efforts. The percentages per district are presented in descending order.

4.4.1 Non-targeted Components

Figures 4-3 through 4-7 focus on the non-targeted materials composition across districts. The figures display high to low material fractions by district and strata. The material fractions are those presented above in Table 4-5.

4.4.1.1 Total Residual Rate

The total residual rate is defined as the sum of all non-targeted components divided by the total weight of all components collected, sorted, and weighed in the MGP program. Non-targeted components included contaminated targeted recyclables, non-targeted glass, non-targeted plastics, and all other residues. Figure

4-3 shows the total residual rate across districts, going from the highest to the lowest fraction by district and strata.

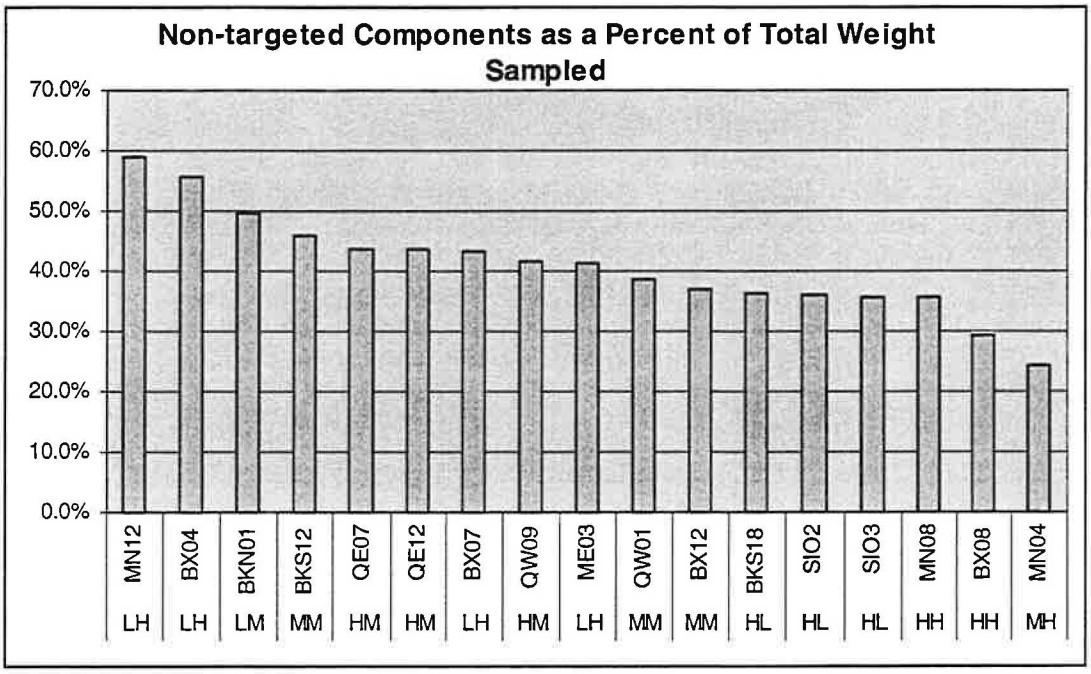


Figure 4-3

Contaminated Targeted Recyclables

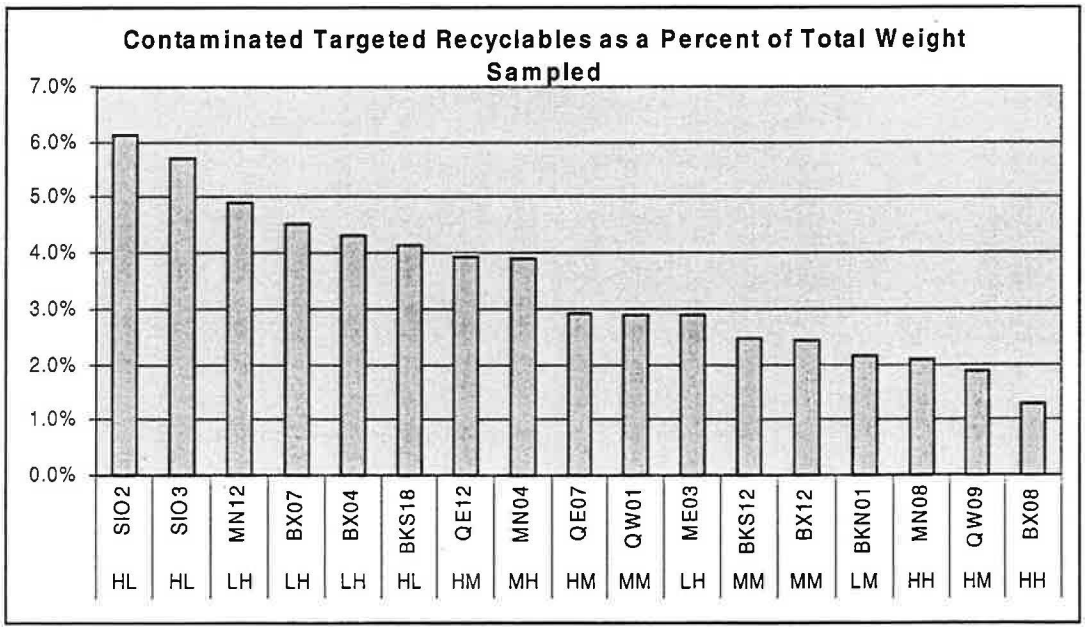


Figure 4-4

Non-targeted Glass

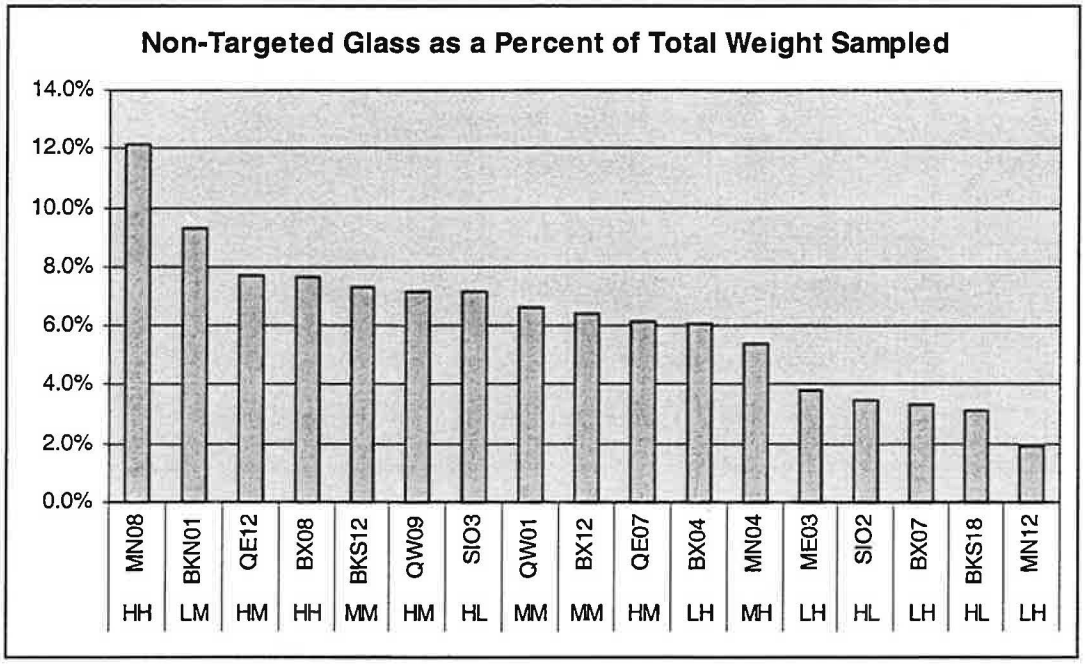


Figure 4-5

Non-targeted Plastics

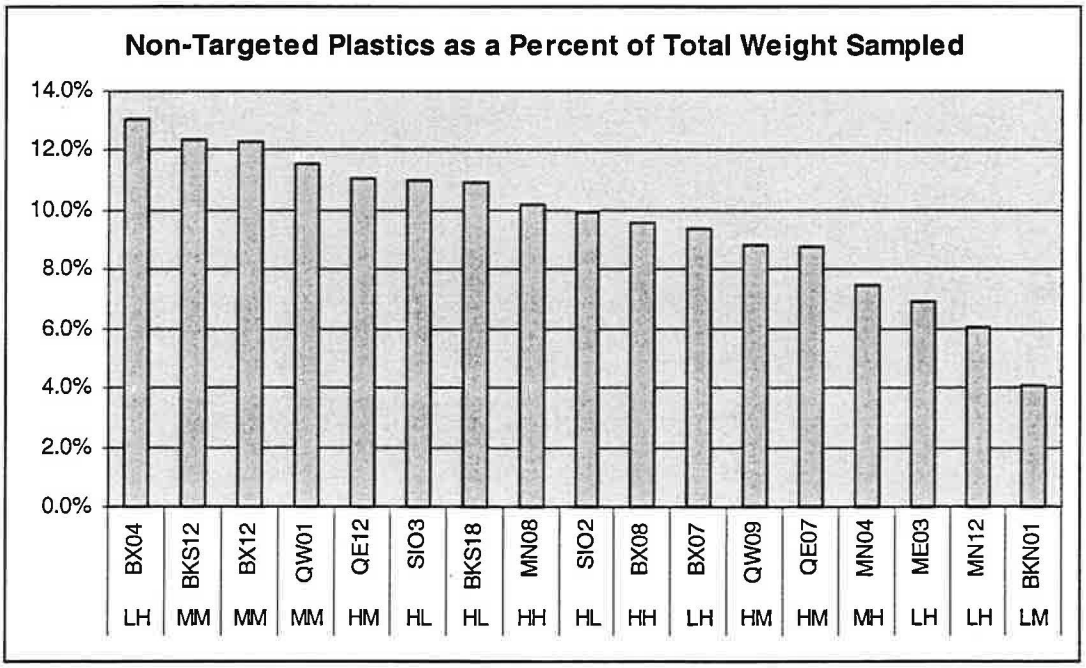


Figure 4-6

All Other Residues

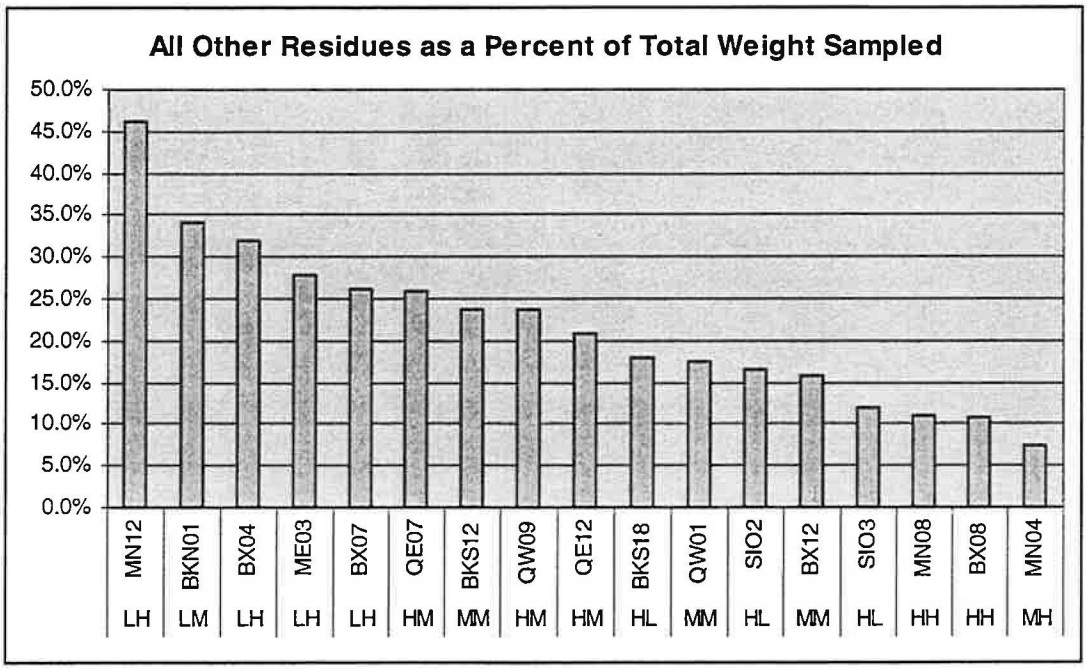


Figure 4-7

4.4.2 Targeted Components

Figures 4-8 through 4-14 compare the targeted material compositions across districts. The figures display high to low material fractions by district and strata. Material fractions are those presented above in Table 4-5. Targeted components include aluminum, aseptic, ferrous metals (HH metals), glass, HDPE, and PETE.

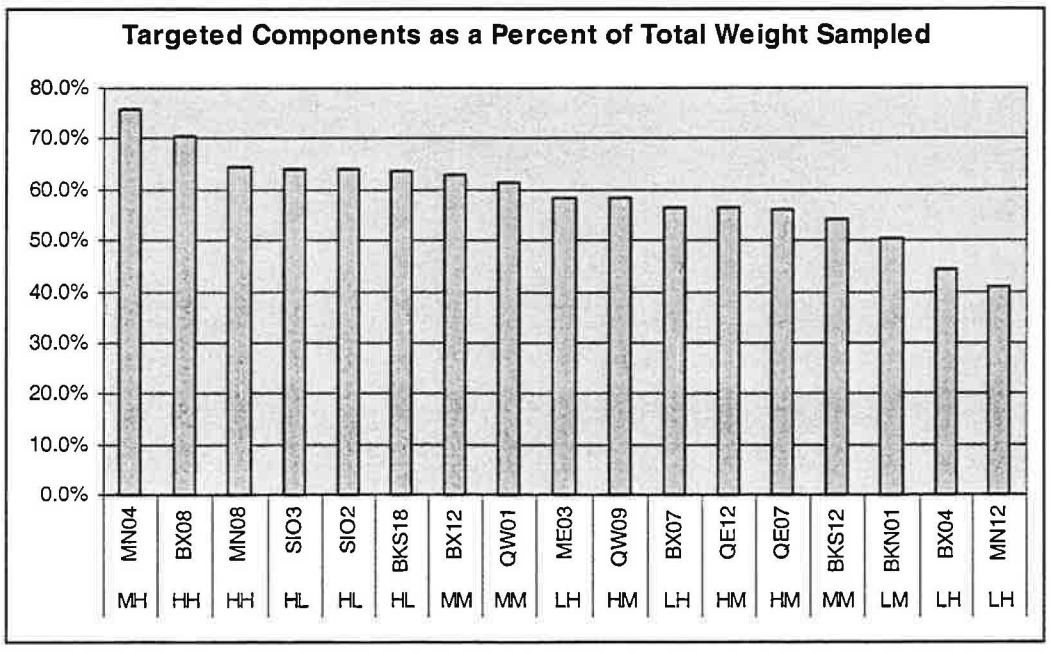


Figure 4-8

Aluminum

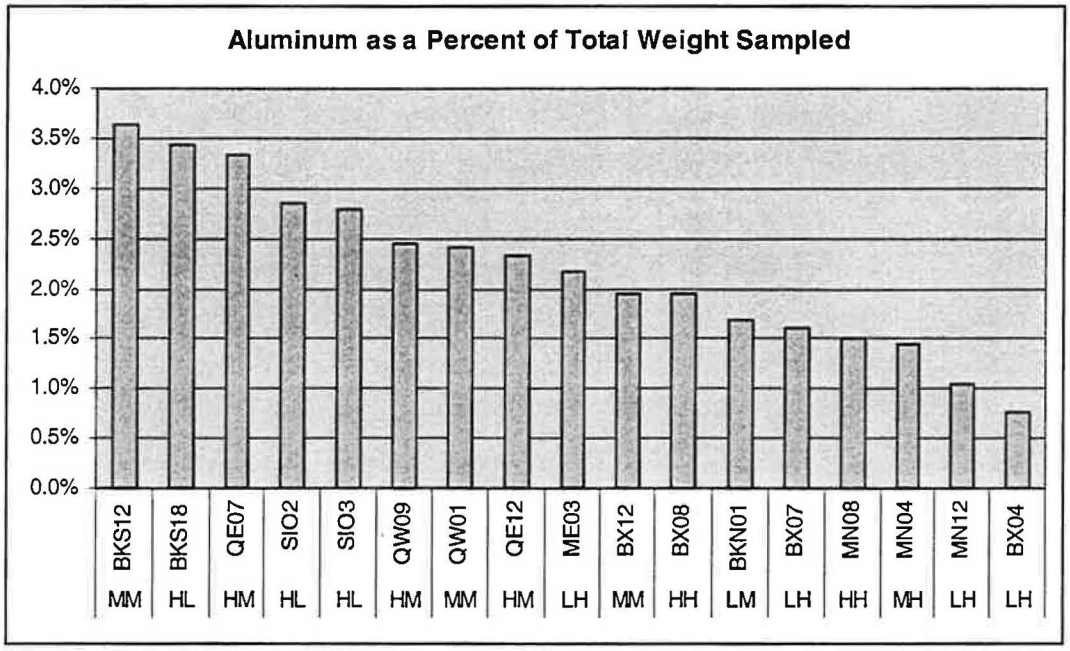


Figure 4-9

Aseptic

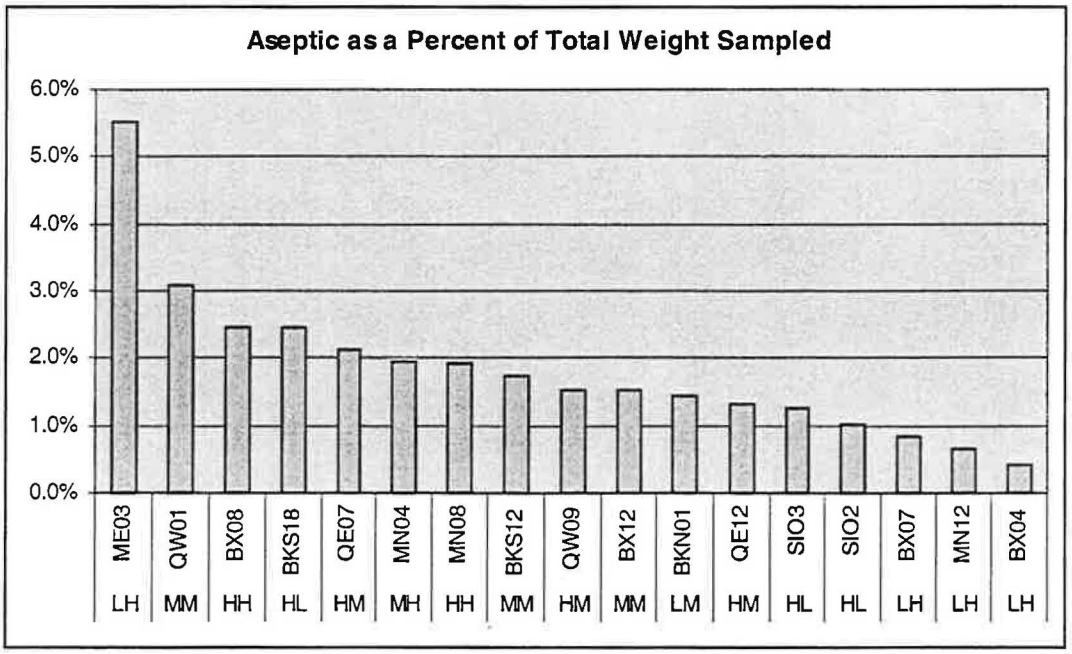


Figure 4-10

Ferrous Metals (HH Metals)

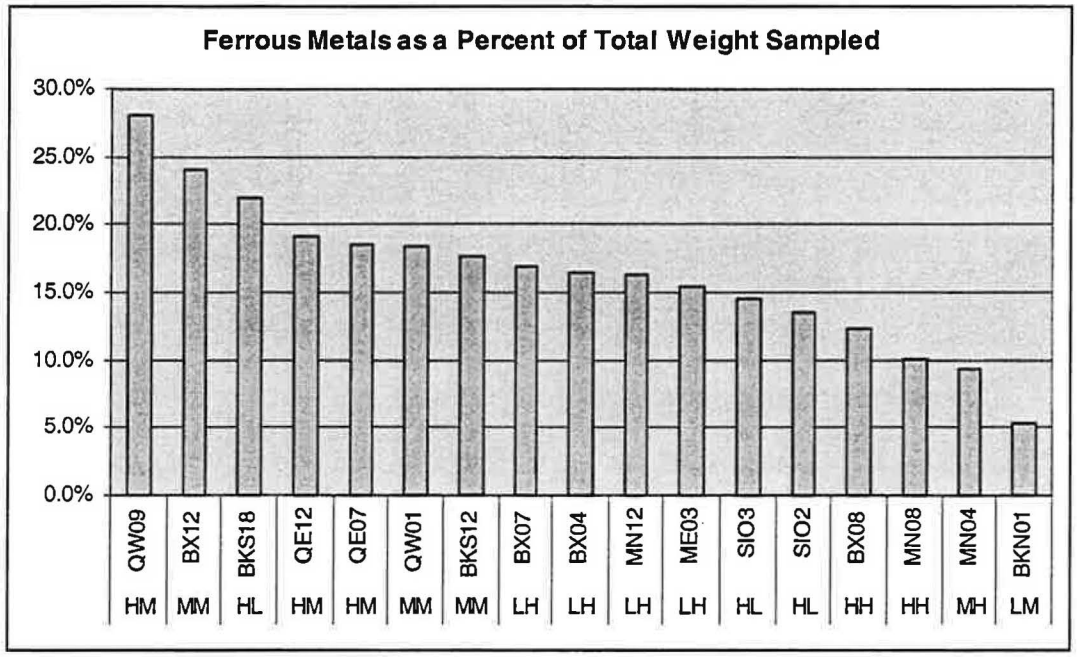


Figure 4-11

Glass

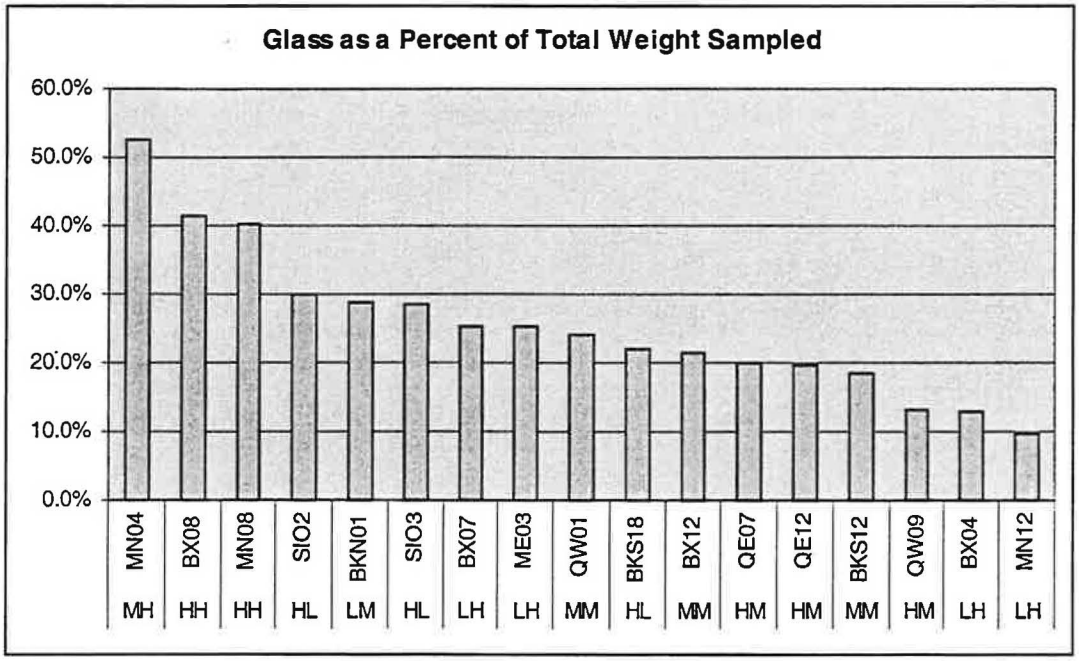


Figure 4-12

HDPE

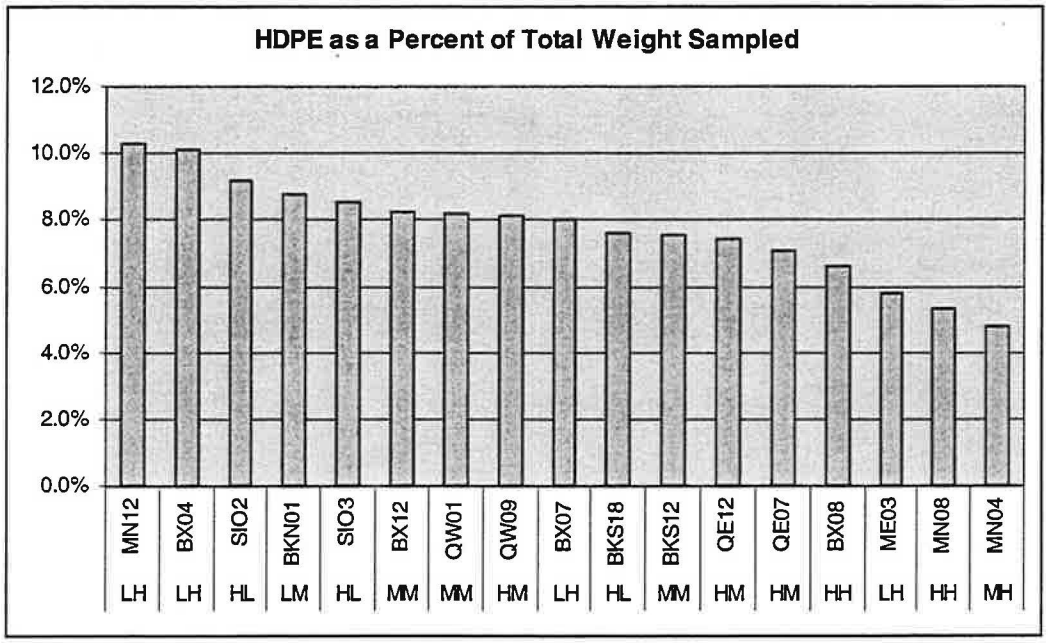


Figure 4-13

PETE

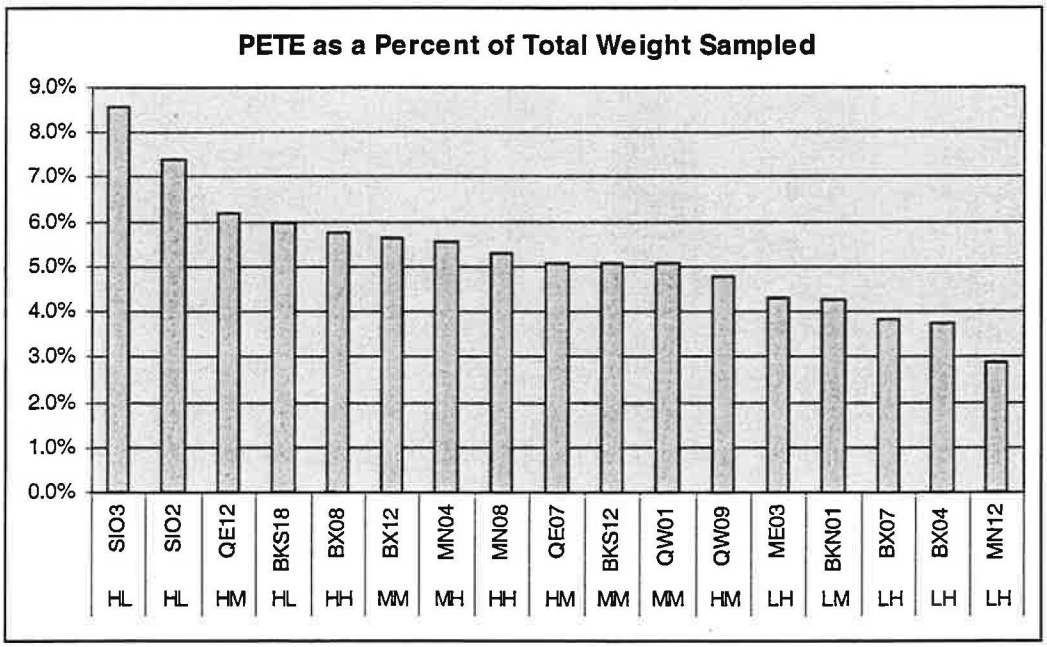


Figure 4-14

Qualitative Discussion of Residuals (Non-targeted Component Categories)

The economic viability of municipal recycling programs is greatly influenced by the quality of the recyclable waste collected. Any additional costs associated with designing elaborate separation systems to remove contaminants make the recyclable waste less desirable. Hence, it is imperative that the recyclable waste collected be segregated as much as possible; otherwise, the recycled product market value is discounted. To avoid a reduction in the commodity value of the recyclable waste and to increase the number of potential end users, the quantity of residual items and/or other non-targeted recyclable waste materials must be kept to a minimum.

During the Recyclable Waste Characterization Study, the following residual categories were encountered within the MGP waste stream:

- **Non-targeted Plastic.** The American Plastics Council developed a numbering system ranging from Nos. 1 through 7 to identify various types of plastic resins. Since the city's recycling program targets only PETE and HDPE (plastic resin codes No. 1 and No. 2, respectively), all other resin codes (Nos. 3 through 7) are considered residual materials. This residual category includes items that are made of polyvinyl chloride (PVC), low-density polyethylene (LDPE), polypropylene (PP), polystyrene (PS), and all other resins or a combination of more than one resin.

  Approximately 10% of the recyclable waste sampled in the waste characterization study contained non-targeted plastics. The most prevalent items observed in the district samples were: small- and large-size plastic toys, plastic chairs, the frames of child car seats, styrofoam egg or food containers, venetian blinds, and garden hoses.

  It should be noted that the plastic bags that are used to hold waste in the MGP recyclables collection program are considered non-targeted plastics. Thus, the recycling program itself actually contributes to the non-targeted waste stream.

- **Non-targeted Glass.** According to the sorting protocols of the study, mirrors, car and/or building window glass, dishware glass, and any unrecognizable fragments of glass were classified as non-targeted glass items. Using these guidelines, only a small quantity of the conventional, recognizable non-targeted glass was observed in the district samples. However, a large quantity of unrecognizable broken glass shards was observed in the center of these piles. These items may have originated from a targeted glass bottle or jar but was classified as non-targeted glass because the visual evidence was inconclusive. The percentage of this sort category varied from a low of 1.9% to a high of 12.2%.

- **Contaminated Targeted Recyclable Waste.** E & E added this sort category to ascertain the amount of recyclable waste materials that would otherwise be considered targeted recyclable waste if it were not soiled. A 5% or greater soiled content threshold was used to make a contaminated recyclable determination. Results indicate that approximately 3% of the recyclable waste falls into that category. Individual district samples ranged from 1.3% to 6.1%.

  Educational initiatives or efforts directed towards emptying, rinsing, or cleaning these items could be considered as the least costly first step toward lowering the overall composite average residual rate by 3.0%.

- **All Other Residue.** Most of the residuals encountered during the study were densely packed items such as discarded electronic products or a combination of plastic/metallic material. These products included items such as computer monitors, microwave ovens, sewing machines, vacuum cleaners, videocassette recorders, space heaters, and portable radios. The remaining items in this category should not have been disposed of as part of the curbside MGP collection. These items included paper products, diabetic syringes and needles, food waste, and rubbish such as upholstered wooden furniture. Most of these items should be placed in the regular curbside collection of municipal solid waste.

  Overall, this category comprised approximately 22% of the samples; however, one district sampled had a fraction as high as 46.1%. Although the MN12 district sample had the highest residue ratio, the sample results for the All Other Residue category may have been an anomaly due to the sample load being laced with white paint. The hypodermic needles and syringes found in the samples did not contribute substantially to the weight percentage breakdown.

4.5 Citywide Estimate of Revenues from MGP Refundable Items

The following section presents data on the pounds of isolated MGP that could have been refunded by residents but was instead discarded. The samples can be used to project revenue estimates associated with the tonnage for the entire MGP recycling program.

4.5.1 Revenue Estimate Method

As mentioned above, E & E performed secondary and tertiary sorts and weighings on glass and plastic redeemable bottles and aluminum cans. These weights were recorded for each district in pounds. To estimate a unit value per pound with which to value the total quantities weighed, the contents of several bags of segregated refundable items were examined. The distribution of glass bottles by size for the samples collected is presented in the Table 4-7.

Table 4-7 Distribution of Redeemable Glass Bottles, by Size, in Bag Inventory Sample

	5.5, 6, or 7 Ounces	11 or 12 Ounces	20, 22, or 24 Ounces	40 Ounces or Greater	Total
Tally	39	601	198	17	855
Percent	4.6	70.3	23.2	2.0	100

Table 4-7 shows that most of the redeemable glass bottles were between 11 and 12 ounces in size. A weighted average unit value was calculated to take into account differing bottle sizes within individual samples. The results of this calculation are presented in Table 4-8. Individual bottles units are worth $0.05, regardless of the size of the bottle.

Table 4-8 Calculation of Unit Value for Redeemable Glass Bottles Used in Revenue Estimate

Sample No.	Weight (pounds)	No. of Units in Bag	$ Value (per pound)
1	68.72	124	0.090
2	75.06	134	0.089
3	51.55	80	0.078
4	50.00	81	0.081
5	36.64	64	0.087
6	56.22	131	0.117
7	46.14	80	0.087
8	48.55	92	0.095
9	49.51	83	0.084
10	44.86	78	0.087
11	91.71	95	0.052
12	63.11	123	0.097
13	27.73	47	0.085
14	38.53	68	0.088
Average Unit Value	748.33	1,280	0.086

A similar calculation to determine a unit value for plastics, in cents per pound, was also made (see Table 4-9).

Table 4-9 Calculation of Unit Value for Redeemable Plastic Bottles Used in Revenue Estimate

Sample No.	Weight (pounds)	No. of Units in Bag	$ Value (per pound)
1	5.11	47	0.460
2	5.79	52	0.449
3	8.34	79	0.474
4	4.69	51	0.544
5	14.55	108	0.371
6	7.90	53	0.335
7	13.28	130	0.489
8	12.38	126	0.509
9	12.26	105	0.428
Average Unit Value	84.30	751.00	0.445

To determine a unit value for aluminum cans, the weight of 25 cans was used. The revenue from this amount (25 x $0.05/can) was divided by the sample net weight. This procedure was used because most cans were 12 ounces in size. The unit value for aluminum cans used in the revenue estimates was equal to:

$$\frac{25 \times \$0.05}{\text{weight of 25 cans (0.8 pounds)}} = \$1.5625/\text{pound}.$$

After the unit values were calculated, the revenue implied from the sampled pounds was determined at both the district and stratum level. A statistical blowup factor for each district was then calculated. This factor was calculated in the following manner:

$$\textit{Statistical Blowup Factor} = \frac{(\textit{Estimated Annual MGP tons collected per district})}{\text{Total MGP (tons) Sampled per District}}$$

To determine an estimate of the annual revenue per district attributable to discarded redeemable items, the statistical blowup factor was then multiplied by the revenue associated with the sample. To determine the revenue estimates implied for the remaining districts within the stratum, an annual value per pound (taken from all sampled districts) was applied to the remaining MGP pounds in that particular stratum. Table 4-10 shows the results of the revenue estimates for each redeemable material and for all three materials combined by strata, and Tables 4-11, 4-12, and 4-13 show how the calculations were made.

Table 4-10 Citywide Estimate of Annual Revenue from Refundable Materials Discarded in MGP Recyclables Program

	Stratum	Estimated Revenue from Discarded Aluminum Cans ($)	%	Estimated Revenue from Plastic Refundable Bottles ($)	%	Estimated Revenue from Discarded Refundable Glass Bottles ($)	%	Total Revenue ($)	%
1	LH	278,124	7.4	215,716	6.4	388,868	14.2	882,708	8.9
2	LM	111,971	3.0	464,584	13.7	552,641	20.1	1,129,196	11.4
3	HH	476,953	12.7	275,998	8.1	383,063	14.0	1,136,015	11.5
4	HM	597,504	15.9	492,255	14.5	181,082	6.6	1,270,841	12.8
5	HL	1,439,851	38.3	1,083,412	31.9	493,414	18.0	3,016,676	30.5
6	MH	65,910	1.8	80,898	2.4	133,484	4.9	280,292	2.8
7	MM	790,615	21.0	782,464	23.0	612,358	22.3	2,185,437	22.1
	Total	**3,760,929**	**100.0**	**3,395,328**	**100.0**	**2,744,909**	**100.0**	**9,901,166**	**100.0**

4.6 Glass Characterization: Analysis of Glass by Color

As mentioned above, E & E also performed secondary sorts and determined weights for additional glass categories. Glass was first separated by color and then separately weighed. Glass color and quality are of interest to glass recycling processors, who must ensure that glass meets the specifications required by manufacturers.

Glass manufacturers can lower energy and operating costs by using recycled glass, known as cullet, as a raw material input in their manufacturing operations; however, the recycled glass must be of high quality. The quality of the materials influences the demand in regional markets. Manufacturers of glass containers recycle cullet, combined with soda ash, limestone, and sand, to create "new" glass. To achieve the requisite quality, glass manufacturers specify the properties that cullet must have to be properly integrated as a feedstock. The cullet, which is separated by color, must be free of contaminants, able to meet market specifications, and originate from container glass. Contaminated cullet (cullet with dirt, metal, gravel, or other impurities) can slow down production, result in defective products, and damage equipment and machinery (Glass Packaging Institute: http://www.gpi.org).

Glass manufacturers require cullet that has been separated by color (i.e., clear, brown [amber], or green). Recycling glass by color helps manufacturers ensure the quality and color consistency of new containers. Since the NYC MGP recyclables collection program does not require citizens to color-sort glass at the curb, it may be of interest to the recycling community to have some idea of the breakdown of commingled glass within the recyclables MGP waste stream across districts, strata, and the city as whole.

Table 4-11 Citywide Estimate of Annual Revenue from Refundable Recyclable Materials Discarded in MGP Containers Aluminum Cans

	Stratum	District	Day	Total Net Weight of Refundable Aluminum Cans (lbs) Sampled	District Sample Revenue Estimate	Total MGP (tons) Sampled per District	Total MGP (lbs) Sampled per District	Refundable Aluminum (lbs) Total MGP Sample (lbs) %	District MGP Weekly Tons Collected[a]	MGP Estimated Annual Tons @ 52 wks	Statistical Blowup Factor = (Est. Annual Tons/Sample tons)	Annual Revenue Estimate
1	LH	**BX07**	4/29/02	4.62	$7.22	0.797	1,594.3	0.3%	118.0	6,136.0	7,697	$55,566
2	LH	**BX04**	4/30/02	2.41	$3.77	1.10	2,208.4	0.1%	70.2	3,650.4	3,306	$12,449
3	LH	**MN12**	5/1/02	5.04	$7.88	3.55	7,091.2	0.1%	154.6	8,039.2	2,267	$17,856
4	LH	**ME03**	5/3/02	11.22	$17.53	1.39	2,789.4	0.4%	63.1	3,281.2	2,353	$41,244
	Subtotal:			23.29	$36.39	6.84	13,683.3	0.2%	405.9	21,106.8		$127,115
	Estimate of remaining districts within stratum								482.2	25,074.4		$151,009
	Stratum Total:								888.1	46,181.2		$278,124
5	LM	**BKN01**	5/4/02	7.21	$11.27	3.032	6,064.74	0.1%	112.2	5,834.4	1,924	$21,676
	Estimate of remaining districts within stratum								467.4	24,304.8		$90,295
	Stratum Total:								579.6	30,139.2		$111,971
6	HM	**QE12**	5/6/02	26.45	$41.33	2.689	5,378.8	0.5%	192.7	10,020.4	3,726	$153,984
7	HM	**QE07**	5/7/02	41.73	$65.20	2.997	5,993.2	0.7%	165.9	8,626.8	2,879	$187,711
8	HM	**QW09**	5/8/02	4.27	$6.67	0.925	1,849.9	0.2%	142.6	7,415.2	8,017	$53,488
	Subtotal:			72.45	$113.20	6.611	13,221.9	0.5%	501.20	26,062.4		$395,182
	Estimate of remaining districts within stratum								256.60	13,343.2		$202,322
	Stratum Total:								757.8	39,405.6		$597,504
9	HL	**SI03**	5/9/02	20.59	$32.17	0.919	1,837.74	1.1%	169.8	8,829.6	9,609	$309,146
10	HL	**SI02**	5/9/02	41.22	$64.41	2.039	4,077.56	1.0%	126.0	6,552.0	3,214	$206,982
11	HL	**BKS18**	5/10/02	30.22	$47.22	3.085	6,169.14	0.5%	168.3	8,751.6	2,837	$133,970
	Subtotal:			92.03	$143.80	6.042	12,084.4	0.8%	464.10	24,133.2		$650,097
	Estimate of remaining districts within stratum								563.80	29,317.6		$789,754
	Stratum Total:								1,027.90	53,450.8		$1,439,851
12	MH	**MN04**	5/11/02	4.65	$7.27	1.09	2178.25	0.2%	67.2	3,494.4	3,208	$23,311
	Estimate of remaining districts within stratum								122.8	6,385.6		$42,599
	Stratum Total:								190.0	9,880.0		$65,910
13	MM	**BX12**	5/13/02	25.46	$39.78	3.9	7805.54	0.3%	138.4	7,196.8	1,844	$73,358
14	MM	**BKS12**	5/14/02	17.84	$27.88	3.6	7147.55	0.2%	137	7,124.0	1,993	$55,566
15	MM	**QW01**	5/15/02	15.54	$24.28	3.6	7217.93	0.2%	138.7	7,212.4	1,998	$48,525
	Subtotal:			58.84	$91.94	11.09	22,171.0	0.3%	414.1	21,533.2		$177,449
	Estimate of remaining districts within stratum								1430.9	74,406.8		$613,166
	Stratum Total:								1,845.00	95,940.0		$790,615

Table 4-11 Citywide Estimate of Annual Revenue from Refundable Recyclable Materials Discarded in MGP Containers Aluminum Cans (continued)

	Stratum	District	Day	Total Net Weight of Refundable Aluminum Cans (lbs) Sampled	District Sample Revenue Estimate	Total MGP (tons) Sampled per District	Total MGP (lbs) Sampled per District	Refundable Aluminum (lbs) Total MGP Sample (lbs) %	District MGP Weekly Tons Collected[a]	MGP Estimated Annual Tons @ 52 wks	Statistical Blowup Factor = (Est. Annual Tons/Sample tons)	Annual Revenue Estimate
16	HH	**BX08**	5/16/02	16.76	$26.19	2.1	4,243	0.4%	72.2	3,754.4	1,770	$46,344
17	HH	**MN08**	5/17/02	47.31	$73.92	6.2	12,330	0.4%	185.8	9,661.6	1,567	$115,846
	Subtotal:			64.07	$100.11	8.3	16,573.2	0.4%	258.0	13,416.0		$162,191
	Estimate of remaining districts within stratum								500.7	26,036.4		$314,763
	Stratum Total:								758.7	39,452.4		$476,953
	Stratum Grand Total			322.5	$504.0	43.0	85,977	0.4%	2,222.7	115,580.4		$1,557,021
	Estimate of remaining districts within stratum								3,824.4	198,868.8		$2,203,908
	Grand Total [Sum of All Strata]								6,047.1	314,449.2		$3,760,929

[a] NYC Dept. of Sanitation's "Districts by Income and Housing Density Strata-Actual Weekly MGP Tons for Feb 2001 to Jan 2002 (Excluding Schools) 4/8/02.

Table 4-12 Citywide Estimate of Annual Revenue from Refundable Recyclable Materials Discarded in MGP Containers
Refundable Plastic

	Stratum	District	Day	Total Net Weight of Refundable Plastic (lbs) Sampled	District Sample Revenue Estimate	Total MGP (tons) Sampled per District	Total MGP (lbs) Sampled per District	Refundable Plastic (lbs) Total MGP Sample (lbs) %	District MGP Weekly Tons Collected[a]	MGP Estimated Annual Tons @ 52 wks	Statistical Blowup Factor = (Est. Annual Tons/Sample tons)	Annual Revenue Estimate
1	LH	**BX07**	4/29/02	8.23	$3.66	0.80	1,594.3	0.5%	118.0	6,136.0	7,697	$28,191
2	LH	**BX04**	4/30/02	20.81	$9.26	1.10	2,208.4	0.9%	70.2	3,650.4	3,306	$30,615
3	LH	**MN12**	5/1/02	33.58	$14.94	3.55	7,091.2	0.5%	154.6	8,039.2	2,267	$33.882
4	LH	**ME03**	5/3/02	5.64	$2.51	1.39	2,789.4	0.2%	63.1	3,281.2	2,353	$5,905
	Subtotal:			68.26	$30.38	6.84	13,683.3	0.5%	405.9	21,106.8		$98,592
	Estimate of remaining districts within stratum								482.2	25,074.4		$117,125
	Stratum Total:								888.1	46,181.2		$215,716
5	LM	**BKN01**	5/4/02	105.04	$46.74	3.032	6,064.74	1.7%	112.2	5,834.4	1,924	$89,935
	Estimate of remaining districts within stratum								467.4	24,304.8		$374,649
	Stratum Total:								579.6	30,139.2		$464,584
6	HM	**QE12**	5/6/02	100.34	444.65	2.689	5.378.8	1.9%	192.7	10,020.4	3,726	$166.365
7	HM	**QE07**	5/7/02	65.85	$29.30	2.997	5,993.2	1.1%	165.9	8,626.8	2,879	$84,360
8	HM	**QW09**	5/8/02	20.98	$9.34	0.925	1,849.9	1.1%	142.6	7,415.2	8,017	$74,847
	Subtotal:			187.17	$83.29	6.611	13,221.9	1.4%	501.20	26,062.4		$325,572
	Estimate of remaining districts within stratum								256.60	13,343.2		$166,683
	Stratum Total:								757.8	39,405.6		$492,255
9	HL	**SI03**	5/9/02	58.92	$26.22	0.919	1,837.74	3.2%	169.8	8,829.6	9,609	$251,947
10	HL	**SI02**	5/9/02	91.83	$40.86	2.039	4,077.56	2.3%	126.0	6552.0	3,214	$131.325
11	HL	**BKS18**	5/10/02	83.87	$37.32	3.085	6,169.14	1.4%	168.3	8,751.6	2,837	$105,891
	Subtotal:			234.62	$104.41	6.042	12,084.4	1.9%	464.10	24,133.2		$489,164
	Estimate of remaining districts within stratum								563.80	29,317.6		$594,248
	Stratum Total:								1,027.90	53,450.8		$1,083,412
12	MH	**MN04**	5/11/02	20.04	$8.902	1.09	2,178.25	0.9%	67.2	3,494.4	3,208	$28,612
	Estimate of remaining districts within stratum								122.8	6,385.6		$52,286
	Stratum Total:								190.0	9,880.0		$80,898
13	MM	**BX12**	5/13/02	108.35	$48.22	3.9	7,805.54	1.4%	138.4	7,196.8	1,844	$88,911
14	MM	**BKS12**	5/14/02	67.05	$29.84	3.6	7,147.55	0.9%	137	7,124.0	1,993	$59,478
15	MM	**QW01**	5/15/02	30.62	$13.63	3.6	7,217.93	0.4%	138.7	7,212.4	1,998	$27,231
	Subtotal:			206.02	$91.68	11.09	22,171.0	0.9%	414.1	21,533.2		$175,620
	Estimate of remaining districts within stratum								1,430.9	74,406.8		$606,845
	Stratum Total:								1,845.00	95,940.0		$782,464

Table 4-12 Citywide Estimate of Annual Revenue from Refundable Recyclable Materials Discarded in MGP Containers Refundable Plastic (continued)

	Stratum	District	Day	Total Net Weight of Refundable Plastic (lbs) Sampled	District Sample Revenue Estimate	Total MGP (tons) Sampled per District	Total MGP (lbs) Sampled per District	Refundable Plastic (lbs) Total MGP Sample (lbs) %	District MGP Weekly Tons Collected[a]	MGP Estimated Annual Tons @ 52 wks	Statistical Blowup Factor = (Est. Annual Tons/Sample tons)	Annual Revenue Estimate
16	HH	**BX08**	5/16/02	44.5	$19.80	2.1	4,243	1.0%	72.2	3,754.4	1,770	$35,045
17	HH	**MN08**	5/17/02	84.33	$37.53	6.2	12,330	0.7%	185.8	9,661.6	1,567	$58.810
Subtotal:				128.83	57.33	8.3	16,573.2	0.8%	258.0	13,416.0		$93,855
Estimate of remaining districts within stratum									500.7	26,036.4		$182,144
Stratum Total:									758.7	39,452.4		$275,998
Stratum Grand Total				950.0	$422.7	43.0	85,977	1.1%	2,222.7	115,580.4		$1,301,349
Estimate of remaining districts within stratum									3,824.4	198,868.8		$2,093,979
Grand Total [Sum of All Strata]									6,047.1	314,449.2		$3,395,328

[a] NYC Dept. of Sanitation's "Districts by Income and Housing Density Strata-Actual Weekly MGP Tons for Feb 2001 to Jan 2002 (Excluding Schools) 4/8/02.

Table 4-13 Citywide Estimate of Annual Revenue from Refundable Recyclable Materials Discarded in MGP Containers
Refundable Glass

	Stratum	District	Day	Total Net Weight of Refundable Glass (lbs) Sampled	District Sample Revenue Estimate	Total MGP (tons) Sampled per District	Total MGP (lbs) Sampled per District	Refundable Glass (lbs) Total MGP Sample (lbs) %	District MGP Weekly Tons Collected[a]	MGP Estimated Annual Tons @ 52 wks	Statistical Blowup Factor = (Est. Annual Tons/Sample tons)	Annual Revenue Estimate
1	LH	**BX07**	4/29/02	157.46	$13.54	0.797	1,594.3	9.9%	118.0	6,136.0	7,697	$104,236
2	LH	**BX04**	4/30/02	91.89	$7.90	1.104	2,208.4	4.2%	70.2	3,650.4	3,306	$26,125
3	LH	**MN12**	5/1/02	155.1	$13.34	3.546	7,091.2	2.2%	154.6	8,039.2	2,267	$30,244
4	LH	**ME03**	5/3/02	84.64	$7.28	1.395	2,789.4	3.0%	63.1	3,281.2	2,353	$17,125
	Subtotal:			489.09	$42.06	6.842	13,683.3	3.6%	405.9	21,106.8		$177,729
	Estimate of remaining districts within stratum								482.2	25,074.4		$211,139
	Stratum Total:								888.1	46,181.2		$388,868
5	LM	**BKN01**	5/4/02	646.54	$55.60	3.032	6,064.74	10.7%	112.2	5,834.4	1,924	$106,981
	Estimate of remaining districts within stratum								467.4	24,304.8		$445,660
	Stratum Total:								579.6	30,139.2		$552,641
6	HM	**QE12**	5/6/02	120.31	$10.35	2.689	5,378.8	2.2%	192.7	10,020.4	3,726	$38,550
7	HM	**QE07**	5/7/02	217.84	$18.73	2.997	5,993.2	3.6%	165.9	8,626.8	2,879	$53,933
8	HM	**QW09**	5/8/02	39.57	$3.40	0.925	1,849.9	2.1%	142.6	7,415.2	8,017	$27,282
	Subtotal:			377.72	32.48	6.611	13,221.9	2.9%	501.20	26,062.4		$119,765
	Estimate of remaining districts within stratum								256.60	13,343.2		$61,316
	Stratum Total:								757.8	39,405.6		$181,082
9	HL	**SI03**	5/9/02	108.83	$9.36	0.919	1,837.74	5.9%	169.8	8,829.6	9,609	$89,936
10	HL	**SI02**	5/9/02	191.21	$16.44	2.039	4,077.56	4.7%	126.0	6,552.0	3,214	$52,846
11	HL	**BKS18**	5/10/02	327.85	$28.20	3.085	6,169.14	5.3%	168.3	8,751.6	2,837	$79,996
	Subtotal:			627.89	$54.00	6.042	12,084.4	5.2%	464.10	24,133.2		$222,778
	Estimate of remaining districts within stratum								563.80	29,317.6		$270,636
	Stratum Total:								1,027.90	53,450.8		$493,414
12	MH	**MN04**	5/11/02	171.10	$14.71	1.09	2,178.25	7.9%	67.2	3,494.4	3,208	$47,211
	Estimate of remaining districts within stratum								122.8	6,385.6		$86,273
	Stratum Total:								190.0	9,880.0		$133,484
13	MM	**BX12**	5/13/02	340.52	$29.28	3.9	7,805.54	4.4%	138.4	7,196.8	1,844	$54.002
14	MM	**BKS12**	5/14/02	162.02	$13.93	3.6	7,147.55	2.3%	137	7,124.0	1,993	$27,776
15	MM	**QW01**	5/15/02	323.87	$27.85	3.6	7,217.93	4.5%	138.7	7,212.4	1,998	$55,663
	Subtotal:			826.41	$71.07	11.09	22,171.0	3.7%	414.1	21,533.2		$137,440
	Estimate of remaining districts within stratum								1,430.9	74,406.8		$474,917
	Stratum Total:								1,845.00	95,940.0		$612.358

Table 4-13 Citywide Estimate of Annual Revenue from Refundable Recyclable Materials Discarded in MGP Containers Refundable Glass (continued)

	Stratum	District	Day	Total Net Weight of Refundable Glass (lbs) Sampled	District Sample Revenue Estimate	Total MGP (tons) Sampled per District	Total MGP (lbs) Sampled per District	Refundable Glass (lbs) Total MGP Sample (lbs) %	District MGP Weekly Tons Collected[a]	MGP Estimated Annual Tons @ 52 wks	Statistical Blowup Factor = (Est. Annual Tons/Sample tons)	Annual Revenue Estimate
16	HH	**BX08**	5/16/02	225.16	$19.36	2.1	4,243	5.3%	72.2	3,754.4	1,770	$34,268
17	HH	**MN08**	5/17/02	712.26	$61.25	6.2	12,330	5.8%	185.8	9,661.6	1,567	$95,994
Subtotal:				937.42	$80.62	8.3	16,573.2	5.7%	258.0	13,416.0		$130,263
Estimate of remaining districts within stratum									500.7	26,036.4		$252,801
Stratum Total:									758.7	39,452.4		$383,063
Stratum Grand Total				4,076.2	$350.6	43.0	85,977	4.7%	2,222.7	115,580.4		$942,68
Estimate of remaining districts within stratum									3,824.4	198,868.8		$1,802,741
Grand Total [Sum of All Strata]									6,047.1	314,449.2		$2,744,909

[a] NYC Dept. of Sanitation's "Districts by Income and Housing Density Strata-Actual Weekly MGP Tons for Feb 2001 to Jan 2002 (Excluding Schools) 4/8/02.

Color sorting can be an expensive manual process. In the present study, it was only feasible to sort color glass on a daily- (district) level, as opposed to table-level, basis. Industry specialists state that even if color separation is not feasible at the curbside, colors and contaminants should be sorted out early in the process. Once the cullet is broken or mixed, contaminants are difficult to remove and can spoil the quality of an entire load. Consequently, mixed cullet has significantly lower demand and revenue potential. Glass manufacturers have limits on the amount of mixed cullet they can use for manufacturing new containers (Glass Packaging Institute: http://www.gpi.org).

Table 4-14 presents the results of the glass characterization by color.

Table 4-14 Glass Characterization Analysis: Total for All Districts

Material	Total in Pounds	Statistical Mean	Variance	Standard Deviation	Standard Error	Lower Confidence Interval	Upper Confidence Interval
Brown	2,297.7	10.8%	0.17%	4.13%	1.00%	8.6%	12.9%
Clear	12,959.1	60.7%	2.23%	14.95%	3.63%	53.1%	68.4%
Green	6,078.8	28.5%	1.76%	13.26%	3.22%	21.7%	35.3%
Total	**21,335.6**	**100.0%**					

The results of the glass sorting and weighing by district show that overall, for the city as a whole, clear glass represents the majority of glass by weight, followed by green and then brown (amber). Table 4-15 presents the results across all districts.

Figures 4-15 through 4-17 show the distribution of glass by color across the individual districts within the stratum.

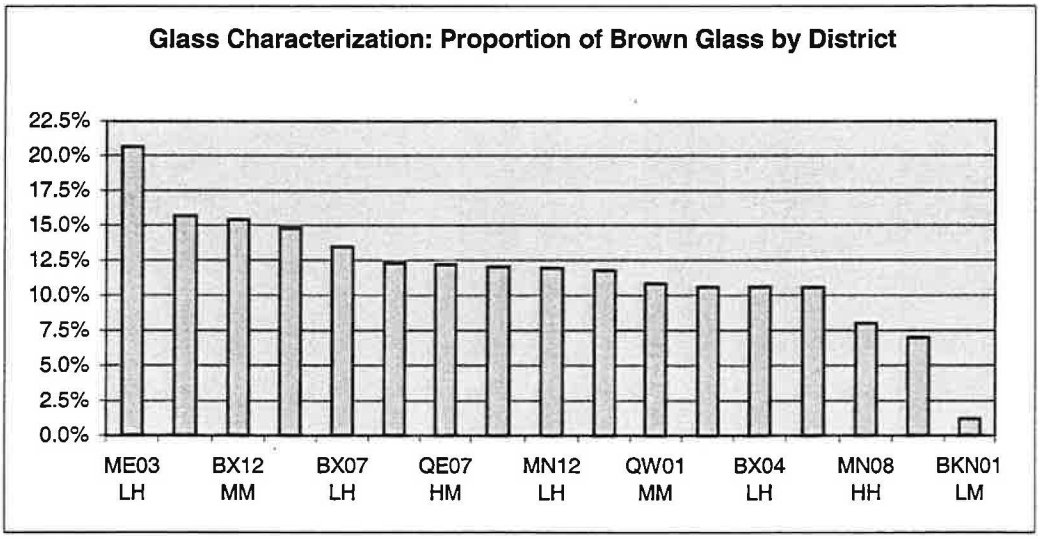


Figure 4-15

Table 4-15 Distribution of Glass by Color Categories by District and Stratum

Material	LH BX07	LH BX04	LH MN12	LH ME03	LM BKN01	HM QE12	HM QE07	HM QW09	HL SIO3	HL SI02	HL BKS18	MH MN04	MM BX12	MM BKS12	MM QW01	HH BX08	HH MN08	Statistical Mean	Standard Deviation
Brown	13.5%	10.6%	12.0%	20.6%	1.2%	10.6%	12.2%	7.0%	12.3%	14.8%	12.1%	15.7%	15.4%	10.6%	10.8%	11.8%	8.0%	10.8%	4.1%
Clear	70.2%	72.9%	59.6%	53.5%	96.2%	78.6%	61.6%	70.2%	69.4%	61.7%	75.7%	31.5%	63.9%	74.5%	61.6%	64.3%	37.5%	60.7%	14.9%
Green	16.3%	16.4%	28.4%	25.9%	2.6%	10.8%	26.2%	22.8%	18.3%	23.5%	12.3%	52.9%	20.7%	15.0%	27.6%	23.9%	54.5%	28.5%	13.3%
Total:	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	

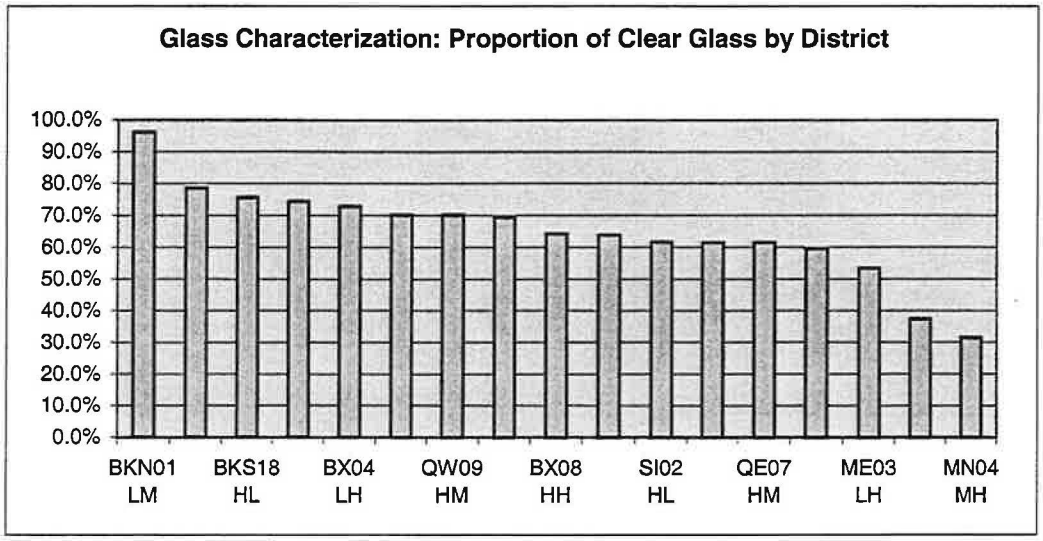


Figure 4-16

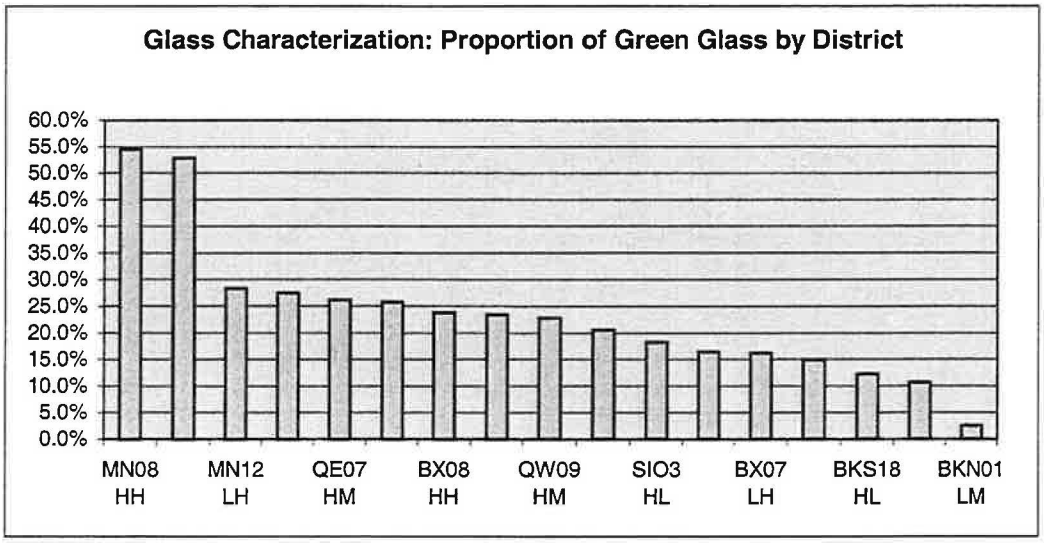


Figure 4-17

4.7 Maps with Study Findings

The following section presents two maps that highlight the study findings and can be used to quickly obtain a summary and visualization of the results in their geographic context.

Figure 4-18 indicates the location of each district within each borough and presents color-coded pie charts showing the distribution of buildings used to determine housing density. Where the percentage of 1- and 2-unit buildings within a district was greater than 67%, the district was considered low density. Where the proportion of buildings with 10 or more units within a district was greater than 67%, the district was classified as high density. Where the distributions did not meet these cutoff thresholds, the buildings were classified as medium density.

Figure 4-19 shows the results of the characterization study. The figure displays the percentage breakdown, by weight, of each MGP category in the form of a pie chart. The pie chart appears within the respective district location and borough. The chart enables one to quickly see the most prominent material fractions within a district and to compare slices across districts.

02:000961.UN11.04 - B0000
L:\Buffalo\NYC-DOS\Maps\Demographics.mxd 06/18/02 - GIS

Source: New York City Department of Sanitation, 2002

Figure 4-18

Housing/Population Density by MGP Collection District

Legend

- Density Distribution
- LOW
- MEDIUM
- HIGH
- 1990 Census Tracts

0 1 2 4 6 Miles

0 1 2 4 6 8 10 Kilometers

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02:000961.UN11.04 - B0000
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Source: New York City Department of Sanitation, 2002

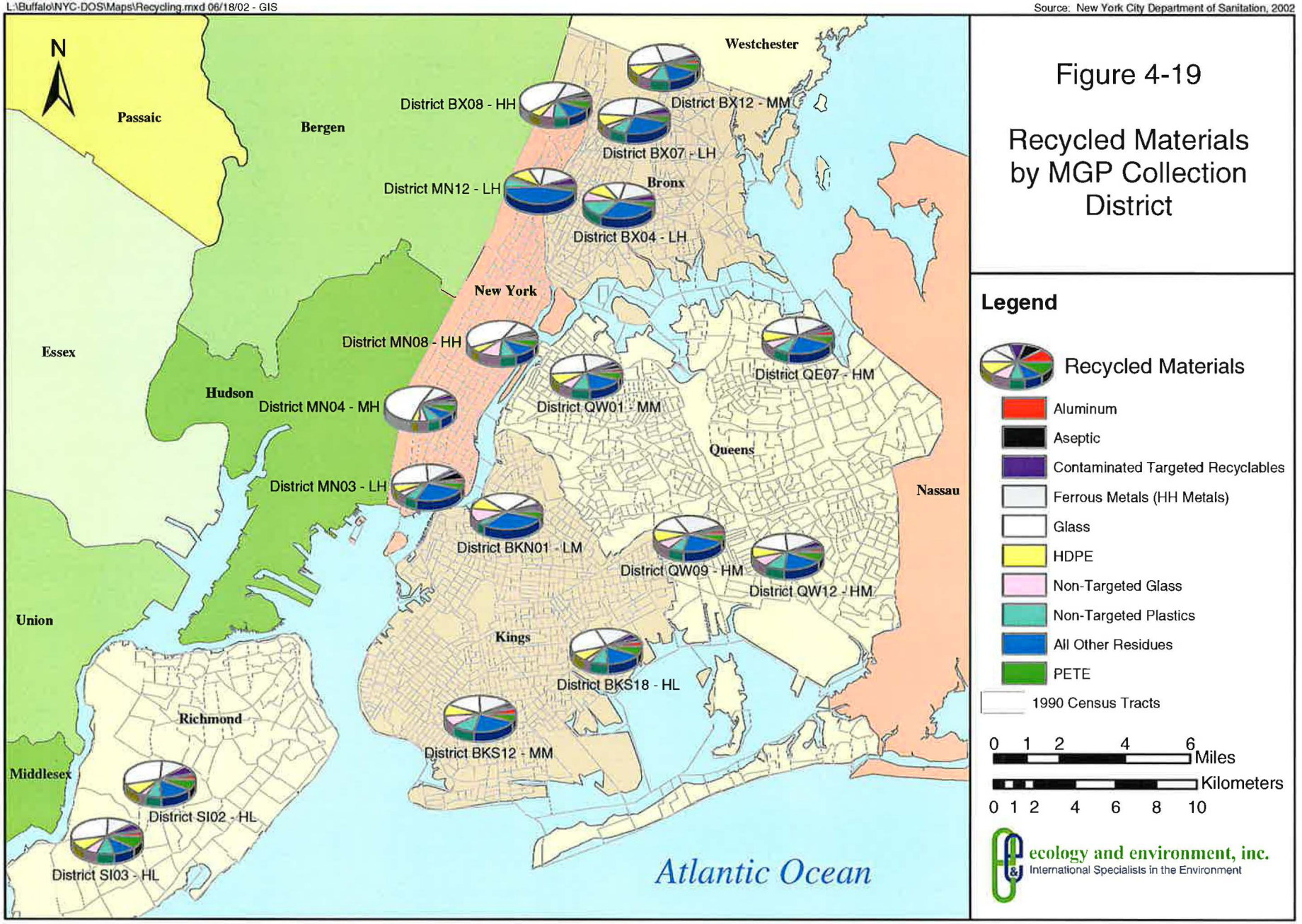

Figure 4-19

Recycled Materials by MGP Collection District

Legend

Recycled Materials

- Aluminum
- Aseptic
- Contaminated Targeted Recyclables
- Ferrous Metals (HH Metals)
- Glass
- HDPE
- Non-Targeted Glass
- Non-Targeted Plastics
- All Other Residues
- PETE

1990 Census Tracts

0 1 2 4 6 Miles

0 1 2 4 6 8 10 Kilometers

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5 Summary and Conclusions

E & E was contracted to design and implement a waste characterization study that would focus on the MGP components of the residential waste stream. A stratified random sample was used to characterize, by weight, the city's collection of MGP intended for recycling. The goal was to gain a better understanding of the proportion of targeted and non-targeted MGP entering the curbside recycling collections. The study revealed that citywide, on average, 41.3% of the collected materials are non-targeted items that are either not intended for the recycling program and/or not amenable to being recycled.

1. The combined residual measure (referred to as a the material fraction of interest) is the ratio of *non-targeted materials to total materials*, where total materials are equal to targeted plus non-targeted items. This measure varied across districts and strata. The highest rate, 58.9%, was found for District MN12, a district falling within a low-income, high-housing/population-density stratum. The lowest rate, 24.3%, was found for district MN04, a medium-income, high-density district.

This report compared the study findings together with relevant demographic data in order to shed light on some of the underlying factors that may contribute to the study's conclusions regarding the characterization of the MGP collections. Relationships between *residual rates* and *income and density* were examined. In general, non-targeted materials constituted a larger proportion of total materials in poorer, more densely populated areas. The association between the relatively higher fractions of residual materials and lower incomes was stronger than the association between higher residual rates and higher density.

2. Observations made during the study suggest that a combination of additional variables might contribute to differences in residual rates across the districts identified. Potential variables include: level and effort of public education; cultural and other attitudes and habits related to recycling; collection procedures; and/or enforcement.

3. It is possible that a portion of the non-targeted materials were originally intact targeted recyclables at the curb that were subsequently transformed or contaminated during the handling process and transport to the recycling processor

(or in this case, to the site of the characterization study). This observation applies primarily to the categories of Non-targeted Glass and Contaminated Recyclables and perhaps to some other types of residuals classified in the All Other Residuals category. Additional research is suggested to analyze the change in composition of the curbside container sample and the sample received by the processor. This analysis would address whether modifications to the collection procedures and transportation to the processor would improve the components of the sample with respect to the proportion of targeted recyclables.

4. The study also estimated the revenue derived from discarded refundable glass and plastic bottles and aluminum cans that are collected as part of the MGP program. The citywide revenue associated with discarded bottles and cans was calculated based on a statistical extrapolation from the stratified random sample. It is estimated that approximately $9.9 million in these potentially refundable materials is discarded annually by residents citywide in the residential curbside MGP collections.

5. Finally, the study measured, by color, the composition of refundable glass materials. On average, the majority of targeted recyclable glass is clear (60.7%), 28.5% is green, and 10.8% is brown (amber). This information is useful to policymakers and recycling processors who are concerned with the properties and quality of glass items citywide and within certain regions.

This study provides the NYCDOS with additional primary data that can form the basis for further analyses and comparisons, both over time and across material categories and demographics.

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A List of Randomly Selected Individual Truck Street Assignments (ITSAs)

Appendix A - Randomly Selected Individual Truck Street Assignments (ITSAs)
used in MGP Recyclable Characterization Study

	Date	Day	District	ITSA	Pickup Side	Street	From	To
1	4/29/02	Mon	BX07	5	B/S	Decatur Ave.	Moshulu Pkwy No.	E. 204th St.
2				10	B/S	E. 206th St.	Bainbridge Ave.	Moshulu Pkwy No.
3				15	B/S	Dekalb Ave.	Gunhill Rd.	E. 208th St.
4	04/30/02	Tues	BXO4	69	E	Grand Concourse	E. 169 St.	X BX XWAY
5				71	N	Mt. Eden Ave.	Weeks Ave.	Selwyn Ave.
6				73	B	Sheridan Ave.	E. 170 St.	Mt. Eden Ave.
7				75	B	Selwyn Ave.	Mt. Eden Ave.	E. 172 St.
8				78	E	E 174 St.	Morris Ave.	Eastburn Ave.
9				81	B	Monroe Ave.	E. 174th St.	Mt. Eden Ave.
10				86	B	E 173 St.	Webster Ave.	Morris Ave.
11				88	W	Belmont Ave.	Clay Ave.	Webster Ave.
12	05/01/02	Wed	MN12	8	B	Audubon Ave.	W. 183 St.	W. 171 St.
13				9	B	Wadsworth Ave.	W. 173 St.	W. 183 St.
14				10	B	W. 181 St.	Amsterdam Ave.	Broadway
15				11	B	Wadsworth Ave.	W. 181 St.	W..173 St.
16				12	B	W. 173 St.	Amsterdam Ave.	Broadway
17				13	B	Amsterdam Ave.	W. 183 St.	W. 171 St.
18				14	B	St. Nicholas	W. 183 St.	W. 171 St.
19				15	B	W 175 St.	Amsterdam Ave.	Broadway
20				16	B	W 174 St.	Broadway	Amsterdam Ave.
21				17	B	W 172 St.	Broadway	Amsterdam Ave.
22				18	B	W 171 St.	Amsterdam Ave.	Broadway
23	5/3/02	Fri	MN03	14	B	Division	Market	Catherine
24				1	B	Pell	Bowery	Mott
25				15	B	Catherine	E. Broadway	Madison
26				5	B	Mott	Canal	Worth
27				23	R	Wagner Pl.	South	Pearl
28				27	L	Forsyth	Grand	Hester
29				19	R	St. James Pl.	Madison	Oliver
30				13	R	Park Row	Pearl	St. James Pl.
31				6	B	Elizabeth	Bayard	Canal
32				11	B	Worth	Baxter	Park Row
33				7	L	Baxter	Canal	Bayard
34				26	R	Eldridge	Canal	Delancy
35				4	B	Mulberry	Worth	Canal
36	5/4/02	Sat	BKN01	56	B/S	Lorimer St.	Broadway	Lee Ave.
37				43	L/S	Heyward St.	Broadway	Wythe Ave.
38				35	L/S	Taylor St.	Kent Ave.	Wythe Ave.
39				50	B/S	Gerry St.	Throop Ave.	Broadway
40				31	L/S	Wilson St.	Bedford Ave.	Wythe Pl.
41				55	L/S	Harrison Ave.	Bartlett St.	Flushing Ave.
42				30	B/S	Ross St.	Wythe Ave.	Bedford Ave.
43				37	B/S	Juliana Pl.	Clymer St.	Morton St.
44				57	R/S	Bedford Ave.	Lynch St.	Division Ave.
45				44	R/S	Rutledge St.	Wythe Ave.	Broadway
46				52	B/S	Thornton St.	Broadway	Throop Ave.
47				33	R/S	Taylor St.	Kent Ave.	Wythe Ave.
48				45	R/S	Marcy Ave.	Lorimer St.	Hooper St.
49				54	B/S	Bartlett St.	Throop Ave.	Harrison Ave.
50				42	L/S	Rutledge St.	Wythe Ave.	Broadway

Appendix A - Randomly Selected Individual Truck Street Assignments (ITSAs)
used in MGP Recyclable Characterization Study

	Date	Day	District	ITSA	Pickup Side	Street	From	To
51	05/06/02	Monday	QE12	1	N/S	Linden Blvd.	Guy Brewer Blvd.	Sutphin Blvd.
52				6	B/S	116 Ave.	Sutphin Blvd.	157 St.
53				5	B/S	115 Dr.	Sutphin Blvd.	157 St.
54				11	B/S	James Ct.	Linden Blvd.	Dead End
55				4	B/S	115 Rd.	Sutphin Blvd.	157th St.
56				7	E/S	Sutphin Blvd.	Foch Blvd.	Linden Blvd.
57				13	S/S	Meyers Ave.	157th St.	Linden Blvd.
58				12	S/S	Linden Blvd.	James Ct.	158 St.
59				3	B/S	115 Ave.	Sutphin Blvd.	157th St.
60				9	B/S	August Ct.	Linden Blvd.	Dead End
61				15	E/S	Long St.	118 Ave.	Foch Blvd.
62				2	B/S	114 Rd.	Sutphin Blvd.	157th St.
63				10	S/S	Linden Blvd.	August Ct.	James Ct.
64				14	S/S	Linden Blvd.	Meyers Ave.	Guy Brewer Blvd.
65				8	S/S	Linden Blvd.	Sutphin Blvd.	August Ct.
66	05/07/02	Tuesday	QE07	11	B	23 Road	Watersedge Drive	215 Street
67				24	B	209 Street	14 Avenue	15 Avenue
68				43	R	Watersedge Drive	23 Avenue	23 Road
69				21	B	23 Avenue	Utopia Parkway	207 Street
70				37	B	15 Road	215 Street	Watersedge Drive
71				22	B	207 Street	23 Avenue	26 Avenue
72				23	B	14 Avenue	209 Street	Dead End
73				18	B	24 Road	202 Street	Utopia Parkway
74				32	B	15 Drive	208 Street	208 Place
75				19	B	202 Street	22 Avenue	26 Avenue
76				33	B	208 Place	15 Drive	Bell Blvd.
77				7	R	Corp. Kennedy St	23 Avenue	18 Avenue
78				28	B	208 Place	15 Drive	15 Road
79				2	R	Bell Blvd.	16 Avenue	23 Avenue (include
80				1	R	16 Avenue	212 Street	Bell Blvd.
81	05/08/02	Wednesday	QW09	16	B/S	91 Road	97 Street	96 Street
82				22	R/S	Jamaica Avenue	102 Street	Woodhaven Blvd.
83				15	L/S	96 Street	89 Avenue	Jamaica Avenue
84				5	L/S	97 Street	Jamaica Avenue	Atlantic Avenue
85				48	B/S	86 Avenue	102 Street	101 Street
86				17	B/S	91 Drive	96 Street	97 Street
87				29	B/S	86 Drive	94 Street	Woodhaven Blvd.
88				8	B/S	93 Avenue	95 Street	Woodhaven Blvd.
89				14	L/S	95 Street	89 Avenue	Jamaica Avenue
90				32	B/S	86 Road	Woodhaven Blvd.	96 Street
91				45	R/S	102 Street	85 Road	Jamaica Avenue
92				4	L/S	98 Street	Atlantic Avenue	Jamaica Avenue
93				33	B/S	85 Road	Woodhaven Blvd.	96 Street
94				6	B/S	95 Street	Atlantic Avenue	91 Avenue
95				11	L/S	94 Street	Jamaica Avenue	89 Avenue
96	05/09/02	Thursday	SI03	46	B/S	Hickory Circle	Rolling Hill Green	Dead End
97				2	R	Rolling Hill Green	Entrance	Arden Avenue
98				26	B/S	Arthur Kill Rd.	Arden Ave.	Woodrow Rd.

Appendix A - Randomly Selected Individual Truck Street Assignments (ITSAs)
used in MGP Recyclable Characterization Study

	Date	Day	District	ITSA	Pickup Side	Street	From	To
99	05/09/02	Thursday	SI02	128	B/S	Galvaston LP	Wellington Ct.	Wellington Ct.
100				129	B/S	Lott Lane	Platnium Ave.	Yukon Ave.
101				123	B/S	Wellington Ct.	Richmond Hill Rd.	Dead End
102				15	1/S	Richmond Hill	Richmond Ave.	Forest Hill Rd.
103				124	B/S	Essex Dr.	Richmond Hill Rd.	Dead End
104				105	B/S	Lamped Loop	Richmond Hill Rd.	Richmond Hill Rd.
105				107	B/S	Daffodile Lane	Lamped Loop	Lamped Loop
106				38	B/S	Stone St.	Forest Hill Rd.	Dead End
107				104	B/S	Racal Ct.	Richmond Hill Rd.	Richmond Hill Rd.
108				109	B/S	Westport	Marsh Ave.	Dead End
109				5	B/S	Buchanan	Willowbrook Rd.	Westwood Ave.
110				106	B/S	Gardenia Loop	Lamped Loop	Lamped Loop
111				110	B/S	Saturn Lane	Richmond Hill Rd.	Richmond Hill Rd.
112				113	B/S	Country Dr. No.	Dead End	Dead End
113				39	B/S	Forest Hill Rd.	Richmond Hill Rd.	Platinum Ave.
114				111	B/S	Westport Lane	Richmond Hill Rd.	Westport
115				108	B/S	Golfview	Richmond Hill Rd.	Dead End
116				24	B/S	Nehring	Klondike	Bodine
117				34	B/S	Edward Ct.	Denker	Dead End
118				35	1/S	Bradley Ave.	Willowbrook Rd.	Sunset
119	05/10/02	Friday	BKS18	6	R	Avenue J	Rockaway Parkwa	E 98 St.
120				11	R	Avenue J	E 98 St.	E 103 St.
121				1	R	Avenue J	E 103 St.	Rockaway Parkway
122				10	R	E 98th St.	Ave K	Ave J
123				9	B	E 99th St	Ave J	Ave K
124				2	R	Rockaway Parkwa	Ave J	Ave K
125				7	R	E 98th St.	Ave J	Ave K
126				4	R	Avenue K	E 103 St.	Rockaway Parkway
127				3	R	Avenue K	Rockaway Parkwa	E 103 St.
128				13	B	E 101 St.	Ave J	Ave L
129				12	R	E 102 St.	Ave L	Ave J
130				5	R	Rockaway Parkwa	Ave K	Ave J
131				8	B	E 100 St	Ave K	Ave J
132	05/11/02	Saturday	MN04	10	B/S	22nd Street	11th Ave	8th Ave
133				11	B/S	21st Street	8th Ave	10th Ave
134				14	B/S	18th Street	10th Ave	8th Ave
135				12	B/S	20th Street	11th Ave	8th Ave
136				9	B/S	23rd Street	11th Ave	9th Ave
137				8	B/S	24th Street	10th Ave	9th Ave
138				2	B/S	33rd Street	9th Ave	11th Ave
139				5	B/S	27th Street	9th Ave	11th Ave
140				16	L/S	9th Ave	26th St	17th St
141				6	B/S	26th Street	11th Ave	9th Ave
142				13	B/S	19th Street	8th Ave	11th Ave
143				3	B/S	29th Street	10th Ave	11th Ave
144				4	B/S	28th Street	11th Ave	10th Ave
145				15	B/S	10th Ave	17th St	28th St
146				18	B/S	9th Ave	34th St	17th St

Appendix A - Randomly Selected Individual Truck Street Assignments (ITSAs)
used in MGP Recyclable Characterization Study

	Date	Day	District	ITSA	Pickup Side	Street	From	To
147	05/13/02	Monday	BX12	87	L	E 224 St	White Plains Rd	Bronx Blvd
148				90	R	E 224 St	White Plains Rd	Carpenter Ave
149				78	R	Lowerre Pl	E 230 St	E 226 St
150				89	R	E 223 St	Carpenter Ave	White Plains Rd.
151				81	L	E 228 St	White Plains Rd	Carpenter Ave
152				59	R	E 222 St	White Plains Rd	Bronx Blvd
153				79	R	E 226 St	Lowerre Pl	Carpenter Ave
154				62	R	E 222 St	Carpenter Ave	White Plains Rd.
155				60	R	Bronx Blvd.	E 222 St	E 233 St
156				85	L	E 226 St	White Plains Rd	Carpenter Ave
157				70	L	E 229 St	Carpenter Ave	White Plains
158				71	R	E 226 St	White Plains Rd	Lowerre Pl
159				92	L	Barnes	E. 216th St.	E 222 St
160				76	R	E 229 St	Bronx Blvd	Carpenter Ave
161				63	R	White Plains Rd.	E 222 St	E 233 St
162				72	R	Lowerre Pl	E 226 St	E 230 St
163				74	R	E 229 St	Carpenter Ave	White Plains Rd.
164				86	L	E 223 St	Carpenter Ave	White Plains Rd.
165				65	R	E 232 St	White Plains Rd	Carpenter Ave
166				73	L	E 230 St	Lowerre Pl	Carpenter Ave
167				88	B	E 226 St	Bronx Blvd	Carpenter Ave
168				83	R	E 227 St	Lowerre Pl	Carpenter Ave
169				84	R	E 225 St	Carpenter Ave	White Plains Rd.
170				64	L	Carpenter Ave	E 233 St	E 222 St
171	05/14/02	Tuesday	BKS12	36	B	E2 St	Ave M	D.E.
172				37	B	E 3 St	Ave M	D.E.
173				33	R	Ave N	McDonald Av	Ocean Pkwy
174				35	R	Ave M	Ocean Pkwy	McDonald Ave
175				40	R	Ave N	Ocean Pkwy	McDonald Ave
176				30	L	E2 St	Ave M	Ave P
177				39	R	Ave O	McDonald Av	Ocean Pkwy
178				32	R	E 4 St	Ave L	Ave P
179				41	R	McDonald Ave	Ave P	Ave N
180				31	R	E 3 St	Ave P	Ave M
181				38	R	Ave O	Ocean Pkwy	C.I.A.
182				34	R	Ave O	Ocean Pkwy	McDonald Ave
183				23	L	E 4 St	Ave L	Ave P
184				27	R	Ocean Pkwy	Ave P	Ave M
185				25	R	E 2 St	Ave M	Ave P
186				26	L	E 3 St	Ave P	Ave M
187				29	L	E 5 St	Ave P	Ave N
188				28	B	Ryder	Ocean Pkwy	McDonald Ave
189				24	R	E 5 St	Ave P	Ave L
190	05/15/02	Wednesday	QW01	8	S	Astoria	Steinway	44 St
191				22	R	BQE	Bulova (inc taxi & li	42 St
192				28	L	50th St	25 Ave	30 Ave
193				11	R	45th St	Astoria	30 Ave
194				15	S	25th Ave	Steinway	47 St
195				3	R	43 St	30 Ave	Astoria
196				29	R	50 St	25 Ave	30 Ave
197				21	R	49 St	30 Ave	25 Ave
198				10	R	45 St	30 Ave	Astoria
199				2	R	42 St	Astoria	30 Ave
200				7	N	25 Ave	49 St	Steinway
201				24	R	49 St	Astoria	BQE
202				6	L	43 St	30 Ave	Astoria

Appendix A - Randomly Selected Individual Truck Street Assignments (ITSAs)
used in MGP Recyclable Characterization Study

	Date	Day	District	ITSA	Pickup Side	Street	From	To
203	5/16/02	Thurs	BX08	58	R	W. 246th St.	Fieldston Rd.	Livingston Ave.
204				53	R	Henry Hudson Pk	Manh. Coll. Pkwy.	W. 246th St.
205				49	B	Oxford Ave.	Tulfan Terrace	Johnson Ave.
206				54	R	W. 246th St.	Henry Hudson Pkw	Fieldston Rd.
207				56	B	W. 245th St.	Fieldston Rd.	Dead End
208				72	B	Greystone Ave.	Manh. Coll. Pkwy.	W. 240th St.
209				65	B	W. 246th St.	Tibbet Ave.	H. Hudson Ave.
210				62	B	W. 245th St.	Greystone Ave.	Waldo Ave.
211				60	B	W. 245th St.	Livingston Ave.	Greystone Ave.
212				29	L	Hudson Manor Te	W. 227th St.	W. 233rd St.
213				30	L	W. 239th St.	Hudson Manor Ter	Independence Ave.
214				31	B	Independence Av	W. 239th St.	Palisade Ave.
215	5/17/02	Friday	MN08	17	S/S	87th St.	3rd Ave.	5th Ave.
216				3	S/S	85th St.	3rd Ave.	5th Ave.
217				11	S/S	83rd St.	3rd Ave.	5th Ave.
218				15	W/S	Lexington Ave	87th St.	82nd St.
219				14	E/S	Lexington Ave	87th St.	82nd St.
220				2	N/S	84th St.	5th Ave.	3rd Ave.
221				16	N/S	87th St.	3rd Ave.	5th Ave.
222				5	N/S	86th St.	3rd Ave.	5th Ave.
223				12	E/S	Park Ave.	82nd St.	87th St.
224				8	W/S	Madison Ave.	82nd St.	87th St.
225				1	N/S	85th St.	3rd Ave.	5th Ave.
226				7	E/S	Madison Ave.	82nd St.	87th St.
227				6	E/S	5th Ave.	87th St.	82nd St.
228				4	S/S	84th St.	5th Ave.	3rd Ave.
229				10	N/S	83rd St.	3rd Ave.	5th Ave.
230				13	W/S	Park Ave.	87th St.	82nd St.
231				9	S/S	86th St.	5th Ave.	3rd Ave.

B Site-Specific Health and Safety Plan

Site-Specific Health and Safety Plan
Summary

The following text summarizes information that was provided to the sorters as part of their training.

Task Description

The fieldwork involves sorting metal, glass, and plastic items that have been collected as part of the city's recycling program. Recyclable materials are received by truck once per day. Materials are dumped in a designated area (tipping floor) of the Greenpoint Marine Transfer Station (MTS). Materials will be loaded into wheeled containers for transfer to the sorting tables. Materials will be sorted and placed into appropriate bins for weighing and recycling.

Site Description

The Greenpoint MTS facility is located in an industrial section of Brooklyn adjacent to Newtown Creek, which separates Brooklyn from Queens. It was formerly used as a barge transfer station for the municipal solid waste collected by the City of New York. The building structure has high ceilings and is fabricated with metal siding material on all its sides except for the south side. The south entrance of the Greenpoint MTS has a huge bay door through which trucks of all sizes can enter the facility. The interior of the facility is a large, open-space area (approximately 8,000 square feet) paved with asphalt. A water pit that provides barge access to the creek is located on the east and west sides of the facility, approximately 20 feet below ground level.

Safety and Health Hazards

Physical, chemical, and biological hazards may be encountered during the sorting process.

Prevention Methods

1. **Personal Protection Equipment:** Coveralls, dual protection using nitrile and leather gloves, safety glasses, dust masks, and leather boots.

2. **Immunizations:** Hepatitis A and B and Tetanus.

3. **Engineering Controls:** Safety fencing along the east and west sides of the facility to restrict any access to the water pits.

4. **Safe Work Practices:** Personnel hygiene and awareness training.

5. **Emergency Procedures:** Eyewash and first aid kit station, emergency phone numbers, fire extinguisher, and life ring locations.

Nearest Hospital
New York Methodist Hospital
894 Manhattan Avenue, Brooklyn, New York
(718) 383-3377

Notes: A more detailed description of the full health and safety plan can be found in the project work files.

C Exposure Control Plan for Blood-borne Pathogens

E & E Exposure Control Plan for Blood-Borne Pathogens

Site: Greenpoint Marine Transfer Station

Task: Sorting recyclable materials for the New York City DOS Study

The work involves sorting recyclable materials, including metal, glass and plastic, from the City of New York's commercial and residential recycling bins. Recyclable materials are received by truck once per day. The materials will be dumped in a designated area on the floor (tipping floor) within the building and then loaded into wheeled containers for transfer to the sorting tables. The materials will be sorted into appropriate categories (metal, glass, plastic, and non-recyclable materials) and placed in appropriate bins for weighing and recycling.

Hazard: Potential Medical Waste in Recyclable Material

A remote possibility exists for medical waste or drug paraphernalia (needles) to be mixed in with the recyclable material.

Methods of Compliance

Any waste suspected of being medical waste (syringes, IV bags or bottles, tubing, scalpels, clamps, gauze, surgical gloves, etc.) will be placed into a properly labeled medical waste container using the precautions outlined below.

1. **Work Practice Controls**

   a. Employees will use either hand tools or mechanical equipment when containerizing or moving potentially infectious materials in order to avoid direct body contact.

   b. All procedures involving exposure to potentially infectious materials will be performed in such a manner as to minimize splashing, spraying, spattering, and generating of dust or droplets of these substances.

   c. Employees are required to wash their hands with either an appropriate antiseptic hand cleaner and clean paper towels or antiseptic towelettes as soon as possible after removal of gloves and other protective equipment after contact with potentially infectious waste.

   d. Eating, drinking, smoking, or applying cosmetics or lip balm is prohibited in all work areas at all times, including areas where there is the potential for exposure to infectious materials.

2. Personal Protective Equipment

a. E & E requires employees to wear appropriate personal protective equipment (PPE) if the possibility of exposure to potentially infectious materials exists.

b. Required PPE includes: leather work gloves, surgical nitrile inner gloves, one-piece coverall, leather safety boots, and safety glasses.

c. Any disposable PPE that becomes contaminated with a potentially infectious material will be removed as soon as feasible and disposed of properly in a designated container.

d. Gloves that are contaminated or become torn or punctured will be replaced as soon as feasible. Disposable gloves will be worn only once.

3. Decontamination

a. Contaminated hand tools or mechanical equipment will be decontaminated with an appropriate disinfectant (i.e., soaked for 30 minutes in Clorox) followed by any required chemical decontamination solutions once work has been completed. Manual decontamination methods will be used to reduce aerosol generation.

b. Decontamination fluids and contaminated PPE will be properly discarded as a biohazard/hazardous waste or as determined by laboratory analysis.

D Examples of Database Entry Forms

ecology & environment, inc.
International Specialists in the Environment

Date: _____
Time: _____
Recorded by: _____

Recyclables Sort Study

Load Number: _____

Truck No.: _____ Load Weight: _____ Weather: _____
Truck Wt. Loaded: _____ Truck Wt. Empty: _____
District Section: _____ Sanitation District: _____
Collection Route: _____ Strata: _____
Driver Name: _____ Driver Weight: _____
Truck Type: _____ Table Number: _____

Categories:	Weight									
	Load 1	Load 2	Load 3	Load 4	Load 5	Load 6	Load 7	Load 8	Load 9	Load 10
1 **Ferrous Metals (HH Metals)**										
2 **Aluminum**										
3 **PET**										
4 **HDPE**										
5 **Non-Targeted Plastics**										
6 **Aseptic (juice boxes and milk containers)**										
7 **Glass**										
8 **Non-Targeted Glass**										
9 **All other residues**										
10 **Contaminated targeted recyclables**										

Gross Load Form is used to weigh MGP from tipping floor in 8.4 Lb bins

Date	4/29/02	District	BX07	Strata	LH							
	Gross Load 1	Gross Load 2	Gross Load 3	Gross Load 4	Gross Load 5	Gross Load 6	Gross Load 7	Gross Load 8	Gross Sum:	Bin Wt /1	Cal factor /2	Net Weight
Table 1	31.8	48.6	23.4						103.8	25.2	0.6	78.0
Table 2	25.8								25.8	8.4	0.2	17.2
Table 3	30.8	35.8							66.6	16.8	0.4	49.4
Table 4	19.4	30.2							49.6	16.8	0.4	32.4
Sum:	107.8	114.6	23.4	0	0	0	0	0	245.8	67.2	1.6	177

Note:
/1 Bin weight is equal to 8.4 lbs.
/2 calibration factor is equal to 0.2 lbs which must be netted from gross loads because of scale

Gross Load Form is used to weigh MGP from tipping floor in 8.4 Lb bins

Date	4/30/02	District	BX04	Strata	LH							
	Gross Load 1	Gross Load 2	Gross Load 3	Gross Load 4	Gross Load 5	Gross Load 6	Gross Load 7	Gross Load 8	Gross Sum:	Bin Wt /1	Cal factor /2	Net Weight
Table 1									0	8.4	0.2	-8.6
Table 2									0	8.4	0.2	-8.6
Table 3									0	8.4	0.2	-8.6
Table 4									0	8.4	0.2	-8.6
Sum:	0	0	0	0	0	0	0	0	0	33.6	0.8	-34.4

Note:
/1 Bin weight is equal to 8.4 lbs.
/2 calibration factor is equal to 0.2 lbs which must be netted from gross loads because of scale

Micro materials

Daily Total Weights

Date: _____

District: _____

	Load 1	Load 2	Load 3	Load 4	Load 5	Load 6	Load 7	Load 8	Load 9	Total Bins
Glass:										
Clear:										
Brown:										
Green:										
Refundable Aluminum Cans:										
Refundable Plastics:										
Refundable Glass:										

ACT TO SCALE REQR

ecology & environment, Inc.
International Specialists in the Environment

Date: 05-04-07
Time: 12-8 SHIFT
Recorded by: CONSOLAZIO / GRAHAM

Recyclables Sort Study

Truck No.:	25CF115	Load Weight:	3.10
Truck Wt. Loaded:	22.10	Truck Wt. Empty:	19.00
District Section:	14	Sanitation District:	BKN-1
Collection Route:	2	Strata:	L
Driver Name:	C. GUERRERO	Driver Weight:	

The **BOLDED TEN CATEGORIES** were mandated by DOS as Study Specified Material

Categories	Weight (in pounds)
Ferrous Metals (HH Metals)	
Aluminum	
PET	
HDPE	
LDPE	
Non-Targeted Plastics	
Aseptic (juice boxes and milk containers)	
Glass	
Non-Targeted Glass	
All other residues	

Work Station/Sort Table No. _____
Sort Load Number _____

BKN01

THE CITY OF NEW YORK DEPARTMENT OF SANITATION

DEPARTMENTAL RECEIPT

DS 1421 (3-99)

PCLS

SCALE	OP-ID	TRANSACTION DATE-TIME	LOAD	TRUCK ID
M680	RFREEB	050402 050939	3108	25CF-115

GROSS WEIGHT	NET WEIGHT	TARE WEIGHT	ADDL TARE	MATL TYPE	WEIGHT TYPE	WEIGHT TON RATIO
19.00	.00	19.00	.00	22	2	.0

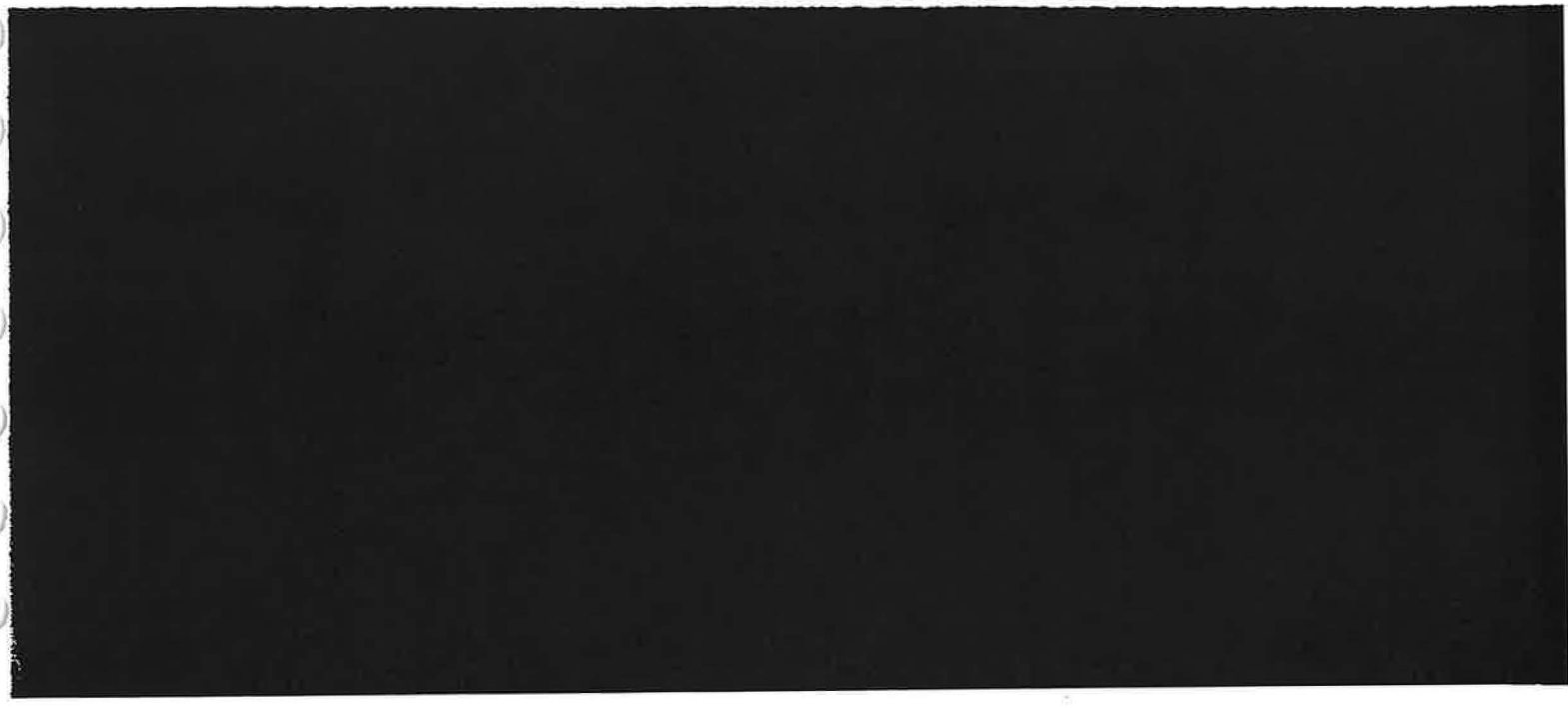
THE CITY OF NEW YORK DEPARTMENT OF SANITATION

DEPARTMENTAL RECEIPT

SCALE

SCALE	OP-ID	TRANSACTION DATE-TIME	LOAD	TRUCK ID
M680	RFREEB	050402 045111	3107	25CF-115

GROSS WEIGHT	NET WEIGHT	TARE WEIGHT	ADDL TARE	MATL TYPE	WEIGHT TYPE	WEIGHT TON RATIO
22.10	3.10	19.00	.00	22	2	.1



E Pounds of MGP by Material Category by District and Sample Count

Appendix E.1
Net Weight of MGP per Material Category by Recyclable Collection District

Weights in pounds

Material	LH BX07	LH BX04	LH MN12	LH ME03	LM BKN01	HM QE12	HM QE07	HM QW09	HL SIO3	HL SIO2	HL BKS18	MH MN04	MM BX12	MM BKS12	MM QW01	HH BX08	HH MN08	Total
Aluminum	25.8	17.0	73.5	60.4	102.0	125.6	200.1	45.6	51.5	116.2	212.7	31.7	152.8	260.1	174.7	82.6	185.3	1,917.5
Aseptic	13.3	9.2	45.8	153.6	86.8	71.5	127.3	28.3	23.3	41.0	152.4	42.7	118.6	124.4	222.1	104.9	236.2	1,601.5
Contaminated Targeted Recyclabl	72.0	95.2	349.3	80.3	130.5	211.0	174.6	34.8	105.0	249.9	255.4	64.8	190.8	176.5	208.0	54.9	259.1	2,732.0
Ferrous Metals (HH Metals)	270.0	363.4	1,160.9	430.2	327.4	1,032.3	1,111.6	519.9	268.0	554.0	1,357.6	203.5	1,878.8	1,262.6	1,334.6	521.2	1,243.3	13,839.2
Glass	405.1	286.0	695.6	706.3	1,743.2	1,065.6	1,201.4	246.7	523.5	1,219.1	1,367.1	1,145.5	1,680.3	1,314.0	1,743.6	1,756.9	4,971.2	22,071.1
HDPE	127.6	223.4	730.7	162.1	532.1	400.0	423.6	150.1	156.8	374.6	469.4	104.1	643.7	539.3	593.3	281.2	657.8	6,570.0
Non-Targeted Glass	53.9	134.1	135.0	106.9	562.0	415.1	367.1	132.9	131.3	142.9	194.1	117.4	499.2	521.0	476.5	325.4	1,498.6	5,813.3
Non-Targeted Plastics	149.4	288.6	429.0	194.0	245.2	596.5	526.3	163.6	201.7	404.6	675.6	163.3	960.9	882.0	832.0	407.0	1,260.2	8,380.0
All Other Residues	416.0	706.4	3,265.7	775.9	2,076.2	1,126.9	1,555.4	439.5	219.2	672.7	1,114.3	163.6	1,239.8	1,704.2	1,266.6	463.5	1,368.9	18,574.9
PETE	61.4	83.2	205.5	119.7	259.2	334.2	305.6	88.8	157.5	302.6	370.5	121.5	440.6	363.6	366.7	245.1	651.8	4,477.5
Total in Pounds:	1,594.3	2,206.4	7,091.2	2,789.4	6,064.7	5,378.6	5,993.3	1,649.9	1,837.7	4,077.6	6,169.1	2,176.3	7,805.5	7,147.6	7,217.9	4,242.9	12,330.2	85,977
Total in Tons:	0.8	1.1	3.5	1.4	3.0	2.7	3.0	0.9	0.9	2.0	3.1	1.1	3.9	3.6	3.6	2.1	6.2	43.0

Appendix E.2
Count of Samples By Material by District

Material	LH BX07	LH BX04	LH MN12	LH ME03	LM BKN01	HM QE12	HM QE07	HM QW09	HL SI03	HL SI02	HL BKS18	MH MN04	MM BX12	MM BKS12	MM QW01	HH BX06	HH MN06	Total:
Aluminum	10	5	16	15	34	25	43	13	23	38	41	10	30	49	33	23	47	455
Aseptic	8	5	20	29	32	25	44	9	12	21	57	15	36	35	62	31	65	506
Contaminated Targeted Recyclabl	5	7	27	7	16	12	17	7	11	17	21	8	17	17	18	5	18	230
Ferrous Metals (HH Metals)	25	27	78	44	37	70	68	27	32	68	102	21	110	76	90	47	133	1,075
Glass	20	16	37	33	81	44	60	15	28	58	65	47	70	58	76	64	177	949
HDPE	30	32	84	23	81	49	57	20	28	61	70	16	75	62	75	35	75	873
Non-Targeted Glass	6	7	8	6	19	13	14	6	12	13	15	10	24	18	23	10	46	252
Non-Targeted Plastics	37	44	75	51	65	100	120	31	46	106	135	39	148	139	161	90	296	1,683
All Other Residues	28	40	147	49	103	63	95	29	24	56	84	16	78	87	84	34	117	1,134
PETE	26	26	53	36	80	87	91	25	58	112	125	35	117	85	96	62	174	1,268
Total:	195	209	545	295	548	488	629	182	274	550	715	217	705	626	718	401	1,148	8,445

F District Level Mean Material Proportions and Confidence Intervals

Appendix F
LH Districts

Net Weights for Each Material Processed Per Day (in Pounds)
LH Stratum
MN12 - 5/1/2002

Material	Table No. 1	2	3	4	5	6	Total
Aluminum	11.32	11.11	16.91	13.98	20.15		73.47
Aseptic	12.31	9.56	9.70	8.74	5.53		45.84
Contaminated Targeted Recyclables	61.74	64.36	16.48	119.44	87.31		349.33
Ferrous Metals (HH Metals)	241.89	215.56	478.33	149.44	75.72		1,160.94
Glass	158.58	178.65	153.59	133.19	71.63		695.64
HDPE	192.06	180.51	147.43	132.30	78.41		730.71
Non-Targeted Glass	6.88	23.33	85.53	14.00	5.27		135.01
Non-Targeted Plastics	57.60	100.45	164.60	56.80	49.58		429.03
Other residues	900.72	694.33	756.14	518.83	395.71		3,265.73
PETE	57.88	54.38	35.64	37.72	19.89		205.51
Total:	1,700.98	1,532.24	1,864.35	1,184.44	809.20		7,091.21

Net Weights for Each Material Processed Per Day (Percent of Total Net Weight)
LH Stratum
MN12 - 5/1/2002

Material	Table No. 1	2	3	4	5	6	Statistical Mean	Variance	Standard Deviation	Standard Error	Lower Confidence Interval	Upper Confidence Interval
Aluminum	0.7%	0.7%	0.9%	1.2%	2.5%		1.0%	0.006%	0.8%	0.188%	0.6%	1.4%
Aseptic	0.7%	0.6%	0.5%	0.7%	0.7%		0.65%	0.000%	0.1%	0.020%	0.60%	0.69%
Cont. Target Recyc.	3.6%	4.2%	0.9%	10.1%	10.8%		4.9%	0.187%	4.3%	0.831%	3.2%	6.6%
Ferrous Metals	14.2%	14.1%	25.7%	12.6%	9.4%		16.4%	0.381%	6.2%	0.699%	15.0%	17.8%
Glass	9.3%	11.7%	8.2%	11.2%	8.9%		9.8%	0.023%	1.5%	0.248%	9.3%	10.3%
HDPE	11.3%	11.8%	7.9%	11.2%	9.7%		10.3%	0.025%	1.6%	0.173%	10.0%	10.6%
Non-Targeted Glass	0.4%	1.5%	4.6%	1.2%	0.7%		1.9%	0.029%	1.7%	0.597%	0.5%	3.3%
Non-Targeted Plastics	3.4%	6.6%	8.8%	4.8%	6.1%		6.1%	0.041%	2.0%	0.235%	5.6%	6.5%
Other residues	53.0%	45.3%	40.6%	43.8%	48.9%		46.1%	0.228%	4.8%	0.394%	45.3%	46.8%
PETE	3.4%	3.5%	1.9%	3.2%	2.5%		2.9%	0.005%	0.7%	0.095%	2.7%	3.1%
Total:	100.0%	100.0%	100.0%	100.0%	100.0%		100.0%					

Count of Bins [Samples (n) per Material Category Per Table]
LH Stratum
MN12 - 5/1/2002

Material	Table No. 1	2	3	4	5	6	Total
Aluminum	3	3	3	3	4		16
Aseptic	5	4	3	4	4		20
Cont. Target Recyc.	5	4	1	10	7		27
Ferrous Metals	16	17	24	12	9		78
Glass	9	9	7	6	6		37
HDPE	18	21	17	18	10		84
Non-Targeted Glass	1	2	2	1	2		8
Non-Targeted Plastics	9	18	29	11	8		75
Other residues	42	28	31	26	20		147
PETE	14	13	9	11	6		53
Total:	122	119	126	102	76		545

Appendix F
LH Districts

Net Weights for Each Material Processed Per Day (in Pounds)
LH Stratum
ME03 - 5/3/2002

Material	Table No. 1	2	3	4	5	6	Total
Aluminum	17.28	4.98	15.96		22.16		60.38
Aseptic	92.22	3.46	46.72		11.22		153.62
Contaminated Targeted Recyclables	28.22	5.12	34.88		12.08		80.30
Ferrous Metals (HH Metals)	164.40	18.92	200.30		46.58		430.20
Glass	215.26	72.44	292.50		126.12		706.32
HDPE	55.75	24.32	64.66		17.4		162.13
Non-Targeted Glass	11.42	5.06	66.94		23.44		106.86
Non-Targeted Plastics	42.2	26.98	110.66		14.14		193.98
Other residues	289.72	77.52	257.22		151.46		775.92
PETE	36.63	22.38	36.60		24.1		119.71
Total:	953.10	261.18	1126.44	0.00	448.70		2,789.42

Net Weights for Each Material Processed Per Day (Percent of Total Net Weight)
LH Stratum
ME03 - 5/3/2002

Material	Table No. 1	2	3	4	5	6	Statistical Mean	Variance	Standard Deviation	Standard Error	Lower Confidence Interval	Upper Confidence Inter
Aluminum	1.8%	1.9%	1.4%		4.9%		2.2%	0.026%	1.6%	0.420%	1.3%	%
Aseptic	9.7%	1.3%	4.1%		2.5%		5.5%	0.137%	3.7%	0.686%	4.10%	6.91%
Cont. Target Recyc.	3.0%	2.0%	3.1%		2.7%		2.9%	0.003%	0.5%	0.192%	2.4%	3.3%
Ferrous Metals	17.2%	7.2%	17.8%		10.4%		15.4%	0.269%	5.2%	0.782%	13.8%	%
Glass	22.6%	27.7%	26.0%		28.1%		25.3%	0.064%	2.5%	0.439%	24.4%	%
HDPE	5.8%	9.3%	5.7%		3.9%		5.8%	0.051%	2.3%	0.473%	4.8%	6.8%
Non-Targeted Glass	1.2%	1.9%	5.9%		5.2%		3.8%	0.056%	2.4%	0.833%	1.9%	5.8%
Non-Targeted Plastics	4.4%	10.3%	9.8%		3.2%		7.0%	0.135%	3.7%	0.514%	5.9%	%
Other residues	30.4%	29.7%	22.8%		33.8%		27.8%	0.210%	4.6%	0.654%	26.5%	%
PETE	3.8%	8.6%	3.2%		5.4%		4.3%	0.057%	2.4%	0.397%	3.5%	5.1%
Total:	100.0%	100.0%	100.0%		100.0%		100.0%					

Count of Bins [Samples (n) per Material Category Per Table]
LH Stratum
ME03 - 5/3/2002

Material	Table No. 1	2	3	4	5	6	Total
Aluminum	6	2	5		2		15
Aseptic	14	2	9		4		29
Cont. Target Recyc.	3	1	2		1		7
Ferrous Metals	21	2	16		5		44
Glass	13	3	11		6		33
HDPE	9	4	8		2		23
Non-Targeted Glass	2	1	2		3		8
Non-Targeted Plastics	13	6	29		3		51
Other residues	24	3	15		7		49
PETE	12	7	12		5		36
Total:	117	31	109	0	38		295

Appendix F
LH Districts

LH Stratum Summary	Table No.==========>						
Material	1	2	3	4	5	6	Total
Aluminum	40.98	28.34	47.85	16.96	42.31		176.44
Aseptic	112.91	19.94	61.80	10.53	16.75		221.93
Contaminated Targeted Recyc	140.14	93.96	98.55	164.83	99.39		596.87
Ferrous Metals (HH Metals)	617.00	347.29	925.72	212.20	122.30		2,224.51
Glass	612.46	410.25	656.62	215.97	197.75		2,093.05
HDPE	352.40	306.58	308.71	180.29	95.81		1,243.79
Non-Targeted Glass	59.24	77.71	215.79	48.34	28.71		429.79
Non-Targeted Plastics	221.00	265.82	389.70	120.74	63.72		1,060.98
Other residues	1,723.03	922.75	1,288.46	684.66	547.17		5,166.07
PETE	144.90	115.96	104.57	60.45	43.99		469.87
Total:	4,024.06	2,588.60	4,097.77	1,714.97	1,257.90		13,683.30

LH Summary	Table No.==========>										Lower	Upper
							Statistical		Standard	Standard	Confidence	Confidence
Material	1	2	3	4	5	6	Mean	Variance	Deviation	Error	Interval	Interval
Aluminum	1.0%	1.1%	1.2%	1.0%	3.4%		1.3%	0.011%	1.0%	0.152%	1.0%	1.6%
Aseptic	2.8%	0.8%	1.5%	0.6%	1.3%		1.6%	0.008%	0.9%	0.110%	1.40%	1.84%
Cont. Target Recyc.	3.5%	3.6%	2.4%	9.6%	7.9%		4.4%	0.099%	3.2%	0.465%	3.4%	5.3%
Ferrous Metals	15.3%	13.4%	22.6%	12.4%	9.7%		16.3%	0.236%	4.9%	0.368%	15.5%	17.0%
Glass	15.2%	15.8%	16.0%	12.6%	15.7%		15.3%	0.020%	1.4%	0.138%	15.0%	15.6%
HDPE	8.8%	11.8%	7.5%	10.5%	7.6%		9.1%	0.035%	1.9%	0.145%	8.8%	9.4%
Non-Targeted Glass	1.5%	3.0%	5.3%	2.8%	2.3%		3.1%	0.020%	1.4%	0.263%	2.6%	3.7%
Non-Targeted Plastics	5.5%	10.3%	9.5%	7.0%	5.1%		7.8%	0.055%	2.3%	0.163%	7.4%	8.1%
Other residues	42.8%	35.6%	31.4%	39.9%	43.5%		37.8%	0.259%	5.1%	0.313%	37.1%	38.4%
PETE	3.6%	4.5%	2.6%	3.5%	3.5%		3.4%	0.005%	0.7%	0.057%	3.3%	3.5%
Total:	100.0%	100.0%	100.0%		100.0%		100.0%					

LH Summary	Table No.==========>						
Material	1	2	3	4	5	6	Total
Aluminum	14	8	13	5	6		46
Aseptic	24	9	16	5	8		62
Cont. Target Recyc.	13	7	6	12	8		46
Ferrous Metals	53	32	56	19	14		174
Glass	34	20	29	11	12		106
HDPE	46	43	41	27	12		169
Non-Targeted Glass	7	6	8	3	5		29
Non-Targeted Plastics	41	48	86	21	11		207
Other residues	91	41	68	37	27		264
PETE	45	33	34	18	11		141
Total:	368	247	357	158	114		1244

Appendix F
LM Districts

Net Weights for Each Material Processed Per Day (in Pounds)
LM Stratum
BKN01 - 5/4/2002 Table No.==========>

Material	1	2	3	4	5	6	Total
Aluminum	24.69	22.67	35.10	5.33	14.19		101.98
Aseptic	21.35	18.65	18.88	8.88	19.05		86.81
Contaminated Targeted Rec	26.53	15.92	9.39	9.25	69.38		130.47
Ferrous Metals (HH Metals)	88.71	76.68	108.97	14.90	38.15		327.41
Glass	515.57	344.47	325.97	173.63	383.59		1,743.23
HDPE	130.52	112.31	117.81	60.18	111.32		532.14
Non-Targeted Glass	28.80	19.89	382.94	53.42	76.96		562.01
Non-Targeted Plastics	45.94	42.68	90.32	38.04	28.26		245.24
Other residues	765.53	573.26	395.19	35.87	306.38		2,076.23
PETE	61.27	55.26	68.30	19.98	54.41		259.22
Total:	1,708.91	1,281.79	1,552.87	419.48	1,101.69		6,064.74

Net Weights for Each Material Processed Per Day (Percent of Total Net Weight)
LM Stratum
BKN01 - 5/4/2002 Table No.==========>

Material	1	2	3	4	5	6	Statistical Mean	Variance	Standard Deviation	Standard Error	Lower Confidence Interval	Upper Confidence Interval
Aluminum	1.4%	1.8%	2.3%	1.3%	1.3%		1.7%	0.002%	0.4%	0.071%	1.5%	1.8%
Aseptic	1.2%	1.5%	1.2%	2.1%	1.7%		1.4%	0.001%	0.4%	0.066%	1.30%	1.57%
Cont. Target Recyc.	1.6%	1.2%	0.6%	2.2%	6.3%		2.2%	0.051%	2.3%	0.566%	0.9%	[illegible]
Ferrous Metals	5.2%	6.0%	7.0%	3.6%	3.5%		5.4%	0.024%	1.5%	0.254%	4.9%	[illegible]
Glass	30.2%	26.9%	21.0%	41.4%	34.8%		28.7%	0.601%	7.8%	0.861%	27.0%	30.5%
HDPE	7.6%	8.8%	7.6%	14.3%	10.1%		8.8%	0.078%	2.8%	0.311%	8.2%	9.4%
Non-Targeted Glass	1.7%	1.6%	24.7%	12.7%	7.0%		9.3%	0.927%	9.6%	2.209%	4.6%	1[illegible]
Non-Targeted Plastics	2.7%	3.3%	5.8%	9.1%	2.6%		4.0%	0.077%	2.8%	0.344%	3.4%	4.[illegible]
Other residues	44.8%	44.7%	25.4%	8.6%	27.8%		34.2%	2.302%	15.2%	1.495%	31.2%	37.2%
PETE	3.6%	4.3%	4.4%	4.8%	4.9%		4.3%	0.003%	0.5%	0.058%	4.2%	4.4%
Total:	100.0%	100.0%	100.0%	100.0%	100.0%		100.0%					

Count of Bins [Samples (n) per Material Category Per Table]
LM Stratum
BKN01 - 5/4/2002 Table No.==========>

Material	1	2	3	4	5	6	Total
Aluminum	9	8	9	2	6		34
Aseptic	7	7	7	3	8		32
Cont. Target Recyc.	4	2	2	2	6		16
Ferrous Metals	11	8	9	2	7		37
Glass	24	17	14	7	19		81
HDPE	21	16	17	9	18		81
Non-Targeted Glass	2	2	8	2	5		19
Non-Targeted Plastics	14	10	25	7	9		65
Other residues	39	19	23	4	18		103
PETE	19	16	18	7	20		80
Total:	150	105	132	45	116		548

Appendix F
HM Districts

Net Weights for Each Material Processed Per Day (in Pounds)

HM Stratum QE12 - 5/6/2002 Material	Table No. 1	2	3	4	5	6	Total
Aluminum	14.75	29.23	22.40	18.25	19.68	21.32	125.63
Aseptic	14.04	15.75	10.13	9.01	7.23	15.36	71.52
Contaminated Targeted Recycl	35.32	17.55	13.24	44.05	18.36	82.50	211.02
Ferrous Metals (HH Metals)	172.51	189.79	150.61	147.86	138.75	232.73	1,032.25
Glass	265.19	228.66	136.34	125.93	125.00	184.52	1,065.64
HDPE	91.21	113.17	37.36	54.19	41.04	63.05	400.02
Non-Targeted Glass	4.85	10.17	11.35	131.06	131.08	126.56	415.07
Non-Targeted Plastics	127.15	109.99	60.07	80.66	79.98	138.69	596.54
Other residues	399.66	209.84	121.45	103.27	88.53	204.13	1,126.88
PETE	70.72	59.25	51.37	47.04	41.56	64.30	334.24
Total:	1,195.40	983.40	614.32	761.32	691.21	1,133.16	5,378.81

Net Weights for Each Material Processed Per Day (Percent of Total Net Weight)

HM Stratum QE12 - 5/6/2002 Material	Table No. 1	2	3	4	5	6	Statistical Mean	Variance	Standard Deviation	Standard Error	Lower Confidence Interval	Upper Confidence Interval
Aluminum	1.2%	3.0%	3.6%	2.4%	2.8%	1.9%	2.3%	0.007%	0.9%	0.171%	2.0%	2.7%
Aseptic	1.2%	1.6%	1.6%	1.2%	1.0%	1.4%	1.3%	0.001%	0.2%	0.049%	1.23%	1.43%
Cont. Target Recyc.	3.0%	1.8%	2.2%	5.8%	2.7%	7.3%	3.9%	0.050%	2.2%	0.643%	2.5%	5.3%
Ferrous Metals	14.4%	19.3%	24.5%	19.4%	20.1%	20.5%	19.2%	0.104%	3.2%	0.386%	18.4%	20.0%
Glass	22.2%	23.3%	22.2%	16.5%	18.1%	16.3%	19.8%	0.098%	3.1%	0.473%	18.9%	20.8%
HDPE	7.6%	11.5%	6.1%	7.1%	5.9%	5.6%	7.4%	0.048%	2.2%	0.314%	6.8%	8.1%
Non-Targeted Glass	0.4%	1.0%	1.8%	17.2%	19.0%	11.2%	7.7%	0.716%	8.5%	2.347%	2.6%	12.8%
Non-Targeted Plastics	10.6%	11.2%	9.8%	10.6%	11.6%	12.2%	11.1%	0.007%	0.9%	0.086%	10.9%	11.3%
Other residues	33.4%	21.3%	19.8%	13.6%	12.8%	18.0%	21.0%	0.558%	7.5%	0.941%	19.1%	22.8%
PETE	5.9%	6.0%	8.4%	6.2%	6.0%	5.7%	6.2%	0.010%	1.0%	0.107%	6.0%	6.4%
Total:	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%					

Count of Bins [Samples (n) per Material Category Per Table]

HM Stratum QE12 - 5/6/2002 Material	Table No. 1	2	3	4	5	6	Total
Aluminum	4	5	3	4	4	5	25
Aseptic	5	5	3	4	3	5	25
Cont. Target Recyc.	2	2	1	3	1	3	12
Ferrous Metals	14	13	9	10	10	14	70
Glass	11	9	6	5	6	7	44
HDPE	11	14	5	6	5	8	49
Non-Targeted Glass	1	1	1	4	3	3	13
Non-Targeted Plastics	22	16	10	15	14	23	100
Other residues	17	11	9	8	6	12	63
PETE	18	15	14	13	10	17	87
Total:	105	91	61	72	62	97	488

Appendix F
HM Districts

Net Weights for Each Material Processed Per Day (in Pounds)
HM Stratum
QE07 - 5/7/2002 Table No.==========>

Material	1	2	3	4	5	Total
Aluminum	48.14	31.19	51.86	40.27	28.66	200.12
Aseptic	32.45	28.49	25.96	21.34	19.10	127.34
Contaminated Targetec	35.83	38.81	33.05	27.59	39.36	174.64
Ferrous Metals (HH Me	297.95	184.03	293.68	197.76	138.20	1,111.62
Glass	257.19	245.07	318.14	194.83	186.19	1,201.42
HDPE	100.43	96.03	66.85	104.94	55.51	423.76
Non-Targeted Glass	10.62	30.51	165.34	87.06	73.58	367.11
Non-Targeted Plastics	152.65	137.55	112.96	46.52	76.62	526.30
Other residues	468.80	265.18	364.62	191.78	265.00	1,555.38
PETE	88.71	61.26	59.97	56.10	39.60	305.64
Total:	1,492.77	1,118.12	1,492.43	968.19	921.82	5,993.33

Net Weights for Each Material Processed Per Day (Percent of Total Net Weight)
HM Stratum
QE07 - 5/7/2002 Table No.==========>

Material	1	2	3	4	5	6	Statistical Mean	Variance	Standard Deviation	Standard Error	Lower Confidence Interval	Upr Confi e Interval
Aluminum	3.2%	2.8%	3.5%	4.2%	3.1%		3.3%	0.003%	0.5%	0.078%	3.2%	3.5%
Aseptic	2.2%	2.5%	1.7%	2.2%	2.1%		2.1%	0.001%	0.3%	0.044%	2.04%	%
Cont. Target Recyc.	2.4%	3.5%	2.2%	2.8%	4.3%		2.9%	0.007%	0.8%	0.204%	2.5%	.3%
Ferrous Metals	20.0%	16.5%	19.7%	20.4%	15.0%		18.5%	0.059%	2.4%	0.258%	18.0%	19.1%
Glass	17.2%	21.9%	21.3%	20.1%	20.2%		20.0%	0.033%	1.8%	0.233%	19.6%	20.5%
HDPE	6.7%	8.6%	4.5%	10.8%	6.0%		7.1%	0.060%	2.5%	0.325%	6.4%	%
Non-Targeted Glass	0.7%	2.7%	11.1%	9.0%	8.0%		6.1%	0.192%	4.4%	1.172%	3.6%	8.7%
Non-Targeted Plastics	10.2%	12.3%	7.6%	4.8%	8.3%		8.8%	0.080%	2.8%	0.258%	8.3%	9.3%
Other residues	31.4%	23.7%	24.4%	19.8%	28.7%		26.0%	0.205%	4.5%	0.465%	25.0%	%
PETE	5.9%	5.5%	4.0%	5.8%	4.3%		5.1%	0.008%	0.9%	0.093%	4.9%	%
Total:	100.0%	100.0%	100.0%	100.0%	100.0%		100.0%					

Count of Bins [Samples (n) per Material Category Per Table]
HM Stratum
QE07 - 5/7/2002 Table No.==========>

Material	1	2	3	4	5	6	Total
Aluminum	13	9	7	7	7		43
Aseptic	12	10	8	7	7		44
Cont. Target Recyc.	5	3	2	2	5		17
Ferrous Metals	25	19	16	15	13		88
Glass	16	13	13	9	9		60
HDPE	13	13	9	14	8		57
Non-Targeted Glass	1	3	5	2	3		14
Non-Targeted Plastics	35	30	27	12	16		120
Other residues	38	16	13	11	17		95
PETE	26	19	18	15	13		91
Total:	184	135	118	94	98		629

Appendix F
HM Districts

Net Weights for Each Material Processed Per Day (in Pounds)

HM Stratum
QW09 - 5/8/2002 Table No.==========>

Material	1	2	3	4	5	Total
Aluminum	8.22	9.28	9.80	7.45	10.80	45.55
Aseptic	6.70	8.78		6.01	6.79	28.28
Contaminated Targeted Re	10.12		7.91	4.71	11.86	34.60
Ferrous Metals (HH Metals	178.08	82.75	96.38	38.34	124.32	519.87
Glass	48.72	58.41	43.56	43.96	52.02	246.67
HDPE	45.33	39.84	18.12	19.25	27.60	150.14
Non-Targeted Glass	0.96	16.79	39.16	4.42	71.56	132.89
Non-Targeted Plastics	35.71	48.15	27.51	18.88	33.36	163.61
Other residues	140.01	92.42	133.50	47.54	26.00	439.47
PETE	26.54	16.90	13.60	15.05	16.72	88.81
Total:	500.39	373.32	389.54	205.61	381.03	1,849.89

Net Weights for Each Material Processed Per Day (Percent of Total Net Weight)

HM Stratum
QW09 - 5/8/2002 Table No.==========>

Material	1	2	3	4	5	6	Statistical Mean	Variance	Standard Deviation	Standard Error	Lower Confidence Interval	Upper Confidence Interval
Aluminum	1.6%	2.5%	2.5%	3.6%	2.8%		2.5%	0.005%	0.7%	0.198%	2.0%	2.9%
Aseptic	1.3%	2.4%	0.0%	2.9%	1.8%		1.5%	0.012%	1.1%	0.371%	0.67%	2.38%
Cont. Target Recyc.	2.0%	0.0%	2.0%	2.3%	3.1%		1.9%	0.013%	1.1%	0.434%	0.8%	2.9%
Ferrous Metals	35.6%	22.2%	24.7%	18.6%	32.6%		28.1%	0.508%	7.1%	1.372%	25.3%	30.9%
Glass	9.7%	15.6%	11.2%	21.4%	13.7%		13.3%	0.207%	4.6%	1.175%	10.8%	15.9%
HDPE	9.1%	10.7%	4.7%	9.4%	7.2%		8.1%	0.054%	2.3%	0.521%	7.0%	9.2%
Non-Targeted Glass	0.2%	4.5%	10.1%	2.1%	18.8%		7.2%	0.560%	7.5%	3.056%	-0.7%	15.0%
Non-Targeted Plastics	7.1%	12.9%	7.1%	9.2%	8.8%		8.8%	0.056%	2.4%	0.426%	8.0%	9.7%
Other residues	28.0%	24.8%	34.3%	23.1%	6.8%		23.8%	1.040%	10.2%	1.893%	19.9%	27.6%
PETE	5.3%	4.5%	3.5%	7.3%	4.4%		4.8%	0.021%	1.4%	0.289%	4.2%	5.4%
Total:	100.0%	100.0%	100.0%	100.0%	100.0%		100.0%					

Count of Bins [Samples (n) per Material Category Per Table]

HM Stratum
QW09 - 5/8/2002 Table No.==========>

Material	1	2	3	4	5	6	Total
Aluminum	3	3	2	2	3		13
Aseptic	2	3		2	2		9
Cont. Target Recyc.	2		1	2	2		7
Ferrous Metals	7	6	5	4	5		27
Glass	3	4	2	3	3		15
HDPE	5	6	2	3	4		20
Non-Targeted Glass	1	1	1	1	2		6
Non-Targeted Plastics	8	7	5	5	6		31
Other residues	11	6	6	4	2		29
PETE	6	5	4	4	6		25
Total:	48	41	28	30	35		182

Appendix F
HM Districts

HM Stratum Summary	Table No.==========>						
Material	1	2	3	4	5	6	Total
Aluminum	71.11	69.70	84.06	65.97	59.14	21.32	371.30
Aseptic	53.19	53.02	36.09	36.36	33.12	15.36	227.14
Contaminated Targeted Recycl	81.27	56.36	54.20	76.35	69.58	82.50	420.26
Ferrous Metals (HH Metals)	648.54	456.57	540.67	383.96	401.27	232.73	2,663.74
Glass	571.10	532.14	498.04	364.72	363.21	184.52	2,513.73
HDPE	236.97	249.04	122.33	178.38	124.15	63.05	973.92
Non-Targeted Glass	16.43	57.47	215.85	222.54	276.22	126.56	915.07
Non-Targeted Plastics	315.51	295.69	200.54	146.06	189.96	138.69	1,286.45
Other residues	1,008.47	567.44	619.57	342.59	379.53	204.13	3,121.73
PETE	185.97	137.41	124.94	118.19	97.88	64.30	728.69
Total:	3,188.56	2,474.84	2,496.29	1,935.12	1,994.06	1,133.16	13,222.03

HM Summary	Table No.==========>						Statistical		Standard	Standard	Lower Confidence	Upper Confide...
Material	1	2	3	4	5	6	Mean	Variance	Deviation	Error	Interval	Interval
Aluminum	2.2%	2.8%	3.4%	3.4%	3.0%	1.9%	2.8%	0.004%	0.6%	0.068%	2.7%	2.9%
Aseptic	1.7%	2.1%	1.4%	1.9%	1.7%	1.4%	1.7%	0.001%	0.3%	0.033%	1.65%	1.[illegible]
Cont. Target Recyc.	2.5%	2.3%	2.2%	3.9%	3.5%	7.3%	3.2%	0.037%	1.9%	0.321%	2.5%	3.[illegible]
Ferrous Metals	20.3%	18.4%	21.7%	19.8%	20.1%	20.5%	20.1%	0.011%	1.0%	0.077%	20.0%	20.3%
Glass	17.9%	21.5%	20.0%	18.8%	18.2%	16.3%	19.0%	0.032%	1.8%	0.164%	18.7%	19.3%
HDPE	7.4%	10.1%	4.9%	9.2%	6.2%	5.6%	7.4%	0.042%	2.1%	0.184%	7.0%	7
Non-Targeted Glass	0.5%	2.3%	8.6%	11.5%	13.9%	11.2%	6.9%	0.290%	5.4%	0.938%	5.0%	8.[illegible]
Non-Targeted Plastics	9.9%	11.9%	8.0%	7.5%	9.5%	12.2%	9.7%	0.038%	1.9%	0.122%	9.5%	10.0%
Other residues	31.6%	22.9%	24.8%	17.7%	19.0%	18.0%	23.6%	0.288%	5.4%	0.392%	22.8%	24.4%
PETE	5.8%	5.6%	5.0%	6.1%	4.9%	5.7%	5.5%	0.002%	0.5%	0.033%	5.4%	5
Total:	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%					

HM Summary	Table No.==========>						
Material	1	2	3	4	5	6	Total
Aluminum	20	17	12	13	14	5	81
Aseptic	19	18	11	13	12	5	78
Cont. Target Recyc.	9	5	4	7	8	3	36
Ferrous Metals	46	38	30	29	28	14	185
Glass	30	26	21	17	18	7	119
HDPE	29	33	16	23	17	8	126
Non-Targeted Glass	3	5	7	7	8	3	33
Non-Targeted Plastics	65	53	42	32	36	23	251
Other residues	66	33	28	23	25	12	187
PETE	50	39	36	32	29	17	203
Total:	337	267	207	196	195	97	1299

Appendix F
HL Districts

Net Weights for Each Material Processed Per Day (in Pounds)
HL Stratum
SI03 - 5/9/2002

Material	Table No. 1	2	3	4	5	6	Total
Aluminum	8.49	12.34	13.74	7.51	9.45		51.53
Aseptic	4.02	9.18	0.92	3.44	5.74		23.30
Contaminated Targeted Recycl	24.86	24.64	2.66	15.73	37.07		104.96
Ferrous Metals (HH Metals)	69.99	46.50	49.03	46.29	56.20		268.01
Glass	124.81	102.51	97.02	68.55	130.60		523.49
HDPE	43.90	26.53	31.32	36.58	18.44		156.77
Non-Targeted Glass	27.17	11.14	24.94	12.38	55.68		131.31
Non-Targeted Plastics	37.75	64.90	35.61	26.62	36.84		201.72
Other residues	65.07	37.57	65.01	15.10	36.43		219.18
PETE	51.51	30.35	26.94	25.10	23.57		157.47
Total:	457.57	365.66	347.19	257.30	410.02		1,837.74

Net Weights for Each Material Processed Per Day (Percent of Total Net Weight)
HL Stratum
SI03 - 5/9/2002

Material	Table No. 1	2	3	4	5	6	Statistical Mean	Variance	Standard Deviation	Standard Error	Lower Confidence Interval	Upper Confidence Interval
Aluminum	1.9%	3.4%	4.0%	2.9%	2.3%		2.8%	0.007%	0.8%	0.174%	2.4%	3.2%
Aseptic	0.9%	2.5%	0.3%	1.3%	1.4%		1.3%	0.007%	0.8%	0.238%	0.74%	1.79%
Cont. Target Recyc.	5.4%	6.7%	0.8%	6.1%	9.0%		5.7%	0.092%	3.0%	0.914%	3.7%	7.7%
Ferrous Metals	15.3%	12.7%	14.1%	18.0%	13.7%		14.6%	0.041%	2.0%	0.358%	13.9%	15.3%
Glass	27.3%	28.0%	27.9%	26.6%	31.9%		28.5%	0.041%	2.0%	0.385%	27.7%	29.3%
HDPE	9.6%	7.3%	9.0%	14.2%	4.5%		8.5%	0.127%	3.6%	0.674%	7.1%	9.9%
Non-Targeted Glass	5.9%	3.0%	7.2%	4.8%	13.6%		7.1%	0.162%	4.0%	1.162%	4.6%	9.7%
Non-Targeted Plastics	8.3%	17.7%	10.3%	10.3%	9.0%		11.0%	0.145%	3.8%	0.562%	9.8%	12.1%
Other residues	14.2%	10.3%	18.7%	5.9%	8.9%		11.9%	0.249%	5.0%	1.019%	9.8%	14.0%
PETE	11.3%	8.3%	7.8%	9.8%	5.7%		8.6%	0.043%	2.1%	0.273%	8.0%	9.1%
Total:	100.0%	100.0%	100.0%	100.0%	100.0%		100.0%					

Count of Bins [Samples (n) per Material Category Per Table]
HL Stratum
SI03 - 5/9/2002

Material	Table No. 1	2	3	4	5	6	Total
Aluminum	4	6	6	3	4		23
Aseptic	2	4	1	2	3		12
Cont. Target Recyc.	2	3	1	2	3		11
Ferrous Metals	7	6	6	6	7		32
Glass	6	6	5	4	7		28
HDPE	7	5	5	7	4		28
Non-Targeted Glass	3	2	1	2	4		12
Non-Targeted Plastics	9	10	10	7	10		46
Other residues	8	5	5	3	3		24
PETE	15	11	11	11	10		58
Total:	63	58	51	47	55		274

Appendix F
HL Districts

Net Weights for Each Material Processed Per Day (in Pounds)
HL Stratum
SI02 - 5/9/2002 Table No.==========>

Material	1	2	3	4	5	6	Total
Aluminum	27.80	24.90	24.62	25.11	13.80		116.23
Aseptic	5.83	9.56	7.94	10.50	7.19		41.02
Contaminated Targeted Re	31.64	59.55	42.25	52.12	64.36		249.92
Ferrous Metals (HH Metals)	107.46	121.03	140.79	108.66	76.07		554.01
Glass	239.30	261.63	288.58	259.31	170.23		1,219.05
HDPE	62.54	97.25	91.87	72.73	50.21		374.60
Non-Targeted Glass	5.18	15.36	51.92	34.10	36.30		142.86
Non-Targeted Plastics	63.67	113.96	98.01	80.22	48.76		404.62
Other residues	102.78	170.54	169.91	123.44	105.98		672.65
PETE	62.20	74.14	56.65	69.68	39.93		302.60
Total:	708.40	947.92	972.54	835.87	612.83		4,077.56

Net Weights for Each Material Processed Per Day (Percent of Total Net Weight)
HL Stratum
SI02 - 5/9/2002 Table No.==========>

Material	1	2	3	4	5	6	Statistical Mean	Variance	Standard Deviation	Standard Error	Lower Confidence Interval	Upper Confid Interva
Aluminum	3.9%	2.6%	2.5%	3.0%	2.3%		2.9%	0.004%	0.6%	0.105%	2.6%	3.1%
Aseptic	0.8%	1.0%	0.8%	1.3%	1.2%		1.0%	0.000%	0.2%	0.044%	0.92%	1.1
Cont. Target Recyc.	4.5%	6.3%	4.3%	6.2%	10.5%		6.1%	0.062%	2.5%	0.604%	4.8%	7
Ferrous Metals	15.2%	12.8%	14.5%	13.0%	12.4%		13.6%	0.014%	1.2%	0.145%	13.3%	13.9%
Glass	33.8%	27.6%	29.7%	31.0%	27.8%		29.9%	0.065%	2.6%	0.336%	29.2%	30.6%
HDPE	8.8%	10.3%	9.4%	8.7%	8.2%		9.2%	0.006%	0.8%	0.102%	9.0%	9
Non-Targeted Glass	0.7%	1.6%	5.3%	4.1%	5.9%		3.5%	0.052%	2.3%	0.632%	2.1%	4
Non-Targeted Plastics	9.0%	12.0%	10.1%	9.6%	8.0%		9.9%	0.023%	1.5%	0.146%	9.6%	10.2%
Other residues	14.5%	18.0%	17.5%	14.8%	17.3%		16.5%	0.027%	1.6%	0.219%	16.1%	16.9%
PETE	8.8%	7.8%	5.8%	8.3%	6.5%		7.4%	0.016%	1.2%	0.118%	7.2%	7
Total:	100.0%	100.0%	100.0%	100.0%	100.0%		100.0%					

Count of Bins [Samples (n) per Material Category Per Table]
HL Stratum
SI02 - 5/9/2002 Table No.==========>

Material	1	2	3	4	5	6	Total
Aluminum	8	9	8	8	5		38
Aseptic	2	6	4	5	4		21
Cont. Target Recyc.	2	4	3	3	5		17
Ferrous Metals	11	16	17	14	10		68
Glass	11	14	12	12	9		58
HDPE	10	16	15	11	9		61
Non-Targeted Glass	1	3	2	3	4		13
Non-Targeted Plastics	17	25	31	19	14		106
Other residues	9	12	14	11	10		56
PETE	21	28	23	23	17		112
Total:	92	133	129	109	87		550

Appendix F
HL Districts

Net Weights for Each Material Processed Per Day (in Pounds)
HL Stratum
BKS18 - 5/10/2002 Table No.==========>

Material	1	2	3	4	5	6	Total
Aluminum	44.28	98.15	33.15	29.47	7.60		212.65
Aseptic	34.82	32.38	41.16	34.17	9.91		152.44
Contaminated Targeted Recycl	35.83	50.35	43.48	65.27	60.49		255.42
Ferrous Metals (HH Metals)	416.22	249.57	189.18	199.83	302.80		1,357.60
Glass	395.90	298.13	282.61	307.85	82.59		1,367.08
HDPE	97.37	108.03	94.96	132.35	36.71		469.42
Non-Targeted Glass	26.67	47.40	76.61	31.97	11.45		194.10
Non-Targeted Plastics	165.40	185.87	156.29	115.19	52.86		675.61
Other residues	337.10	217.61	198.10	244.59	116.91		1,114.31
PETE	110.15	84.21	68.72	75.55	31.88		370.51
Total:	1,663.74	1,371.70	1,184.26	1,236.24	713.20		6,169.14

Net Weights for Each Material Processed Per Day (Percent of Total Net Weight)
HL Stratum
BKS18 - 5/10/2002 Table No.==========>

Material	1	2	3	4	5	6	Statistical Mean	Variance	Standard Deviation	Standard Error	Lower Confidence Interval	Upper Confidence Interval
Aluminum	2.7%	7.2%	2.8%	2.4%	1.1%		3.4%	0.053%	2.3%	0.361%	2.7%	4.2%
Aseptic	2.1%	2.4%	3.5%	2.8%	1.4%		2.5%	0.006%	0.8%	0.103%	2.26%	2.68%
Cont. Target Recyc.	2.2%	3.7%	3.7%	5.3%	8.5%		4.1%	0.058%	2.4%	0.526%	3.0%	5.2%
Ferrous Metals	25.0%	18.2%	16.0%	16.2%	42.5%		22.0%	1.251%	11.2%	1.107%	19.8%	24.2%
Glass	23.8%	21.7%	23.9%	24.9%	11.6%		22.2%	0.301%	5.5%	0.680%	20.8%	23.5%
HDPE	5.9%	7.9%	8.0%	10.7%	5.1%		7.6%	0.047%	2.2%	0.260%	7.1%	8.1%
Non-Targeted Glass	1.6%	3.5%	6.5%	2.6%	1.6%		3.1%	0.041%	2.0%	0.520%	2.0%	4.3%
Non-Targeted Plastics	9.9%	13.6%	13.2%	9.3%	7.4%		11.0%	0.069%	2.6%	0.226%	10.5%	11.4%
Other residues	20.3%	15.9%	16.7%	19.8%	16.4%		18.1%	0.042%	2.1%	0.224%	17.6%	18.5%
PETE	6.6%	6.1%	5.8%	6.1%	4.5%		6.0%	0.007%	0.8%	0.073%	5.9%	6.1%
Total:	100.0%	100.0%	100.0%	100.0%	100.0%		100.0%					

Count of Bins [Samples (n) per Material Category Per Table]
HL Stratum
BKS18 - 5/10/2002 Table No.==========>

Material	1	2	3	4	5	6	Total
Aluminum	10	13	7	8	3		41
Aseptic	12	15	14	12	4		57
Cont. Target Recyc.	3	5	3	5	5		21
Ferrous Metals	24	26	20	19	13		102
Glass	17	15	13	15	5		65
HDPE	15	17	14	18	6		70
Non-Targeted Glass	2	4	4	3	2		15
Non-Targeted Plastics	24	35	35	28	13		135
Other residues	25	16	17	18	8		84
PETE	33	32	25	25	10		125
Total:	165	178	152	151	69		715

Appendix F
HL Districts

HL Stratum Summary	Table No.==========>						
Material	1	2	3	4	5	6	Total
Aluminum	80.57	135.39	71.51	62.09	30.85		380.41
Aseptic	44.67	51.12	50.02	48.11	22.84		216.76
Contaminated Targeted Recy	92.33	134.54	88.39	133.12	161.92		610.30
Ferrous Metals (HH Metals)	593.67	417.10	379.00	354.78	435.07		2,179.62
Glass	760.01	662.27	668.21	635.71	383.42		3,109.62
HDPE	203.81	231.81	218.15	241.66	105.36		1,000.79
Non-Targeted Glass	59.02	73.90	153.47	78.45	103.43		468.27
Non-Targeted Plastics	266.82	364.73	289.91	222.03	138.46		1,281.95
Other residues	504.95	425.72	433.02	383.13	259.32		2,006.14
PETE	223.86	188.70	152.31	170.33	95.38		830.58
Total:	2,829.71	2,685.28	2,503.99	2,329.41	1,736.05		12,084.44

HL Summary	Table No.==========>						Statistical		Standard	Standard	Lower Confidence	Upper Confiden.
Material	1	2	3	4	5	6	Mean	Variance	Deviation	Error	Interval	Interval
Aluminum	2.8%	5.0%	2.9%	2.7%	1.8%		3.1%	0.015%	1.2%	0.119%	2.9%	3.4%
Aseptic	1.6%	1.9%	2.0%	2.1%	1.3%		1.8%	0.001%	0.3%	0.033%	1.73%	1.8
Cont. Target Recyc.	3.3%	5.0%	3.5%	5.7%	9.3%		5.1%	0.059%	2.4%	0.348%	4.3%	5.6
Ferrous Metals	21.0%	15.5%	15.1%	15.2%	25.1%		18.0%	0.200%	4.5%	0.315%	17.4%	18.7%
Glass	26.9%	24.7%	26.7%	27.3%	22.1%		25.7%	0.047%	2.2%	0.176%	25.4%	26.1%
HDPE	7.2%	8.6%	8.7%	10.4%	6.1%		8.3%	0.027%	1.6%	0.130%	8.0%	8.5
Non-Targeted Glass	2.1%	2.8%	6.1%	3.4%	6.0%		3.9%	0.035%	1.9%	0.295%	3.3%	4.5
Non-Targeted Plastics	9.4%	13.6%	11.6%	9.5%	8.0%		10.6%	0.048%	2.2%	0.129%	10.4%	10.9%
Other residues	17.8%	15.9%	17.3%	16.4%	14.9%		16.6%	0.013%	1.2%	0.090%	16.4%	16.8%
PETE	7.9%	7.0%	6.1%	7.3%	5.5%		6.9%	0.009%	1.0%	0.056%	6.8%	7.(
Total:	100.0%	100.0%	100.0%	100.0%	100.0%		100.0%					

HL Summary	Table No.==========>						
Material	1	2	3	4	5	6	Total
Aluminum	22	28	21	19	12		102
Aseptic	16	25	19	19	11		90
Cont. Target Recyc.	7	12	7	10	13		49
Ferrous Metals	42	48	43	39	30		202
Glass	34	35	30	31	21		151
HDPE	32	38	34	36	19		159
Non-Targeted Glass	6	9	7	8	10		40
Non-Targeted Plastics	50	70	76	54	37		287
Other residues	42	33	36	32	21		164
PETE	69	71	59	59	37		295
Total:	320	369	332	307	211		1539

Appendix F
MH Districts

Net Weights for Each Material Processed Per Day (in Pounds)
MH Stratum
MN04 - 5/11/2002

Material	Table No. 1	2	3	4	5	6	Total
Aluminum	7.11	8.57	5.74	4.02	6.22		31.66
Aseptic	8.64	9.26	8.04	6.63	10.16		42.73
Contaminated Targeted Recyclables	9.08	16.46	18.02	4.73	36.51		84.80
Ferrous Metals (HH Metals)	42.78	46.04	62.89	17.04	34.74		203.49
Glass	205.15	254.66	206.71	221.98	256.98		1,145.48
HDPE	21.49	32.49	22.09	13.99	14.07		104.13
Non-Targeted Glass	13.01	4.46	4.50	4.33	91.14		117.44
Non-Targeted Plastics	18.48	50.02	27.15	26.01	41.62		163.28
Other residues	28.44	39.76	35.71	39.23	20.65		163.79
PETE	28.94	29.17	23.93	17.37	22.04		121.45
Total:	383.12	490.89	414.78	355.33	534.13		2,178.25

Net Weights for Each Material Processed Per Day (Percent of Total Net Weight)
MH Stratum
MN04 - 5/11/2002

Material	Table No. 1	2	3	4	5	6	Statistical Mean	Variance	Standard Deviation	Standard Error	Lower Confidence Interval	Upper Confidence Interval
Aluminum	1.9%	1.7%	1.4%	1.1%	1.2%		1.5%	0.001%	0.3%	0.105%	1.2%	1.7%
Aseptic	2.3%	1.9%	1.9%	1.9%	1.9%		2.0%	0.000%	0.2%	0.042%	1.87%	2.05%
Cont. Target Recyc.	2.4%	3.4%	4.3%	1.3%	6.8%		3.9%	0.044%	2.1%	0.744%	2.1%	5.7%
Ferrous Metals	11.2%	9.4%	15.2%	4.8%	6.5%		9.3%	0.165%	4.1%	0.886%	7.5%	11.2%
Glass	53.5%	51.9%	49.8%	62.5%	48.1%		52.6%	0.313%	5.6%	0.816%	50.9%	54.2%
HDPE	5.6%	6.6%	5.3%	3.9%	2.6%		4.8%	0.024%	1.6%	0.389%	4.0%	5.6%
Non-Targeted Glass	3.4%	0.9%	1.1%	1.2%	17.1%		5.4%	0.485%	7.0%	2.203%	0.4%	10.4%
Non-Targeted Plastics	4.8%	10.2%	6.5%	7.3%	7.8%		7.5%	0.038%	2.0%	0.313%	6.9%	8.1%
Other residues	7.4%	8.1%	8.6%	11.0%	3.9%		7.5%	0.067%	2.6%	0.648%	6.1%	8.9%
PETE	7.6%	5.9%	5.8%	4.9%	4.1%		5.6%	0.017%	1.3%	0.218%	5.1%	6.0%
Total:	100.0%	100.0%	100.0%	100.0%	100.0%		100.0%					

Count of Bins [Samples (n) per Material Category Per Table]
MH Stratum
MN04 - 5/11/2002

Material	Table No. 1	2	3	4	5	6	Total
Aluminum	2	4	2	1	1		10
Aseptic	2	4	3	3	3		15
Cont. Target Recyc.	1	2	2	1	2		8
Ferrous Metals	3	6	5	2	5		21
Glass	7	10	8	12	10		47
HDPE	3	6	3	2	2		16
Non-Targeted Glass	1	1	1	1	6		10
Non-Targeted Plastics	4	11	10	7	7		39
Other residues	3	3	5	2	3		16
PETE	8	8	8	5	6		35
Total:	34	55	47	36	45		217

Appendix F
MM Districts

Net Weights for Each Material Processed Per Day (in Pounds)
MM Stratum
BX12 - 5/13/2002 Table No. ⟹

Material	1	2	3	4	5	6	Total
Aluminum	34.42	43.09	43.38	26.96	4.90		152.75
Aseptic	16.58	43.59	26.52	24.36	7.58		118.63
Contaminated Targeted Rec	26.26	41.96	48.38	49.71	24.52		190.83
Ferrous Metals (HH Metals)	334.50	504.27	349.07	539.48	151.48		1,878.80
Glass	489.19	453.59	281.66	349.93	105.96		1,680.33
HDPE	122.55	204.35	128.62	143.71	44.44		643.67
Non-Targeted Glass	78.64	53.12	196.94	131.68	38.86		499.24
Non-Targeted Plastics	227.09	296.98	198.78	182.31	55.72		960.88
Other residues	140.33	222.46	356.34	401.85	118.82		1,239.80
PETE	107.08	139.20	66.41	102.27	25.65		440.61
Total:	1,576.64	2,002.61	1,696.10	1,952.26	577.93		7,805.54

Net Weights for Each Material Processed Per Day (Percent of Total Net Weight)
MM Stratum
BX12 - 5/13/2002 Table No. ⟹

Material	1	2	3	4	5	6	Statistical Mean	Variance	Standard Deviation	Standard Error	Lower Confidence Interval	Upper Conf In
Aluminum	2.2%	2.2%	2.6%	1.4%	0.8%		2.0%	0.005%	0.7%	0.127%	1.7%	2.2%
Aseptic	1.1%	2.2%	1.6%	1.2%	1.3%		1.5%	0.002%	0.4%	0.073%	1.37%	1.67%
Cont. Target Recyc.	1.7%	2.1%	2.9%	2.5%	4.2%		2.4%	0.010%	1.0%	0.238%	1.9%	9%
Ferrous Metals	21.2%	25.2%	20.6%	27.6%	26.2%		24.1%	0.097%	3.1%	0.297%	23.5%	%
Glass	31.0%	22.6%	16.6%	17.9%	18.3%		21.5%	0.347%	5.9%	0.704%	20.1%	22.9%
HDPE	7.8%	10.2%	7.6%	7.4%	7.7%		8.2%	0.014%	1.2%	0.136%	8.0%	8.5%
Non-Targeted Glass	5.0%	2.7%	11.6%	6.7%	6.7%		6.4%	0.108%	3.3%	0.672%	5.0%	8%
Non-Targeted Plastics	14.4%	14.8%	11.7%	9.3%	9.6%		12.3%	0.066%	2.6%	0.212%	11.9%	%
Other residues	8.9%	11.1%	21.0%	20.6%	20.6%		15.9%	0.351%	5.9%	0.671%	14.5%	17.2%
PETE	6.8%	7.0%	3.9%	5.2%	4.4%		5.6%	0.019%	1.4%	0.126%	5.4%	5.9%
Total:	100.0%	100.0%	100.0%	100.0%	100.0%		100.0%					

Count of Bins [Samples (n) per Material Category Per Table]
MM Stratum
BX12 - 5/13/2002 Table No. ⟹

Material	1	2	3	4	5	6	Total
Aluminum	6	9	7	5	3		30
Aseptic	5	12	8	7	4		36
Cont. Target Recyc.	3	4	4	3	3		17
Ferrous Metals	22	30	24	24	10		110
Glass	17	19	11	17	6		70
HDPE	15	25	14	16	5		75
Non-Targeted Glass	4	4	6	6	4		24
Non-Targeted Plastics	25	43	38	32	10		148
Other residues	10	15	21	26	6		78
PETE	28	35	20	24	10		117
Total:	135	196	153	160	61		705

Appendix F
MM Districts

Net Weights for Each Material Processed Per Day (in Pounds)
MM Stratum
BKS12 - 5/14/2002 Table No. ==========>

Material	1	2	3	4	5	6	Total
Aluminum	60.92	55.45	36.62	35.75	24.13	47.26	260.13
Aseptic	33.28	28.42	13.18	16.92	9.24	23.31	124.35
Contaminated Targeted Rec	27.67	26.21	22.40	45.53	12.35	42.29	176.45
Ferrous Metals (HH Metals)	339.47	299.86	150.65	136.40	132.65	203.54	1,262.57
Glass	292.15	275.73	160.37	180.35	97.79	307.63	1,314.02
HDPE	155.03	94.76	71.77	63.88	28.11	125.77	539.32
Non-Targeted Glass	4.64	41.16	60.81	138.22	65.92	210.26	521.01
Non-Targeted Plastics	208.28	194.09	89.78	106.68	70.98	212.15	881.96
Other residues	469.79	251.99	271.57	115.36	205.42	390.04	1,704.17
PETE	88.17	85.52	30.17	46.82	33.45	79.44	363.57
Total:	1,679.40	1,353.19	907.32	885.91	680.04	1,641.69	7,147.55

Net Weights for Each Material Processed Per Day (Percent of Total Net Weight)
MM Stratum
BKS12 - 5/14/2002 Table No. ==========>

Material	1	2	3	4	5	6	Statistical Mean	Variance	Standard Deviation	Standard Error	Lower Confidence Interval	Upper Confidence Interval
Aluminum	3.6%	4.1%	4.0%	4.0%	3.5%	2.9%	3.6%	0.002%	0.5%	0.067%	3.5%	3.8%
Aseptic	2.0%	2.1%	1.5%	1.9%	1.4%	1.4%	1.7%	0.001%	0.3%	0.056%	1.63%	1.85%
Cont. Target Recyc.	1.6%	1.9%	2.5%	5.1%	1.8%	2.6%	2.5%	0.017%	1.3%	0.315%	1.8%	3.1%
Ferrous Metals	20.2%	22.2%	16.6%	15.4%	19.5%	12.4%	17.7%	0.128%	3.6%	0.411%	16.8%	18.5%
Glass	17.4%	20.4%	17.7%	20.4%	14.4%	18.7%	18.4%	0.050%	2.2%	0.295%	17.8%	19.0%
HDPE	9.2%	7.0%	7.9%	7.2%	4.1%	7.7%	7.5%	0.029%	1.7%	0.215%	7.1%	8.0%
Non-Targeted Glass	0.3%	3.0%	6.7%	15.6%	9.7%	12.8%	7.3%	0.339%	5.8%	1.373%	4.4%	10.2%
Non-Targeted Plastics	12.4%	14.3%	9.9%	12.0%	10.4%	12.9%	12.3%	0.027%	1.6%	0.139%	12.1%	12.6%
Other residues	28.0%	18.6%	29.9%	13.0%	30.2%	23.8%	23.8%	0.478%	6.9%	0.741%	22.4%	25.3%
PETE	5.3%	6.3%	3.3%	5.3%	4.9%	4.8%	5.1%	0.009%	1.0%	0.105%	4.9%	5.3%
Total:	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%					

Count of Bins [Samples (n) per Material Category Per Table]
MM Stratum
BKS12 - 5/14/2002 Table No. ==========>

Material	1	2	3	4	5	6	Total
Aluminum	12	10	6	7	5	9	49
Aseptic	10	7	4	5	3	6	35
Cont. Target Recyc.	2	4	2	3	2	4	17
Ferrous Metals	18	17	9	9	9	14	76
Glass	15	11	7	7	6	12	58
HDPE	15	12	7	8	4	16	62
Non-Targeted Glass	2	2	1	4	2	7	18
Non-Targeted Plastics	34	26	19	16	12	32	139
Other residues	23	13	14	8	10	19	87
PETE	20	19	8	11	8	19	85
Total:	151	121	77	78	61	138	626

Appendix F
MM Districts

Net Weights for Each Material Processed Per Day (in Pounds)
MM Stratum
QW01 - 5/15/2002 Table No.==========>

Material	1	2	3	4	5	6	Total
Aluminum	32.87	35.52	29.81	19.13	17.75	39.61	174.69
Aseptic	33.20	43.86	44.60	22.83	24.77	52.82	222.08
Contaminated Targeted Rec	36.74	34.17	22.11	22.36	63.24	29.42	208.04
Ferrous Metals (HH Metals)	206.91	178.71	319.44	125.91	120.64	382.95	1,334.56
Glass	333.71	289.01	346.77	170.21	227.56	376.29	1,743.55
HDPE	110.58	111.09	110.91	66.73	63.77	130.20	593.28
Non-Targeted Glass	14.70	93.17	19.43	82.04	124.40	142.71	476.45
Non-Targeted Plastics	131.87	148.28	146.37	72.59	136.05	196.88	832.04
Other residues	272.92	213.39	278.70	60.27	174.52	266.77	1,266.57
PETE	62.65	67.77	54.33	40.21	44.21	97.50	366.67
Total:	1,236.15	1,214.97	1,372.47	682.28	996.91	1,715.15	7,217.93

Net Weights for Each Material Processed Per Day (Percent of Total Net Weight)
MM Stratum
QW01 - 5/15/2002 Table No.==========>

Material	1	2	3	4	5	6	Statistical Mean	Variance	Standard Deviation	Standard Error	Lower Confidence Interval	Upper Confider Interv
Aluminum	2.7%	2.9%	2.2%	2.8%	1.8%	2.3%	2.4%	0.002%	0.4%	0.075%	2.3%	2.6%
Aseptic	2.7%	3.6%	3.2%	3.3%	2.5%	3.1%	3.1%	0.002%	0.4%	0.054%	2.97%	3.18%
Cont. Target Recyc.	3.0%	2.8%	1.6%	3.3%	6.3%	1.7%	2.9%	0.030%	1.7%	0.405%	2.0%	3.
Ferrous Metals	16.7%	14.7%	23.3%	18.5%	12.1%	22.3%	18.5%	0.188%	4.3%	0.457%	17.6%	19.
Glass	27.0%	23.8%	25.3%	24.9%	22.8%	21.9%	24.2%	0.033%	1.8%	0.209%	23.7%	24.6%
HDPE	8.9%	9.1%	8.1%	9.8%	6.4%	7.6%	8.2%	0.015%	1.2%	0.141%	7.9%	8.5%
Non-Targeted Glass	1.2%	7.7%	1.4%	12.0%	12.5%	8.3%	6.6%	0.244%	4.9%	1.031%	4.5%	8.
Non-Targeted Plastics	10.7%	12.2%	10.7%	10.6%	13.6%	11.5%	11.5%	0.014%	1.2%	0.095%	11.3%	11..
Other residues	22.1%	17.6%	20.3%	8.8%	17.5%	15.6%	17.5%	0.212%	4.6%	0.503%	16.5%	18.6%
PETE	5.1%	5.6%	4.0%	5.9%	4.4%	5.7%	5.1%	0.006%	0.8%	0.078%	4.9%	5.2%
Total:	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%					

Count of Bins [Samples (n) per Material Category Per Table]
MM Stratum
QW01 - 5/15/2002 Table No.==========>

Material	1	2	3	4	5	6	Total
Aluminum	5	6	5	6	4	7	33
Aseptic	9	12	11	8	8	14	62
Cont. Target Recyc.	4	2	2	3	5	2	18
Ferrous Metals	15	12	18	12	10	23	90
Glass	16	12	15	8	10	15	76
HDPE	12	13	14	9	9	18	75
Non-Targeted Glass	2	3	1	4	5	8	23
Non-Targeted Plastics	28	27	30	16	25	35	161
Other residues	19	14	17	7	10	17	84
PETE	16	16	14	12	14	24	96
Total:	126	117	127	85	100	163	718

Appendix F
MM Districts

MM Stratum Summary	Table No.==========>						
Material	1	2	3	4	5	6	Total
Aluminum	128.21	134.06	109.81	81.84	46.78	86.87	587.57
Aseptic	83.06	115.87	84.30	64.11	41.59	76.13	465.06
Contaminated Targeted Recycl	90.67	102.34	92.89	117.60	100.11	71.71	575.32
Ferrous Metals (HH Metals)	880.88	982.84	819.16	801.79	404.77	586.49	4,475.93
Glass	1,115.05	1,018.33	788.80	700.49	431.31	683.92	4,737.90
HDPE	388.16	410.20	311.30	274.32	136.32	255.97	1,776.27
Non-Targeted Glass	97.98	187.45	277.18	351.94	229.18	352.97	1,496.70
Non-Targeted Plastics	567.24	639.35	434.93	361.58	262.75	409.03	2,674.88
Other residues	883.04	687.84	906.61	577.48	498.76	656.81	4,210.54
PETE	257.90	292.49	150.91	189.30	103.31	176.94	1,170.85
Total:	4,492.19	4,570.77	3,975.89	3,520.45	2,254.88	3,356.84	22,171.02

MM Summary	Table No.==========>						Statistical		Standard	Standard	Lower Confidence	Upper Confidence
Material	1	2	3	4	5	6	Mean	Variance	Deviation	Error	Interval	Interval
Aluminum	2.9%	2.9%	2.8%	2.3%	2.1%	2.6%	2.7%	0.001%	0.3%	0.031%	2.6%	2.7%
Aseptic	1.8%	2.5%	2.1%	1.8%	1.8%	2.3%	2.1%	0.001%	0.3%	0.025%	2.05%	2.15%
Cont. Target Recyc.	2.0%	2.2%	2.3%	3.3%	4.4%	2.1%	2.6%	0.009%	1.0%	0.132%	2.3%	2.9%
Ferrous Metals	19.6%	21.5%	20.6%	22.8%	18.0%	17.5%	20.2%	0.042%	2.1%	0.124%	19.9%	20.4%
Glass	24.8%	22.3%	19.8%	19.9%	19.1%	20.4%	21.4%	0.045%	2.1%	0.149%	21.1%	21.7%
HDPE	8.6%	9.0%	7.8%	7.8%	6.0%	7.6%	8.0%	0.010%	1.0%	0.070%	7.9%	8.1%
Non-Targeted Glass	2.2%	4.1%	7.0%	10.0%	10.2%	10.5%	6.8%	0.125%	3.5%	0.438%	5.9%	7.6%
Non-Targeted Plastics	12.6%	14.0%	10.9%	10.3%	11.7%	12.2%	12.1%	0.017%	1.3%	0.062%	11.9%	12.2%
Other residues	19.7%	15.0%	22.8%	16.4%	22.1%	19.6%	19.0%	0.094%	3.1%	0.194%	18.6%	19.4%
PETE	5.7%	6.4%	3.8%	5.4%	4.6%	5.3%	5.3%	0.008%	0.9%	0.053%	5.2%	5.4%
Total:	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%					

MM Summary	Table No.==========>						
Material	1	2	3	4	5	6	Total
Aluminum	23	25	18	18	12	16	112
Aseptic	24	31	23	20	15	20	133
Cont. Target Recyc.	9	10	8	9	10	6	52
Ferrous Metals	55	59	51	45	29	37	276
Glass	48	42	33	32	22	27	204
HDPE	42	50	35	33	18	34	212
Non-Targeted Glass	8	9	8	14	11	15	65
Non-Targeted Plastics	87	96	87	64	47	67	448
Other residues	52	42	52	41	26	36	249
PETE	64	70	42	47	32	43	298
Total:	412	434	357	323	222	301	2049

Appendix F
HH Districts

Net Weights for Each Material Processed Per Day (in Pounds)
HH Stratum
BX08 - 5/16/2002 Table No. ⟹

Material	1	2	3	4	5	6	Total
Aluminum	21.04	24.32	22.00	7.04	8.42		82.82
Aseptic	21.92	35.16	29.80	4.18	13.84		104.90
Contaminated Targeted Recyc	19.02	7.26	14.82	4.84	8.96		54.90
Ferrous Metals (HH Metals)	160.96	155.36	124.12	32.74	48.04		521.22
Glass	612.20	443.96	447.30	100.52	152.92		1,756.90
HDPE	68.81	82.45	57.85	32.19	39.85		281.15
Non-Targeted Glass	37.20	13.90	153.46	55.46	65.40		325.42
Non-Targeted Plastics	122.24	113.84	104.96	25.56	40.40		407.00
Other residues	145.16	115.54	163.20	15.30	24.34		463.54
PETE	66.92	66.59	62.78	17.04	31.76		245.09
Total:	1,275.47	1,058.38	1,180.29	294.87	433.93		4,242.94

Net Weights for Each Material Processed Per Day (Percent of Total Net Weight)
HH Stratum
BX08 - 5/16/2002 Table No. ⟹

Material	1	2	3	4	5	6	Statistical Mean	Variance	Standard Deviation	Standard Error	Lower Confidence Interval	Upper Confid Interv...
Aluminum	1.6%	2.3%	1.9%	2.4%	1.9%		2.0%	0.001%	0.3%	0.064%	1.8%	2.1%
Aseptic	1.7%	3.3%	2.5%	1.4%	3.2%		2.5%	0.007%	0.9%	0.153%	2.16%	2.7[illegible]%
Cont. Target Recyc.	1.5%	0.7%	1.3%	1.6%	2.1%		1.3%	0.003%	0.5%	0.228%	0.7%	
Ferrous Metals	12.6%	14.7%	10.5%	11.1%	11.1%		12.3%	0.029%	1.7%	0.247%	11.8%	12.8%
Glass	48.0%	41.9%	37.9%	34.1%	35.2%		41.4%	0.320%	5.7%	0.708%	40.0%	42.8%
HDPE	5.4%	7.8%	4.9%	10.9%	9.2%		6.6%	0.064%	2.5%	0.428%	5.8%	7.[illegible]%
Non-Targeted Glass	2.9%	1.3%	13.0%	18.8%	15.1%		7.7%	0.594%	7.7%	2.438%	2.2%	1[illegible]
Non-Targeted Plastics	9.6%	10.8%	8.9%	8.7%	9.3%		9.6%	0.007%	0.8%	0.086%	9.4%	9.8%
Other residues	11.4%	10.9%	13.8%	5.2%	5.6%		10.9%	0.145%	3.8%	0.653%	9.6%	12.3%
PETE	5.2%	6.3%	5.3%	5.8%	7.3%		5.8%	0.007%	0.9%	0.108%	5.6%	[illegible]
Total:	100.0%	100.0%	100.0%	100.0%	100.0%		100.0%					

Count of Bins [Samples (n) per Material Category Per Table]
HH Stratum
BX08 - 5/16/2002 Table No. ⟹

Material	1	2	3	4	5	6	Total
Aluminum	6	7	5	2	3		23
Aseptic	7	11	7	2	4		31
Cont. Target Recyc.	1	1	1	1	1		5
Ferrous Metals	13	14	12	3	5		47
Glass	21	17	15	4	7		64
HDPE	9	11	7	3	5		35
Non-Targeted Glass	2	1	4	1	2		10
Non-Targeted Plastics	24	26	24	5	11		90
Other residues	11	8	9	2	4		34
PETE	16	18	16	4	8		62
Total:	110	114	100	27	50		401

Appendix F
HH Districts

Net Weights for Each Material Processed Per Day (in Pounds)
HH Stratum
MN08 - 5/17/2002

Material	Table No. 1	2	3	4	5	6	Total
Aluminum	36.64	42.65	29.32	35.29	29.82	11.59	185.31
Aseptic	50.84	51.79	45.82	38.40	37.29	12.01	236.15
Contaminated Targeted Recyc	42.18	55.95	74.46	62.94	8.45	15.09	259.07
Ferrous Metals (HH Metals)	256.62	243.43	259.79	216.44	177.03	90.01	1,243.32
Glass	1,126.31	1,085.47	904.36	951.19	703.04	200.80	4,971.17
HDPE	139.78	154.83	128.88	106.58	97.10	30.64	657.81
Non-Targeted Glass	24.42	34.57	291.92	499.94	385.14	262.60	1,498.59
Non-Targeted Plastics	244.57	259.34	252.31	216.25	200.03	87.69	1,260.19
Other residues	336.61	264.11	284.39	168.72	202.87	110.15	1,366.85
PETE	142.64	130.37	120.72	112.80	108.75	36.47	651.75
Total:	2,400.61	2,322.51	2,391.97	2,408.55	1,949.52	857.05	12,330.21

Net Weights for Each Material Processed Per Day (Percent of Total Net Weight)
HH Stratum
MN08 - 5/17/2002

Material	Table No. 1	2	3	4	5	6	Statistical Mean	Variance	Standard Deviation	Standard Error	Lower Confidence Interval	Upper Confidence Interval
Aluminum	1.5%	1.8%	1.2%	1.5%	1.5%	1.4%	1.5%	0.000%	0.2%	0.030%	1.4%	1.6%
Aseptic	2.1%	2.2%	1.9%	1.6%	1.9%	1.4%	1.9%	0.001%	0.3%	0.039%	1.84%	1.99%
Cont. Target Recyc.	1.8%	2.4%	3.1%	2.6%	0.4%	1.8%	2.1%	0.009%	0.9%	0.220%	1.6%	2.6%
Ferrous Metals	10.7%	10.5%	10.9%	9.0%	9.1%	10.5%	10.1%	0.007%	0.8%	0.073%	9.9%	10.2%
Glass	46.9%	46.7%	37.8%	39.5%	36.1%	23.4%	40.3%	0.746%	8.6%	0.649%	39.0%	41.6%
HDPE	5.8%	6.7%	5.4%	4.4%	5.0%	3.6%	5.3%	0.012%	1.1%	0.125%	5.1%	5.6%
Non-Targeted Glass	1.0%	1.5%	12.2%	20.8%	19.8%	30.6%	12.2%	1.367%	11.7%	1.724%	8.7%	15.6%
Non-Targeted Plastics	10.2%	11.2%	10.5%	9.0%	10.3%	10.2%	10.2%	0.005%	0.7%	0.041%	10.1%	10.3%
Other residues	14.0%	11.4%	11.9%	7.0%	10.4%	12.9%	11.1%	0.059%	2.4%	0.224%	10.6%	11.5%
PETE	5.9%	5.6%	5.0%	4.7%	5.6%	4.3%	5.3%	0.004%	0.6%	0.048%	5.2%	5.4%
Total:	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%					

Count of Bins [Samples (n) per Material Category Per Table]
HH Stratum
MN08 - 5/17/2002

Material	Table No. 1	2	3	4	5	6	Total
Aluminum	9	10	8	9	7	4	47
Aseptic	14	14	12	12	10	3	65
Cont. Target Recyc.	3	5	4	4	1	1	18
Ferrous Metals	29	23	26	26	19	10	133
Glass	44	39	30	32	26	6	177
HDPE	16	17	15	11	12	4	75
Non-Targeted Glass	2	3	11	11	10	9	46
Non-Targeted Plastics	64	45	66	48	51	22	296
Other residues	32	19	23	15	20	8	117
PETE	39	34	33	33	27	8	174
Total:	252	209	228	201	183	75	1148

Appendix F
HH Districts

HH Stratum Summary	Table No.==========>						
Material	1	2	3	4	5	6	Total
Aluminum	57.68	66.97	51.32	42.33	38.24	11.59	268.13
Aseptic	72.76	86.95	75.62	42.58	51.13	12.01	341.05
Contaminated Targeted Recycla	61.20	63.21	89.28	67.78	17.41	15.09	313.97
Ferrous Metals (HH Metals)	417.58	398.79	383.91	249.18	225.07	90.01	1,764.54
Glass	1,738.51	1,529.43	1,351.66	1,051.71	855.96	200.80	6,728.07
HDPE	208.59	237.28	186.73	138.77	136.95	30.64	938.96
Non-Targeted Glass	61.62	48.47	445.38	555.40	450.54	262.60	1,824.01
Non-Targeted Plastics	366.81	373.18	357.27	241.81	240.43	87.69	1,667.19
Other residues	481.77	379.65	447.59	184.02	227.21	110.15	1,830.39
PETE	209.56	196.96	183.50	129.84	140.51	36.47	896.84
Total:	3,676.08	3,380.89	3,572.26	2,703.42	2,383.45	857.05	16,573.15

HH Summary	Table No.==========>						Statistical		Standard	Standard	Lower Confidence	Upper Confidenc
Material	1	2	3	4	5	6	Mean	Variance	Deviation	Error	Interval	Interva.
Aluminum	1.6%	2.0%	1.4%	1.6%	1.6%	1.4%	1.6%	0.000%	0.2%	0.026%	1.6%	1.7%
Aseptic	2.0%	2.6%	2.1%	1.6%	2.1%	1.4%	2.1%	0.002%	0.4%	0.043%	1.97%	2.14%
Cont. Target Recyc.	1.7%	1.9%	2.5%	2.5%	0.7%	1.8%	1.9%	0.004%	0.7%	0.137%	1.6%	2.2
Ferrous Metals	11.4%	11.8%	10.7%	9.2%	9.4%	10.5%	10.6%	0.010%	1.0%	0.076%	10.5%	10.8
Glass	47.3%	45.2%	37.8%	38.9%	35.9%	23.4%	40.6%	0.712%	8.4%	0.544%	39.5%	41.7%
HDPE	5.7%	7.0%	5.2%	5.1%	5.7%	3.6%	5.7%	0.012%	1.1%	0.107%	5.5%	5.9%
Non-Targeted Glass	1.7%	1.4%	12.5%	20.5%	18.9%	30.6%	11.0%	1.311%	11.4%	1.530%	7.9%	14.1
Non-Targeted Plastics	10.0%	11.0%	10.0%	8.9%	10.1%	10.2%	10.1%	0.004%	0.7%	0.034%	10.0%	10.1
Other residues	13.1%	11.2%	12.5%	6.8%	9.5%	12.9%	11.0%	0.060%	2.4%	0.199%	10.7%	11.4%
PETE	5.7%	5.8%	5.1%	4.8%	5.9%	4.3%	5.4%	0.004%	0.7%	0.043%	5.3%	5.5%
Total:	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%					

HH Summary	Table No.==========>						
Material	1	2	3	4	5	6	Total
Aluminum	15	17	13	11	10	4	70
Aseptic	21	25	19	14	14	3	96
Cont. Target Recyc.	4	6	5	5	2	1	23
Ferrous Metals	42	37	38	29	24	10	180
Glass	65	56	45	36	33	6	241
HDPE	25	28	22	14	17	4	110
Non-Targeted Glass	4	4	15	12	12	9	56
Non-Targeted Plastics	88	71	90	53	62	22	386
Other residues	43	27	32	17	24	8	151
PETE	55	52	49	37	35	8	236
Total:	362	323	328	228	233	75	1,549