Seattle Public Utilities

2002 Residential Waste Stream Composition Study

FINAL Report

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1 Overview

1.1 Introduction and Background

Seattle Public Utilities (SPU) provides for the collection, transfer, and disposal of municipal solid waste (MSW) from within the City of Seattle. As part of this responsibility, SPU designs and implements programs intended to achieve a 60% recycling goal by 2008. To better understand the types and quantities of MSW disposed, and to assess the city's recycling potential, SPU has conducted waste composition studies since 1988. These studies analyzed the residential, commercial, and self-haul waste streams at intervals of about four years. Table 1-1 shows the number of waste samples sorted by these three waste streams from 1988 through the current study in 2002.

Table 1-1: Samples per Study Period, by Substream

	(Number of Samples)			
Year	**Commercial**	**Residential**	**Self-Haul**	**Total**
1988-89	121	212	217	550
1990	0	114	203	317
1992	251	0	197	448
1994-95	0	368	0	368
1996	348	0	199	547
1998-99	0	360	0	360
2000	347	0	200	547
2002	0	309	0	309

All of these studies share three common objectives, which include:

- Obtaining information about the City's residential, commercial, and self-haul waste streams in order to estimate the recycling potential for each;
- Understanding differences between these three streams so that targeted recycling programs can be designed, implemented, and monitored for each; and,
- Establishing a baseline for continued long-term measurement of system performance.

This report, which consists of four sections, presents the results of 2002 residential waste study. Section 1 briefly introduces the project and the methodology and Section 2 summarizes the findings. In Section 3, the 2002 findings are compared to those from the 1988/89, 1994/95, and 1998/99 residential studies. Detailed results of the 2002 residential waste composition study are presented in Section 4. Appendices follow the main body of the report and provide: material definitions; study methodology; comments on sampling events; waste composition calculations; year-to-year comparison calculations; and, copies of field forms.

1.2 Seattle's Residential Waste Stream

This study examined waste disposed by two types of residences, *single*- and *multi-family.*[1] In Seattle, the single- and multi-family waste streams are defined as follows:

- ***Single-family:*** Waste set out for disposal in cans primarily from detached single family, duplex, triplex, and four-plex homes. These wastes are collected by one of two city-contracted residential haulers.
- ***Multi-family:*** Waste collected from dumpsters that primarily serve apartments and condominiums with five or more units. This waste is collected by one of two city-contracted residential haulers.

The contract haulers collect and deliver both single-family and multi-family residential waste to Seattle's two transfer stations. *Self-hauled* residential waste was not addressed by this study. Self-hauled waste is delivered to a transfer station by the individual homeowner or renter as opposed to a city-contracted hauler.[2]

There also are two service areas from which Seattle's residential waste is collected, *north* and *south*. The Lake Washington Ship Canal is the physical boundary that divides the north and south service areas. Please see Figure 1-1 below.

Figure 1-1: Seattle's Two Collection Areas

To enhance the analytical value of the residential waste composition study and to improve the precision of the data, four *subpopulations* were established. On the next page, Figure 1-2 depicts these four residential waste stream *subpopulations,* which are defined by residence type and service area.

[1] It should be noted that this study measures waste disposal, not generation. Waste generation equals the sum of disposed and recycled amounts.
[2] The last study completed on self-haul waste was in 2000.

Figure 1-2: Subpopulations, by Residence Type and Service Area

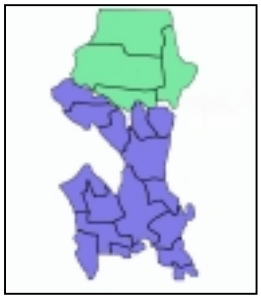
	Residence Type	
	Single-family	*Multi-family*
Service Area *North*	Single-Family North	Multi-Family North
South	Single-Family South	Multi-Family South

1.3 Study Methodology

The following section provides an overview of the 2002 study methodology. As shown, there were four major steps involved in conducting this waste composition study. The steps are presented according to the order in which they occurred during the course of the study. Please see Appendix B for a detailed description of the methodology.

Step 1: Develop Sampling Plan

- Samples were allocated among the four residential subpopulations: about two-thirds to single-family residential waste, and about one-third to multi-family residential waste. Both single- and multi-family samples were evenly split between the north and south service areas.
- A sampling schedule was constructed for the 2002 calendar year, and consisted of two consecutive sampling days each month. Sampling days were randomly selected to assure a representative distribution across the days of the week and weeks of the month.
- A complete list of Seattle's residential routes was assembled in conjunction with the City's contracted waste haulers.



Step 2: Schedule and Collect Waste Samples

- Prior to each month's sampling, vehicle routes were randomly selected from each of the four subpopulations.
- The contract haulers were sent a list of the routes chosen for each day of sampling.
- Waste was collected from the designated routes, and delivered to the appropriate transfer station for sampling.

Step 3: Capture and Sort Samples

- As each vehicle entered the facility, the sampling crew supervisor verified information with the driver about the waste collected, and directed the front loader operator to scoop a portion of the waste being tipped out of the vehicle. About 250 pounds of this waste was placed on a tarpaulin for sorting.
- For this study, a total of 309 samples were sorted into 89 distinct component categories, such as office paper or PET plastic bottles. (Since the 1998/99 study, three additional components were added: *television sets*, *computer monitors*, and *other computer equipment* (all previously categorized as *A/V equipment*).

Step 4: Analyze Data and Prepare Report

- Each month all sort data were entered into a customized database and reviewed for data entry errors. At the conclusion of the study, waste composition estimates were calculated by aggregating sampling data using a *weighted average* procedure. SPU provided annual waste tonnages to perform these calculations.

- Once the data were analyzed, an accompanying report was prepared.

2 Summary of Year 2002 Sampling Results

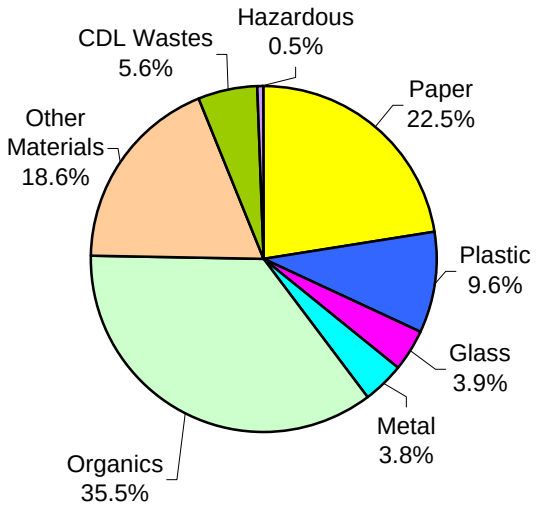
2.1 Overall Residential Composition

Composition results are presented in the following order in this report. First, a pie chart reflects the composition percentages of the eight broad material categories. A table that lists the top ten components, by weight, follows the pie charts.[3] Lastly, a table listing the full composition results of all 89 components is presented. Percentages may not add to 100% in tables throughout the report due to rounding.

For this study, 309 residential waste loads were sampled between January and December 2002. Seattle residents disposed a total of 142,910 tons of waste during this time. The composition estimates were applied to these tons to estimate the amount of waste disposed in 2002 for each component category.

The detailed residential composition results are presented in Table 2-2. As shown in Figure 2-1, *organics* accounted for more than one-third of the residential tonnage, while *paper* and *other materials* each composed approximately 20% of the self-haul waste. *Other materials* includes materials such as *textiles/clothing, carpet/upholstery* and *furniture*.

Figure 2-1: Composition Summary – Overall Residential
(January – December 2002)



[3] Since the 1998/99 report, tables listing the *largest components* (greater than 5% by weight) have been replaced with tables listing the top ten components by weight.

The top ten components of Seattle's overall disposed waste are listed in Table 2-1. When summed, they account for approximately 68% of the overall residential tonnage. Making up nearly 33%, *food* was the largest single component of this waste. *Compostable/soiled paper*, *mixed low grade paper*, and *animal by-products* were large components of this substream as well (each more than 5%, by weight). Table 2-2 lists the composition percentages, by weight, of each component in Seattle's residential substream.[4]

Table 2-1: Top Ten Components – Overall Residential
(January – December 2002)

Component	Mean	Cum. %	Tons
Food	32.9%	32.9%	47,076
Compostable/Soiled Paper	7.0%	39.9%	9,945
Mixed Low Grade Paper	5.5%	45.4%	7,836
Animal By-Products	5.4%	50.7%	7,646
Disposable Diapers	4.3%	55.0%	6,131
Unwaxed OCC/Kraft Paper	3.1%	58.1%	4,414
Newspaper	2.9%	61.0%	4,164
Textiles/Clothing	2.4%	63.4%	3,364
Leaves and Grass	2.3%	65.7%	3,317
Other Plastic Film	2.2%	67.9%	3,111
Total	**67.9%**		**97,005**

[4] All waste composition results were derived using a 90% confidence level. This means that there is a 90% certainty that the actual composition is within the calculated range. In charts throughout this report, the values graphed represent the mean component percentage, not the range.

Table 2-2: Composition by Weight – Overall Residential
(January – December 2002)

Calculated at a 90% confidence level

	Tons	Mean	Low	High
Paper	**32,143**	**22.5%**		
Newspaper	4,164	2.9%	2.7%	3.1%
OCC/Kraft, unwaxed	4,414	3.1%	2.9%	3.3%
OCC/Kraft, waxed	21	0.0%	0.0%	0.0%
Office Paper	2,200	1.5%	1.4%	1.7%
Computer Paper	117	0.1%	0.1%	0.1%
Mixed Low Grade	7,836	5.5%	5.2%	5.8%
Phone Books	246	0.2%	0.1%	0.2%
Milk/Juice Polycoats	490	0.3%	0.3%	0.4%
Frozen Food Polycoats	277	0.2%	0.2%	0.2%
Compostable/Soiled	9,945	7.0%	6.7%	7.2%
Paper/Other Materials	2,217	1.6%	1.4%	1.7%
Other Paper	216	0.2%	0.1%	0.2%
Plastic	**13,663**	**9.6%**		
PET Pop and Liquor	271	0.2%	0.2%	0.2%
Other PET Bottles	514	0.4%	0.3%	0.4%
HDPE Milk and Juice	230	0.2%	0.1%	0.2%
Other HDPE Bottles	458	0.3%	0.3%	0.3%
Other Plastic Bottles	149	0.1%	0.1%	0.1%
Jars and Tubs	495	0.3%	0.3%	0.4%
Expanded Polystyrene	859	0.6%	0.6%	0.6%
Other Rigid Packaging	1,541	1.1%	1.0%	1.1%
Grocery/Bread Bags	1,888	1.3%	1.3%	1.4%
Garbage Bags	1,654	1.2%	1.1%	1.2%
Other Film	3,111	2.2%	2.1%	2.3%
Plastic Products	1,425	1.0%	0.9%	1.1%
Plastic/Other Materials	1,069	0.7%	0.6%	0.8%
Glass	**5,538**	**3.9%**		
Clear Beverage	1,441	1.0%	0.9%	1.1%
Green Beverage	1,166	0.8%	0.7%	0.9%
Brown Beverage	1,119	0.8%	0.7%	0.9%
Container Glass	1,106	0.8%	0.7%	0.8%
Fluorescent Tubes	9	0.0%	0.0%	0.0%
Other Glass	695	0.5%	0.4%	0.6%
Metal	**5,423**	**3.8%**		
Aluminum Cans	526	0.4%	0.3%	0.4%
Alum. Foil/Containers	358	0.3%	0.2%	0.3%
Other Aluminum	21	0.0%	0.0%	0.0%
Other Nonferrous	96	0.1%	0.0%	0.1%
Tin Food Cans	1,410	1.0%	0.9%	1.1%
Empty Aerosol Cans	223	0.2%	0.1%	0.2%
Other Ferrous	1,174	0.8%	0.6%	1.0%
Mixed Metals/Materials	1,592	1.1%	0.9%	1.3%
Motor Oil Filters	23	0.0%	0.0%	0.0%

	Tons	Mean	Low	High
Organics	**50,764**	**35.5%**		
Pallets	6	0.0%	0.0%	0.0%
Crates/Boxes	59	0.0%	0.0%	0.1%
Leaves and Grass	3,317	2.3%	1.9%	2.8%
Prunings	306	0.2%	0.1%	0.3%
Food	47,076	32.9%	32.2%	33.7%
Other Materials	**26,647**	**18.6%**		
Textiles/Clothing	3,364	2.4%	2.1%	2.6%
Carpet/Upholstery	3,063	2.1%	1.8%	2.4%
Leather	176	0.1%	0.1%	0.2%
Disposable Diapers	6,131	4.3%	3.9%	4.6%
Animal By-Products	7,646	5.4%	4.9%	5.8%
Tires	4	0.0%	0.0%	0.0%
Ash	225	0.2%	0.1%	0.2%
Rubber Products	258	0.2%	0.1%	0.2%
Misc. Organics	2,001	1.4%	1.2%	1.6%
Furniture	475	0.3%	0.1%	0.6%
Mattresses	118	0.1%	0.0%	0.2%
Small Appliances	449	0.3%	0.2%	0.4%
A/V Equipment	376	0.3%	0.2%	0.4%
Ceramics/Porcelain	755	0.5%	0.4%	0.7%
Non-distinct Fines	618	0.4%	0.3%	0.5%
Misc. Inorganics	538	0.4%	0.3%	0.5%
Computer Monitors	62	0.0%	0.0%	0.1%
Other Computer Components	305	0.2%	0.1%	0.3%
TVs	82	0.1%	0.0%	0.2%
CDL Wastes	**8,059**	**5.6%**		
Dimension Lumber	1,497	1.0%	0.9%	1.2%
Other Untreated Wood	286	0.2%	0.1%	0.3%
Treated Wood	600	0.4%	0.3%	0.6%
Contaminated Wood	1,122	0.8%	0.6%	0.9%
New Gypsum Scrap	45	0.0%	0.0%	0.1%
Demo Gypsum Scrap	1,039	0.7%	0.2%	1.2%
Fiberglass Insulation	10	0.0%	0.0%	0.0%
Rock/Concrete/Brick	768	0.5%	0.2%	0.9%
Asphaltic Roofing	41	0.0%	0.0%	0.0%
Other Construction Debris	803	0.6%	0.2%	0.9%
Sand/Soil/Dirt	1,848	1.3%	0.9%	1.7%
Hazardous	**688**	**0.5%**		
Latex Paints	96	0.1%	0.0%	0.1%
Hazardous Adhesives/Glues	2	0.0%	0.0%	0.0%
NonHazardous Adhesives/Glues	10	0.0%	0.0%	0.0%
Oil-based Paints/Solvents	25	0.0%	0.0%	0.0%
Cleaners	34	0.0%	0.0%	0.0%
Pesticides/Herbicides	37	0.0%	0.0%	0.0%
Dry-Cell Batteries	114	0.1%	0.1%	0.1%
Wet-Cell Batteries	136	0.1%	0.0%	0.2%
Gasoline/Kerosene	0	0.0%	0.0%	0.0%
Motor Oil/Diesel Oil	32	0.0%	0.0%	0.0%
Asbestos	0	0.0%	0.0%	0.0%
Explosives	1	0.0%	0.0%	0.0%
Other Hazardous Chemicals	182	0.1%	0.1%	0.2%
Other NonHazardous Chemicals	19	0.0%	0.0%	0.0%

Total Tons	**142,910**
Sample Count	**309**

2.2 Residential Waste by Subpopulation

In addition to the overall residential substream, waste composition estimates were calculated for the following groups:

- *Residence type:* single-family and multi-family
- *Service area:* north and south
- *Residence type and service area:* single-family north, single-family south, multi-family north, and multi-family south
- *Season:* spring, summer, fall, and winter
- *Household income*: low and high
- *Household size*: small and large

As with the overall estimates, a *weighted average* procedure was employed to calculate composition estimates by residence type and service area (see Appendix D for more detail on weighted averages). The largest components for each sampling group are shown in Table 2-3 (each accounting for more than 5%). *Food* and *compostable/soiled paper* were large components in all groups. Frequently, *animal by-products* (which includes animal wastes and kitty litter) and *mixed low grade paper* were large components of each group. The largest components added to about 50% of each sampling group's total waste, by weight.

Table 2-3: Largest Waste Components, by Subpopulation
(January – December 2002)

Subpopulation	Paper		Organics	Other Materials		
	Mixed Low Grade	Compostable/ Soiled	Food	Disposable Diapers	Animal By-products	**Sum of Largest**
Residence Type						
Single-family		7.9%	35.8%	5.4%	6.1%	**55.1%**
Multi-family	6.6%	5.4%	28.1%			**40.1%**
Service Area						
North	5.5%	7.0%	34.8%		5.3%	**52.6%**
South	5.4%	6.9%	31.7%		5.4%	**49.5%**
Service Area and Generator Type						
Single-family North		8.0%	37.8%	5.5%	6.1%	**57.4%**
Single-family South		7.7%	34.4%	5.3%	6.1%	**53.5%**
Multi-family North	7.0%	5.1%	29.3%			**41.4%**
Multi-family South	6.3%	5.6%	27.4%			**39.3%**
Season						
Spring	5.4%	7.0%	34.5%		5.5%	**52.5%**
Summer	5.4%	6.5%	34.4%			**46.4%**
Autumn	5.5%	6.7%	34.4%		6.2%	**52.9%**
Winter	5.6%	7.5%	34.0%		5.6%	**52.7%**
Demographics						
Low Income		8.2%	36.7%	5.4%	5.7%	**56.0%**
High Income	5.6%	7.5%	34.0%		5.6%	**52.7%**
Small Households	5.3%	7.4%	35.0%		6.8%	**54.5%**
Large Households		8.5%	37.2%	6.3%		**52.0%**
Overall Residential	**5.5%**	**7.0%**	**32.9%**		**5.4%**	**50.7%**

The following conclusions can be drawn from the waste composition estimates of the overall residential substream and for each subpopulation.

- *Food* typically accounted for about a third of each substream's waste, by weight.
- *Food* and *compostable/soiled paper* were always among the largest components.
- The largest components were highly similar among subpopulations. The main differences appear to be the following.[5]
    - Single-family residents disposed a greater percentage of *food* and *animal by-products;* multi-family residents disposed more *mixed low grade paper*.
    - More *food* was disposed in the north service area than in the south.
    - High-income households disposed more *mixed low grade paper* while *disposable diapers* were a larger percentage of low-income households.
    - Large households disposed less *mixed low grade paper* and more *disposable diapers* than small households.

[5] No statistical tests were performed to identify differences between sample groups in the estimated percentage of each component disposed. Therefore, the comparisons mentioned in this paragraph may not be statistically significant.

3 Trends in Residential Disposal: 1988/89 – 2002

The overall residential results for the 2002 study were compared to previous studies of the residential waste stream.[6] Comparisons with the 1988/89 study identify trends that have occurred since the start of the curbside recycling program in 1988. Since the commingled recycling program was initiated in 2000, more recent comparisons will show trends since the development of this program.[7] All four of the previous residential studies followed the same basic methodology as the 2002 study.[8]

The year-to-year comparisons were made by examining the changes in the total amount of waste disposed and in composition percentages for each of the eight broad waste categories. Statistical t-tests were used to analyze differences in the composition percentages. Section 3.1 provides an overview of the changes in the last 14 years. Section 3.2 provides the detailed results of the comparisons. See Appendix E for details about year-to-year comparison calculations.

3.1 Trends in Waste Disposed Over the Last 14 Years

Figure 3-1 illustrates the changes in disposed tons since the 1988/89 study for each of the eight broad waste categories: *paper*, *plastic*, *glass*, *metals*, *organics*, *other materials*, *CDL* wastes, and *hazardous*. The total amount of waste disposed decreased dramatically from 179,968 tons in 1988/89 to 145,591 tons in 1994/95. It then remained steady from 1994/95 to 1998/99 (an increase of about 1,050 tons). From 1998/99 to 2002, it decreased further to 142,910 tons. Overall, the broad waste categories of *paper*, *organics*, and *other materials* (which includes animal by-products, disposable diapers, furniture, carpet, etc.) showed the greatest relative changes.

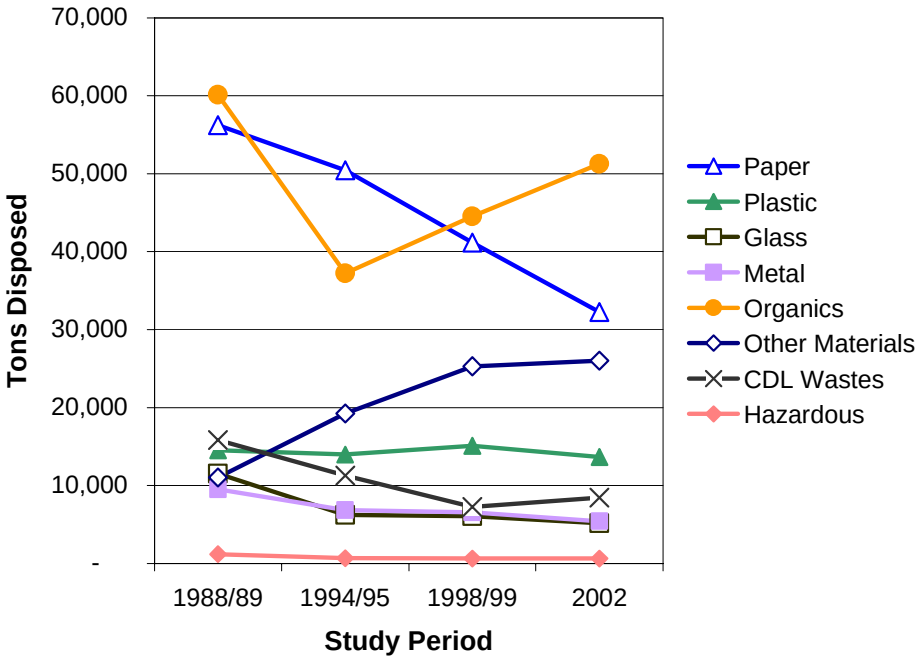
A new commingled curbside recycling program with added materials began in April 2000. Trends since the beginning of the new curbside program (which also included extensive outreach to the multi-family sector) can be seen by comparing the 1998 study with the current 2002 study.

[6] The composition and tonnage figures presented in this Section were calculated using an unweighted analytical process. Thus, they may not necessarily equal the composition percentages (and associated tonnages) presented in Section 4 as these are derived using a weighted process. Appendix D provides more detail on weighted averages, while Appendix E outlines year-to-year comparison calculations.

[7] The commingled recycling program allows residents to combine plastic and paper recyclable materials. Glass is still collected in a separate bin. Materials added include polycoated paper, aseptic packaging, plastic jars, tubs, and bottles, and clean plastic film bags.

[8] See Appendix B for more detail regarding the methodology.

Figure 3-1: Changes in Disposed Tons – 1988/89 to 2002



The following describes the changes in composition percentages of each commodity over the study years since 1988/89.

- ***Paper***. The mean percentage of *paper* in the waste stream decreased each study year since 1988/89.
- ***Plastic***. The mean percentage of *plastic* increased every study period through 1998/1999. It decreased between 1998/99 and 2002.
- ***Glass***. The mean percentage of *glass* decreased from 6.41% in 1988/89 to 3.6% in 2002. The biggest decrease due to one material category occurred in *container glass* between 1988/89 and 1994/95.
- ***Metal***. The mean percentage of *metal* in the waste stream decreased slightly between each of the study periods.
- ***Organics***. From 1988/89 to 1994/95, the mean percentage of *organics* showed a noticeable decrease. Since 1994/95, however, the estimated percentage of *organics* has increased, particularly the amount of *food*.
- ***Other Materials***. The mean percentage of other materials in the waste stream has increased since 1988/89. The increase since 1988/89 is difficult to measure because in that study period, *animal-by-products*, *furniture*, *mattresses*, *small appliances*, and *A/V equipment* were not sorted individually. The components in the *other materials* waste category in the study years since the 1994/95 study, however, were more comparable. The greatest change came between 1994/95 and 1998/99. Most of this increase can be attributed to *animal-by-products*.
- ***CDL Wastes***. The mean percentage of *CDL wastes* decreased between 1988/89 (8.8%) and 1998/99 (5.0%) and has increased since 1998/99 to approximately 5.9%.
- ***Hazardous***. The mean percentage of *hazardous* materials has remained steady since 1988/89. However, since the total amount of waste disposed has increased since 1988/89, so also has the quantity of *hazardous* materials.

3.2 Changes in Residential Waste

3.2.1 Changes in Residential Waste: 1988/89 vs. 2002

The bolded broad material categories in Table 3-1 showed statistically significant changes between 1988/89 and 2002. *Paper*, *glass*, *metal*, and *CDL wastes* experienced the largest decreases, while *plastic* and *other materials* increased. The amount of *other materials* disposed in the waste stream increased dramatically from 6.1% (11,046 tons) in 1988/89 to 18.2% (26,049 tons) in 2002, but at least part of this increase is due to the addition of various sorting categories such as *furniture*, *small appliances*, and *AV equipment*, which in the 1988/89 study were classified according to their dominant material type. See Appendix A for a table outlining changes in material categories across study periods.[9]

Table 3-1: Changes in Residential Waste – 1988/99 and 2002 Study Periods

	Percent		Change in	Disposed Tons	
	1988/89	2002	Composition %	1988/89	2002
Paper	**31.2%**	**22.6%**	**-8.7%** ↓	**56,220**	**32,248**
Plastic	**8.1%**	**9.6%**	**1.5%** ↑	**14,508**	**13,671**
Glass	**6.4%**	**3.6%**	**-2.8%** ↓	**11,537**	**5,170**
Metal	**5.3%**	**3.8%**	**-1.5%** ↓	**9,491**	**5,406**
Organics	33.4%	35.9%	2.4% ↑	60,145	51,254
Other Materials	**6.1%**	**18.2%**	**12.1%** ↑	**11,046**	**26,049**
CDL Wastes	**8.8%**	**5.9%**	**-2.9%** ↓	**15,830**	**8,469**
Hazardous	0.7%	0.5%	-0.2% ↓	1,192	644
Total	**100%**	**100%**		**179,968**	**142,910**

* Bold type indicates statistically significant changes.

[9] The change in sorting categories may have also affected the estimated proportions of plastic, metal, and glass causing them to be slightly higher in the 1988/89 study. The exact amount of this difference cannot be calculated.

3.2.2 Changes in Residential Waste: 1998/99 vs. 2002

In Table 3-2, bolded broad material categories experienced significant differences between the 1998/99 and 2002 study periods. *Paper* showed the largest decrease of almost 6% and *plastic* also had a statistically significant decrease from 10.3% (15,085 tons) to 9.6% (13,671 tons). *Organics* increased significantly from about 30.4% (44,573 tons) in 1998/99 to 35.9% (51,254 tons) in 2002 mostly due to an increase in *food*.

Table 3-2: Changes in Residential Waste – 1998/99 and 2002 Study Periods

	Percent		Change in	Disposed Tons	
	1998/1999	2002	Composition %	1998/1999	2002
Paper	**28.1%**	**22.6%**	**-5.5%** ⬇	**41,178**	**32,248**
Plastic	**10.3%**	**9.6%**	**-0.7%** ⬇	**15,085**	**13,671**
Glass	4.1%	3.6%	-0.5% ⬇	6,055	5,170
Metal	4.5%	3.8%	-0.7% ⬇	6,541	5,406
Organics	**30.4%**	**35.9%**	**5.5%** ⬆	**44,573**	**51,254**
Other Materials	17.3%	18.2%	1.0% ⬆	25,302	26,049
CDL Wastes	5.0%	5.9%	1.0% ⬆	7,280	8,469
Hazardous	0.4%	0.5%	0.0% ⬆	646	644
Total	**100%**	**100%**		**146,660**	**142,910**

* Bold type indicates statistically significant changes.

4 Composition Results: By Subpopulation

4.1 Overview

A total of 309 loads from the residential waste stream were sampled from January to December 2002. Table 4-1 summarizes the sample information for each residential subpopulation. The average sample weight for the 309 residential samples was approximately 255 pounds. Seattle Public Utilities and the City's authorized waste haulers provided the total 2002 disposal tonnages presented in this section of the report.

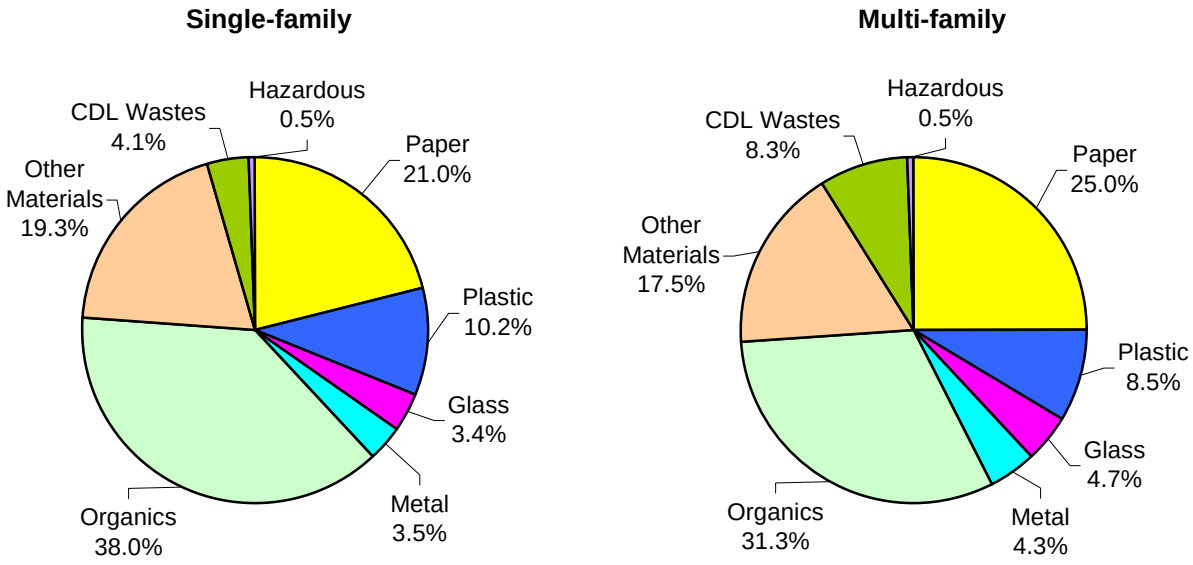
Table 4-1: Description of each Subpopulation
(January – December 2002)

Subpopulation		*(All Weights in pounds)*		
	Sample Count	Total Sample	Average Sample	Average Net Load Weight
Residence Type				
Single-family	204	50,167.9	245.9	13,997.9
Multi-family	105	28,642.5	272.8	17,560.8
Service Area				
North	154	38,909.2	252.7	15,266.7
South	155	39,901.2	257.4	15,144.3
Service Area and Generator Type				
Single-family North	101	24,294.2	240.5	13,842.4
Single-family South	103	25,873.8	251.2	14,148.9
Multi-family North	53	14,615.0	240.5	18,005.8
Multi-family South	52	14,027.4	269.8	17,115.8
Season				
Spring	76	18,204.1	239.5	14,611.6
Summer	79	20,602.4	260.8	16,307.3
Autumn	66	18,243.8	276.4	14,560.3
Winter	88	21,760.1	247.3	15,236.1
Demographics				
Low Income	48	11,742.5	244.6	14,722.9
High Income	45	11,246.6	249.9	13,888.9
Small Households	48	12,427.8	258.9	13,689.2
Large Households	49	11,883.9	242.5	14,892.2
Overall Residential	**309**	**78,810.4**	**255.1**	**15,204.9**

4.2 By Residence Type

A total of 204 samples were taken from single-family waste loads and 105 samples were captured from multi-family waste loads. Figure 4-1 summarizes the percentage of each of the broad waste categories disposed by both single- and multi-family residences. *Paper* and *organics* comprised the bulk of waste from both single- and the multi-family residences (a combined total of 59.0% for single-family and 56.3% for multi-family). *Organics* accounted for 38.0% of the waste from single-family residences, as compared to 31.3% of waste from multi-family residences. *Paper* accounted for 21.0% of single-family waste as compared to 25.0% of multi-family waste.

Figure 4-1: Composition Summary, by Residence Type
(January – December 2002)



4.2.1 Single-family Residences

Single-family residences disposed approximately 89,900 tons of waste during the 2002 calendar year. The composition estimates were applied to these tons to estimate the amount of waste disposed for each component category. As shown in Table 4-2, *food* was the largest component, accounting for almost 36% of the total tons disposed by single-family residences in 2002. When added together, all of the top ten components summed to about 71% of the total, by weight. The full single-family composition results are presented in Table 4-4.

Table 4-2: Top Ten Components – Single-family
(January – December 2002)

Component	Mean	Cum. %	Tons
Food	35.8%	35.8%	32,186
Compostable/Soiled Paper	7.9%	43.6%	7,061
Animal By-Products	6.1%	49.7%	5,463
Disposable Diapers	5.4%	55.1%	4,821
Mixed Low Grade Paper	4.9%	59.9%	4,365
Unwaxed OCC/Kraft Paper	2.5%	62.4%	2,224
Other Plastic Film	2.4%	64.8%	2,200
Newspaper	2.2%	67.0%	1,956
Leaves and Grass	2.0%	69.0%	1,809
Textiles/Clothing	2.0%	71.0%	1,777
Total	**71.0%**		**63,863**

4.2.2 Multi-family Residences

Seattle's multi-family residents disposed of 53,000 tons of waste during the 2002 calendar year. The composition estimates were applied to these tons to estimate the amount of waste disposed for each component category. Table 4-3 lists the top ten components disposed by multi-family residences. *Food* alone accounted for approximately 28%, by weight. *Mixed low grade paper* and *compostable/soiled paper* were also large components. The top ten components listed in Table 4-3 summed to approximately 64% of the total waste disposed by multi-family residences. The full multi-family composition results are listed in Table 4-5.

Table 4-3: Top Ten Components – Multi-family
(January – December 2002)

Component	Mean	Cum. %	Tons
Food	28.1%	28.1%	14,886
Mixed Low Grade Paper	6.6%	34.7%	3,470
Compostable/Soiled Paper	5.4%	40.1%	2,883
Newspaper	4.2%	44.3%	2,207
Unwaxed OCC/Kraft Paper	4.1%	48.4%	2,189
Animal By-Products	4.1%	52.5%	2,183
Textiles/Clothing	3.0%	55.5%	1,587
Carpet/Upholstery	2.9%	58.4%	1,516
Leaves and Grass	2.8%	61.2%	1,508
Disposable Diapers	2.5%	63.7%	1,309
Total	**63.7%**		**33,738**

4.2.3 Comparisons Between Single and Multi-family Residences

While *food* was the largest component of both single- and multi-family wastes, it made up almost 36% of single-family wastes, as compared to slightly more than 28% of multi-family wastes. *Compostable/soiled paper*, *animal by-products*, *disposable diapers*, *mixed low grade paper*, *unwaxed OCC/Kraft paper*, *newspaper*, *leaves and grass*, and *textiles/clothing* were top ten components of waste from both residence types.

There were few differences between single- and multi-family wastes. *Disposable diapers* accounted for twice as much of waste from single-family residences (5.4%) as that from multi-family residences (2.5%). In addition, *carpet/upholstery* was a top ten component only for those wastes disposed by multi-family residences: *other plastic film* was a top ten component for single-family wastes only.

Table 4-4: Composition by Weight – Single-family
(January – December 2002)

Calculated at a 90% confidence level

	Tons	Mean	Low	High
Paper	**18,901**	**21.0%**		
Newspaper	1,956	2.2%	1.9%	2.4%
OCC/Kraft, unwaxed	2,224	2.5%	2.3%	2.6%
OCC/Kraft, waxed	1	0.0%	0.0%	0.0%
Office Paper	1,219	1.4%	1.2%	1.5%
Computer Paper	50	0.1%	0.0%	0.1%
Mixed Low Grade	4,365	4.9%	4.6%	5.1%
Phone Books	50	0.1%	0.0%	0.1%
Milk/Juice Polycoats	313	0.3%	0.3%	0.4%
Frozen Food Polycoats	158	0.2%	0.1%	0.2%
Compostable/Soiled	7,061	7.9%	7.6%	8.1%
Paper/Other Materials	1,371	1.5%	1.4%	1.6%
Other Paper	133	0.1%	0.1%	0.2%
Plastic	**9,158**	**10.2%**		
PET Pop and Liquor	128	0.1%	0.1%	0.2%
Other PET Bottles	307	0.3%	0.3%	0.4%
HDPE Milk and Juice	109	0.1%	0.1%	0.1%
Other HDPE Bottles	307	0.3%	0.3%	0.4%
Other Plastic Bottles	100	0.1%	0.1%	0.1%
Jars and Tubs	341	0.4%	0.4%	0.4%
Expanded Polystyrene	599	0.7%	0.6%	0.7%
Other Rigid Packaging	1,084	1.2%	1.1%	1.3%
Grocery/Bread Bags	1,270	1.4%	1.3%	1.5%
Garbage Bags	1,046	1.2%	1.1%	1.2%
Other Film	2,200	2.4%	2.3%	2.6%
Plastic Products	887	1.0%	0.9%	1.1%
Plastic/Other Materials	781	0.9%	0.7%	1.0%
Glass	**3,052**	**3.4%**		
Clear Beverage	727	0.8%	0.7%	0.9%
Green Beverage	589	0.7%	0.6%	0.7%
Brown Beverage	532	0.6%	0.5%	0.7%
Container Glass	738	0.8%	0.7%	0.9%
Fluorescent Tubes	6	0.0%	0.0%	0.0%
Other Glass	460	0.5%	0.4%	0.6%
Metal	**3,133**	**3.5%**		
Aluminum Cans	263	0.3%	0.3%	0.3%
Alum. Foil/Containers	263	0.3%	0.3%	0.3%
Other Aluminum	12	0.0%	0.0%	0.0%
Other Nonferrous	50	0.1%	0.0%	0.1%
Tin Food Cans	868	1.0%	0.9%	1.0%
Empty Aerosol Cans	148	0.2%	0.1%	0.2%
Other Ferrous	607	0.7%	0.5%	0.8%
Mixed Metals/Materials	903	1.0%	0.8%	1.2%
Motor Oil Filters	19	0.0%	0.0%	0.0%
Organics	**34,198**	**38.0%**		
Pallets	6	0.0%	0.0%	0.0%
Crates/Boxes	33	0.0%	0.0%	0.1%
Leaves and Grass	1,809	2.0%	1.5%	2.5%
Prunings	165	0.2%	0.1%	0.3%
Food	32,186	35.8%	34.8%	36.7%
Other Materials	**17,392**	**19.3%**		
Textiles/Clothing	1,777	2.0%	1.8%	2.2%
Carpet/Upholstery	1,547	1.7%	1.4%	2.0%
Leather	77	0.1%	0.0%	0.1%
Disposable Diapers	4,821	5.4%	4.9%	5.8%
Animal By-Products	5,463	6.1%	5.5%	6.7%
Tires	0	0.0%	0.0%	0.0%
Ash	209	0.2%	0.1%	0.3%
Rubber Products	186	0.2%	0.2%	0.3%
Misc. Organics	1,466	1.6%	1.4%	1.9%
Furniture	71	0.1%	0.0%	0.2%
Mattresses	118	0.1%	0.0%	0.3%
Small Appliances	290	0.3%	0.2%	0.4%
A/V Equipment	205	0.2%	0.1%	0.3%
Ceramics/Porcelain	323	0.4%	0.2%	0.5%
Non-distinct Fines	410	0.5%	0.3%	0.6%
Misc. Inorganics	336	0.4%	0.3%	0.5%
Computer Monitors	26	0.0%	0.0%	0.1%
Other Computer Components	68	0.1%	0.0%	0.1%
TVs	0	0.0%	0.0%	0.0%
CDL Wastes	**3,668**	**4.1%**		
Dimension Lumber	741	0.8%	0.6%	1.0%
Other Untreated Wood	210	0.2%	0.1%	0.3%
Treated Wood	202	0.2%	0.1%	0.3%
Contaminated Wood	520	0.6%	0.4%	0.7%
New Gypsum Scrap	45	0.0%	0.0%	0.1%
Demo Gypsum Scrap	651	0.7%	0.0%	1.4%
Fiberglass Insulation	10	0.0%	0.0%	0.0%
Rock/Concrete/Brick	278	0.3%	0.1%	0.5%
Asphaltic Roofing	28	0.0%	0.0%	0.1%
Other Construction Debris	391	0.4%	0.2%	0.6%
Sand/Soil/Dirt	590	0.7%	0.4%	0.9%
Hazardous	**440**	**0.5%**		
Latex Paints	57	0.1%	0.0%	0.1%
Hazardous Adhesives/Glues	2	0.0%	0.0%	0.0%
NonHazardous Adhesives/Glues	8	0.0%	0.0%	0.0%
Oil-based Paints/Solvents	20	0.0%	0.0%	0.0%
Cleaners	12	0.0%	0.0%	0.0%
Pesticides/Herbicides	36	0.0%	0.0%	0.1%
Dry-Cell Batteries	80	0.1%	0.1%	0.1%
Wet-Cell Batteries	77	0.1%	0.0%	0.2%
Gasoline/Kerosene	0	0.0%	0.0%	0.0%
Motor Oil/Diesel Oil	19	0.0%	0.0%	0.0%
Asbestos	0	0.0%	0.0%	0.0%
Explosives	1	0.0%	0.0%	0.0%
Other Hazardous Chemicals	112	0.1%	0.0%	0.2%
Other NonHazardous Chemicals	17	0.0%	0.0%	0.0%
Total Tons	**89,942**			
Sample Count	**204**			

Table 4-5: Composition by Weight – Multi-family
(January – December 2002)

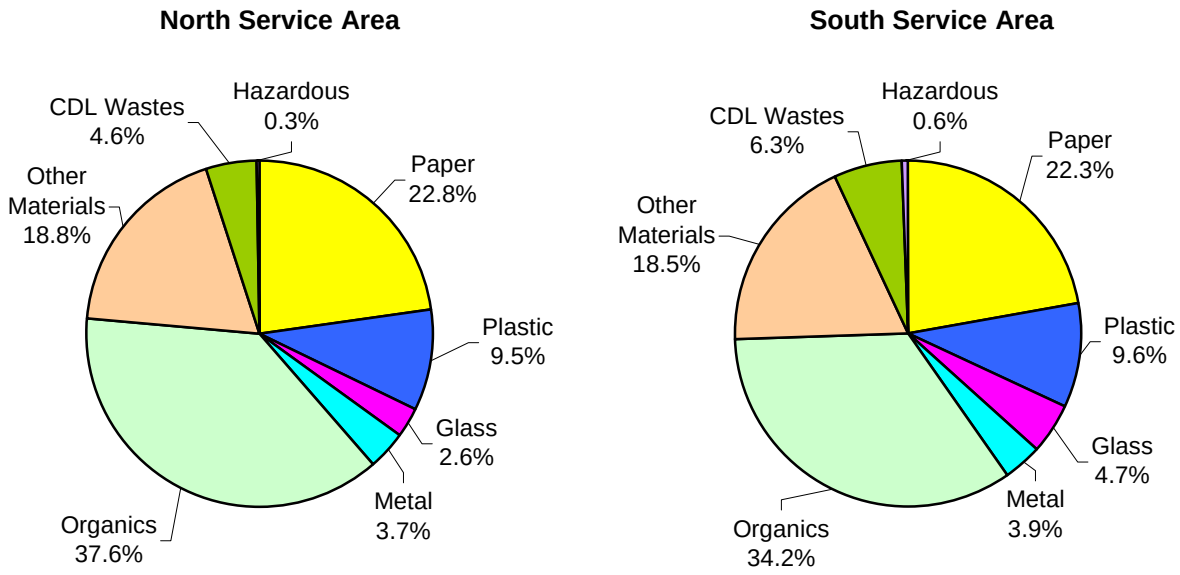
Calculated at a 90% confidence level

	Tons	Mean	Low	High
Paper	**13,239**	**25.0%**		
Newspaper	2,207	4.2%	3.7%	4.6%
OCC/Kraft, unwaxed	2,189	4.1%	3.7%	4.6%
OCC/Kraft, waxed	20	0.0%	0.0%	0.1%
Office Paper	981	1.9%	1.6%	2.1%
Computer Paper	67	0.1%	0.1%	0.2%
Mixed Low Grade	3,470	6.6%	6.0%	7.2%
Phone Books	196	0.4%	0.2%	0.5%
Milk/Juice Polycoats	177	0.3%	0.2%	0.5%
Frozen Food Polycoats	119	0.2%	0.2%	0.3%
Compostable/Soiled	2,883	5.4%	4.9%	5.9%
Paper/Other Materials	846	1.6%	1.3%	1.9%
Other Paper	83	0.2%	0.1%	0.3%
Plastic	**4,504**	**8.5%**		
PET Pop and Liquor	143	0.3%	0.2%	0.3%
Other PET Bottles	208	0.4%	0.4%	0.4%
HDPE Milk and Juice	121	0.2%	0.2%	0.3%
Other HDPE Bottles	151	0.3%	0.2%	0.3%
Other Plastic Bottles	49	0.1%	0.1%	0.1%
Jars and Tubs	154	0.3%	0.3%	0.3%
Expanded Polystyrene	260	0.5%	0.4%	0.6%
Other Rigid Packaging	457	0.9%	0.8%	0.9%
Grocery/Bread Bags	618	1.2%	1.1%	1.3%
Garbage Bags	608	1.1%	1.0%	1.3%
Other Film	911	1.7%	1.6%	1.9%
Plastic Products	537	1.0%	0.8%	1.2%
Plastic/Other Materials	288	0.5%	0.4%	0.7%
Glass	**2,485**	**4.7%**		
Clear Beverage	714	1.3%	1.1%	1.6%
Green Beverage	577	1.1%	0.9%	1.3%
Brown Beverage	587	1.1%	0.9%	1.3%
Container Glass	368	0.7%	0.6%	0.8%
Fluorescent Tubes	3	0.0%	0.0%	0.0%
Other Glass	236	0.4%	0.3%	0.6%
Metal	**2,290**	**4.3%**		
Aluminum Cans	263	0.5%	0.4%	0.6%
Alum. Foil/Containers	95	0.2%	0.2%	0.2%
Other Aluminum	9	0.0%	0.0%	0.0%
Other Nonferrous	46	0.1%	0.0%	0.1%
Tin Food Cans	542	1.0%	0.9%	1.1%
Empty Aerosol Cans	76	0.1%	0.1%	0.2%
Other Ferrous	567	1.1%	0.7%	1.5%
Mixed Metals/Materials	688	1.3%	1.0%	1.6%
Motor Oil Filters	4	0.0%	0.0%	0.0%
Organics	**16,561**	**31.3%**		
Pallets	0	0.0%	0.0%	0.0%
Crates/Boxes	26	0.0%	0.0%	0.1%
Leaves and Grass	1,508	2.8%	2.0%	3.7%
Prunings	141	0.3%	0.1%	0.5%
Food	14,886	28.1%	26.7%	29.5%
Other Materials	**9,252**	**17.5%**		
Textiles/Clothing	1,587	3.0%	2.5%	3.5%
Carpet/Upholstery	1,516	2.9%	2.2%	3.5%
Leather	99	0.2%	0.1%	0.3%
Disposable Diapers	1,309	2.5%	2.0%	3.0%
Animal By-Products	2,183	4.1%	3.3%	4.9%
Tires	4	0.0%	0.0%	0.0%
Ash	17	0.0%	0.0%	0.1%
Rubber Products	72	0.1%	0.1%	0.2%
Misc. Organics	535	1.0%	0.8%	1.2%
Furniture	404	0.8%	0.2%	1.4%
Mattresses	0	0.0%	0.0%	0.0%
Small Appliances	159	0.3%	0.2%	0.4%
A/V Equipment	171	0.3%	0.2%	0.5%
Ceramics/Porcelain	432	0.8%	0.5%	1.1%
Non-distinct Fines	208	0.4%	0.2%	0.6%
Misc. Inorganics	202	0.4%	0.1%	0.6%
Computer Monitors	36	0.1%	0.0%	0.2%
Other Computer Components	237	0.4%	0.1%	0.8%
TVs	82	0.2%	0.0%	0.4%
CDL Wastes	**4,391**	**8.3%**		
Dimension Lumber	755	1.4%	1.1%	1.8%
Other Untreated Wood	76	0.1%	0.1%	0.2%
Treated Wood	398	0.8%	0.4%	1.1%
Contaminated Wood	602	1.1%	0.8%	1.5%
New Gypsum Scrap	0	0.0%	0.0%	0.0%
Demo Gypsum Scrap	388	0.7%	0.1%	1.4%
Fiberglass Insulation	0	0.0%	0.0%	0.0%
Rock/Concrete/Brick	489	0.9%	0.1%	1.8%
Asphaltic Roofing	13	0.0%	0.0%	0.0%
Other Construction Debris	412	0.8%	0.0%	1.6%
Sand/Soil/Dirt	1,258	2.4%	1.5%	3.3%
Hazardous	**248**	**0.5%**		
Latex Paints	40	0.1%	0.0%	0.2%
Hazardous Adhesives/Glues	0	0.0%	0.0%	0.0%
NonHazardous Adhesives/Glues	2	0.0%	0.0%	0.0%
Oil-based Paints/Solvents	5	0.0%	0.0%	0.0%
Cleaners	22	0.0%	0.0%	0.1%
Pesticides/Herbicides	1	0.0%	0.0%	0.0%
Dry-Cell Batteries	34	0.1%	0.0%	0.1%
Wet-Cell Batteries	59	0.1%	0.0%	0.3%
Gasoline/Kerosene	0	0.0%	0.0%	0.0%
Motor Oil/Diesel Oil	13	0.0%	0.0%	0.1%
Asbestos	0	0.0%	0.0%	0.0%
Explosives	0	0.0%	0.0%	0.0%
Other Hazardous Chemicals	69	0.1%	0.0%	0.3%
Other NonHazardous Chemicals	2	0.0%	0.0%	0.0%
Total Tons	**52,969**			
Sample Count	**105**			

4.3 By Service Area[10]

On a broad waste category level, *paper* and *organics* accounted for the highest percentage of waste from both the north and south service areas.[11] Combined, these two categories accounted for 60.4% of the waste from the north and 56.5% of the waste from the south. *Other materials* made up almost 19% in each service area, by weight. Other than *CDL wastes* and *glass,* which were each slightly greater in the south than in the north service area, very little differences existed between the other broad waste categories.

Figure 4-2: Composition Summary, by Service Area
(January – December 2002)



[10] Comparison of composition between north and south service areas was important prior to 2000. In April 2000, the new commingled recycling program was implemented city-wide. The previous program had different collection containers, separation requirements, and pick-up frequencies. These differences made it important to track disposal composition by service territory as one means of evaluating the curbside program. Future reports will likely exclude this comparison.

[11] The Lake Washington Ship Canal is the physical boundary that divides the north and south service areas. See Section 1 for a map outlining these two areas.

4.3.1 North Service Area

From the north service area, 154 samples were sorted between January and December 2002. North service area residents disposed an estimated 55,699 tons of waste in 2002. Table 4-6 lists the top ten components from the north. *Food* accounted for more than a third (34.8%, by weight). C*ompostable/soiled paper*, *mixed low grade paper,* and *animal by-products* were also large components, each greater than 5% of the total, by weight. The top ten components listed in Table 4-6 summed to approximately 70% of the total waste disposed in the north. The full composition results for the north service area are listed in Table 4-8.

Table 4-6: Top Ten Components – North Service Area
(January – December 2002)

Component	Mean	Cum. %	Tons
Food	34.8%	34.8%	19,385
Compostable/Soiled Paper	7.0%	41.8%	3,915
Mixed Low Grade Paper	5.5%	47.4%	3,083
Animal By-Products	5.3%	52.7%	2,957
Disposable Diapers	4.5%	57.2%	2,499
Unwaxed OCC/Kraft Paper	3.2%	60.3%	1,767
Newspaper	3.0%	63.3%	1,655
Leaves and Grass	2.5%	65.8%	1,382
Carpet/Upholstery	2.4%	68.1%	1,314
Other Plastic Film	2.2%	70.4%	1,244
Total	**70.4%**		**39,200**

4.3.2 South Service Area

During the calendar year 2002, 155 loads were sampled in the south service area. Seattle's south end residents disposed approximately 87,212 tons in 2002. The composition estimates for this service area were applied to these tons to estimate the amount of waste disposed for each component category. *Food* accounted for over 30% of this waste, by weight. *Compostable/soiled paper*, *mixed low grade paper*, and *animal by-products* each accounted for more than 5% of the total disposed waste for the south service area. The top ten components summed to almost 67% and represented almost 58,000 tons of the annual waste disposed. The full composition results for the south service area are listed in Table 4-9.

Table 4-7: Top Ten Components – South Service Area
(January – December 2002)

Component	Mean	Cum. %	Tons
Food	31.7%	31.7%	27,687
Compostable/Soiled Paper	6.9%	38.7%	6,029
Mixed Low Grade Paper	5.4%	44.1%	4,753
Animal By-Products	5.4%	49.5%	4,688
Disposable Diapers	4.2%	53.6%	3,631
Unwaxed OCC/Kraft Paper	3.0%	56.7%	2,646
Newspaper	2.9%	59.6%	2,509
Textiles/Clothing	2.5%	62.1%	2,209
Leaves and Grass	2.2%	64.3%	1,935
Other Plastic Film	2.1%	66.5%	1,867
Total	**66.5%**		**57,953**

4.3.3 Comparisons Between North and South Service Areas

At approximately 34.8% for the north service area and 31.7% for the south service area, *food* was the largest component of waste from both service areas. *Compostable/soiled paper*, *mixed low grade paper*, and *animal by-products* were the next three largest components for both groups. Nine of the top ten components were common to waste from both the north and south areas. *Carpet/upholstery* was present as a top ten component in waste only from the north service area, while *textiles/clothing* was a top ten component only in waste from the south service area.

Table 4-8: Composition by Weight – North Service Area
(January – December 2002)

Calculated at a 90% confidence level

	Tons	Mean	Low	High
Paper	**12,725**	**22.8%**		
Newspaper	1,655	3.0%	2.6%	3.4%
OCC/Kraft, unwaxed	1,767	3.2%	2.9%	3.5%
OCC/Kraft, waxed	6	0.0%	0.0%	0.0%
Office Paper	851	1.5%	1.3%	1.7%
Computer Paper	34	0.1%	0.0%	0.1%
Mixed Low Grade	3,083	5.5%	5.2%	5.9%
Phone Books	78	0.1%	0.1%	0.2%
Milk/Juice Polycoats	184	0.3%	0.3%	0.4%
Frozen Food Polycoats	117	0.2%	0.2%	0.2%
Compostable/Soiled	3,915	7.0%	6.7%	7.4%
Paper/Other Materials	924	1.7%	1.5%	1.8%
Other Paper	111	0.2%	0.1%	0.3%
Plastic	**5,265**	**9.5%**		
PET Pop and Liquor	92	0.2%	0.1%	0.2%
Other PET Bottles	173	0.3%	0.3%	0.3%
HDPE Milk and Juice	88	0.2%	0.1%	0.2%
Other HDPE Bottles	167	0.3%	0.3%	0.3%
Other Plastic Bottles	54	0.1%	0.1%	0.1%
Jars and Tubs	218	0.4%	0.4%	0.4%
Expanded Polystyrene	356	0.6%	0.6%	0.7%
Other Rigid Packaging	646	1.2%	1.1%	1.2%
Grocery/Bread Bags	669	1.2%	1.1%	1.3%
Garbage Bags	615	1.1%	1.0%	1.2%
Other Film	1,244	2.2%	2.1%	2.4%
Plastic Products	512	0.9%	0.8%	1.0%
Plastic/Other Materials	432	0.8%	0.6%	0.9%
Glass	**1,466**	**2.6%**		
Clear Beverage	313	0.6%	0.5%	0.7%
Green Beverage	254	0.5%	0.4%	0.5%
Brown Beverage	336	0.6%	0.5%	0.7%
Container Glass	345	0.6%	0.5%	0.7%
Fluorescent Tubes	5	0.0%	0.0%	0.0%
Other Glass	213	0.4%	0.3%	0.5%
Metal	**2,064**	**3.7%**		
Aluminum Cans	183	0.3%	0.3%	0.4%
Alum. Foil/Containers	151	0.3%	0.2%	0.3%
Other Aluminum	6	0.0%	0.0%	0.0%
Other Nonferrous	51	0.1%	0.0%	0.1%
Tin Food Cans	473	0.8%	0.8%	0.9%
Empty Aerosol Cans	92	0.2%	0.1%	0.2%
Other Ferrous	469	0.8%	0.6%	1.1%
Mixed Metals/Materials	634	1.1%	0.9%	1.4%
Motor Oil Filters	6	0.0%	0.0%	0.0%
Total Tons	**55,699**			
Sample Count	**154**			

	Tons	Mean	Low	High
Organics	**20,958**	**37.6%**		
Pallets	6	0.0%	0.0%	0.0%
Crates/Boxes	11	0.0%	0.0%	0.1%
Leaves and Grass	1,382	2.5%	1.8%	3.2%
Prunings	174	0.3%	0.1%	0.5%
Food	19,385	34.8%	33.7%	35.9%
Other Materials	**10,479**	**18.8%**		
Textiles/Clothing	1,155	2.1%	1.8%	2.4%
Carpet/Upholstery	1,314	2.4%	1.8%	2.9%
Leather	53	0.1%	0.0%	0.2%
Disposable Diapers	2,499	4.5%	4.0%	5.0%
Animal By-Products	2,957	5.3%	4.6%	6.0%
Tires	4	0.0%	0.0%	0.0%
Ash	106	0.2%	0.1%	0.3%
Rubber Products	114	0.2%	0.1%	0.3%
Misc. Organics	870	1.6%	1.3%	1.8%
Furniture	87	0.2%	0.1%	0.3%
Mattresses	0	0.0%	0.0%	0.0%
Small Appliances	97	0.2%	0.1%	0.3%
A/V Equipment	178	0.3%	0.2%	0.5%
Ceramics/Porcelain	274	0.5%	0.3%	0.7%
Non-distinct Fines	304	0.5%	0.4%	0.7%
Misc. Inorganics	193	0.3%	0.2%	0.5%
Computer Monitors	26	0.0%	0.0%	0.1%
Other Computer Components	165	0.3%	0.1%	0.5%
TVs	82	0.1%	0.0%	0.4%
CDL Wastes	**2,579**	**4.6%**		
Dimension Lumber	458	0.8%	0.6%	1.0%
Other Untreated Wood	142	0.3%	0.1%	0.4%
Treated Wood	290	0.5%	0.3%	0.7%
Contaminated Wood	366	0.7%	0.4%	0.9%
New Gypsum Scrap	41	0.1%	0.0%	0.1%
Demo Gypsum Scrap	139	0.3%	0.1%	0.4%
Fiberglass Insulation	5	0.0%	0.0%	0.0%
Rock/Concrete/Brick	138	0.2%	0.1%	0.4%
Asphaltic Roofing	28	0.1%	0.0%	0.1%
Other Construction Debris	254	0.5%	0.2%	0.7%
Sand/Soil/Dirt	717	1.3%	0.8%	1.8%
Hazardous	**162**	**0.3%**		
Latex Paints	19	0.0%	0.0%	0.1%
Hazardous Adhesives/Glues	0	0.0%	0.0%	0.0%
NonHazardous Adhesives/Glues	7	0.0%	0.0%	0.0%
Oil-based Paints/Solvents	5	0.0%	0.0%	0.0%
Cleaners	9	0.0%	0.0%	0.0%
Pesticides/Herbicides	3	0.0%	0.0%	0.0%
Dry-Cell Batteries	43	0.1%	0.1%	0.1%
Wet-Cell Batteries	1	0.0%	0.0%	0.0%
Gasoline/Kerosene	0	0.0%	0.0%	0.0%
Motor Oil/Diesel Oil	2	0.0%	0.0%	0.0%
Asbestos	0	0.0%	0.0%	0.0%
Explosives	1	0.0%	0.0%	0.0%
Other Hazardous Chemicals	70	0.1%	0.0%	0.3%
Other NonHazardous Chemicals	4	0.0%	0.0%	0.0%

Table 4-9: Composition by Weight – South Service Area
(January – December 2002)

Calculated at a 90% confidence level

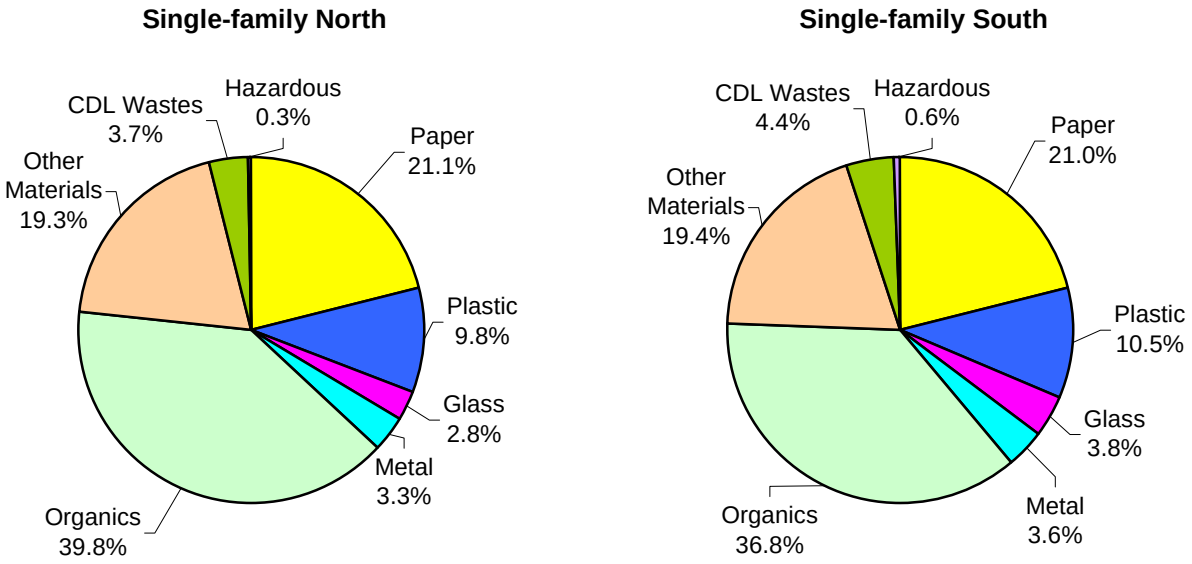
	Tons	Mean	Low	High
Paper	**19,415**	**22.3%**		
Newspaper	2,509	2.9%	2.6%	3.2%
OCC/Kraft, unwaxed	2,646	3.0%	2.8%	3.3%
OCC/Kraft, waxed	15	0.0%	0.0%	0.0%
Office Paper	1,348	1.5%	1.4%	1.7%
Computer Paper	83	0.1%	0.1%	0.1%
Mixed Low Grade	4,753	5.4%	5.0%	5.9%
Phone Books	168	0.2%	0.1%	0.3%
Milk/Juice Polycoats	306	0.4%	0.3%	0.4%
Frozen Food Polycoats	159	0.2%	0.1%	0.2%
Compostable/Soiled	6,029	6.9%	6.6%	7.3%
Paper/Other Materials	1,293	1.5%	1.3%	1.6%
Other Paper	106	0.1%	0.1%	0.2%
Plastic	**8,396**	**9.6%**		
PET Pop and Liquor	178	0.2%	0.2%	0.2%
Other PET Bottles	341	0.4%	0.4%	0.4%
HDPE Milk and Juice	142	0.2%	0.1%	0.2%
Other HDPE Bottles	291	0.3%	0.3%	0.4%
Other Plastic Bottles	95	0.1%	0.1%	0.1%
Jars and Tubs	277	0.3%	0.3%	0.3%
Expanded Polystyrene	502	0.6%	0.5%	0.6%
Other Rigid Packaging	895	1.0%	1.0%	1.1%
Grocery/Bread Bags	1,219	1.4%	1.3%	1.5%
Garbage Bags	1,039	1.2%	1.1%	1.3%
Other Film	1,867	2.1%	2.0%	2.3%
Plastic Products	913	1.0%	0.9%	1.2%
Plastic/Other Materials	637	0.7%	0.6%	0.9%
Glass	**4,071**	**4.7%**		
Clear Beverage	1,128	1.3%	1.1%	1.5%
Green Beverage	913	1.0%	0.9%	1.2%
Brown Beverage	783	0.9%	0.7%	1.1%
Container Glass	760	0.9%	0.8%	1.0%
Fluorescent Tubes	5	0.0%	0.0%	0.0%
Other Glass	482	0.6%	0.4%	0.7%
Metal	**3,358**	**3.9%**		
Aluminum Cans	343	0.4%	0.4%	0.4%
Alum. Foil/Containers	207	0.2%	0.2%	0.3%
Other Aluminum	15	0.0%	0.0%	0.0%
Other Nonferrous	45	0.1%	0.0%	0.1%
Tin Food Cans	937	1.1%	1.0%	1.2%
Empty Aerosol Cans	131	0.2%	0.1%	0.2%
Other Ferrous	705	0.8%	0.6%	1.1%
Mixed Metals/Materials	958	1.1%	0.9%	1.3%
Motor Oil Filters	17	0.0%	0.0%	0.0%
Total Tons	**87,212**			
Sample Count	**155**			

	Tons	Mean	Low	High
Organics	**29,801**	**34.2%**		
Pallets	0	0.0%	0.0%	0.0%
Crates/Boxes	48	0.1%	0.0%	0.1%
Leaves and Grass	1,935	2.2%	1.6%	2.8%
Prunings	131	0.2%	0.1%	0.2%
Food	27,687	31.7%	30.7%	32.8%
Other Materials	**16,165**	**18.5%**		
Textiles/Clothing	2,209	2.5%	2.2%	2.9%
Carpet/Upholstery	1,749	2.0%	1.6%	2.4%
Leather	124	0.1%	0.1%	0.2%
Disposable Diapers	3,631	4.2%	3.7%	4.6%
Animal By-Products	4,688	5.4%	4.7%	6.0%
Tires	0	0.0%	0.0%	0.0%
Ash	119	0.1%	0.1%	0.2%
Rubber Products	144	0.2%	0.1%	0.2%
Misc. Organics	1,131	1.3%	1.1%	1.5%
Furniture	388	0.4%	0.1%	0.8%
Mattresses	118	0.1%	0.0%	0.4%
Small Appliances	352	0.4%	0.3%	0.5%
A/V Equipment	198	0.2%	0.1%	0.4%
Ceramics/Porcelain	481	0.6%	0.4%	0.7%
Non-distinct Fines	314	0.4%	0.2%	0.5%
Misc. Inorganics	345	0.4%	0.2%	0.6%
Computer Monitors	36	0.0%	0.0%	0.1%
Other Computer Components	140	0.2%	0.0%	0.3%
TVs	0	0.0%	0.0%	0.0%
CDL Wastes	**5,480**	**6.3%**		
Dimension Lumber	1,038	1.2%	0.9%	1.4%
Other Untreated Wood	144	0.2%	0.1%	0.2%
Treated Wood	310	0.4%	0.2%	0.6%
Contaminated Wood	755	0.9%	0.7%	1.1%
New Gypsum Scrap	3	0.0%	0.0%	0.0%
Demo Gypsum Scrap	900	1.0%	0.2%	1.8%
Fiberglass Insulation	5	0.0%	0.0%	0.0%
Rock/Concrete/Brick	630	0.7%	0.2%	1.3%
Asphaltic Roofing	13	0.0%	0.0%	0.0%
Other Construction Debris	550	0.6%	0.1%	1.1%
Sand/Soil/Dirt	1,131	1.3%	0.8%	1.8%
Hazardous	**526**	**0.6%**		
Latex Paints	78	0.1%	0.0%	0.2%
Hazardous Adhesives/Glues	2	0.0%	0.0%	0.0%
NonHazardous Adhesives/Glues	3	0.0%	0.0%	0.0%
Oil-based Paints/Solvents	20	0.0%	0.0%	0.1%
Cleaners	25	0.0%	0.0%	0.0%
Pesticides/Herbicides	33	0.0%	0.0%	0.1%
Dry-Cell Batteries	72	0.1%	0.1%	0.1%
Wet-Cell Batteries	135	0.2%	0.0%	0.3%
Gasoline/Kerosene	0	0.0%	0.0%	0.0%
Motor Oil/Diesel Oil	30	0.0%	0.0%	0.1%
Asbestos	0	0.0%	0.0%	0.0%
Explosives	0	0.0%	0.0%	0.0%
Other Hazardous Chemicals	112	0.1%	0.0%	0.2%
Other NonHazardous Chemicals	16	0.0%	0.0%	0.0%

4.4 By Service Area and Residence Type: Single-family

Broad material categories (as shown in Figure 4-3) were compared between single-family north and single-family south subpopulations. In both subpopulations, *organics* made up almost 40% of the total. Other predominant categories included *paper*, at about 21% in each subpopulation, and *other materials*, at slightly more than 19% in both subpopulations. The remaining categories were similarly proportioned for both the single-family north and south waste.

Figure 4-3: Composition Summary, Single-family
(January – December 2002)



4.4.1 Single-family North

A total of 101 samples were sorted from single-family north waste loads. This subpopulation disposed of approximately 36,340 tons during the calendar year 2002. Composition estimates for this subpopulation were applied to these tons to estimate the amount of waste disposed for each component category. The top ten components for the single-family north subpopulation accounted for nearly 73% and 26,441 tons of the annual waste disposed. *Food* was, by far, the largest component, at nearly 40% of the waste stream. *Compostable/soiled paper* (8.0%), *animal by-products* (6.1%), and *disposable diapers* (5.5%) were also large components. Table 4-12 details the full composition results for the single-family north subpopulation.

Table 4-10: Top Ten Components – Single-family North
(January – December 2002)

Component	Mean	Cum. %	Tons
Food	37.8%	37.8%	13,723
Compostable/Soiled Paper	8.0%	45.8%	2,920
Animal By-Products	6.1%	51.9%	2,213
Disposable Diapers	5.5%	57.4%	1,988
Mixed Low Grade Paper	4.8%	62.1%	1,731
Other Plastic Film	2.5%	64.6%	914
Unwaxed OCC/Kraft Paper	2.4%	67.0%	875
Newspaper	2.0%	69.1%	736
Miscellaneous Organics	1.8%	70.9%	670
Leaves and Grass	1.8%	72.8%	670
Total	**72.8%**		**26,441**

4.4.2 Single-family South

There were a total of 103 samples taken from single-family south loads. It is estimated that this subpopulation disposed of 53,601 tons of waste between January and December 2002. *Food* accounted for slightly less than in the single-family north subpopulation, at 34.4%, by weight. *Compostable/soiled paper* (7.7%), *animal by-products* (6.1%), and *disposable diapers* (5.3%) were also large components. Alternately, *miscellaneous organics* is a top ten component for single-family north. The detailed composition results for the single-family south subpopulation are listed in Table 4-13.

Table 4-11: Top Ten Components – Single-family South
(January – December 2002)

Component	Mean	Cum. %	Tons
Food	34.4%	34.4%	18,463
Compostable/Soiled Paper	7.7%	42.2%	4,141
Animal By-Products	6.1%	48.2%	3,250
Disposable Diapers	5.3%	53.5%	2,834
Mixed Low Grade Paper	4.9%	58.4%	2,635
Unwaxed OCC/Kraft Paper	2.5%	61.0%	1,349
Other Plastic Film	2.4%	63.4%	1,286
Newspaper	2.3%	65.6%	1,220
Leaves and Grass	2.1%	67.8%	1,139
Textiles/Clothing	2.1%	69.8%	1,116
Total	**69.8%**		**37,432**

4.4.3 Comparisons Between Single-family North and Single-family South

At over one-third, *food* is the largest component of waste from both the single-family north and south subpopulations. *Compostable/soiled paper*, *animal by-products*, and *disposable diapers* were next largest components for both subpopulations. Nine of the top ten components are the present in both top ten lists. However, *miscellaneous organics* was found to be a top ten component only in the single-family subpopulation (this component includes such items as wax, modeling clay, bar soap, cigarette butts, etc.). *Textiles/clothing* was a top ten component in the single-family south, but not in the single-family north subpopulation.

Table 4-12: Composition by Weight – Single-family North
(January – December 2002)

Calculated at a 90% confidence level

	Tons	Mean	Low	High
Paper	**7,650**	**21.1%**		
Newspaper	736	2.0%	1.6%	2.5%
OCC/Kraft, unwaxed	875	2.4%	2.2%	2.6%
OCC/Kraft, waxed	0	0.0%	0.0%	0.0%
Office Paper	466	1.3%	1.1%	1.5%
Computer Paper	20	0.1%	0.0%	0.1%
Mixed Low Grade	1,731	4.8%	4.3%	5.2%
Phone Books	21	0.1%	0.0%	0.1%
Milk/Juice Polycoats	133	0.4%	0.3%	0.4%
Frozen Food Polycoats	71	0.2%	0.2%	0.2%
Compostable/Soiled	2,920	8.0%	7.6%	8.5%
Paper/Other Materials	603	1.7%	1.5%	1.9%
Other Paper	72	0.2%	0.1%	0.3%
Plastic	**3,552**	**9.8%**		
PET Pop and Liquor	41	0.1%	0.1%	0.1%
Other PET Bottles	98	0.3%	0.2%	0.3%
HDPE Milk and Juice	36	0.1%	0.1%	0.1%
Other HDPE Bottles	117	0.3%	0.3%	0.4%
Other Plastic Bottles	37	0.1%	0.1%	0.1%
Jars and Tubs	159	0.4%	0.4%	0.5%
Expanded Polystyrene	254	0.7%	0.6%	0.8%
Other Rigid Packaging	451	1.2%	1.2%	1.3%
Grocery/Bread Bags	441	1.2%	1.1%	1.3%
Garbage Bags	392	1.1%	1.0%	1.2%
Other Film	914	2.5%	2.3%	2.7%
Plastic Products	305	0.8%	0.7%	1.0%
Plastic/Other Materials	308	0.8%	0.7%	1.0%
Glass	**1,014**	**2.8%**		
Clear Beverage	210	0.6%	0.5%	0.7%
Green Beverage	174	0.5%	0.4%	0.6%
Brown Beverage	204	0.6%	0.4%	0.7%
Container Glass	267	0.7%	0.6%	0.8%
Fluorescent Tubes	3	0.0%	0.0%	0.0%
Other Glass	157	0.4%	0.3%	0.5%
Metal	**1,210**	**3.3%**		
Aluminum Cans	84	0.2%	0.2%	0.3%
Alum. Foil/Containers	113	0.3%	0.3%	0.4%
Other Aluminum	3	0.0%	0.0%	0.0%
Other Nonferrous	21	0.1%	0.0%	0.1%
Tin Food Cans	290	0.8%	0.7%	0.9%
Empty Aerosol Cans	59	0.2%	0.1%	0.2%
Other Ferrous	271	0.7%	0.6%	0.9%
Mixed Metals/Materials	366	1.0%	0.8%	1.2%
Motor Oil Filters	4	0.0%	0.0%	0.0%
Organics	**14,466**	**39.8%**		
Pallets	6	0.0%	0.0%	0.0%
Crates/Boxes	0	0.0%	0.0%	0.0%
Leaves and Grass	670	1.8%	1.2%	2.5%
Prunings	68	0.2%	0.1%	0.3%
Food	13,723	37.8%	36.4%	39.1%
Other Materials	**7,018**	**19.3%**		
Textiles/Clothing	661	1.8%	1.5%	2.1%
Carpet/Upholstery	623	1.7%	1.2%	2.3%
Leather	22	0.1%	0.0%	0.1%
Disposable Diapers	1,988	5.5%	4.8%	6.1%
Animal By-Products	2,213	6.1%	5.1%	7.0%
Tires	0	0.0%	0.0%	0.0%
Ash	96	0.3%	0.1%	0.5%
Rubber Products	92	0.3%	0.1%	0.4%
Misc. Organics	670	1.8%	1.6%	2.1%
Furniture	9	0.0%	0.0%	0.1%
Mattresses	0	0.0%	0.0%	0.0%
Small Appliances	45	0.1%	0.0%	0.2%
A/V Equipment	121	0.3%	0.2%	0.5%
Ceramics/Porcelain	110	0.3%	0.2%	0.4%
Non-distinct Fines	155	0.4%	0.3%	0.6%
Misc. Inorganics	167	0.5%	0.2%	0.7%
Computer Monitors	26	0.1%	0.0%	0.2%
Other Computer Components	22	0.1%	0.0%	0.1%
TVs	0	0.0%	0.0%	0.0%
CDL Wastes	**1,328**	**3.7%**		
Dimension Lumber	312	0.9%	0.6%	1.2%
Other Untreated Wood	101	0.3%	0.1%	0.5%
Treated Wood	115	0.3%	0.1%	0.5%
Contaminated Wood	126	0.3%	0.2%	0.5%
New Gypsum Scrap	41	0.1%	0.0%	0.2%
Demo Gypsum Scrap	130	0.4%	0.1%	0.6%
Fiberglass Insulation	5	0.0%	0.0%	0.0%
Rock/Concrete/Brick	46	0.1%	0.0%	0.2%
Asphaltic Roofing	19	0.1%	0.0%	0.1%
Other Construction Debris	139	0.4%	0.1%	0.7%
Sand/Soil/Dirt	293	0.8%	0.4%	1.2%
Hazardous	**102**	**0.3%**		
Latex Paints	18	0.0%	0.0%	0.1%
Hazardous Adhesives/Glues	0	0.0%	0.0%	0.0%
NonHazardous Adhesives/Glues	6	0.0%	0.0%	0.0%
Oil-based Paints/Solvents	5	0.0%	0.0%	0.0%
Cleaners	1	0.0%	0.0%	0.0%
Pesticides/Herbicides	3	0.0%	0.0%	0.0%
Dry-Cell Batteries	32	0.1%	0.1%	0.1%
Wet-Cell Batteries	1	0.0%	0.0%	0.0%
Gasoline/Kerosene	0	0.0%	0.0%	0.0%
Motor Oil/Diesel Oil	2	0.0%	0.0%	0.0%
Asbestos	0	0.0%	0.0%	0.0%
Explosives	1	0.0%	0.0%	0.0%
Other Hazardous Chemicals	30	0.1%	0.0%	0.2%
Other NonHazardous Chemicals	3	0.0%	0.0%	0.0%
Total Tons	**36,340**			
Sample Count	**101**			

Table 4-13: Composition by Weight – Single-family South
(January – December 2002)

Calculated at a 90% confidence level

	Tons	Mean	Low	High
Paper	**11,251**	**21.0%**		
Newspaper	1,220	2.3%	2.0%	2.6%
OCC/Kraft, unwaxed	1,349	2.5%	2.3%	2.7%
OCC/Kraft, waxed	1	0.0%	0.0%	0.0%
Office Paper	753	1.4%	1.2%	1.6%
Computer Paper	30	0.1%	0.0%	0.1%
Mixed Low Grade	2,635	4.9%	4.5%	5.3%
Phone Books	29	0.1%	0.0%	0.1%
Milk/Juice Polycoats	179	0.3%	0.3%	0.4%
Frozen Food Polycoats	86	0.2%	0.1%	0.2%
Compostable/Soiled	4,141	7.7%	7.3%	8.1%
Paper/Other Materials	767	1.4%	1.3%	1.6%
Other Paper	61	0.1%	0.1%	0.2%
Plastic	**5,607**	**10.5%**		
PET Pop and Liquor	87	0.2%	0.1%	0.2%
Other PET Bottles	208	0.4%	0.3%	0.4%
HDPE Milk and Juice	73	0.1%	0.1%	0.2%
Other HDPE Bottles	190	0.4%	0.3%	0.4%
Other Plastic Bottles	63	0.1%	0.1%	0.1%
Jars and Tubs	182	0.3%	0.3%	0.4%
Expanded Polystyrene	345	0.6%	0.6%	0.7%
Other Rigid Packaging	633	1.2%	1.1%	1.3%
Grocery/Bread Bags	830	1.5%	1.4%	1.7%
Garbage Bags	654	1.2%	1.1%	1.3%
Other Film	1,286	2.4%	2.2%	2.6%
Plastic Products	582	1.1%	0.9%	1.3%
Plastic/Other Materials	473	0.9%	0.7%	1.1%
Glass	**2,038**	**3.8%**		
Clear Beverage	517	1.0%	0.8%	1.2%
Green Beverage	415	0.8%	0.7%	0.9%
Brown Beverage	329	0.6%	0.5%	0.8%
Container Glass	471	0.9%	0.8%	1.0%
Fluorescent Tubes	3	0.0%	0.0%	0.0%
Other Glass	303	0.6%	0.4%	0.7%
Metal	**1,922**	**3.6%**		
Aluminum Cans	179	0.3%	0.3%	0.4%
Alum. Foil/Containers	150	0.3%	0.2%	0.3%
Other Aluminum	9	0.0%	0.0%	0.0%
Other Nonferrous	29	0.1%	0.0%	0.1%
Tin Food Cans	579	1.1%	1.0%	1.2%
Empty Aerosol Cans	89	0.2%	0.1%	0.2%
Other Ferrous	336	0.6%	0.5%	0.8%
Mixed Metals/Materials	537	1.0%	0.8%	1.3%
Motor Oil Filters	15	0.0%	0.0%	0.0%

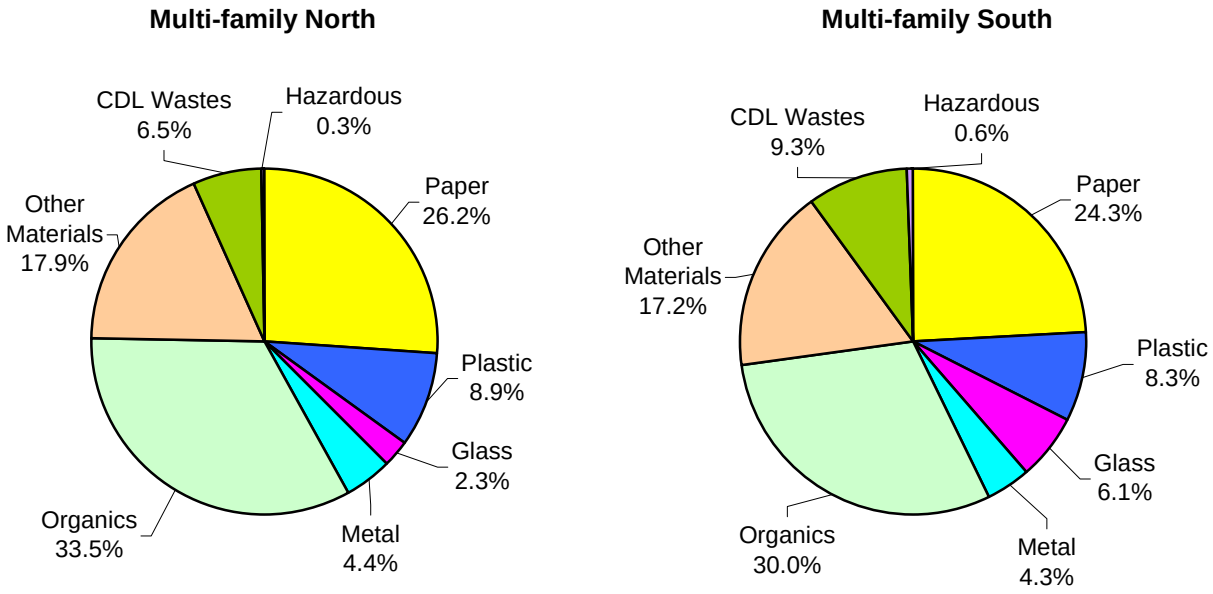
	Tons	Mean	Low	High
Organics	**19,732**	**36.8%**		
Pallets	0	0.0%	0.0%	0.0%
Crates/Boxes	33	0.1%	0.0%	0.1%
Leaves and Grass	1,139	2.1%	1.3%	2.9%
Prunings	97	0.2%	0.0%	0.3%
Food	18,463	34.4%	33.1%	35.7%
Other Materials	**10,374**	**19.4%**		
Textiles/Clothing	1,116	2.1%	1.8%	2.4%
Carpet/Upholstery	924	1.7%	1.4%	2.0%
Leather	55	0.1%	0.0%	0.2%
Disposable Diapers	2,834	5.3%	4.6%	5.9%
Animal By-Products	3,250	6.1%	5.3%	6.9%
Tires	0	0.0%	0.0%	0.0%
Ash	112	0.2%	0.1%	0.3%
Rubber Products	94	0.2%	0.1%	0.2%
Misc. Organics	796	1.5%	1.1%	1.8%
Furniture	62	0.1%	0.0%	0.3%
Mattresses	118	0.2%	0.0%	0.6%
Small Appliances	245	0.5%	0.3%	0.7%
A/V Equipment	85	0.2%	0.0%	0.3%
Ceramics/Porcelain	214	0.4%	0.2%	0.6%
Non-distinct Fines	255	0.5%	0.3%	0.6%
Misc. Inorganics	169	0.3%	0.2%	0.4%
Computer Monitors	0	0.0%	0.0%	0.0%
Other Computer Components	46	0.1%	0.0%	0.2%
TVs	0	0.0%	0.0%	0.0%
CDL Wastes	**2,340**	**4.4%**		
Dimension Lumber	429	0.8%	0.6%	1.0%
Other Untreated Wood	109	0.2%	0.1%	0.3%
Treated Wood	87	0.2%	0.1%	0.2%
Contaminated Wood	394	0.7%	0.5%	1.0%
New Gypsum Scrap	3	0.0%	0.0%	0.0%
Demo Gypsum Scrap	521	1.0%	0.0%	2.1%
Fiberglass Insulation	5	0.0%	0.0%	0.0%
Rock/Concrete/Brick	233	0.4%	0.1%	0.8%
Asphaltic Roofing	9	0.0%	0.0%	0.0%
Other Construction Debris	252	0.5%	0.2%	0.8%
Sand/Soil/Dirt	297	0.6%	0.3%	0.8%
Hazardous	**338**	**0.6%**		
Latex Paints	39	0.1%	0.0%	0.1%
Hazardous Adhesives/Glues	2	0.0%	0.0%	0.0%
NonHazardous Adhesives/Glues	2	0.0%	0.0%	0.0%
Oil-based Paints/Solvents	15	0.0%	0.0%	0.1%
Cleaners	11	0.0%	0.0%	0.0%
Pesticides/Herbicides	33	0.1%	0.0%	0.1%
Dry-Cell Batteries	48	0.1%	0.1%	0.1%
Wet-Cell Batteries	76	0.1%	0.0%	0.4%
Gasoline/Kerosene	0	0.0%	0.0%	0.0%
Motor Oil/Diesel Oil	17	0.0%	0.0%	0.1%
Asbestos	0	0.0%	0.0%	0.0%
Explosives	0	0.0%	0.0%	0.0%
Other Hazardous Chemicals	82	0.2%	0.0%	0.3%
Other NonHazardous Chemicals	14	0.0%	0.0%	0.1%

Total Tons	**53,601**
Sample Count	**103**

4.5 By Service Area and Residence Type: Multi-family

As shown in Figure 4-4, *paper* and *organics* comprise the bulk of the waste from multi-family residences both in the north (59.7%) and in the south (54.3%). *Other materials* was another large component, accounting for slightly more than 17% of both subpopulations. As with the single-family subpopulations, *CDL wastes* and *glass* accounted for a larger percentage of the waste from the south than from the north.

Figure 4-4: Composition Summary, Multi-family
(January – December 2002)



4.5.1 Multi-family North

A total of 53 loads were sampled for the multi-family north subpopulation. The amount of disposed waste for this subpopulation for calendar year 2002 was 19,358 tons. Composition estimates for this subpopulation were applied to these tons to estimate the amount of waste disposed for each component category. Almost 30% of the subpopulation was composed of *food*. *Mixed low grade paper* and *compostable/soiled paper* each accounted for more than 5% of the subpopulation. The full composition results for the multi-family north subpopulation are listed in Table 4-16.

Table 4-14: Top Ten Components – Multi-family North
(January – December 2002)

Component	Mean	Cum. %	Tons
Food	29.3%	29.3%	5,663
Mixed Low Grade Paper	7.0%	36.2%	1,352
Compostable/Soiled Paper	5.1%	41.4%	994
Newspaper	4.7%	46.1%	918
Unwaxed OCC/Kraft Paper	4.6%	50.7%	892
Animal By-Products	3.8%	54.6%	744
Leaves and Grass	3.7%	58.2%	712
Carpet/Upholstery	3.6%	61.8%	691
Disposable Diapers	2.6%	64.5%	511
Textiles/Clothing	2.6%	67.0%	494
Total	**67.0%**		**12,972**

4.5.2 Multi-family South

To characterize waste from the multi-family south subpopulation, 52 samples were sorted. It is estimated that multi-family residents in the south service area disposed about 33,610 tons in 2002. Composition estimates for this subpopulation were applied to the 33,610 tons to estimate the amount of waste disposed for each component category. The top ten components for this subpopulation accounted for almost 62%, or 20,804 tons. Table 4-17 lists detailed composition results for waste from multi-family residences in the south service area.

Table 4-15: Top Ten Components – Multi-family South
(January – December 2002)

Component	Mean	Cum. %	Tons
Food	27.4%	27.4%	9,224
Mixed Low Grade Paper	6.3%	33.7%	2,118
Compostable/Soiled Paper	5.6%	39.4%	1,888
Animal By-Products	4.3%	43.6%	1,438
Unwaxed OCC/Kraft Paper	3.9%	47.5%	1,297
Newspaper	3.8%	51.3%	1,289
Textiles/Clothing	3.3%	54.6%	1,093
Sand/Soil/Dirt	2.5%	57.1%	834
Carpet/Upholstery	2.5%	59.5%	825
Disposable Diapers	2.4%	61.9%	797
Total	**61.9%**		**20,804**

4.5.3 Comparisons Between Multi-family North and Multi-family South

In waste from both multi-family north and multi-family south residences, *food* comprised almost 30% of the subpopulation. Also, *mixed low grade paper* and *compostable/soiled paper* were the second and third largest components for both.

Only one of the top ten components differs between the two subpopulations – *leaves and grass.* It is a top ten component only in the multi-family north subpopulation, while *sand/soil/dirt* is a top ten component only in the multi-family south subpopulation.

Table 4-16: Composition by Weight – Multi-family North
(January – December 2002)

Calculated at a 90% confidence level

	Tons	Mean	Low	High
Paper	**5,075**	**26.2%**		
Newspaper	918	4.7%	4.0%	5.5%
OCC/Kraft, unwaxed	892	4.6%	3.9%	5.3%
OCC/Kraft, waxed	6	0.0%	0.0%	0.1%
Office Paper	385	2.0%	1.6%	2.3%
Computer Paper	14	0.1%	0.0%	0.1%
Mixed Low Grade	1,352	7.0%	6.4%	7.6%
Phone Books	57	0.3%	0.1%	0.5%
Milk/Juice Polycoats	51	0.3%	0.2%	0.3%
Frozen Food Polycoats	46	0.2%	0.2%	0.3%
Compostable/Soiled	994	5.1%	4.6%	5.7%
Paper/Other Materials	320	1.7%	1.3%	2.0%
Other Paper	39	0.2%	0.0%	0.4%
Plastic	**1,714**	**8.9%**		
PET Pop and Liquor	51	0.3%	0.2%	0.3%
Other PET Bottles	75	0.4%	0.3%	0.5%
HDPE Milk and Juice	52	0.3%	0.2%	0.3%
Other HDPE Bottles	49	0.3%	0.2%	0.3%
Other Plastic Bottles	17	0.1%	0.1%	0.1%
Jars and Tubs	59	0.3%	0.3%	0.3%
Expanded Polystyrene	103	0.5%	0.3%	0.7%
Other Rigid Packaging	195	1.0%	0.9%	1.1%
Grocery/Bread Bags	228	1.2%	1.0%	1.3%
Garbage Bags	223	1.2%	1.0%	1.3%
Other Film	330	1.7%	1.5%	1.9%
Plastic Products	207	1.1%	0.8%	1.3%
Plastic/Other Materials	124	0.6%	0.4%	0.8%
Glass	**452**	**2.3%**		
Clear Beverage	104	0.5%	0.4%	0.7%
Green Beverage	79	0.4%	0.3%	0.5%
Brown Beverage	132	0.7%	0.5%	0.9%
Container Glass	78	0.4%	0.3%	0.5%
Fluorescent Tubes	1	0.0%	0.0%	0.0%
Other Glass	57	0.3%	0.2%	0.4%
Metal	**854**	**4.4%**		
Aluminum Cans	99	0.5%	0.4%	0.6%
Alum. Foil/Containers	38	0.2%	0.1%	0.2%
Other Aluminum	3	0.0%	0.0%	0.0%
Other Nonferrous	30	0.2%	0.1%	0.3%
Tin Food Cans	184	0.9%	0.8%	1.1%
Empty Aerosol Cans	33	0.2%	0.1%	0.3%
Other Ferrous	198	1.0%	0.5%	1.6%
Mixed Metals/Materials	268	1.4%	0.9%	1.9%
Motor Oil Filters	2	0.0%	0.0%	0.0%
Organics	**6,492**	**33.5%**		
Pallets	0	0.0%	0.0%	0.0%
Crates/Boxes	11	0.1%	0.0%	0.2%
Leaves and Grass	712	3.7%	2.1%	5.2%
Prunings	107	0.6%	0.0%	1.1%
Food	5,663	29.3%	27.3%	31.2%
Other Materials	**3,461**	**17.9%**		
Textiles/Clothing	494	2.6%	2.0%	3.1%
Carpet/Upholstery	691	3.6%	2.4%	4.7%
Leather	31	0.2%	0.0%	0.3%
Disposable Diapers	511	2.6%	1.8%	3.5%
Animal By-Products	744	3.8%	2.7%	5.0%
Tires	4	0.0%	0.0%	0.1%
Ash	10	0.1%	0.0%	0.1%
Rubber Products	22	0.1%	0.1%	0.2%
Misc. Organics	199	1.0%	0.6%	1.4%
Furniture	78	0.4%	0.1%	0.7%
Mattresses	0	0.0%	0.0%	0.0%
Small Appliances	52	0.3%	0.1%	0.5%
A/V Equipment	57	0.3%	0.1%	0.5%
Ceramics/Porcelain	165	0.9%	0.3%	1.4%
Non-distinct Fines	149	0.8%	0.4%	1.2%
Misc. Inorganics	26	0.1%	0.0%	0.2%
Computer Monitors	0	0.0%	0.0%	0.0%
Other Computer Components	144	0.7%	0.1%	1.3%
TVs	82	0.4%	0.0%	1.1%
CDL Wastes	**1,251**	**6.5%**		
Dimension Lumber	146	0.8%	0.5%	1.0%
Other Untreated Wood	41	0.2%	0.0%	0.4%
Treated Wood	174	0.9%	0.4%	1.4%
Contaminated Wood	240	1.2%	0.6%	1.8%
New Gypsum Scrap	0	0.0%	0.0%	0.0%
Demo Gypsum Scrap	10	0.1%	0.0%	0.1%
Fiberglass Insulation	0	0.0%	0.0%	0.0%
Rock/Concrete/Brick	92	0.5%	0.1%	0.8%
Asphaltic Roofing	9	0.0%	0.0%	0.1%
Other Construction Debris	115	0.6%	0.1%	1.1%
Sand/Soil/Dirt	423	2.2%	1.0%	3.4%
Hazardous	**59**	**0.3%**		
Latex Paints	0	0.0%	0.0%	0.0%
Hazardous Adhesives/Glues	0	0.0%	0.0%	0.0%
NonHazardous Adhesives/Glues	0	0.0%	0.0%	0.0%
Oil-based Paints/Solvents	0	0.0%	0.0%	0.0%
Cleaners	7	0.0%	0.0%	0.1%
Pesticides/Herbicides	1	0.0%	0.0%	0.0%
Dry-Cell Batteries	11	0.1%	0.0%	0.1%
Wet-Cell Batteries	0	0.0%	0.0%	0.0%
Gasoline/Kerosene	0	0.0%	0.0%	0.0%
Motor Oil/Diesel Oil	0	0.0%	0.0%	0.0%
Asbestos	0	0.0%	0.0%	0.0%
Explosives	0	0.0%	0.0%	0.0%
Other Hazardous Chemicals	39	0.2%	0.0%	0.5%
Other NonHazardous Chemicals	1	0.0%	0.0%	0.0%
Total Tons	**19,358**			
Sample Count	**53**			

Table 4-17: Composition by Weight – Multi-family South
(January – December 2002)

Calculated at a 90% confidence level

	Tons	Mean	Low	High
Paper	**8,164**	**24.3%**		
Newspaper	1,289	3.8%	3.3%	4.4%
OCC/Kraft, unwaxed	1,297	3.9%	3.3%	4.4%
OCC/Kraft, waxed	15	0.0%	0.0%	0.1%
Office Paper	595	1.8%	1.4%	2.1%
Computer Paper	53	0.2%	0.1%	0.2%
Mixed Low Grade	2,118	6.3%	5.4%	7.2%
Phone Books	139	0.4%	0.2%	0.6%
Milk/Juice Polycoats	127	0.4%	0.2%	0.6%
Frozen Food Polycoats	73	0.2%	0.1%	0.3%
Compostable/Soiled	1,888	5.6%	4.9%	6.3%
Paper/Other Materials	525	1.6%	1.2%	1.9%
Other Paper	45	0.1%	0.0%	0.2%
Plastic	**2,790**	**8.3%**		
PET Pop and Liquor	91	0.3%	0.2%	0.3%
Other PET Bottles	133	0.4%	0.3%	0.4%
HDPE Milk and Juice	69	0.2%	0.2%	0.2%
Other HDPE Bottles	101	0.3%	0.2%	0.4%
Other Plastic Bottles	32	0.1%	0.1%	0.1%
Jars and Tubs	94	0.3%	0.2%	0.3%
Expanded Polystyrene	157	0.5%	0.4%	0.6%
Other Rigid Packaging	262	0.8%	0.7%	0.9%
Grocery/Bread Bags	390	1.2%	1.0%	1.3%
Garbage Bags	385	1.1%	0.9%	1.4%
Other Film	581	1.7%	1.5%	2.0%
Plastic Products	330	1.0%	0.8%	1.2%
Plastic/Other Materials	164	0.5%	0.4%	0.6%
Glass	**2,033**	**6.1%**		
Clear Beverage	611	1.8%	1.4%	2.2%
Green Beverage	498	1.5%	1.2%	1.7%
Brown Beverage	455	1.4%	1.0%	1.7%
Container Glass	290	0.9%	0.7%	1.0%
Fluorescent Tubes	2	0.0%	0.0%	0.0%
Other Glass	179	0.5%	0.4%	0.7%
Metal	**1,436**	**4.3%**		
Aluminum Cans	164	0.5%	0.4%	0.6%
Alum. Foil/Containers	57	0.2%	0.1%	0.2%
Other Aluminum	6	0.0%	0.0%	0.0%
Other Nonferrous	17	0.0%	0.0%	0.1%
Tin Food Cans	358	1.1%	0.9%	1.2%
Empty Aerosol Cans	43	0.1%	0.1%	0.2%
Other Ferrous	369	1.1%	0.5%	1.7%
Mixed Metals/Materials	420	1.3%	0.8%	1.7%
Motor Oil Filters	2	0.0%	0.0%	0.0%

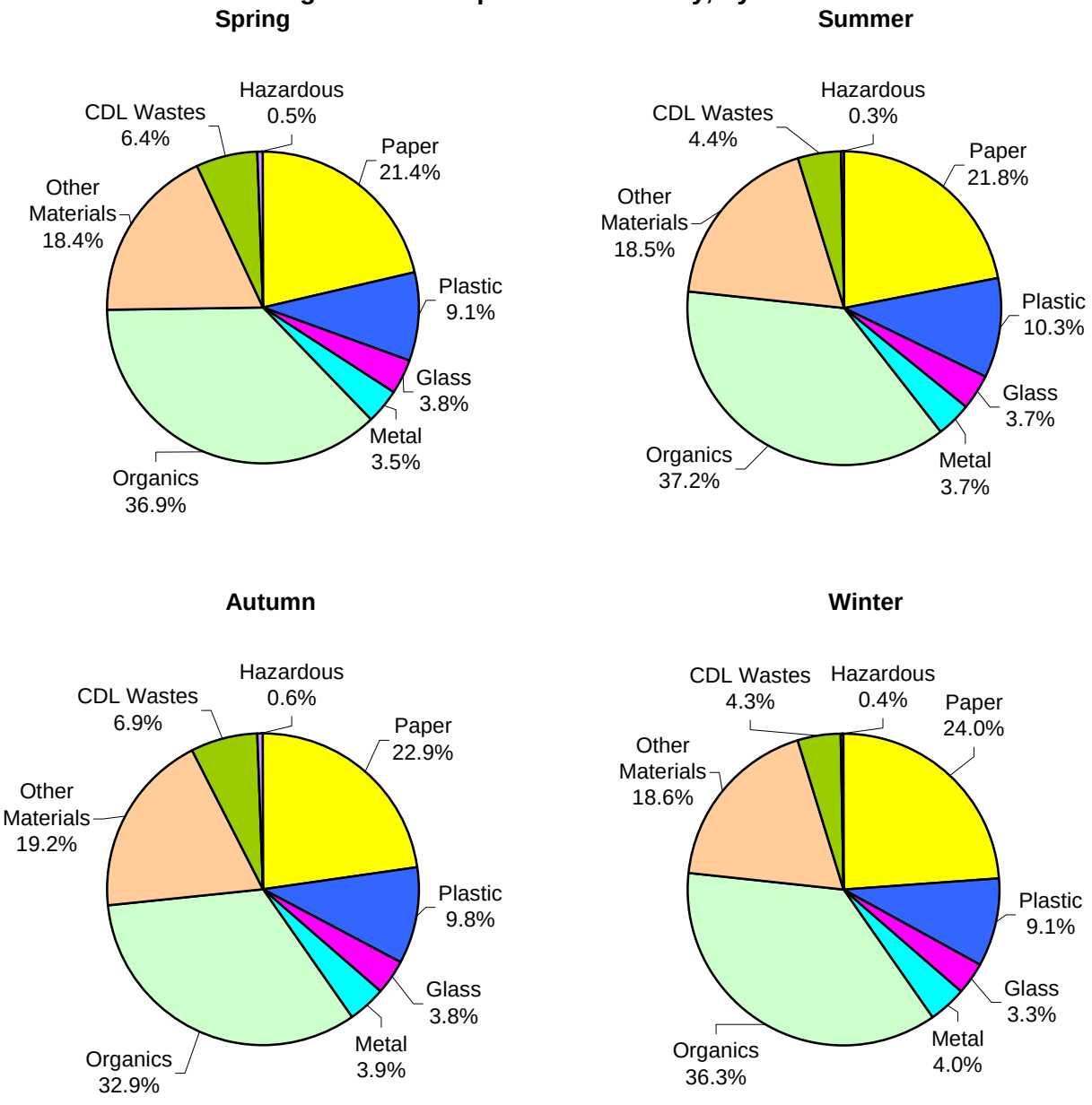
	Tons	Mean	Low	High
Organics	**10,069**	**30.0%**		
Pallets	0	0.0%	0.0%	0.0%
Crates/Boxes	15	0.0%	0.0%	0.1%
Leaves and Grass	796	2.4%	1.4%	3.4%
Prunings	34	0.1%	0.0%	0.2%
Food	9,224	27.4%	25.6%	29.3%
Other Materials	**5,791**	**17.2%**		
Textiles/Clothing	1,093	3.3%	2.5%	4.0%
Carpet/Upholstery	825	2.5%	1.6%	3.3%
Leather	68	0.2%	0.1%	0.4%
Disposable Diapers	797	2.4%	1.8%	3.0%
Animal By-Products	1,438	4.3%	3.1%	5.4%
Tires	0	0.0%	0.0%	0.0%
Ash	6	0.0%	0.0%	0.0%
Rubber Products	50	0.1%	0.1%	0.2%
Misc. Organics	335	1.0%	0.8%	1.2%
Furniture	326	1.0%	0.0%	1.9%
Mattresses	0	0.0%	0.0%	0.0%
Small Appliances	107	0.3%	0.1%	0.5%
A/V Equipment	113	0.3%	0.1%	0.5%
Ceramics/Porcelain	267	0.8%	0.5%	1.1%
Non-distinct Fines	59	0.2%	0.1%	0.3%
Misc. Inorganics	176	0.5%	0.2%	0.9%
Computer Monitors	36	0.1%	0.0%	0.3%
Other Computer Components	93	0.3%	0.0%	0.6%
TVs	0	0.0%	0.0%	0.0%
CDL Wastes	**3,140**	**9.3%**		
Dimension Lumber	609	1.8%	1.3%	2.4%
Other Untreated Wood	35	0.1%	0.0%	0.2%
Treated Wood	224	0.7%	0.2%	1.2%
Contaminated Wood	361	1.1%	0.7%	1.5%
New Gypsum Scrap	0	0.0%	0.0%	0.0%
Demo Gypsum Scrap	379	1.1%	0.1%	2.2%
Fiberglass Insulation	0	0.0%	0.0%	0.0%
Rock/Concrete/Brick	397	1.2%	0.0%	2.5%
Asphaltic Roofing	3	0.0%	0.0%	0.0%
Other Construction Debris	297	0.9%	0.0%	2.1%
Sand/Soil/Dirt	834	2.5%	1.2%	3.8%
Hazardous	**188**	**0.6%**		
Latex Paints	39	0.1%	0.0%	0.2%
Hazardous Adhesives/Glues	0	0.0%	0.0%	0.0%
NonHazardous Adhesives/Glues	2	0.0%	0.0%	0.0%
Oil-based Paints/Solvents	5	0.0%	0.0%	0.0%
Cleaners	15	0.0%	0.0%	0.1%
Pesticides/Herbicides	0	0.0%	0.0%	0.0%
Dry-Cell Batteries	23	0.1%	0.0%	0.1%
Wet-Cell Batteries	59	0.2%	0.0%	0.5%
Gasoline/Kerosene	0	0.0%	0.0%	0.0%
Motor Oil/Diesel Oil	13	0.0%	0.0%	0.1%
Asbestos	0	0.0%	0.0%	0.0%
Explosives	0	0.0%	0.0%	0.0%
Other Hazardous Chemicals	30	0.1%	0.0%	0.2%
Other NonHazardous Chemicals	2	0.0%	0.0%	0.0%

Total Tons	**33,610**
Sample Count	**52**

4.6 By Season

Waste composition results were examined for seasonal variations. Samples were classified into four seasons according to the month in which they were sorted: March, April, and May are spring; June, July, and August are summer; September, October, and November are autumn; and December, January, and February are winter. Figure 4-5 summarizes the results by broad material category for each season. When summed together, *paper* and *organics* accounted for almost 60% of the total tonnage for each of the four seasons. *Organics* accounted for a slightly smaller percentage of waste in the autumn (33% compared with about 37% for the other three seasons).

Figure 4-5: Composition Summary, by Season



4.6.1 Spring

A total of 76 samples were captured between the months of March and May 2002. The top ten components, which are listed in Table 4-18, sum to approximately 69.2% of the total, by weight. *Food* accounted for more than one-third of the total tons disposed in the spring (34.5%). The remaining top ten components – *compostable/soiled paper*, *animal by-products*, *mixed low grade paper*, *disposable diapers*, *newspaper*, *unwaxed OCC/Kraft paper*, *carpet/upholstery*, *textiles/clothing*, and *other film* – each account for 7% or less. Table 4-22 lists the full composition results for residential waste disposed during the spring of 2002.

Table 4-18: Top Ten Components – Spring
(March – May 2002)

Component	Mean	Cum. %
Food	34.5%	34.5%
Compostable/Soiled Paper	7.0%	41.6%
Animal By-Products	5.5%	47.0%
Mixed Low Grade Paper	5.4%	52.5%
Disposable Diapers	4.3%	56.7%
Newspaper	2.9%	59.6%
Unwaxed OCC/Kraft Paper	2.8%	62.4%
Carpet/Upholstery	2.7%	65.1%
Textiles/Clothing	2.2%	67.3%
Other Plastic Film	1.9%	69.2%
Total	**69.2%**	

4.6.2 Summer

In the summer of 2002, 79 samples were taken. As shown in Table 4-19, *food* was the largest component at 34.4%. The remaining components – *compostable/soiled paper*, *mixed low grade paper*, *disposable diapers*, *animal by-products*, *unwaxed OCC/Kraft paper*, *carpet/upholstery*, *newspaper*, *leaves and grass*, and *other film* – each represented less than 7% of the total, by weight. See Table 4-23 for a complete list of the composition results for residential waste disposed in the summer.

Table 4-19: Top Ten Components – Summer
(June – August 2002)

Component	Mean	Cum. %
Food	34.4%	34.4%
Compostable/Soiled Paper	6.5%	40.9%
Mixed Low Grade Paper	5.4%	46.4%
Disposable Diapers	4.7%	51.0%
Animal By-Products	4.2%	55.2%
Unwaxed OCC/Kraft Paper	3.0%	58.2%
Carpet/Upholstery	2.8%	61.0%
Newspaper	2.7%	63.7%
Leaves and Grass	2.6%	66.4%
Other Plastic Film	2.3%	68.6%
Total	**68.6%**	

4.6.3 Autumn

Between September and November of 2003, a total of 66 samples were captured from residential loads. Table 4-20 lists the top ten components of waste disposed in the autumn. *Food* composed almost 30% of the total, while *compostable/soiled paper*, *animal by-products*, *mixed low grade paper*, *disposable diapers*, *unwaxed OCC/Kraft paper*, *newspaper*, *leaves and grass*, *other film*, and *textiles/clothing* together accounted for another 36%. When summed together, the top ten components made up almost 66% of the total waste disposed in the autumn of 2002. Table 4-24 lists the composition results for this season in detail.

Table 4-20: Top Ten Components – Autumn
(September – November 2002)

Component	Mean	Cum. %
Food	29.8%	29.8%
Compostable/Soiled Paper	6.7%	36.5%
Animal By-Products	6.2%	42.7%
Mixed Low Grade Paper	5.5%	48.3%
Disposable Diapers	3.9%	52.1%
Unwaxed OCC/Kraft Paper	3.3%	55.4%
Newspaper	3.0%	58.4%
Leaves and Grass	2.9%	61.3%
Other Plastic Film	2.3%	63.6%
Textiles/Clothing	2.2%	65.8%
Total	**65.8%**	

4.6.4 Winter

A total of 88 samples were sorted from residential waste disposed during the winter of 2002. The top ten components are listed in Table 4-21, and sum to approximately 70.5% of the total, by weight. As in the other seasons, *food* accounted for over a third of the waste stream. *Compostable/soiled paper*, *animal by-products*, *mixed low grade paper*, *disposable diapers*, *unwaxed OCC/Kraft paper*, *newspaper*, *textiles/clothing*, *other film*, and *leaves and grass* were each less than 8% of the of waste disposed during January, February, and December 2002. Table 4-25 details the full composition results of this season's waste.

Table 4-21: Top Ten Components – Winter
(January, February, and December 2002)

Component	Mean	Cum. %
Food	34.0%	34.0%
Compostable/Soiled Paper	7.5%	41.5%
Animal By-Products	5.6%	47.1%
Mixed Low Grade Paper	5.6%	52.7%
Disposable Diapers	4.5%	57.2%
Unwaxed OCC/Kraft Paper	3.3%	60.6%
Newspaper	3.1%	63.6%
Textiles/Clothing	2.6%	66.2%
Other Plastic Film	2.2%	68.4%
Leaves and Grass	2.1%	70.5%
Total	**70.5%**	

4.6.5 Comparisons between Seasons

Food was the largest component for each of the four seasons. In addition to *food*, seven other components (*animal by-products*, *compostable/soiled paper*, *disposable diapers*, *mixed low grade paper*, *newspaper*, *unwaxed OCC/Kraft paper*, and *other film*) were among the top ten components in each season. Summer was the only season without *textiles/clothing* in the top ten. C*arpet/upholstery* was one of the largest components in the spring and summer, only.

Table 4-22: Composition by Weight – Spring
(March – May 2002)

Calculated at a 90% confidence level

	Mean	Low	High		Mean	Low	High
Paper	**21.4%**			***Organics***	**36.9%**		
Newspaper	2.9%	2.4%	3.4%	Pallets	0.0%	0.0%	0.0%
OCC/Kraft, unwaxed	2.8%	2.5%	3.0%	Crates/Boxes	0.1%	0.0%	0.2%
OCC/Kraft, waxed	0.0%	0.0%	0.0%	Leaves and Grass	1.9%	1.2%	2.5%
Office Paper	1.2%	1.0%	1.4%	Prunings	0.4%	0.0%	0.8%
Computer Paper	0.2%	0.2%	0.3%	Food	34.5%	32.8%	36.2%
Mixed Low Grade	5.4%	4.9%	6.0%	***Other Materials***	**18.4%**		
Phone Books	0.1%	0.0%	0.2%	Textiles/Clothing	2.2%	1.8%	2.5%
Milk/Juice Polycoats	0.3%	0.2%	0.3%	Carpet/Upholstery	2.7%	2.1%	3.4%
Frozen Food Polycoats	0.1%	0.1%	0.2%	Leather	0.1%	0.0%	0.2%
Compostable/Soiled	7.0%	6.5%	7.6%	Disposable Diapers	4.3%	3.6%	4.9%
Paper/Other Materials	1.3%	1.2%	1.5%	Animal By-Products	5.5%	4.4%	6.6%
Other Paper	0.0%	0.0%	0.0%	Tires	0.0%	0.0%	0.0%
Plastic	**9.1%**			Ash	0.1%	0.0%	0.3%
PET Pop and Liquor	0.2%	0.1%	0.2%	Rubber Products	0.2%	0.2%	0.3%
Other PET Bottles	0.3%	0.3%	0.4%	Misc. Organics	1.2%	1.0%	1.4%
HDPE Milk and Juice	0.2%	0.1%	0.2%	Furniture	0.1%	0.0%	0.4%
Other HDPE Bottles	0.3%	0.2%	0.3%	Mattresses	0.0%	0.0%	0.0%
Other Plastic Bottles	0.1%	0.1%	0.1%	Small Appliances	0.3%	0.1%	0.6%
Jars and Tubs	0.3%	0.3%	0.3%	A/V Equipment	0.2%	0.1%	0.3%
Expanded Polystyrene	0.7%	0.5%	0.9%	Ceramics/Porcelain	0.5%	0.3%	0.6%
Other Rigid Packaging	0.9%	0.9%	1.0%	Non-distinct Fines	0.0%	0.0%	0.1%
Grocery/Bread Bags	1.3%	1.2%	1.5%	Misc. Inorganics	0.4%	0.1%	0.6%
Garbage Bags	1.2%	1.1%	1.4%	Computer Monitors	0.1%	0.0%	0.2%
Other Film	1.9%	1.8%	2.1%	Other Computer Components	0.2%	0.0%	0.3%
Plastic Products	1.1%	0.9%	1.3%	TVs	0.3%	0.0%	0.9%
Plastic/Other Materials	0.5%	0.4%	0.6%	***CDL Wastes***	**6.4%**		
Glass	**3.8%**			Dimension Lumber	1.9%	1.4%	2.3%
Clear Beverage	1.2%	0.9%	1.4%	Other Untreated Wood	0.4%	0.1%	0.6%
Green Beverage	0.8%	0.7%	1.0%	Treated Wood	0.1%	0.0%	0.3%
Brown Beverage	0.8%	0.5%	1.0%	Contaminated Wood	0.8%	0.5%	1.1%
Container Glass	0.7%	0.6%	0.8%	New Gypsum Scrap	0.0%	0.0%	0.0%
Fluorescent Tubes	0.0%	0.0%	0.0%	Demo Gypsum Scrap	0.8%	0.3%	1.2%
Other Glass	0.3%	0.2%	0.4%	Fiberglass Insulation	0.0%	0.0%	0.0%
Metal	**3.5%**			Rock/Concrete/Brick	0.5%	0.0%	1.0%
Aluminum Cans	0.4%	0.3%	0.5%	Asphaltic Roofing	0.0%	0.0%	0.1%
Alum. Foil/Containers	0.2%	0.2%	0.3%	Other Construction Debris	1.1%	0.1%	2.1%
Other Aluminum	0.0%	0.0%	0.0%	Sand/Soil/Dirt	0.9%	0.5%	1.3%
Other Nonferrous	0.1%	0.0%	0.2%	***Hazardous***	**0.5%**		
Tin Food Cans	1.0%	0.9%	1.2%	Latex Paints	0.2%	0.0%	0.3%
Empty Aerosol Cans	0.1%	0.1%	0.2%	Hazardous Adhesives/Glues	0.0%	0.0%	0.0%
Other Ferrous	0.7%	0.4%	0.9%	NonHazardous Adhesives/Glues	0.0%	0.0%	0.0%
Mixed Metals/Materials	0.9%	0.6%	1.2%	Oil-based Paints/Solvents	0.0%	0.0%	0.0%
Motor Oil Filters	0.0%	0.0%	0.0%	Cleaners	0.0%	0.0%	0.1%
				Pesticides/Herbicides	0.0%	0.0%	0.0%
				Dry-Cell Batteries	0.1%	0.1%	0.1%
				Wet-Cell Batteries	0.0%	0.0%	0.0%
				Gasoline/Kerosene	0.0%	0.0%	0.0%
				Motor Oil/Diesel Oil	0.0%	0.0%	0.1%
				Asbestos	0.0%	0.0%	0.0%
				Explosives	0.0%	0.0%	0.0%
				Other Hazardous Chemicals	0.1%	0.0%	0.3%
Sample Count	**76**			Other NonHazardous Chemicals	0.0%	0.0%	0.0%

Table 4-23: Composition by Weight – Summer
(June – August 2002)

Calculated at a 90% confidence level

	Mean	Low	High		Mean	Low	High
Paper	**21.8%**			***Organics***	**37.2%**		
Newspaper	2.7%	2.3%	3.2%	Pallets	0.0%	0.0%	0.1%
OCC/Kraft, unwaxed	3.0%	2.6%	3.5%	Crates/Boxes	0.0%	0.0%	0.0%
OCC/Kraft, waxed	0.0%	0.0%	0.1%	Leaves and Grass	2.6%	1.8%	3.4%
Office Paper	1.3%	1.0%	1.5%	Prunings	0.1%	0.1%	0.2%
Computer Paper	0.0%	0.0%	0.0%	Food	34.4%	32.7%	36.1%
Mixed Low Grade	5.4%	4.8%	6.1%	***Other Materials***	**18.5%**		
Phone Books	0.2%	0.1%	0.3%	Textiles/Clothing	2.2%	1.8%	2.6%
Milk/Juice Polycoats	0.3%	0.2%	0.3%	Carpet/Upholstery	2.8%	1.8%	3.7%
Frozen Food Polycoats	0.3%	0.2%	0.4%	Leather	0.1%	0.0%	0.1%
Compostable/Soiled	6.5%	6.0%	7.0%	Disposable Diapers	4.7%	3.8%	5.5%
Paper/Other Materials	1.8%	1.5%	2.1%	Animal By-Products	4.2%	3.4%	5.0%
Other Paper	0.3%	0.1%	0.4%	Tires	0.0%	0.0%	0.0%
Plastic	**10.3%**			Ash	0.3%	0.1%	0.5%
PET Pop and Liquor	0.2%	0.1%	0.2%	Rubber Products	0.2%	0.1%	0.2%
Other PET Bottles	0.4%	0.3%	0.4%	Misc. Organics	1.3%	1.0%	1.5%
HDPE Milk and Juice	0.1%	0.1%	0.2%	Furniture	0.4%	0.1%	0.8%
Other HDPE Bottles	0.3%	0.3%	0.4%	Mattresses	0.3%	0.0%	0.7%
Other Plastic Bottles	0.1%	0.1%	0.1%	Small Appliances	0.4%	0.2%	0.6%
Jars and Tubs	0.4%	0.3%	0.4%	A/V Equipment	0.2%	0.0%	0.3%
Expanded Polystyrene	0.6%	0.5%	0.6%	Ceramics/Porcelain	0.7%	0.4%	1.1%
Other Rigid Packaging	1.3%	1.1%	1.4%	Non-distinct Fines	0.5%	0.3%	0.7%
Grocery/Bread Bags	1.4%	1.3%	1.6%	Misc. Inorganics	0.3%	0.2%	0.4%
Garbage Bags	1.2%	1.1%	1.3%	Computer Monitors	0.0%	0.0%	0.0%
Other Film	2.3%	2.1%	2.5%	Other Computer Components	0.2%	0.0%	0.4%
Plastic Products	1.0%	0.8%	1.2%	TVs	0.0%	0.0%	0.0%
Plastic/Other Materials	1.1%	0.8%	1.3%	***CDL Wastes***	**4.4%**		
Glass	**3.7%**			Dimension Lumber	0.6%	0.3%	0.8%
Clear Beverage	0.9%	0.7%	1.2%	Other Untreated Wood	0.2%	0.0%	0.4%
Green Beverage	0.7%	0.5%	0.8%	Treated Wood	0.4%	0.2%	0.6%
Brown Beverage	0.9%	0.7%	1.1%	Contaminated Wood	1.0%	0.6%	1.3%
Container Glass	0.8%	0.6%	0.9%	New Gypsum Scrap	0.0%	0.0%	0.0%
Fluorescent Tubes	0.0%	0.0%	0.0%	Demo Gypsum Scrap	0.6%	0.0%	1.3%
Other Glass	0.4%	0.3%	0.5%	Fiberglass Insulation	0.0%	0.0%	0.0%
Metal	**3.7%**			Rock/Concrete/Brick	0.3%	0.1%	0.4%
Aluminum Cans	0.3%	0.3%	0.4%	Asphaltic Roofing	0.0%	0.0%	0.0%
Alum. Foil/Containers	0.2%	0.2%	0.3%	Other Construction Debris	0.4%	0.1%	0.8%
Other Aluminum	0.0%	0.0%	0.0%	Sand/Soil/Dirt	1.0%	0.5%	1.5%
Other Nonferrous	0.1%	0.0%	0.2%	***Hazardous***	**0.3%**		
Tin Food Cans	0.8%	0.7%	0.8%	Latex Paints	0.0%	0.0%	0.0%
Empty Aerosol Cans	0.2%	0.1%	0.2%	Hazardous Adhesives/Glues	0.0%	0.0%	0.0%
Other Ferrous	0.6%	0.4%	0.8%	NonHazardous Adhesives/Glues	0.0%	0.0%	0.0%
Mixed Metals/Materials	1.5%	1.1%	1.9%	Oil-based Paints/Solvents	0.0%	0.0%	0.0%
Motor Oil Filters	0.0%	0.0%	0.0%	Cleaners	0.0%	0.0%	0.1%
				Pesticides/Herbicides	0.0%	0.0%	0.0%
				Dry-Cell Batteries	0.1%	0.1%	0.1%
				Wet-Cell Batteries	0.0%	0.0%	0.0%
				Gasoline/Kerosene	0.0%	0.0%	0.0%
				Motor Oil/Diesel Oil	0.0%	0.0%	0.0%
				Asbestos	0.0%	0.0%	0.0%
				Explosives	0.0%	0.0%	0.0%
				Other Hazardous Chemicals	0.1%	0.0%	0.2%
Sample Count		**79**		Other NonHazardous Chemicals	0.0%	0.0%	0.0%

Table 4-24: Composition by Weight – Autumn
(September – November 2002)

Calculated at a 90% confidence level

	Mean	Low	High		Mean	Low	High
Paper	**22.9%**			***Organics***	**32.9%**		
Newspaper	3.0%	2.5%	3.6%	Pallets	0.0%	0.0%	0.0%
OCC/Kraft, unwaxed	3.3%	2.8%	3.8%	Crates/Boxes	0.1%	0.0%	0.2%
OCC/Kraft, waxed	0.0%	0.0%	0.0%	Leaves and Grass	2.9%	1.8%	3.9%
Office Paper	1.9%	1.6%	2.2%	Prunings	0.2%	0.0%	0.4%
Computer Paper	0.0%	0.0%	0.0%	Food	29.8%	28.2%	31.4%
Mixed Low Grade	5.5%	5.0%	6.1%	***Other Materials***	**19.2%**		
Phone Books	0.2%	0.1%	0.3%	Textiles/Clothing	2.2%	1.6%	2.7%
Milk/Juice Polycoats	0.4%	0.3%	0.4%	Carpet/Upholstery	1.8%	1.4%	2.2%
Frozen Food Polycoats	0.2%	0.1%	0.2%	Leather	0.2%	0.1%	0.3%
Compostable/Soiled	6.7%	6.2%	7.3%	Disposable Diapers	3.9%	3.1%	4.7%
Paper/Other Materials	1.6%	1.3%	1.8%	Animal By-Products	6.2%	5.0%	7.4%
Other Paper	0.1%	0.1%	0.2%	Tires	0.0%	0.0%	0.0%
Plastic	**9.8%**			Ash	0.2%	0.1%	0.3%
PET Pop and Liquor	0.2%	0.2%	0.3%	Rubber Products	0.1%	0.1%	0.2%
Other PET Bottles	0.4%	0.3%	0.5%	Misc. Organics	1.1%	0.9%	1.4%
HDPE Milk and Juice	0.2%	0.2%	0.2%	Furniture	0.5%	0.0%	1.1%
Other HDPE Bottles	0.4%	0.3%	0.4%	Mattresses	0.0%	0.0%	0.0%
Other Plastic Bottles	0.1%	0.1%	0.1%	Small Appliances	0.4%	0.2%	0.5%
Jars and Tubs	0.3%	0.3%	0.4%	A/V Equipment	0.5%	0.2%	0.9%
Expanded Polystyrene	0.5%	0.5%	0.6%	Ceramics/Porcelain	0.6%	0.1%	1.0%
Other Rigid Packaging	1.2%	1.1%	1.3%	Non-distinct Fines	0.7%	0.4%	1.0%
Grocery/Bread Bags	1.3%	1.2%	1.5%	Misc. Inorganics	0.3%	0.2%	0.5%
Garbage Bags	1.3%	1.0%	1.5%	Computer Monitors	0.0%	0.0%	0.0%
Other Film	2.3%	2.1%	2.6%	Other Computer Components	0.6%	0.1%	1.1%
Plastic Products	0.9%	0.7%	1.0%	TVs	0.0%	0.0%	0.0%
Plastic/Other Materials	0.7%	0.5%	0.8%	***CDL Wastes***	**6.9%**		
Glass	**3.8%**			Dimension Lumber	0.8%	0.5%	1.2%
Clear Beverage	0.8%	0.6%	1.0%	Other Untreated Wood	0.1%	0.1%	0.2%
Green Beverage	0.8%	0.7%	1.0%	Treated Wood	0.6%	0.3%	1.0%
Brown Beverage	0.7%	0.5%	0.9%	Contaminated Wood	0.6%	0.4%	0.9%
Container Glass	0.8%	0.6%	0.9%	New Gypsum Scrap	0.0%	0.0%	0.1%
Fluorescent Tubes	0.0%	0.0%	0.0%	Demo Gypsum Scrap	1.0%	0.0%	2.6%
Other Glass	0.7%	0.5%	0.9%	Fiberglass Insulation	0.0%	0.0%	0.0%
Metal	**3.9%**			Rock/Concrete/Brick	1.1%	0.1%	2.1%
Aluminum Cans	0.4%	0.3%	0.4%	Asphaltic Roofing	0.0%	0.0%	0.1%
Alum. Foil/Containers	0.2%	0.2%	0.3%	Other Construction Debris	0.5%	0.2%	0.8%
Other Aluminum	0.0%	0.0%	0.0%	Sand/Soil/Dirt	2.0%	0.9%	3.2%
Other Nonferrous	0.0%	0.0%	0.1%	***Hazardous***	**0.6%**		
Tin Food Cans	0.9%	0.8%	1.1%	Latex Paints	0.0%	0.0%	0.0%
Empty Aerosol Cans	0.2%	0.1%	0.3%	Hazardous Adhesives/Glues	0.0%	0.0%	0.0%
Other Ferrous	1.0%	0.7%	1.4%	NonHazardous Adhesives/Glues	0.0%	0.0%	0.0%
Mixed Metals/Materials	1.0%	0.7%	1.2%	Oil-based Paints/Solvents	0.0%	0.0%	0.0%
Motor Oil Filters	0.0%	0.0%	0.0%	Cleaners	0.0%	0.0%	0.0%
				Pesticides/Herbicides	0.0%	0.0%	0.1%
				Dry-Cell Batteries	0.1%	0.0%	0.1%
				Wet-Cell Batteries	0.3%	0.0%	0.7%
				Gasoline/Kerosene	0.0%	0.0%	0.0%
				Motor Oil/Diesel Oil	0.0%	0.0%	0.1%
				Asbestos	0.0%	0.0%	0.0%
				Explosives	0.0%	0.0%	0.0%
				Other Hazardous Chemicals	0.1%	0.0%	0.2%
Sample Count	**66**			Other NonHazardous Chemicals	0.0%	0.0%	0.1%

Table 4-25: Composition by Weight – Winter
(January, February, and December 2002)

Calculated at a 90% confidence level

	Mean	Low	High		Mean	Low	High
Paper	**24.0%**			***Organics***	**36.3%**		
Newspaper	3.1%	2.6%	3.6%	Pallets	0.0%	0.0%	0.0%
OCC/Kraft, unwaxed	3.3%	3.0%	3.7%	Crates/Boxes	0.0%	0.0%	0.0%
OCC/Kraft, waxed	0.0%	0.0%	0.0%	Leaves and Grass	2.1%	1.0%	3.2%
Office Paper	1.8%	1.5%	2.1%	Prunings	0.2%	0.1%	0.3%
Computer Paper	0.1%	0.0%	0.1%	Food	34.0%	32.3%	35.7%
Mixed Low Grade	5.6%	5.1%	6.1%	***Other Materials***	**18.6%**		
Phone Books	0.1%	0.0%	0.2%	Textiles/Clothing	2.6%	2.1%	3.1%
Milk/Juice Polycoats	0.4%	0.3%	0.6%	Carpet/Upholstery	1.5%	1.1%	2.0%
Frozen Food Polycoats	0.2%	0.1%	0.2%	Leather	0.1%	0.0%	0.2%
Compostable/Soiled	7.5%	7.0%	8.1%	Disposable Diapers	4.5%	3.9%	5.1%
Paper/Other Materials	1.6%	1.3%	1.8%	Animal By-Products	5.6%	4.7%	6.5%
Other Paper	0.2%	0.0%	0.3%	Tires	0.0%	0.0%	0.0%
Plastic	**9.1%**			Ash	0.1%	0.0%	0.1%
PET Pop and Liquor	0.2%	0.2%	0.2%	Rubber Products	0.2%	0.1%	0.3%
Other PET Bottles	0.3%	0.3%	0.3%	Misc. Organics	2.0%	1.5%	2.5%
HDPE Milk and Juice	0.1%	0.1%	0.2%	Furniture	0.2%	0.0%	0.3%
Other HDPE Bottles	0.3%	0.3%	0.4%	Mattresses	0.0%	0.0%	0.0%
Other Plastic Bottles	0.1%	0.1%	0.1%	Small Appliances	0.2%	0.0%	0.3%
Jars and Tubs	0.4%	0.3%	0.4%	A/V Equipment	0.2%	0.1%	0.3%
Expanded Polystyrene	0.6%	0.6%	0.7%	Ceramics/Porcelain	0.3%	0.2%	0.4%
Other Rigid Packaging	1.0%	0.9%	1.1%	Non-distinct Fines	0.6%	0.4%	0.8%
Grocery/Bread Bags	1.1%	1.0%	1.2%	Misc. Inorganics	0.5%	0.2%	0.8%
Garbage Bags	1.0%	0.9%	1.1%	Computer Monitors	0.1%	0.0%	0.2%
Other Film	2.2%	2.0%	2.4%	Other Computer Components	0.0%	0.0%	0.1%
Plastic Products	1.0%	0.8%	1.2%	TVs	0.0%	0.0%	0.0%
Plastic/Other Materials	0.7%	0.6%	0.9%	***CDL Wastes***	**4.3%**		
Glass	**3.3%**			Dimension Lumber	0.8%	0.5%	1.0%
Clear Beverage	0.8%	0.6%	1.0%	Other Untreated Wood	0.1%	0.1%	0.2%
Green Beverage	0.7%	0.5%	0.8%	Treated Wood	0.6%	0.2%	1.0%
Brown Beverage	0.6%	0.4%	0.8%	Contaminated Wood	0.7%	0.3%	1.0%
Container Glass	0.7%	0.6%	0.9%	New Gypsum Scrap	0.1%	0.0%	0.2%
Fluorescent Tubes	0.0%	0.0%	0.0%	Demo Gypsum Scrap	0.3%	0.1%	0.5%
Other Glass	0.5%	0.3%	0.6%	Fiberglass Insulation	0.0%	0.0%	0.0%
Metal	**4.0%**			Rock/Concrete/Brick	0.2%	0.0%	0.4%
Aluminum Cans	0.4%	0.3%	0.5%	Asphaltic Roofing	0.1%	0.0%	0.1%
Alum. Foil/Containers	0.3%	0.2%	0.3%	Other Construction Debris	0.2%	0.0%	0.4%
Other Aluminum	0.0%	0.0%	0.0%	Sand/Soil/Dirt	1.2%	0.6%	1.8%
Other Nonferrous	0.0%	0.0%	0.1%	***Hazardous***	**0.4%**		
Tin Food Cans	1.1%	1.0%	1.2%	Latex Paints	0.1%	0.0%	0.1%
Empty Aerosol Cans	0.1%	0.1%	0.2%	Hazardous Adhesives/Glues	0.0%	0.0%	0.0%
Other Ferrous	0.9%	0.5%	1.3%	NonHazardous Adhesives/Glues	0.0%	0.0%	0.0%
Mixed Metals/Materials	1.0%	0.8%	1.3%	Oil-based Paints/Solvents	0.1%	0.0%	0.1%
Motor Oil Filters	0.0%	0.0%	0.0%	Cleaners	0.0%	0.0%	0.0%
				Pesticides/Herbicides	0.0%	0.0%	0.1%
				Dry-Cell Batteries	0.1%	0.0%	0.1%
				Wet-Cell Batteries	0.0%	0.0%	0.0%
				Gasoline/Kerosene	0.0%	0.0%	0.0%
				Motor Oil/Diesel Oil	0.0%	0.0%	0.0%
				Asbestos	0.0%	0.0%	0.0%
				Explosives	0.0%	0.0%	0.0%
				Other Hazardous Chemicals	0.2%	0.0%	0.4%
Sample Count	**88**			Other NonHazardous Chemicals	0.0%	0.0%	0.0%

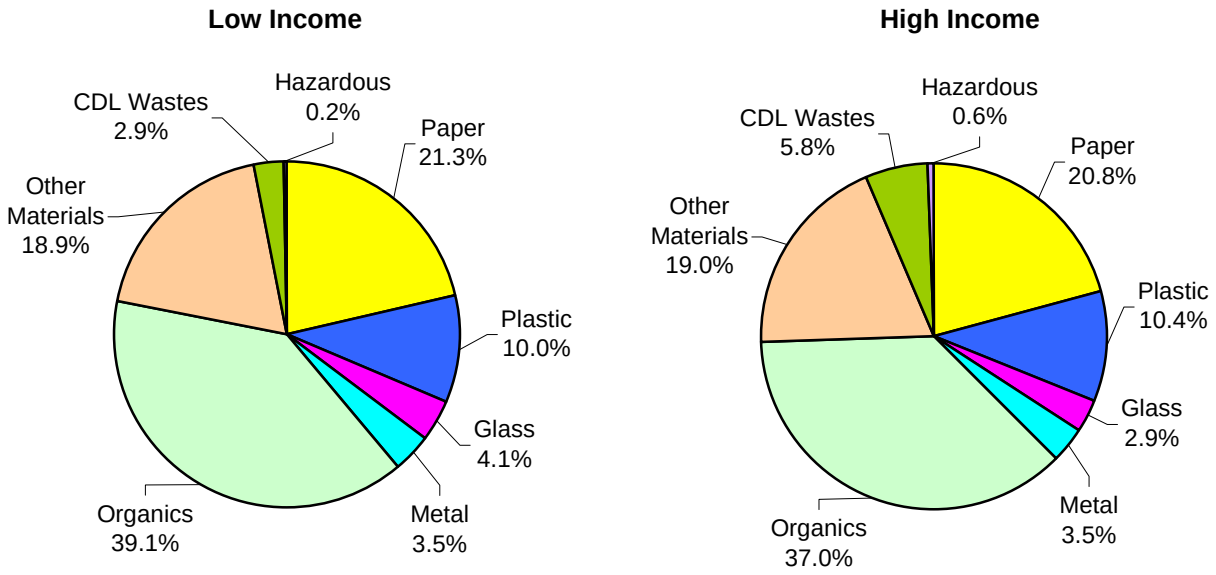
4.7 By Demographics

Waste composition for various demographic groups were calculated by considering the median household income and mean household size of each sampled garbage route. These demographic parameters were calculated based on information from the 2000 Census at the Census Block and Block Group levels of geography.[12] Sampled routes were divided into quartiles based on the median income and mean household size of each garbage route. Waste samples from the first (0 - 25%) quartile of routes were used to calculate *low income* and *small household* waste compositions and samples from the top quartile (75% - 100%) were used to calculate *high income* and *large household* composition profiles. See Appendix D for details on demographic calculations.

4.7.1 By Household Income

Figure 4-6 summarizes the composition by broad material category for each household income type. *Organics*, for each income type, accounted for nearly 40% of the total, by weight. *Paper*, *other materials*, and *plastic*, together, made up about half of the waste from each. *CDL wastes* were a higher percentage for high-income households (5.8%) as compared to low-income households (2.9%).

Figure 4-6: Composition Summary, by Household Income
(January – December 2002)



[12] A Census Block is generally equivalent to a city block. A Block Group is a collection of Blocks. For reference, a Tract is a collection of Block Groups. There are approximately 9,200 blocks, 570 block groups, and 126 tracts in Seattle.

4.7.1.1 High Income

A total of 45 waste samples were sorted from *high income* routes during 2002. Table 4-26 lists the top ten components, which sum to approximately 69.5% of the total, by weight. The largest component, *food*, accounted for slightly more than one-third of the waste stream. *Compostable/soiled paper*, *animal by-products*, and *mixed low grade paper* each made up at least 5% of the waste. The detailed composition results for high income routes are listed in Table 4-28.

Table 4-26: Top Ten Components – High Income
(January – December 2002)

Component	Mean	Cum. %
Food	34.0%	34.0%
Compostable/Soiled Paper	7.6%	41.6%
Animal By-Products	6.7%	48.3%
Mixed Low Grade Paper	5.0%	53.3%
Disposable Diapers	4.5%	57.8%
Leaves and Grass	2.7%	60.5%
Unwaxed OCC/Kraft Paper	2.6%	63.1%
Other Plastic Film	2.4%	65.5%
Carpet/Upholstery	2.1%	67.6%
Demo Gypsum Scrap	1.9%	69.5%
Total	**69.5%**	

4.7.1.2 Low Income

A total of 48 samples were sorted from the *low income* routes during 2002. The top ten components of this waste are listed in Table 4-27. *Food* made up almost 37% of the total waste, by weight. *Compostable/soiled paper*, *animal by-products*, and *disposable diapers* were each greater than 5%. The top ten components made up approximately 72.6% of this waste. Table 4-29 details the waste composition results for low income routes.

Table 4-27: Top Ten Components – Low Income
(January – December 2002)

Component	Mean	Cum. %
Food	36.7%	36.7%
Compostable/Soiled Paper	8.2%	44.9%
Animal By-Products	5.7%	50.6%
Disposable Diapers	5.4%	56.0%
Mixed Low Grade Paper	4.7%	60.7%
Newspaper	2.6%	63.3%
Leaves and Grass	2.4%	65.7%
Unwaxed OCC/Kraft Paper	2.4%	68.1%
Other Plastic Film	2.4%	70.5%
Carpet/Upholstery	2.1%	72.6%
Total	**72.6%**	

4.7.1.3 Comparisons between High and Low Income

Waste disposed by *high* and *low income* households contain many of the same top ten components. In fact, nine of the top ten materials are the same in both. *Newspaper* was a top ten component for waste from low income households, while *demo gypsum scrap* was a top ten component for waste from high income households only. *Food* made up more than a third of the waste for both groups.

Table 4-28: Composition by Weight – High Income
(January – December 2002)

Calculated at a 90% confidence level

	Mean	Low	High		Mean	Low	High
Paper	**20.8%**			***Organics***	**37.0%**		
Newspaper	1.8%	1.5%	2.1%	Pallets	0.0%	0.0%	0.0%
OCC/Kraft, unwaxed	2.6%	2.3%	2.8%	Crates/Boxes	0.0%	0.0%	0.0%
OCC/Kraft, waxed	0.0%	0.0%	0.0%	Leaves and Grass	2.7%	1.6%	3.7%
Office Paper	1.5%	1.2%	1.8%	Prunings	0.2%	0.1%	0.4%
Computer Paper	0.1%	0.0%	0.1%	Food	34.0%	31.9%	36.1%
Mixed Low Grade	5.0%	4.5%	5.5%	***Other Materials***	**19.0%**		
Phone Books	0.1%	0.0%	0.3%	Textiles/Clothing	1.5%	1.2%	1.9%
Milk/Juice Polycoats	0.4%	0.3%	0.4%	Carpet/Upholstery	2.1%	1.4%	2.7%
Frozen Food Polycoats	0.1%	0.1%	0.2%	Leather	0.1%	0.0%	0.2%
Compostable/Soiled	7.6%	6.9%	8.3%	Disposable Diapers	4.5%	3.6%	5.4%
Paper/Other Materials	1.6%	1.4%	1.8%	Animal By-Products	6.7%	5.2%	8.3%
Other Paper	0.1%	0.0%	0.2%	Tires	0.0%	0.0%	0.0%
Plastic	**10.4%**			Ash	0.4%	0.1%	0.8%
PET Pop and Liquor	0.1%	0.1%	0.2%	Rubber Products	0.2%	0.1%	0.3%
Other PET Bottles	0.3%	0.2%	0.3%	Misc. Organics	1.4%	1.1%	1.8%
HDPE Milk and Juice	0.1%	0.1%	0.1%	Furniture	0.1%	0.0%	0.2%
Other HDPE Bottles	0.3%	0.3%	0.4%	Mattresses	0.0%	0.0%	0.0%
Other Plastic Bottles	0.1%	0.1%	0.2%	Small Appliances	0.3%	0.1%	0.5%
Jars and Tubs	0.4%	0.3%	0.4%	A/V Equipment	0.3%	0.1%	0.5%
Expanded Polystyrene	0.5%	0.4%	0.6%	Ceramics/Porcelain	0.3%	0.2%	0.5%
Other Rigid Packaging	1.4%	1.3%	1.5%	Non-distinct Fines	0.4%	0.2%	0.6%
Grocery/Bread Bags	1.3%	1.1%	1.4%	Misc. Inorganics	0.4%	0.2%	0.7%
Garbage Bags	1.1%	1.0%	1.3%	Computer Monitors	0.2%	0.0%	0.4%
Other Film	2.4%	2.2%	2.6%	Other Computer Components	0.0%	0.0%	0.0%
Plastic Products	1.2%	0.8%	1.6%	TVs	0.0%	0.0%	0.0%
Plastic/Other Materials	1.2%	0.8%	1.6%	***CDL Wastes***	**5.8%**		
Glass	**2.9%**			Dimension Lumber	0.9%	0.4%	1.5%
Clear Beverage	0.4%	0.3%	0.5%	Other Untreated Wood	0.4%	0.0%	0.9%
Green Beverage	0.8%	0.6%	1.0%	Treated Wood	0.2%	0.0%	0.3%
Brown Beverage	0.4%	0.3%	0.5%	Contaminated Wood	0.6%	0.4%	0.9%
Container Glass	0.8%	0.7%	1.0%	New Gypsum Scrap	0.0%	0.0%	0.0%
Fluorescent Tubes	0.0%	0.0%	0.0%	Demo Gypsum Scrap	1.9%	0.0%	4.5%
Other Glass	0.5%	0.3%	0.7%	Fiberglass Insulation	0.0%	0.0%	0.0%
Metal	**3.5%**			Rock/Concrete/Brick	0.1%	0.0%	0.3%
Aluminum Cans	0.2%	0.2%	0.3%	Asphaltic Roofing	0.0%	0.0%	0.1%
Alum. Foil/Containers	0.3%	0.2%	0.3%	Other Construction Debris	0.8%	0.2%	1.4%
Other Aluminum	0.0%	0.0%	0.0%	Sand/Soil/Dirt	0.7%	0.3%	1.2%
Other Nonferrous	0.1%	0.0%	0.2%	***Hazardous***	**0.6%**		
Tin Food Cans	0.8%	0.6%	0.9%	Latex Paints	0.1%	0.0%	0.2%
Empty Aerosol Cans	0.2%	0.1%	0.3%	Hazardous Adhesives/Glues	0.0%	0.0%	0.0%
Other Ferrous	0.8%	0.5%	1.0%	NonHazardous Adhesives/Glues	0.0%	0.0%	0.1%
Mixed Metals/Materials	1.1%	0.8%	1.4%	Oil-based Paints/Solvents	0.0%	0.0%	0.0%
Motor Oil Filters	0.0%	0.0%	0.0%	Cleaners	0.0%	0.0%	0.1%
				Pesticides/Herbicides	0.0%	0.0%	0.0%
				Dry-Cell Batteries	0.1%	0.1%	0.1%
				Wet-Cell Batteries	0.0%	0.0%	0.0%
				Gasoline/Kerosene	0.0%	0.0%	0.0%
				Motor Oil/Diesel Oil	0.0%	0.0%	0.0%
				Asbestos	0.0%	0.0%	0.0%
				Explosives	0.0%	0.0%	0.0%
				Other Hazardous Chemicals	0.3%	0.1%	0.6%
				Other NonHazardous Chemicals	0.0%	0.0%	0.0%
Sample Count	**45**						

Table 4-29: Composition by Weight – Low Income
(January – December 2002)

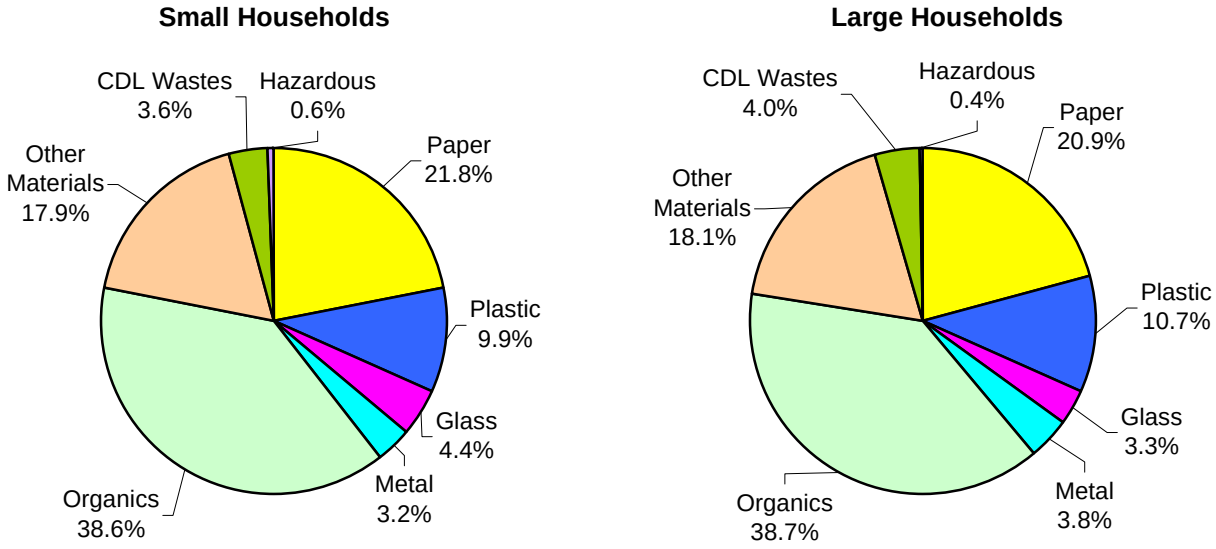
Calculated at a 90% confidence level

	Mean	Low	High		Mean	Low	High
Paper	**21.3%**			***Organics***	**39.1%**		
Newspaper	2.6%	2.0%	3.1%	Pallets	0.0%	0.0%	0.0%
OCC/Kraft, unwaxed	2.4%	2.1%	2.8%	Crates/Boxes	0.0%	0.0%	0.0%
OCC/Kraft, waxed	0.0%	0.0%	0.0%	Leaves and Grass	2.4%	0.9%	4.0%
Office Paper	1.3%	1.0%	1.5%	Prunings	0.1%	0.0%	0.1%
Computer Paper	0.1%	0.0%	0.1%	Food	36.7%	34.6%	38.7%
Mixed Low Grade	4.7%	4.2%	5.3%	***Other Materials***	**18.9%**		
Phone Books	0.1%	0.0%	0.2%	Textiles/Clothing	1.9%	1.4%	2.3%
Milk/Juice Polycoats	0.3%	0.2%	0.3%	Carpet/Upholstery	2.1%	1.1%	3.0%
Frozen Food Polycoats	0.2%	0.1%	0.2%	Leather	0.1%	0.0%	0.2%
Compostable/Soiled	8.2%	7.5%	8.9%	Disposable Diapers	5.4%	4.5%	6.3%
Paper/Other Materials	1.3%	1.1%	1.5%	Animal By-Products	5.7%	4.4%	6.9%
Other Paper	0.2%	0.0%	0.5%	Tires	0.0%	0.0%	0.0%
Plastic	**10.0%**			Ash	0.1%	0.0%	0.1%
PET Pop and Liquor	0.2%	0.1%	0.2%	Rubber Products	0.2%	0.1%	0.4%
Other PET Bottles	0.4%	0.3%	0.4%	Misc. Organics	1.8%	1.1%	2.6%
HDPE Milk and Juice	0.1%	0.1%	0.2%	Furniture	0.0%	0.0%	0.0%
Other HDPE Bottles	0.3%	0.3%	0.4%	Mattresses	0.0%	0.0%	0.0%
Other Plastic Bottles	0.1%	0.1%	0.2%	Small Appliances	0.2%	0.1%	0.3%
Jars and Tubs	0.4%	0.3%	0.4%	A/V Equipment	0.3%	0.0%	0.7%
Expanded Polystyrene	0.8%	0.7%	0.9%	Ceramics/Porcelain	0.3%	0.2%	0.4%
Other Rigid Packaging	1.1%	1.0%	1.2%	Non-distinct Fines	0.6%	0.3%	1.0%
Grocery/Bread Bags	1.5%	1.3%	1.7%	Misc. Inorganics	0.3%	0.1%	0.4%
Garbage Bags	1.2%	1.0%	1.3%	Computer Monitors	0.0%	0.0%	0.0%
Other Film	2.4%	2.2%	2.6%	Other Computer Components	0.0%	0.0%	0.0%
Plastic Products	0.9%	0.7%	1.1%	TVs	0.0%	0.0%	0.0%
Plastic/Other Materials	0.7%	0.4%	1.0%	***CDL Wastes***	**2.9%**		
Glass	**4.1%**			Dimension Lumber	1.1%	0.6%	1.5%
Clear Beverage	1.0%	0.8%	1.3%	Other Untreated Wood	0.1%	0.0%	0.2%
Green Beverage	0.6%	0.5%	0.7%	Treated Wood	0.2%	0.1%	0.3%
Brown Beverage	1.0%	0.7%	1.4%	Contaminated Wood	0.6%	0.3%	1.0%
Container Glass	0.9%	0.8%	1.1%	New Gypsum Scrap	0.0%	0.0%	0.1%
Fluorescent Tubes	0.0%	0.0%	0.0%	Demo Gypsum Scrap	0.3%	0.0%	0.6%
Other Glass	0.5%	0.3%	0.7%	Fiberglass Insulation	0.0%	0.0%	0.1%
Metal	**3.5%**			Rock/Concrete/Brick	0.2%	0.0%	0.3%
Aluminum Cans	0.4%	0.3%	0.4%	Asphaltic Roofing	0.0%	0.0%	0.1%
Alum. Foil/Containers	0.3%	0.2%	0.4%	Other Construction Debris	0.0%	0.0%	0.0%
Other Aluminum	0.0%	0.0%	0.0%	Sand/Soil/Dirt	0.4%	0.1%	0.6%
Other Nonferrous	0.0%	0.0%	0.0%	***Hazardous***	**0.2%**		
Tin Food Cans	1.0%	0.9%	1.2%	Latex Paints	0.0%	0.0%	0.0%
Empty Aerosol Cans	0.2%	0.1%	0.2%	Hazardous Adhesives/Glues	0.0%	0.0%	0.0%
Other Ferrous	0.5%	0.3%	0.6%	NonHazardous Adhesives/Glues	0.0%	0.0%	0.0%
Mixed Metals/Materials	1.1%	0.7%	1.5%	Oil-based Paints/Solvents	0.0%	0.0%	0.0%
Motor Oil Filters	0.0%	0.0%	0.0%	Cleaners	0.0%	0.0%	0.0%
				Pesticides/Herbicides	0.0%	0.0%	0.0%
				Dry-Cell Batteries	0.1%	0.1%	0.2%
				Wet-Cell Batteries	0.0%	0.0%	0.0%
				Gasoline/Kerosene	0.0%	0.0%	0.0%
				Motor Oil/Diesel Oil	0.0%	0.0%	0.0%
				Asbestos	0.0%	0.0%	0.0%
				Explosives	0.0%	0.0%	0.0%
				Other Hazardous Chemicals	0.0%	0.0%	0.1%
				Other NonHazardous Chemicals	0.0%	0.0%	0.0%
Sample Count	**48**						

4.7.2 By Household Size

A waste composition summary, by broad material category, is presented in Figure 4-7 for wastes disposed by small and large households. For each household type, *organics*, *paper*, and *other materials*, together, made up about 80% of the total, by weight. Waste percentages are very similar for both household types.

Figure 4-7: Composition Summary, by Household Size
(January – December 2002)



4.7.2.1 Small Households

A total of 48 samples were obtained from *small household* routes. Table 4-30 lists the top ten components, by weight, for small households. *Food*, *compostable/soiled paper*, *animal by-products*, and *mixed low grade paper* each made up more than 5% of the total, by weight. The top components, together, accounted for approximately 71.3% of the total waste. The full composition results for this waste are listed in Table 4-32.

Table 4-30: Top Ten Components – Small Households
(January – December 2002)

Component	Mean	Cum. %
Food	35.0%	35.0%
Compostable/Soiled Paper	7.4%	42.4%
Animal By-Products	6.8%	49.2%
Mixed Low Grade Paper	5.3%	54.5%
Disposable Diapers	4.2%	58.7%
Leaves and Grass	3.2%	61.9%
Unwaxed OCC/Kraft Paper	2.7%	64.6%
Other Plastic Film	2.5%	67.1%
Newspaper	2.4%	69.5%
Paper/Other Materials	1.7%	71.3%
Total	**71.3%**	

4.7.2.2 Large Households

A total of 49 samples were captured and sorted from *large household* routes. As shown in Table 4-31, *food*, *compostable/soiled paper*, and *disposable diapers* accounted for more than 5% of the total, by weight. Table 4-33 lists the detailed composition results for waste from large households.

Table 4-31: Top Ten Components – Large Households
(January – December 2002)

Component	Mean	Cum. %
Food	37.2%	37.2%
Compostable/Soiled Paper	8.5%	45.6%
Disposable Diapers	6.3%	52.0%
Mixed Low Grade Paper	4.4%	56.4%
Animal By-Products	3.5%	59.8%
Unwaxed OCC/Kraft Paper	2.5%	62.3%
Other Plastic Film	2.4%	64.7%
Newspaper	2.3%	67.0%
Textiles/Clothing	2.3%	69.2%
Miscellaneous Organics	1.6%	70.9%
Total	**70.9%**	

4.7.3 Comparisons between Small and Large Households

For both small and large households, *food* made up more than a third of the total waste, by weight. Most all of the other nine components appear in both top ten lists. *Leaves and grass* and *paper/other materials* are top ten components of waste from small households yet not for large, while *miscellaneous organics* and *textiles/clothing* are top ten components only for waste from large households.

Table 4-32: Composition by Weight – Small Households
(January – December 2002)

Calculated at a 90% confidence level

	Mean	Low	High		Mean	Low	High
Paper	**21.8%**			***Organics***	**38.6%**		
Newspaper	2.4%	1.9%	2.9%	Pallets	0.0%	0.0%	0.0%
OCC/Kraft, unwaxed	2.7%	2.4%	3.0%	Crates/Boxes	0.0%	0.0%	0.0%
OCC/Kraft, waxed	0.0%	0.0%	0.0%	Leaves and Grass	3.2%	1.6%	4.8%
Office Paper	1.3%	1.0%	1.5%	Prunings	0.4%	0.1%	0.7%
Computer Paper	0.0%	0.0%	0.1%	Food	35.0%	33.2%	36.8%
Mixed Low Grade	5.3%	4.7%	5.8%	***Other Materials***	**17.9%**		
Phone Books	0.1%	0.0%	0.2%	Textiles/Clothing	1.4%	1.2%	1.7%
Milk/Juice Polycoats	0.4%	0.3%	0.4%	Carpet/Upholstery	1.8%	1.2%	2.4%
Frozen Food Polycoats	0.3%	0.2%	0.3%	Leather	0.1%	0.0%	0.1%
Compostable/Soiled	7.4%	6.8%	8.0%	Disposable Diapers	4.2%	3.2%	5.1%
Paper/Other Materials	1.7%	1.5%	2.0%	Animal By-Products	6.8%	5.6%	7.9%
Other Paper	0.2%	0.0%	0.5%	Tires	0.0%	0.0%	0.0%
Plastic	**9.9%**			Ash	0.2%	0.0%	0.4%
PET Pop and Liquor	0.2%	0.2%	0.2%	Rubber Products	0.2%	0.1%	0.4%
Other PET Bottles	0.4%	0.3%	0.4%	Misc. Organics	1.5%	1.2%	1.9%
HDPE Milk and Juice	0.2%	0.1%	0.2%	Furniture	0.0%	0.0%	0.0%
Other HDPE Bottles	0.3%	0.3%	0.4%	Mattresses	0.0%	0.0%	0.0%
Other Plastic Bottles	0.1%	0.1%	0.1%	Small Appliances	0.3%	0.1%	0.4%
Jars and Tubs	0.4%	0.4%	0.5%	A/V Equipment	0.3%	0.0%	0.7%
Expanded Polystyrene	0.6%	0.5%	0.7%	Ceramics/Porcelain	0.3%	0.2%	0.4%
Other Rigid Packaging	1.3%	1.2%	1.4%	Non-distinct Fines	0.4%	0.2%	0.5%
Grocery/Bread Bags	1.3%	1.2%	1.5%	Misc. Inorganics	0.3%	0.2%	0.5%
Garbage Bags	1.1%	1.0%	1.2%	Computer Monitors	0.0%	0.0%	0.0%
Other Film	2.5%	2.2%	2.8%	Other Computer Components	0.1%	0.0%	0.2%
Plastic Products	0.8%	0.6%	1.0%	TVs	0.0%	0.0%	0.0%
Plastic/Other Materials	0.7%	0.5%	0.9%	***CDL Wastes***	**3.6%**		
Glass	**4.4%**			Dimension Lumber	0.7%	0.3%	1.2%
Clear Beverage	1.1%	0.8%	1.3%	Other Untreated Wood	0.1%	0.0%	0.1%
Green Beverage	0.8%	0.6%	1.0%	Treated Wood	0.3%	0.0%	0.6%
Brown Beverage	1.0%	0.7%	1.3%	Contaminated Wood	0.5%	0.3%	0.7%
Container Glass	0.9%	0.8%	1.1%	New Gypsum Scrap	0.1%	0.0%	0.2%
Fluorescent Tubes	0.0%	0.0%	0.0%	Demo Gypsum Scrap	0.1%	0.0%	0.2%
Other Glass	0.6%	0.4%	0.8%	Fiberglass Insulation	0.0%	0.0%	0.0%
Metal	**3.2%**			Rock/Concrete/Brick	0.7%	0.0%	1.3%
Aluminum Cans	0.3%	0.2%	0.3%	Asphaltic Roofing	0.0%	0.0%	0.0%
Alum. Foil/Containers	0.3%	0.3%	0.4%	Other Construction Debris	0.3%	0.0%	0.6%
Other Aluminum	0.0%	0.0%	0.0%	Sand/Soil/Dirt	0.9%	0.3%	1.4%
Other Nonferrous	0.1%	0.0%	0.2%	***Hazardous***	**0.6%**		
Tin Food Cans	0.9%	0.7%	1.0%	Latex Paints	0.0%	0.0%	0.1%
Empty Aerosol Cans	0.2%	0.1%	0.2%	Hazardous Adhesives/Glues	0.0%	0.0%	0.0%
Other Ferrous	0.6%	0.3%	0.8%	NonHazardous Adhesives/Glues	0.0%	0.0%	0.0%
Mixed Metals/Materials	0.8%	0.6%	1.1%	Oil-based Paints/Solvents	0.0%	0.0%	0.0%
Motor Oil Filters	0.0%	0.0%	0.0%	Cleaners	0.0%	0.0%	0.0%
				Pesticides/Herbicides	0.1%	0.0%	0.2%
				Dry-Cell Batteries	0.1%	0.1%	0.1%
				Wet-Cell Batteries	0.3%	0.0%	0.8%
				Gasoline/Kerosene	0.0%	0.0%	0.0%
				Motor Oil/Diesel Oil	0.0%	0.0%	0.0%
				Asbestos	0.0%	0.0%	0.0%
				Explosives	0.0%	0.0%	0.0%
				Other Hazardous Chemicals	0.0%	0.0%	0.0%
				Other NonHazardous Chemicals	0.1%	0.0%	0.1%
Sample Count	**48**						

Table 4-33: Composition by Weight – Large Households
(January – December 2002)

Calculated at a 90% confidence level

	Mean	Low	High		Mean	Low	High
Paper	**20.9%**			***Organics***	**38.7%**		
Newspaper	2.3%	1.8%	2.8%	Pallets	0.0%	0.0%	0.0%
OCC/Kraft, unwaxed	2.5%	2.2%	2.8%	Crates/Boxes	0.1%	0.0%	0.3%
OCC/Kraft, waxed	0.0%	0.0%	0.0%	Leaves and Grass	1.4%	0.9%	1.9%
Office Paper	1.3%	1.0%	1.6%	Prunings	0.1%	0.0%	0.1%
Computer Paper	0.1%	0.1%	0.2%	Food	37.2%	35.2%	39.1%
Mixed Low Grade	4.4%	3.9%	4.8%	***Other Materials***	**18.1%**		
Phone Books	0.0%	0.0%	0.0%	Textiles/Clothing	2.3%	1.8%	2.7%
Milk/Juice Polycoats	0.3%	0.2%	0.4%	Carpet/Upholstery	1.3%	1.0%	1.6%
Frozen Food Polycoats	0.1%	0.1%	0.1%	Leather	0.2%	0.1%	0.3%
Compostable/Soiled	8.5%	8.0%	9.0%	Disposable Diapers	6.3%	5.5%	7.2%
Paper/Other Materials	1.3%	1.1%	1.5%	Animal By-Products	3.5%	2.6%	4.3%
Other Paper	0.1%	0.0%	0.2%	Tires	0.0%	0.0%	0.0%
Plastic	**10.7%**			Ash	0.1%	0.0%	0.3%
PET Pop and Liquor	0.2%	0.1%	0.2%	Rubber Products	0.2%	0.1%	0.3%
Other PET Bottles	0.4%	0.3%	0.4%	Misc. Organics	1.6%	1.0%	2.3%
HDPE Milk and Juice	0.1%	0.1%	0.2%	Furniture	0.2%	0.0%	0.5%
Other HDPE Bottles	0.4%	0.3%	0.4%	Mattresses	0.5%	0.0%	1.3%
Other Plastic Bottles	0.1%	0.1%	0.1%	Small Appliances	0.6%	0.3%	1.0%
Jars and Tubs	0.3%	0.2%	0.3%	A/V Equipment	0.1%	0.0%	0.1%
Expanded Polystyrene	0.7%	0.6%	0.8%	Ceramics/Porcelain	0.2%	0.1%	0.3%
Other Rigid Packaging	1.1%	1.0%	1.3%	Non-distinct Fines	0.6%	0.2%	0.9%
Grocery/Bread Bags	1.6%	1.4%	1.8%	Misc. Inorganics	0.3%	0.1%	0.5%
Garbage Bags	1.3%	1.2%	1.5%	Computer Monitors	0.0%	0.0%	0.0%
Other Film	2.4%	2.2%	2.6%	Other Computer Components	0.1%	0.0%	0.2%
Plastic Products	1.2%	0.8%	1.6%	TVs	0.0%	0.0%	0.0%
Plastic/Other Materials	1.0%	0.6%	1.3%	***CDL Wastes***	**4.0%**		
Glass	**3.3%**			Dimension Lumber	1.4%	0.9%	1.8%
Clear Beverage	1.1%	0.8%	1.4%	Other Untreated Wood	0.2%	0.0%	0.4%
Green Beverage	0.5%	0.4%	0.7%	Treated Wood	0.2%	0.1%	0.4%
Brown Beverage	0.5%	0.3%	0.6%	Contaminated Wood	1.1%	0.6%	1.6%
Container Glass	0.8%	0.6%	0.9%	New Gypsum Scrap	0.0%	0.0%	0.0%
Fluorescent Tubes	0.0%	0.0%	0.0%	Demo Gypsum Scrap	0.3%	0.0%	0.5%
Other Glass	0.5%	0.2%	0.7%	Fiberglass Insulation	0.0%	0.0%	0.0%
Metal	**3.8%**			Rock/Concrete/Brick	0.2%	0.0%	0.4%
Aluminum Cans	0.4%	0.3%	0.5%	Asphaltic Roofing	0.0%	0.0%	0.0%
Alum. Foil/Containers	0.3%	0.2%	0.4%	Other Construction Debris	0.3%	0.0%	0.5%
Other Aluminum	0.0%	0.0%	0.0%	Sand/Soil/Dirt	0.4%	0.2%	0.5%
Other Nonferrous	0.0%	0.0%	0.0%	***Hazardous***	**0.4%**		
Tin Food Cans	1.3%	1.1%	1.4%	Latex Paints	0.1%	0.0%	0.2%
Empty Aerosol Cans	0.1%	0.1%	0.2%	Hazardous Adhesives/Glues	0.0%	0.0%	0.0%
Other Ferrous	0.5%	0.2%	0.8%	NonHazardous Adhesives/Glues	0.0%	0.0%	0.0%
Mixed Metals/Materials	1.2%	0.8%	1.6%	Oil-based Paints/Solvents	0.0%	0.0%	0.0%
Motor Oil Filters	0.0%	0.0%	0.1%	Cleaners	0.0%	0.0%	0.0%
				Pesticides/Herbicides	0.0%	0.0%	0.0%
				Dry-Cell Batteries	0.1%	0.0%	0.1%
				Wet-Cell Batteries	0.0%	0.0%	0.0%
				Gasoline/Kerosene	0.0%	0.0%	0.0%
				Motor Oil/Diesel Oil	0.1%	0.0%	0.1%
				Asbestos	0.0%	0.0%	0.0%
				Explosives	0.0%	0.0%	0.0%
				Other Hazardous Chemicals	0.1%	0.0%	0.3%
				Other NonHazardous Chemicals	0.0%	0.0%	0.0%
Sample Count	**49**						

Appendix A: Waste Components

Waste samples were sorted by hand into 89 waste component categories, as defined in this section. The waste categories in the Year 2002 study were nearly identical to those used in Seattle's last waste composition study (the commercial and self-haul waste study). The two exceptions are that *computer monitors* and *television sets* were sorted separately from one another, and the brand name of each television set was recorded.

Medical wastes were weighed but not sorted; all other waste was sorted, weighed, and recorded.

Paper

NEWSPAPER: Printed newsprint (Advertising "slicks" (glossy paper) were included in this category if found mixed with newspaper; otherwise, ad slicks are included with mixed low grade paper.).

PLAIN OCC/KRAFT PAPER: Old unwaxed/uncoated corrugated container boxes and Kraft paper, and brown paper bags.

WAXED OCC/KRAFT PAPER: Old waxed/coated corrugated container boxes and Kraft paper, and brown paper bags.

OFFICE PAPER: White or lightly colored sulfite/sulfate bond, copy papers, and envelopes.

COMPUTER PAPER: Continuous-feed sulfite/sulfate/ground wood computer printouts and forms of all types, excluding carbonless paper.

MIXED LOW GRADE: Low-grade, potentially recyclable papers, including junk mail, magazines, colored papers, bleached Kraft, boxboard, mailing tubes, carbonless copy paper, and paperback books.

PHONE BOOKS: Telephone directories.

MILK/JUICE POLYCOAT: Bleached polycoated milk, ice cream, and aseptic juice containers.

FROZEN FOOD POLYCOATS: Bleached and unbleached polycoated frozen/refrigerator packaging, and excluding polycoated milk/ice cream/aseptic containers.

COMPOSTABLE/SOILED PAPER: Paper towels, paper plates, waxed paper, and tissues.

PAPER/OTHER MATERIALS: Predominantly paper with other materials attached (e.g. orange juice cans and spiral notebooks).

OTHER PAPERS: Carbon copy paper, hardcover books, and photographs.

Plastic

PET POP & LIQUOR: Polyethylene terephthalate translucent pop and liquor bottles.

OTHER PET BOTTLES: All other PET bottles not included above.

HDPE MILK & JUICE: High-density translucent polyethylene milk, juice, and beverage containers.

OTHER HDPE BOTTLES: All other HDPE bottles not included above.

OTHER PLASTIC BOTTLES: Plastic bottles not classified in the above-defined PET or HDPE categories; includes #3-#7, unknown bottles, petroleum bottles, and other dark colored bottles.

JARS & TUBS: Wide mouth jars and tubs #1-#7 such as yogurt, cottage cheese, margarine.

EXPANDED POLYSTYRENE: Includes packaging and finished products made of expanded polystyrene.

OTHER RIGID PACKAGING: Rigid plastic packaging #1-#7 and unknown (excluding expanded polystyrene). Includes clamshells, salad trays, lids, cookie tray inserts, plastic spools, and toothpaste tubes.

GROCERY/BREAD BAGS: Bread, grocery, and dry cleaner plastic film bags.

GARBAGE BAGS: Plastic garbage bags.

OTHER FILM: Includes film packaging, excluding grocery/bread and garbage bags. Also includes plastic sheeting, photographic negatives, and shower curtains.

PLASTIC PRODUCTS: Finished plastic products such as toys, toothbrushes, and vinyl hose. Includes fiberglass resin products and materials.

PLASTIC/OTHER MATERIALS: Predominately plastic with other materials attached such as disposable razors, pens, lighters, toys, and 3-ring binders.

Glass

CLEAR BEVERAGE: Includes clear pop, liquor, wine, juice, beer, and vinegar bottles.

GREEN BEVERAGE: Includes green pop, liquor, wine, beer, and lemon juice bottles.

BROWN BEVERAGE: Includes brown pop, beer, liquor, juice, and vanilla extract bottles.

CONTAINER GLASS: All glass containers, all colors, holding solid materials such as mayonnaise, non-dairy creamer, and facial cream containers.

FLUORESCENT TUBES: Fluorescent light tubes.

OTHER GLASS: Window glass, light bulbs (except fluorescent tubes), glassware, etc.

Metal

ALUMINUM CANS: Aluminum beverage cans (UBC) and bi-metal cans made mostly of aluminum.
ALUMINUM FOIL/CONTAINERS: Aluminum food containers, trays, and foil.

OTHER ALUMINUM: Aluminum products and scrap such as window frames, cookware.

OTHER NONFERROUS: Metals not derived from iron, to which a magnet will not adhere, and which are not significantly contaminated with other metals or materials.

TIN FOOD CANS: Tinned steel food containers, including bi-metal cans mostly of steel.

EMPTY AEROSOL CANS: Empty, mixed material/metal aerosol cans. (Aerosols that still contain product are sorted according to that material—for instance, solvent-based paint.)

OTHER FERROUS: Ferrous and alloyed ferrous scrap metals to which a magnet adheres and which are not significantly contaminated with other metals or materials.

OIL FILTERS: Metal oil filters used in cars and other automobiles.

MIXED METALS/MATERIALS: Motors, insulated wire, and finished products containing a mixture of metals, or metals and other materials, whose weight is derived significantly from the metal portion of its construction. White goods are banned from Seattle's disposal. However, segments of large appliances are occasionally found; they are included in this category.

Organic

PALLETS: Wood pallets.

CRATES: Crates, and other packaging lumber/panelboard.

LEAVES AND GRASS: Grass clippings, leaves, and weeds.

PRUNINGS: Cut prunings, 6" or less in diameter, from bushes, shrubs, and trees.

FOOD: Food wastes and scraps, including bone, rinds, etc. Excludes the weight of food containers, except when container weight is not appreciable compared to the food inside.

Other Materials

TEXTILES: Fabric materials including natural and synthetic textiles such as cotton, wool, silk, woven nylon, rayon, polyester, and other materials.

CARPET/UPHOLSTERY: General category of flooring applications consisting of various natural or synthetic fibers bonded to some type of backing material.

LEATHER: Finished products or scraps of leather.

DISPOSABLE DIAPERS: Disposable baby diapers and adult protective undergarments.

ANIMAL BY-PRODUCTS: Animal carcasses and wastes, and kitty litter.

RUBBER PRODUCTS: Finished products and scrap materials made of rubber, such as bath mats, inner tubes, rubber hoses, and foam rubber.

TIRES: Vehicle tires of all types.

ASH: Fireplace, burn barrel, or fire pit ash.

FURNITURE: Mixed-material furniture such as upholstered chairs.

MATTRESSES: Mattresses and box springs.

SMALL APPLIANCES: Small electric appliances such as toasters, microwave ovens, power tools, curling irons, and light fixtures.

AUDIO/VISUAL EQUIPMENT: Stereos, radios, tape decks, VCRs, etc.

COMPUTER MONITORS: Computer monitors, laptops, and other items containing a cathode ray tube (CRT).

TELEVISIONS: Television sets containing a cathode ray tube (CRT).

OTHER COMPUTER EQUIPMENT: Computer items such as processors, mice and mouse pads, keyboards, and disk drives that do not contain cathode ray tubes.

CERAMICS/PORCELAIN: Finished ceramic or porcelain products such as dishware, toilets, etc.

NONDISTINCT FINES: Self-defined.

MISCELLANEOUS ORGANICS: Wax, modeling clay, bar soap, cigarette butts, etc.

MISCELLANEOUS INORGANICS: Vacuum cleaner bag contents, and other inorganics not classified elsewhere.

CDL Wastes

DIMENSION LUMBER: Milled lumber.

OTHER UNTREATED WOOD: Compostable prunings or stumps 6" or greater in diameter.

TREATED WOOD: Lumber and wood products that have been painted or treated so as to render them difficult to compost.

CONTAMINATED WOOD: Lumber and wood products, often with adhering concrete or other contaminants that would not compost easily.

NEW GYPSUM SCRAP: New gypsum wallboard scrap.

DEMO GYPSUM SCRAP: Used or demolition gypsum wallboard scrap.

FIBERGLASS INSULATION: Fiberglass building and mechanical insulation, batt or rigid.

ROCK/CONCRETE/BRICKS: Includes rock gravel larger than 2" diameter, Portland cement mixtures (set or unset), and fired-clay bricks.

ASPHALTIC ROOFING: Asphalt shingles, tarpaper of built-up roofing.

CONSTRUCTION DEBRIS: Construction debris (other than wood), which cannot be classified into other component categories, and mixed fine building material scraps.

SAND/SOIL/DIRT: Contains mixed fines smaller than 2" in diameter.

Household Hazardous

LATEX PAINTS: Water-based paints and similar products.

HAZARDOUS ADHESIVES/GLUES: Oil/resin/volatile solvent-based glues and adhesives, including epoxy, rubber cement, two-part glues and sealers, and auto body fillers.

NON-HAZARDOUS ADHESIVES/GLUES: Water-based glues, caulking compounds, grouts, and spackle.

OIL-BASED PAINT/SOLVENT: Solvent-based paints, varnishes, and similar products. Various solvents, including chlorinated and flammable solvents, paint strippers, solvents contaminated with other products such as paints, degreasers and some other cleaners if the primary ingredient is (or was) a solvent, or alcohol such as methanol and isopropanol.

HAZARDOUS CLEANERS: Various acids and bases whose primary purpose is to clean surfaces, unclog drains, or perform other actions.

PESTICIDES/HERBICIDES: Variety of poisons whose purpose is to discourage or kill pests, weeds, or microorganisms. Fungicides and wood preservatives, such as pentachlorophenol, are also included.

DRY-CELL BATTERIES: Dry-cell batteries of various sizes and types as commonly used in households.

WET-CELL BATTERIES: Wet-cell batteries of various sizes and types as commonly used in automobiles.

GASOLINE/KEROSENE: Gasoline, diesel fuel, and fuel oils.

MOTOR OIL/DIESEL OIL: Lubricating oils, primarily used in vehicles but including other types with similar characteristics.

ASBESTOS: Asbestos and asbestos-containing wastes (if this is the primary hazard associated with these wastes).

EXPLOSIVES: Gunpowder, unspent ammunition, picric acid, and other potentially explosive chemicals.

OTHER HAZARDOUS CHEMICALS: Other hazardous wastes that do not fit into the above categories, including unidentifiable materials and medical wastes such as I.V. tubing and patient drapes (Medical wastes that could be considered a bio-hazard were excluded from the sorts.).

OTHER NON-HAZARDOUS CHEMICALS: Non-hazardous soaps, cleaners, medicines, cosmetics, and other household chemicals.

Changes to Waste Component Categories

The material types used to categorize Seattle's waste stream have been refined over the years. Table A-1 tracks these changes. (An "X" signifies that the component remains the same from the previous study period; an outline border reflects how components were split apart or grouped together.)

Table A-1: Changes to Waste Component Categories, 1988 to present

1988-89	*1990*	*1992*	*1994*	1996	1998/99	2000	2002
PAPER							
Newspaper	x	x	x	x	x	x	x
Corrugated Paper	x	x	OCC/Kraft	OCC/Kraft, Unwaxed	x	x	x
Office Paper	x	x	x	x	x	x	x
Computer Paper	x	x	x	x	x	x	x
Mixed Scrap Paper	x	x	Mixed Low Grade	x	x	x	x
			Phone Books	x	x	x	x
Other Paper	x	x	Milk/Juice Polycoats	x	x	x	x
			Frozen Food Polycoats	x	x	x	x
			Compostable/Soiled	x	x	x	x
				OCC/Kraft, Waxed	x	x	x
			Paper/Other Materials	x	x	x	x
			Other Paper	x	x	x	x
PLASTIC							
PET Bottles	x	x	PET Pop & Liquor	x	x	x	x
			Other PET Bottles	x	x	x	x
HDPE Bottles	x	x	HDPE Milk & Juice	x	x	x	x
			Other HDPE Bottles	x	x	x	x
Expanded Polystyrene	x	x	x	x	x	x	x
Plastic Packaging	Other Plastic Bottles	x	x	x	x	x	x
	x	x	Other Rigid Containers	Jars & Tubs	x	x	x
			Other Rigid Packaging	x	x	x	x
			Grocery/Bread Bags	x	x	x	x
			Other Film	Garbage Bags	x	x	x
				x	x	x	x
Other Plastic Products	x	x	Plastic Products	x	x	x	x
			Plastic/Other Materials	x	x	x	x
GLASS							
Nonrefillable Pop	x	x	Clear Beverage	x	x	x	x
Refillable Pop	x	x	Green Beverage	x	x	x	x
Nonrefillable Beer	x	x	Brown Beverage	x	x	x	x
Refillable Beer	x	x	*(After 1994, characterized according to color)*				
Container Glass	x	x	x	x	x	x	x
Nonrecyclable Glass	x	x	x	Other Glass	x	x	x
				Fluorescent Tubes	x	x	x
METAL							
Aluminum Cans	x	x	x	x	x	x	x
Aluminum Foil/Containers	x	x	x	x	x	x	x
Tinned Cans	x	x	x	x	x	x	x
Bi-metal Cans	x	x	*(After 1994, characterized according to predominant metal)*				
Ferrous	x	x	x	x	x	x	x
Nonferrous	x	x	x	Other Nonferrous	x	x	x
			Other Aluminum	x	x	x	x
				Empty Aerosol Cans	x	x	x
Mixed Metals/Materials	x	x	x	x	x	x	x
					Metal Oil Filters	x	x
White Goods	x	x	*(After 1994, banned from disposal. Parts show up in "Mixed Metals")*				
RUBBER							
Rubber Products	x	x	*moved to "Other Materials"*	x	x	x	x
Tires	x	x	*moved to "Other Materials"*	x	x	x	x

Table A-1: Changes to Waste Component Categories, 1988 to present, Contd.

1988-89	*1990*	*1992*	*1994*	1996	1998/99	2000	2002
ORGANICS							
Wood	x	Untreated Wood	x	Dimension Lumber; *new category CDL Wastes*	x	x	x
			Crates/Pallets	Other Untreated Wood; *new category CDL Wastes*	x	x	x
				Pallets	x	x	x
				Crates/Boxes	x	x	x
		Treated Wood	x	*Moved to new category CDL Wastes*	*x*	*x*	*x*
				Contaminated Wood; *new category CDL Wastes*	x	x	x
Leaves and Grass	x	x	x	x	x	x	x
Prunings	x	x	x	x	x	x	x
Food	x	x	x	x	x	x	x
OTHER MATERIALS							
Textiles	x	x	x	Textiles/Clothing	x	x	x
			Carpet/Upholstery	x	x	x	x
Leather	x	x	x	x	x	x	x
Disposable Diapers	x	x	x	x	x	x	x
(Discarded from samples prior to 1994)			Animal By-Products	x	x	x	x
Ash	x	x	x	x	x	x	x
(Prior to 1994, split among various materials; Mixed Metal, Textiles, Other Plastics, etc.)			Furniture	x	x	x	x
(Prior to 1994, split among various materials; Mixed Metal, Textiles, Other Plastics, etc.)			Mattresses	x	x	x	x
(Prior to 1994, split among various materials; Mixed Metal, Textiles, Other Plastics, etc.)			Small Appliances	x	x	x	x
(Prior to 1994, split among various materials; Mixed Metal, Textiles, Other Plastics, etc.)			A/V Equipment	x	x	x Televisions & Computer Monitors Other Computer Eqipment	x Television Sets Computer Monitors x
Ceramics, Porcelain, China	x	x	x	x	x	x	x
Gypsum Drywall	x	x	x	New Gypsum Scrap; *new category CDL Wastes*	x	x	x
				Demo Gypsum Scrap; *new category CDL Wastes*	x	x	x
Fiberglass Insulation	x	x	x	*Moved to new category CDL Wastes*	*x*	*x*	*x*
Rock/Concrete/Brick	x	x	x	*Moved to new category CDL Wastes*	*x*	*x*	*x*
Other Construction Debris	x	x	x	*Moved to new category CDL Wastes*	*x*	*x*	*x*
				Asphaltic Roofing; *new category CDL Wastes*	x	x	x
Sand, Dirt, Non-distinct Fines	x	x	Sand/Soil/Dirt	*Moved to new category CDL Wastes*	*x*	*x*	*x*
			Non-distinct Fines	x	x	x	x
(Prior to 1994, mostly in "Sand, Dirt, Non-distinct Fines; also in various "Mixed" and "Other" categories)			Misc. Organics		*x*	*x*	*x*
(Prior to 1994, mostly in "Sand, Dirt, Non-distinct Fines; also in various "Mixed" and "Other" categories)			Misc. Inorganics		*x*	*x*	*x*
HOUSEHOLD HAZARDOUS							
Latex Paints	x	x	x	x	x	x	x
Adhesives/Glues	x	x	x	Hazardous Glue/Adhesives	x	x	x
				NonHazardous Glue/Adhesives	x	x	x
Oil-based Paints/Solvents	x	x	x	x	x	x	x
Cleaners	x	x	x	x	x	x	x
Pesticides/Herbicides	x	x	x	x	x	x	x
Batteries	x	x	Dry-Cell Batteries	x	x	x	x
			Wet-Cell Batteries	x	x	x	x
Gasoline/Kerosene	x	x	x	x	x	x	x
Motor Oil/Diesel Oil	x	x	x	x	x	x	x
Asbestos	x	x	x	x	x	x	x
Explosives	x	x	x	x	x	x	x
Other Chemicals	x	x	x	Other Hazardous Chemicals	x	x	x
				Other NonHazardous Chemicals	x	x	x

Appendix B: Sampling Methodology

Overview

The objective of the 2002 Seattle Waste Composition Study was to provide statistically significant data on the composition of residential wastes from single- and multi-family households in the City of Seattle. The residential waste stream was last sampled in 1998/99. The current project followed the same basic methodology as the previous study.

This appendix outlines the sampling methodology for the current study.

Sampling Populations

This study examined waste disposed by two residence types: *single*- and *multi-family* residences. All materials were collected from Seattle's two contract haulers, each servicing a specific geographic area within the city. Self-hauled residential waste loads were not included in this study.

In Seattle, the single- and multi-family residence types were defined as follows:

- ***Single-family:*** Waste set out for disposal in cans primarily from detached single family, duplex, triplex, and four-plex homes.
- ***Multi-family:*** Waste collected from dumpsters that primarily serve apartments and condominiums with five or more units.

There are two service areas from which Seattle's residential waste was collected: *north* and *south*. The Lake Washington Ship Canal is the physical boundary that divides the north and south service areas.

Figure B-1 depicts each of the four residential subpopulations, according to residence type and service area.

Figure B-1: Subpopulations, by Generator Type and Service Area

	Generator Type	
	Single-family	*Multi-family*
Service Area *(North)*	Single-Family North	Multi-Family North
(South)	Single-Family South	Multi-Family South

Sample Allocation

We used the ratio of single-family to multi-family samples from the 1998/99 study for the current study. Approximately two-thirds of the samples were allocated to waste from single-family residences consistent with the 1998/99 study, while the remaining one-third was allocated to waste from multi-family residences. Both single- and multi-family samples were evenly apportioned between the north and south service areas. Table B-2 outlines the total number of waste samples that were planned for the 2002 study and the actual number of samples sorted, by residence type and service area.

Table B-2: Planned versus Actual Number of Samples

	Planned Number of Samples for Year	Actual Number of Samples Sorted
Single-Family		
North	108	101
South	108	103
Multi-Family		
North	54	53
South	54	52
Total	**324**	**309**

Sampling Calendar

To reflect seasonal variation in the amounts and types of waste disposed by Seattle residents, the samples were distributed across the 12-month study period. Since the field crew can sort between 13 and 14 samples per day, two days of waste sampling were required each month to meet the study's sampling goals.

Working around major holidays and weekends (since residential waste is not collected on those days) and the sorting crew's availability, sampling dates were selected so that the distribution across weeks of the month and days of the week was roughly even. Whenever possible, waste sorting days were scheduled in contiguous two-day blocks. The year's calendar is shown in Table B-3, and the resulting allocation of waste sampling days is shown in Table B-4.

As shown, twice as many sampling days were scheduled at the SRDS than the NRDS. This was necessitated because nearly all loads collected from the south and about half of the loads from the north are normally delivered to the SRDS.

Table B-3: Waste Sampling Calendar

Date	Facility	Day of the Week
1/30/2002	SRDS	Wednesday
1/31/2002	SRDS	Thursday
2/20/2002	NRDS	Wednesday
2/21/2002	SRDS	Thursday
3/28/2002	NRDS	Thursday
3/29/2002	SRDS	Friday
4/17/2002	NRDS	Wednesday
4/18/2002	NRDS	Thursday
4/19/2002	SRDS	Friday
5/16/2002	SRDS	Thursday
5/17/2002	NRDS	Friday
6/4/2002	NRDS	Tuesday
6/5/2002	SRDS	Wednesday
7/9/2002	SRDS	Tuesday
8/14/2002	NRDS	Wednesday
8/28/2002	SRDS	Wednesday
8/29/2002	SRDS	Thursday
9/3/2002	SRDS	Tuesday
9/4/2002	SRDS	Wednesday
10/14/2002	SRDS	Monday
10/15/2002	SRDS	Tuesday
11/18/2002	SRDS	Monday
11/22/2002	NRDS	Friday
12/10/2002	NRDS	Tuesday
12/11/2002	SRDS	Wednesday
12/12/2002	SRDS	Thursday

Table B-4: Distribution of Waste Sampling Days

	Number of Waste Sampling Days: South					
	Monday	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Overall**
	1	**3**	**5**	**5**	**3**	**17**
Winter	**0**	**0**	**2**	**3**	**0**	**5**
Week 1	0	0	0	0	0	0
Week 2	0	0	1	1	0	2
Week 3	0	0	0	1	0	1
Week 4	0	0	0	0	0	0
Week 5	0	0	1	1	0	2
Spring	**0**	**0**	**0**	**1**	**2**	**3**
Week 1	0	0	0	0	0	0
Week 2	0	0	0	0	0	0
Week 3	0	0	0	1	1	2
Week 4	0	0	0	0	0	0
Week 5	0	0	0	0	1	1
Summer	**0**	**1**	**2**	**1**	**0**	**4**
Week 1	0	0	1	0	0	1
Week 2	0	1	0	0	0	1
Week 3	0	0	0	0	0	0
Week 4	0	0	1	1	0	2
Week 5	0	0	0	0	0	0
Fall	**1**	**2**	**1**	**0**	**1**	**5**
Week 1	0	1	1	0	0	2
Week 2	1	0	0	0	0	1
Week 3	0	1	0	0	0	1
Week 4	0	0	0	0	1	1
Week 5	0	0	0	0	0	0

	Number of Waste Sampling Days: North					
	Monday	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Overall**
	1	**2**	**3**	**2**	**1**	**9**
Winter	**0**	**1**	**1**	**0**	**0**	**2**
Week 1	0	0	0	0	0	0
Week 2	0	1	0	0	0	1
Week 3	0	0	1	0	0	1
Week 4	0	0	0	0	0	0
Week 5	0	0	0	0	0	0
Spring	**0**	**0**	**1**	**2**	**1**	**4**
Week 1	0	0	0	0	0	0
Week 2	0	0	0	0	0	0
Week 3	0	0	1	1	1	3
Week 4	0	0	0	1	0	1
Week 5	0	0	0	0	0	0
Summer	**0**	**1**	**1**	**0**	**0**	**2**
Week 1	0	1	0	0	0	1
Week 2	0	0	1	0	0	1
Week 3	0	0	0	0	0	0
Week 4	0	0	0	0	0	0
Week 5	0	0	0	0	0	0
Fall	**1**	**0**	**0**	**0**	**0**	**1**
Week 1	0	0	0	0	0	0
Week 2	0	0	0	0	0	0
Week 3	0	0	0	0	0	0
Week 4	1	0	0	0	0	1
Week 5	0	0	0	0	0	0

Sample Selection

The first step in selecting sample loads was to collect detailed information from Seattle Public Utilities (SPU) and the two contract haulers regarding the "universe" of waste loads hauled to the City's two Recycling and Disposal Stations (defined below). This information included route number, geographic area covered by the route, truck number, collection day, residence type served, and disposal facility.

Using a computer-generated random number, loads were selected from each of the four subpopulations for each sampling day. (For example, of all the possible routes for single-family waste in the south that run on the first Monday of the month, the one with the lowest random number was selected.) This step was repeated until a sufficient number of loads were selected from each subpopulation for each day.

This study was designed to sample "pure" loads only: single-family or multi-family loads, but not single- and multi-family waste mixed in the same load. The hauler contracted to collect waste in the south serviced territory operated vehicles that service both single- and multi-family residences. Generally, these vehicles collected more single-family than multi-family waste (greater than 60% of each load is from single-family residences).

A special truck, operated by the hauler in the south, collected waste from all multi-family residences located on those mixed routes selected for sampling. This eliminated all multi-family waste from single-family routes.

Hauler and Transfer Station Participation

The City owns and operates two transfer stations (North and South Recycling and Disposal Stations – NRDS and SRDS). Both of the City's contract haulers are required to deliver all residential waste loads to the two stations. Depending on several factors that vary daily (i.e., time needed to cover a specified route, traffic at the NRDS and SRDS), loads from the two service areas can be taken to either transfer station.

The Project Manager met with both contract haulers and NRDS and SRDS transfer station management at the outset of the study to communicate study objectives and explain all sampling procedures. In addition, affected personnel were contacted each month about upcoming sampling events.

More specifically, haulers and transfer station management were sent a vehicle selection sheet prior to each sampling day. (Please see Appendix G for a copy of this sheet.) The vehicle selection sheet was sent with a memo alerting hauling and transfer station management of loads included in the upcoming sort, suggesting that appropriate personnel be notified.

Field Procedures

The Field Supervisor was responsible for selecting the appropriate loads and retrieving net weights for each sample load.

As the selected truck dumped at the transfer station, a loader "nosed" into the stream of material falling from the truck and captured a 5-cubic-yard slice (about 250 pounds) of garbage.

Each sample was sorted by hand into 89 component categories. (See Appendix A for a list of the components.) The weights of all materials were recorded on a waste tally sheet (see Appendix G). Each sample was sorted to the greatest reasonable detail, so that no more than 10 pounds of "supermix" (generally consisting of pieces less than two-inches) remained.

Changes in Methodology from 1998/99 Study

The sampling methodology for this study differed from 1998/99 in the following ways:

- The total number of samples planned for the 12-month study period decreased from 360 to 324. (The actual number taken for the current study was 309.)

- The number of sampling days scheduled at the NRDS was reduced from 12 to 8 to accommodate a greater number of loads being delivered to the NRDS.

- The component categories were updated to provide more detail about specific materials in the waste stream. These category changes are tracked in Appendix A.

Appendix C: Comments on Monthly Sampling Events

January

South Seattle waste sampling began on January 30th at the SRDS and eleven samples were obtained (7 single-family samples, 1 less than planned, and 4 multi-family samples).

On January 31st at SRDS, 14 samples (9 single-family and 5 multi-family) were captured. One pre-selected vehicle did not arrive at the station.

February

In February, a total of 22 samples were sorted: 11 samples at NRDS on February 20th and 11 samples at SRDS on February 21st.

March

In March, we sorted 1 multi-family sample on the 28th at NRDS because both loaders required to capture waste broke down. A total of 14 samples, one more single-family than planned, were sorted on March 29th at SRDS.

April

April 17th was scheduled to make up for the March 28th sorting day that was cancelled due to operational difficulties. The crew captured 13 samples at the NRDS: 10 single-family loads and 3 loads from multi-family vehicles.

On April 18th, the crew sorted 13 samples at the North Recycling and Disposal Station: 9 single-family and 4 multi-family loads.

During the April 19th sorting day at the SRDS, 10 vehicles were sampled. Half of the samples were from single-family loads while the other half came from multi-family loads. No Waste Management trucks were sampled as the hauler accidentally sent these vehicles to the North Station.

May

We captured 13 samples on May 16th at the SRDS as planned. A total of 9 single-family loads and four multi-family loads were captured.

During the May 17th sorting day at the North Recycling and Disposal Station, 12 vehicles were sampled, 7 multi-family and 5 single-family loads.

June

On June 4th at the North Recycling and Disposal Station, 8 single-family and 5 multi-family loads were captured for a total of 13 loads.

We sampled a total of 12 loads at the South Recycling and Disposal Station on June 5th: 9 single-family and 3 multi-family loads.

July

On July 9th, 15 loads (9 single-family and 6 multi-family) were sorted at the South Recycling and Disposal Station.

On July 10th, we were unable to sample waste at either the NRDS or SRDS because of unexpected construction projects underway at these facilities.

August

August 14th was scheduled to makeup for the missed loads on Wednesday, July 10th due to construction at both the North and South stations. We captured a total of 11 samples at the North Recycling and Disposal Station. Seven of these samples came from single-family trucks and four from multi-family ones.

On August 28th at SRDS, four multi-family and 10 single-family made up the 14 loads sorted.

On August 29th, we captured and sorted 14 samples at the SRDS. A total of 10 single-family and four multi-family loads were sampled.

September

A total of 14 samples were captured at the SRDS on Tuesday, September 3rd. Eight of these samples came from single-family and six from multi-family vehicles.

During the September 4th sorting day at the South Recycling and Disposal Station, 11 vehicles were sampled, three less than planned. Three multi-family loads were not collected from Waste Management since those vehicles did not show up for sampling. A total of eight single-family samples were captured

October

On October 14th, the crew sorted a total of 10 samples at the SRDS. Of these 10 samples, six were from single-family trucks and the remaining four were from multi-family trucks.

During the October 15th sorting day at the SRDS, 8 vehicles (five single-family and three multi-family) were sampled.

November

On November 18th, the crew sorted a total of 12 samples at the NRDS. Half of the samples were from single-family trucks, while the other half were from multi-family vehicles.

Our crew captured and sorted a total of 11 samples on November 22nd at the SRDS. A total of seven single-family and four multi-family samples were taken.

December

A total of 12 samples were sorted during the December 10th sampling day at the North Recycling and Disposal Station. Eight single-family and four multi-family loads were captured.

During the December 11th sampling day at the South Recycling and Disposal Station, the crew captured 16 samples in total. A total of 13 single-family and three multi-family samples were obtained.

In order to capture additional Waste Management loads, an extra sampling day was scheduled for December 12th at the SRDS. Of the 13 samples taken, 10 were from single-family loads and three were from multi-family loads.

Appendix D: Waste Composition Calculations

Composition Calculations

The composition estimates represent the **ratio of the components' weight to the total waste** for each noted substream. They were derived by summing each component's weight across all of the selected records and dividing by the sum of the total weight of waste, as shown in the following equation:

$$r_j = \frac{\sum_i c_{ij}}{\sum_i w_i}$$

where:

c = weight of particular component

w = sum of all component weights

for i 1 to n

where n = number of selected samples

for j 1 to m

where m = number of components

The confidence interval for this estimate was derived in two steps. First, the variance around the estimate was calculated, accounting for the fact that the ratio includes two random variables (the component and total sample weights). The **variance of the ratio estimator** equation follows:

$$V\hat{a}r_{r_j} = \left(\frac{1}{n}\right) \cdot \left(\frac{1}{\overline{w}^2}\right) \cdot \left(\frac{\sum_i \left(c_{ij} - r_j w_i\right)^2}{n-1}\right)$$

where:

$$\overline{w} = \frac{\sum_i w_i}{n}$$

Second, **precision levels** at the 90% confidence interval were calculated for a component's mean as follows:

$$r_j \pm \left(t \cdot \sqrt{V\hat{a}r_{r_j}}\right)$$

where:

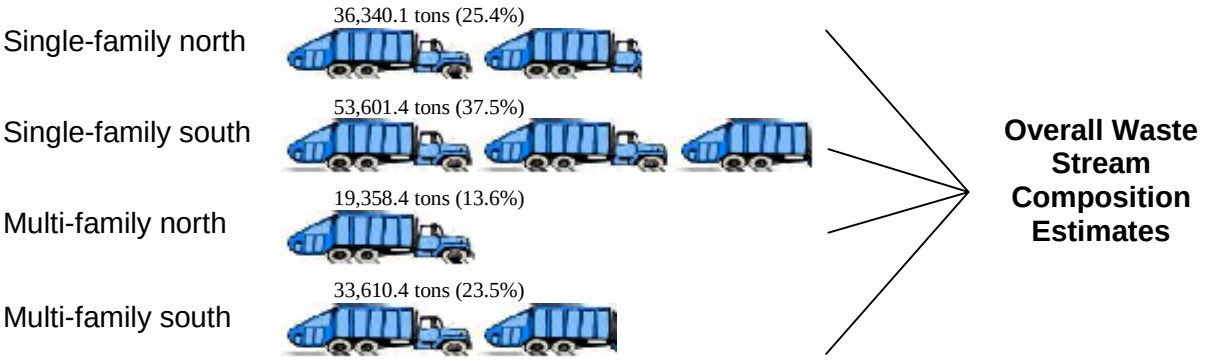
t = the value of the t-statistic (1.645) corresponding to a 90% confidence level

For more detail, please refer to Chapter 6 "Ratio, Regression and Difference Estimation" of *Elementary Survey Sampling* by R.L. Scheaffer, W. Mendenhall and L. Ott (PWS Publishers, 1986).

Weighted Averages

Waste composition estimates were calculated by using a weighted average procedure. For example, to develop composition estimates for Seattle's single-family residential waste, both single-family north and single-family south waste samples were combined, with more importance given to the single-family south samples (contributing about 60% of total single-family tons disposed). Figure D-2 depicts the weighted average process for the overall waste stream.

Figure D-2: Calculation Process to Characterize Overall Waste Stream



Seattle provided the estimate of tonnage disposed by each of the four subpopulations. The composition estimates were applied to the relevant tonnages to estimate the amount of waste disposed for each component category for each residence type, service area, and subpopulation.

The **weighted average for an overall composition estimate** was performed as follows:

$$O_j = \left(p_1 * r_{j1}\right) + \left(p_2 * r_{j2}\right) + \left(p_3 * r_{j3}\right) + \ldots$$

where:

p = the proportion of tonnage contributed by the noted substream

r = ratio of component weight to total waste weight in the noted substream

for j 1 to m

where m = number of components

The **variance of the weighted average** will be calculated:

$$VarO_j = \left(p_1^{\,2} * \bar{V}_{r_{j1}}\right) + \left(p_2^{\,2} * \bar{V}_{r_{j2}}\right) + \left(p_3^{\,2} * \bar{V}_{r_{j3}}\right) + \ldots$$

The following tables show the sets of weighting percentages that were used to produce the estimates for overall residential, and then for each residence type and service area.

Table D-1: Weighting Percentages, Overall

Subpopulation	Tons Disposed	Percent of Total
Single-family North	36,340	25.43%
Multi-family North	19,358	13.55%
Single-family South	53,601	37.51%
Multi-family South	33,610	23.52%
Overall	**142,910**	**100%**

Table D-2: Weighting Percentages – Single-family Residences

Service Area	Tons Disposed	Percent of Total
Single-family North	36,340	40.40%
Single-family South	53,601	59.60%
Overall	**89,942**	**100%**

Table D-3: Weighting Percentages – Multi-family Residences

Service Area	Tons Disposed	Percent of Total
Multi-family North	19,358	36.55%
Multi-family South	33,610	63.45%
Overall	**52,969**	**100%**

Table D-4: Weighting Percentages – North Service Area

Residence Type	Tons Disposed	Percent of Total
Single-family North	36,340	65.24%
Multi-family North	19,358	34.76%
Overall	**55,699**	**100%**

Table D-5: Weighting Percentages –South Service Area

Residence Type	Tons Disposed	Percent of Total
Single-family South	53,601	61.46%
Multi-family South	33,610	38.54%
Overall	**87,212**	**100%**

Comparison Calculations

Identifying statistically significant differences requires a two-step calculation. First, assuming that the two groups to be compared have the same variance, a **pooled sample variance** will be calculated:

$$S_{pool}^{\ 2} = \frac{\left[(n1-1)\cdot\left(n1\cdot \bar{V}_{r_j 1}^{\ 2}\right)\right] + \left[(n2-1)\cdot\left(n2\cdot \bar{V}_{r_j 2}^{\ 2}\right)\right]}{n1+n2-2}$$

Next, the **t-statistic** will be constructed:

$$t = \frac{(r1-r2)}{\sqrt{\frac{S_{pool}^{\ 2}}{n1} + \frac{S_{pool}^{\ 2}}{n2}}}$$

The **p-value** of the t-statistic will be calculated based on (n1+n2 -2) degrees of freedom.

Demographic Calculations

Waste compositions for different demographic groups were calculated by considering the median household income and mean household size of each sampled garbage route. Single-family waste samples were grouped according to whether they were collected from garbage routes with high-income, low-income, large household size, or small household size. Once the waste samples were identified as belonging to one of these four demographic groups, waste composition calculations were performed as described above under "Composition Calculations."

Calculations of each garbage route's **mean household size** were performed as follows, using information from the 2000 Census:

1. Population and number of households were obtained for each Census Block in Seattle via download from the U.S. Census Bureau at http://factfinder.census.gov. Most Census Blocks are based on city blocks, and are the finest level of geography that the Census Bureau reports.
2. Groups of Census Blocks were aggregated in a Geographic Information System (GIS) to approximate the areas covered by each Seattle single-family garbage route serviced by U.S. Disposal and Waste Management. These companies provided physical maps of their recent garbage routes, which were used to rectify digital route maps supplied by the City of Seattle.

3. The total population and total households for each garbage route were then calculated by summing the population and number of households for all Census Blocks contained within each route.
4. Mean household size was calculated by dividing the total population of each route by the total number of households.

Calculations of each garbage route's **median income** were performed as follows, using information from the 2000 Census. Note that unlike population and housing information, median income is gathered from a 1-in-6 sample of the population, and is therefore not reported at the Block level. Instead, the finest level of geography for which this information is reported is the Block Group, the next level up from Census Block.

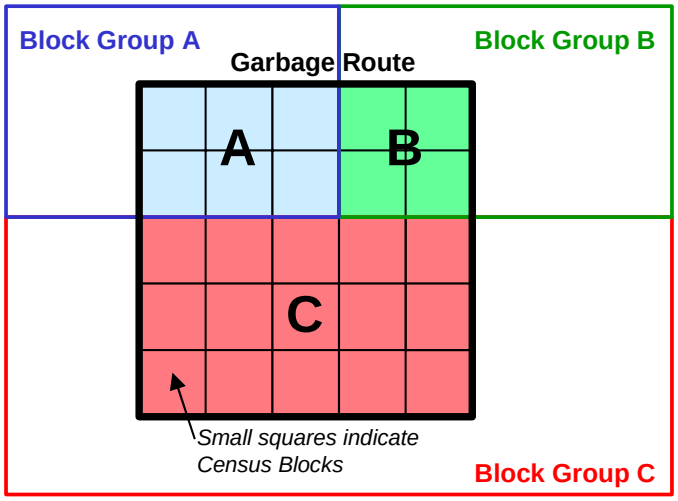
1. For each garbage route, the Block Groups that intersected the route were selected using GIS. Figure D-3 presents an example where Block Groups A, B, and C intersect a designated garbage route.
2. The number of households within Block Groups A, B, and C was determined by aggregating the associated Census Blocks in a GIS. (Census Blocks are represented by cells within the Block Groups in Figure D-3.)
3. The number of households in each Block Group was used to calculate a weighted median income for the route. For instance, because Block Group C contains more households than Block Group A and B, the median income of Block Group C would be given more importance than the other two Block Groups in calculating the median income for the designated route. The weighting was carried out as follows, where "Households" refers to the number of households in each Block Group, and "Income" refers to the median income of each Block Group within the designated route.

   Estimated Median Income of Garbage Route =

$$\frac{\textbf{A}\text{ Households} * \textbf{A}\text{ Income} + \textbf{B}\text{ Households} * \textbf{B}\text{ Income} + \textbf{C}\text{ Households} * \textbf{C}\text{ Income}}{\textbf{A}\text{ Households} + \textbf{B}\text{ Households} + \textbf{C}\text{ Households}}$$

4. The result of this weighting is an approximation of the median income for the designated route.

Figure D-3: Geographies Used in Demographic Calculations



Sampled routes were then divided into quartiles based on the median income and mean household size of each garbage route. Since 129 single-family routes were sampled, each quartile generally contained 32 routes, with one quartile containing 33 routes. Waste samples from the first (0 - 25%) quartile were used to calculate “low income” and “small household” waste compositions and samples from the top quartile (75% - 100%) were used to calculate “high income” and “large household” waste compositions.

Appendix E: Comparison Calculations

The comparison methodology is outlined in the first section of this appendix and the calculations are outlined in Appendix C. For more detail, the remaining sections describe technical issues regarding the statistics.

Background

In an ongoing effort to monitor the types and amounts of materials disposed locally, Seattle has performed several waste composition studies. Differences are often apparent between project years and among subpopulations. In this appendix, detailed results from the following comparisons are presented. The results of these comparisons can be used to indicate trends in the composition data.

- Year-to-year comparisons
  - 1988/89 vs. 2002
  - 1998/99 vs. 2002
- Comparisons among subpopulations
  - Single-family vs. multi-family
  - North vs. south
  - Single-family north vs. single-family south

In order to control for population changes and other factors that may influence the total amount of waste disposed from year to year, the tests described in this appendix measure waste proportions, not actual tonnage. For example, say that newspaper accounts for 5% of a particular substream's disposed waste each year, and that a total of 1,000 tons of waste was disposed in one year and 2,000 tons of waste in the next. While the amount of newspaper increased from 50 to 100 tons, the percentage remained the same. Therefore, the tests would indicate that there had been no change.

The purpose of conducting these comparisons is to identify trends within the residential substream, in the percentage of selected types of waste disposed over time and between substreams. One specific example is stated as follows:

Hypothesis: "There is no statistically significant difference, between the 1988/89 and 2002 study periods, in the percentage of paper disposed."

Statistics are then employed to look for evidence disproving the hypothesis. A "significant" result means that there is enough evidence to disprove the hypothesis and it can be concluded that there is a true difference across years. "Insignificant" results indicate that either a) there is no true difference, or b) even though there may be a difference, there is not enough evidence to prove it.[1]

The purpose of these tests is to identify changes across years and among substreams. However, the study did not attempt to investigate *why* or *how* these changes occurred. The

[1] Please see the "Power Analysis" discussion on page E-3.

changes may be due to a variety of factors. For example, the decrease in paper could be due to any combination of the following:

- Consumer Preferences—plastic containers might have captured some of the market previously held by corrugated containers.
- Technology—manufacturers might use thinner paperboard than in the past, which would decrease the weight of cardboard, even if the same number of boxes were disposed.
- Recycling—more residents may participate in paper recycling programs.

Future studies could be designed to test the influence of various potential sources of the increase/decrease of specific materials in the disposed waste stream.

Statistical Considerations

The analyses were based on the component percentages, by weight. As described in Appendix D, these percentages are calculated by dividing the sum of the selected component weights by the sum of the corresponding sample weights. T-tests (modified for ratio estimation) were used to examine the variations from year-to-year and within subpopulations.

Normality

The distributions of some of the waste categories (particularly the hazardous materials) are skewed and may not follow a normal distribution. Although t-tests assume a normal distribution, they are very robust to departures from this assumption, particularly with large sample sizes. In addition, most of the selected categories are sums of several individual waste components, which improve our ability to meet the assumptions of normality.

Dependence

There may be dependence between waste types (if a person disposes of material A, they always dispose of material B at the same time).

There is certainly a degree of dependence between the calculated percentages. Because the percentages sum to 100 (in the case of year-to-year comparisons) or near 100 (in the case of subpopulation comparisons), if the percentage of material A increases, the percentage of some other material must decrease.

Multiple T-Tests

In all statistical tests, there is a chance of incorrectly concluding that a result is significant. The year-to-year comparison required conducting several t-tests (one for each waste category) **each** of which carries that risk. However, we were willing to accept only a 10% chance, **overall**, of making an incorrect conclusion. Therefore, each test was adjusted by setting the significance threshold to $\frac{0.10}{w}$ (w = the number of t-tests).

The adjustment can be explained as follows:

For each test, we set a $1-\frac{0.10}{w}$ chance of not making a mistake, which results in a $\left(1-\frac{0.10}{w}\right)^{w}$ chance of not making a mistake during all *w* tests.

Since one minus the chance of not making a mistake equals the chance of making a mistake, by making this adjustment, we have set the overall risk of making a wrong conclusion during any one of the tests at $\left(1-\left(1-\frac{0.10}{w}\right)^{w}\right)=0.10$.

The chance of a "false positive" for the year-to-year comparisons made in this study is restricted to 10% overall, or 1.25% for each test (10% divided by the eight tests within the residential substream equals 1.25%). Among, the subpopulation comparisons, the chance of a false positive results is also restricted to 10% overall and 0.91% for each test (10% divided by the eleven tests performed).

For more detail regarding this issue, please refer to Section 11.2 "The Multiplicity Problem and the Bonferroni Inequality" of *An Introduction to Contemporary Statistics* by L.H. Koopmans (Duxbury Press, 1981).

Power Analysis

As the number of samples is increased, so is the ability to detect differences. In the future, an *a priori* power analysis might benefit this research by determining how many samples would be required to detect a particular minimum difference of interest.

Interpreting the Calculation Results

The following tables include detailed calculation results. An asterisk notes the statistically significant differences.

For the purposes of this study, only those calculation results with a p-value of less than 1.25% for the residential substream are considered to be statistically significant. As described above, the threshold for determining statistically significant results (the "alpha-level") is conservative, accounting for the fact that so many individual tests were calculated.

The t-statistic is calculated from the data. According to statistical theory, the larger the absolute value of the t-statistic, the less likely that the two populations have the same mean. The p-value describes the probability of observing the calculated t-statistic if there were no true difference between the population means.

Table E-6 shows that the proportions of *paper*, *glass*, *metal*, and *CDL wastes* show decreasing trends over the last 14 years. *Other materials* and *plastic* show increasing trends. Variations among the proportions of *organics* and *hazardous materials* were not significant.

Table E-6: Comparison of Residential Composition Results, 1988/89 vs. 2002
(Includes all 8 broad material categories)

	Mean Ratio (Material Wt/Total Wt)		t-Statistic	p-Value (Cut-off for statistically valid difference = 0.0125)
	1988/1989	*2002*		
Other Materials	6.14%	18.23%	20.4520	0.0000 *
Paper	31.24%	22.57%	10.0393	0.0000 *
Glass	6.41%	3.62%	9.6972	0.0000 *
Metal	5.27%	3.78%	5.7931	0.0000 *
Plastic	8.06%	9.57%	5.6508	0.0000 *
CDL Wastes	8.80%	5.93%	3.8727	0.0001 *
Organics	33.42%	35.86%	2.1144	0.0350
Hazardous	0.66%	0.45%	1.8293	0.0679
Number of Samples	*212*	*309*		

As displayed in Table E-7, *organics* proportions shows an increasing trend while *paper* and *plastic* show decreasing trends over the last 14 years. Variations among the remaining comparison groups were not significant.

Table E-7: Comparison of Residential Composition Results, 1998/99 vs. 2002
(Includes all 8 broad material categories)

	Mean Ratio (Material Wt/Total Wt)		t-Statistic	p-Value (Cut-off for statistically valid difference = 0.0125)
	1998/1999	*2002*		
Paper	28.08%	22.57%	9.4347	0.0000 *
Organics	30.39%	35.86%	7.5544	0.0000 *
Plastic	10.29%	9.57%	2.8317	0.0048 *
Metal	4.46%	3.78%	2.3508	0.0190
Glass	4.13%	3.62%	2.3353	0.0198
Other Materials	17.25%	18.23%	1.6738	0.0946
CDL Wastes	4.96%	5.93%	1.6158	0.1066
Hazardous	0.44%	0.45%	0.0895	0.9287
Number of Samples	*360*	*309*		

Appendix F: Analytical Database Description

Data was double entered into a Microsoft Access database specifically constructed for this project to minimize entry errors. In addition to the actual waste results, each record includes route, demographic and delivery characteristics of the sample. A description of the key data fields and structure of each record follows.

1.1 Analytical Database Structure

Each record consists of 109 fields of fixed size and type (89 of these fields are the material components). Please refer to Appendix A for a complete listing of the field names of each waste component. The database file is compatible with the dBase III Plus file construct. A complete description of all fields is given below.

The field types used include AutoNumber, Number, Text, Date/Time, and Yes/No. Dates are carried as "mm/dd/yy." Each record can have an associated Memo of up to 64K characters in length to record additional comments or notes about the sample.

1.1.1 Data Tables

The basic relationships of the database are illustrated in Figure F-4. As shown, SvyKey is the unique identifier linking each sample to its composition while SchedID links the sample to the information about date of collection. In addition, the database contains “code” tables, linked to these key tables, which translate values into specific information about each sample.

Figure F-4: Basic Database Relationships

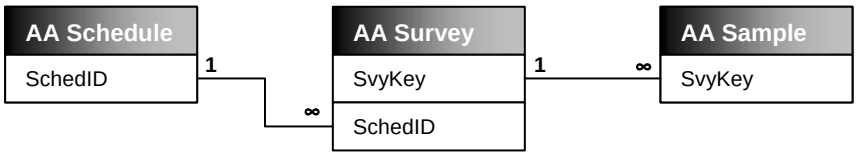


Figure F-5: AA Schedule

Field Name	Type	Description	Validation Rules	Corresponding Code Table
ScheduleID	Number	Unique ID for each sampling field day.	(No duplicates)	☐
SiteID	Number	Unique ID for each sampling site.		☑
Site	Text	Corresponding sample site.		☐
Date	Date/Time	Date during which sampling occurred.		☐
Season	Number	Season during which sampling occurred. (Summer, Fall, Winder, Autumn)		☑
Month	Text	Month during which sampling occurred.		☐
Shift	Text	Shift during which sampling occurred. (Day, Night)		☐
StudyPeriod	Text	Study year during which sampling occurred.		☐
Comment	Text	Notes specific to the sampling field day.		☐
StudyPdAsNumber	Number	For use when you want to use < or > when screening by study period		☐
Day	Text	New in 1998/99. Day during which sampling occurred.		☐
WeekofMonth	Number	New in 1998/99. Week during which sampling occurred. (1, 2, 3, 4, or 5)		☐

Figure F-6: AA Survey

Field Name	Type	Description	Validation Rules	Corresponding Code Table
SvyKey	Number	Unique ID for each sample.		☐
Sched ID	Number	Links each sample to [AA Schedule].		☐
FieldSampleID	Text	For field work, unique ID assigned by field crew.		☐
Net Weight	Number	Net weight of associated vehicle.		☐
SubstreamCode	Text	Indicates substream (C=commercial, R=residential, S=self-haul)	"C" Or "R" Or "S"	☑
GenType	Number	Indicates generator (e.g., single family residential, restaurant, etc.)		☑
VehicleType	Number	Indicates vehicle (pick-up truck, front loader, etc.).		☑
Hauler	Number	Indicates waste hauler.		☑
RD1	Text	Route Designator 1--meaning depends on Substream. Res/Comm: Route #, SelfHaul: start of person's license plate		☐
RD2	Text	Route Designator 2--meaning depends on Substream. Res: AM/PM to indicate which load, Comm: Truck type (RO=roll-over, FL=Front Loader, etc.), SelfHaul: Time of arrival (24 hour clock)		☐
Destination	Number	Also called "Origin" in 1998/99. Where the truck was headed if we didn't come along. (As opposed to Site = where we did the sampling)		☐
Recycle	Text	Used for 98/99 study. Designated sample as recycling, not waste.	Y Or "N" Or Is Null	☐
Res Accts	Number	Number of residential accounts asociated with sample.		☐
PoolAll	Text	For use when user wants to pool all samples. Should = "SelectedSamples" for all records.		☐
TruckNumber	Text			☐
RealSample	Text	Yes= real sample, No=sample added to perform analyses		☐
C&DSample	Text	Yes= MSW sample, No=C&D Sample from Eastmont, not used in analysis (90% or more C&D)		☐
TVType	Text	Describes TV, if applicable (TV is new subclass for 2002)		☐
PureMethod	Text	For the 1988/89 study; sampling plan included getting "pure" (one biz type only) Commercial loads	Y Or "N" Or Is Null	☐
NumMotorOilFilters	Number	Number of motor oil filters in sample		☐
				☐

Figure F-7: AA Sample

Field Name	Type	Description	Validation Rules	Corresponding Code Table
Samp ID	Number	Unique ID for each material component within each sample.		☐
SampKey	Number	Used to cross-check sample IDs.		☐
Uniform Subclass ID	Number	Corresponds to baseline set of material components.		☑
Original Subclass ID	Number	Corresponds to set of materials for most surrent study.		☑
Weight	Number	Net weight of material in given sample.		☐
SvyKey	Number	Links each material component to associated sample in [AA Survey].		☐

1.1.2 Code Tables

Code Route is linked to AA Survey by the field “SvyKey”.

Figure F-8: Code Route

Field Name	Type	Description
SvyKey	Number	Links to SvyKey in [AASurvey].
Hauler	Text	Designates waste hauling company.
N or S	Text	North or South
Day	Text	Day of week when associated sample was collected.
RD1	Text	Route numbers as encoded in the SWC database; corresponds to route numbers in ArcView GIS database.
Route	Text	Coded routes in the ArcView GIS database.

Code Gen is linked to AA Survey by the field “GeneratorID.”

Figure F-9: Code Gen

Field Name	Type	Description
GeneratorID	AutoNumber	Links to [GenType].[AA Survey]
Generator	Text	Description of generator type (e.g. single family residential, restaurant, etc.)
Report Order	Number	For reporting purposes.
GeneratorGroup	Text	Description of grouped generator types.
Old Code	Text	From previous studies.
GeneratorGroupID	Number	For grouping individual generator types.

Code Hauler is linked to AA Survey by the field “HaulerID.”

Figure F-10: Code Hauler

Field Name	Type	Description
HaulerID	AutoNumber	Links to [Hauler].[AA Survey]
Hauler	Text	Name of hauling company.
Report Order	Number	For reporting purposes.
Old Code	Text	From previous studies.

Code Subclass is linked to AA Sample.

Figure F-11: Code Subclass

Field Name	Type	Description
UniKey	AutoNumber	Primary key for this table.
ClassID	Number	ID for broad material categories.
ClassName	Text	Name of broad material categories.
ClassOrder	Number	For reporting purposes, order of broad material categories.
TClass	Text	Category designations for t-tests
Uniform ID	Number	ID's to compare waste component weights across years (54 total)
Uniform_Name	Text	Names of baseline set of material components.
1988/89_Class	Text	Names of broad material categories used for the 1988/1989 study year.
1988/89_ClassOrder	Number	Associated ID for broad material categories used for the 1988/1989 study year.
1988/89_ID	Number	52 subclasses (#'d 1-54 with 10 & 34 missing)
1988/89_Name	Text	Name of material components used for 1988/89 study year.
1990_Class	Text	Names of broad material categories used for the 1990 study year.
1990_ClassOrder	Number	Associated ID for broad material categories used for the 1990 study year.
1990_ID	Number	53 subclasses
1990_Name	Text	Name of material components used for 1990 study year.
1992/93_Class	Text	Names of broad material categories used for the 1992/1993 study year.
1992/93_ClassOrder	Number	Associated ID for broad material categories used for the 1992/1993 study year.
1992/93_ID	Number	54 subclasses
1992/93_Name	Text	Name of material components used for 1992/1993 study year.
1994/95_Class	Text	Names of broad material categories used for the 1994/1995 study year.
1994/95_ClassOrder	Number	Associated ID for broad material categories used for the 1994/1995 study year.
1994/95_ID	Number	74 subclasses
1994/95_Name	Text	Name of material components used for 1994/1995 study year.
1996_Class	Text	Names of broad material categories used for the 1996 study year.
1996_ClassOrder	Number	Associated ID for broad material categories used for the 1996 study year.
1996_ID	Number	85 subclasses
1996_Name	Text	Name of material components used for 1996 study year.
1998/99_Class	Text	Names of broad material categories used for the 1998/1999 study year.
1998/99_ClassOrder	Number	Associated ID for broad material categories used for the 1998/1999 study year.
1998/99_ID	Number	86 subclasses
1998/99_Name	Text	Name of material components used for 1998/1999 study year.
2000_Class	Text	Names of broad material categories used for the 2000 study year.
2000_ClassOrder	Number	Associated ID for broad material categories used for the 2000 study year.
2000_ID	Number	88 subclasses
2000_Name	Text	Name of material components used for 2000 study year.
Report Order	Number	For reporting purposes, order of broad material categories.
Chart Order	Number	Order as shown in the Tracking Chart
OldClassName	Text	Field no longer used.
2002_Class	Text	Names of broad material categories used for the 2002 study year.
2002_ClassOrder	Number	Associated ID for broad material categories used for the 2002 study year.
2002_ID	Number	89 subclasses
2002_Name	Text	Name of material components used for 2002 study year.

Code Season is linked to AA Schedule by the field “SeasonID.”

Figure F-12: Code Season

Field Name	Type	Description
SeasonID	Number	Links to [Season].[AA Schedule]
Season	Text	Designates season. (Spring, Summer, Autumn, Fall)
SeasonDescription	Text	Months included in season plus year, for multi-year studies (e.g. Fall (October - December 1992), .

Code Site is linked to AA Schedule by the field “SiteID.”

Figure F-13: Code Site

Field Name	Type	Description
SiteID	Number	Links to [SiteID].[AA Schedule]
Site	Text	Designates site (e.g., North Recycling and Disposal Station, Eastmont, etc.).
SiteType	Text	Designates operator of facility. ("City of Seattle" or "Private Facility" or Is Null)

Code Substream is linked to AA Survey by the field “SubstreamID.”

Figure F-14: Code Substream

Field Name	Type	Description
SubstreamID	AutoNumber	Links to [SubstreamCode].[AA Survey]
SubstreamCode	Text	Indicates substream in one-letter code. ("C" or "R" or "S")
Substream	Text	Description of substream. ("Commercial" or "Residential" or "Self-haul")

Code Vehicle is linked to AA Survey by the field “VehicleID.”

Figure F-15: Code Vehicle

Field Name	Type	Description
VehicleID	AutoNumber	Links to [VehicleType].[AA Survey]
Vehicle	Text	Designates vehicle (e.g., Rear Loader, Loose Roll-off, etc.).
Report Order	Number	For reporting purposes.
Old Code	Text	From previous studies.
AggVehicle	Text	General vehicle categories used for individual vehicle types (e.g., packer, roll-off, etc.).

Appendix G: Field Forms

The field forms are included in the following order:

- Vehicle Selection Sheet
- Waste Tally Sheet

Vehicle Selection Sheet
Seattle Residential Waste Composition Study

Sampling Date: Thursday, February 21, 2002

Sampling Location: South Recycling and Disposal Station

Hauler: U.S. Disposal & Waste Management

Sample ID	Hauler	Truck #	Gen Type	Route #	Truck Type	E. T. A.	Net Weight
	USD	**710005**	SF	1	FL	3:30pm	
	USD	**710024**	SF	15	FL	3:45pm	
	USD	**710032**	SF	20	FL	3:30pm	
	USD	**710028**	SF	21	FL	3:30pm	
	USD	**710021**	SF	23	FL	3:00pm	
A	USD	**710030**	SF	18	FL	4:00pm	
	USD	**790031**	MF	731	FL	2:30pm	
	USD	**710027**	MF	797	FL	3:00pm	
A	USD	**770113**	MF	733	FL	2:30pm	
	WM	**263054**	SF	1	FL	4:00pm	
	WM	**151524**	SF	10	SL	4:00pm	
	WM	**151520**	SF	12	SL	3:45pm	
	WM	**151525**	SF	19	SL	4:15pm	
A	WM	**151528**	SF	16	SL	4:30pm	
	WM	**203998**	MF	44	FL	4:45pm	
	WM	**305751**	MF	40	RL	4:00pm	
A	WM	**305752**	MF	41	RL	4:00pm	

Sampling Plan: 4 SFWM, 5 SFUS, 2 MFWM, 2 MFUS

Waste Tally Sheet, Front

PAPER				
Newspaper				
Plain OCC/Kraft				
Waxed OCC/Kraft				
Mixed Low Grade				
Phone Books				
Office Paper				
Computer Paper				
Milk/Ice Cream/Juice				
Frozen Food Polycoats				
Compostable Soiled				
Paper/Other Materials				
Other Paper				

GLASS				
Clear Beverage/Liquid				
Green Beverage/Liquid				
Brown Beverage/Liquid				
Container Glass				
Other Glass				
Fluorescent Tubes				

PLASTICS				
#1 Pop & Liquor				
#1 Other Bottles				
#2 Milk & Juice				
#2 Other				
Other Bottles				
Jars & Tubs				
Expanded Polystyrene				
Other Rigid Packaging				
Grocery/Store/Bread Bags				
Garbage Bags				
Other Plastic Film				
Plastic Products				
Plastic/Other Materials				

WOOD & YARD WASTES				
Dimension Lumber				
Other Untreated Wood				
Pallets				
Crates/Boxes				
Treated Wood				
Contaminated Wood				
Leaves & Grass				
Prunings				

METALS				
Alum. Beverage Cans				
Alum. Foil/Containers				
Other Aluminum				
Tinned Food Cans				
Other Ferrous				
Other Nonferrous				
Mixed Metals/Material				
Empty Aerosol Cans				
Motor Oil filters			Oil Filters (count):	

ORGANICS				
Food Wastes				
Textiles/Clothing				
Carpet/Upholstery				
Leather				
Disposable Diapers				
Animal By-products				
Rubber Products				
Tires				
Ash				
Misc. Organics				

Sample ID: **Date:** **Location:**

Waste Tally Sheet, Back

OTHER WASTES				
Furniture				
Mattresses				
Small Appliances				
Audio/Visual Equipment				
Computer Monitors				
Television Sets		TV (brand name):		
Other Computer Equipment				
Ceramics/China				
New Gypsum Scrap				
Demo Gypsum Scrap				
Fiberglass Insulation				
Rock/Concrete/Bricks				
Other Construction Debris				
Asphaltic Roofing				
Sand/Soil/Dirt				
Non-distinct Fines				
Misc. Inorganics				

HAZARDOUS WASTES				
Latex Paint				
Hazardous Glue/Adhesives				
Non-hazardous Glues				
Oil-based Paint/Thinners				
Hazardous Cleaners				
Pesticides/Herbicides				
Dry-cell Batteries				
Wet-cell Batteries				
Gasoline/Kerosene				
Motor Oil/Diesel Oil				
Asbestos				
Explosives				
Other Hazardous				
Other Non-hazardous				

SUPERMIX:

HAULER: **U - U.S. Disposal**
W - Waste Management

VEHICLE TYPE:
FL - Front Loader
RL - Rear Loader
SL - Side Loader

TRUCK #:

ROUTE #:

DEST.: **N - NRDS**
S - SRDS

NET WEIGHT (in pounds):

GENERATOR TYPE:**
SF - Single-family
MF - Multi-family

**** If the load is not pure SF or pure MF, take contingency sample**

NR - No Response