Seattle Public Utilities

2006 Residential Waste Stream Composition Study *FINAL* Report

prepared by

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in cooperation with

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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 2012. SPU has conducted waste composition studies since 1988 to better understand the types and quantities of MSW disposed, to assess the city's recycling potential, and to aid in the evaluation of existing programs. These studies have 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 2006.

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
2004	270	0	216	486
2006	0	356	0	356

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 2006 residential waste study. Section 1 briefly introduces the project and the methodology and Section 2 summarizes the findings. In Section 3, the 2006 findings are compared to those from the 1988/89, 1994/95, 1998/99 and 2002 residential studies. Detailed results of the 2006 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.
- ***Multi-family:*** Waste collected from dumpsters that primarily serve apartments and condominiums with five or more units.

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 sampling groups were established.

Figure 1-2 depicts these four residential waste stream sampling groups, which are defined by residence type and service area.

Figure 1-2: Sampling Groups, by Residence 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

[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 2004.

1.3 Study Methodology

The following section provides an overview of the 2006 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. Appendix B contains a detailed description of the methodology.

Step 1: Develop Sampling Plan

- Samples were allocated among the four residential sampling groups: 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 2006 calendar year, and consisted of two or three 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 sampling groups.
- 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.

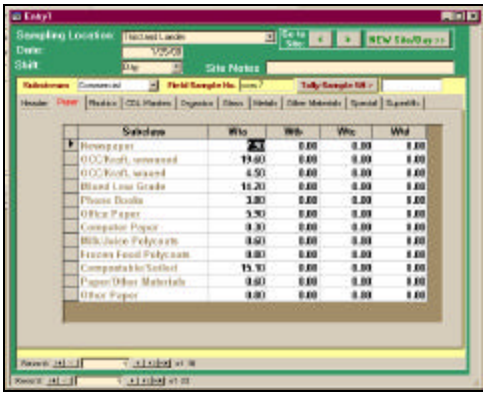
Step 3: Capture and Sort Samples

- 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 356 samples were sorted into 83 distinct component categories, such as office paper or PET plastic bottles. Refer to Appendices A for an in-depth description of the changes made to the component categories from the 2002 study.

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, this report was prepared.



2 Summary of Year 2006 Sampling Results

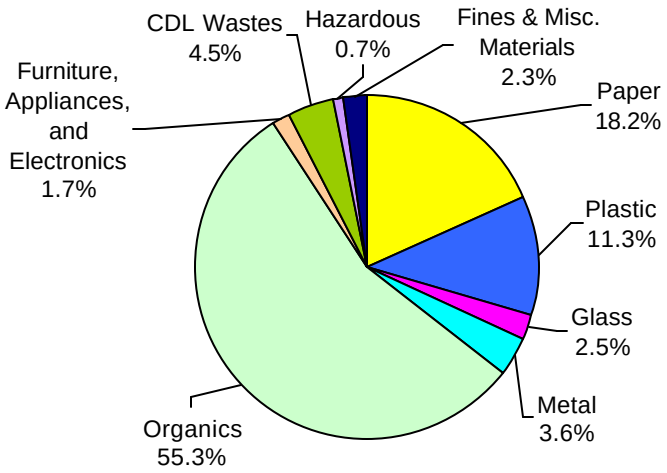
2.1 Overall Residential Composition

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 83 components is presented. Percentages may not add to 100% in tables throughout the report due to rounding.

For this study, 356 residential waste loads were sampled between January and December 2006. Seattle residents disposed a total of 133,774 tons of waste during this time. The composition estimates were applied to these tons to estimate the amount of waste disposed in 2006 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-half of the residential tonnage, while *paper* composed approximately 18% of the residential waste.

Figure 2-1: Composition Summary – Overall Residential
(January – December 2006)



[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 residential waste are listed in Table 2-1. When summed, they account for approximately 75% of the overall residential tonnage. Making up approximately one-third, *food* was the largest single component of this waste. In addition, *Animal by-products, compostable/soiled paper*, and *mixed low grade paper* each account for more than 6% of the overall residential waste stream. 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 2006)

Component	Mean	Cum. %	Tons
Food	33.4%	33.4%	44,735
Animal By-Products	8.7%	42.1%	11,627
Compostable/Soiled Paper	6.7%	48.8%	8,978
Mixed Low Grade Paper	6.2%	55.1%	8,315
Disposable Diapers	5.7%	60.8%	7,624
Other Plastic Film	5.1%	65.9%	6,842
Textiles/Clothing	2.9%	68.7%	3,822
Leaves and Grass	2.0%	70.7%	2,683
Unwaxed OCC/Kraft Paper	1.9%	72.7%	2,603
Newspaper	1.5%	74.2%	2,030
Total	**74.2%**		**99,260**

[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 2006)

Calculated at a 90% confidence level

	Tons	Mean	Low	High		Tons	Mean	Low	High
Paper	**24,382**	**18.2%**			***Furniture/Appliances/Electronics***	**2,258**	**1.7%**		
Newspaper	2,030	1.5%	1.4%	1.7%	Furniture	584	0.4%	0.2%	0.7%
OCC/Kraft, unwaxed	2,603	1.9%	1.8%	2.1%	Mattresses	29	0.0%	0.0%	0.0%
OCC/Kraft, waxed	36	0.0%	0.0%	0.1%	Small Appliances	733	0.5%	0.3%	0.8%
High Grade	1,043	0.8%	0.7%	0.9%	A/V Equipment	419	0.3%	0.2%	0.4%
Mixed Low Grade	8,315	6.2%	5.9%	6.5%	Computer Monitors	31	0.0%	0.0%	0.1%
Compostable/Soiled	8,978	6.7%	6.5%	7.0%	TVs	99	0.1%	0.0%	0.2%
Paper/Other Materials	1,376	1.0%	0.9%	1.1%	Other Computer Components	363	0.3%	0.1%	0.4%
Plastic	**15,053**	**11.3%**			***CDL Wastes***	**5,997**	**4.5%**		
#1 PET Bottles	829	0.6%	0.6%	0.7%	Dimension Lumber	391	0.3%	0.2%	0.4%
#2 HDPE Natural Bottles	314	0.2%	0.2%	0.3%	Pallets	54	0.0%	0.0%	0.1%
#2 HDPE Colored Bottles	459	0.3%	0.3%	0.4%	Crates	59	0.0%	0.0%	0.1%
Other Plastic Bottles	145	0.1%	0.1%	0.1%	Other Untreated Wood	160	0.1%	0.1%	0.2%
Tubs	1,489	1.1%	1.1%	1.2%	Treated Wood	1,548	1.2%	0.9%	1.4%
Expanded Polystyrene	979	0.7%	0.7%	0.8%	Contaminated Wood	515	0.4%	0.3%	0.5%
Other Rigid Packaging	944	0.7%	0.7%	0.8%	New Gypsum Scrap	401	0.3%	0.1%	0.5%
Clean Shopping/Dry Cleaner Bags	403	0.3%	0.3%	0.3%	Demo Gypsum Scrap	315	0.2%	0.1%	0.3%
Other Clean PE Bags	140	0.1%	0.1%	0.1%	Fiberglass Insulation	24	0.0%	0.0%	0.0%
Other Film	6,842	5.1%	5.0%	5.3%	Rock/Concrete/Brick	429	0.3%	0.2%	0.4%
Plastic Products	1,652	1.2%	1.1%	1.4%	Asphaltic Roofing	365	0.3%	0.1%	0.4%
Plastic/Other Materials	857	0.6%	0.6%	0.7%	Ceramics/Porcelain	536	0.4%	0.3%	0.5%
Glass	**3,322**	**2.5%**			Other Construction Debris	1,201	0.9%	0.6%	1.2%
Clear Bottles	724	0.5%	0.5%	0.6%	***Hazardous***	**904**	**0.7%**		
Green Bottles	633	0.5%	0.4%	0.5%	Latex Paints	202	0.2%	0.0%	0.3%
Brown Bottles	698	0.5%	0.4%	0.6%	Solvent-based Adhesives/Glues	1	0.0%	0.0%	0.0%
Container Glass	662	0.5%	0.4%	0.5%	Water-based Adhesives/Glues	7	0.0%	0.0%	0.0%
Fluorescent Tubes	13	0.0%	0.0%	0.0%	Oil-based Paints/Solvents	30	0.0%	0.0%	0.0%
Other Glass	592	0.4%	0.4%	0.5%	Caustic Cleaners	30	0.0%	0.0%	0.1%
Metal	**4,767**	**3.6%**			Pesticides/Herbicides	28	0.0%	0.0%	0.0%
Aluminum Cans	412	0.3%	0.3%	0.3%	Dry-Cell Batteries	132	0.1%	0.1%	0.1%
Alum. Foil/Containers	367	0.3%	0.2%	0.3%	Wet-Cell Batteries	0	0.0%	0.0%	0.0%
Other Aluminum	142	0.1%	0.1%	0.1%	Gasoline/Kerosene	0	0.0%	0.0%	0.0%
Other Nonferrous	46	0.0%	0.0%	0.0%	Motor Oil/Diesel Oil	7	0.0%	0.0%	0.0%
Tin Food Cans	984	0.7%	0.7%	0.8%	Asbestos	0	0.0%	0.0%	0.0%
Empty Aerosol Cans	219	0.2%	0.1%	0.2%	Explosives	1	0.0%	0.0%	0.0%
Other Ferrous	1,547	1.2%	0.9%	1.4%	Medical Wastes	222	0.2%	0.1%	0.2%
Oil Filters	11	0.0%	0.0%	0.0%	Other Cleaners/Chemicals	167	0.1%	0.1%	0.2%
Mixed Metals/Materials	1,040	0.8%	0.7%	0.9%	Other Potentially Harmful Wastes	78	0.1%	0.0%	0.1%
Organics	**74,026**	**55.3%**			***Fines & Misc Materials***	**3,066**	**2.3%**		
Leaves and Grass	2,683	2.0%	1.5%	2.5%	Sand/Soil/Dirt	1,198	0.9%	0.5%	1.3%
Prunings	540	0.4%	0.2%	0.6%	Non-distinct Fines	72	0.1%	0.0%	0.1%
Food	44,735	33.4%	32.4%	34.5%	Misc. Organics	1,343	1.0%	0.9%	1.1%
Textiles/Clothing	3,822	2.9%	2.6%	3.2%	Misc. Inorganics	453	0.3%	0.2%	0.5%
Mixed Textiles	1,091	0.8%	0.7%	0.9%					
Carpet	1,508	1.1%	0.6%	1.6%					
Disposable Diapers	7,624	5.7%	5.4%	6.0%					
Animal By-Products	11,627	8.7%	8.0%	9.4%	**Total Percentage**	**100%**			
Rubber Products	356	0.3%	0.1%	0.4%	**Total Tons**	**133,774**			
Tires	40	0.0%	0.0%	0.1%	**Sample Count**	**356**			

2.2 Residential Waste by Subpopulation

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

- *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, autumn, 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 subpopulation are shown in Table 2-3 (each accounting for more than 5%). *Compostable/soiled* and *mixed low-grade paper,* as well as *food* and *animal-by products* (which includes animal wastes and kitty litter), were large components in all groups. Frequently, *disposable diapers* and *other-film* were large components of each group. The sum of the six largest materials added up to 50% or more of each subpopulation's total waste, by weight.

Table 2-3: Largest Waste Components, by Subpopulation (January – December 2006)

	Paper		Organics			Plastic	Sum of the Largest
Subpopulation	Compostable Paper	Mixed Low-Grade	Food	Animal By-Products	Disposable Diapers	Other Film	
Residence Type							
Single-Family	7.3%	5.5%	35.9%	9.4%	7.2%	5.5%	70.8%
Multi-Family	5.9%	7.2%	30.0%	7.8%			50.9%
Service Area							
North	7.2%	6.2%	32.3%	9.3%	6.5%	5.2%	66.7%
South	6.4%	6.2%	34.1%	8.3%	5.2%	5.0%	65.2%
Service Area and Generator Type							
Single-family North	7.9%	5.5%	34.0%	10.7%	7.8%	5.5%	71.4%
Single-family South	6.9%	5.6%	37.2%	8.4%	6.7%	5.6%	70.4%
Multi-family North	6.0%	7.5%	29.2%	6.9%			49.6%
Multi-family South	5.8%	7.0%	30.4%	8.2%			51.4%
Season							
Spring	6.8%	5.2%	30.2%	9.6%	6.4%	5.7%	63.9%
Summer	6.9%	6.6%	32.1%	9.7%	5.9%	5.0%	66.2%
Autumn	6.9%	6.6%	36.7%	7.9%	6.5%		64.6%
Winter	7.0%	6.2%	36.5%	7.9%	5.4%	5.4%	68.4%
Demographics							
Low Income	6.8%	5.5%	36.7%	10.3%	6.8%	5.2%	71.3%
High Income	8.0%	5.5%	33.2%	9.5%	7.4%	5.9%	69.5%
Small Households	6.8%	5.6%	33.9%	11.3%	7.3%	5.5%	70.4%
Large Households	6.7%	5.2%	40.2%	7.2%	7.0%	5.6%	71.9%
Overall Residential	6.7%	6.2%	33.4%	8.7%	5.7%	5.1%	65.8%

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.
- *Compostable/soiled* and *mixed low-grade paper,* as well as *food* and *animal by-products* were among the largest components for all subpopulations.
- The material components that are present in greatest amounts were similar among subpopulations. However, the main differences appear to include::[5]
    - Single-family residents discarded a greater percentage of *food, compostable/soiled paper, disposable diapers, animal by-products*, and *other film* than did multi-family residents. Conversely, multi-family residents disposed of a greater portion of *mixed low grade paper*.
    - The south service area discarded a slightly higher percentage of *food* than the north service area, while *disposable diapers* represented a larger proportion of the north substream.
    - A higher percentage of *animal by-products* was disposed of in the spring and summer than autumn and winter, while a greater percentage of *food* was thrown away in the autumn and winter.
    - Low-income households discarded relatively more *food*, relative to other materials in this substream, while *compostable/soiled paper* made up a larger percentage of waste from high-income households.
    - Large households disposed of a lower percentage of *animal by-products* and a higher percentage of *food* 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 – 2006

The overall residential results for the 2006 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 and the yard waste program in 1989. The commingled recycling program was initiated in 2000; therefore more recent comparisons show trends since the development of this program.[7] In addition, starting in January 2005, recycling requirements throughout Seattle were initiated; enforcement of those requirements began in January 2006. Also in mid-2006, the yard waste program was expanded to accept vegetative food waste and compostable paper. All four of the previous residential studies followed the same basic methodology as the 2006 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.[9] Statistical t-tests were used to analyze differences in the composition percentages. Section 3.1 provides an overview of the changes in the last 18 years. Section ? 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 18 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. The tonnage increased slightly from 1994/95 to 1998/99 (an increase of about 1,050 tons), but decreased almost 4,000 tons between 1998/99 to 2002. Between 2002 and 2006, the total amount of waste disposed dropped by 6.4% from 142,910 tons to 133,774 tons (a 9,000 ton drop). Overall, the broad waste categories of *paper*, *organics*, and *other materials* (which include animal by-products, disposable diapers, furniture, carpet, etc.) showed the greatest relative changes.

The following describes the changes in tonnage for each commodity over the study years since 1988/89 shown in Figure 3-1 on the following page.

- ***Paper***. The tonnage of *paper* has decreased consistently between study periods since 1988/89. The tonnage has dropped by more than 50% from 56,220 tons in

[6] The composition and tonnage figures presented in this section were calculated using an unweighted analytical process. Thus, they may not be equal to 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.

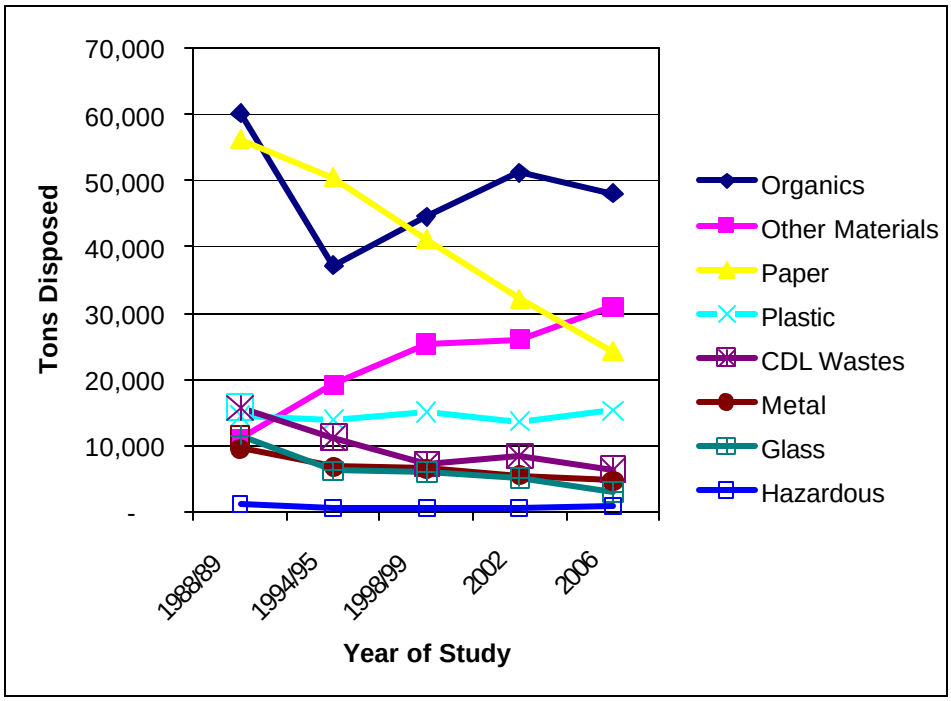
[7] The commingled recycling program started in 2000 allows residents to combine plastic and paper recyclable materials. Glass is still collected in a separate bin. Materials added to the recycling program in 2000 include polycoated paper, aseptic packaging, plastic jars, tubs, and bottles, and clean plastic film bags.

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

[9] The material categories for each season have been calibrated to match 1989/89 material list for two reasons: (1) the materials list has changed from 52 material categories in 1988/89 to 83 materials in 2006 and (2) several materials have been moved to different broad material categories to better reflect new policies in recycling and composting. Therefore, the percentages of broad material categories in Section 3 will not necessarily match the percentages of broad material categories presented in Section 4. This is explained in greater depth in Appendix E.

1988/99 to 24,236 tons in 2006. This decrease has been lead by noticeable decreases in *newspaper, unwaxed OCC/Kraft,* and *mixed low grade* paper between each study period.

Figure 3-1: Changes in Disposed Tons – 1988/89 to 2006



- ***Plastic***. The tonnage of *plastic* increased between 2002 and 2006 by almost 2,000 tons. The material component *other film* was largely responsible for the increase due to a tonnage increase from 3,111 tons to 6,842 tons between 2002 and 2006.
- ***Glass***. Since 1988/89, glass tonnage has decreased by 75% from 11,537 tons in 1988/89 to 3,029 tons in 2006.
- ***Metal***. The tonnage of *metal* in the waste stream has declined steadily since 1988/89.
- ***Organics***. From 1988/89 to 1994/95, the tonnage of *organics* showed a noticeable decrease. However, between 1994/95 and 2002, the tonnage of *organics* increased, particularly due to the amount of *food*. Between 2002 and 2006, *organics* decreased by approximately 3,000 tons with two thirds of the decrease being directly linked to food.
- ***Other Materials***. The tonnage of *other materials* in the waste stream has increased since 1988/89. The increase is difficult to measure because in 1988/89, *animal-by-products*, *furniture*, *mattresses*, *small appliances*, and *A/V equipment* were not sorted individually. Since the 1994/95 study, the waste categories in *other materials* are more comparable. The increase in *other materials* between 1994/95 and 2006 can be largely attributed to the 7,000 ton increase of *animal-by-products* during this time.
- ***CDL Wastes***. The tonnage of *CDL wastes* decreased between 1988/89 (15,830 tons) and 1998/99 (7,280 tons), followed by an increase of *CDL waste* in 2002 to

8,469 tons. Between 2002 and 2006, the amount of *CDL waste* decreased by approximately 2,000 tons.

- ***Hazardous***. The tonnage of *hazardous* materials has remained steady since 1988/89. The amount has changes slightly from 1,192 tons in 1988/89 to 904 tons in 2006.

3.2 Changes in Residential Waste

3.2.1 Changes in Residential Waste: 1988/89 vs. 2006

The bolded broad material categories in Table 3-1 showed statistically significant changes between 1988/89 and 2006. *Paper*, *glass*, *metal*, and *CDL wastes* experienced the largest significant decreases, while *plastic* and *other materials* increased significantly. *Organics* increased slightly during this period and *hazardous* waste has remained consistent at 0.7% of the overall waste stream. The portion of *other materials* disposed in the waste stream increased dramatically from 6.1% (11,046 tons) in 1988/89 to 23.2% (30,991 tons) in 2006. 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.[10]

Table 3-1: Changes in Residential Waste – 1988/99 and 2006 Study Periods

	Percent		Change in Composition %	Disposed Tons	
	1988/89	2006		1988/89	2006
Paper	**31.2%**	**18.1%**	**-13.1%** ↓	**56,220**	**24,236**
Plastic	**8.1%**	**11.5%**	**3.4%** ↑	**14,508**	**15,325**
Glass	**6.4%**	**2.3%**	**-4.1%** ↓	**11,537**	**3,029**
Metal	**5.3%**	**3.5%**	**-1.7%** ↓	**9,491**	**4,745**
Organics	33.4%	36.0%	2.6% ↑	60,145	48,121
Other Materials	**6.1%**	**23.2%**	**17.0%** ↑	**11,046**	**30,991**
CDL Wastes	**8.8%**	**4.8%**	**-4.0%** ↓	**15,830**	**6,452**
Hazardous	0.7%	0.7%	0.0% ↔	1,192	874
Total	**100%**	**100%**		**179,968**	**133,774**

* Bold type indicates statistically significant changes.

[10] 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: 2002 vs. 2006

In Table 3-2, bolded broad material categories experienced significant differences between the 2002 and 2006 study periods. *Paper* has the largest statistically significant decrease from 22.6% (32,248 tons) to 18.1% (24,236 tons). *Other Materials* increased significantly from about 18.2% (26,049 tons) in 2002 to 23.2% (30,991 tons) in 2006.

Table 3-2: Changes in Residential Waste – 2002 and 2006 Study Periods

	Percent		Change in Composition %	Disposed Tons	
	2002	2006		2002	2006
Paper	**22.6%**	**18.1%**	**-4.4%** ⬇	**32,248**	**24,236**
Plastic	**9.6%**	**11.5%**	**1.9%** ⬆	**13,671**	**15,325**
Glass	**3.6%**	**2.3%**	**-1.4%** ⬇	**5,170**	**3,029**
Metal	3.8%	3.5%	-0.2% ⬇	5,406	4,745
Organics	35.9%	36.0%	0.1% ⬆	51,254	48,121
Other Materials	**18.2%**	**23.2%**	**4.9%** ⬆	**26,049**	**30,991**
CDL Wastes	5.9%	4.8%	-1.1% ⬇	8,469	6,452
Hazardous	0.5%	0.7%	0.2% ⬆	644	874
Total	**100%**	**100%**		**142,910**	**133,774**

* Bold type indicates statistically significant changes.

4 Composition Results: By Subpopulation

4.1 Overview

A total of 356 loads from the residential waste stream were sampled from January to December 2006. Table 4-1 summarizes the sample information for each residential subpopulation. The average sample weight for the 356 residential samples was approximately 263 pounds. Seattle Public Utilities and the City's authorized waste haulers provided the total 2006 disposal tonnages presented in this section of the report.

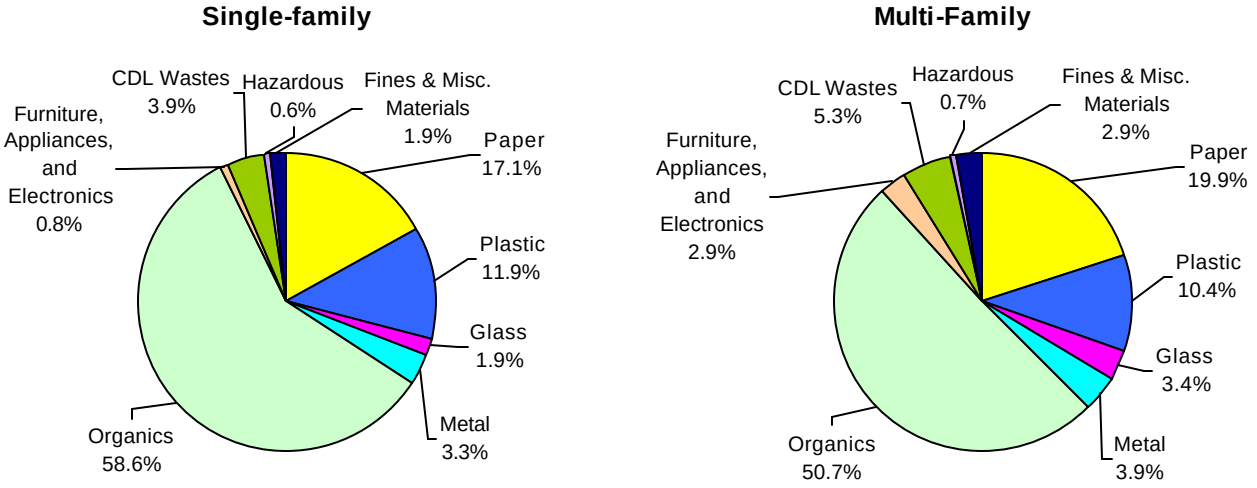
Table 4-1: Sampling Information, by Subpopulation
(January – December 2006)

Subpopulation	Sample Count	*(All Weights in pounds)* Total Sample	Average Sample	Average Net Load Weight
Residence Type				
Single-family	242	62,069.7	256.5	13,408.3
Multi-family	114	31,492.2	276.2	15,654.4
Service Area				
North	178	46,984.1	264.0	12,853.5
South	178	46,577.7	261.7	15,401.7
Service Area and Generator Type				
Single-family North	121	30,725.6	253.9	11,460.0
Single-family South	121	31,344.1	259.0	15,356.7
Multi-family North	57	16,258.5	285.2	15,811.6
Multi-family South	57	15,233.7	267.3	15,497.2
Season				
Spring	92	24,973.2	271.4	13,406.5
Summer	93	25,044.2	269.3	14,035.9
Autumn	93	23,575.0	253.5	14,930.1
Winter	78	19,969.4	256.0	14,130.5
Overall Residential	**356**	**93,561.9**	**262.8**	**14,127.6**

4.2 By Residence Type

As shown in Figure 4-1, *paper* and *organics* comprised the bulk of waste from both single and the multi-family residences (a combined total of 75.7% for single-family and 70.6% for multi-family). *Organics* accounted for 58.6% of the waste from single-family residences, as compared to 50.7% of waste from multi-family residences. *Paper* accounted for 17.1% of single-family waste as compared to 19.9% of multi-family waste. *Plastic* made up over 10% of the waste for both single and multi-family residences. Together these three materials contributed to approximately 85% of the residential waste stream.

Figure 4-1: Composition Summary, by Residence Type
(January – December 2006)



4.2.1 Single-family Residences

A total of 242 samples were sorted from single-family loads during the 2006 study period. Single-family residences disposed of approximately 78,000 tons of waste. 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 2006. When added together, all of the top ten components summed to about 78% 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 2006)

Component	Mean	Cum. %	Tons
Food	35.9%	35.9%	28,026
Animal By-Products	9.4%	45.2%	7,310
Compostable/Soiled Paper	7.3%	52.5%	5,705
Disposable Diapers	7.2%	59.7%	5,611
Mixed Low Grade Paper	5.5%	65.3%	4,329
Other Plastic Film	5.5%	70.8%	4,327
Textiles/Clothing	2.7%	73.5%	2,076
Unwaxed OCC/Kraft Paper	1.5%	75.0%	1,193
Leaves and Grass	1.4%	76.4%	1,107
Plastic Products	1.3%	77.7%	1,003
Total	**77.7%**		**60,689**

4.2.2 Multi-family Residences

From loads of multi-family waste, 114 samples were captured and sorted between January and December, 2006. In 2006, Seattle's multi-family residents disposed of more than 55,000 tons of waste. 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 30%, by weight. *Animal by-products* and *mixed low grade paper* were also large components. The top ten components, listed in Table 4-3, summed to approximately 70% 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 2006)

Component	Mean	Cum. %	Tons
Food	30.0%	30.0%	16,708
Animal By-Products	7.8%	37.8%	4,317
Mixed Low Grade Paper	7.2%	44.9%	3,986
Compostable/Soiled Paper	5.9%	50.8%	3,272
Other Plastic Film	4.5%	55.3%	2,516
Disposable Diapers	3.6%	58.9%	2,013
Textiles/Clothing	3.1%	62.1%	1,745
Leaves and Grass	2.8%	64.9%	1,576
Unwaxed OCC/Kraft Paper	2.5%	67.4%	1,411
Newspaper	2.3%	69.7%	1,260
Total	**69.7%**		**38,804**

4.2.3 Comparisons between Single and Multi-family Residences

While *food* was the largest component of both single and multi-family waste, it made up almost 36% of single-family waste, as compared to 30% of multi-family waste. *Compostable/soiled paper*, *animal by-products*, *disposable diapers*, *mixed low grade paper*, *unwaxed OCC/Kraft paper*, *other film*, *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 waste. *Disposable diapers* accounted for twice as much of waste from single-family residences (7.2%) as that from multi-family residences (3.6%). In addition, *plastic products* were a top ten component only for single-family waste while *newspaper* was a top ten component for multi-family waste only.

Table 4-4: Composition by Weight – Single-family
(January – December 2006)

Calculated at a 90% confidence level

	Tons	Mean	Low	High		Tons	Mean	Low	High
Paper	**13,323**	**17.1%**			***Furniture/Appliances/Electronics***	**655**	**0.8%**		
Newspaper	771	1.0%	0.9%	1.1%	Furniture	28	0.0%	0.0%	0.1%
OCC/Kraft, unwaxed	1,193	1.5%	1.4%	1.7%	Mattresses	0	0.0%	0.0%	0.0%
OCC/Kraft, waxed	0	0.0%	0.0%	0.0%	Small Appliances	307	0.4%	0.2%	0.6%
High Grade	500	0.6%	0.5%	0.7%	A/V Equipment	191	0.2%	0.2%	0.3%
Mixed Low Grade	4,329	5.5%	5.2%	5.8%	Computer Monitors	0	0.0%	0.0%	0.0%
Compostable/Soiled	5,705	7.3%	7.0%	7.6%	TVs	39	0.1%	0.0%	0.1%
Paper/Other Materials	825	1.1%	0.9%	1.2%	Other Computer Components	89	0.1%	0.0%	0.2%
Plastic	**9,273**	**11.9%**			***CDL Wastes***	**3,068**	**3.9%**		
#1 PET Bottles	422	0.5%	0.5%	0.6%	Dimension Lumber	197	0.3%	0.2%	0.3%
#2 HDPE Natural Bottles	161	0.2%	0.2%	0.2%	Pallets	6	0.0%	0.0%	0.0%
#2 HDPE Colored Bottles	258	0.3%	0.3%	0.4%	Crates	3	0.0%	0.0%	0.0%
Other Plastic Bottles	94	0.1%	0.1%	0.1%	Other Untreated Wood	93	0.1%	0.1%	0.2%
Tubs	960	1.2%	1.2%	1.3%	Treated Wood	688	0.9%	0.7%	1.0%
Expanded Polystyrene	631	0.8%	0.8%	0.9%	Contaminated Wood	170	0.2%	0.1%	0.3%
Other Rigid Packaging	582	0.7%	0.7%	0.8%	New Gypsum Scrap	184	0.2%	0.1%	0.4%
Clean Shopping/Dry Cleaner Bags	218	0.3%	0.3%	0.3%	Demo Gypsum Scrap	193	0.2%	0.1%	0.4%
Other Clean PE Bags	92	0.1%	0.1%	0.2%	Fiberglass Insulation	14	0.0%	0.0%	0.0%
Other Film	4,327	5.5%	5.4%	5.7%	Rock/Concrete/Brick	212	0.3%	0.1%	0.4%
Plastic Products	1,003	1.3%	1.1%	1.4%	Asphaltic Roofing	114	0.1%	0.1%	0.2%
Plastic/Other Materials	525	0.7%	0.6%	0.7%	Ceramics/Porcelain	313	0.4%	0.3%	0.5%
Glass	**1,456**	**1.9%**			Other Construction Debris	879	1.1%	0.7%	1.5%
Clear Bottles	297	0.4%	0.3%	0.4%	***Hazardous***	**493**	**0.6%**		
Green Bottles	223	0.3%	0.2%	0.3%	Latex Paints	85	0.1%	0.0%	0.2%
Brown Bottles	236	0.3%	0.2%	0.4%	Solvent-based Adhesives/Glues	1	0.0%	0.0%	0.0%
Container Glass	380	0.5%	0.4%	0.5%	Water-based Adhesives/Glues	1	0.0%	0.0%	0.0%
Fluorescent Tubes	8	0.0%	0.0%	0.0%	Oil-based Paints/Solvents	29	0.0%	0.0%	0.1%
Other Glass	311	0.4%	0.3%	0.5%	Caustic Cleaners	2	0.0%	0.0%	0.0%
Metal	**2,581**	**3.3%**			Pesticides/Herbicides	7	0.0%	0.0%	0.0%
Aluminum Cans	174	0.2%	0.2%	0.2%	Dry-Cell Batteries	75	0.1%	0.1%	0.1%
Alum. Foil/Containers	246	0.3%	0.3%	0.3%	Wet-Cell Batteries	0	0.0%	0.0%	0.0%
Other Aluminum	81	0.1%	0.1%	0.1%	Gasoline/Kerosene	0	0.0%	0.0%	0.0%
Other Nonferrous	33	0.0%	0.0%	0.1%	Motor Oil/Diesel Oil	5	0.0%	0.0%	0.0%
Tin Food Cans	567	0.7%	0.7%	0.8%	Asbestos	0	0.0%	0.0%	0.0%
Empty Aerosol Cans	146	0.2%	0.2%	0.2%	Explosives	1	0.0%	0.0%	0.0%
Other Ferrous	780	1.0%	0.7%	1.3%	Medical Wastes	143	0.2%	0.1%	0.3%
Oil Filters	3	0.0%	0.0%	0.0%	Other Cleaners/Chemicals	89	0.1%	0.1%	0.1%
Mixed Metals/Materials	553	0.7%	0.6%	0.8%	Other Potentially Harmful Wastes	53	0.1%	0.0%	0.1%
Organics	**45,809**	**58.6%**			***Fines & Misc Materials***	**1,452**	**1.9%**		
Leaves and Grass	1,107	1.4%	1.0%	1.9%	Sand/Soil/Dirt	410	0.5%	0.3%	0.7%
Prunings	253	0.3%	0.2%	0.5%	Non-distinct Fines	13	0.0%	0.0%	0.0%
Food	28,026	35.9%	34.8%	36.9%	Misc. Organics	842	1.1%	0.9%	1.2%
Textiles/Clothing	2,076	2.7%	2.3%	3.0%	Misc. Inorganics	187	0.2%	0.2%	0.3%
Mixed Textiles	703	0.9%	0.8%	1.0%					
Carpet	401	0.5%	0.4%	0.7%					
Disposable Diapers	5,611	7.2%	6.8%	7.6%					
Animal By-Products	7,310	9.4%	8.6%	10.1%	**Total Percentage**	**100%**			
Rubber Products	281	0.4%	0.1%	0.6%	**Total Tons**	**78,110**			
Tires	40	0.1%	0.0%	0.1%	**Sample Count**	**242**			

Table 4-5: Composition by Weight – Multi-family
(January – December 2006)

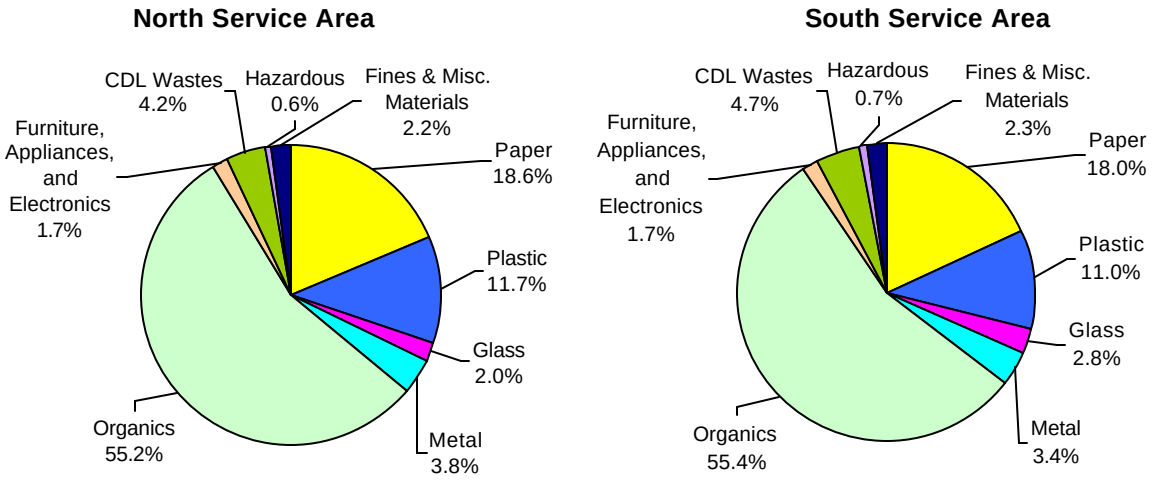
Calculated at a 90% confidence level

	Tons	Mean	Low	High		Tons	Mean	Low	High
Paper	**11,059**	**19.9%**			***Furniture/Appliances/Electronics***	**1,602**	**2.9%**		
Newspaper	1,260	2.3%	1.9%	2.6%	Furniture	555	1.0%	0.4%	1.6%
OCC/Kraft, unwaxed	1,411	2.5%	2.2%	2.8%	Mattresses	29	0.1%	0.0%	0.1%
OCC/Kraft, waxed	36	0.1%	0.0%	0.1%	Small Appliances	426	0.8%	0.3%	1.2%
High Grade	543	1.0%	0.7%	1.2%	A/V Equipment	227	0.4%	0.2%	0.7%
Mixed Low Grade	3,986	7.2%	6.6%	7.7%	Computer Monitors	31	0.1%	0.0%	0.1%
Compostable/Soiled	3,272	5.9%	5.4%	6.4%	TVs	60	0.1%	0.0%	0.3%
Paper/Other Materials	551	1.0%	0.9%	1.1%	Other Computer Components	274	0.5%	0.2%	0.8%
Plastic	**5,780**	**10.4%**			***CDL Wastes***	**2,928**	**5.3%**		
#1 PET Bottles	406	0.7%	0.7%	0.8%	Dimension Lumber	193	0.3%	0.1%	0.6%
#2 HDPE Natural Bottles	154	0.3%	0.2%	0.3%	Pallets	48	0.1%	0.0%	0.2%
#2 HDPE Colored Bottles	201	0.4%	0.3%	0.4%	Crates	55	0.1%	0.0%	0.2%
Other Plastic Bottles	51	0.1%	0.1%	0.1%	Other Untreated Wood	68	0.1%	0.1%	0.2%
Tubs	529	0.9%	0.9%	1.0%	Treated Wood	860	1.5%	0.9%	2.2%
Expanded Polystyrene	348	0.6%	0.6%	0.7%	Contaminated Wood	345	0.6%	0.4%	0.8%
Other Rigid Packaging	362	0.7%	0.6%	0.7%	New Gypsum Scrap	217	0.4%	0.0%	0.9%
Clean Shopping/Dry Cleaner Bags	184	0.3%	0.3%	0.4%	Demo Gypsum Scrap	122	0.2%	0.1%	0.4%
Other Clean PE Bags	48	0.1%	0.1%	0.1%	Fiberglass Insulation	10	0.0%	0.0%	0.0%
Other Film	2,516	4.5%	4.2%	4.8%	Rock/Concrete/Brick	217	0.4%	0.2%	0.6%
Plastic Products	649	1.2%	0.9%	1.4%	Asphaltic Roofing	251	0.5%	0.1%	0.8%
Plastic/Other Materials	332	0.6%	0.5%	0.7%	Ceramics/Porcelain	222	0.4%	0.3%	0.5%
Glass	**1,866**	**3.4%**			Other Construction Debris	322	0.6%	0.2%	0.9%
Clear Bottles	427	0.8%	0.6%	0.9%	***Hazardous***	**411**	**0.7%**		
Green Bottles	410	0.7%	0.6%	0.9%	Latex Paints	116	0.2%	0.0%	0.5%
Brown Bottles	462	0.8%	0.6%	1.0%	Solvent-based Adhesives/Glues	0	0.0%	0.0%	0.0%
Container Glass	282	0.5%	0.4%	0.6%	Water-based Adhesives/Glues	5	0.0%	0.0%	0.0%
Fluorescent Tubes	5	0.0%	0.0%	0.0%	Oil-based Paints/Solvents	0	0.0%	0.0%	0.0%
Other Glass	281	0.5%	0.3%	0.7%	Caustic Cleaners	27	0.0%	0.0%	0.1%
Metal	**2,186**	**3.9%**			Pesticides/Herbicides	22	0.0%	0.0%	0.1%
Aluminum Cans	238	0.4%	0.4%	0.5%	Dry-Cell Batteries	57	0.1%	0.1%	0.2%
Alum. Foil/Containers	121	0.2%	0.2%	0.3%	Wet-Cell Batteries	0	0.0%	0.0%	0.0%
Other Aluminum	60	0.1%	0.1%	0.2%	Gasoline/Kerosene	0	0.0%	0.0%	0.0%
Other Nonferrous	13	0.0%	0.0%	0.0%	Motor Oil/Diesel Oil	1	0.0%	0.0%	0.0%
Tin Food Cans	418	0.8%	0.7%	0.8%	Asbestos	0	0.0%	0.0%	0.0%
Empty Aerosol Cans	72	0.1%	0.1%	0.2%	Explosives	0	0.0%	0.0%	0.0%
Other Ferrous	767	1.4%	1.0%	1.7%	Medical Wastes	80	0.1%	0.1%	0.2%
Oil Filters	8	0.0%	0.0%	0.0%	Other Cleaners/Chemicals	77	0.1%	0.1%	0.2%
Mixed Metals/Materials	487	0.9%	0.6%	1.1%	Other Potentially Harmful Wastes	25	0.0%	0.0%	0.1%
Organics	**28,217**	**50.7%**			***Fines & Misc Materials***	**1,614**	**2.9%**		
Leaves and Grass	1,576	2.8%	1.8%	3.9%	Sand/Soil/Dirt	789	1.4%	0.5%	2.3%
Prunings	287	0.5%	0.2%	0.8%	Non-distinct Fines	58	0.1%	0.0%	0.2%
Food	16,708	30.0%	28.1%	32.0%	Misc. Organics	501	0.9%	0.7%	1.1%
Textiles/Clothing	1,745	3.1%	2.6%	3.6%	Misc. Inorganics	266	0.5%	0.1%	0.8%
Mixed Textiles	389	0.7%	0.5%	0.9%					
Carpet	1,107	2.0%	0.8%	3.2%					
Disposable Diapers	2,013	3.6%	3.1%	4.2%					
Animal By-Products	4,317	7.8%	6.5%	9.0%	**Total Percentage**	**100%**			
Rubber Products	76	0.1%	0.1%	0.2%	**Total Tons**	**55,664**			
Tires	0	0.0%	0.0%	0.0%	**Sample Count**	**114**			

4.3 By Service Area[11]

On a broad waste category level, *paper* and *organics* accounted for the highest percentage of waste from both the north and south service areas.[12] Combined, these two categories accounted for nearly three-quarters of the waste from both service areas. *Plastic* made up almost 11% 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 2006)



[11] Comparison of composition between north and south service areas was more important prior to 2000 because previous programs 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. In April 2000, the new commingled recycling program was implemented city-wide.

[12] 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, 178 samples were sorted between January and December 2006. North service area residents disposed an estimated 50,687 tons of waste in 2006. Table 4-6 lists the top ten components from the north. *Food* accounted for nearly a third of this waste. *Animal by-products*, *compostable/soiled paper, disposable diapers,* and *mixed low grade paper* were also large components, each greater than 6% of the total, by weight. The top ten components listed in Table 4-6 summed to approximately 75% 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 2006)

Component	Mean	Cum. %	Tons
Food	32.3%	32.3%	16,369
Animal By-Products	9.3%	41.6%	4,724
Compostable/Soiled Paper	7.2%	48.8%	3,665
Disposable Diapers	6.5%	55.3%	3,272
Mixed Low Grade Paper	6.2%	61.5%	3,164
Other Plastic Film	5.2%	66.8%	2,647
Textiles/Clothing	2.9%	69.7%	1,484
Unwaxed OCC/Kraft Paper	2.2%	71.8%	1,092
Leaves and Grass	1.9%	73.8%	975
Other Ferrous Metal	1.4%	75.2%	723
Total	**75.2%**		**38,115**

4.3.2 South Service Area

During the calendar year 2006, 178 loads were sampled in the south service area. Seattle's south end residents disposed of approximately 83,087 tons in 2006. 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 34% of this waste, by weight. *Animal by-products*, *compostable/soiled paper*, and *mixed low grade paper* each accounted for more than 6% of the total disposed waste for the south service area. The top ten components summed to over 73% and represented over 60,000 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 2006)

Component	Mean	Cum. %	Tons
Food	34.1%	34.1%	28,366
Animal By-Products	8.3%	42.4%	6,903
Compostable/Soiled Paper	6.4%	48.8%	5,313
Mixed Low Grade Paper	6.2%	55.0%	5,151
Disposable Diapers	5.2%	60.3%	4,352
Other Plastic Film	5.0%	65.3%	4,196
Textiles/Clothing	2.8%	68.1%	2,338
Leaves and Grass	2.1%	70.2%	1,708
Unwaxed OCC/Kraft Paper	1.8%	72.0%	1,511
Newspaper	1.7%	73.7%	1,406
Total	**73.7%**		**61,243**

4.3.3 Comparisons between North and South Service Areas

Consisting of approximately 32.3% for the north service area and 34.1% for the south service area, *food* was the largest component of waste from both service areas. *Animal by-products* and *compostable/soiled paper* were the next two largest components for both groups. Nine of the top ten components were common to waste from both the north and south areas. *Other ferrous metal* was present as a top ten component in waste only from the north service area, while *plastic products* was a top ten component only in waste from the south service area.

Table 4-8: Composition by Weight – North Service Area
(January – December 2006)

Calculated at a 90% confidence level

	Tons	Mean	Low	High		Tons	Mean	Low	High
Paper	**9,428**	**18.6%**			***Furniture/Appliances/Electronics***	**862**	**1.7%**		
Newspaper	624	1.2%	1.0%	1.4%	Furniture	233	0.5%	0.1%	0.8%
OCC/Kraft, unwaxed	1,092	2.2%	2.0%	2.3%	Mattresses	10	0.0%	0.0%	0.1%
OCC/Kraft, waxed	15	0.0%	0.0%	0.1%	Small Appliances	201	0.4%	0.2%	0.6%
High Grade	292	0.6%	0.5%	0.7%	A/V Equipment	221	0.4%	0.2%	0.6%
Mixed Low Grade	3,164	6.2%	5.9%	6.6%	Computer Monitors	31	0.1%	0.0%	0.2%
Compostable/Soiled	3,665	7.2%	6.9%	7.5%	TVs	33	0.1%	0.0%	0.2%
Paper/Other Materials	575	1.1%	1.0%	1.2%	Other Computer Components	132	0.3%	0.1%	0.5%
Plastic	**5,943**	**11.7%**			***CDL Wastes***	**2,116**	**4.2%**		
#1 PET Bottles	295	0.6%	0.5%	0.6%	Dimension Lumber	122	0.2%	0.2%	0.3%
#2 HDPE Natural Bottles	121	0.2%	0.2%	0.3%	Pallets	8	0.0%	0.0%	0.0%
#2 HDPE Colored Bottles	185	0.4%	0.3%	0.4%	Crates	5	0.0%	0.0%	0.0%
Other Plastic Bottles	48	0.1%	0.1%	0.1%	Other Untreated Wood	85	0.2%	0.1%	0.2%
Tubs	638	1.3%	1.2%	1.3%	Treated Wood	580	1.1%	0.9%	1.4%
Expanded Polystyrene	389	0.8%	0.7%	0.8%	Contaminated Wood	183	0.4%	0.3%	0.5%
Other Rigid Packaging	368	0.7%	0.7%	0.8%	New Gypsum Scrap	63	0.1%	0.0%	0.2%
Clean Shopping/Dry Cleaner Bags	143	0.3%	0.3%	0.3%	Demo Gypsum Scrap	160	0.3%	0.1%	0.5%
Other Clean PE Bags	62	0.1%	0.1%	0.2%	Fiberglass Insulation	18	0.0%	0.0%	0.1%
Other Film	2,647	5.2%	5.0%	5.4%	Rock/Concrete/Brick	221	0.4%	0.2%	0.7%
Plastic Products	700	1.4%	1.2%	1.5%	Asphaltic Roofing	102	0.2%	0.0%	0.4%
Plastic/Other Materials	347	0.7%	0.6%	0.8%	Ceramics/Porcelain	187	0.4%	0.3%	0.5%
Glass	**999**	**2.0%**			Other Construction Debris	382	0.8%	0.5%	1.0%
Clear Bottles	204	0.4%	0.3%	0.5%	***Hazardous***	**300**	**0.6%**		
Green Bottles	169	0.3%	0.3%	0.4%	Latex Paints	48	0.1%	0.0%	0.2%
Brown Bottles	174	0.3%	0.3%	0.4%	Solvent-based Adhesives/Glues	0	0.0%	0.0%	0.0%
Container Glass	228	0.5%	0.4%	0.5%	Water-based Adhesives/Glues	0	0.0%	0.0%	0.0%
Fluorescent Tubes	5	0.0%	0.0%	0.0%	Oil-based Paints/Solvents	24	0.0%	0.0%	0.1%
Other Glass	219	0.4%	0.4%	0.5%	Caustic Cleaners	1	0.0%	0.0%	0.0%
Metal	**1,906**	**3.8%**			Pesticides/Herbicides	6	0.0%	0.0%	0.0%
Aluminum Cans	143	0.3%	0.3%	0.3%	Dry-Cell Batteries	43	0.1%	0.1%	0.1%
Alum. Foil/Containers	137	0.3%	0.2%	0.3%	Wet-Cell Batteries	0	0.0%	0.0%	0.0%
Other Aluminum	67	0.1%	0.1%	0.2%	Gasoline/Kerosene	0	0.0%	0.0%	0.0%
Other Nonferrous	17	0.0%	0.0%	0.1%	Motor Oil/Diesel Oil	3	0.0%	0.0%	0.0%
Tin Food Cans	334	0.7%	0.6%	0.7%	Asbestos	0	0.0%	0.0%	0.0%
Empty Aerosol Cans	72	0.1%	0.1%	0.2%	Explosives	1	0.0%	0.0%	0.0%
Other Ferrous	723	1.4%	1.0%	1.9%	Medical Wastes	93	0.2%	0.1%	0.3%
Oil Filters	3	0.0%	0.0%	0.0%	Other Cleaners/Chemicals	59	0.1%	0.1%	0.2%
Mixed Metals/Materials	411	0.8%	0.7%	0.9%	Other Potentially Harmful Wastes	22	0.0%	0.0%	0.1%
Organics	**27,998**	**55.2%**			***Fines & Misc Materials***	**1,136**	**2.2%**		
Leaves and Grass	975	1.9%	1.2%	2.7%	Sand/Soil/Dirt	339	0.7%	0.4%	0.9%
Prunings	202	0.4%	0.2%	0.6%	Non-distinct Fines	68	0.1%	0.0%	0.3%
Food	16,369	32.3%	31.1%	33.5%	Misc. Organics	576	1.1%	0.9%	1.3%
Textiles/Clothing	1,484	2.9%	2.5%	3.4%	Misc. Inorganics	153	0.3%	0.2%	0.4%
Mixed Textiles	520	1.0%	0.9%	1.2%					
Carpet	354	0.7%	0.3%	1.1%					
Disposable Diapers	3,272	6.5%	6.0%	7.0%					
Animal By-Products	4,724	9.3%	8.4%	10.2%	**Total Percentage**	**100%**			
Rubber Products	96	0.2%	0.1%	0.2%	**Total Tons**	**50,687**			
Tires	2	0.0%	0.0%	0.0%	**Sample Count**	**178**			

Table 4-9: Composition by Weight – South Service Area
(January – December 2006)

Calculated at a 90% confidence level

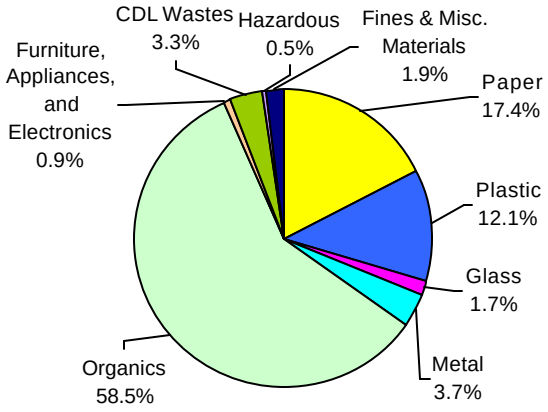
	Tons	Mean	Low	High		Tons	Mean	Low	High
Paper	**14,954**	**18.0%**			***Furniture/Appliances/Electronics***	**1,396**	**1.7%**		
Newspaper	1,406	1.7%	1.5%	1.9%	Furniture	350	0.4%	0.1%	0.8%
OCC/Kraft, unwaxed	1,511	1.8%	1.6%	2.0%	Mattresses	19	0.0%	0.0%	0.1%
OCC/Kraft, waxed	21	0.0%	0.0%	0.1%	Small Appliances	532	0.6%	0.3%	1.0%
High Grade	751	0.9%	0.7%	1.1%	A/V Equipment	198	0.2%	0.1%	0.4%
Mixed Low Grade	5,151	6.2%	5.8%	6.6%	Computer Monitors	0	0.0%	0.0%	0.0%
Compostable/Soiled	5,313	6.4%	6.0%	6.8%	TVs	66	0.1%	0.0%	0.2%
Paper/Other Materials	801	1.0%	0.8%	1.1%	Other Computer Components	231	0.3%	0.1%	0.4%
Plastic	**9,110**	**11.0%**			***CDL Wastes***	**3,881**	**4.7%**		
#1 PET Bottles	534	0.6%	0.6%	0.7%	Dimension Lumber	269	0.3%	0.2%	0.5%
#2 HDPE Natural Bottles	193	0.2%	0.2%	0.3%	Pallets	46	0.1%	0.0%	0.1%
#2 HDPE Colored Bottles	274	0.3%	0.3%	0.4%	Crates	53	0.1%	0.0%	0.1%
Other Plastic Bottles	97	0.1%	0.1%	0.1%	Other Untreated Wood	76	0.1%	0.1%	0.1%
Tubs	850	1.0%	1.0%	1.1%	Treated Wood	969	1.2%	0.7%	1.6%
Expanded Polystyrene	590	0.7%	0.7%	0.8%	Contaminated Wood	332	0.4%	0.3%	0.5%
Other Rigid Packaging	577	0.7%	0.6%	0.8%	New Gypsum Scrap	338	0.4%	0.0%	0.8%
Clean Shopping/Dry Cleaner Bags	260	0.3%	0.3%	0.4%	Demo Gypsum Scrap	156	0.2%	0.1%	0.3%
Other Clean PE Bags	78	0.1%	0.1%	0.1%	Fiberglass Insulation	5	0.0%	0.0%	0.0%
Other Film	4,196	5.0%	4.8%	5.3%	Rock/Concrete/Brick	208	0.3%	0.1%	0.4%
Plastic Products	952	1.1%	1.0%	1.3%	Asphaltic Roofing	263	0.3%	0.1%	0.5%
Plastic/Other Materials	510	0.6%	0.5%	0.7%	Ceramics/Porcelain	349	0.4%	0.3%	0.5%
Glass	**2,322**	**2.8%**			Other Construction Debris	819	1.0%	0.6%	1.4%
Clear Bottles	520	0.6%	0.5%	0.7%	***Hazardous***	**604**	**0.7%**		
Green Bottles	464	0.6%	0.4%	0.7%	Latex Paints	154	0.2%	0.0%	0.4%
Brown Bottles	524	0.6%	0.5%	0.8%	Solvent-based Adhesives/Glues	1	0.0%	0.0%	0.0%
Container Glass	434	0.5%	0.5%	0.6%	Water-based Adhesives/Glues	6	0.0%	0.0%	0.0%
Fluorescent Tubes	7	0.0%	0.0%	0.0%	Oil-based Paints/Solvents	6	0.0%	0.0%	0.0%
Other Glass	373	0.4%	0.3%	0.6%	Caustic Cleaners	29	0.0%	0.0%	0.1%
Metal	**2,861**	**3.4%**			Pesticides/Herbicides	23	0.0%	0.0%	0.1%
Aluminum Cans	269	0.3%	0.3%	0.4%	Dry-Cell Batteries	88	0.1%	0.1%	0.1%
Alum. Foil/Containers	230	0.3%	0.2%	0.3%	Wet-Cell Batteries	0	0.0%	0.0%	0.0%
Other Aluminum	75	0.1%	0.1%	0.1%	Gasoline/Kerosene	0	0.0%	0.0%	0.0%
Other Nonferrous	29	0.0%	0.0%	0.1%	Motor Oil/Diesel Oil	4	0.0%	0.0%	0.0%
Tin Food Cans	651	0.8%	0.7%	0.9%	Asbestos	0	0.0%	0.0%	0.0%
Empty Aerosol Cans	146	0.2%	0.1%	0.2%	Explosives	0	0.0%	0.0%	0.0%
Other Ferrous	824	1.0%	0.8%	1.2%	Medical Wastes	129	0.2%	0.1%	0.2%
Oil Filters	8	0.0%	0.0%	0.0%	Other Cleaners/Chemicals	108	0.1%	0.1%	0.2%
Mixed Metals/Materials	629	0.8%	0.6%	0.9%	Other Potentially Harmful Wastes	56	0.1%	0.0%	0.1%
Organics	**46,028**	**55.4%**			***Fines & Misc Materials***	**1,930**	**2.3%**		
Leaves and Grass	1,708	2.1%	1.4%	2.7%	Sand/Soil/Dirt	860	1.0%	0.4%	1.7%
Prunings	339	0.4%	0.2%	0.6%	Non-distinct Fines	4	0.0%	0.0%	0.0%
Food	28,366	34.1%	32.7%	35.6%	Misc. Organics	767	0.9%	0.8%	1.0%
Textiles/Clothing	2,338	2.8%	2.4%	3.2%	Misc. Inorganics	300	0.4%	0.1%	0.6%
Mixed Textiles	571	0.7%	0.6%	0.8%					
Carpet	1,154	1.4%	0.6%	2.2%					
Disposable Diapers	4,352	5.2%	4.8%	5.7%					
Animal By-Products	6,903	8.3%	7.3%	9.3%	**Total Percentage**	**100%**			
Rubber Products	260	0.3%	0.1%	0.5%	**Total Tons**	**83,087**			
Tires	38	0.0%	0.0%	0.1%	**Sample Count**	**178**			

4.4 By Service Area and Residence Type: Single-family

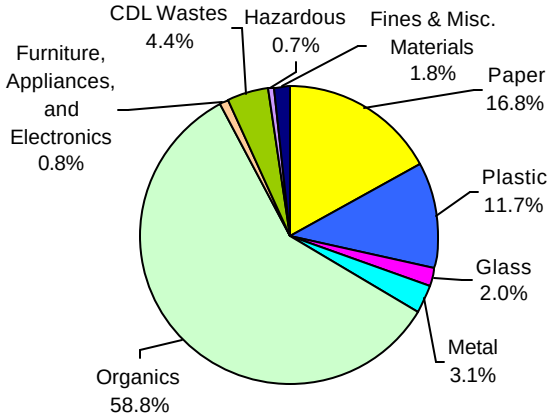
Broad material categories (as shown in Figure 4-3) were compared between single-family north and single-family south subpopulations. In both subpopulations, *organics* made up almost 60% of the total. Other predominant categories included *paper*, at about 17% in each subpopulation, and *plastic*, at close to 12% 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 2006)

Single-family North



Single-family South



4.4.1 Single-family North

A total of 121 samples were sorted from single-family north waste loads. This subpopulation disposed of approximately 32,559 tons during the calendar year 2006. 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 79%, or 25,657 tons, of the annual waste disposed. *Food* was, by far, the largest component, at nearly 34% of the waste stream. *Animal by-products* (10.7%), *compostable/soiled paper* (7.9%), and *disposable diapers* (7.8%) 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 2006)

Component	Mean	Cum. %	Tons
Food	34.0%	34.0%	11,068
Animal By-Products	10.7%	44.7%	3,474
Compostable/Soiled Paper	7.9%	52.6%	2,584
Disposable Diapers	7.8%	60.4%	2,546
Mixed Low Grade Paper	5.5%	65.9%	1,797
Other Plastic Film	5.5%	71.4%	1,791
Textiles/Clothing	2.9%	74.3%	944
Unwaxed OCC/Kraft Paper	1.7%	76.0%	542
Other Ferrous Metal	1.4%	77.4%	462
Plastic Products	1.4%	78.8%	448
Total	**78.8%**		**25,657**

4.4.2 Single-family South

There were a total of 121 samples taken from single-family south loads. It is estimated that this subpopulation disposed of 45,551 tons of waste between January and December 2006. *Food* accounted for slightly more than in the single-family north subpopulation, at 37.2%, by weight. *Animal by-products* (8.4%), *compostable/soiled paper* (6.9%), and *disposable diapers* (6.7%) were also large components. 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 2006)

Component	Mean	Cum. %	Tons
Food	37.2%	37.2%	16,958
Animal By-Products	8.4%	45.7%	3,836
Compostable/Soiled Paper	6.9%	52.5%	3,122
Disposable Diapers	6.7%	59.2%	3,065
Mixed Low Grade Paper	5.6%	64.8%	2,532
Other Plastic Film	5.6%	70.4%	2,536
Textiles/Clothing	2.5%	72.8%	1,132
Unwaxed OCC/Kraft Paper	1.4%	74.3%	650
Leaves and Grass	1.6%	75.9%	736
Other Ferrous Metal	0.7%	76.6%	317
Total	**76.6%**		**34,885**

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

At over one-third, *food was* the largest component of waste from both the single-family north and south subpopulations. *Animal by-products, compostable/soiled paper*, and *disposable diapers* were the next largest components for both subpopulations. Nine of the top ten components are the same in both top ten lists. *Leaves and grass* was a top ten component in the single-family south, but not in the single-family north subpopulation. Alternately, *plastic products* was a top ten component for single-family north.

Table 4-12: Composition by Weight – Single-family North
(January – December 2006)

Calculated at a 90% confidence level

	Tons	Mean	Low	High		Tons	Mean	Low	High
Paper	**5,666**	**17.4%**			***Furniture/Appliances/Electronics***	**288**	**0.9%**		
Newspaper	218	0.7%	0.6%	0.8%	Furniture	23	0.1%	0.0%	0.2%
OCC/Kraft, unwaxed	542	1.7%	1.5%	1.8%	Mattresses	0	0.0%	0.0%	0.0%
OCC/Kraft, waxed	0	0.0%	0.0%	0.0%	Small Appliances	90	0.3%	0.2%	0.4%
High Grade	148	0.5%	0.4%	0.5%	A/V Equipment	126	0.4%	0.2%	0.6%
Mixed Low Grade	1,797	5.5%	5.1%	5.9%	Computer Monitors	0	0.0%	0.0%	0.0%
Compostable/Soiled	2,584	7.9%	7.5%	8.3%	TVs	33	0.1%	0.0%	0.3%
Paper/Other Materials	377	1.2%	1.0%	1.3%	Other Computer Components	15	0.0%	0.0%	0.1%
Plastic	**3,933**	**12.1%**			***CDL Wastes***	**1,073**	**3.3%**		
#1 PET Bottles	156	0.5%	0.4%	0.5%	Dimension Lumber	68	0.2%	0.1%	0.3%
#2 HDPE Natural Bottles	64	0.2%	0.2%	0.2%	Pallets	5	0.0%	0.0%	0.0%
#2 HDPE Colored Bottles	106	0.3%	0.3%	0.4%	Crates	3	0.0%	0.0%	0.0%
Other Plastic Bottles	37	0.1%	0.1%	0.1%	Other Untreated Wood	44	0.1%	0.1%	0.2%
Tubs	441	1.4%	1.3%	1.5%	Treated Wood	296	0.9%	0.7%	1.1%
Expanded Polystyrene	267	0.8%	0.7%	0.9%	Contaminated Wood	67	0.2%	0.1%	0.3%
Other Rigid Packaging	260	0.8%	0.7%	0.9%	New Gypsum Scrap	36	0.1%	0.0%	0.2%
Clean Shopping/Dry Cleaner Bags	99	0.3%	0.3%	0.3%	Demo Gypsum Scrap	85	0.3%	0.1%	0.5%
Other Clean PE Bags	48	0.1%	0.1%	0.2%	Fiberglass Insulation	11	0.0%	0.0%	0.1%
Other Film	1,791	5.5%	5.3%	5.7%	Rock/Concrete/Brick	90	0.3%	0.1%	0.5%
Plastic Products	448	1.4%	1.2%	1.6%	Asphaltic Roofing	36	0.1%	0.0%	0.2%
Plastic/Other Materials	216	0.7%	0.6%	0.7%	Ceramics/Porcelain	103	0.3%	0.2%	0.4%
Glass	**556**	**1.7%**			Other Construction Debris	231	0.7%	0.4%	1.0%
Clear Bottles	92	0.3%	0.2%	0.4%	***Hazardous***	**179**	**0.5%**		
Green Bottles	69	0.2%	0.2%	0.3%	Latex Paints	27	0.1%	0.0%	0.1%
Brown Bottles	91	0.3%	0.2%	0.4%	Solvent-based Adhesives/Glues	0	0.0%	0.0%	0.0%
Container Glass	142	0.4%	0.4%	0.5%	Water-based Adhesives/Glues	0	0.0%	0.0%	0.0%
Fluorescent Tubes	4	0.0%	0.0%	0.0%	Oil-based Paints/Solvents	24	0.1%	0.0%	0.1%
Other Glass	157	0.5%	0.4%	0.6%	Caustic Cleaners	0	0.0%	0.0%	0.0%
Metal	**1,191**	**3.7%**			Pesticides/Herbicides	4	0.0%	0.0%	0.0%
Aluminum Cans	60	0.2%	0.2%	0.2%	Dry-Cell Batteries	30	0.1%	0.1%	0.1%
Alum. Foil/Containers	102	0.3%	0.3%	0.4%	Wet-Cell Batteries	0	0.0%	0.0%	0.0%
Other Aluminum	45	0.1%	0.1%	0.2%	Gasoline/Kerosene	0	0.0%	0.0%	0.0%
Other Nonferrous	14	0.0%	0.0%	0.1%	Motor Oil/Diesel Oil	3	0.0%	0.0%	0.0%
Tin Food Cans	200	0.6%	0.5%	0.7%	Asbestos	0	0.0%	0.0%	0.0%
Empty Aerosol Cans	59	0.2%	0.1%	0.2%	Explosives	1	0.0%	0.0%	0.0%
Other Ferrous	462	1.4%	0.7%	2.1%	Medical Wastes	46	0.1%	0.0%	0.3%
Oil Filters	2	0.0%	0.0%	0.0%	Other Cleaners/Chemicals	31	0.1%	0.1%	0.1%
Mixed Metals/Materials	247	0.8%	0.6%	0.9%	Other Potentially Harmful Wastes	14	0.0%	0.0%	0.1%
Organics	**19,038**	**58.5%**			***Fines & Misc Materials***	**634**	**1.9%**		
Leaves and Grass	371	1.1%	0.4%	1.9%	Sand/Soil/Dirt	138	0.4%	0.2%	0.6%
Prunings	103	0.3%	0.1%	0.5%	Non-distinct Fines	10	0.0%	0.0%	0.1%
Food	11,068	34.0%	32.6%	35.3%	Misc. Organics	362	1.1%	0.9%	1.3%
Textiles/Clothing	944	2.9%	2.2%	3.6%	Misc. Inorganics	125	0.4%	0.2%	0.5%
Mixed Textiles	357	1.1%	0.9%	1.3%					
Carpet	104	0.3%	0.2%	0.5%					
Disposable Diapers	2,546	7.8%	7.2%	8.4%					
Animal By-Products	3,474	10.7%	9.6%	11.8%	**Total Percentage**	**100%**			
Rubber Products	68	0.2%	0.1%	0.3%	**Total Tons**	**32,559**			
Tires	2	0.0%	0.0%	0.0%	**Sample Count**	**121**			

Table 4-13: Composition by Weight – Single-family South
(January – December 2006)

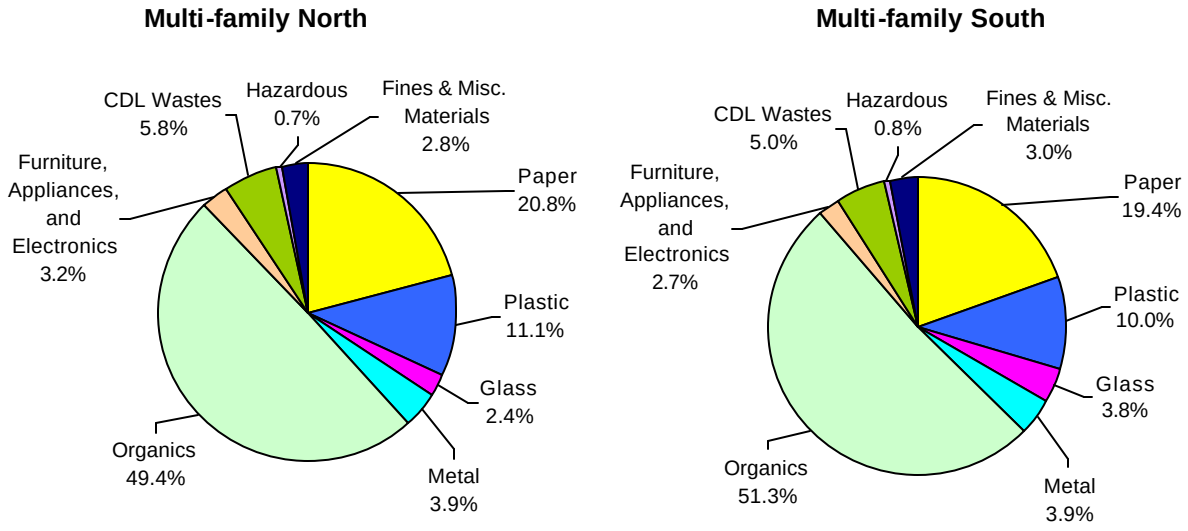
Calculated at a 90% confidence level

	Tons	Mean	Low	High		Tons	Mean	Low	High
Paper	**7,657**	**16.8%**			***Furniture/Appliances/Electronics***	**368**	**0.8%**		
Newspaper	552	1.2%	1.0%	1.4%	Furniture	5	0.0%	0.0%	0.0%
OCC/Kraft, unwaxed	650	1.4%	1.2%	1.6%	Mattresses	0	0.0%	0.0%	0.0%
OCC/Kraft, waxed	0	0.0%	0.0%	0.0%	Small Appliances	218	0.5%	0.2%	0.8%
High Grade	352	0.8%	0.6%	0.9%	A/V Equipment	65	0.1%	0.1%	0.2%
Mixed Low Grade	2,532	5.6%	5.1%	6.0%	Computer Monitors	0	0.0%	0.0%	0.0%
Compostable/Soiled	3,122	6.9%	6.5%	7.2%	TVs	6	0.0%	0.0%	0.0%
Paper/Other Materials	448	1.0%	0.8%	1.1%	Other Computer Components	74	0.2%	0.0%	0.3%
Plastic	**5,340**	**11.7%**			***CDL Wastes***	**1,995**	**4.4%**		
#1 PET Bottles	266	0.6%	0.5%	0.6%	Dimension Lumber	129	0.3%	0.2%	0.4%
#2 HDPE Natural Bottles	97	0.2%	0.2%	0.2%	Pallets	2	0.0%	0.0%	0.0%
#2 HDPE Colored Bottles	152	0.3%	0.3%	0.4%	Crates	1	0.0%	0.0%	0.0%
Other Plastic Bottles	57	0.1%	0.1%	0.2%	Other Untreated Wood	49	0.1%	0.0%	0.2%
Tubs	519	1.1%	1.1%	1.2%	Treated Wood	392	0.9%	0.6%	1.1%
Expanded Polystyrene	364	0.8%	0.7%	0.9%	Contaminated Wood	104	0.2%	0.1%	0.3%
Other Rigid Packaging	322	0.7%	0.6%	0.8%	New Gypsum Scrap	148	0.3%	0.0%	0.6%
Clean Shopping/Dry Cleaner Bags	120	0.3%	0.2%	0.3%	Demo Gypsum Scrap	108	0.2%	0.1%	0.4%
Other Clean PE Bags	43	0.1%	0.1%	0.1%	Fiberglass Insulation	3	0.0%	0.0%	0.0%
Other Film	2,536	5.6%	5.3%	5.8%	Rock/Concrete/Brick	122	0.3%	0.1%	0.4%
Plastic Products	555	1.2%	1.0%	1.5%	Asphaltic Roofing	78	0.2%	0.1%	0.3%
Plastic/Other Materials	309	0.7%	0.6%	0.8%	Ceramics/Porcelain	211	0.5%	0.3%	0.6%
Glass	**899**	**2.0%**			Other Construction Debris	649	1.4%	0.8%	2.1%
Clear Bottles	205	0.4%	0.4%	0.5%	***Hazardous***	**314**	**0.7%**		
Green Bottles	154	0.3%	0.3%	0.4%	Latex Paints	59	0.1%	0.0%	0.2%
Brown Bottles	145	0.3%	0.2%	0.4%	Solvent-based Adhesives/Glues	1	0.0%	0.0%	0.0%
Container Glass	238	0.5%	0.4%	0.6%	Water-based Adhesives/Glues	1	0.0%	0.0%	0.0%
Fluorescent Tubes	4	0.0%	0.0%	0.0%	Oil-based Paints/Solvents	6	0.0%	0.0%	0.0%
Other Glass	154	0.3%	0.3%	0.4%	Caustic Cleaners	2	0.0%	0.0%	0.0%
Metal	**1,390**	**3.1%**			Pesticides/Herbicides	2	0.0%	0.0%	0.0%
Aluminum Cans	114	0.2%	0.2%	0.3%	Dry-Cell Batteries	45	0.1%	0.1%	0.1%
Alum. Foil/Containers	144	0.3%	0.3%	0.4%	Wet-Cell Batteries	0	0.0%	0.0%	0.0%
Other Aluminum	36	0.1%	0.0%	0.1%	Gasoline/Kerosene	0	0.0%	0.0%	0.0%
Other Nonferrous	19	0.0%	0.0%	0.1%	Motor Oil/Diesel Oil	2	0.0%	0.0%	0.0%
Tin Food Cans	367	0.8%	0.7%	0.9%	Asbestos	0	0.0%	0.0%	0.0%
Empty Aerosol Cans	87	0.2%	0.1%	0.2%	Explosives	0	0.0%	0.0%	0.0%
Other Ferrous	317	0.7%	0.5%	0.9%	Medical Wastes	97	0.2%	0.1%	0.4%
Oil Filters	1	0.0%	0.0%	0.0%	Other Cleaners/Chemicals	58	0.1%	0.1%	0.2%
Mixed Metals/Materials	306	0.7%	0.5%	0.9%	Other Potentially Harmful Wastes	40	0.1%	0.0%	0.1%
Organics	**26,770**	**58.8%**			***Fines & Misc Materials***	**818**	**1.8%**		
Leaves and Grass	736	1.6%	1.1%	2.2%	Sand/Soil/Dirt	272	0.6%	0.3%	0.9%
Prunings	150	0.3%	0.1%	0.6%	Non-distinct Fines	4	0.0%	0.0%	0.0%
Food	16,958	37.2%	35.7%	38.8%	Misc. Organics	480	1.1%	0.9%	1.2%
Textiles/Clothing	1,132	2.5%	2.1%	2.9%	Misc. Inorganics	63	0.1%	0.1%	0.2%
Mixed Textiles	346	0.8%	0.6%	0.9%					
Carpet	297	0.7%	0.4%	0.9%					
Disposable Diapers	3,065	6.7%	6.1%	7.3%					
Animal By-Products	3,836	8.4%	7.4%	9.4%	**Total Percentage**	**100%**			
Rubber Products	213	0.5%	0.1%	0.9%	**Total Tons**	**45,551**			
Tires	38	0.1%	0.0%	0.2%	**Sample Count**	**121**			

4.5 By Service Area and Residence Type: Multi-family

As shown in Figure 4-4, *paper* and *organics* together comprise about 70% of the waste from multi-family residences in both service areas. *Plastic* was another large component, accounting for 11.1% and 10.0%, respectively. *CDL wastes* and *furniture, appliances, and electronics* waste were higher in the north while the percentage of *glass* waste was higher in the south. The remaining waste categories were similarly proportioned for multi-family north and south.

Figure 4-4: Composition Summary, Multi-family
(January – December 2006)



4.5.1 Multi-family North

A total of 57 loads were sampled for the multi-family north subpopulation. The amount of disposed waste for this subpopulation for calendar year 2006 was 18,128 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 waste was composed of *food*. *Mixed low grade paper, animal by-products,* and *compostable/soiled paper* each accounted for at least 6%, by weight. 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 2006)

Component	Mean	Cum. %	Tons
Food	29.2%	29.2%	5,301
Mixed Low Grade Paper	7.5%	36.8%	1,367
Animal By-Products	6.9%	43.7%	1,250
Compostable/Soiled Paper	6.0%	49.6%	1,081
Other Plastic Film	4.7%	54.4%	856
Disposable Diapers	4.0%	58.4%	726
Leaves and Grass	3.3%	61.7%	603
Unwaxed OCC/Kraft Paper	3.0%	64.7%	550
Textiles/Clothing	3.0%	67.7%	539
Newspaper	2.2%	70.0%	406
Total	**70.0%**		**12,681**

4.5.2 Multi-family South

To characterize waste from the multi-family south subpopulation, 57 samples were sorted. It is estimated that multi-family residents in the south service area disposed about 37,536 tons in 2006. Composition estimates for this subpopulation were applied to the 37,536 tons to estimate the amount of waste disposed for each component category. The top ten components for this subpopulation accounted for almost 70%, or 26,127 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 2006)

Component	Mean	Cum. %	Tons
Food	30.4%	30.4%	11,408
Animal By-Products	8.2%	38.6%	3,066
Mixed Low Grade Paper	7.0%	45.5%	2,619
Compostable/Soiled Paper	5.8%	51.4%	2,191
Other Plastic Film	4.4%	55.8%	1,660
Disposable Diapers	3.4%	59.2%	1,287
Textiles/Clothing	3.2%	62.4%	1,206
Leaves and Grass	2.6%	65.0%	973
Unwaxed OCC/Kraft Paper	2.3%	67.3%	861
Carpet	2.3%	69.6%	857
Total	**69.6%**		**26,127**

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

For both multi-family north and multi-family south residences, *food* comprised almost 30% of the waste. Also, *mixed low grade paper* and *animal by-products* rounded out the top three largest components for both.

Only one of the top ten components differs between the two subpopulations. *Newspaper* was the number ten component in the multi-family north subpopulation, while *carpet* was the number ten component in the multi-family south subpopulation.

Table 4-16: Composition by Weight – Multi-family North
(January – December 2006)

Calculated at a 90% confidence level

	Tons	Mean	Low	High		Tons	Mean	Low	High
Paper	**3,762**	**20.8%**			***Furniture/Appliances/Electronics***	**574**	**3.2%**		
Newspaper	406	2.2%	1.7%	2.8%	Furniture	210	1.2%	0.2%	2.1%
OCC/Kraft, unwaxed	550	3.0%	2.6%	3.5%	Mattresses	10	0.1%	0.0%	0.2%
OCC/Kraft, waxed	15	0.1%	0.0%	0.2%	Small Appliances	111	0.6%	0.1%	1.1%
High Grade	144	0.8%	0.6%	1.0%	A/V Equipment	95	0.5%	0.1%	0.9%
Mixed Low Grade	1,367	7.5%	6.9%	8.2%	Computer Monitors	31	0.2%	0.0%	0.5%
Compostable/Soiled	1,081	6.0%	5.4%	6.5%	TVs	0	0.0%	0.0%	0.0%
Paper/Other Materials	198	1.1%	0.9%	1.3%	Other Computer Components	117	0.6%	0.1%	1.2%
Plastic	**2,010**	**11.1%**			***CDL Wastes***	**1,043**	**5.8%**		
#1 PET Bottles	139	0.8%	0.7%	0.9%	Dimension Lumber	54	0.3%	0.1%	0.5%
#2 HDPE Natural Bottles	58	0.3%	0.3%	0.4%	Pallets	3	0.0%	0.0%	0.1%
#2 HDPE Colored Bottles	79	0.4%	0.4%	0.5%	Crates	2	0.0%	0.0%	0.0%
Other Plastic Bottles	11	0.1%	0.0%	0.1%	Other Untreated Wood	41	0.2%	0.0%	0.4%
Tubs	198	1.1%	1.0%	1.2%	Treated Wood	283	1.6%	1.0%	2.2%
Expanded Polystyrene	122	0.7%	0.6%	0.8%	Contaminated Wood	116	0.6%	0.4%	0.9%
Other Rigid Packaging	107	0.6%	0.5%	0.7%	New Gypsum Scrap	27	0.1%	0.0%	0.3%
Clean Shopping/Dry Cleaner Bags	44	0.2%	0.2%	0.3%	Demo Gypsum Scrap	74	0.4%	0.0%	0.8%
Other Clean PE Bags	13	0.1%	0.0%	0.1%	Fiberglass Insulation	8	0.0%	0.0%	0.1%
Other Film	856	4.7%	4.4%	5.1%	Rock/Concrete/Brick	132	0.7%	0.1%	1.3%
Plastic Products	252	1.4%	1.1%	1.6%	Asphaltic Roofing	66	0.4%	0.0%	0.9%
Plastic/Other Materials	131	0.7%	0.5%	0.9%	Ceramics/Porcelain	84	0.5%	0.2%	0.7%
Glass	**443**	**2.4%**			Other Construction Debris	152	0.8%	0.3%	1.4%
Clear Bottles	111	0.6%	0.5%	0.8%	***Hazardous***	**121**	**0.7%**		
Green Bottles	100	0.6%	0.4%	0.7%	Latex Paints	21	0.1%	0.0%	0.3%
Brown Bottles	83	0.5%	0.3%	0.6%	Solvent-based Adhesives/Glues	0	0.0%	0.0%	0.0%
Container Glass	86	0.5%	0.3%	0.6%	Water-based Adhesives/Glues	0	0.0%	0.0%	0.0%
Fluorescent Tubes	1	0.0%	0.0%	0.0%	Oil-based Paints/Solvents	0	0.0%	0.0%	0.0%
Other Glass	62	0.3%	0.2%	0.5%	Caustic Cleaners	1	0.0%	0.0%	0.0%
Metal	**715**	**3.9%**			Pesticides/Herbicides	2	0.0%	0.0%	0.0%
Aluminum Cans	83	0.5%	0.4%	0.5%	Dry-Cell Batteries	13	0.1%	0.0%	0.1%
Alum. Foil/Containers	35	0.2%	0.1%	0.3%	Wet-Cell Batteries	0	0.0%	0.0%	0.0%
Other Aluminum	22	0.1%	0.0%	0.2%	Gasoline/Kerosene	0	0.0%	0.0%	0.0%
Other Nonferrous	3	0.0%	0.0%	0.0%	Motor Oil/Diesel Oil	0	0.0%	0.0%	0.0%
Tin Food Cans	134	0.7%	0.6%	0.8%	Asbestos	0	0.0%	0.0%	0.0%
Empty Aerosol Cans	14	0.1%	0.0%	0.1%	Explosives	0	0.0%	0.0%	0.0%
Other Ferrous	260	1.4%	1.0%	1.9%	Medical Wastes	47	0.3%	0.0%	0.5%
Oil Filters	1	0.0%	0.0%	0.0%	Other Cleaners/Chemicals	28	0.2%	0.1%	0.2%
Mixed Metals/Materials	164	0.9%	0.7%	1.1%	Other Potentially Harmful Wastes	8	0.0%	0.0%	0.1%
Organics	**8,960**	**49.4%**			***Fines & Misc Materials***	**502**	**2.8%**		
Leaves and Grass	603	3.3%	1.7%	5.0%	Sand/Soil/Dirt	201	1.1%	0.5%	1.7%
Prunings	99	0.5%	0.1%	1.0%	Non-distinct Fines	58	0.3%	0.0%	0.6%
Food	5,301	29.2%	26.9%	31.6%	Misc. Organics	214	1.2%	0.8%	1.6%
Textiles/Clothing	539	3.0%	2.5%	3.5%	Misc. Inorganics	29	0.2%	0.0%	0.3%
Mixed Textiles	164	0.9%	0.6%	1.2%					
Carpet	250	1.4%	0.4%	2.4%					
Disposable Diapers	726	4.0%	3.2%	4.8%					
Animal By-Products	1,250	6.9%	5.4%	8.3%	**Total Percentage**	**100%**			
Rubber Products	28	0.2%	0.1%	0.2%	**Total Tons**	**18,128**			
Tires	0	0.0%	0.0%	0.0%	**Sample Count**	**57**			

Table 4-17: Composition by Weight – Multi-family South
(January – December 2006)

Calculated at a 90% confidence level

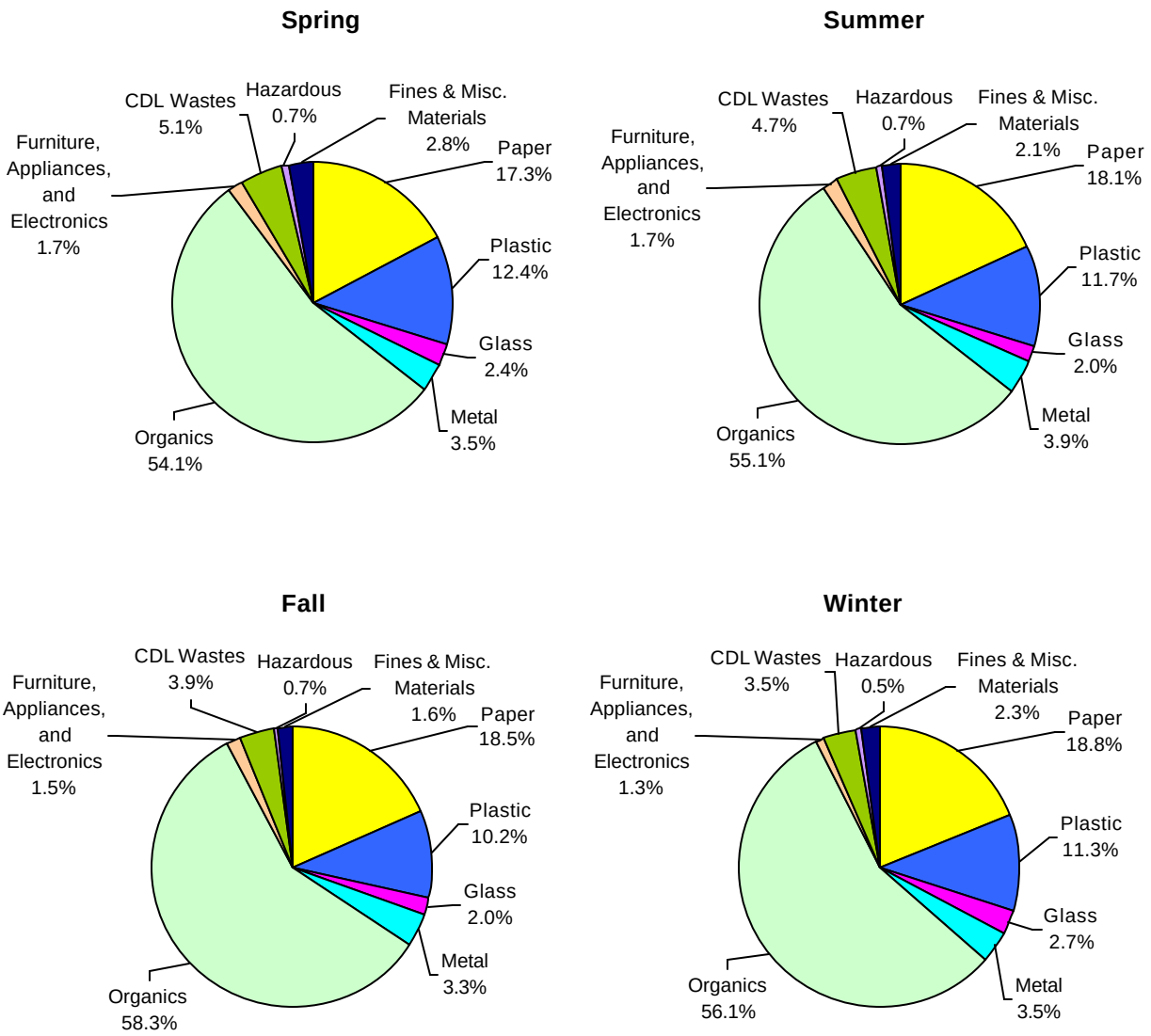
	Tons	Mean	Low	High		Tons	Mean	Low	High
Paper	**7,297**	**19.4%**			***Furniture/Appliances/Electronics***	**1,028**	**2.7%**		
Newspaper	854	2.3%	1.9%	2.7%	Furniture	345	0.9%	0.1%	1.7%
OCC/Kraft, unwaxed	861	2.3%	1.9%	2.7%	Mattresses	19	0.1%	0.0%	0.1%
OCC/Kraft, waxed	21	0.1%	0.0%	0.2%	Small Appliances	315	0.8%	0.2%	1.4%
High Grade	399	1.1%	0.7%	1.4%	A/V Equipment	133	0.4%	0.0%	0.7%
Mixed Low Grade	2,619	7.0%	6.3%	7.7%	Computer Monitors	0	0.0%	0.0%	0.0%
Compostable/Soiled	2,191	5.8%	5.2%	6.5%	TVs	60	0.2%	0.0%	0.4%
Paper/Other Materials	353	0.9%	0.8%	1.1%	Other Computer Components	157	0.4%	0.1%	0.7%
Plastic	**3,770**	**10.0%**			***CDL Wastes***	**1,886**	**5.0%**		
#1 PET Bottles	267	0.7%	0.6%	0.8%	Dimension Lumber	139	0.4%	0.1%	0.7%
#2 HDPE Natural Bottles	96	0.3%	0.2%	0.3%	Pallets	44	0.1%	0.0%	0.3%
#2 HDPE Colored Bottles	123	0.3%	0.3%	0.4%	Crates	53	0.1%	0.0%	0.3%
Other Plastic Bottles	40	0.1%	0.1%	0.1%	Other Untreated Wood	27	0.1%	0.0%	0.1%
Tubs	331	0.9%	0.8%	1.0%	Treated Wood	576	1.5%	0.7%	2.4%
Expanded Polystyrene	226	0.6%	0.5%	0.7%	Contaminated Wood	228	0.6%	0.3%	0.9%
Other Rigid Packaging	255	0.7%	0.6%	0.8%	New Gypsum Scrap	190	0.5%	0.0%	1.3%
Clean Shopping/Dry Cleaner Bags	140	0.4%	0.3%	0.5%	Demo Gypsum Scrap	48	0.1%	0.0%	0.2%
Other Clean PE Bags	35	0.1%	0.0%	0.1%	Fiberglass Insulation	2	0.0%	0.0%	0.0%
Other Film	1,660	4.4%	4.0%	4.8%	Rock/Concrete/Brick	86	0.2%	0.1%	0.4%
Plastic Products	397	1.1%	0.8%	1.4%	Asphaltic Roofing	184	0.5%	0.0%	0.9%
Plastic/Other Materials	201	0.5%	0.4%	0.6%	Ceramics/Porcelain	138	0.4%	0.2%	0.5%
Glass	**1,423**	**3.8%**			Other Construction Debris	170	0.5%	0.0%	0.9%
Clear Bottles	315	0.8%	0.6%	1.0%	***Hazardous***	**291**	**0.8%**		
Green Bottles	310	0.8%	0.6%	1.0%	Latex Paints	95	0.3%	0.0%	0.7%
Brown Bottles	379	1.0%	0.7%	1.3%	Solvent-based Adhesives/Glues	0	0.0%	0.0%	0.0%
Container Glass	196	0.5%	0.4%	0.6%	Water-based Adhesives/Glues	5	0.0%	0.0%	0.0%
Fluorescent Tubes	3	0.0%	0.0%	0.0%	Oil-based Paints/Solvents	0	0.0%	0.0%	0.0%
Other Glass	219	0.6%	0.3%	0.9%	Caustic Cleaners	27	0.1%	0.0%	0.2%
Metal	**1,470**	**3.9%**			Pesticides/Herbicides	20	0.1%	0.0%	0.1%
Aluminum Cans	155	0.4%	0.3%	0.5%	Dry-Cell Batteries	43	0.1%	0.0%	0.2%
Alum. Foil/Containers	86	0.2%	0.2%	0.3%	Wet-Cell Batteries	0	0.0%	0.0%	0.0%
Other Aluminum	38	0.1%	0.0%	0.2%	Gasoline/Kerosene	0	0.0%	0.0%	0.0%
Other Nonferrous	10	0.0%	0.0%	0.0%	Motor Oil/Diesel Oil	1	0.0%	0.0%	0.0%
Tin Food Cans	284	0.8%	0.6%	0.9%	Asbestos	0	0.0%	0.0%	0.0%
Empty Aerosol Cans	59	0.2%	0.1%	0.2%	Explosives	0	0.0%	0.0%	0.0%
Other Ferrous	507	1.4%	0.9%	1.8%	Medical Wastes	32	0.1%	0.0%	0.2%
Oil Filters	7	0.0%	0.0%	0.0%	Other Cleaners/Chemicals	50	0.1%	0.1%	0.2%
Mixed Metals/Materials	323	0.9%	0.5%	1.2%	Other Potentially Harmful Wastes	16	0.0%	0.0%	0.1%
Organics	**19,258**	**51.3%**			***Fines & Misc Materials***	**1,112**	**3.0%**		
Leaves and Grass	973	2.6%	1.3%	3.9%	Sand/Soil/Dirt	588	1.6%	0.2%	2.9%
Prunings	189	0.5%	0.1%	0.9%	Non-distinct Fines	0	0.0%	0.0%	0.0%
Food	11,408	30.4%	27.7%	33.1%	Misc. Organics	288	0.8%	0.6%	0.9%
Textiles/Clothing	1,206	3.2%	2.5%	3.9%	Misc. Inorganics	237	0.6%	0.1%	1.1%
Mixed Textiles	225	0.6%	0.4%	0.8%					
Carpet	857	2.3%	0.6%	4.0%					
Disposable Diapers	1,287	3.4%	2.7%	4.1%					
Animal By-Products	3,066	8.2%	6.4%	10.0%	**Total Percentage**	**100%**			
Rubber Products	48	0.1%	0.1%	0.2%	**Total Tons**	**37,536**			
Tires	0	0.0%	0.0%	0.0%	**Sample Count**	**57**			

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: Spring (March, April, May), Summer (June, July, August), Fall (September, October, November), and Winter (January, February, December).

Figure 4-5 summarizes the results by broad material category for each season. When summed together, *paper* and *organics* accounted for more than 70% of the total tonnage for each of the four seasons. *Paper* and *Organics* waste was lowest in the spring (17.3% and 54.1%, respectively) and highest in fall (18.5% and 58.3%, respectively).

Figure 4-5: Composition Summary, by Season



4.6.1 Spring

A total of 92 samples were captured between the months of March and May 2006. The top ten components, which are listed in Table 4-18, sum to approximately 72.3% of the total, by weight. *Food* accounted for nearly one-third of the total weight disposed in the spring (30.2%). *Animal by-products* are the second largest waste component at 9.6%. The remaining eight components each account for less than 7%. Table 4-22 lists the full composition results for residential waste disposed during the spring of 2006.

Table 4-18: Top Ten Components – Spring
(March – May 2006)

Component	Mean	Cum. %	Tons
Food	30.2%	30.2%	9,910
Animal By-Products	9.6%	39.7%	3,154
Compostable/Soiled Paper	6.8%	46.6%	2,249
Disposable Diapers	6.4%	53.0%	2,103
Other Plastic Film	5.7%	58.7%	1,887
Mixed Low Grade Paper	5.2%	63.9%	1,701
Textiles/Clothing	3.0%	66.9%	991
Leaves and Grass	2.1%	69.0%	674
Unwaxed OCC/Kraft Paper	1.8%	70.8%	586
Newspaper	1.5%	72.3%	495
Total	**72.3%**		**23,750**

4.6.2 Summer

In the summer of 2006, 93 samples were captured and sorted. As shown in Table 4-19, *food* was the largest component at 32.1%. As was true of the top 10 components from spring, *animal by-products* were second (9.7%). Each of the remaining materials made up 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 2006)

Component	Mean	Cum. %	Tons
Food	32.1%	32.1%	10,986
Animal By-Products	9.7%	41.8%	3,330
Compostable/Soiled Paper	6.9%	48.7%	2,361
Mixed Low Grade Paper	6.6%	55.3%	2,247
Disposable Diapers	5.9%	61.2%	2,016
Other Plastic Film	5.0%	66.1%	1,700
Textiles/Clothing	3.1%	69.2%	1,060
Unwaxed OCC/Kraft Paper	1.8%	71.1%	633
Leaves and Grass	1.8%	72.9%	624
Treated Wood	1.6%	74.4%	534
Total	**74.4%**		**25,491**

4.6.3 Fall

Between September and November of 2006, a total of 93 samples were captured from residential loads. Table 4-20 lists the top ten components of waste disposed in the fall. *Food* composed 36.7% of the total, the highest food percentage of any season. When summed together, the top ten components made up almost 77.6% of the total waste disposed in the fall of 2006. Table 4-24 lists the composition results for this season in detail.

Table 4-20: Top Ten Components – Fall
(September – November 2006)

Component	Mean	Cum. %	Tons
Food	36.7%	36.7%	12,134
Animal By-Products	7.9%	44.6%	2,617
Compostable/Soiled Paper	6.9%	51.5%	2,269
Mixed Low Grade Paper	6.6%	58.0%	2,178
Disposable Diapers	6.5%	64.6%	2,163
Other Plastic Film	4.8%	69.4%	1,579
Leaves and Grass	2.7%	72.1%	890
Textiles/Clothing	2.4%	74.5%	803
Unwaxed OCC/Kraft Paper	1.8%	76.3%	605
Newspaper	1.3%	77.6%	415
Total	**77.6%**		**25,653**

4.6.4 Winter

A total of 78 samples were sorted from residential waste disposed during the winter months of 2006. The top ten components are listed in Table 4-21, and sum to approximately 75% of the total, by weight. As in the other seasons, *food* was the top waste component and represented over a third of the waste stream at 36.5%. *Animal by-products*, *compostable/soiled paper, mixed low grade paper*, *disposable diapers*, *other film*, *textiles/clothing*, *unwaxed OCC/Kraft paper*, *leaves and grass,* and *treated wood* were each less than 8% of the of waste disposed during January, February, and December 2006. Table 4-25 details the full composition results of this season's waste.

Table 4-21: Top Ten Components – Winter
(January, February, and December 2006)

Component	Mean	Cum. %	Tons
Food	36.5%	36.5%	12,252
Animal By-Products	7.9%	44.4%	2,669
Compostable/Soiled Paper	7.0%	51.4%	2,342
Mixed Low Grade Paper	6.2%	57.6%	2,084
Disposable Diapers	5.4%	63.0%	1,803
Other Plastic Film	5.4%	68.3%	1,806
Textiles/Clothing	2.7%	71.1%	912
Unwaxed OCC/Kraft Paper	2.3%	73.4%	778
Leaves and Grass	0.9%	74.3%	319
Treated Wood	0.9%	75.2%	293
Total	**75.2%**		**25,258**

4.6.5 Comparisons between Seasons

Food was the largest component for each of the four seasons. The percentage of *food waste* was highest in fall (36.7%) and lowest in spring (30.2%) Spring, summer, and fall shared the exact same top ten categories. Winter had the only differing component, at the number 10 spot, where *treated wood* edged out *newspaper*, which was number 10 for the other three seasons. In all, the four seasons shared a very similar profile.

Table 4-22: Composition by Weight – Spring
(March – May 2006)

Calculated at a 90% confidence level

	Tons	Mean	Low	High		Tons	Mean	Low	High
Paper	**5,682**	**17.3%**			***Furniture/Appliances/Electronics***	**548**	**1.7%**		
Newspaper	495	1.5%	1.2%	1.9%	Furniture	162	0.5%	0.0%	1.0%
OCC/Kraft, unwaxed	586	1.8%	1.6%	2.0%	Mattresses	12	0.0%	0.0%	0.1%
OCC/Kraft, waxed	0	0.0%	0.0%	0.0%	Small Appliances	159	0.5%	0.2%	0.8%
High Grade	284	0.9%	0.7%	1.1%	A/V Equipment	124	0.4%	0.1%	0.6%
Mixed Low Grade	1,701	5.2%	4.7%	5.6%	Computer Monitors	0	0.0%	0.0%	0.0%
Compostable/Soiled	2,249	6.8%	6.4%	7.3%	TVs	6	0.0%	0.0%	0.0%
Paper/Other Materials	367	1.1%	1.0%	1.3%	Other Computer Components	85	0.3%	0.0%	0.5%
Plastic	**4,085**	**12.4%**			***CDL Wastes***	**1,681**	**5.1%**		
#1 PET Bottles	190	0.6%	0.5%	0.6%	Dimension Lumber	65	0.2%	0.1%	0.3%
#2 HDPE Natural Bottles	73	0.2%	0.2%	0.3%	Pallets	5	0.0%	0.0%	0.0%
#2 HDPE Colored Bottles	109	0.3%	0.3%	0.4%	Crates	23	0.1%	0.0%	0.2%
Other Plastic Bottles	30	0.1%	0.1%	0.1%	Other Untreated Wood	73	0.2%	0.1%	0.3%
Tubs	421	1.3%	1.2%	1.4%	Treated Wood	347	1.1%	0.8%	1.3%
Expanded Polystyrene	268	0.8%	0.7%	0.9%	Contaminated Wood	141	0.4%	0.3%	0.6%
Other Rigid Packaging	304	0.9%	0.8%	1.0%	New Gypsum Scrap	168	0.5%	0.0%	1.0%
Clean Shopping/Dry Cleaner Bags	91	0.3%	0.2%	0.3%	Demo Gypsum Scrap	119	0.4%	0.1%	0.6%
Other Clean PE Bags	40	0.1%	0.0%	0.2%	Fiberglass Insulation	3	0.0%	0.0%	0.0%
Other Film	1,887	5.7%	5.4%	6.0%	Rock/Concrete/Brick	196	0.6%	0.3%	0.9%
Plastic Products	452	1.4%	1.2%	1.6%	Asphaltic Roofing	99	0.3%	0.0%	0.7%
Plastic/Other Materials	220	0.7%	0.6%	0.8%	Ceramics/Porcelain	178	0.5%	0.4%	0.7%
Glass	**790**	**2.4%**			Other Construction Debris	264	0.8%	0.3%	1.3%
Clear Bottles	187	0.6%	0.4%	0.7%	***Hazardous***	**233**	**0.7%**		
Green Bottles	134	0.4%	0.3%	0.5%	Latex Paints	28	0.1%	0.0%	0.2%
Brown Bottles	167	0.5%	0.4%	0.7%	Solvent-based Adhesives/Glues	0	0.0%	0.0%	0.0%
Container Glass	162	0.5%	0.4%	0.6%	Water-based Adhesives/Glues	1	0.0%	0.0%	0.0%
Fluorescent Tubes	3	0.0%	0.0%	0.0%	Oil-based Paints/Solvents	25	0.1%	0.0%	0.2%
Other Glass	138	0.4%	0.3%	0.5%	Caustic Cleaners	0	0.0%	0.0%	0.0%
Metal	**1,148**	**3.5%**			Pesticides/Herbicides	6	0.0%	0.0%	0.0%
Aluminum Cans	96	0.3%	0.3%	0.3%	Dry-Cell Batteries	30	0.1%	0.1%	0.1%
Alum. Foil/Containers	101	0.3%	0.3%	0.4%	Wet-Cell Batteries	0	0.0%	0.0%	0.0%
Other Aluminum	45	0.1%	0.1%	0.2%	Gasoline/Kerosene	0	0.0%	0.0%	0.0%
Other Nonferrous	16	0.0%	0.0%	0.1%	Motor Oil/Diesel Oil	0	0.0%	0.0%	0.0%
Tin Food Cans	223	0.7%	0.6%	0.8%	Asbestos	0	0.0%	0.0%	0.0%
Empty Aerosol Cans	52	0.2%	0.1%	0.2%	Explosives	0	0.0%	0.0%	0.0%
Other Ferrous	377	1.1%	0.9%	1.4%	Medical Wastes	90	0.3%	0.0%	0.5%
Oil Filters	1	0.0%	0.0%	0.0%	Other Cleaners/Chemicals	42	0.1%	0.1%	0.2%
Mixed Metals/Materials	238	0.7%	0.6%	0.9%	Other Potentially Harmful Wastes	12	0.0%	0.0%	0.1%
Organics	**17,779**	**54.1%**			***Fines & Misc Materials***	**918**	**2.8%**		
Leaves and Grass	674	2.1%	1.2%	2.9%	Sand/Soil/Dirt	447	1.4%	0.6%	2.2%
Prunings	155	0.5%	0.2%	0.8%	Non-distinct Fines	12	0.0%	0.0%	0.1%
Food	9,910	30.2%	28.7%	31.6%	Misc. Organics	363	1.1%	0.8%	1.4%
Textiles/Clothing	991	3.0%	2.5%	3.5%	Misc. Inorganics	97	0.3%	0.2%	0.4%
Mixed Textiles	317	1.0%	0.8%	1.1%					
Carpet	300	0.9%	0.3%	1.6%					
Disposable Diapers	2,103	6.4%	5.7%	7.1%					
Animal By-Products	3,154	9.6%	8.4%	10.8%	**Total Percentage**	**100%**			
Rubber Products	176	0.5%	0.0%	1.0%	**Total Tons**	**32,866**			
Tires	0	0.0%	0.0%	0.0%	**Sample Count**	**92**			

Table 4-23: Composition by Weight – Summer
(June – August 2006)

Calculated at a 90% confidence level

	Tons	Mean	Low	High		Tons	Mean	Low	High
Paper	**6,190**	**18.1%**			***Furniture/Appliances/Electronics***	**586**	**1.7%**		
Newspaper	377	1.1%	0.9%	1.3%	Furniture	122	0.4%	0.0%	0.7%
OCC/Kraft, unwaxed	633	1.8%	1.7%	2.0%	Mattresses	0	0.0%	0.0%	0.0%
OCC/Kraft, waxed	16	0.0%	0.0%	0.1%	Small Appliances	186	0.5%	0.2%	0.9%
High Grade	189	0.6%	0.4%	0.7%	A/V Equipment	125	0.4%	0.1%	0.6%
Mixed Low Grade	2,247	6.6%	6.1%	7.0%	Computer Monitors	38	0.1%	0.0%	0.3%
Compostable/Soiled	2,361	6.9%	6.4%	7.4%	TVs	72	0.2%	0.0%	0.5%
Paper/Other Materials	367	1.1%	0.9%	1.2%	Other Computer Components	43	0.1%	0.0%	0.2%
Plastic	**4,011**	**11.7%**			***CDL Wastes***	**1,622**	**4.7%**		
#1 PET Bottles	219	0.6%	0.6%	0.7%	Dimension Lumber	110	0.3%	0.2%	0.4%
#2 HDPE Natural Bottles	84	0.2%	0.2%	0.3%	Pallets	30	0.1%	0.0%	0.2%
#2 HDPE Colored Bottles	148	0.4%	0.4%	0.5%	Crates	9	0.0%	0.0%	0.0%
Other Plastic Bottles	50	0.1%	0.1%	0.2%	Other Untreated Wood	24	0.1%	0.0%	0.1%
Tubs	474	1.4%	1.3%	1.5%	Treated Wood	534	1.6%	1.1%	2.0%
Expanded Polystyrene	258	0.8%	0.7%	0.8%	Contaminated Wood	126	0.4%	0.2%	0.5%
Other Rigid Packaging	247	0.7%	0.7%	0.8%	New Gypsum Scrap	49	0.1%	0.0%	0.2%
Clean Shopping/Dry Cleaner Bags	79	0.2%	0.2%	0.3%	Demo Gypsum Scrap	62	0.2%	0.0%	0.3%
Other Clean PE Bags	24	0.1%	0.0%	0.1%	Fiberglass Insulation	12	0.0%	0.0%	0.1%
Other Film	1,700	5.0%	4.7%	5.2%	Rock/Concrete/Brick	114	0.3%	0.0%	0.6%
Plastic Products	495	1.4%	1.2%	1.7%	Asphaltic Roofing	35	0.1%	0.0%	0.2%
Plastic/Other Materials	233	0.7%	0.6%	0.8%	Ceramics/Porcelain	143	0.4%	0.3%	0.6%
Glass	**689**	**2.0%**			Other Construction Debris	374	1.1%	0.7%	1.5%
Clear Bottles	142	0.4%	0.3%	0.5%	***Hazardous***	**229**	**0.7%**		
Green Bottles	135	0.4%	0.3%	0.5%	Latex Paints	41	0.1%	0.0%	0.2%
Brown Bottles	139	0.4%	0.3%	0.5%	Solvent-based Adhesives/Glues	1	0.0%	0.0%	0.0%
Container Glass	156	0.5%	0.4%	0.5%	Water-based Adhesives/Glues	1	0.0%	0.0%	0.0%
Fluorescent Tubes	2	0.0%	0.0%	0.0%	Oil-based Paints/Solvents	7	0.0%	0.0%	0.0%
Other Glass	115	0.3%	0.3%	0.4%	Caustic Cleaners	2	0.0%	0.0%	0.0%
Metal	**1,319**	**3.9%**			Pesticides/Herbicides	6	0.0%	0.0%	0.0%
Aluminum Cans	103	0.3%	0.2%	0.4%	Dry-Cell Batteries	24	0.1%	0.0%	0.1%
Alum. Foil/Containers	70	0.2%	0.2%	0.3%	Wet-Cell Batteries	0	0.0%	0.0%	0.0%
Other Aluminum	31	0.1%	0.0%	0.1%	Gasoline/Kerosene	0	0.0%	0.0%	0.0%
Other Nonferrous	10	0.0%	0.0%	0.1%	Motor Oil/Diesel Oil	0	0.0%	0.0%	0.0%
Tin Food Cans	241	0.7%	0.6%	0.8%	Asbestos	0	0.0%	0.0%	0.0%
Empty Aerosol Cans	63	0.2%	0.1%	0.2%	Explosives	0	0.0%	0.0%	0.0%
Other Ferrous	518	1.5%	0.7%	2.3%	Medical Wastes	68	0.2%	0.0%	0.4%
Oil Filters	3	0.0%	0.0%	0.0%	Other Cleaners/Chemicals	46	0.1%	0.1%	0.2%
Mixed Metals/Materials	281	0.8%	0.6%	1.0%	Other Potentially Harmful Wastes	32	0.1%	0.0%	0.1%
Organics	**18,862**	**55.1%**			***Fines & Misc Materials***	**735**	**2.1%**		
Leaves and Grass	624	1.8%	1.1%	2.5%	Sand/Soil/Dirt	261	0.8%	0.3%	1.2%
Prunings	80	0.2%	0.1%	0.4%	Non-distinct Fines	26	0.1%	0.0%	0.2%
Food	10,986	32.1%	30.3%	33.9%	Misc. Organics	358	1.0%	0.9%	1.2%
Textiles/Clothing	1,060	3.1%	2.3%	3.9%	Misc. Inorganics	89	0.3%	0.1%	0.4%
Mixed Textiles	289	0.8%	0.7%	1.0%					
Carpet	399	1.2%	0.3%	2.0%					
Disposable Diapers	2,016	5.9%	5.2%	6.6%					
Animal By-Products	3,330	9.7%	8.5%	11.0%	**Total Percentage**	**100%**			
Rubber Products	44	0.1%	0.1%	0.2%	**Total Tons**	**34,242**			
Tires	34	0.1%	0.0%	0.2%	**Sample Count**	**93**			

Table 4-24: Composition by Weight – Fall
(September – November 2006)

Calculated at a 90% confidence level

	Tons	Mean	Low	High		Tons	Mean	Low	High
Paper	**6,106**	**18.5%**			***Furniture/Appliances/Electronics***	**504**	**1.5%**		
Newspaper	415	1.3%	1.0%	1.5%	Furniture	97	0.3%	0.0%	0.6%
OCC/Kraft, unwaxed	605	1.8%	1.5%	2.1%	Mattresses	0	0.0%	0.0%	0.0%
OCC/Kraft, waxed	0	0.0%	0.0%	0.0%	Small Appliances	171	0.5%	0.2%	0.9%
High Grade	233	0.7%	0.5%	0.9%	A/V Equipment	118	0.4%	0.1%	0.6%
Mixed Low Grade	2,178	6.6%	6.0%	7.2%	Computer Monitors	0	0.0%	0.0%	0.0%
Compostable/Soiled	2,269	6.9%	6.4%	7.3%	TVs	4	0.0%	0.0%	0.0%
Paper/Other Materials	406	1.2%	1.0%	1.4%	Other Computer Components	114	0.3%	0.0%	0.7%
Plastic	**3,390**	**10.2%**			***CDL Wastes***	**1,296**	**3.9%**		
#1 PET Bottles	187	0.6%	0.5%	0.6%	Dimension Lumber	96	0.3%	0.2%	0.4%
#2 HDPE Natural Bottles	59	0.2%	0.2%	0.2%	Pallets	0	0.0%	0.0%	0.0%
#2 HDPE Colored Bottles	97	0.3%	0.3%	0.3%	Crates	4	0.0%	0.0%	0.0%
Other Plastic Bottles	39	0.1%	0.1%	0.2%	Other Untreated Wood	28	0.1%	0.0%	0.2%
Tubs	329	1.0%	0.9%	1.1%	Treated Wood	293	0.9%	0.6%	1.1%
Expanded Polystyrene	205	0.6%	0.6%	0.7%	Contaminated Wood	128	0.4%	0.2%	0.6%
Other Rigid Packaging	168	0.5%	0.5%	0.5%	New Gypsum Scrap	88	0.3%	0.0%	0.6%
Clean Shopping/Dry Cleaner Bags	90	0.3%	0.2%	0.3%	Demo Gypsum Scrap	53	0.2%	0.0%	0.3%
Other Clean PE Bags	50	0.2%	0.1%	0.2%	Fiberglass Insulation	5	0.0%	0.0%	0.0%
Other Film	1,579	4.8%	4.5%	5.1%	Rock/Concrete/Brick	96	0.3%	0.1%	0.5%
Plastic Products	386	1.2%	0.9%	1.5%	Asphaltic Roofing	71	0.2%	0.0%	0.5%
Plastic/Other Materials	200	0.6%	0.5%	0.7%	Ceramics/Porcelain	77	0.2%	0.1%	0.4%
Glass	**654**	**2.0%**			Other Construction Debris	356	1.1%	0.6%	1.6%
Clear Bottles	131	0.4%	0.3%	0.5%	***Hazardous***	**221**	**0.7%**		
Green Bottles	101	0.3%	0.2%	0.4%	Latex Paints	32	0.1%	0.0%	0.2%
Brown Bottles	110	0.3%	0.2%	0.5%	Solvent-based Adhesives/Glues	0	0.0%	0.0%	0.0%
Container Glass	167	0.5%	0.4%	0.6%	Water-based Adhesives/Glues	2	0.0%	0.0%	0.0%
Fluorescent Tubes	5	0.0%	0.0%	0.0%	Oil-based Paints/Solvents	1	0.0%	0.0%	0.0%
Other Glass	140	0.4%	0.3%	0.6%	Caustic Cleaners	16	0.0%	0.0%	0.1%
Metal	**1,105**	**3.3%**			Pesticides/Herbicides	8	0.0%	0.0%	0.1%
Aluminum Cans	83	0.3%	0.2%	0.3%	Dry-Cell Batteries	22	0.1%	0.0%	0.1%
Alum. Foil/Containers	89	0.3%	0.2%	0.3%	Wet-Cell Batteries	0	0.0%	0.0%	0.0%
Other Aluminum	31	0.1%	0.0%	0.2%	Gasoline/Kerosene	0	0.0%	0.0%	0.0%
Other Nonferrous	10	0.0%	0.0%	0.1%	Motor Oil/Diesel Oil	2	0.0%	0.0%	0.0%
Tin Food Cans	225	0.7%	0.6%	0.8%	Asbestos	0	0.0%	0.0%	0.0%
Empty Aerosol Cans	53	0.2%	0.1%	0.2%	Explosives	1	0.0%	0.0%	0.0%
Other Ferrous	369	1.1%	0.7%	1.5%	Medical Wastes	58	0.2%	0.1%	0.3%
Oil Filters	0	0.0%	0.0%	0.0%	Other Cleaners/Chemicals	55	0.2%	0.1%	0.2%
Mixed Metals/Materials	243	0.7%	0.6%	0.9%	Other Potentially Harmful Wastes	23	0.1%	0.0%	0.1%
Organics	**19,272**	**58.3%**			***Fines & Misc Materials***	**525**	**1.6%**		
Leaves and Grass	890	2.7%	1.3%	4.1%	Sand/Soil/Dirt	97	0.3%	0.1%	0.5%
Prunings	134	0.4%	0.0%	0.8%	Non-distinct Fines	34	0.1%	0.0%	0.3%
Food	12,134	36.7%	35.0%	38.4%	Misc. Organics	347	1.0%	0.8%	1.3%
Textiles/Clothing	803	2.4%	2.0%	2.8%	Misc. Inorganics	48	0.1%	0.1%	0.2%
Mixed Textiles	277	0.8%	0.6%	1.0%					
Carpet	170	0.5%	0.2%	0.8%					
Disposable Diapers	2,163	6.5%	5.8%	7.3%					
Animal By-Products	2,617	7.9%	6.9%	8.9%	**Total Percentage**	**100%**			
Rubber Products	79	0.2%	0.1%	0.3%	**Total Tons**	**33,073**			
Tires	5	0.0%	0.0%	0.0%	**Sample Count**	**93**			

Table 4-25: Composition by Weight – Winter
(January, February, and December 2006)

Calculated at a 90% confidence level

	Tons	Mean	Low	High		Tons	Mean	Low	High
Paper	**6,314**	**18.8%**			***Furniture/Appliances/Electronics***	**425**	**1.3%**		
Newspaper	587	1.7%	1.4%	2.1%	Furniture	121	0.4%	0.0%	0.9%
OCC/Kraft, unwaxed	778	2.3%	1.9%	2.7%	Mattresses	13	0.0%	0.0%	0.1%
OCC/Kraft, waxed	17	0.1%	0.0%	0.1%	Small Appliances	140	0.4%	0.2%	0.7%
High Grade	258	0.8%	0.5%	1.0%	A/V Equipment	56	0.2%	0.0%	0.3%
Mixed Low Grade	2,084	6.2%	5.6%	6.8%	Computer Monitors	0	0.0%	0.0%	0.0%
Compostable/Soiled	2,342	7.0%	6.3%	7.6%	TVs	0	0.0%	0.0%	0.0%
Paper/Other Materials	249	0.7%	0.6%	0.9%	Other Computer Components	95	0.3%	0.0%	0.5%
Plastic	**3,809**	**11.3%**			***CDL Wastes***	**1,175**	**3.5%**		
#1 PET Bottles	212	0.6%	0.6%	0.7%	Dimension Lumber	101	0.3%	0.1%	0.5%
#2 HDPE Natural Bottles	98	0.3%	0.2%	0.3%	Pallets	2	0.0%	0.0%	0.0%
#2 HDPE Colored Bottles	109	0.3%	0.3%	0.4%	Crates	0	0.0%	0.0%	0.0%
Other Plastic Bottles	22	0.1%	0.0%	0.1%	Other Untreated Wood	49	0.1%	0.1%	0.2%
Tubs	310	0.9%	0.8%	1.0%	Treated Wood	293	0.9%	0.2%	1.5%
Expanded Polystyrene	279	0.8%	0.7%	0.9%	Contaminated Wood	68	0.2%	0.1%	0.3%
Other Rigid Packaging	228	0.7%	0.6%	0.8%	New Gypsum Scrap	17	0.1%	0.0%	0.1%
Clean Shopping/Dry Cleaner Bags	135	0.4%	0.3%	0.5%	Demo Gypsum Scrap	113	0.3%	0.1%	0.6%
Other Clean PE Bags	29	0.1%	0.0%	0.1%	Fiberglass Insulation	8	0.0%	0.0%	0.1%
Other Film	1,806	5.4%	5.0%	5.8%	Rock/Concrete/Brick	35	0.1%	0.0%	0.3%
Plastic Products	355	1.1%	0.8%	1.3%	Asphaltic Roofing	119	0.4%	0.2%	0.6%
Plastic/Other Materials	227	0.7%	0.6%	0.8%	Ceramics/Porcelain	132	0.4%	0.3%	0.5%
Glass	**922**	**2.7%**			Other Construction Debris	237	0.7%	0.0%	1.4%
Clear Bottles	196	0.6%	0.5%	0.7%	***Hazardous***	**183**	**0.5%**		
Green Bottles	192	0.6%	0.4%	0.7%	Latex Paints	82	0.2%	0.0%	0.6%
Brown Bottles	180	0.5%	0.4%	0.7%	Solvent-based Adhesives/Glues	0	0.0%	0.0%	0.0%
Container Glass	166	0.5%	0.4%	0.6%	Water-based Adhesives/Glues	0	0.0%	0.0%	0.0%
Fluorescent Tubes	3	0.0%	0.0%	0.0%	Oil-based Paints/Solvents	3	0.0%	0.0%	0.0%
Other Glass	185	0.6%	0.4%	0.7%	Caustic Cleaners	0	0.0%	0.0%	0.0%
Metal	**1,168**	**3.5%**			Pesticides/Herbicides	1	0.0%	0.0%	0.0%
Aluminum Cans	110	0.3%	0.3%	0.4%	Dry-Cell Batteries	55	0.2%	0.1%	0.2%
Alum. Foil/Containers	118	0.4%	0.3%	0.4%	Wet-Cell Batteries	0	0.0%	0.0%	0.0%
Other Aluminum	39	0.1%	0.0%	0.2%	Gasoline/Kerosene	0	0.0%	0.0%	0.0%
Other Nonferrous	11	0.0%	0.0%	0.1%	Motor Oil/Diesel Oil	5	0.0%	0.0%	0.0%
Tin Food Cans	286	0.9%	0.8%	1.0%	Asbestos	0	0.0%	0.0%	0.0%
Empty Aerosol Cans	47	0.1%	0.1%	0.2%	Explosives	0	0.0%	0.0%	0.0%
Other Ferrous	278	0.8%	0.6%	1.1%	Medical Wastes	11	0.0%	0.0%	0.1%
Oil Filters	6	0.0%	0.0%	0.0%	Other Cleaners/Chemicals	15	0.0%	0.0%	0.1%
Mixed Metals/Materials	273	0.8%	0.5%	1.1%	Other Potentially Harmful Wastes	9	0.0%	0.0%	0.1%
Organics	**18,834**	**56.1%**			***Fines & Misc Materials***	**762**	**2.3%**		
Leaves and Grass	319	0.9%	0.5%	1.4%	Sand/Soil/Dirt	229	0.7%	0.2%	1.2%
Prunings	158	0.5%	0.1%	0.8%	Non-distinct Fines	20	0.1%	0.0%	0.1%
Food	12,252	36.5%	34.1%	38.9%	Misc. Organics	328	1.0%	0.8%	1.1%
Textiles/Clothing	912	2.7%	2.1%	3.3%	Misc. Inorganics	186	0.6%	0.2%	0.9%
Mixed Textiles	274	0.8%	0.5%	1.1%					
Carpet	393	1.2%	0.3%	2.0%					
Disposable Diapers	1,803	5.4%	4.6%	6.2%					
Animal By-Products	2,669	7.9%	6.3%	9.5%	**Total Percentage**	**100%**			
Rubber Products	55	0.2%	0.1%	0.2%	**Total Tons**	**33,592**			
Tires	0	0.0%	0.0%	0.0%	**Sample Count**	**78**			

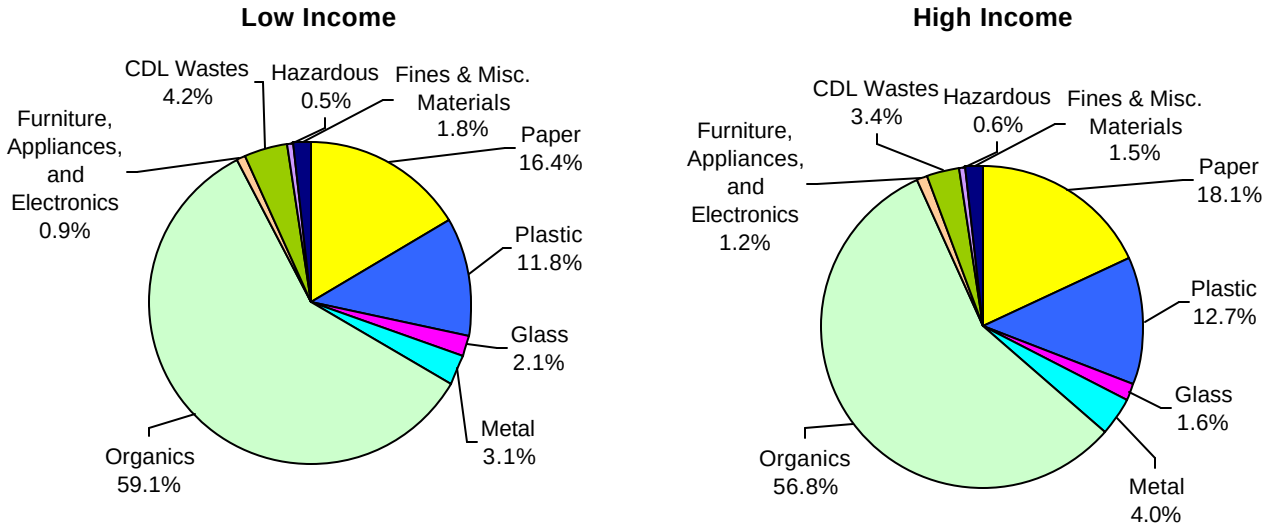
4.7 By Demographics

Waste compositions 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.[13] 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 more than 55% of the total, by weight. *Paper* and *plastic* together, made up about 30% of the waste from each. *Organic wastes* made up a slightly higher percentage for low-income households (59.1%) as compared to high-income households (56.8%).

Figure 4-6: Composition Summary, by Household Income
(January – December 2006)



[13] 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 60 waste samples were sorted from *high income* routes during 2006. Table 4-26 lists the top ten components, which sum to approximately 77.7% of the total, by weight. The largest component, *food*, accounted for approximately one-third of the waste stream. *Animal by-products, compostable/soiled paper,* and *disposable diapers* each made up at least 7% 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 2006)

Component	Mean	Cum. %
Food	33.2%	33.2%
Animal By-Products	9.5%	42.8%
Compostable/Soiled Paper	8.0%	50.8%
Disposable Diapers	7.4%	58.1%
Other Plastic Film	5.9%	64.0%
Mixed Low Grade Paper	5.5%	69.5%
Textiles/Clothing	3.1%	72.6%
Unwaxed OCC/Kraft Paper	1.9%	74.5%
Other Ferrous Metal	1.7%	76.2%
Plastic Products	1.5%	77.7%
Total	**77.7%**	

4.7.1.2 Low Income

A total of 62 samples were sorted from the *low income* routes during 2006. The top ten components of this waste are listed in Table 4-27. *Food* made up almost 37% of the total waste, by weight. *Animal by-products, compostable/soiled paper,* and *disposable diapers* made up almost 25% of the overall *low income* waste. The top ten components made up approximately 78.1% 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 2006)

Component	Mean	Cum. %
Food	36.7%	36.7%
Animal By-Products	10.3%	47.0%
Compostable/Soiled Paper	6.8%	53.8%
Disposable Diapers	6.8%	60.6%
Mixed Low Grade Paper	5.5%	66.1%
Other Plastic Film	5.2%	71.3%
Textiles/Clothing	2.4%	73.7%
Leaves and Grass	1.5%	75.2%
Unwaxed OCC/Kraft Paper	1.5%	76.7%
Plastic Products	1.4%	78.1%
Total	**78.1%**	

4.7.1.3 Comparisons between High and Low Income

Waste disposed by *high* and *low income* households contain nine of the same top ten materials. *Leaves and grass* was a top ten component for waste from low income households, while *other ferrous metal* was a top ten component for waste from high income households only. *Food* made up a third or more of the waste for both groups.

Table 4-28: Composition by Weight – High Income
(January – December 2006)

Calculated at a 90% confidence level

	Mean	Low	High		Mean	Low	High
Paper	**18.1%**			***Furniture/Appliances/Electronics***	**1.2%**		
Newspaper	1.0%	0.7%	1.2%	Furniture	0.1%	0.0%	0.1%
OCC/Kraft, unwaxed	1.9%	1.6%	2.1%	Mattresses	0.0%	0.0%	0.0%
OCC/Kraft, waxed	0.0%	0.0%	0.0%	Small Appliances	0.7%	0.0%	1.3%
High Grade	0.7%	0.5%	0.9%	A/V Equipment	0.3%	0.1%	0.5%
Mixed Low Grade	5.5%	5.0%	6.0%	Computer Monitors	0.0%	0.0%	0.0%
Compostable/Soiled	8.0%	7.3%	8.7%	TVs	0.0%	0.0%	0.0%
Paper/Other Materials	1.1%	0.8%	1.4%	Other Computer Components	0.2%	0.0%	0.3%
Plastic	**12.7%**			***CDL Wastes***	**3.4%**		
#1 PET Bottles	0.5%	0.4%	0.5%	Dimension Lumber	0.2%	0.1%	0.3%
#2 HDPE Natural Bottles	0.2%	0.1%	0.2%	Pallets	0.0%	0.0%	0.0%
#2 HDPE Colored Bottles	0.4%	0.3%	0.4%	Crates	0.0%	0.0%	0.0%
Other Plastic Bottles	0.2%	0.1%	0.2%	Other Untreated Wood	0.1%	0.0%	0.1%
Tubs	1.3%	1.2%	1.5%	Treated Wood	0.6%	0.4%	0.8%
Expanded Polystyrene	0.8%	0.7%	0.9%	Contaminated Wood	0.2%	0.1%	0.3%
Other Rigid Packaging	0.8%	0.8%	0.9%	New Gypsum Scrap	0.0%	0.0%	0.1%
Clean Shopping/Dry Cleaner Bags	0.3%	0.2%	0.3%	Demo Gypsum Scrap	0.2%	0.0%	0.5%
Other Clean PE Bags	0.2%	0.1%	0.3%	Fiberglass Insulation	0.0%	0.0%	0.0%
Other Film	5.9%	5.5%	6.3%	Rock/Concrete/Brick	0.2%	0.1%	0.3%
Plastic Products	1.5%	1.2%	1.8%	Asphaltic Roofing	0.1%	0.0%	0.3%
Plastic/Other Materials	0.7%	0.6%	0.9%	Ceramics/Porcelain	0.3%	0.2%	0.5%
Glass	**1.6%**			Other Construction Debris	1.4%	0.3%	2.5%
Clear Bottles	0.3%	0.2%	0.3%	***Hazardous***	**0.6%**		
Green Bottles	0.3%	0.2%	0.4%	Latex Paints	0.1%	0.0%	0.2%
Brown Bottles	0.3%	0.2%	0.4%	Solvent-based Adhesives/Glues	0.0%	0.0%	0.0%
Container Glass	0.5%	0.4%	0.6%	Water-based Adhesives/Glues	0.0%	0.0%	0.0%
Fluorescent Tubes	0.0%	0.0%	0.0%	Oil-based Paints/Solvents	0.0%	0.0%	0.0%
Other Glass	0.3%	0.2%	0.4%	Caustic Cleaners	0.0%	0.0%	0.0%
Metal	**4.0%**			Pesticides/Herbicides	0.0%	0.0%	0.0%
Aluminum Cans	0.2%	0.2%	0.2%	Dry-Cell Batteries	0.1%	0.1%	0.1%
Alum. Foil/Containers	0.3%	0.3%	0.4%	Wet-Cell Batteries	0.0%	0.0%	0.0%
Other Aluminum	0.1%	0.0%	0.2%	Gasoline/Kerosene	0.0%	0.0%	0.0%
Other Nonferrous	0.0%	0.0%	0.0%	Motor Oil/Diesel Oil	0.0%	0.0%	0.0%
Tin Food Cans	0.7%	0.6%	0.8%	Asbestos	0.0%	0.0%	0.0%
Empty Aerosol Cans	0.2%	0.1%	0.2%	Explosives	0.0%	0.0%	0.0%
Other Ferrous	1.7%	0.4%	3.1%	Medical Wastes	0.1%	0.0%	0.2%
Oil Filters	0.0%	0.0%	0.0%	Other Cleaners/Chemicals	0.1%	0.0%	0.1%
Mixed Metals/Materials	0.8%	0.6%	1.1%	Other Potentially Harmful Wastes	0.2%	0.0%	0.3%
Organics	**56.8%**			***Fines & Misc Materials***	**1.5%**		
Leaves and Grass	1.3%	0.5%	2.1%	Sand/Soil/Dirt	0.5%	0.2%	0.9%
Prunings	0.5%	0.1%	0.9%	Non-distinct Fines	0.0%	0.0%	0.0%
Food	33.2%	31.0%	35.4%	Misc. Organics	0.8%	0.7%	1.0%
Textiles/Clothing	3.1%	1.8%	4.4%	Misc. Inorganics	0.2%	0.1%	0.3%
Mixed Textiles	0.7%	0.5%	0.9%				
Carpet	0.9%	0.4%	1.3%				
Disposable Diapers	7.4%	6.5%	8.2%				
Animal By-Products	9.5%	7.9%	11.2%	**Total Percentage**	**100%**		
Rubber Products	0.2%	0.1%	0.3%	**Sample Count**	**60**		
Tires	0.0%	0.0%	0.1%				

Table 4-29: Composition by Weight – Low Income
(January – December 2006)

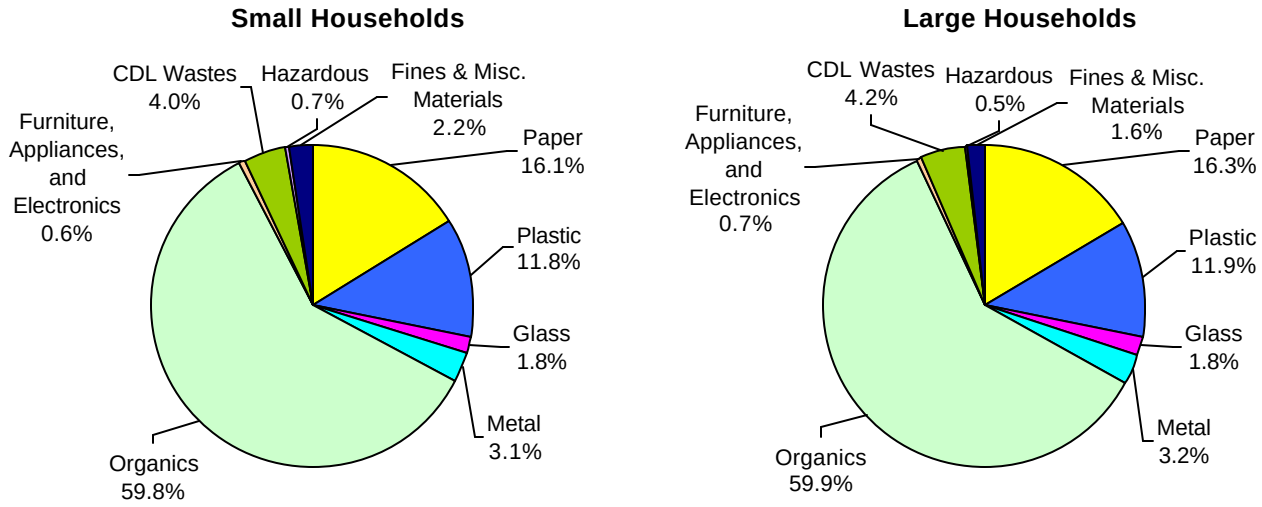
Calculated at a 90% confidence level

	Mean	Low	High		Mean	Low	High
Paper	**16.4%**			***Furniture/Appliances/Electronics***	**0.9%**		
Newspaper	1.1%	0.9%	1.4%	Furniture	0.0%	0.0%	0.0%
OCC/Kraft, unwaxed	1.5%	1.2%	1.7%	Mattresses	0.0%	0.0%	0.0%
OCC/Kraft, waxed	0.0%	0.0%	0.0%	Small Appliances	0.4%	0.2%	0.6%
High Grade	0.6%	0.4%	0.9%	A/V Equipment	0.3%	0.1%	0.5%
Mixed Low Grade	5.5%	4.9%	6.1%	Computer Monitors	0.0%	0.0%	0.0%
Compostable/Soiled	6.8%	6.3%	7.4%	TVs	0.2%	0.0%	0.5%
Paper/Other Materials	0.9%	0.7%	1.0%	Other Computer Components	0.1%	0.0%	0.1%
Plastic	**11.8%**			***CDL Wastes***	**4.2%**		
#1 PET Bottles	0.7%	0.6%	0.7%	Dimension Lumber	0.4%	0.3%	0.6%
#2 HDPE Natural Bottles	0.3%	0.2%	0.3%	Pallets	0.0%	0.0%	0.1%
#2 HDPE Colored Bottles	0.3%	0.3%	0.4%	Crates	0.0%	0.0%	0.0%
Other Plastic Bottles	0.1%	0.1%	0.1%	Other Untreated Wood	0.1%	0.1%	0.2%
Tubs	1.1%	1.0%	1.2%	Treated Wood	1.0%	0.6%	1.5%
Expanded Polystyrene	0.9%	0.8%	1.0%	Contaminated Wood	0.1%	0.0%	0.2%
Other Rigid Packaging	0.7%	0.6%	0.8%	New Gypsum Scrap	0.5%	0.0%	1.0%
Clean Shopping/Dry Cleaner Bags	0.3%	0.3%	0.4%	Demo Gypsum Scrap	0.3%	0.0%	0.7%
Other Clean PE Bags	0.1%	0.0%	0.2%	Fiberglass Insulation	0.0%	0.0%	0.0%
Other Film	5.2%	4.9%	5.6%	Rock/Concrete/Brick	0.4%	0.0%	0.7%
Plastic Products	1.4%	1.0%	1.8%	Asphaltic Roofing	0.1%	0.0%	0.2%
Plastic/Other Materials	0.6%	0.5%	0.7%	Ceramics/Porcelain	0.3%	0.2%	0.4%
Glass	**2.1%**			Other Construction Debris	0.9%	0.4%	1.4%
Clear Bottles	0.5%	0.4%	0.6%	***Hazardous***	**0.5%**		
Green Bottles	0.4%	0.2%	0.5%	Latex Paints	0.1%	0.0%	0.2%
Brown Bottles	0.3%	0.2%	0.4%	Solvent-based Adhesives/Glues	0.0%	0.0%	0.0%
Container Glass	0.5%	0.4%	0.6%	Water-based Adhesives/Glues	0.0%	0.0%	0.0%
Fluorescent Tubes	0.0%	0.0%	0.0%	Oil-based Paints/Solvents	0.1%	0.0%	0.1%
Other Glass	0.4%	0.4%	0.5%	Caustic Cleaners	0.0%	0.0%	0.0%
Metal	**3.1%**			Pesticides/Herbicides	0.0%	0.0%	0.0%
Aluminum Cans	0.3%	0.2%	0.3%	Dry-Cell Batteries	0.1%	0.1%	0.1%
Alum. Foil/Containers	0.3%	0.2%	0.4%	Wet-Cell Batteries	0.0%	0.0%	0.0%
Other Aluminum	0.1%	0.0%	0.2%	Gasoline/Kerosene	0.0%	0.0%	0.0%
Other Nonferrous	0.1%	0.0%	0.1%	Motor Oil/Diesel Oil	0.0%	0.0%	0.0%
Tin Food Cans	0.8%	0.7%	0.9%	Asbestos	0.0%	0.0%	0.0%
Empty Aerosol Cans	0.2%	0.1%	0.3%	Explosives	0.0%	0.0%	0.0%
Other Ferrous	0.8%	0.5%	1.1%	Medical Wastes	0.1%	0.0%	0.1%
Oil Filters	0.0%	0.0%	0.0%	Other Cleaners/Chemicals	0.1%	0.0%	0.2%
Mixed Metals/Materials	0.5%	0.3%	0.6%	Other Potentially Harmful Wastes	0.0%	0.0%	0.1%
Organics	**59.1%**			***Fines & Misc Materials***	**1.8%**		
Leaves and Grass	1.5%	0.7%	2.2%	Sand/Soil/Dirt	0.4%	0.0%	0.8%
Prunings	0.1%	0.0%	0.1%	Non-distinct Fines	0.0%	0.0%	0.0%
Food	36.7%	34.5%	39.0%	Misc. Organics	1.1%	0.8%	1.5%
Textiles/Clothing	2.4%	2.1%	2.7%	Misc. Inorganics	0.2%	0.1%	0.4%
Mixed Textiles	0.8%	0.6%	1.0%				
Carpet	0.3%	0.1%	0.5%				
Disposable Diapers	6.8%	5.9%	7.7%				
Animal By-Products	10.3%	8.5%	12.0%	**Total Percentage**	**100%**		
Rubber Products	0.2%	0.1%	0.3%	**Sample Count**	**62**		
Tires	0.0%	0.0%	0.0%				

4.8 By Household Size

A waste composition summary, by broad material category, is presented in Figure 4-7 for waste disposed by *small* and *large households*. For each household type, *organics*, *paper*, and *plastic*, together, made up almost 90% of the total, by weight. Waste percentages by broad material categories are very similar for both household types.

Figure 4-7: Composition Summary, by Household Size
(January – December 2006)



4.8.1.1 Small Households

A total of 62 samples were obtained from *small household* routes. Table 4-30 lists the top ten components, by weight, for *small households*. *Food*, *animal by-products*, *disposable diapers,* and *compostable/soiled paper* each made up more than 6% of the total, by weight. The top ten components, together, accounted for approximately 77.6% 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 2006)

Component	Mean	Cum. %
Food	33.9%	33.9%
Animal By-Products	11.3%	45.1%
Disposable Diapers	7.3%	52.5%
Compostable/Soiled Paper	6.8%	59.3%
Mixed Low Grade Paper	5.6%	64.8%
Other Plastic Film	5.5%	70.3%
Textiles/Clothing	2.9%	73.3%
Leaves and Grass	1.7%	74.9%
Unwaxed OCC/Kraft Paper	1.4%	76.3%
Plastic Tubs	1.3%	77.6%
Total	**77.6%**	

4.8.1.2 Large Households

A total of 58 samples were captured and sorted from *large household* routes. As shown in Table 4-31, *food* accounted for about 40%. *Animal by-products, compostable/soiled paper*, and *disposable diapers* each accounted for more than 6% 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 2006)

Component	Mean	Cum. %
Food	40.2%	40.2%
Animal By-Products	7.2%	47.4%
Compostable/Soiled Paper	7.0%	54.5%
Disposable Diapers	6.7%	61.2%
Other Plastic Film	5.6%	66.8%
Mixed Low Grade Paper	5.2%	72.0%
Textiles/Clothing	2.5%	74.5%
Unwaxed OCC/Kraft Paper	1.5%	75.9%
Leaves and Grass	1.4%	77.3%
Plastic Products	1.3%	78.7%
Total	**78.7%**	

4.8.2 Comparisons between Small and Large Households

Waste disposed by *small* and *large households* contain nine of the same top ten materials. For both *small* and *large households, food* made up more than a third of the total waste, by weight. *Tubs* are a top ten component of waste from *small households*, while *plastic products* were one of the top ten components for *large households*.

Table 4-32: Composition by Weight – Small Households
(January – December 2006)

Calculated at a 90% confidence level

	Mean	Low	High		Mean	Low	High
Paper	**16.1%**			***Furniture/Appliances/Electronics***	**0.6%**		
Newspaper	0.8%	0.6%	1.0%	Furniture	0.0%	0.0%	0.1%
OCC/Kraft, unwaxed	1.4%	1.2%	1.5%	Mattresses	0.0%	0.0%	0.0%
OCC/Kraft, waxed	0.0%	0.0%	0.0%	Small Appliances	0.1%	0.0%	0.2%
High Grade	0.5%	0.4%	0.7%	A/V Equipment	0.3%	0.1%	0.5%
Mixed Low Grade	5.6%	5.1%	6.1%	Computer Monitors	0.0%	0.0%	0.0%
Compostable/Soiled	6.8%	6.4%	7.3%	TVs	0.2%	0.0%	0.5%
Paper/Other Materials	1.0%	0.8%	1.2%	Other Computer Components	0.0%	0.0%	0.0%
Plastic	**11.8%**			***CDL Wastes***	**4.0%**		
#1 PET Bottles	0.5%	0.4%	0.5%	Dimension Lumber	0.2%	0.1%	0.4%
#2 HDPE Natural Bottles	0.2%	0.2%	0.3%	Pallets	0.0%	0.0%	0.1%
#2 HDPE Colored Bottles	0.3%	0.2%	0.3%	Crates	0.0%	0.0%	0.0%
Other Plastic Bottles	0.1%	0.1%	0.1%	Other Untreated Wood	0.1%	0.0%	0.2%
Tubs	1.3%	1.2%	1.4%	Treated Wood	0.9%	0.6%	1.1%
Expanded Polystyrene	0.8%	0.7%	0.9%	Contaminated Wood	0.2%	0.1%	0.4%
Other Rigid Packaging	0.8%	0.7%	0.9%	New Gypsum Scrap	0.2%	0.1%	0.4%
Clean Shopping/Dry Cleaner Bags	0.3%	0.2%	0.4%	Demo Gypsum Scrap	0.1%	0.0%	0.3%
Other Clean PE Bags	0.2%	0.1%	0.3%	Fiberglass Insulation	0.0%	0.0%	0.0%
Other Film	5.5%	5.2%	5.9%	Rock/Concrete/Brick	0.5%	0.1%	0.8%
Plastic Products	1.1%	0.9%	1.4%	Asphaltic Roofing	0.2%	0.0%	0.4%
Plastic/Other Materials	0.7%	0.5%	0.8%	Ceramics/Porcelain	0.4%	0.3%	0.6%
Glass	**1.8%**			Other Construction Debris	1.0%	0.4%	1.6%
Clear Bottles	0.3%	0.2%	0.4%	***Hazardous***	**0.7%**		
Green Bottles	0.3%	0.2%	0.4%	Latex Paints	0.2%	0.0%	0.4%
Brown Bottles	0.3%	0.2%	0.5%	Solvent-based Adhesives/Glues	0.0%	0.0%	0.0%
Container Glass	0.4%	0.3%	0.5%	Water-based Adhesives/Glues	0.0%	0.0%	0.0%
Fluorescent Tubes	0.0%	0.0%	0.0%	Oil-based Paints/Solvents	0.0%	0.0%	0.1%
Other Glass	0.4%	0.3%	0.5%	Caustic Cleaners	0.0%	0.0%	0.0%
Metal	**3.1%**			Pesticides/Herbicides	0.0%	0.0%	0.0%
Aluminum Cans	0.2%	0.2%	0.3%	Dry-Cell Batteries	0.1%	0.1%	0.1%
Alum. Foil/Containers	0.3%	0.2%	0.3%	Wet-Cell Batteries	0.0%	0.0%	0.0%
Other Aluminum	0.2%	0.0%	0.3%	Gasoline/Kerosene	0.0%	0.0%	0.0%
Other Nonferrous	0.0%	0.0%	0.1%	Motor Oil/Diesel Oil	0.0%	0.0%	0.0%
Tin Food Cans	0.7%	0.6%	0.7%	Asbestos	0.0%	0.0%	0.0%
Empty Aerosol Cans	0.2%	0.1%	0.2%	Explosives	0.0%	0.0%	0.0%
Other Ferrous	0.9%	0.6%	1.1%	Medical Wastes	0.1%	0.0%	0.3%
Oil Filters	0.0%	0.0%	0.0%	Other Cleaners/Chemicals	0.1%	0.0%	0.1%
Mixed Metals/Materials	0.6%	0.5%	0.8%	Other Potentially Harmful Wastes	0.1%	0.0%	0.1%
Organics	**59.8%**			***Fines & Misc Materials***	**2.2%**		
Leaves and Grass	1.7%	0.8%	2.5%	Sand/Soil/Dirt	0.8%	0.3%	1.3%
Prunings	0.5%	0.1%	0.8%	Non-distinct Fines	0.1%	0.0%	0.1%
Food	33.9%	32.2%	35.5%	Misc. Organics	1.0%	0.8%	1.2%
Textiles/Clothing	2.9%	2.2%	3.6%	Misc. Inorganics	0.4%	0.2%	0.6%
Mixed Textiles	1.1%	0.8%	1.3%				
Carpet	0.4%	0.2%	0.7%				
Disposable Diapers	7.3%	6.4%	8.2%				
Animal By-Products	11.3%	9.6%	12.9%	**Total Percentage**	**100%**		
Rubber Products	0.8%	0.0%	1.5%	**Sample Count**	**62**		
Tires	0.0%	0.0%	0.0%				

Table 4-33: Composition by Weight – Large Households
(January – December 2006)

Calculated at a 90% confidence level

	Mean	Low	High		Mean	Low	High
Paper	**16.3%**			***Furniture/Appliances/Electronics***	**0.7%**		
Newspaper	1.1%	0.8%	1.3%	Furniture	0.0%	0.0%	0.0%
OCC/Kraft, unwaxed	1.5%	1.2%	1.8%	Mattresses	0.0%	0.0%	0.0%
OCC/Kraft, waxed	0.0%	0.0%	0.0%	Small Appliances	0.4%	0.1%	0.7%
High Grade	0.7%	0.5%	0.9%	A/V Equipment	0.2%	0.1%	0.3%
Mixed Low Grade	5.2%	4.6%	5.9%	Computer Monitors	0.0%	0.0%	0.0%
Compostable/Soiled	7.0%	6.5%	7.6%	TVs	0.0%	0.0%	0.0%
Paper/Other Materials	0.8%	0.6%	1.0%	Other Computer Components	0.1%	0.0%	0.2%
Plastic	**11.9%**			***CDL Wastes***	**4.2%**		
#1 PET Bottles	0.6%	0.6%	0.7%	Dimension Lumber	0.3%	0.1%	0.5%
#2 HDPE Natural Bottles	0.2%	0.2%	0.2%	Pallets	0.0%	0.0%	0.0%
#2 HDPE Colored Bottles	0.4%	0.3%	0.4%	Crates	0.0%	0.0%	0.0%
Other Plastic Bottles	0.1%	0.1%	0.1%	Other Untreated Wood	0.1%	0.0%	0.2%
Tubs	1.0%	0.9%	1.1%	Treated Wood	0.7%	0.3%	1.1%
Expanded Polystyrene	0.9%	0.8%	1.0%	Contaminated Wood	0.2%	0.0%	0.3%
Other Rigid Packaging	0.7%	0.6%	0.7%	New Gypsum Scrap	0.5%	0.0%	1.0%
Clean Shopping/Dry Cleaner Bags	0.3%	0.2%	0.3%	Demo Gypsum Scrap	0.3%	0.1%	0.5%
Other Clean PE Bags	0.1%	0.0%	0.1%	Fiberglass Insulation	0.0%	0.0%	0.0%
Other Film	5.6%	5.2%	6.0%	Rock/Concrete/Brick	0.4%	0.0%	0.7%
Plastic Products	1.3%	0.9%	1.8%	Asphaltic Roofing	0.2%	0.0%	0.3%
Plastic/Other Materials	0.7%	0.5%	0.8%	Ceramics/Porcelain	0.4%	0.2%	0.6%
Glass	**1.8%**			Other Construction Debris	1.3%	0.5%	2.0%
Clear Bottles	0.5%	0.4%	0.6%	***Hazardous***	**0.5%**		
Green Bottles	0.3%	0.2%	0.4%	Latex Paints	0.0%	0.0%	0.1%
Brown Bottles	0.2%	0.1%	0.3%	Solvent-based Adhesives/Glues	0.0%	0.0%	0.0%
Container Glass	0.5%	0.3%	0.6%	Water-based Adhesives/Glues	0.0%	0.0%	0.0%
Fluorescent Tubes	0.0%	0.0%	0.0%	Oil-based Paints/Solvents	0.0%	0.0%	0.0%
Other Glass	0.3%	0.3%	0.4%	Caustic Cleaners	0.0%	0.0%	0.0%
Metal	**3.2%**			Pesticides/Herbicides	0.0%	0.0%	0.0%
Aluminum Cans	0.3%	0.2%	0.3%	Dry-Cell Batteries	0.1%	0.1%	0.1%
Alum. Foil/Containers	0.3%	0.3%	0.3%	Wet-Cell Batteries	0.0%	0.0%	0.0%
Other Aluminum	0.1%	0.0%	0.1%	Gasoline/Kerosene	0.0%	0.0%	0.0%
Other Nonferrous	0.0%	0.0%	0.0%	Motor Oil/Diesel Oil	0.0%	0.0%	0.0%
Tin Food Cans	0.9%	0.7%	1.0%	Asbestos	0.0%	0.0%	0.0%
Empty Aerosol Cans	0.2%	0.1%	0.3%	Explosives	0.0%	0.0%	0.0%
Other Ferrous	0.8%	0.5%	1.2%	Medical Wastes	0.2%	0.0%	0.3%
Oil Filters	0.0%	0.0%	0.0%	Other Cleaners/Chemicals	0.1%	0.0%	0.2%
Mixed Metals/Materials	0.7%	0.3%	1.0%	Other Potentially Harmful Wastes	0.1%	0.0%	0.2%
Organics	**59.9%**			***Fines & Misc Materials***	**1.6%**		
Leaves and Grass	1.4%	0.7%	2.0%	Sand/Soil/Dirt	0.6%	0.1%	1.0%
Prunings	0.1%	0.0%	0.2%	Non-distinct Fines	0.0%	0.0%	0.0%
Food	40.2%	37.6%	42.8%	Misc. Organics	0.9%	0.7%	1.1%
Textiles/Clothing	2.5%	1.3%	3.6%	Misc. Inorganics	0.1%	0.0%	0.2%
Mixed Textiles	0.8%	0.5%	1.0%				
Carpet	0.6%	0.2%	1.0%				
Disposable Diapers	6.7%	5.8%	7.5%				
Animal By-Products	7.2%	5.8%	8.6%	**Total Percentage**	**100%**		
Rubber Products	0.2%	0.1%	0.4%	**Sample Count**	**58**		
Tires	0.2%	0.0%	0.4%				

Appendix A: Waste Components

Waste samples were sorted by hand into 83 waste component categories, as defined in this section.

Waste Components

Paper

NEWSPAPER: Printed ground wood newsprint. Includes advertising "slicks" (glossy paper), if found mixed with newspaper; otherwise, ad slicks are included with mixed low grade.

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.

HIGH-GRADE PAPER: White and lightly colored bond, rag, or stationary grade paper. This includes white or lightly colored sulfite/sulfate bond, copy papers, notebook paper, envelopes, continuous-feed sulfite/sulfate computer printouts and forms of all types, excluding carbonless paper.

MIXED LOW-GRADE PAPER: Mixed paper acceptable in Seattle's residential curbside program. This includes junk mail; magazines; colored papers; bleached Kraft; boxboard; mailing tubes; carbonless copy paper; ground wood computer printouts; paperback books; telephone directories; polycoated milk, ice cream, and aseptic juice containers, including those with plastic spouts attached; and frozen/refrigerator packaging. Excludes juice concentrate cans.

COMPOSTABLE/SOILED PAPER: Paper towels, paper plates, waxed paper, tissues, and other papers that were soiled with food during use (e.g., pizza box inserts).

MIXED/OTHER PAPER: Predominantly paper with other materials attached (e.g. orange juice cans and spiral notebooks), and other non-recyclable papers such as carbon copy paper, hardcover books, and photographs.

Plastic

PET BOTTLES: Blow-molded polyethylene terephthalate (#1) bottles and jars excluding toxic product containers.

HDPE NATURAL BOTTLES: Blow-molded high-density translucent polyethylene (#2) bottles and jars excluding toxic product containers. Examples include milk, juice, beverage, oil, vinegar, and distilled water.

HDPE COLORED BOTTLES: Blow-molded high-density colored polyethylene (#2) bottles and jars excluding toxic product containers. Examples include liquid detergent bottles and some hair care bottles.

OTHER PLASTIC BOTTLES: Blow-molded #3-#7 plastic bottles and jars and unknown bottles. Excludes toxic product containers.

TUBS: #1-#7 tubs such as yogurt, cottage cheese, prescription vials, and margarine. Excludes toxic product containers.

EXPANDED POLYSTYRENE: Includes packaging and finished products made of expanded polystyrene. Includes Styrofoam products such as plates and bowls.

OTHER RIGID PACKAGING: #1-#7 and unmarked rigid plastic packaging (excluding expanded polystyrene), such as clamshells, salad trays, lids, cookie tray inserts, plastic spools, plastic frozen food trays, and plastic toothpaste tubes. Also includes toxic product containers, such as for motor oil or antifreeze.

CLEAN SHOPPING/DRY CLEANER BAGS: Labeled grocery and merchandise, dry cleaner, and newspaper polyethylene film bags that were not contaminated with food, liquid or grit during use.

OTHER CLEAN POLYETHLENE FILM: Polyethylene film and bags, other than those identified above, which were not contaminated with food, liquid or grit during use.

OTHER FILM: Film packaging not defined above, or: was contaminated with food, liquid or grit during use; is woven together (e.g., grain bags); or that contains multiple layers of film or other materials that have been fused together (e.g., potato chip bags). This category also includes plastic sheeting, photographic negatives, shower curtains, any bags used to contain food or liquid (e.g., produce and bread bags), and used garbage bags.

PLASTIC PRODUCTS: Finished plastic products made entirely of plastic such as toys, toothbrushes, vinyl hose, forks and spoons, plastic lawn furniture, foam mattresses, and foam carpet padding. Includes fiberglass resin products and materials.

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

Glass

CLEAR BEVERAGE: Bottles that are clear in color, including pop, liquor, wine, juice, beer, and vinegar bottles.

GREEN BEVERAGE: Bottles that are green in color, including green pop, liquor, wine, beer, and lemon juice bottles.

BROWN BEVERAGE: Bottles that are brown in color, including brown pop, beer, liquor, juice, and extract bottles.

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

FLUORESCENT TUBES: Fluorescent light tubes and compact fluorescent bulbs (CFL).

OTHER GLASS: Window glass, mirrors, light bulbs (except fluorescent tubes), glassware, and blue glass bottles.

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 made 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: Items that are predominately metal with other materials attached such as motors, insulated wire, and finished products containing a mixture of metals, or metals and other materials. White goods are banned from Seattle's disposal. However, segments of large appliances are occasionally found; they are included in this category.

Organic

LEAVES AND GRASS: Non-woody plant materials from a yard or garden area, including grass clippings, leaves, weeds, and garden wastes.

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. Biodegradable packaging peanuts (made from corn starch) are also included in this category.

TEXTILES: Rag stock fabric materials including natural and synthetic textiles such as cotton, wool, silk, woven nylon, rayon, and polyester.

MIXED TEXTILES: Non-rag stock grade textiles such as upholstered items, non-leather shoes and handbags, heavy linens, and draperies.

CARPET: General category of flooring applications and non-rag stock textiles consisting of various natural or synthetic fibers bonded to some type of backing material. Also includes felt fabric carpet padding.

DISPOSABLE DIAPERS: Diapers made from a combination of fibers, synthetic, and/or natural, and made for the purpose of single use. This includes disposable baby diapers and adult protective undergarments.

ANIMAL BY-PRODUCTS: Animal carcasses not resulting from food storage or preparation, animal wastes, and kitty litter.

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

TIRES: Vehicle tires of all types. Tubes are put into the rubber category.

Furniture, Appliances, and Electronics

FURNITURE: Mixed-material furniture such as upholstered chairs. Furniture that is made purely of one material, such as plastic or metal, would be categorized according to that material (e.g., plastic products or other ferrous metal).

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: Examples include stereos, radios, tape decks, VCRs, and cell phones.

COMPUTER MONITORS: Computer monitors containing a cathode ray tube (CRT).

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

OTHER COMPUTER EQUIPMENT: Computer items not containing CRTs such as processors, mice and mouse pads, keyboards, disk drives, and laptops.

Construction Debris

DIMENSION LUMBER: Milled lumber commonly used in construction for framing and related uses, including 2 x 4's, 2 x 6's, sheets of plywood, strandboard, and particleboard.

PALLETS: Untreated wood pallets, whole and broken.

CRATES: Untreated crates, pieces of crates, and other packaging lumber/panelboard.

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 (with generally 50% or more of the surface area treated). This includes painted and chemically treated lumber.

CONTAMINATED WOOD: Predominantly wood and lumber products that are mixed with other materials in such a way that they cannot easily be separated. This includes wood with metal, gypsum, concrete, or other contaminants that would not compost easily.

NEW GYPSUM SCRAP: Calcium sulfate dehydrate sandwiched between heavy layers of Kraft-type paper. Also known as drywall. This category includes new drywall that has not been painted or treated in other ways.

DEMO GYPSUM SCRAP: Used or demolition gypsum wallboard scrap that has been painted or treated.

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

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

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

CERAMICS: Finished ceramic or porcelain products such as toilets, sinks, and some dishware.

OTHER CONSTRUCTION DEBRIS: Construction debris (other than wood) that cannot be classified elsewhere, and mixed fine building material scraps. For example, floor sweepings from construction activities containing sawdust, nails, wire, etc.

Hazardous Wastes

LATEX PAINTS: Water-based paints and similar products.

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

WATER-BASED 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.

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

PESTICIDES/HERBICIDES: Variety of poisons with the purpose of discouraging or killing insects, 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. Includes cell phone and button cell batteries.

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.

MEDICAL WASTES: Materials typically discarded in a health care setting such as I.V. tubing and patient drapes, specimen containers, and Petri dishes. Medical wastes that could be considered a biohazard are weighed, but not further sorted.

OTHER CLEANERS/CHEMICALS: Soaps, non-caustic cleaners, medicines, cosmetics, and other household chemicals.

OTHER POTENTIALLY HARMFUL WASTES: Other chemicals or potentially harmful wastes that do not fit into the above categories, including unidentifiable materials.

Fines and Miscellaneous Materials

SAND/SOIL/DIRT: Sand, soil, dirt, and gravel smaller than 2" in diameter.

NONDISTINCT FINES: Mixed MSW fines smaller than 2” in diameter.

MISCELLANEOUS ORGANICS: Combustible materials including wax; bar soap; cigarette butts; scraps of leather and leather products including shoes and belts; feminine hygiene products; briquettes; fireplace, burn barrel and fire pit ash; and other organic materials not classified elsewhere.

MISCELLANEOUS INORGANICS: Other inorganic, non-combustible materials not classified elsewhere.

Changes to Waste Component Categories

The material types used to categorize Seattle's waste stream have been refined over the years. The waste categories in the current study were nearly identical to those used in Seattle's last waste composition study (the 2004 commercial and self-haul waste study). The exceptions are:

- *Mixed Low Grade* and *polycoated paper* were combined into one category called *mixed low grade paper*,
- The *PET bottle* category now includes other PET bottles which was formally included in the category *other plastic bottles*,
- The *other rigid packaging* category now includes other HDPE bottles which was formally included in the category *other plastic bottles*, and
- Upholstery was split out from the *carpet/upholstery* category into a new category, *mixed textiles*.

Table A-2 tracks changes to the material categories since 1988/1989. An "X" signifies that the component remained the same from the previous study period. If a material type was split into two or more material component categories (e.g., *compostable/soiled paper* into *compostable/soiled paper* and *OCC/Kraft, waxed*), then the rows will look like the example highlighted below in 1994 and 1996. If the two or more materials are combined into one material component category (e.g., *mixed low grade* and *polycoated paper* into *mixed low grade*), the rows will look like the example highlighted below in 2004 and 2006. Table A-1 provides an explanation of tracked changes shown in Table A-2.

Table A-1: Explanation of Track Changes

1994	1996	1998/99	2000	2002	2004	2006
PAPER						
Newspaper	x	x	x	x	x	Newspaper
OCC/Kraft	OCC/Kraft, Unwaxed	x	x	x	x	Plain OCC/Kraft
Office Paper	x	x	x	x	High Grade Paper	High Grade Paper
Computer Paper	x	x	x	x		
Mixed Low Grade	x	x	x	x	Mixed Low Grade	Mixed Low Grade
Phone Books	x	x	x	x		
Milk/Juice Polycoats	x	x	x	x	Polycoated Paper	
Frozen Food Polycoats	x	x	x	x		
Compostable/Soiled	x	x	x	Compostable Paper	x	Compostable Paper
	OCC/Kraft, Waxed	x	x	x	x	Waxed OCC/Kraft
Paper/Other Materials	x	x	x	x	Mixed/Other Paper	Mixed/Other Paper
Other Paper	x	x	x	x		

Table A-2: Changes to Waste Component Categories, 1988 to present

1988-89	1990	1992	1994	1996	1998/99	2000	2002	2004	2006
PAPER									
Newspaper	x	x	x	x	x	x	x	x	x
Corrugated Paper	x	x	OCC/Kraft	OCC/Kraft, Unwaxed	x	x	x	x	x
Office Paper	x	x	x	x	x	x	x	High Grade Paper	x
Computer Paper	x	x	x	x	x	x	x		
Mixed Scrap Paper	x	x	Mixed Low Grade	x	x	x	x	Mixed Low Grade	Mixed Low-Grade
			Phone Books	x	x	x	x		
Other Paper	x	x	Milk/Juice Polycoats	x	x	x	x	Polycoated Paper	
			Frozen Food Polycoats	x	x	x	x		
			Compostable/Soiled	x	x	x	x	x	x
				OCC/Kraft, Waxed	x	x	x	x	x
			Paper/Other Materials	x	x	x	x	Mixed/Other Paper	x
			Other Paper	x	x	x	x		
PLASTIC									
PET Bottles	x	x	PET Pop & Liquor	x	x	x	x	#1 PET Bottles	#1 PET Bottles
			Other PET Bottles	x	x	x	x	*Moved to component "Other plastic bottles"*	
HDPE Bottles	x	x	HDPE Milk & Juice	x	x	x	x	#2 HDPE Natural Bottles	x
								#2 HDPE Colored Bottles	x
			Other HDPE Bottles	x	x	x	x	*Moved to component "Other plastic bottles"*	*Moved to component "Other rigid packaging"*
Expanded Polystyrene	x	x	x	x	x	x	x	x	x
Plastic Packaging	Other Plastic Bottles	x	x	x	x	x	x	x	x
	x	x	Other Rigid Containers	Jars & Tubs	x	x	x	x	Renamed "Tubs"
			Other Rigid Packaging	x	x	x	x	x	x
			Grocery/Bread Bags	x	x	x	x	Clean Shopping/Dry Cleaner Bags	x
			Other Film	Garbage Bags	x	x	x	Other Film	x
				x	x	x	x		
								Other Clean PE Film	x
Other Plastic Products	x	x	Plastic Products	x	x	x	x	x	x
			Plastic/Other Materials	x	x	x	x	x	x

1988-89	1990	1992	1994	1996	1998/99	2000	2002	2004	2006
GLASS									
Nonrefillable Pop	x	x	Clear Beverage	x	x	x	x	Clear Bottles	x
Refillable Pop	x	x	Green Beverage	x	x	x	x	Green Bottles	x
Nonrefillable Beer	x	x	Brown Beverage	x	x	x	x	Brown Bottles	x
Refillable Beer	x	x	*(After 1994, characterized according to color)*						
Container Glass	x	x	x	x	x	x	x	x	x
Nonrecyclable Glass	x	x	x	Other Glass	x	x	x	x	x
				Fluorescent Tubes	x	x	x	x	x
METAL									
Aluminum Cans	x	x	x	x	x	x	x	x	x
Aluminum Foil/Containers	x	x	x	x	x	x	x	x	x
Tinned Cans	x	x	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	x	x
Nonferrous	x	x	x	Other Nonferrous	x	x	x	x	x
			Other Aluminum	x	x	x	x	x	x
				Empty Aerosol Cans	x	x	x	x	x
Mixed Metals/Materials	x	x	x	x	x	x	x	x	x
					Metal Oil Filters	x	x	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	*Moved to "Organics"*	x
Tires	x	x	*moved to "Other Materials"*	x	x	x	x	*Moved to "Organics"*	x

1988-89	1990	1992	1994	1996	1998/99	2000	2002	2004	2006
ORGANICS									
Wood	x	Untreated Wood	x	Dimension Lumber; *new category "CDL Wastes"*	x	x	x	x	x
			Crates/Pallets	Other Untreated Wood; *new category "CDL Wastes"*	x	x	x	x	x
				Pallets	x	x	x	*Moved to "CDL Wastes"*	x
				Crates/Boxes	x	x	x	*Moved to "CDL Wastes"; renamed "Crates"*	x
		Treated Wood	x	*Moved to new category "CDL Wastes"*	*x*	*x*	*x*	*x*	*x*
				Contaminated Wood; *new category "CDL Wastes"*	x	x	x	x	x
Leaves and Grass	x	x	x	x	x	x	x	x	x
Prunings	x	x	x	x	x	x	x	x	x
Food	x	x	x	x	x	x	x	x	x
OTHER MATERIALS									
Textiles	x	x	x	Textiles/Clothing	x	x	x	*Moved to "Organics"*	x
			Carpet/Upholstery	x	x	x	x	*Moved to "Organics"*	Carpet
									Mixed Textiles
Leather	x	x	x	x	x	x	x	*Moved to component "Miscellaneous Organics"*	x
Disposable Diapers	x	x	x	x	x	x	x	*Moved to "Organics"*	x
(Discarded from samples prior to 1994)			Animal By -Products	x	x	x	x	*Moved to "Organics"*	x
Ash	x	x	x	x	x	x	x	*Moved to component "Miscellaneous Organics"*	x
(Prior to 1994, split among various materials; Mixed Metal, Textiles, Other Plastics, etc.)			Furniture	x	x	x	x	*Moved to new category "Furniture, Appliances, and Electronics"*	x
(Prior to 1994, split among various materials; Mixed Metal, Textiles, Other Plastics, etc.)			Mattresses	x	x	x	x	*Moved to new category "Furniture, Appliances, and Electronics"*	x
(Prior to 1994, split among various materials; Mixed Metal, Textiles, Other Plastics, etc.)			Small Appliances	x	x	x	x	*Moved to new category "Furniture, Appliances, and Electronics"*	x

1988-89	1990	1992	1994	1996	1998/99	2000	2002	2004	2006
OTHER MATERIALS (cont.)									
(Prior to 1994, split among various materials; Mixed Metal, Textiles, Other Plastics, etc.)			A/V Equipment	x	x	x	x	*Moved to new category "Furniture, Appliances, and Electronics"*	x
						Televisions & Computer Monitors	Television Sets	*Moved to new category "Furniture, Appliances, and Electronics"*	x
							Computer Monitors	*Moved to new category "Furniture, Appliances, and Electronics"*	x
						Other Computer Equipment	x	*Moved to new category "Furniture, Appliances, and Electronics"*	x
Ceramics, Porcelain, China	x	x	x	x	x	x	x	*Moved to "CDL Wastes"; renamed "Ceramics"*	x
Gypsum Drywall	x	x	x	New Gypsum Scrap; *new category CDL Wastes*	x	x	x	x	x
				Demo Gypsum Scrap; *new category CDL Wastes*	x	x	x	x	x
Fiberglass Insulation	x	x	x	*Moved to new category CDL Wastes*	*x*	*x*	*x*	*x*	x
Rock/Concrete/Brick	x	x	x	*Moved to new category CDL Wastes*	*x*	*x*	*x*	*x*	x
Other Construction Debris	x	x	x	*Moved to new category CDL Wastes*	*x*	*x*	*x*	*x*	x
				Asphaltic Roofing; *new category CDL Wastes*	x	x	x	x	x
Sand, Dirt, Non-distinct Fines	x	x	Sand/Soil/Dirt	*Moved to new category CDL Wastes*	*x*	*x*	*x*	*Moved to new category "Fines & Miscellaneous Materials"*	*x*
			Non-distinct Fines	x	x	x	x	*Moved to new category "Fines & Miscellaneous Materials"*	x

1988-89	1990	1992	1994	1996	1998/99	2000	2002	2004	2006
OTHER MATERIALS (cont.)									
(Prior to 1994, mostly in "Sand, Dirt, Non-distinct Fines; also in various "Mixed" and "Other" categories)			Misc. Organics	x	*x*	*x*	*x*	*Moved to new category "Fines & Miscellaneous Materials"*	*x*
(Prior to 1994, mostly in "Sand, Dirt, Non-distinct Fines; also in various "Mixed" and "Other" categories)			Misc. Inorganics	x	*x*	*x*	*x*	*Moved to new category "Fines & Miscellaneous Materials"*	*x*
HOUSEHOLD HAZARDOUS									
Latex Paints	x	x	x	x	x	x	x	x	x
Adhesives/Glues	x	x	x	Hazardous Glue/Adhesives	x	x	x	Renamed "Solvent-based Adhesives/Glues"	x
				Non-Hazardous Glue/Adhesives	x	x	x	Renamed "Water-based Adhesives/Glues"	x
Oil-based Paints/Solvents	x	x	x	x	x	x	x	x	x
Cleaners	x	x	x	x	x	x	x	Renamed "Caustic Cleaners"	x
Pesticides/Herbicides	x	x	x	x	x	x	x	x	x
Batteries	x	x	Dry-Cell Batteries	x	x	x	x	x	x
			Wet-Cell Batteries	x	x	x	x	x	x
Gasoline/Kerosene	x	x	x	x	x	x	x	x	x
Motor Oil/Diesel Oil	x	x	x	x	x	x	x	x	x
Asbestos	x	x	x	x	x	x	x	x	x
Explosives	x	x	x	x	x	x	x	x	x
Other Chemicals	x	x	x	Other Hazardous Chemicals	x	x	x	Other Potentially Harmful Wastes	x
								Medical Wastes	x
				Other Non-Hazardous Chemicals	x	x	x	Renamed "Other Cleaners/Chemicals"	x

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Appendix B: Sampling Methodology

Overview

The objective of the 2006 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 2002. The current project followed the same basic methodology as the previous study.

This appendix outlines the sampling methodology used for the current study.

Sampling Populations

This study examined waste disposed by two generators: single and multi-family residences. All materials were collected from Seattle's two contracted 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 generators 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 1 depicts each of the four residential subpopulations, according to generator type and service area.

Figure 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

The same ratio of single-family to multi-family samples from the 2002 study was used for the current study. Approximately two-thirds of the samples were allocated to the single-family substream, while the remaining one-third was allocated to the multi-family substream. Both single and multi-family samples were evenly apportioned between service areas. Table 2 outlines the total number of waste samples that were planned for the 2006 study and the actual number of samples sorted, by residence type and service area.

Table B-2: Planned versus Actual Number of Samples

	Number of Samples	Actual Number of Samples Sorted
Single-Family		
North	120	121
South	120	121
Multi-Family		
North	60	57
South	60	57
Total	**360**	**356**

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 about 12 samples per day, 30 days of sampling were planned. Monthly sampling events consisted of two or three days of sampling.

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 or three-day blocks. The year's calendar is shown in Table 3, and the resulting allocation of waste sampling days is shown in Table 4.

As shown, an equal number of sampling days were scheduled at the SRDS and the NRDS. Nearly all loads collected from the south are delivered to the SRDS and most of the loads from the north are delivered to the NRDS.

Table 3: Waste Sampling Calendar

Date	Facility	No. of Samples	Day of the Week	Week of the Month
1/25/2006	SRDS	12	Wednesday	4
1/26/2006	SRDS	12	Thursday	4
1/27/2006	NRDS	12	Friday	4
2/1/2006	NRDS	12	Wednesday	1
2/2/2006	SRDS	12	Thursday	1
3/27/2006	NRDS	12	Monday	4
3/28/2006	NRDS	12	Tuesday	4
3/29/2006	SRDS	12	Wednesday	5
4/11/2006	SRDS	12	Tuesday	2
4/12/2006	NRDS	12	Wednesday	2
5/15/2006	SRDS	12	Monday	3
5/16/2006	SRDS	12	Tuesday	3
5/17/2006	NRDS	12	Wednesday	3
6/12/2006	NRDS	12	Monday	2
6/13/2006	SRDS	12	Tuesday	2
7/19/2006	NRDS	12	Wednesday	3
7/20/2006	NRDS	12	Thursday	3
7/21/2006	SRDS	12	Friday	3
8/21/2006	SRDS	12	Monday	3
8/22/2006	NRDS	12	Tuesday	4
9/27/2006	SRDS	12	Wednesday	4
9/28/2006	SRDS	12	Thursday	4
9/29/2006	NRDS	12	Friday	5
10/5/2006	NRDS	12	Thursday	1
10/6/2006	SRDS	12	Friday	1
11/1/2006	NRDS	12	Wednesday	1
11/2/2006	NRDS	12	Thursday	1
11/3/2006	SRDS	12	Friday	1
12/7/2006	SRDS	12	Thursday	1
12/8/2006	NRDS	12	Friday	2

Table 4: Distribution of Waste Sampling Days

	Number of Waste Sampling Days: South					
	Monday	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Overall**
	2	**3**	**3**	**4**	**3**	**15**
Winter	**0**	**0**	**1**	**3**	**0**	**4**
Week 1	0	0	0	2	0	2
Week 2	0	0	0	0	0	0
Week 3	0	0	0	0	0	0
Week 4	0	0	1	1	0	2
Week 5	0	0	0	0	0	0
Spring	**1**	**2**	**1**	**0**	**0**	**4**
Week 1	0	0	0	0	0	0
Week 2	0	1	0	0	0	1
Week 3	1	1	0	0	0	2
Week 4	0	0	0	0	0	0
Week 5	0	0	1	0	0	1
Summer	**1**	**1**	**0**	**0**	**1**	**3**
Week 1	0	0	0	0	0	0
Week 2	0	1	0	0	0	1
Week 3	1	0	0	0	1	2
Week 4	0	0	0	0	0	0
Week 5	0	0	0	0	0	0
Fall	**0**	**0**	**1**	**1**	**2**	**4**
Week 1	0	0	0	0	2	2
Week 2	0	0	0	0	0	0
Week 3	0	0	0	0	0	0
Week 4	0	0	1	1	0	2
Week 5	0	0	0	0	0	0

	Number of Waste Sampling Days: North					
	Monday	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Overall**
	2	**2**	**5**	**3**	**3**	**15**
Winter	**0**	**0**	**1**	**0**	**2**	**3**
Week 1	0	0	1	0	0	1
Week 2	0	0	0	0	1	1
Week 3	0	0	0	0	0	0
Week 4	0	0	0	0	1	1
Week 5	0	0	0	0	0	0
Spring	**1**	**1**	**2**	**0**	**0**	**4**
Week 1	0	0	0	0	0	0
Week 2	0	0	1	0	0	1
Week 3	0	0	1	0	0	1
Week 4	1	1	0	0	0	2
Week 5	0	0	0	0	0	0
Summer	**1**	**1**	**1**	**1**	**0**	**4**
Week 1	0	0	0	0	0	0
Week 2	1	0	0	0	0	1
Week 3	0	0	1	1	0	2
Week 4	0	1	0	0	0	1
Week 5	0	0	0	0	0	0
Fall	**0**	**0**	**1**	**2**	**1**	**4**
Week 1	0	0	1	2	0	3
Week 2	0	0	0	0	0	0
Week 3	0	0	0	0	0	0
Week 4	0	0	0	0	0	0
Week 5	0	0	0	0	1	1

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 of single-family and multi-family waste only. The hauler contracted to collect waste in the south operates vehicles that service both commercial customers and multi-family residences. In the north service area, the trucks servicing the multi-family routes also collect waste from libraries and other city buildings. On sampling days, the hauler for the selected service area operated a special truck to collect waste from all multi-family residences located on mixed routes selected for sampling.

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 contracted haulers deliver most 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 are typically taken to either transfer station, but may be diverted to a private station if there is a problem at the nearest city station.

The Project Manager met with both contracted 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.

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 83 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

E). 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 2002 Study

The sampling methodology for this study differed from 2002 in the following ways:

- The total number of samples planned for the 12-month study period increased from 324 to 360.
- The number of planned sampling days increased from 26 to 30.
- The component categories were updated to provide more detail about specific materials in the waste stream. These changes are tracked in Appendix A.

Appendix C: Comments on Monthly Sampling Events

January

On January 25th, sampling took place at SRDS. Consistent with the sampling plan, eight single-family and four USD multifamily loads were sampled. Two of the trucks on our list were not seen and one selected single-family truck did not arrive until very late in the day. In place of these trucks, two single-family trucks that had not been on the list were selected for sampling. All four multi-family trucks arrived and were sampled as planned.

Sampling on January 26th also occurred at SRDS from USD trucks. Seven single-family and five multi-family samples were sorted. One more multi-family load was captured because two single-family loads (including one contingency) did not arrive as expected. One multifamily truck did not arrive at the site. Another selected multifamily load did not collect a pure multifamily route as requested of all the selected multifamily drivers. Three alternate multifamily trucks were selected.

Friday, January 27th was the first day of sampling at NRDS for Waste Management trucks. As planned, eight single-family and four multifamily trucks were sampled. All trucks arrived as expected.

February

On February 1st, only three single-family and three multifamily WM trucks were sampled. On this day, the NRDS had an excess of material left in the pit from the day before. Due to the problems of processing this extra material, they would not be able to accept contract hauler loads until 4pm as is needed for sampling. When this information was received, Cascadia talked to the Waste Management route supervisor who felt sure that they could get loads in by 3pm. Unfortunately, six of the single-family loads, including one contingency, and 1 multifamily load did not arrive by 3pm.

On February 2nd, SRDS was closed for the day due to a machinery breakdown. Because this was discovered in the beginning of the day, Cascadia was able to move sampling to the NRDS. Most of the trucks arrived as planned. Eight single-family and three multifamily trucks were sampled. Two USD single-family and one USD multifamily trucks did not arrive at NRDS. One WM single-family truck was sampled as an alternate.

March

On March 27th, ten single-family and four multi-family Waste Management samples were captured and sorted. All selected loads arrived as planned on this day. Two additional samples were sorted to make up for shortcomings from previous sampling events.

Seven single-family and four multi-family samples from Waste Management loads were sorted on March 28th. Two of the selected trucks on this day were not spotted. It is most likely that these trucks finished their routes after the North Station was accepting contract hauler trucks.

Sampling on Wednesday took place at the SRDS and focused on USD trucks. A total of seven single-family and four multi-family loads were sorted on this day. Two trucks did not arrive as expected on this day. One selected load was pushed by the loader before a sample was captured.

April

On April 11th, six single-family and no multi-family USD samples were captured and sorted. Due to an error on our part, the selected multi-family drivers did not receive notice in time to participate in the sampling event. Additionally, because of a driver shortage that day, many trucks did not finish in time to go to the South Station. For these reasons, two single-family and four multi-family loads were missed.

Nine single-family and four multi-family Waste Management samples and one USD multi-family sample were sorted on April 12th. One additional single-family WM load was included. The USD multi-family load was selected in place of the previous day's shortage.

May

On May 15th, nine single-family and five multi-family USD samples were captured and sorted. All of the selected trucks arrived as expected. One additional single-family and one additional multi-family were selected and sampled.

Five single-family and five multi-family USD samples were sorted on May 16th. An additional multi-family sample was requested from the hauler and captured that day, for a total of five multi-family routes. The plan for the day called for eight single-family samples. Although the trucks arrived as expected, the crew supervisor opted to take two additional samples on Monday and so only needed 10 on Tuesday to reach the goal of 24 for the two days.

On Wednesday, May 17th, eight single-family and four multifamily Waste Management trucks were sampled as called for in the day's sampling plan.

June

On June 12th, eight single-family and four multi-family WM samples were captured and sorted. One of the selected trucks did not arrive and one load was pushed prior to sampling. Both of the contingencies were sampled.

Six single-family and two multi-family USD samples were sorted on June 13th. The plan for the day called for eight single-family samples. This was an extremely busy day at SRDS. The missed samples were pushed before a sample was taken or the trucks arrived when the facility was too busy to get samples.

Wednesday, June 14th, was scheduled as a make-up day to catch up on USD samples. Eight single-family and four multifamily USD trucks were sampled as called for in the day's sampling plan. All selected trucks arrived as expected. One multi-family load was skipped because the load was mixed commercial/multifamily.

July

On July 19th, nine single-family and three multi-family Waste Management samples were captured and sorted. One of the multifamily trucks did not arrive as expected so an additional single-family truck was sampled in its place. Both of the contingencies were sampled. One of the trucks had a different route than anticipated but was still sampled.

Eight single-family and four multi-family WM samples were sorted on July 20th, as was called for in the day's sampling plan. Two trucks had different routes than anticipated. One additional truck that was not on the day's plan was sampled.

USD trucks were sampled on Friday, July 21st. Eight single-family and four multifamily USD trucks were sampled as called for in the day's sampling plan. All selected trucks arrived as expected. One load was pushed and one did not arrive so both contingencies were sampled.

August

On August 21st, nine single-family and three multi-family USD samples were captured and sorted. An additional single-family truck, not on the sampling plan, was sampled since one of the single-family and one of the multifamily trucks did not arrive as expected. Also, the crew supervisor needed to skip one of the single-family trucks as the sorting area was full with samples. Both of the contingencies were sampled. One more single-family sample and one fewer multifamily sample than planned were sorted.

Nine single-family and four multi-family WM samples were sorted on August 22nd, which was one greater single-family than planned. One contingency was sampled.

September

On Wednesday, September 27th, seven USD single-family and three multifamily loads were sampled. On this day, three of the single-family routes selected for sampling were "open" routes, meaning that they did not have trucks assigned to them but were absorbed by other routes that day. Because fewer vehicles were on the vehicle selection sheet, the crew supervisor selected two single-family trucks not included on the sampling plan.

On Thursday, September 28th, one multifamily and eleven single-family samples were captured and sorted. Three of the multifamily trucks were not available for sampling (one arrived at 9am, one was not a scheduled route although it appeared on our list of routes, and one was apparently an open route that day).

Friday's sampling of Waste Management loads resulted in eight single-family and five multifamily samples. One additional multifamily sample was captured to make up for a previous shortage.

October

Waste Management trucks were sampled again on Monday as part of October's sampling event. As planned, eight single-family and four multifamily trucks were sampled.

On Tuesday, October 3rd, eight single-family and three multifamily USD trucks were sampled. One multifamily truck did not arrive while the crew was at the transfer station.

November

On November 1st, nine single-family and four multi-family Waste Management samples were captured and sorted. An additional single-family truck, one of the contingencies on the sampling plan, was sampled.

Eight single-family and four multifamily Waste Management loads were sampled on Thursday, November 2nd.

On Friday, November 3rd, the South Transfer Station stopped accepting loads in early afternoon. Additionally, waste from one of the selected loads was pushed before a sample was taken. Due to the back-up at the facility that day, only seven single-family and three multifamily samples were captured and sorted. All of these samples were on the day's sampling plan.

December

On December 20th, eight single-family and four multi-family Waste Management samples were captured and sorted. Additionally, three USD multifamily samples were captured to balance out previous shortfalls. Two of the selected USD multifamily trucks did not arrive as expected and one truck was sampled in their place.

Eight single-family and four multifamily USD loads were sampled on Thursday, December 21st. All sampled trucks were on the original sampling plan for the day.

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:

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

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:

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

where:

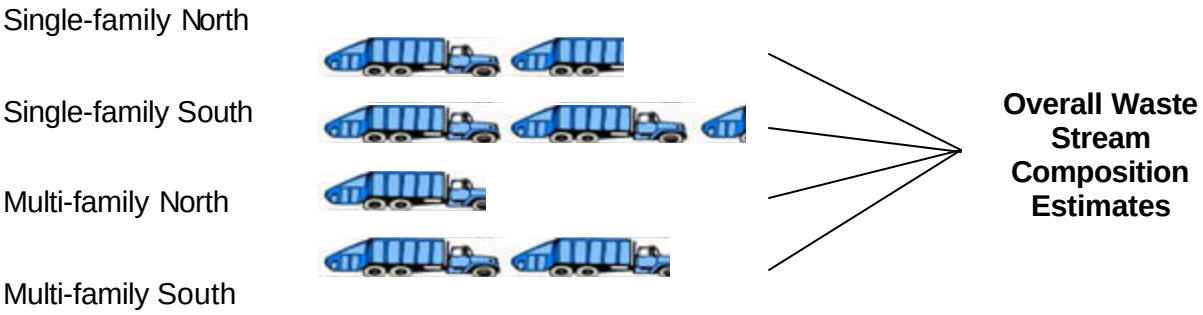
t = the value of the t-statistic (1.645) corresponding to a 90% confidence level

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 approximately 60% of total single-family tons disposed). Figure D-1 depicts the weighted average process for the overall waste stream.

Figure D-1: 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:

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

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	32,559	24.34%
Multi-family North	18,128	13.55%
Single-family South	45,551	34.05%
Multi-family South	37,536	28.06%
Overall	**133,774**	**100%**

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

Service Area	Tons Disposed	Percent of Total
Single-family North	32,559	41.68%
Single-family South	45,551	58.32%
Overall	**78,110**	**100%**

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

Service Area	Tons Disposed	Percent of Total
Multi-family North	18,128	32.57%
Multi-family South	37,536	67.43%
Overall	**55,664**	**100%**

Table D-4: Weighting Percentages – North Service Area

Residence Type	Tons Disposed	Percent of Total
Single-family North	32,559	64.23%
Multi-family North	18,128	35.77%
Overall	**50,687**	**100%**

Table D-5: Weighting Percentages –South Service Area

Residence Type	Tons Disposed	Percent of Total
Single-family South	45,551	54.82%
Multi-family South	37,536	45.18%
Overall	**83,087**	**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:

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

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.

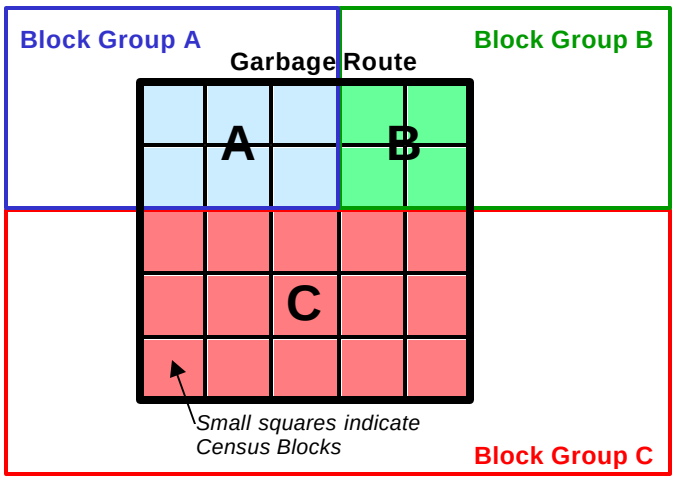
Calculations of each garbage route's **median income** were performed as follows, using information from the 2000 Census. Note that unlike population and housing information, median income is gathered from a 1-in-6 sample of the population, and is therefore not reported at the Block level. Instead, the 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-2 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-2.)
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.

$$\textbf{Estimated Median Income of Garbage Route} = \frac{\textbf{A}\text{ Households} * \textbf{A}\text{ Income} + \textbf{B}\text{ Households} * \textbf{B}\text{ Income} + \textbf{C}\text{ Households} * \textbf{C}\text{ Income}}{\textbf{A}\text{ Households} + \textbf{B}\text{ Households} + \textbf{C}\text{ Households}}$$

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

Figure D-2: 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. 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.

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Appendix E: Comparison Calculations

The comparison methodology is outlined in the first section of this appendix and the calculations are outlined in Appendix D. 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
  - 1998/99 vs. 2006
  - 2002 vs. 2006
- 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 *mixed low-grade* paper accounts for 10% 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 100 to 200 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 2006 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 due to new education programs or new programs such as commingled recycling.

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 18 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. 2006
(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	*2006*		
Other Materials	6.14%	23.17%	24.1279	0.0000 *
Paper	31.24%	18.12%	17.1647	0.0000 *
Glass	6.41%	2.26%	17.0799	0.0000 *
Plastic	8.06%	11.46%	12.3271	0.0000 *
Metal	5.27%	3.55%	6.1080	0.0000 *
CDL Wastes	8.80%	4.82%	5.9241	0.0000 *
Organics	33.42%	35.97%	2.1823	0.0295
Hazardous	0.66%	0.65%	0.0811	0.9354
Number of Samples	*212*	*356*		

As displayed in Table E-7, *plastic* and *other materials* proportions shows an increasing trend while *paper* and *glass* show decreasing trends over the last 4 years. Variations among the remaining comparison groups were not significant.

Table E-7: Comparison of Residential Composition Results, 2002 vs. 2006
(Includes all 8 broad material categories)

	Mean Ratio (Material Wt/Total Wt)		t-Statistic	p-Value (Cut-off for statistically valid difference = 0.0125)
	2002	*2006*		
Paper	22.57%	18.12%	8.7342	0.0000 *
Glass	3.62%	2.26%	7.8815	0.0000 *
Plastic	9.57%	11.46%	7.8432	0.0000 *
Other Materials	18.23%	23.17%	7.3772	0.0000 *
CDL Wastes	5.93%	4.82%	1.9967	0.0462
Hazardous	0.45%	0.65%	1.7853	0.0746
Metal	3.78%	3.55%	1.0116	0.3121
Organics	35.86%	35.97%	0.1344	0.8931
Number of Samples	*360*	*356*		

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 (83 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-3. 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-3: Basic Database Relationships

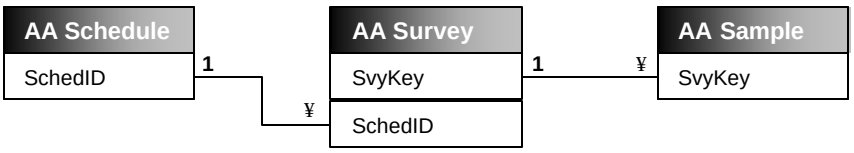

Figure F-4: AA Schedule

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)		☐
Sector	Text	New in 2006. What substreams were sampled in Study Period		☐

Figure F-5: 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].		☐

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		☐
Comments	Memo	New in 2006. Notes specific to the sample.		☐
GISrouteCode	Text	New in 2006. Connects the survey with the cities route map		☐

1.1.2 Code Tables

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

Figure F-7: 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 Subclass is linked to AA Sample.

Figure F-8: 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.
2004_Class	Text	Names of broad material categories used for the 2004 study year.
2004_ClassOrder	Number	Associated ID for broad material categories used for the 2004 study year.
2004_ID	Number	89 subclasses
2004_Name	Text	Name of material components used for 2004 study year.
2006_Class	Text	Names of broad material categories used for the 2006 study year.
2006_ClassOrder	Number	Associated ID for broad material categories used for the 2006 study year.
2006_ID	Number	89 subclasses
2006_Name	Text	Name of material components used for 2006 study year.
DE Subclass	Number	New in 2006. Data Entry code for current year subclass ID. Order in data entry form is based on this field.
DE Class	Text	New in 2006. Class name for current year.
Subclass	Text	New in 2006. Subclass name for current year.

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	Designates waste hauling company.
Report Order	Number	For reporting purposes.
Old Code	Text	From previous studies.
ResServiceArea	Text	New in 2006. Used for tracking samples.

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

Figure F-11: 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-12: 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-13: 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-14: 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

Vehicle Selection Sheet Sampling Date: **Tuesday, March 28, 2006**

Seattle Residential Waste Composition Study Hauler: **Waste Management**

Sample ID	SF/MF	Truck No.	Driver	Route	Load	Est Arrival/Actual Arrival	Truck Type	Notes
	SF	260151	A. Anousone	73	1	2:30 - 3:00		
	SF	261978	T. Keohokapu	77	1	2:30 - 3:00		
	SF	262112	T. Masaniai	78	1	2:30 - 3:00		
	SF	262114	L. Anderson	80	1	2:30 - 3:00		
	SF	262129	R. Espinoza	89	1	2:30 - 3:00		
	SF	262473	M. Vargas	93	1	2:30 - 3:00		
	SF	262948	J.Esqueda	88	1	2:30 - 3:00		
cont. 1	SF	262949	G. Turner	87	1	2:30 - 3:00		
	SF	263035	G. Gonzalez	85	1	2:30 - 3:00		
	SF	264215	R. Thompson	90	1	2:30 - 3:00		
	MF	203998	A. Swanson	44	1	2:00 - 3:00		
	MF	305751	C. Garcia	40	1	2:00 - 3:00		
	MF	305752	M. Gonzales	41	1	2:00 - 3:00		
	MF	305754	W. Coleman	42	1	2:00 - 3:00		

Today's Sampling Plan: 9 SF, 4 MF

Waste Tally Sheet, Front

Tally Sheet - Page 1

2006 Seattle Waste Composition Study

Revised 1/5/06

PAPER	Newspaper				
	Plain OCC/Kraft				
	Waxed OCC/Kraft				
	High Grade				
	Mixed Low Grade				
	Compostable/Soiled				
	Mixed/Other Paper				

PLASTIC	#1 PET Bottles				
	#2 HDPE Natural Bottles				
	#2 HDPE Colored Bottles				
	Other Bottles				
	Tubs				
	Expanded Polystyrene				
	Other Rigid Packaging				
	Store/Dry Cleaning Bags				
	Clean PE Film				
	Other Film				
	Plastic Products				
	Plastic/Other Materials				

WOOD & CONSTRUCTION	Dimension Lumber				
	Pallets				
	Crates/Boxes				
	Other Untreated Wood				
	Treated Wood				
	Contaminated Wood				
	New Gypsum Scrap				
	Demo Gypsum Scrap				
	Fiberglass Insulation				
	Rock/Concrete/Bricks				
	Asphaltic Roofing				
	Ceramics/China				
	Other Construction Debris				

ORGANICS	Leaves & Grass				
	Prunings				
	Food				
	Textiles/Clothing				
	Mixed Textiles				
	Carpet				
	Disposable Diapers				
	Animal By-products				
	Rubber Products				
	Tires				

GLASS	Clear Bottles				
	Green Bottles				
	Brown Bottles				
	Container Glass				
	Fluorescent Tubes				
	Other Glass				

METAL	Alum. Beverage Cans				
	Alum. Foil/Containers				
	Other Aluminum				
	Other Nonferrous				
	Tin Food Cans				
	Empty Aerosol Cans				
	Other Ferrous				
	Oil filters			Filter Count:	
	Mixed Metals/Material				

MISC.	Sand/Soil/Dirt				
	Non-distinct Fines				
	Misc. Organics				
	Misc. Inorganics				

CAPTURE DATE **SAMPLE NUMBER**

Waste Tally Sheet, Back

FURNITURE, APPLIANCES, AND ELECTRONICS	Furniture		
	Mattresses		
	Small Appliances		
	Audio/Visual Equipment		
	Monitors		
	Televisions		
	Other Computer Equipment		

HAZARDOUS WASTES	Latex Paint		
	Solvent-based Adhesives		
	Water-based Adhesives		
	Oil-based Paint/Thinners		
	Caustic Cleaners		
	Pesticides/Herbicides		
	Dry-cell Batteries		
	Wet-cell Batteries		
	Gasoline/Kerosene		
	Motor Oil/Diesel Oil		
	Asbestos		
	Explosives		
	Medical Wastes		
	Other Household Chemicals		
	Other Miscellaneous Chemicals		

SUPERMIX:

SAMPLE NUMBER

HAULER	**U - U.S. Disposal** **W - Waste Management**
VEHICLE TYPE	**FL** - Front Loader **RL** - Rear Loader **SL** - Side Loader
TRUCK & ROUTE	**TRUCK #:** **ROUTE #:**
DESTINATION	**N - NRDS** **S - SRDS**
WEIGHT	**NET WEIGHT (in pounds):**
GENERATOR TYPE	**SF** - Single-family **MF** - Multi-family **NR - No Response**
NOTES	

Tally Sheet - Page 2

2006 Seattle Waste Composition Study

Revised 1/5/06