THURSTON COUNTY
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THURSTON COUNTY
WASTE COMPOSITION STUDY

DECEMBER 2014

GREEN SOLUTIONS

THURSTON COUNTY
WASTE COMPOSITION STUDY
2013 - 2014

prepared for

Thurston County Solid Waste
Olympia, Washington
360-867-2491
www.ThurstonSolidWaste.org

prepared by

Green Solutions, LLC
South Prairie, Washington 98385
360-897-9533
rick@green-solutions.biz

DECEMBER 2014

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EXECUTIVE SUMMARY

INTRODUCTION

This report provides the results of a study of the quantity and composition of solid waste (garbage) and "mixed organics" collected in Thurston County, Washington during 2013 - 2014. The primary objectives of this study were to provide:

- Accurate data on the composition and quantity of disposed materials for evaluating current waste diversion programs, including waste diversion activities at the Thurston County Waste and Recovery Center (WARC).
- Accurate data on the composition and quantity of mixed organics (yard debris and food scraps) collected in Thurston County.
- Data that can be used for planning future waste diversion programs for recyclables and organics.
- Data for specific County buildings and for the City of Olympia.

This waste composition study was conducted by the environmental consulting firm of Green Solutions, with assistance from two subconsultants, Environmental Practices and DGB Consulting. Additional assistance was provided by Waste Connections, Thurston County and the City of Olympia. This study was primarily organized by Thurston County, but the City of Olympia provided funds for additional data collection to allow better data to be provided about the City's residential and commercial waste streams (see Appendix A).

OVERVIEW OF THE METHODOLOGIES USED

This study examined mixed municipal solid waste (MSW) disposed at Thurston County's transfer facilities. Mixed municipal solid waste is a term commonly used for residential and commercial wastes, including the waste collected by garbage haulers and waste delivered directly to disposal sites by the waste generators themselves (self-haul). This study also examined the mixed organics (food scraps and yard debris) brought to WARC for transfer to other facilities. This study did not examine source-separated recyclable materials or specially-handled materials such as large appliances.

The intent of this study was to provide data for the County's entire waste stream and for the mixed organics stream, but the sampling and data collection procedures also allowed data to be collected on the quantity and composition of waste disposed by specific sources as well. In addition, the study was designed to allow data to be collected separately for the City of Olympia for three of the sources. For the waste

disposed through the Thurston County system, the sources (waste generators) analyzed by this study included:

- **Residential Self-Haul**: waste brought to WARC by the homeowner or renter who generated the load of waste, typically transported using a car or pickup truck.

- **Rural Dropboxes**: waste brought to one of the two satellite facilities: the Rainier Dropbox and Rochester Dropbox. This waste can be assumed to be primarily Residential Self-Haul because the acceptance policies at these sites limit the size and type of loads.

- **Single-Family**: waste collected by Waste Connections or the City of Olympia from single-family homes.

- **Multi-Family**: waste collected by Waste Connections or the City of Olympia from apartment buildings.

- **Non-Residential Self-Haul**: waste from businesses or contractors that was brought in by an employee of that business. A substantial amount of this waste stream consists of loads of construction and demolition wastes brought in by contractors.

- **Commercial**: waste from businesses (commercial and industrial) and institutions (schools, hospitals, government offices, etc.). These wastes are typically collected using front-loading garbage trucks (for emptying dumpsters) or trucks carrying roll-off containers and compactors.

- **County Offices**: samples were taken each quarter from three Thurston County facilities in order to provide data to the County on the results of in-house recycling and waste reduction programs.

For the mixed organics stream, the sources were divided into two collection systems, Waste Connections and the City of Olympia, and into two sources within each system, residential and commercial.

The <u>quantity</u> (tonnage) of solid waste disposed by each type of generator was determined by applying data from a survey of the incoming traffic to the scalehouse records. The survey data was used to allocate self-haul tonnages into Residential and Non-Residential, and to allocate hauler tonnages (for the City of Olympia and Waste Connections) into Single-Family, Multi-Family and Commercial wastes.

The <u>composition</u> of the County's solid waste stream was determined by randomly selecting and sorting samples of waste and mixed organics at WARC (see photo of

sorting crew). Sampling was conducted for six days each quarter for MSW and for one or two days each quarter for the mixed organics. Each sample of MSW was sorted into 88 categories of materials, and the samples of organics were sorted into 25 categories. The Glossary provides additional detail on the definitions used for the categories of materials.

This study was conducted over the course of a year to encompass seasonal variations in the quantities and composition of the County's waste stream. The fieldwork for this study was conducted in October, 2013, and in January/February, May, and August 2014. The mixed organics tests were added partway into this project, so sampling of this material was not conducted in the first quarter (October 2013).

Sorting crew working on a sample at WARC, May 21, 2014.

RESULTS AND CONCLUSIONS

Waste Quantities

The waste quantity results are summarized in Table E-1. As shown Table E-1, residential sources disposed of slightly more waste (51.4% of the County's annual amount) than non-residential sources (48.6%). For individual sources, Commercial waste generators disposed of the greatest quantity (37.0% of the total annual amount).

Table E-1
QUANTITIES OF DISPOSED WASTES

Type of Generator	Annual Amounts	
	Tons	Percent
Residential Self-Haul	21,490	13.5%
Rural Dropboxes	3,440	2.2%
Single-Family	46,890	29.5%
Multi-Family	9,690	6.1%
Residential Subtotal	**81,500**	**51.4%**
Non-Residential Self-Haul	18,480	11.6%
Commercial	58,720	37.0%
Non-Residential Subtotal	**77,200**	**48.6%**
Total	**158,700**	**100.0%**

Waste Composition Results

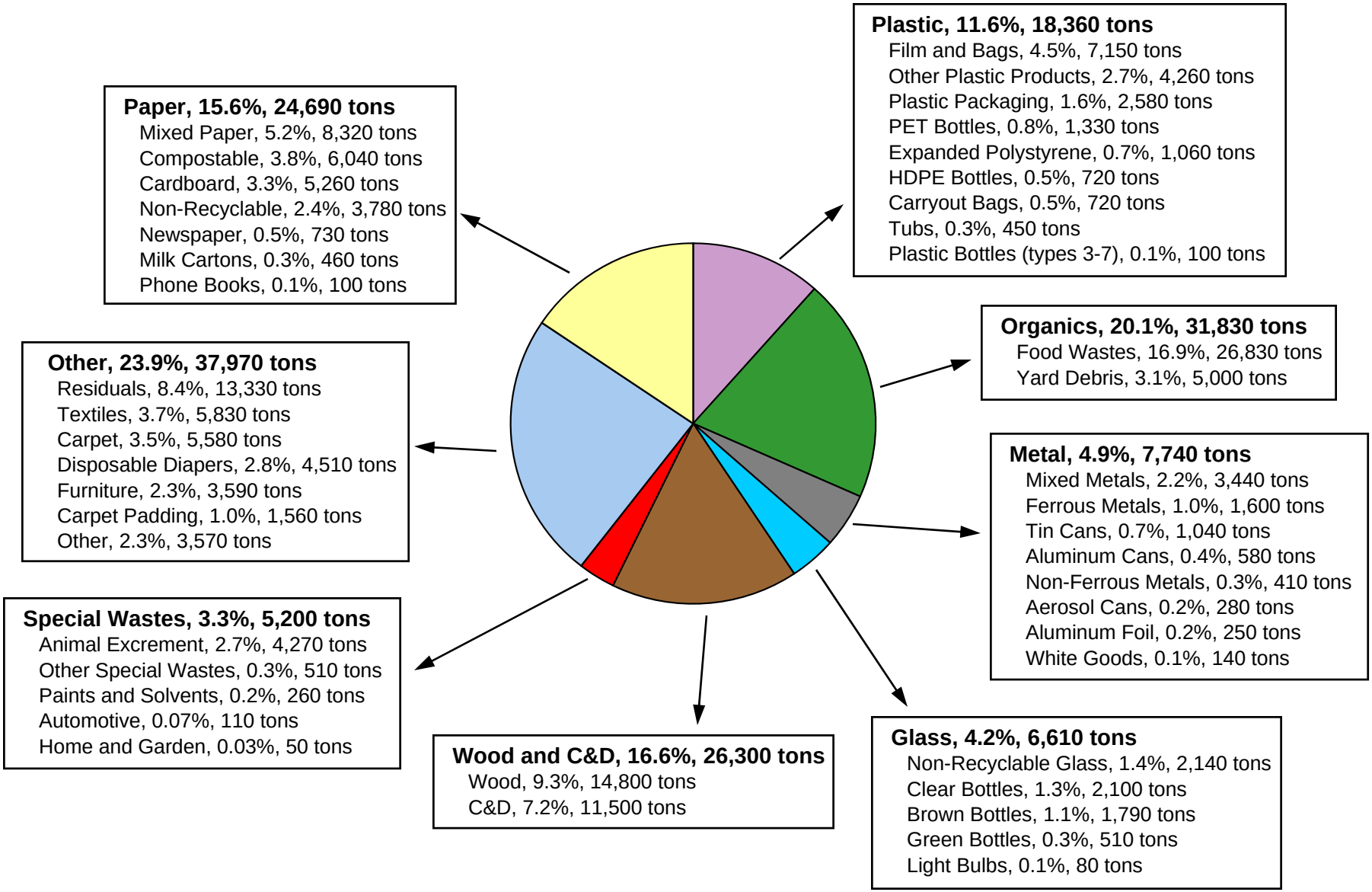
Waste composition results for the entire County are summarized in Figure E-1, and Table E-2 shows the data for each type of waste generator (see also Table 4 of the main report). The noteworthy results for each generator are:

- **Residential Self-Haul**: self-haul loads from residential sources have more wood and construction debris but less food waste than other residential sources, reflecting activities such as remodeling and the other special projects that are often the source of self-haul waste. The largest categories of materials in this waste stream are wood (18.1%), food waste (11.1%), furniture (6.0%), construction and demolition wastes (5.2%), and mixed metals (4.9%).

  Residential Self-Haul customers deliver only 13.5% of the total waste stream, but because of their small loads this type of customer represents more than half (55%) of the transactions at WARC for incoming waste loads, or about 90,660 loads per year of waste. Residential Self-Haul waste contains 18.1% of materials that could be recycled through a typical curbside recycling program (more than Single-Family but less than Multi-Family generators), and another 24.9% of this waste stream consists of organic materials that could be composted. Other types of potentially-recyclable materials contribute 30.8%, leaving only 26.2% of this waste stream that actually needs to be treated as waste.

- **Rural Dropboxes**: the wastes brought to the two rural stations are similar to Residential Self-Haul wastes (in other words, consisting of a blend of household garbage and waste from special projects). Wood waste is the material present in the largest quantity (14.4%) in this waste stream, followed by construction and

Figure E-1
WASTE COMPOSITION RESULTS



Note: Figures are percent by weight or tons per year.

Table E-2
COMPOSITION OF DISPOSED WASTES

Type of Material	Annual Average by Waste Generator						Total Waste Stream
	Residential Self-Haul	Rural Dropboxes	Single-Family	Multi-Family	Non-Res. Self-Haul	Commercial	
Recyclable Paper	9.4	6.4	7.3	11.3	5.6	12.0	9.4
Compostable Paper	1.5	1.3	4.0	3.5	0.5	5.8	3.8
Non-Recyclable Paper	1.0	2.4	1.9	2.6	1.4	3.5	2.4
Plastic Bottles	1.2	1.1	1.4	3.0	0.2	1.5	1.4
Plastic Bags and Film	2.6	3.0	5.8	5.0	1.2	6.5	5.0
Other Plastics	5.1	6.0	4.9	4.6	4.5	5.9	5.3
Metals	8.4	12.3	3.9	4.8	2.8	4.6	4.9
Food Waste	11.1	7.7	22.9	22.4	0.6	19.0	16.9
Yard Debris	2.1	3.7	7.3	2.2	1.1	1.0	3.2
Recyclable Glass	6.1	2.7	3.4	5.5	0.4	1.4	2.8
Other Glass	1.7	0.2	0.3	0.3	4.6	1.5	1.4
Disposable Diapers	0.6	2.1	5.0	6.0	0.1	2.3	2.8
Textiles	4.4	3.9	4.8	5.8	0.8	3.1	3.7
Carpet and Padding	5.9	4.7	0.4	1.7	7.0	6.9	4.5
Furniture and Mattresses	7.7	3.1	0.6	1.1	8.7	0.7	2.6
Wood Waste	18.1	14.4	2.5	3.2	24.2	7.6	9.3
Construction/Demolition	5.2	8.6	1.3	0.9	34.5	5.1	7.2
Animal Excrement	1.0	1.1	7.0	4.8	0.1	0.5	2.7
Other Special Wastes	1.5	0.4	0.7	0.5	0.1	0.4	0.6
Other Materials	5.6	14.9	14.8	11.0	2.0	10.7	10.3
Totals	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Notes: All figures are percentages by weight. The sum of the figures may not equal exactly 100% due to rounding.

demolition wastes (8.6%), food (7.7%), mixed metals (7.5%), tires (4.9%), and carpet (4.6%).

The waste from the Rural Dropboxes contains only 11.4% of the curbside recyclable materials, but another 22.1% is organic materials that could be composted and an additional 39.1% consists of other materials that could potentially be recycled through a variety of different programs. Only about one-quarter of this waste stream (27.4%) actually needs to be treated as waste.

- **Single-Family**: the largest category of material in this waste stream is food waste (22.9%), followed by yard debris (7.3%), animal excrement (or "kitty litter," 7.0%), plastic bags and film (5.8%), disposable diapers (5.0%), mixed waste paper (5.0%), and textiles (4.8%).

  Significant quantities of recyclable materials remain in this waste stream despite the widespread availability of recycling and organics collection programs for single-family homes. If residents recycled all of the materials currently accepted through existing recycling and organics collection programs, an additional 48.7% of the Single-Family waste stream could be recycled. This is the equivalent of 22,840 tons per year of additional recyclable and compostable materials. If residents also diverted other potentially-recyclable materials, then less than one-third (32.6%) of the current amount of waste would actually need to be disposed.

- **Multi-Family** (apartments): the largest categories of materials in this waste stream are food waste (22.4%), mixed waste paper (7.1%), disposable diapers (6.0%), textiles (5.8%), plastic bags and film (5.0%), and animal excrement (4.8%).

  The percentage of recyclable materials in apartment wastes is higher than for single-family homes, although the tonnage of recyclable materials disposed is lower due to the lower total amount of waste from apartments. The Multi-Family waste stream contains 22.6% of the typical curbside recyclables, 28.9% organics, and 20.6% other potentially-recyclable materials, leaving only 27.9% of the current waste that actually needs to be disposed.

- **Non-Residential Self-Haul**: like self-haul waste from residential sources, Non-Residential Self-Haul loads are often the result of construction activities or other special projects. The primary materials in this waste stream include construction and demolition waste (34.5%), wood (24.2%), furniture (8.3%), carpeting (6.3%), and cardboard (4.7%).

  The Non-Residential Self-Haul waste stream only contains 20.2% of the typical recyclable and compostable materials, or about 3,740 tons per year. The wood, other types of construction materials and other potentially-recyclable materials in this waste stream, however, add up to 53.9% or 9,970 tons per year. Diverting all

of the recyclable and compostable materials would only leave one-quarter (25.9%) of this waste stream remaining for disposal as waste.

- **Commercial**: the largest categories of materials in the Commercial waste stream are food waste (19.0%), wood waste (7.6%), mixed waste paper (6.9%), plastic bags and film (6.5%), compostable paper (5.8%), and carpet (5.4%).

  The Commercial waste stream contains 16.2% recyclable materials, or about 9,500 tons per year, and even more organics that could be composted, at 26.9% or 15,790 tons per year. Other materials that could potentially be recycled add up to 30.0% or 17,640 tons per year, leaving only about one-quarter (26.9%) of this waste stream that actually needs to be disposed as waste.

- **Total Waste Stream**: overall, the County's waste stream contains significant amounts of food waste (16.9%), wood waste (9.3%), construction and demolition waste (7.2%), mixed waste paper (5.2%), and plastic bags and film (5.0%).

  The County's waste stream contains 15.0% or 23,720 tons per year of material that could be handled through typical recycling programs, plus an additional 27.4% or 43,480 tons per year of organic materials that could be diverted to composting programs. Other types of recycling programs could potentially handle another 29.2%, or 46,330 tons per year, leaving only 28.5% of the waste from Thurston County that actually needs to be handled as a waste.

Carryout Bags

As of July 1, 2014, many types of plastic bags were banned from use at retail stores in most of Thurston County. In anticipation of this ban, a category for "carryout bags" was added to the list of materials measured by this study. The results for this category show a decrease in the amount of carryout bags for all generator types. Overall, there was a 53% decrease in the amount of bags found in the Thurston County waste stream. This represents a decrease of 382 tons per year.

Edible Food

To supplement the data being collected on mixed organics (see below), a category for "edible food" was added for the waste samples. This was done by dividing the original category of "food waste" into "edible food" (meaning food that had been edible when it was disposed or at some point prior to that) and "inedible food" (scraps resulting from food preparation and other food-related items that were never intended for human consumption). The results of this part of the analysis shows that 43% of the food waste

in Thurston County's waste stream could have been eaten at some point prior to being placed in the garbage. This is the equivalent of 12,488 tons of food per year.

Mixed Organics Results

Mixed organics collected in Thurston County are brought to WARC for transfer to one of several processing facilities. Sampling and analysis of these mixed organics was conducted as part of the waste sorting study, and this part of the project is described in greater detail in a separate report (see Appendix C). Comparing those results to the results of this waste composition study shows that only 4.6% of the food waste and 8.0% of the compostable paper is being diverted to the mixed organics program, while 82.3% of the yard debris is being diverted from disposal.

Comparison to Previous Studies

This is the fourth waste composition study that Thurston County has conducted over the past fifteen years. Figure E-2 compares the results of these four studies by material category. Figure E-3 shows these results on the basis of Thurston County's population, which highlights the fact that tonnages have decreased despite increases in population. Drawing firm conclusions from this data is difficult because several factors can influence these results, but the following general observations can be made:

- **Paper**: the amount of newspaper in Thurston County's waste stream has shown a steady decline over the years, as can be expected from increased participation in recycling programs and lower subscription rates, but other paper grades first dropped, then increased and then dropped again, both in terms of percentages and total tonnages. The decrease found in the current study appears to be tied to an overall decrease in Thurston County's waste stream.

- **Plastic**: the overall amount of plastic and most of the plastic categories were displaying steady increases for the previous ten years but have dropped significantly in the current study. The decrease found in the current study could be due in part to the overall decrease in Thurston County's wastes, although increased recycling of plastic bottles could also be a contributing factor.

- **Metal**: the amount of metal in the waste stream has generally been in decline over the previous three studies, but most of the metal categories show sharp declines in both percentages and tonnages for the current study. The tonnage of ferrous metal in particular has dropped in the current study. This appears to be primarily the result of decreases in ferrous metals for the Non-Residential, Commercial and Rural Dropbox sources, but the other waste generators also show decreases in this material.

Figure E-2
DISPOSAL TRENDS, ANNUAL TONS BY MATERIAL

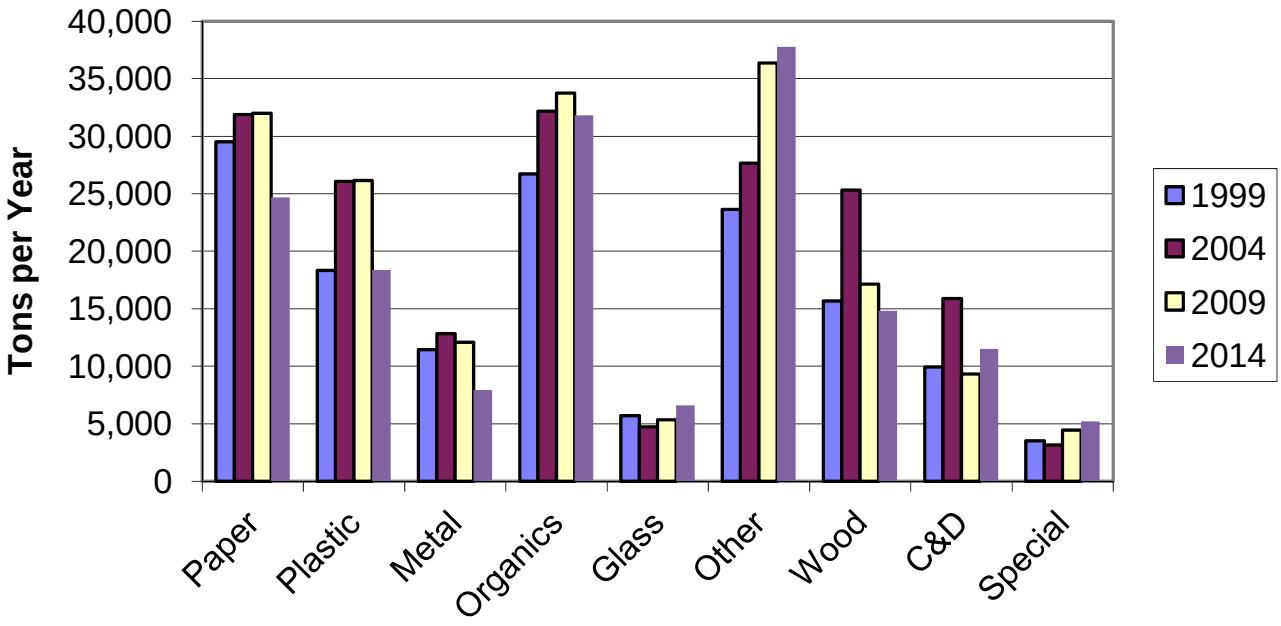
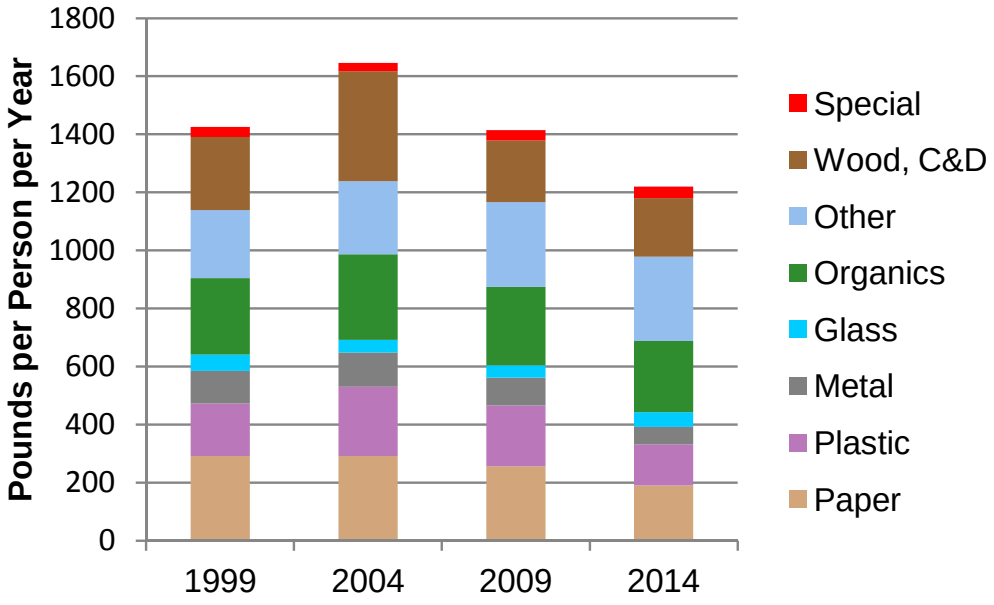


Figure E-3
DISPOSAL TRENDS, PER CAPITA AMOUNTS



- **Food Waste**: the amount of food waste in the County's waste stream has varied somewhat on a percentage basis over the four studies, but the current tonnages show a decrease compared to the 2009 study. This decrease in tonnages reverses the trend that had been occurring for steadily-increasing tonnages of food waste.

- **Yard Debris**: the percentages and tonnages of yard debris in the County's waste stream have been relatively steady over the years, although there was a spike in tonnages that occurred in the 2004 study. About two-thirds (64.6%) of the current tonnages of yard waste is being disposed by Single-Family generators from outside of Olympia.

- **Glass**: the amount of glass bottles in the waste stream has varied over the years but has generally declined, probably due to changes in consumer packaging and increased recycling levels. The exception to this observation is brown bottles, which increased significantly in the current study. This increase is due to increases that occurred for all of the residential categories (Residential Self-Haul, Rural Dropbox, Single-Family and Multi-Family), while Commercial tonnages for brown bottles dropped.

- **Wood and Construction/Demolition (C&D) Wastes**: the percentage and tonnages of wood and C&D wastes in the County's waste stream showed a sharp decrease in the previous study, and the combined total amount of wood and C&D wastes is still at that lower level despite an increase in construction activities in the past year. The amount of wood waste has dropped even farther since 2009, indicating that a portion of the wood waste is possibly being diverted to other facilities for recycling.

RECOMMENDATIONS

The following recommendations are based on the results of this study:

- There continues to be a significant amount of recyclable materials disposed in Thurston County's waste stream, and a few of the materials (brown glass bottles and non-ferrous metals) have actually increased in tonnages since the previous study. Increased education and other steps could help increase the recycling rate for these materials, although these increases would be incremental. If Thurston County desires to increase the recycling rate substantially over current levels, a different approach may be needed. Alternative approaches could include mandatory recycling, increasing the tipping fee at WARC (which provides an incentive to recycle), disposal bans, and an increased focus on new materials (carpet, textiles, construction and demolition wastes, etc.).

- The County should continue to explore options to divert other recoverable products from the waste stream such as carpet, carpet padding, mattresses and textiles.

- Single-family customers in Thurston County are disposing of significant amounts of yard debris, despite the options for handling this material on-site and the availability of collection programs for it. Additional education and other steps should be considered to encourage the diversion of this material.

- There continues to be a significant amount of wood and C&D in the waste stream. The County should continue to explore options to expand waste reduction options for these materials and to promote the availability of recycling services in the region.

- Recent steps have been taken in Thurston County to increase food waste diversion, but for now large amounts of this material remain in the waste stream. More publicity about the programs for food waste should be considered.

- The ban on plastic bags appears to have had a significant impact on the number of plastic bags disposed. Additional steps should be taken to monitor the impact of the bag ban, including monitoring the number of littered bags and the amount found in recyclables.

The part of this study that examined the mixed organics program also made a number of recommendations, including addressing the need to increase the amount of food waste diverted from disposal through public education and other steps; the desirability of recycling cardboard and other paper rather than placing these materials into the mixed organics program; and continuing education for the mixed organics program to minimize contamination.

SECTION I

INTRODUCTION

A. SCOPE AND OBJECTIVES

This report provides the results of a study of the quantity and composition of solid waste (garbage) and "mixed organics" collected in Thurston County, Washington during 2013 - 2014. The primary objectives of this study were to provide:

- Accurate data on the composition and quantity of disposed materials for evaluating current waste diversion programs, including waste diversion activities at the Thurston County Waste and Recovery Center (WARC).
- Accurate data on the composition and quantity of mixed organics (yard debris and food scraps) collected in Thurston County.
- Data that can be used for planning future programs.
- Data for specific County buildings and for the City of Olympia.

This waste composition study was conducted by the environmental consulting firm of Green Solutions, with assistance from two subconsultants, Environmental Practices and DGB Consulting. Additional assistance was provided by Waste Connections, Thurston County and the City of Olympia. This study was primarily organized by Thurston County, but the City of Olympia provided funds for additional data collection to allow better data to be provided about the City's residential and commercial waste streams (see Appendix A).

B. BACKGROUND

Previous waste characterization studies have been conducted in Thurston County in 1999, 2004, and 2009, so that Thurston County now has four studies spanning the past fifteen years. The materials examined by these studies have changed slightly over the years in response to evolving interests and issues, and also in response to changes that have occurred in the waste stream itself. Changes in the waste stream have occurred as a result of:

- A more extensive recycling and composting system that is diverting a wider variety of materials from the waste stream,
- Changes in packaging and consumer choices, and
- The emergence of new types of materials and new product categories.

C. CONTENTS OF THIS REPORT

This report consists of the following sections:

Section 2, Characterization of Thurston County's Waste Stream – this section provides data on the quantity and composition of the County's waste stream, including detailed data on the breakdown of three of the waste categories (wood, construction/demolition and special wastes). This section also provides additional data on the breakdown for light bulbs and hazardous wastes, and on the findings for carryout bags and edible food.

Section 3, Mixed Organics Results – this section provides a summary of the results for the quantity and composition of the mixed organics stream in Thurston County.

Section 4, Conclusions and Recommendations – this section discusses the interpretation and analysis of the results, and provides recommendations for possible future steps by the County.

Glossary – provides the definitions used for the sorting categories.

Appendix A, Waste Composition Data for the City of Olympia – provides results specific to Olympia's waste collection system.

Appendix B, Composition Data for Thurston County Offices – provides the results of quarterly samples taken from three county facilities.

Appendix C, Mixed Organics Results – provides more detailed results for the samples taken of the mixed organics collected separately in Thurston County.

Appendix D, Statistical Certainty of Results – provides data on the confidence intervals associated with the waste composition results.

SECTION II

CHARACTERIZATION OF THURSTON COUNTY'S WASTE STREAM

A. INTRODUCTION

This section provides the waste quantity and composition results for the solid wastes collected and disposed in Thurston County, as well as additional information collected on the County's waste stream during the fieldwork for this study.

B. OVERVIEW OF PROCEDURES

This study examined mixed municipal solid waste disposed at Thurston County's transfer facilities. Mixed municipal solid waste (MSW) is a term commonly used for residential and commercial garbage, including the waste collected by garbage haulers and waste delivered directly to disposal sites by the waste generators themselves ("self-haul"). This study also examined the mixed organics (food scraps and yard debris) collected in Thurston County. The results of the mixed organics sampling are summarized in the next section of this report. This study did not examine other source-separated recyclable materials or specially-handled materials.

The Thurston County Solid Waste System

The solid waste collection and transfer system for Thurston County consists of one large transfer station, the Thurston County Waste and Recovery Center (WARC), and two satellite stations (or rural dropboxes). The two rural dropboxes are the Rainier Dropbox and Rochester Dropbox. WARC is owned by Thurston County and operated by Waste Connections. This facility includes:

- A waste transfer operation, where waste is compacted into transfer trailers and exported out of the county to the Allied Waste landfill in Klickitat County, Washington.
- An extensive recycling drop-off center.
- A yard debris and mixed organics collection and transfer operation.
- A moderate risk waste collection facility (the "HazoHouse").
- Special collection programs for electronic wastes, appliances and other materials.

This section of the report addresses only the wastes that are handled at WARC, including the wastes brought there from the rural dropboxes.

Types of Waste Generators

The intent of this part of the study was to provide data for the County's entire waste stream, but the sampling and data collection procedures also allowed data to be collected on the quantity and composition of waste disposed by specific sources as well. In addition, the study was designed to allow data to be collected separately for the City of Olympia for three of the sources. For the waste disposed through the Thurston County system, the sources (waste generators) analyzed by this study included:

- **Residential Self-Haul**: waste delivered to WARC by the homeowners and renters who generated the load of waste, although in some cases they may be assisting a family member, neighbor or acquaintance who actually generated the waste. This type of waste is typically transported to WARC using a car or pickup truck. There is a clear pattern in the timing of such deliveries, with much of the self-haul waste being brought to WARC on the weekends or in the evenings.

- **Rural Dropboxes**: waste from the two satellite facilities: the Rochester and Rainier Dropbox sites. This waste can be assumed to be primarily Residential Self-Haul because the acceptance policies at these sites limit the size of the loads.

- **Single-Family**: waste collected by Waste Connections or the City of Olympia from single-family homes. This waste is typically bagged before collection, consists primarily of small pieces of many different types of materials, and is delivered to the disposal site most often between mid-morning and mid-afternoon Monday through Friday (Tuesday through Friday on alternating weeks for the City of Olympia loads). Additional samples were taken for Single-Family waste from Olympia to allow this source to be analyzed separately.

- **Multi-Family**: waste collected by Waste Connections or the City of Olympia from apartment buildings. This waste is often bagged before collection, consists primarily of small pieces of many different types of materials, and is delivered to the disposal site most often between early morning and mid-afternoon Monday through Friday. Multi-Family waste is almost always mixed with Commercial waste when collected because both types of customers use dumpsters for garbage collection, but part of the Multi-Family waste is also collected separately using roll-offs and compactors. Additional samples were taken for Multi-Family waste from Olympia to allow this source to be analyzed separately.

- **Non-Residential Self-Haul**: waste from businesses or contractors that is brought in by an employee of that business. The pattern in the delivery of this waste tends to be the opposite of Residential Self-Haul wastes, occurring primarily during regular work hours, and is typically brought in with larger vehicles (dump trucks, pickup trucks with trailers, and other trucks). A substantial amount of this waste stream consists of loads of construction and demolition wastes brought in by construction contractors.

- **Commercial**: waste from businesses (commercial and industrial) and institutions (schools, hospitals, government offices, etc.). These wastes are typically collected using front-loading garbage trucks (for emptying dumpsters) or trucks carrying roll-off containers and compactors, and are usually delivered early morning through mid-afternoon Monday through Friday. A small amount of Commercial waste is also collected by the City of Olympia and Waste Connections from carts using side- and rear-loaders. Additional samples were taken for Commercial waste from Olympia to allow this source to be analyzed separately.

- **Thurston County Offices**: samples were taken each quarter from three Thurston County facilities to provide data on the results of recycling and waste reduction programs in those facilities. These results are shown in Appendix B.

Construction and demolition (C&D) wastes and other special wastes were included in the above categories as appropriate for the source and delivery method. C&D wastes are often delivered by employees of a construction company and so were frequently included with Non-Residential Self-Haul waste, but C&D wastes are also delivered by homeowners (which is defined as Residential Self-Haul waste), or by waste haulers from construction sites (Commercial waste), or even by waste haulers delivering roll-off containers from do-it-yourself home remodeling projects (Single-Family waste).

Waste Quantity Procedures

The quantity (tonnage) of waste disposed by each type of generator was determined by applying the results of a survey of the incoming traffic to data from scalehouse records. The survey data was used to allocate self-haul tonnages into Residential and Non-Residential, and to allocate hauler tonnages (for the City of Olympia and Waste Connections) into Single-Family, Multi-Family and Commercial wastes. Tonnages for a two-week period each season were determined in this way, and those tonnages were used to determine annual weighted averages for each type of waste generator by combining quarterly data for individual generators. The annual amount of Multi-Family waste for the City of Olympia was adjusted based on data from the City.

The annual amounts for each generator and the annual weighted average for the entire county were determined by an in-depth analysis of a year's worth of transaction records. The 12-month period of September 1, 2013 through August 31, 2014 was used for this analysis as this most closely corresponded to the sorting periods used for this study. This data initially consisted of 237,322 rows of transaction data, including date, gross tons, tare tons, net tons, customer name, truck number and other information for each transaction. After deleting outbound loads, there remained 191,612 transaction records for inbound loads of waste and yard waste (or mixed organics). This data was sorted by customer type and the survey data for each type applied to that category to allocate tonnages by generator type.

Waste Composition Procedures

The composition of the County's solid waste stream was determined by randomly selecting and sorting samples of waste at WARC. Sampling was conducted for six days each quarter. Each sample was sorted into 88 categories of materials. The Glossary provides additional detail on the definitions used for the categories of materials.

C. RESULTS, WASTE QUANTITIES

Total Waste Quantities

Table 1 shows the results of the analysis of a year's worth of transaction records for the inbound loads at WARC. This data is shown by customer type, and was converted to the waste generator categories used in this study primarily by applying the waste quantity survey data gathered at the scalehouse and supplemented with additional research in some cases. The results of converting this data to the waste generator categories used for this study are shown in Table 2.

Waste disposal rates are often expressed on a per capita basis. Based on an estimated population of 260,100 people in 2013 (from the Thurston Regional Planning Commission) and a total waste quantity of 158,701 tons per year, Thurston County's waste disposal rate is 0.61 tons per person per year. This is the equivalent of 3.3 pounds per person per day or 1,220 pounds per person per year. This is a significant decrease from the previous two waste composition studies, which showed 0.82 tons per person per year in 2004 and 0.71 tons per person per year in 2009.

A more precise approach for waste disposal rates is to express residential waste quantities on the basis of population figures and non-residential waste quantities on the number of employees (see below).

Residential Waste Quantities

Waste Quantities: The residential waste stream accounts for 51.4% of the County's total waste. This is up slightly from the 47.8% found in the previous waste composition study in 2009. Single-Family generators contribute 57.5% of the total residential waste stream, Multi-Family accounts for 11.9%, and Residential Self-Haul (including the Rural Dropboxes) accounts for 30.6% of the residential waste quantities.

Residential Per Capita Disposal Rates: Based on 81,499 tons of residential waste per year and the County's 2013 population (260,100 people), the current residential per capita disposal rate for Thurston County is 0.31 tons per person per year or 1.72 pounds per person per day.

Table 1
ANNUAL QUANTITIES BY CUSTOMER TYPE

Type of Customer	Type of Material	Number of Transactions	Weight, TPY
Cash Customers	MSW	92,374	17,465
	C&D	21,263	12,814
	Asbestos	21	15.3
	Yard Waste	22,848	5,381
	MSW by the Cubic Yard	19,684	NA[1]
Rural Dropboxes	MSW	781	3,435
Waste Connections	MSW and C&D	16,249	89,298
	All Yard Waste[2]	2,164	13,213
City of Olympia	MSW	4,917	25,996
	Yard Waste	175	482
	Blended Yard Waste[2]	832	5,842
Non-Residential Charge Customers	MSW	2,158	2,604
	C&D	5,609	6,570
	Asbestos	25	32.7
	Vactor Waste	35	310
	Yard Waste	1,226	665
	MSW by the Cubic Yard	161	NA[1]
Other Charge Customers	Residential Self-Haul	237	516
	Res. SH, Yard Waste	4	1.4
	Multi-Family (MF)	9	4.3
	MF Yard Waste	3	3.4
Other	Landfill Maintenance	327	1,369
	Christmas Trees	501	51
Subtotal, MSW and C&D		**163,442**	**158,701**
Subtotal, Organics		**27,753**	**25,639**
Subtotal, Other Wastes		**408**	**1,727**
TOTALS		**191,612**	**186,067**

Notes: The annual amounts shown above are for the period from September 1, 2013 through August 31, 2014. Asbestos, vactor wastes, and landfill maintenance wastes were not included in this study, but are shown here because these materials were included in the transaction records.

1. The category "MSW by the Cubic Yard" is for customers of the rural dropboxes. Weights are not known for these customers, but the aggregate weight for these customers is included in the Rural Dropboxes category.
2. "Blended yard waste" denotes mixed yard debris and food scraps. For Waste Connections, the figures for "all yard waste" include both blended yard waste and regular yard waste.

Table 2
ANNUAL QUANTITIES OF DISPOSED WASTES BY SOURCE AND TYPE OF GENERATOR

Type of Generator	Annual Amount by Source, Tons			Annual Amounts (2013-2014)	
	City of Olympia	Waste Connections	Self-Haul	Total Tons	Percent
Residential Self-Haul	NA	NA	21,490	21,490	13.5%
Rural Dropboxes	NA	NA	3,435	3,435	2.2%
Single-Family	6,105	40,783	NA	46,888	29.5%
Multi-Family	4,324	5,362	NA	9,686	6.1%
Residential Subtotal	**10,429**	**46,145**	**24,925**	**81,499**	**51.4%**
Non-Residential Self-Haul	NA	NA	18,479	18,479	11.6%
Commercial	15,566	43,157	NA	58,723	37.0%
Non-Residential Subtotal	**15,566**	**43,157**	**18,479**	**77,202**	**48.6%**
Totals	**25,996**	**89,302**	**43,403**	**158,701**	**100.0%**
Percent of the Total Waste Stream	**16.4%**	**56.3%**	**27.3%**		

The annual amounts shown above are for the period from September 1, 2013 through August 31, 2014, as this period most closely corresponds to the timing of this study. The annual amount for Olympia Multi-Family is a 2013 figure provided by the City.

Non-Residential Waste Quantities

Waste Quantities: The non-residential waste stream accounts for 48.6% of Thurston County's total waste. 23.9% of this, or 18,479 tons, was Non-Residential Self-Haul waste, and 76.1%, or 58,723 tons, was Commercial waste.

Disposal Rates per Employee: Based on 77,202 tons of non-residential waste and the County's estimated 2014 employment level of 103,700 workers (for August, 2014, from Workforce Explorer), the current non-residential disposal rate for Thurston County is 0.74 tons per employee per year or 5.8 pounds per employee per day (based on 255 workdays per year).

D. RESULTS, WASTE COMPOSITION

Number of Samples

The composition of the County's waste stream was determined by randomly selecting and sorting a total of 252 samples of waste. These samples were allocated between the different types of generators based on the need to examine certain types in greater detail. Additional samples were also taken for three of the generators (Single-Family, Multi-Family and Commercial) to allow separate results to be reported for the City of Olympia. The number of samples taken each season is shown in Table 3.

Table 3
ALLOCATION OF SAMPLES BY TYPE OF GENERATOR

Type of Generator	Oct. 2013	Jan. 2014	May 2014	August 2014	Total Samples	
					Number	Percent
Residential Self-Haul	11	10	10	10	41	16%
Rural Dropboxes	4	4	4	4	16	6%
Single-Family	11	11	11	11	44	18%
Multi-Family	8	9	9	9	35	14%
Residential Subtotal	**34**	**34**	**34**	**34**	**135**	**54%**
Non-Residential Self-Haul	11	11	11	11	44	18%
Commercial	15	15	15	15	60	24%
Non-Residential Subtotal	**26**	**26**	**26**	**26**	**104**	**41%**
County Buildings	**3**	**3**	**3**	**3**	**12**	**5%**
TOTALS	**63**	**63**	**63**	**63**	**252**	**100%**

Waste Composition Results

Table 4 shows the annual averages for each generator and for the entire County. As can be seen in this table, there are marked differences in the waste streams of the different types of waste generators. The results for the entire County are also illustrated in Figure 1.

It should be noted that the figures shown in Table 4 have a specific degree of error associated with them. As with all sampling and survey procedures, a certain degree of error is unavoidable but quantifiable (see Appendix D for more details).

Residential Waste Composition

As can be seen in Table 4, there are substantial differences in the composition of wastes from the different residential sources. These differences can be explained by the different activities that created the wastes. Residential Self-Haul waste contains some "regular" household garbage but also contains a large amount of construction debris and other materials that are the result of special projects, since it is these projects that often motivate people to bring loads to the transfer station. The waste from the Rural Dropboxes is similar to Residential Self-Haul. Single-Family waste is influenced by the activities associated with owning and maintaining a home. The waste from apartments (Multi-Family) reflects a more mobile lifestyle and lower recycling participation (as indicated by the amounts of aluminum cans, plastic bottles and glass bottles that are higher than in Single-Family wastes).

The results for each residential generator are illustrated in Figures 2 through 5.

Non-Residential Waste Composition

There are also significant differences between the two types of non-residential wastes. As with residential wastes, this can be explained by the different activities and sources for these wastes. The Commercial waste stream in Thurston County is influenced by various manufacturing activities and by the presence of the State Capitol and related offices, while the Non-Residential Self-Haul waste stream is dominated by construction activities. Ample evidence of the influence of construction activities is provided by the fact that over half of the Non-Residential Self-Haul waste stream is comprised of wood waste (24.2%) and construction/demolition waste (34.5%).

The results for each non-residential generator are illustrated in Figures 6 and 7.

Table 4
WASTE COMPOSITION RESULTS

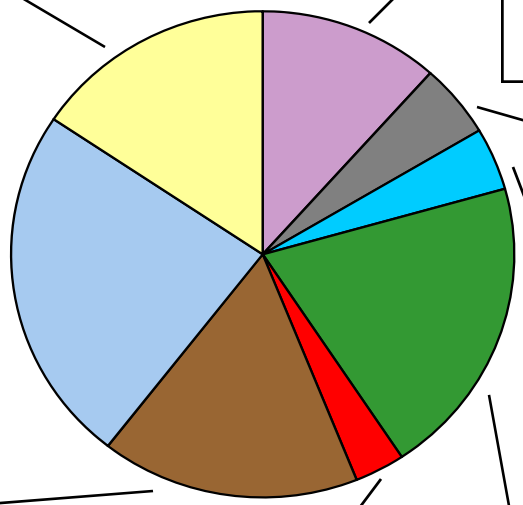
		Residential Self-Haul	Rural Dropboxes	Single-Family	Multi-Family	Non-Res. Self-Haul	Commercial	Average for Entire County
PAPER	Newspaper	0.55%	0.13%	0.42%	1.03%	0.03%	0.53%	0.46%
	Cardboard	4.38%	1.74%	1.54%	2.65%	4.73%	4.10%	3.31%
	Mixed Waste Paper	4.30%	4.35%	4.95%	7.09%	0.86%	6.94%	5.24%
	Phone Books	0.06%	0%	0.09%	0.17%	0%	0.04%	0.06%
	Milk Cartons, Other	0.10%	0.13%	0.33%	0.35%	0.01%	0.40%	0.29%
	Compostable	1.47%	1.30%	3.96%	3.53%	0.49%	5.77%	3.81%
	Non-Recyclable Paper	1.02%	2.40%	1.91%	2.56%	1.38%	3.54%	2.38%
	Paper Subtotal	**11.89%**	**10.05%**	**13.21%**	**17.38%**	**7.49%**	**21.34%**	**15.56%**
PLASTIC	PET Bottles	0.83%	0.61%	0.87%	1.93%	0.17%	0.86%	0.84%
	HDPE Bottles	0.28%	0.40%	0.47%	0.91%	0.03%	0.56%	0.45%
	Bottles 3-7	0.10%	0.04%	0.06%	0.11%	0.01%	0.05%	0.06%
	Tubs	0.17%	0.16%	0.44%	0.36%	0.07%	0.26%	0.28%
	Carryout Bags	0.33%	0.36%	0.74%	0.93%	0.04%	0.33%	0.46%
	Bags and Film	2.25%	2.63%	5.09%	4.02%	1.14%	6.11%	4.51%
	Plastic Packaging	1.24%	1.25%	1.67%	1.71%	0.27%	2.17%	1.63%
	Other Plastic Products	3.33%	4.39%	2.22%	1.76%	1.88%	3.12%	2.68%
	Expanded Polystyrene	0.36%	0.19%	0.58%	0.76%	2.25%	0.36%	0.67%
	Plastic Subtotal	**8.90%**	**10.03%**	**12.15%**	**12.49%**	**5.85%**	**13.83%**	**11.57%**
METAL	Aluminum Cans	0.37%	0.35%	0.29%	1.11%	0.05%	0.41%	0.37%
	Aluminum Foil	0.13%	0.36%	0.23%	0.28%	0.04%	0.11%	0.16%
	Tin Cans	0.64%	0.55%	1.00%	1.20%	0.05%	0.49%	0.66%
	Mixed Metals	4.87%	7.53%	1.35%	1.67%	0.72%	2.05%	2.17%
	Ferrous Metals	1.86%	2.62%	0.60%	0.22%	1.11%	1.03%	1.01%
	White Goods	0%	0.65%	0%	0%	0.63%	0%	0.09%
	Non-Ferrous Metals	0.31%	0.07%	0.16%	0.06%	0.15%	0.39%	0.26%
	Aerosol Cans	0.21%	0.21%	0.22%	0.24%	0.05%	0.16%	0.18%
	Metal Subtotal	**8.39%**	**12.34%**	**3.85%**	**4.77%**	**2.80%**	**4.64%**	**4.87%**
ORGANICS	Food Waste	11.07%	7.71%	22.92%	22.42%	0.60%	19.00%	16.91%
	Yard Debris	2.08%	3.71%	7.27%	2.17%	1.06%	1.03%	3.15%
	Organics Subtotal	**13.15%**	**11.43%**	**30.20%**	**24.59%**	**1.66%**	**20.03%**	**20.06%**
GLASS	Clear Bottles	2.37%	1.02%	1.63%	3.08%	0.27%	0.75%	1.32%
	Brown Bottles	3.44%	1.37%	1.23%	1.54%	0.05%	0.46%	1.13%
	Green Bottles	0.31%	0.34%	0.53%	0.85%	0.05%	0.15%	0.32%
	Light Bulbs	0.16%	0.02%	0.05%	0.02%	0.02%	0.03%	0.05%
	Non-Recyclable Glass	1.52%	0.15%	0.21%	0.26%	4.53%	1.44%	1.35%
	Glass Subtotal	**7.79%**	**2.91%**	**3.64%**	**5.75%**	**4.91%**	**2.84%**	**4.17%**
OTHER WASTES	E-Waste	0%	0%	0%	0.07%	0%	0.01%	0.01%
	Other Electronics	0.23%	0.21%	0.09%	0.09%	0%	0.13%	0.12%
	Tires	0.11%	4.88%	0.03%	0.32%	0%	0%	0.15%
	Rubber	0.36%	2.80%	0.60%	0.14%	0.56%	0.58%	0.57%
	Cosmetics	0.33%	0.11%	0.33%	0.41%	0.01%	0.10%	0.21%
	Pharmaceuticals	0.07%	0.01%	0.11%	0.06%	0%	0.02%	0.05%
	Diapers	0.58%	2.12%	4.98%	6.04%	0.08%	2.35%	2.84%
	Textiles	4.39%	3.87%	4.76%	5.79%	0.76%	3.10%	3.67%
	Carpet	3.82%	4.65%	0.41%	0.53%	6.27%	5.44%	3.51%
	Carpet Padding	2.05%	0.03%	0.01%	1.17%	0.69%	1.47%	0.98%
	Furniture	6.03%	0.33%	0.57%	0.55%	8.31%	0.72%	2.26%
	Mattresses	1.68%	2.78%	0%	0.52%	0.35%	0%	0.36%
	Ash, Dust	1.19%	1.78%	0.19%	0.20%	0.001%	0.42%	0.42%
	Miscellaneous Organics	0.03%	0.13%	0.04%	0.01%	0%	0.05%	0.04%
	Miscellaneous Inorganics	0.21%	0.18%	0.27%	0.37%	0.07%	0.48%	0.32%
	Residuals	3.01%	4.83%	13.10%	9.35%	1.33%	8.89%	8.40%
	Other Wastes Subtotal	**24.09%**	**28.71%**	**25.50%**	**25.60%**	**18.45%**	**23.77%**	**23.92%**
WOOD and C&D	Wood	18.10%	14.40%	2.53%	3.22%	24.19%	7.57%	9.32%
	Construction, Demolition	5.24%	8.61%	1.30%	0.91%	34.49%	5.12%	7.25%
	Wood, C&D Subtotal	**23.35%**	**23.01%**	**3.83%**	**4.13%**	**58.67%**	**12.70%**	**16.57%**
SPECIAL WASTES	Paints and Solvents	0.88%	0.09%	0.01%	0.11%	0.02%	0.08%	0.16%
	Automotive	0.04%	0.18%	0.02%	0.002%	0%	0.14%	0.07%
	Home and Garden	0.004%	0%	0.11%	0.001%	0%	0%	0.03%
	Other Special Wastes	1.51%	1.25%	7.49%	5.16%	0.15%	0.65%	3.02%
	Actual Hazardous Wastes	0.19%	0.16%	0.04%	0.01%	0.02%	0.16%	0.10%
	Special Waste Subtotal	**2.44%**	**1.53%**	**7.63%**	**5.28%**	**0.16%**	**0.86%**	**3.28%**
TOTALS		**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
	Pounds of Samples Sorted:	8,024	3,372	9,510	7,512	8,738	11,873	46,758 (1)
	Number of Samples Sorted:	41	16	44	35	44	60	252 (1)

Notes:

All figures are percent by weight (except for the bottom two rows).

1. The total number of samples and pounds sorted includes 12 samples and 1,828 pounds for specific County buildings.

Figure 1
WASTE COMPOSITION RESULTS



Paper, 15.6%, 24,690 tons
- Mixed Paper, 5.2%, 8,320 tons
- Compostable, 3.8%, 6,040 tons
- Cardboard, 3.3%, 5,260 tons
- Non-Recyclable, 2.4%, 3,780 tons
- Newspaper, 0.5%, 730 tons
- Milk Cartons, 0.3%, 460 tons
- Phone Books, 0.1%, 100 tons

Plastic, 11.6%, 18,360 tons
- Film and Bags, 4.5%, 7,150 tons
- Other Plastic Products, 2.7%, 4,260 tons
- Plastic Packaging, 1.6%, 2,580 tons
- PET Bottles, 0.8%, 1,330 tons
- Expanded Polystyrene, 0.7%, 1,060 tons
- HDPE Bottles, 0.5%, 720 tons
- Carryout Bags, 0.5%, 720 tons
- Tubs, 0.3%, 450 tons
- Plastic Bottles (types 3-7), 0.1%, 100 tons

Other, 23.9%, 37,970 tons
- Residuals, 8.4%, 13,330 tons
- Textiles, 3.7%, 5,830 tons
- Carpet, 3.5%, 5,580 tons
- Disposable Diapers, 2.8%, 4,510 tons
- Furniture, 2.3%, 3,590 tons
- Carpet Padding, 1.0%, 1,560 tons
- Other, 2.3%, 3,570 tons

Metal, 4.9%, 7,740 tons
- Mixed Metals, 2.2%, 3,440 tons
- Ferrous Metals, 1.0%, 1,600 tons
- Tin Cans, 0.7%, 1,040 tons
- Aluminum Cans, 0.4%, 580 tons
- Non-Ferrous Metals, 0.3%, 410 tons
- Aerosol Cans, 0.2%, 280 tons
- Aluminum Foil, 0.2%, 250 tons
- White Goods, 0.1%, 140 tons

Wood and C&D, 16.6%, 26,300 tons
- Wood, 9.3%, 14,800 tons
- C&D, 7.2%, 11,500 tons

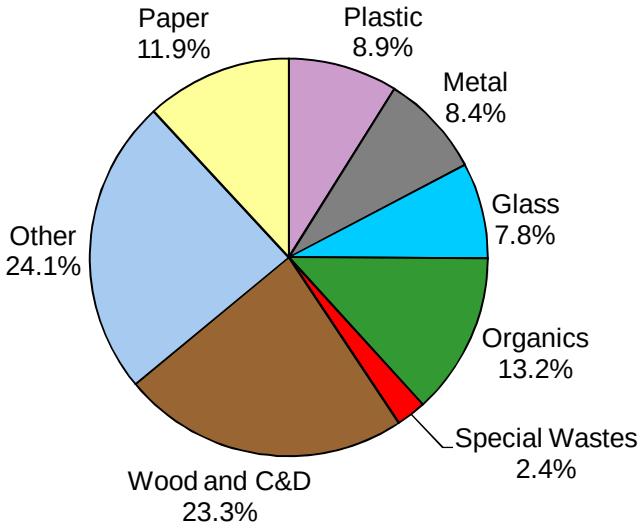
Glass, 4.2%, 6,610 tons
- Non-Recyclable Glass, 1.4%, 2,140 tons
- Clear Bottles, 1.3%, 2,100 tons
- Brown Bottles, 1.1%, 1,790 tons
- Green Bottles, 0.3%, 510 tons
- Light Bulbs, 0.1%, 80 tons

Special Wastes, 3.3%, 5,200 tons
- Animal Excrement, 2.7%, 4,270 tons
- Other Special Wastes, 0.3%, 510 tons
- Paints and Solvents, 0.2%, 260 tons
- Automotive, 0.07%, 110 tons
- Home and Garden, 0.03%, 50 tons

Organics, 20.1%, 31,830 tons
- Food Wastes, 16.9%, 26,830 tons
- Yard Debris, 3.1%, 5,000 tons

Note: Figures are percent by weight or tons per year.

Figure 2
RESIDENTIAL SELF - HAUL WASTE



SUMMARY OF WASTE COMPOSITION RESULTS:

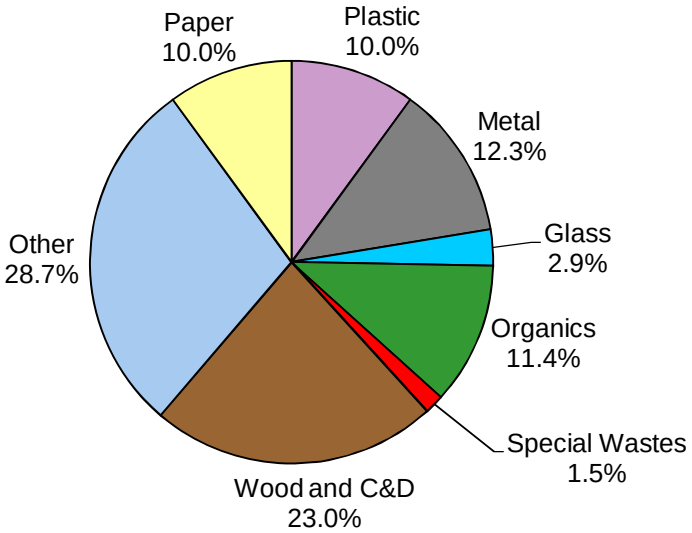
PAPER	**Percent**	**TPY**
Newspaper	0.6%	120
Cardboard	4.4%	940
Other Recyclable Paper	4.5%	960
Compostable Paper	1.5%	320
Non-Recyclable Paper	1.0%	220
Paper Subtotal	**11.9%**	**2,550**
PLASTIC		
Plastic Bottles	1.2%	260
Film and Bags	2.6%	560
Other Plastic	5.1%	1,100
Plastic Subtotal	**8.9%**	**1,910**
METAL		
Aluminum Cans	0.4%	80
Tin Cans	0.6%	140
Other Metals	7.4%	1,590
Metal Subtotal	**8.4%**	**1,800**
GLASS		
Glass Bottles	6.1%	1,310
Other Glass	1.7%	360
Glass Subtotal	**7.8%**	**1,670**

WOOD AND C&D	**Percent**	**TPY**
Wood	18.1%	3,890
Construction, Demolition	5.2%	1,130
Wood, C&D Subtotal	**23.3%**	**5,020**
SPECIAL WASTES		
Animal Excrement	1.0%	200
Other Special Wastes	1.5%	320
Special Waste Subtotal	**2.4%**	**520**
ORGANICS		
Food Waste	11.1%	2,380
Yard Debris	2.1%	450
Organics Subtotal	**13.2%**	**2,830**
OTHER		
Disposable Diapers	0.6%	120
Textiles	4.4%	940
Carpet and Padding	5.9%	1,260
Miscellaneous (1)	13.3%	2,850
Other Subtotal	**24.1%**	**5,180**
TOTALS	**100.0%**	**21,490**

Notes: Percentage figures are percent by weight. TPY = tons per year.

1) "Miscellaneous" includes e-waste, other electronics, tires, other rubber products, cosmetics, pharmaceuticals, furniture, mattresses, ash, dust, miscellaneous organics, miscellaneous inorganics and residuals.

Figure 3
RURAL DROPBOX WASTE



SUMMARY OF WASTE COMPOSITION RESULTS:

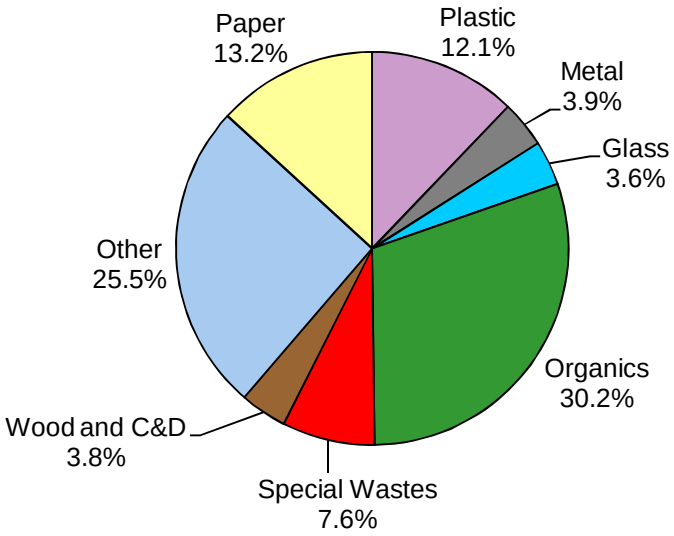
PAPER	**Percent**	**TPY**
Newspaper	0.1%	5
Cardboard	1.7%	60
Other Recyclable Paper	4.5%	150
Compostable Paper	1.3%	40
Non-Recyclable Paper	2.4%	80
Paper Subtotal	**10.0%**	**350**
PLASTIC		
Plastic Bottles	1.1%	40
Film and Bags	3.0%	100
Other Plastic	6.0%	210
Plastic Subtotal	**10.0%**	**340**
METAL		
Aluminum Cans	0.3%	10
Tin Cans	0.5%	20
Other Metals	11.4%	390
Metal Subtotal	**12.3%**	**420**
GLASS		
Glass Bottles	2.7%	90
Other Glass	0.2%	10
Glass Subtotal	**2.9%**	**100**

WOOD AND C&D	**Percent**	**TPY**
Wood	14.4%	490
Construction, Demolition	8.6%	300
Wood, C&D Subtotal	**23.0%**	**790**
SPECIAL WASTES		
Animal Excrement	1.1%	40
Other Special Wastes	0.4%	10
Special Waste Subtotal	**1.5%**	**50**
ORGANICS		
Food Waste	7.7%	260
Yard Debris	3.7%	130
Organics Subtotal	**11.4%**	**390**
OTHER		
Disposable Diapers	2.1%	70
Textiles	3.9%	130
Carpet and Padding	4.7%	160
Miscellaneous (1)	18.0%	620
Other Subtotal	**28.7%**	**990**
TOTALS	**100.0%**	**3,435**

Notes: Percentage figures are percent by weight. TPY = tons per year.

1) "Miscellaneous" includes e-waste, other electronics, tires, other rubber products, cosmetics, pharmaceuticals, furniture, mattresses, ash, dust, miscellaneous organics, miscellaneous inorganics and residuals.

Figure 4
SINGLE - FAMILY WASTE



SUMMARY OF WASTE COMPOSITION RESULTS:

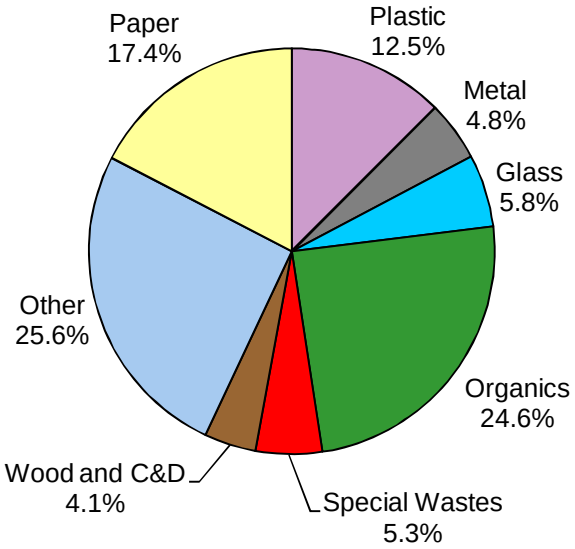
PAPER	**Percent**	**TPY**
Newspaper	0.4%	200
Cardboard	1.5%	720
Other Recyclable Paper	5.4%	2,520
Compostable Paper	4.0%	1,860
Non-Recyclable Paper	1.9%	900
Paper Subtotal	**13.2%**	**6,190**
PLASTIC		
Plastic Bottles	1.4%	650
Film and Bags	5.8%	2,740
Other Plastic	4.9%	2,300
Plastic Subtotal	**12.1%**	**5,700**
METAL		
Aluminum Cans	0.3%	140
Tin Cans	1.0%	470
Other Metals	2.6%	1,200
Metal Subtotal	**3.9%**	**1,810**
GLASS		
Glass Bottles	3.4%	1,590
Other Glass	0.3%	120
Glass Subtotal	**3.6%**	**1,710**

WOOD AND C&D	**Percent**	**TPY**
Wood	2.5%	1,180
Construction, Demolition	1.3%	610
Wood, C&D Subtotal	**3.8%**	**1,800**
SPECIAL WASTES		
Animal Excrement	7.0%	3,270
Other Special Wastes	0.7%	310
Special Waste Subtotal	**7.6%**	**3,580**
ORGANICS		
Food Waste	22.9%	10,750
Yard Debris	7.3%	3,410
Organics Subtotal	**30.2%**	**14,160**
OTHER		
Disposable Diapers	5.0%	2,330
Textiles	4.8%	2,230
Carpet and Padding	0.4%	200
Miscellaneous (1)	15.3%	7,190
Other Subtotal	**25.5%**	**11,950**
TOTALS	**100.0%**	**46,888**

Notes: Percentage figures are percent by weight. TPY = tons per year.

1) "Miscellaneous" includes e-waste, other electronics, tires, other rubber products, cosmetics, pharmaceuticals, furniture, mattresses, ash, dust, miscellaneous organics, miscellaneous inorganics and residuals.

Figure 5
MULTI - FAMILY WASTE



SUMMARY OF WASTE COMPOSITION RESULTS:

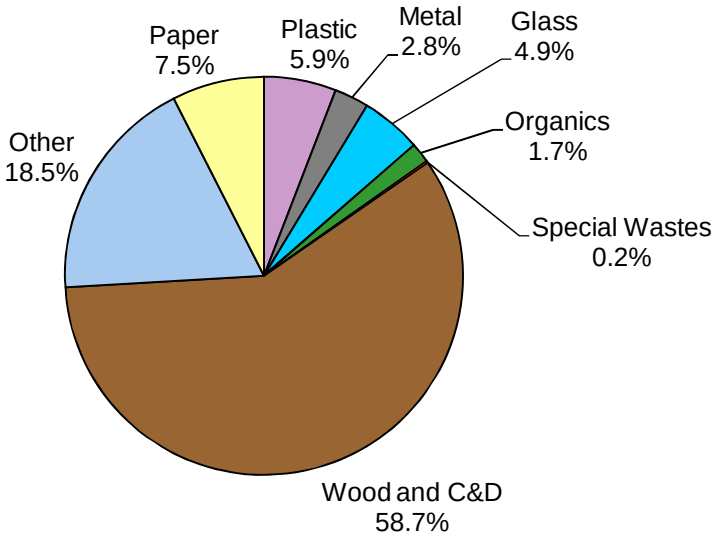
PAPER	**Percent**	**TPY**
Newspaper	1.0%	100
Cardboard	2.7%	260
Other Recyclable Paper	7.6%	740
Compostable Paper	3.5%	340
Non-Recyclable Paper	2.6%	250
Paper Subtotal	**17.4%**	**1,680**
PLASTIC		
Plastic Bottles	3.0%	290
Film and Bags	4.9%	480
Other Plastic	4.6%	440
Plastic Subtotal	**12.5%**	**1,210**
METAL		
Aluminum Cans	1.1%	110
Tin Cans	1.2%	120
Other Metals	2.5%	240
Metal Subtotal	**4.8%**	**460**
GLASS		
Glass Bottles	5.5%	530
Other Glass	0.3%	30
Glass Subtotal	**5.8%**	**560**

WOOD AND C&D	**Percent**	**TPY**
Wood	3.2%	310
Construction, Demolition	0.9%	90
Wood, C&D Subtotal	**4.1%**	**400**
SPECIAL WASTES		
Animal Excrement	4.8%	460
Other Special Wastes	0.5%	50
Special Waste Subtotal	**5.3%**	**510**
ORGANICS		
Food Waste	22.4%	2,170
Yard Debris	2.2%	210
Organics Subtotal	**24.6%**	**2,380**
OTHER		
Disposable Diapers	6.0%	590
Textiles	5.8%	560
Carpet and Padding	1.7%	160
Miscellaneous (1)	12.1%	1,170
Other Subtotal	**25.6%**	**2,480**
TOTALS	**100.0%**	**9,686**

Notes: Percentage figures are percent by weight. TPY = tons per year.

1) "Miscellaneous" includes e-waste, other electronics, tires, other rubber products, cosmetics, pharmaceuticals, furniture, mattresses, ash, dust, miscellaneous organics, miscellaneous inorganics and residuals.

Figure 6
NON - RESIDENTIAL SELF - HAUL WASTE



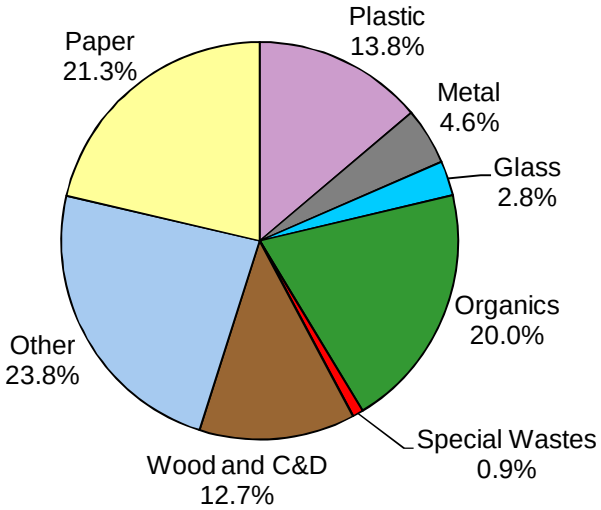
SUMMARY OF WASTE COMPOSITION RESULTS:

PAPER	**Percent**	**TPY**
Newspaper	0.03%	5
Cardboard	4.7%	870
Other Recyclable Paper	0.9%	160
Compostable Paper	0.5%	90
Non-Recyclable Paper	1.4%	250
Paper Subtotal	**7.5%**	**1,380**
PLASTIC		
Plastic Bottles	0.2%	40
Film and Bags	1.2%	220
Other Plastic	4.5%	820
Plastic Subtotal	**5.9%**	**1,080**
METAL		
Aluminum Cans	0.05%	10
Tin Cans	0.05%	10
Other Metals	2.7%	500
Metal Subtotal	**2.8%**	**520**
GLASS		
Glass Bottles	0.4%	70
Other Glass	4.5%	840
Glass Subtotal	**4.9%**	**910**

WOOD AND C&D	**Percent**	**TPY**
Wood	24.2%	4,470
Construction, Demolition	34.5%	6,370
Wood, C&D Subtotal	**58.7%**	**10,840**
SPECIAL WASTES		
Animal Excrement	0.1%	10
Other Special Wastes	0.1%	20
Special Waste Subtotal	**0.2%**	**30**
ORGANICS		
Food Waste	0.6%	110
Yard Debris	1.1%	200
Organics Subtotal	**1.7%**	**310**
OTHER		
Disposable Diapers	0.1%	10
Textiles	0.8%	140
Carpet and Padding	7.0%	1,290
Miscellaneous (1)	10.6%	1,970
Other Subtotal	**18.5%**	**3,410**
TOTALS	**100.0%**	**18,479**

Notes: Percentage figures are percent by weight. TPY = tons per year.
1) "Miscellaneous" includes e-waste, other electronics, tires, other rubber products, cosmetics, pharmaceuticals, furniture, mattresses, ash, dust, miscellaneous organics, miscellaneous inorganics and residuals.

Figure 7
COMMERCIAL WASTES



SUMMARY OF WASTE COMPOSITION RESULTS:

PAPER	**Percent**	**TPY**
Newspaper	0.5%	310
Cardboard	4.1%	2,410
Other Recyclable Paper	7.4%	4,340
Compostable Paper	5.8%	3,390
Non-Recyclable Paper	3.5%	2,080
Paper Subtotal	**21.3%**	**12,530**
PLASTIC		
Plastic Bottles	1.5%	870
Film and Bags	6.4%	3,780
Other Plastic	5.9%	3,470
Plastic Subtotal	**13.8%**	**8,120**
METAL		
Aluminum Cans	0.4%	240
Tin Cans	0.5%	290
Other Metals	3.7%	2,200
Metal Subtotal	**4.6%**	**2,720**
GLASS		
Glass Bottles	1.4%	800
Other Glass	1.5%	860
Glass Subtotal	**2.8%**	**1,670**

WOOD AND C&D	**Percent**	**TPY**
Wood	7.6%	4,450
Construction, Demolition	5.1%	3,010
Wood, C&D Subtotal	**12.7%**	**7,460**
SPECIAL WASTES		
Animal Excrement	0.5%	300
Other Special Wastes	0.3%	200
Special Waste Subtotal	**0.9%**	**510**
ORGANICS		
Food Waste	19.0%	11,160
Yard Debris	1.0%	600
Organics Subtotal	**20.0%**	**11,760**
OTHER		
Disposable Diapers	2.3%	1,380
Textiles	3.1%	1,820
Carpet and Padding	6.9%	4,060
Miscellaneous (1)	11.4%	6,700
Other Subtotal	**23.8%**	**13,960**
TOTALS	**100.0%**	**58,723**

Notes: Percentage figures are percent by weight. TPY = tons per year.

1) "Miscellaneous" includes e-waste, other electronics, tires, other rubber products, cosmetics, pharmaceuticals, furniture, mattresses, ash, dust, miscellaneous organics, miscellaneous inorganics and residuals.

E. WEIGHT OF MATERIALS DISPOSED

The waste quantity and composition results can be combined to show the total weight of disposed materials. Table 5 provides this information for the six waste generators and for the County's entire waste stream.

F. WOOD, C&D AND SPECIAL WASTES

Additional data on the breakdown of wood, construction/demolition, and special wastes is shown in Table 6. Most of this data does not have the same level of statistical certainty as the primary categories of materials due to the lower quantities and greater variability of these materials in the waste stream, but this data may still be useful for future planning activities focused on these types of wastes.

Included in the breakdown for special wastes is an assessment of the amount that met the criteria for hazardous waste. More details about these wastes are shown in Table 7. Table 7 shows only those materials that were actually classified as hazardous waste (in other words, for several categories there were also non-hazardous items found and these are not included in the figures). The figures shown in Table 7 are the number of times that each item was found, except for medical waste where the total number of syringes found is also shown. It should be noted that these numbers correspond to a variable amount of waste sorted for each generator, so comparing the figures between different types of generators may be misleading. For instance, fewer samples and hence less garbage was sorted for the Rural Dropboxes waste stream, so the lower number of items found in that category are largely the result of that difference.

As shown in Table 7, banned electronic wastes ("e-wastes") were found two times over the course of the fieldwork. Items found included a laptop and desktop unit. The count for these items is shown in Table 7 but the weight of these items (and the fluorescent bulbs and CFLs) is not included in the weight for "actual hazardous wastes."

G. ADDITIONAL DATA AND OBSERVATIONS

Types of Light Bulbs Found

The types of light bulbs found were noted during the fieldwork for this study. For all of the samples taken together, 75.6% by weight of the light bulbs found were incandescent bulbs (including a few halogen bulbs), 16.8% were compact fluorescent bulbs (CFLs), and 7.6% were fluorescent bulbs. Compared to the previous study, these figures reflect a decrease in incandescent bulbs (78.2% were found in the 2009 study) and fluorescent bulbs (10.1% previously), and an increase in CFL bulbs (from 11.8% previously). The number of times that CFLs and fluorescent tubes were found is shown in Table 7.

Table 5
WEIGHT OF DISPOSED MATERIALS

		Residential Self-Haul	Rural Dropboxes	Single-Family	Multi-Family	Non-Res. Self-Haul	Commercial	Totals for Entire County
PAPER	Newspaper	120	5	200	100	5	310	730
	Cardboard	940	60	720	260	870	2,410	5,260
	Mixed Waste Paper	920	150	2,320	690	160	4,080	8,320
	Phone Books	10	0	40	20	0	20	100
	Milk Cartons, Other	20	4	160	30	2	240	460
	Compostable	320	40	1,860	340	90	3,390	6,040
	Non-Recyclable Paper	220	80	900	250	250	2,080	3,780
	Paper Subtotal	**2,550**	**350**	**6,190**	**1,680**	**1,380**	**12,530**	**24,690**
PLASTIC	PET Bottles	180	20	410	190	30	500	1,330
	HDPE Bottles	60	10	220	90	10	330	720
	Bottles 3-7	20	1	30	10	2	30	100
	Tubs	40	10	200	30	10	150	450
	Carryout Bags	70	10	350	90	10	200	720
	Bags and Film	480	90	2,390	390	210	3,590	7,150
	Plastic Packaging	270	40	780	170	50	1,270	2,580
	Other Plastic Products	710	150	1,040	170	350	1,840	4,260
	Expanded Polystyrene	80	10	270	70	420	210	1,060
	Plastic Subtotal	**1,910**	**340**	**5,700**	**1,210**	**1,080**	**8,120**	**18,360**
METAL	Aluminum Cans	80	10	140	110	10	240	580
	Aluminum Foil	30	10	110	30	10	70	250
	Tin Cans	140	20	470	120	10	290	1,040
	Mixed Metals	1,050	260	630	160	130	1,200	3,440
	Ferrous Metals	400	90	280	20	200	600	1,600
	White Goods	0	20	0	0	120	0	140
	Non-Ferrous Metals	70	2	80	5	30	230	410
	Aerosol Cans	40	10	100	20	10	100	280
	Metal Subtotal	**1,800**	**420**	**1,810**	**460**	**520**	**2,720**	**7,740**
ORGANICS	Food Waste	2,380	260	10,750	2,170	110	11,160	26,830
	Yard Debris	450	130	3,410	210	200	600	5,000
	Organics Subtotal	**2,830**	**390**	**14,160**	**2,380**	**310**	**11,760**	**31,830**
GLASS	Clear Bottles	510	40	770	300	50	440	2,100
	Brown Bottles	740	50	580	150	10	270	1,790
	Green Bottles	70	10	250	80	10	90	510
	Light Bulbs	30	1	20	2	3	20	80
	Non-Recyclable Glass	330	10	100	30	840	850	2,140
	Glass Subtotal	**1,670**	**100**	**1,710**	**560**	**910**	**1,670**	**6,610**
OTHER WASTES	E-Waste	0	0	0	6	0	10	10
	Other Electronics	50	10	40	10	0	80	190
	Tires	20	170	10	30	0	0	230
	Rubber	80	100	280	10	100	340	910
	Cosmetics	70	4	160	40	2	60	330
	Pharmaceuticals	20	0	50	6	0	10	90
	Diapers	120	70	2,330	590	10	1,380	4,510
	Textiles	940	130	2,230	560	140	1,820	5,830
	Carpet	820	160	190	50	1,160	3,190	5,580
	Carpet Padding	440	1	10	110	130	870	1,560
	Furniture	1,300	10	260	50	1,540	420	3,590
	Mattresses	360	100	0	50	60	0	570
	Ash, Dust	250	60	90	20	0	240	670
	Miscellaneous Organics	10	4	20	1	0	30	70
	Miscellaneous Inorganics	50	10	130	40	10	280	510
	Residuals	650	170	6,140	910	250	5,220	13,330
	Other Wastes Subtotal	**5,180**	**990**	**11,950**	**2,480**	**3,410**	**13,960**	**37,970**
WOOD and C&D	Wood	3,890	490	1,180	310	4,470	4,450	14,800
	Construction, Demolition	1,130	300	610	90	6,370	3,010	11,500
	Wood, C&D Subtotal	**5,020**	**790**	**1,800**	**400**	**10,840**	**7,460**	**26,300**
SPECIAL WASTES	Paints and Solvents	190	3	10	10	3	50	260
	Automotive	10	10	10	0	0	80	110
	Home and Garden	1	0	50	0	0	0	50
	Other Special Wastes	320	40	3,510	500	30	380	4,790
	Actual Hazardous Wastes	40	10	20	1	3	90	160
	Special Waste Subtotal	**520**	**50**	**3,580**	**510**	**30**	**510**	**5,200**
TOTALS		**21,490**	**3,440**	**46,890**	**9,690**	**18,480**	**58,720**	**158,700**

Notes: All figures are tons per year.

Table 6
BREAKDOWN OF WOOD, C&D AND SPECIAL WASTES

		Residential Self-Haul	Rural Dropboxes	Single-Family	Multi-Family	Non-Res. Self-Haul	Commercial	Average for Entire County
WOOD WASTE	Dimension Lumber	10.2%	9.4%	0.4%	0.8%	9.1%	0.8%	3.1%
	Pallets, Crates	0.1%	0%	0%	0%	2.6%	0.3%	0.4%
	Treated Wood	1.1%	0.6%	0.1%	0.02%	0.3%	0%	0.2%
	Roofing	0%	0%	0%	0%	0%	0%	0%
	Contaminated	0.9%	1.0%	0.003%	0.06%	0.6%	2.7%	1.2%
	Stumps, Other Bulky Wood	0.1%	0%	0%	0%	0.1%	0.1%	0.04%
	Plywood	2.0%	0.8%	0.5%	0.4%	2.8%	0.4%	0.9%
	Particleboard, Fiberboard	3.4%	2.2%	1.4%	1.8%	8.6%	3.0%	3.2%
	Wood Products	0.2%	0.2%	0.1%	0.2%	0.1%	0.3%	0.2%
	Other Wood	0.04%	0.17%	0%	0%	0%	0.01%	0.01%
	Total Wood Waste	**18.1%**	**14.4%**	**2.5%**	**3.2%**	**24.2%**	**7.6%**	**9.3%**
CONSTRUCTION AND DEMOLITION (C&D) WASTE	Ceramics, Porc., China	1.5%	0.1%	0.02%	0%	3.4%	0.7%	0.9%
	Rocks, Bricks	0.02%	0%	0.03%	0.003%	0.4%	0%	0.1%
	Concrete	0%	0.7%	0.2%	0.2%	1.6%	0.1%	0.3%
	Soil, Dirt, Fines	0.4%	0.9%	0.7%	0.4%	0.8%	0.1%	0.4%
	Gypsum Board	0.1%	2.3%	0.1%	0.2%	10.2%	2.6%	2.2%
	Fiberglass Insulation	0.1%	0.1%	0.01%	0.001%	3.3%	0.6%	0.6%
	Other Fiberglass	0%	0.6%	0%	0%	1.2%	0.02%	0.2%
	Roofing	1.0%	2.8%	0.04%	0.1%	12.0%	0.4%	1.8%
	Asphalt	0%	0%	0%	0%	0%	0.1%	0.03%
	Other C&D	2.1%	1.0%	0.2%	0.1%	1.6%	0.6%	0.8%
	Total C&D Waste	**5.2%**	**8.6%**	**1.3%**	**0.9%**	**34.5%**	**5.1%**	**7.2%**
SPECIAL WASTES	**Paints and Solvents;**							
	Latex Paint	0.8%	0.1%	0.01%	0.1%	0%	0.1%	0.15%
	Oil-Based Paint	0.04%	0%	0%	0%	0%	0%	0.01%
	Solvents	0.01%	0%	0.01%	0.003%	0.02%	0%	0.004%
	Automotive Wastes;							
	Motor Oil, Other Oils	0%	0%	0.01%	0%	0%	0.03%	0.01%
	Oil Filters	0%	0.2%	0%	0%	0%	0.1%	0.05%
	Gasoline, Fuel Oil	0%	0%	0%	0%	0%	0%	0%
	Antifreeze	0%	0%	0%	0%	0%	0%	0%
	Other Auto Maintenance	0%	0%	0%	0%	0%	0%	0%
	Batteries, Car	0.04%	0%	0.01%	0.002%	0%	0%	0.01%
	Home and Garden;							
	Pesticides, Herbicides	0.004%	0%	0.01%	0%	0%	0%	0.002%
	Fertilizer w/Pest. and Herb.	0%	0%	0%	0%	0%	0%	0%
	Fertilizer w/o Pest., Herb.	0%	0%	0.1%	0.001%	0%	0%	0.03%
	Other;							
	Adhesives, Glues	0.2%	0.05%	0.08%	0%	0.09%	0.02%	0.07%
	Cleaners, Corrosives	0.1%	0.01%	0.02%	0.1%	0%	0.01%	0.03%
	Medical Wastes	0.01%	0.02%	0.02%	0.03%	0%	0.1%	0.04%
	Household Batteries	0.1%	0.1%	0.2%	0.2%	0.01%	0.04%	0.10%
	Animal Excrement	1.0%	1.1%	7.0%	4.8%	0.05%	0.5%	2.69%
	Animal Carcasses	0.05%	0%	0.2%	0%	0%	0%	0.06%
	Gas Cylinders	0%	0%	0%	0%	0%	0%	0%
	Other Special Wastes	0.02%	0%	0.02%	0%	0%	0.01%	0.01%
	Actual Hazardous Waste	**0.19%**	**0.16%**	**0.04%**	**0.01%**	**0.02%**	**0.16%**	**0.10%**
	Total Special Waste	**2.4%**	**1.5%**	**7.6%**	**5.3%**	**0.2%**	**0.9%**	**3.3%**

Notes: All figures are percentages by weight.

Table 7
NUMBER OF TIMES HAZARDOUS WASTES WERE FOUND

Type of Hazardous Waste	Res. Self-Haul	Rural Drop-boxes	Single-Family	Multi-Family	Non-Res. Self-Haul	Com-mercial	Totals
Oil Paint	2						2
Solvents	2		1	1	1		5
Motor Oil			1			1	2
Oil Filters		2				3	5
Car Batteries	1*		1*				2
Pesticides and Herbicides	2		2				4
Fertilizers w/o Pesticides			1	1			2
Adhesives and Glues	3		1			1	5
Cleaners	1		1	1		2	5
Medical Waste (and Number of Syringes)	4 (7)	2 (47)	17 (169)	9 (36)		12 (27)	44 (286)
Rechargeable Batteries	1		3				4
Other	2 (live ammo)						2
Total Number of Times that Wastes were Found	**18**	**4**	**28**	**12**	**1**	**19**	**82**
Total Amount of Hazardous Waste, % by Weight	**0.19%**	**0.16%**	**0.04%**	**0.01%**	**0.02%**	**0.15%**	**0.10%**
Additional Materials of Concern:							
Compact Fluorescents	3	1	8	1	1	4	18
Fluorescent Tubes	1			2		1	4
E-Wastes				1		1	2
Subtotal, Additional Materials of Concern	**4**	**1**	**8**	**4**	**1**	**6**	**24**

* Items shown as "car batteries" were actually smaller batteries of similar use and construction.
Latex paint is not shown above because it is not classified as hazardous. Other types of special wastes not shown above were not found.

Carryout Bags

As of July 1, 2014, many types of plastic bags were banned from use at retail stores in most of Thurston County (Lacey, Olympia, Tumwater and unincorporated Thurston County). In anticipation of this ban, a category for "carryout bags" was added to the list of materials measured by this study. As can be seen in Table 8, the results for this category show a decrease in the amount of carryout bags for all generator types.

Table 8
AMOUNT OF CARRYOUT BAGS

Type of Waste Generator	Average of Three Quarters	August, 2014	Percent Reduction
Residential Self-Haul	0.36%	0.26%	28%
Rural Dropboxes	0.45%	0.15%	67%
Single-Family	0.86%	0.40%	53%
Multi-Family	1.09%	0.44%	60%
Non-Residential Self-Haul	0.04%	0.01%	80%
Commercial	0.38%	0.17%	55%
Countywide Average	**0.53%**	**0.25%**	**53%**

Note: Figures shown in the first two columns of data are percent by weight of the entire waste stream.

The first three quarters of fieldwork conducted for this study (October, 2013, and January and May, 2014) were prior to the effective date of the bag ban, and only one quarter of fieldwork (August 2014) was conducted after the ban took effect. Since the fieldwork that was conducted in mid-August was actually testing garbage that had been generated over an indefinite time period prior to mid-August, it was likely that plastic bags distributed prior to July 1 were still "working their way through the system." In addition, stores were allowed to use up existing supplies of plastic bags, so plastic bags continued to be distributed for an unknown period after July 1. Hence, the results for August are likely not measuring the full impact of the bag ban.

As shown in Table 8, there was an overall decrease of 53% in the amount of carryout bags in Thurston County's waste stream. This amount represents a decrease of 382 tons of plastic bags on an annual basis.

Edible Food

Mixed organics collected in Thurston County are brought to WARC for transfer to one of several processing facilities. Sampling and analysis of these mixed organics was conducted as part of the waste sorting study, and this part of the project is described in greater detail in the next section of this report and in Appendix C. To supplement the data being collected on mixed organics, the category "edible food" was added for the waste samples. In other words, the original category of "food waste" was divided into "edible food" (meaning food that had been edible when it was disposed or at some point prior to that) and "inedible food" (scraps resulting from food preparation and other types of food that were never intended for human consumption). These sorting categories were added partway through the waste sorting project, and so this data is available for only two of the four quarters of fieldwork. The results for these categories are shown in Table 9.

Table 9
AMOUNT OF EDIBLE FOOD DISPOSED IN THURSTON COUNTY

Type of Waste Generator	Percent of Food that was Edible	Total Percent Food	Annual Tons of All Wastes	Tons of Edible Food Disposed
Residential Self-Haul	53.7%	11.1%	21,490	1,277
Rural Dropboxes	44.3%	7.7%	3,435	117
Single-Family, County	48.7%	22.5%	40,783	4,462
Single-Family, City	50.6%	25.8%	6,105	798
Multi-Family, County	46.7%	23.8%	5,362	597
Multi-Family, City	47.2%	20.7%	4,324	422
Non-Residential Self-Haul	7.0%	0.60%	18,479	8
Commercial, County	35.8%	19.6%	43,157	3,033
Commercial, City	66.1%	17.2%	15,566	1,774
Averages/Totals	**42.8%**	**16.9%**	**158,701**	**12,488**

SECTION III

MIXED ORGANICS RESULTS

A. INTRODUCTION

This section provides the results for the composition tests of the mixed organics that are collected in Thurston County by the City of Olympia and Waste Connections. This section also discusses the total amount of edible food that is disposed and composted.

B. OVERVIEW OF PROCEDURES

Sampling and sorting procedures for the mixed organics were conducted in a similar fashion to the procedures used for waste samples. Incoming vehicles carrying mixed organics were randomly selected, except in the case of the commercial organics. In the case of commercial organics, there were only one or two trucks per day carrying this type of waste and so those trucks were targeted for sampling by necessity. Sampling locations within the load were randomly chosen, and the samples were taken after the load was dropped off in the normal receiving area.

Samples of mixed organics were sorted into a different list of categories than the list of categories used for waste samples (see Section C of the Glossary). The categories for the mixed organics were designed so that these could be compared to the results from sorting samples of waste while still providing more detail on a few of the categories (such as a more detailed breakdown for compostable paper and plastic bags).

The types of waste generators used for the mixed organics were also different, although this was primarily because some of the types of waste generators were not relevant to the mixed organics tests. Self-haul customers, for instance, are only supposed to bring in clean yard debris (without food scraps or compostable paper), and so Residential Self-Haul and Non-Residential Self-Haul were not included in the mixed organics tests. At the time of this study, only minor amounts of mixed organics were being collected from Multi-Family buildings and so this source also did not warrant separate testing. This left four sources of mixed organics to be tested:

City Residential: organics collected by the City of Olympia from single-family homes in Olympia,

County Residential: organics collected by Waste Connections from single-family homes in the rest of Thurston County,

City Commercial: commercial organics collected by the City of Olympia, and

County Commercial: commercial organics collected by Waste Connections.

The target number of samples for the mixed organics was 24 samples each for the residential and commercial sources. This number of samples (24) was chosen based on experience from other studies that has shown that 20 to 30 samples are necessary to characterize a specific source with an acceptable degree of accuracy. The 24 samples were allocated to city and county sources based on the estimated amount of each (about one-third from the City of Olympia and two-thirds from the rest of Thurston County).

Samples of the mixed organics were taken over three quarters: January, May and August, 2013. More details about the mixed organics test procedures and results can be found in Appendix C.

C. QUANTITY RESULTS FOR MIXED ORGANICS

An important step for characterizing the mixed organics stream was to determine the amounts of mixed organics generated by the four sources. This data allows the annual averages for each source to be determined with the use of a weighted average that takes into account seasonal variations in quantity and composition. The quantity figures also allow a weighted average to be determined for the entire stream, by taking into account the relative quantities from each source. Quantities delivered by the City of Olympia (for City Residential and City Commercial) were determined using scalehouse transaction records. This approach did not work as well for deliveries by Waste Connection (for County Residential and County Commercial) and so instead reports from Waste Connections were used for these sources. The results are shown in Table 10.

Table 10
QUARTERLY AND ANNUAL AMOUNTS OF MIXED ORGANICS

Source	October, 2013	February, 2014	May, 2014	August, 2014	Annual Totals
City Residential	303.1	111.7	292.3	144.9	**5,279**
County Residential	513.3	160.5	732.1	583.3	**12,853**
City Commercial	22.2	16.7	23.0	18.3	**563**
County Commercial	36.1	21.7	24.5	25.0	**694**
Totals	**874.8**	**310.7**	**1,072.0**	**771.5**	**19,388**

Note: Figures shown for each quarter are for a two-week period. Annual totals are for the period September 1, 2013 through August 31, 2014.

D. COMPOSITION RESULTS FOR MIXED ORGANICS

Table 11 shows the results of the tests conducted on the mixed organics. The results shown are the weighted averages for each source and for the annual amount. As can be seen from the results, most of the material from residential sources is yard debris, with only relatively small amounts of food scraps, compostable paper and wood. Both of the commercial sources have much higher amounts of food scraps and compostable paper.

E. TOTAL AMOUNT OF EDIBLE FOOD DISCARDED

The issue of edible food being discarded rather than being consumed has gained national and international attention in recent years. A considerable amount of food becomes spoiled or otherwise wasted in the process of being harvested, processed and distributed, but a significant amount also goes uneaten locally in households and restaurants. As shown in Table 9, there is an estimated 12,488 tons of edible food that is disposed annually in Thurston County's waste stream. There is another 351 tons of edible food that was found in the mixed organics stream. This includes food that had either been edible when it was discarded or at some point prior to that, but does not include scraps resulting from food preparation and other pieces of food that were never intended for human consumption (such as bones and fruit rinds).

For the 113,283 households in Thurston County (from OFM, for April 2012), the total amount of wasted food (the 12,839 tons of edible food discarded) is the equivalent of 227 pounds per household per year, or 4.4 pounds per household per week.

Table 11
COMPOSITION RESULTS FOR MIXED ORGANICS

		City Residential	County Residential	City Commercial	County Commercial	Average for Entire Stream
ORGANICS	Edible Food	0.44%	0.37%	17.1%	26.5%	1.81%
	Inedible Food	2.43%	2.06%	37.1%	47.8%	4.82%
	Yard Debris	94.1%	92.3%	14.3%	13.4%	87.7%
	Untreated Wood	0.70%	1.28%	0.19%	1.54%	1.10%
	Organics Subtotal	**97.7%**	**96.0%**	**68.8%**	**89.2%**	**95.4%**
COMPOSTABLE PAPER	Waxed Cardboard	0%	0%	1.98%	0.17%	0.06%
	Pizza Boxes	0.21%	0.74%	1.22%	0.09%	0.59%
	Paper Serviceware	0%	1.03%	0.22%	0.01%	0.69%
	Shredded Paper	0.19%	0.01%	0.03%	0.07%	0.06%
	Other Compostable Paper	0.80%	0.67%	12.58%	7.69%	1.31%
	Compostable Paper Subtotal	**1.20%**	**2.46%**	**16.03%**	**8.03%**	**2.71%**
COMPOSTABLE PLASTICS	Approved Bags	0.02%	0.03%	0.19%	1.05%	0.07%
	Non-Approved Bags	0%	0%	0%	0%	0%
	Utensils	0%	0%	0.01%	0%	0.0003%
	Compostable Plastic Cups	0%	0%	0.03%	0.01%	0.001%
	Plastic Serviceware	0%	0%	0%	0%	0%
	Compostable Plastic Subtotal	**0.02%**	**0.03%**	**0.23%**	**1.06%**	**0.07%**
CURBSIDE RECYCLABLES	**Compostable Recyclables:**					
	Cardboard	0.17%	0.35%	8.65%	0.14%	0.53%
	Recyclable Paper	0.36%	0.23%	3.87%	0.40%	0.37%
	Non-Compostable Recyclables:					
	Recyclable Plastics	0%	0.01%	0.07%	0.04%	0.01%
	Glass Bottles	0%	0%	0.11%	0.04%	0.005%
	Metals	0%	0.06%	0.08%	0.06%	0.04%
	Curbside Recyclables Subtotal	**0.52%**	**0.64%**	**12.8%**	**0.69%**	**0.96%**
NON-COMPOSTABLE MATERIALS	Non-Compostable Paper	0.08%	0.14%	1.22%	0.51%	0.17%
	Non-Compostable Plastic Bags	0.05%	0.03%	0.17%	0.13%	0.05%
	Non-Compostable Plastics	0.02%	0.02%	0.23%	0.15%	0.03%
	Non-Bag Plastics	0.01%	0.01%	0.25%	0.06%	0.02%
	Bags of Garbage	0%	0%	0.05%	0.03%	0.002%
	Other	0.39%	0.69%	0.28%	0.13%	0.58%
	Non-Compostable Subtotal	**0.55%**	**0.89%**	**2.19%**	**1.02%**	**0.84%**
TOTALS		**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
Subtotal, All Compostable Materials		**99.4%**	**99.0%**	**97.6%**	**98.8%**	**99.1%**
Subtotal, All Non-Compostable Materials		**0.55%**	**0.96%**	**2.45%**	**1.16%**	**0.90%**
	Pounds of Samples Sorted:	2,159	3,114	1,929	3,228	10,430
	Number of Samples Sorted:	9	15	9	15	48

Notes: All figures are percent by weight (except for the bottom two rows).

SECTION IV

CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

Analysis of Waste Composition Trends

Table 12 shows the current results for the entire waste stream compared to the results from the three previous studies conducted for Thurston County. Figure 8 provides a graphic illustration of how some types of materials have grown while others have decreased. Figure 9 shows this information by year, while Figure 10 shows this on a per capita basis. A few adjustments had to be made in the data to provide results that could be directly compared:

- phone books were added to mixed paper for the 2009 and 2014 studies.
- office paper and magazines were added to mixed paper for the 1999 and 2004 studies.
- compostable paper was added to non-recyclable paper for the 2009 and 2014 studies.
- tubs and plastic film were added to plastic packaging for the 2009 and 2014 studies.
- carryout bags were combined with other bags and film for the 2014 data.
- auto parts were combined with mixed metals for the 2009 data.
- e-waste was added to mixed metals for the 2009 and 2014 studies.
- light bulbs were added to non-recyclable glass for the 2009 and 2014 studies.
- pharmaceuticals were added to cosmetics for the 2009 and 2014 studies.
- carpet padding was added to carpeting for the 2009 and 2014 studies.
- mattresses were added to furniture for the current study.
- miscellaneous organics were added to residuals for the 2009 and 2014 studies.
- residuals and fines for the previous two studies were combined.

When examining this data, it is important to bear in mind that:

- The amount of waste disposed in the past year is substantially lower than the 2004 and 2009 levels, despite increases in population in the past five years. This is probably due to a combination of the current economy, which may still be recovering from the recession, and new diversion programs, which have led to increases in the amounts of materials recycled and composted.

Table 12
COMPARISON OF RESULTS TO PREVIOUS STUDIES

		Results as a Percent by Weight				Results In Tons per Year			
		1999	2004	2009	2014	1999	2004	2009	2014
PAPER	Newspaper	1.82%	1.36%	0.89%	0.46%	2,630	2,430	1,570	730
	Cardboard	3.68%	3.43%	3.85%	3.31%	5,320	6,130	6,800	5,260
	Mixed Waste Paper	5.89%	5.70%	6.26%	5.30%	8,510	10,190	11,050	8,420
	Milk Cartons, Other	0.30%	0.23%	0.32%	0.29%	430	400	560	460
	Non-Recyclable Paper	8.74%	7.12%	6.80%	6.19%	12,630	12,730	12,010	9,820
	Paper Subtotal	**20.43%**	**17.83%**	**18.11%**	**15.56%**	**29,530**	**31,890**	**31,980**	**24,690**
PLASTIC	PET Bottles	0.52%	0.81%	0.92%	0.84%	760	1,440	1,630	1,330
	HDPE Bottles	0.68%	0.55%	0.65%	0.45%	980	990	1,150	720
	Bottles 3-7	0.05%	0.08%	0.07%	0.06%	68	140	120	100
	Plastic Packaging	7.24%	6.00%	6.97%	6.87%	10,460	10,720	12,310	10,910
	Other Plastic Products	3.74%	6.67%	5.36%	2.68%	5,410	11,940	9,470	4,260
	Expanded Polystyrene	0.46%	0.47%	0.83%	0.67%	660	850	1,460	1,060
	Plastic Subtotal	**12.69%**	**14.58%**	**14.80%**	**11.57%**	**18,340**	**26,080**	**26,140**	**18,360**
METAL	Aluminum Cans	0.42%	0.39%	0.50%	0.37%	600	690	890	580
	Aluminum Foil	0.13%	0.14%	0.18%	0.16%	180	240	310	250
	Tin Cans	1.00%	0.67%	0.75%	0.66%	1,450	1,200	1,320	1,040
	Mixed Metals	2.58%	2.50%	3.23%	2.29%	3,730	4,470	5,700	3,640
	Ferrous Metals	2.69%	2.74%	1.75%	1.01%	3,890	4,890	3,090	1,600
	White Goods	0.71%	0.28%	0.07%	0.09%	1,030	500	130	140
	Non-Ferrous Metals	0.18%	0.32%	0.19%	0.26%	270	570	340	410
	Aerosol Cans	0.20%	0.15%	0.17%	0.18%	290	270	300	280
	Metal Subtotal	**7.91%**	**7.18%**	**6.84%**	**5.00%**	**11,430**	**12,860**	**12,080**	**7,930**
ORGANICS	Food Waste	15.46%	13.63%	16.73%	16.91%	22,330	24,370	29,550	26,830
	Yard Debris	3.04%	4.38%	2.38%	3.15%	4,400	7,830	4,210	5,000
	Organics Subtotal	**18.50%**	**18.00%**	**19.12%**	**20.06%**	**26,730**	**32,190**	**33,750**	**31,830**
GLASS	Clear Bottles	1.74%	1.28%	1.25%	1.32%	2,510	2,300	2,220	2,100
	Brown Bottles	0.73%	0.58%	0.58%	1.13%	1,050	1,040	1,020	1,790
	Green Bottles	0.45%	0.27%	0.31%	0.32%	650	490	540	510
	Non-Recyclable Glass	1.03%	0.52%	0.87%	1.40%	1,490	930	1,540	2,220
	Glass Subtotal	**3.94%**	**2.66%**	**3.02%**	**4.17%**	**5,700**	**4,750**	**5,330**	**6,610**
OTHER WASTES	Tires	0.16%	0.04%	0.08%	0.15%	230	70	140	230
	Rubber Products	0.35%	0.29%	0.39%	0.57%	500	520	690	910
	Cosmetics	0.14%	0.36%	0.27%	0.26%	200	640	470	420
	Disposable Diapers	2.11%	1.55%	2.34%	2.84%	3,050	2,780	4,130	4,510
	Textiles	2.60%	2.50%	3.60%	3.67%	3,760	4,470	6,360	5,830
	Carpeting	2.51%	1.33%	2.97%	4.49%	3,630	2,370	5,240	7,130
	Furniture and Mattresses	1.02%	1.43%	3.13%	2.62%	1,470	2,550	5,520	4,160
	Ash, Dust	0.26%	0.28%	0.36%	0.42%	370	510	640	670
	Miscellaneous Inorganics	0.59%	0.13%	0.83%	0.32%	860	240	1,470	510
	Residuals	6.63%	7.03%	6.63%	8.44%	9,580	12,560	11,710	13,400
	Other Subtotal	**16.36%**	**14.95%**	**20.60%**	**23.80%**	**23,640**	**27,640**	**36,380**	**37,770**
WOOD and C&D	Wood	10.86%	14.15%	9.71%	9.32%	15,690	25,310	17,140	14,800
	Construction, Demolition	6.88%	8.88%	5.29%	7.25%	9,940	15,880	9,340	11,500
	Wood, C&D Subtotal	**17.73%**	**23.03%**	**15.00%**	**16.57%**	**25,620**	**41,190**	**26,480**	**26,300**
SPECIAL WASTES		**2.43%**	**1.77%**	**2.52%**	**3.28%**	**3,510**	**3,160**	**4,450**	**5,200**
TOTAL WASTE STREAM		**100.0%**	**100.0%**	**100.00%**	**100.00%**	**144,500**	**178,820**	**176,580**	**158,703**

Figure 8
DISPOSAL TRENDS, ANNUAL TONS BY MATERIAL

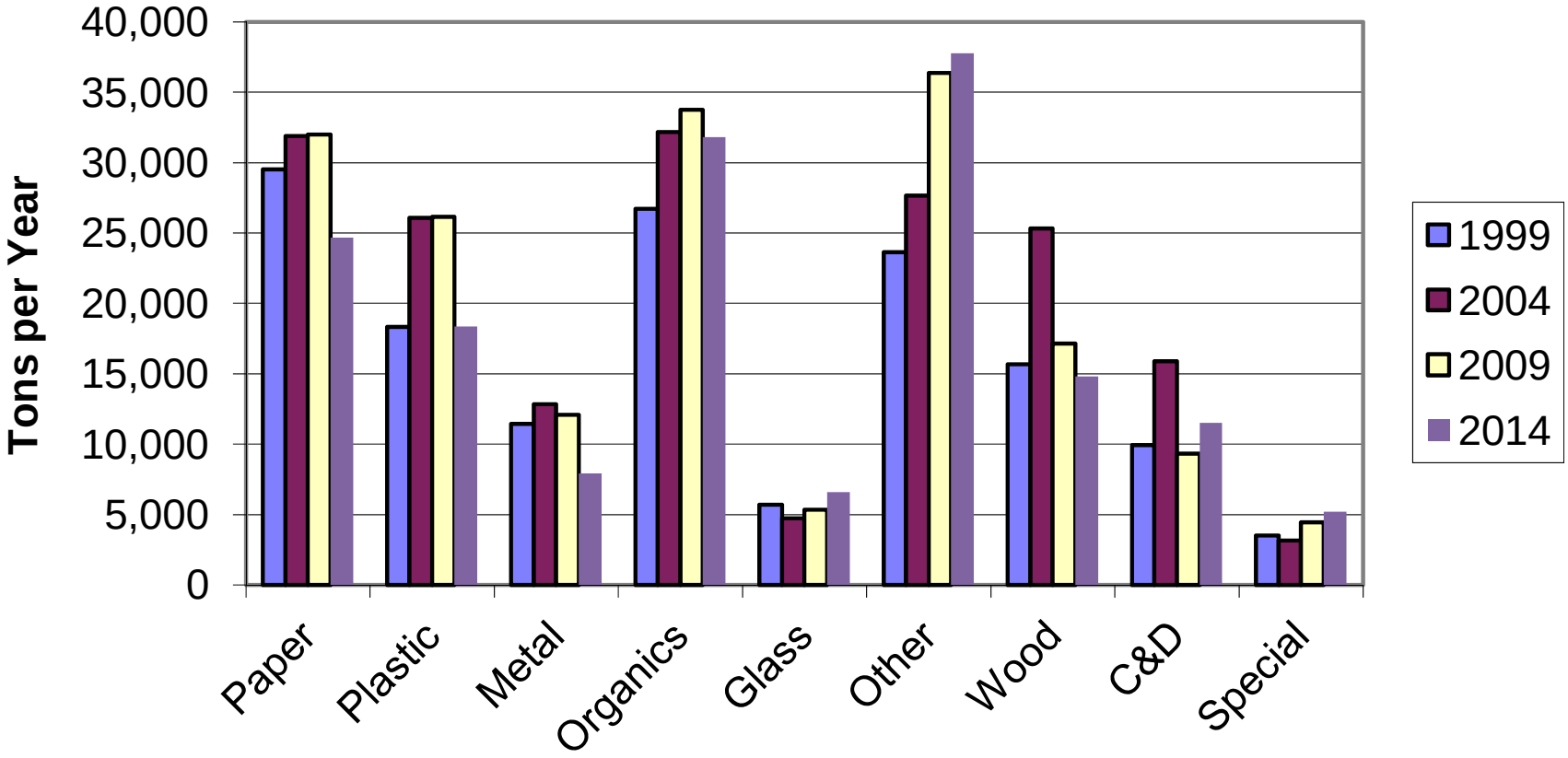


Figure 9
DISPOSAL TRENDS, ANNUAL TONS DISPOSED

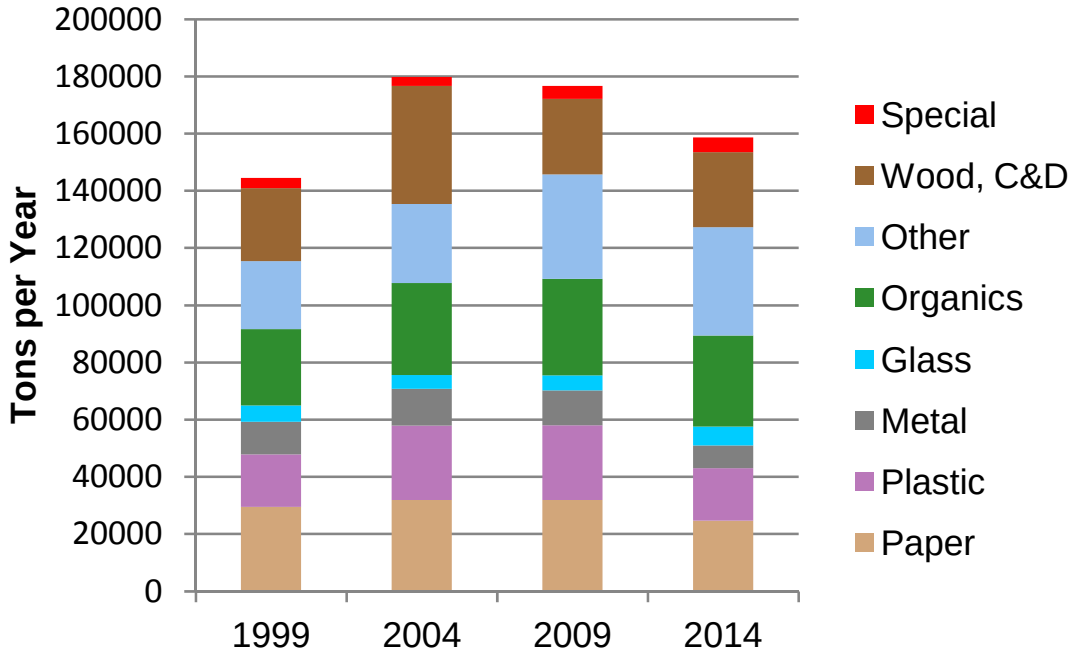
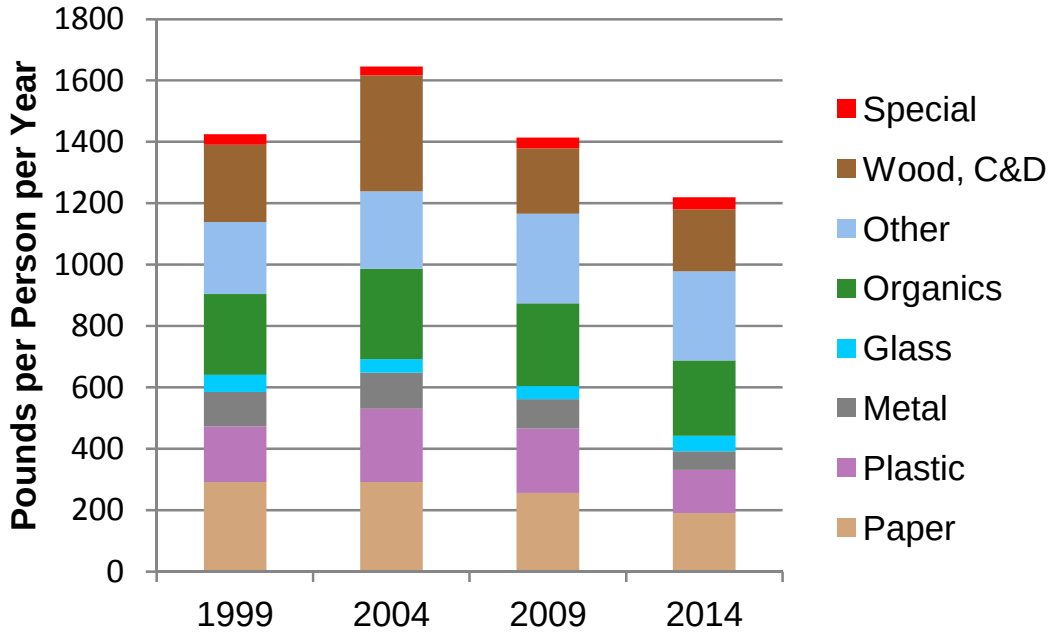


Figure 10
DISPOSAL TRENDS, PER CAPITA AMOUNTS



- The figures in the first set of columns in Table 12 are percentages, and these figures could change due solely to changes in other materials. For example, the annual tonnage of a material such as clear glass bottles could remain at about the same amount, but the percentage of this material would change due to changes in the total waste stream or due to large increases or decreases in other materials.

- The types of materials and definitions are not identical from study to study, which could mask differences in the data from different studies.

Bearing in mind the difficulty of drawing firm conclusions from this data, some interesting trends can still be observed for each of the major categories:

- **Paper**: the amount of newspaper in Thurston County's waste stream has shown a steady decline over the years, as can be expected from increased participation in recycling programs and lower subscription rates, but other paper grades first dropped, then increased and then dropped again, both in terms of percentages and total tonnages. The decrease found in the current study appears to be tied to an overall decrease in Thurston County's waste stream.

- **Plastic**: the overall amount of plastic and most of the plastic categories were displaying steady increases for the previous ten years but have dropped significantly in the current study. The decrease found in the current study again appears to be tied to an overall decrease in Thurston County's waste stream, although increased recycling rates for the plastic bottles could also be a contributing factor.

- **Metal**: the amount of metal in the waste stream has generally been in decline over the past three studies (on a percentage basis), but most of the metal categories show sharp declines in both percentages and tonnages for the current study. The tonnage of ferrous metals in particular has dropped in the current study. This appears to be primarily the result of decreases in ferrous metals for the Non-Residential Self-Haul, Commercial and Rural Dropbox sources, but the other types of waste generators also show decreases in this material.

- **Food Waste**: the amount of food waste in the County's waste stream has varied somewhat on a percentage basis over the four studies, but the current tonnage show a decrease compared to the 2009 study. This decrease in tonnage reverses the trend that had been occurring for steadily-increasing tonnages of food waste.

- **Yard Debris**: the percentages and tonnages of yard debris in the County's waste stream have been relatively steady over the years, although there was a spike in tonnages that occurred in the 2004 study. About two-thirds (64.8%) of the current tonnage of yard waste (5,000 tons per year) is being disposed by Single-Family generators from outside of Olympia.

- **Glass**: the amount of glass bottles in the waste stream has varied over the years but has generally declined, probably due to changes in consumer packaging and increased recycling levels. The exception to this observation is brown bottles, which increased significantly in the current study. This increase is due to increases that occurred for all of the residential categories (Residential Self-Haul, Rural Dropbox, Single-Family and Multi-Family), while Commercial tonnages for brown bottles dropped.

- **Wood and Construction/Demolition (C&D) Wastes**: the percentage and tonnages of wood and C&D wastes in the County's waste stream showed a sharp decrease in the previous study, and the combined total amount of wood and C&D wastes is still at that lower level despite an increase in construction activities in the past year. The amount of wood waste has dropped even farther since 2009, indicating that a portion of the wood waste is possibly being diverted to other facilities for recycling.

- **Other Wastes and Special Wastes**: these categories include a variety of different materials, and it's difficult to draw any conclusions from the historical trends seen for these.

Recycling Potential Assessment

One of the key reasons for conducting a study such as this is to determine how much recyclable material remains in the waste stream. In addition to examining "typical" recyclable materials (those materials that are typically collected through residential curbside and commercial recycling programs), other materials can also be examined, such as organics and other materials that can be recycled through special programs. This data provides important information for planning new or expanded recycling and composting programs.

Table 13 and Figure 11 show the amounts of recyclable materials remaining in each waste stream. Materials have been grouped into three categories for this analysis:

- **Typical Recyclables**: these are the materials typically collected through curbside and commercial programs. The list of materials for this group is based on Olympia's curbside program, and it should be kept in mind that the exact mix of materials collected varies from area to area and also varies depending on the type of generator (commercial programs often differ from residential).

- **Organics**: these are the materials typically collected through "expanded organics" collection programs. Although other materials (such as animal excrement and other types of wood) could potentially be considered "organic"

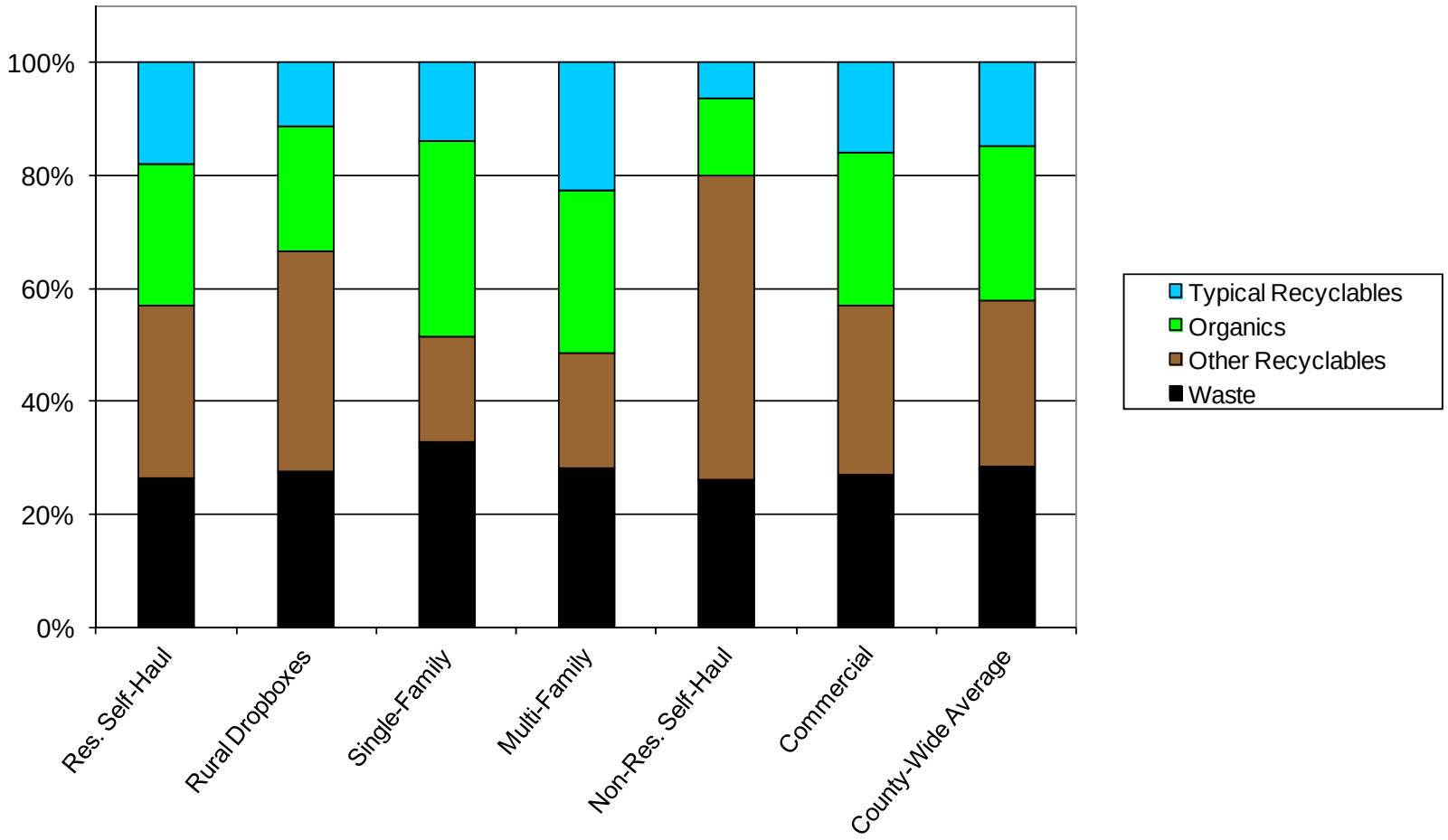
Table 13
RECYCLING POTENTIAL ASSESSMENT

	Residential Self-Haul		Rural Dropboxes		Single-Family		Multi-Family		Non-Res. Self-Haul		Commercial		Totals for Entire County	
	%	TPY	%	TPY	%	TPY	%	TPY	%	TPY	%	TPY	%	TPY
Typical Recyclables														
Newspaper	0.55%	120	0.13%	5	0.42%	200	1.03%	100	0.03%	5	0.53%	310	0.46%	730
Cardboard	4.38%	940	1.74%	60	1.54%	720	2.65%	260	4.73%	870	4.10%	2,410	3.31%	5,260
Mixed Waste Paper	4.30%	920	4.35%	150	4.95%	2,320	7.09%	690	0.86%	160	6.94%	4,080	5.24%	8,320
Phone Books	0.06%	10	0%	0	0.09%	40	0.17%	20	0%	0	0.04%	20	0.06%	100
Milk Cartons, Other	0.10%	20	0.13%	4	0.33%	160	0.35%	30	0.01%	2	0.40%	240	0.29%	460
PET Bottles	0.83%	180	0.61%	20	0.87%	410	1.93%	190	0.17%	30	0.86%	500	0.84%	1,330
HDPE Bottles	0.28%	60	0.40%	10	0.47%	220	0.91%	90	0.03%	10	0.56%	330	0.45%	720
Bottles 3-7	0.10%	20	0.04%	1	0.06%	30	0.11%	10	0.01%	2	0.05%	30	0.06%	100
Tubs	0.17%	40	0.16%	10	0.44%	200	0.36%	30	0.07%	10	0.26%	150	0.28%	450
Aluminum Cans	0.37%	80	0.35%	10	0.29%	140	1.11%	110	0.05%	10	0.41%	240	0.37%	580
Tin Cans	0.64%	140	0.55%	20	1.00%	470	1.20%	120	0.05%	10	0.49%	290	0.66%	1,040
Aerosol Cans	0.21%	40	0.21%	10	0.22%	100	0.24%	20	0.05%	10	0.16%	100	0.18%	280
Glass Bottles	6.11%	1,320	2.74%	100	3.39%	1,600	5.47%	530	0.36%	70	1.37%	800	2.77%	4,400
Subtotal	**18.1%**	**3,890**	**11.4%**	**400**	**14.1%**	**6,610**	**22.6%**	**2,200**	**6.4%**	**1,189**	**16.2%**	**9,500**	**15.0%**	**23,770**
Organics														
Compostable Paper	1.47%	320	1.30%	40	3.96%	1,860	3.53%	340	0.49%	90	5.77%	3,390	3.81%	6,040
Food Waste	11.1%	2,380	7.71%	260	22.9%	10,750	22.4%	2,170	0.60%	110	19.0%	11,160	16.9%	26,830
Yard Debris	2.08%	450	3.71%	130	7.27%	3,410	2.17%	210	1.06%	200	1.03%	600	3.15%	5,000
Dimension Lumber	10.2%	2,180	9.36%	320	0.44%	210	0.76%	70	9.06%	1,670	0.81%	480	3.11%	4,940
Pallets, Crates	0.12%	30	0%	0	0%	0	0%	0	2.60%	480	0.28%	164	0.42%	669
Subtotal	**24.9%**	**5,360**	**22.1%**	**750**	**34.6%**	**16,230**	**28.9%**	**2,790**	**13.8%**	**2,550**	**26.9%**	**15,794**	**27.4%**	**43,479**
Other Recyclables														
Plastic Bags and Film	2.59%	550	2.99%	100	5.84%	2,740	4.95%	480	1.18%	220	6.45%	3,790	4.96%	7,870
Plastic Packaging	1.24%	270	1.25%	40	1.67%	780	1.71%	170	0.27%	50	2.17%	1,270	1.63%	2,580
Expanded Polystyrene	0.36%	80	0.19%	10	0.58%	270	0.76%	70	2.25%	420	0.36%	210	0.67%	1,060
Mixed Metals	4.87%	1,050	7.53%	260	1.35%	630	1.67%	160	0.72%	130	2.05%	1,200	2.17%	3,440
Ferrous Metals	1.86%	400	2.62%	90	0.60%	280	0.22%	20	1.11%	200	1.03%	600	1.01%	1,600
White Goods	0%	0	0.65%	20	0%	0	0%	0	0.63%	120	0%	0	0.09%	140
Non-Ferrous Metals	0.31%	70	0.07%	2	0.16%	80	0.06%	5	0.15%	30	0.39%	230	0.26%	410
Light Bulbs	0.16%	30	0.02%	1	0.05%	20	0.02%	2	0.02%	3	0.03%	20	0.05%	80
E-Waste	0%	0	0%	0	0%	0	0.07%	6	0%	0	0.01%	10	0.01%	10
Other Electronics	0.23%	50	0.21%	10	0.09%	40	0.09%	10	0%	0	0.13%	80	0.12%	190

Table 13, Recycling Potential Assessment, continued

	Residential Self-Haul		Rural Dropboxes		Single-Family		Multi-Family		Non-Res. Self-Haul		Commercial		Totals for Entire County	
	%	TPY	%	TPY	%	TPY	%	TPY	%	TPY	%	TPY	%	TPY
Other Recyclables, continued														
Tires	0.11%	20	4.88%	170	0.03%	10	0.32%	30	0.00%	0	0.00%	0	0.15%	230
Textiles	4.39%	940	3.87%	130	4.76%	2,230	5.79%	560	0.76%	140	3.10%	1,820	3.67%	5,830
Carpet	3.82%	820	4.65%	160	0.41%	190	0.53%	50	6.27%	1,160	5.44%	3,190	3.51%	5,580
Carpet Padding	2.05%	440	0.03%	1	0.01%	10	1.17%	110	0.69%	130	1.47%	870	0.98%	1,560
Stumps, Bulky Wood	0.08%	17	0%	0	0%	0	0%	0	0.07%	13	0.06%	33	0.04%	63
Plywood	2.03%	440	0.76%	26	0.45%	212	0.37%	36	2.78%	513	0.35%	207	0.90%	1,432
Particleboard	3.43%	740	2.25%	77	1.41%	662	1.81%	176	8.63%	1,595	3.02%	1,773	3.16%	5,019
Ceramics, Porcelain	1.54%	330	0.07%	2	0.02%	7	0%	0	3.44%	635	0.69%	402	0.87%	1,379
Rocks, Bricks	0.02%	5	0%	0	0.03%	13	0%	0	0.37%	69	0%	0	0.05%	87
Concrete	0%	0	0.70%	24	0.18%	84	0.19%	18	1.65%	305	0.06%	37	0.29%	468
Soil, Dirt, Fines	0.44%	95	0.94%	32	0.68%	320	0.41%	40	0.76%	140	0.09%	51	0.43%	679
Gypsum Board	0.05%	10	2.33%	80	0.15%	69	0.15%	15	10.2%	1,877	2.57%	1,506	2.24%	3,559
Roofing (Asphalt)	1.02%	220	2.85%	98	0.04%	18	0.06%	6	12.0%	2,221	0.40%	233	1.76%	2,795
Motor Oil, Other Oils	0%	0	0%	0	0.01%	5	0%	0	0%	0	0.03%	16	0.01%	21
Oil Filters	0%	0	0.18%	6	0%	0	0%	0	0%	0	0.11%	67	0.05%	73
Batteries, Car	0.04%	9	0%	0	0.01%	3	0%	0	0%	0	0%	0	0.01%	12
Household Batteries	0.14%	30	0.08%	3	0.17%	81	0.22%	22	0.01%	1	0.04%	25	0.10%	161
Subtotal	**30.8%**	**6,616**	**39.1%**	**1,344**	**18.7%**	**8,754**	**20.6%**	**1,988**	**53.9%**	**9,973**	**30.0%**	**17,640**	**29.2%**	**46,327**
Other Materials (Wastes)	**26.2%**	**5,624**	**27.4%**	**946**	**32.6%**	**15,296**	**27.9%**	**2,712**	**25.9%**	**4,769**	**26.9%**	**15,786**	**28.5%**	**45,124**
Total Waste Stream		**21,490**		**3,440**		**46,890**		**9,690**		**18,480**		**58,720**		**158,700**

Figure 11
RECYCLING POTENTIAL ASSESSMENT



(in the sense that these materials could potentially be broken down through composting), these are not included here because current composting systems are generally not equipped to handle these materials.

- **Other Recyclables**: the third group consists of materials that could potentially be recycled through existing or new recycling programs, including materials that:
  - are recycled currently through programs that are conducted separately from municipal and hauler-based programs (such as textiles and plastic bags);
  - are being recycled to a limited extent currently through a few specialized programs (such as carpet); and
  - are being diverted to applications that do not meet the definition of recycling (such as wood converted to hog fuel).

The data shown in Table 13 does not take into account the marketability of the materials once the materials have been mixed with wastes, although that is not a factor here since this assessment assumes that the additional materials would be primarily diverted through source-separation programs and not through a mixed waste processing system. It should be noted, however, that there is no approach that can recover 100% of a recyclable material (although a combination of mandatory requirements together with financial incentives, such as is used for car batteries, can come close).

Waste Composition Conclusions

There are distinct differences in the waste streams of the different types of waste generators. For each of the generators, a few noteworthy conclusions can be drawn:

- **Residential Self-Haul**: self-haul loads from residential sources have more wood and construction debris but less food waste than other residential sources, reflecting activities such as remodeling and the other special projects that are often the source of self-haul waste. The largest categories of materials in this waste stream are:

  - wood is the material present in the largest quantity, at 18.1%,
  - followed by food waste, 11.1%,
  - furniture, 6.0%,
  - construction/demolition wastes, 5.2%, and
  - mixed metals, 4.9%.

  Residential Self-Haul customers deliver only 13.5% of the total waste stream, but because of their small loads this type of customer represents more than half of the transactions at WARC. Residential Self-Haul customers make up 68% of the cash customers (by weight), and cash customers represent 82% of all inbound

waste transactions, so Residential Self-Haul customers are estimated to bring in about 55% of all waste loads (not including yard waste and other materials), or about 90,660 loads per year of waste.

Residential Self-Haul waste contains 18.1% of materials that could be recycled through a typical curbside recycling program (more than Single-Family but less than Multi-Family generators), and another 24.9% consists of organic materials that could be composted. Other types of potentially-recyclable materials contribute 30.8%, leaving only 26.2% of this waste stream that actually needs to be treated as waste.

- **Rural Dropboxes**: the wastes brought to the two rural stations are similar to Residential Self-Haul wastes (in other words, consisting of a blend of household garbage and waste from special projects). The waste stream for this generator includes the following materials:

  - wood is the material present in the largest quantity, at 14.4%,
  - followed by construction and demolition wastes, 8.6%,
  - food, 7.7%,
  - mixed metals, 7.5%,
  -tires, 4.9%, and
  - carpet, 4.6%.

  The waste from the Rural Dropboxes contains only 11.4% of the typical recyclable materials, but another 22.1% is organic materials that could be composted and an additional 39.1% consists of other materials that could potentially be recycled through a variety of different programs. As with Residential Self-Haul waste, only about one-quarter of this waste stream (27.4%) actually needs to be treated as waste.

- **Single-Family**: the largest categories of materials in this waste stream are:

  - food waste, 22.9%,
  - yard debris, 7.3%,
  - animal excrement, 7.0%,
  - plastic bags and film, 5.8%,
  - disposable diapers, 5.0%,
  - mixed waste paper, 5.0%, and
  - textiles, 4.8%.

  Significant quantities of recyclable materials remain in this waste stream despite the widespread availability of recycling and organics collection programs for single-family homes. If residents recycled all of the materials currently accepted through existing recycling and organics collection programs, an additional 48.7%

of the Single-Family waste stream could be recycled. This is the equivalent of 22,840 tons per year of additional recyclable and compostable materials. If residents also diverted other potentially-recyclable materials (besides those collected through municipal and hauler-based programs), then less than one-third (32.6%) of the current amount of waste would actually need to be disposed.

- **Multi-Family** (apartments): the largest categories of materials in this waste stream are:

  - food waste, 22.4%,
  - mixed waste paper, 7.1%,
  - disposable diapers, 6.0%,
  - textiles, 5.8%,
  - plastic bags and film, 5.0%, and
  - animal excrement, 4.8%.

  The percentage of recyclable materials in apartment wastes is higher than for single-family homes, although the tonnage of recyclable materials disposed is lower due to the lower total amount of waste from apartments. The Multi-Family waste stream contains 22.6% of the typical curbside recyclables, 28.9% organics, and 20.6% other potentially-recyclable materials, leaving only 27.9% of the current waste that actually needs to be disposed.

- **Non-Residential Self-Haul**: like self-haul waste from residential sources, Non-Residential Self-Haul loads are often the result of construction activities or other special projects. The primary materials in this waste stream include:

  - construction and demolition waste, 34.5%,
  - wood, 24.2%,
  - furniture, 8.3%,
  - carpeting, 6.3%,
  - cardboard, 4.7%, and
  - non-recyclable glass, 4.5%.

  The Non-Residential Self-Haul waste stream only contains 20.2% of the typical recyclable and compostable materials, or about 3,740 tons per year. The wood, construction materials and other potentially-recyclable materials in this waste stream, however, add up to 53.9% or 9,970 tons per year. Diverting all of the recyclable and compostable materials would only leave one-quarter (25.9%) of this waste stream remaining.

- **Commercial**: the differences in the waste streams of the two types of non-residential customers (Non-Residential Self-Haul and Commercial) highlight the

different services needed for these business types. The largest categories of materials in the Commercial waste stream are:

- food waste, 19.0%,
- wood waste, 7.6%,
- mixed waste paper, 6.9%,
- plastic bags and film, 6.5%,
- compostable paper, 5.8%, and
- carpet, 5.4%.

The Commercial waste stream contains 16.2% recyclable materials, or about 9,500 tons per year, and even more organics that could be composted, at 26.9% or 15,790 tons per year. Other materials that could potentially be recycled amount to 30.0% or 17,640 tons per year, again leaving only about one-quarter (26.9%) of this waste stream that actually needs to be disposed as waste.

- **Total Waste Stream**: overall, the County's waste stream contains significant amounts of:

  - food waste, 16.9%,
  - wood waste, 9.3%,
  - construction and demolition waste, 7.2%,
  - mixed waste paper, 5.2%, and
  - plastic bags and film, 5.0%.

  The County's waste stream contains 15.0% or 23,720 tons per year of material that could be handled through typical recycling programs, plus an additional 27.4% or 43,480 tons per year of organic materials that could be diverted to composting programs. Other types of recycling programs could potentially handle another 29.2%, or 46,330 tons per year, leaving only 28.5% of the waste from Thurston County that actually needs to be handled as a waste.

B. RECOMMENDATIONS

The following recommendations are based on the results of this study:

- There continues to be a significant amount of recyclable materials disposed in Thurston County's waste stream, and a few of the materials (brown glass bottles and non-ferrous metals) have actually increased in tonnages since the previous study. Increased education and other steps could help increase the recycling rate for these materials, although these increases would be incremental. If Thurston County desires to increase the recycling rate substantially over current levels, a different approach may be needed. Alternative approaches could include mandatory recycling, increasing the tipping fee at WARC (which provides an incentive to

recycle), disposal bans, and an increased focus on new materials (carpet, textiles, construction and demolition wastes, etc.).

- The County should continue to explore options to divert other recoverable products from the waste stream such as carpet, carpet padding, mattresses and textiles.

- Single-family customers in Thurston County are disposing of significant amounts of yard debris, despite the options for handling this material on-site and the availability of collection programs for it. Additional education and other steps should be considered to encourage the diversion of this material.

- There continues to be a significant amount of wood and C&D in the waste stream. The County should continue to explore options to expand waste reduction options for these materials and to promote the availability of recycling services in the region.

- Recent steps have been taken in Thurston County to increase food waste diversion, but for now large amounts of this material remain in the waste stream. More publicity about the programs for food waste should be considered.

- The ban on plastic bags appears to have had a significant impact on the number of plastic bags disposed. Additional steps should be taken to monitor the impact of the bag ban, including monitoring the number of littered bags and the amount found in recyclables.

GLOSSARY

INTRODUCTION

This glossary includes three sets of definitions:

a) Definitions for waste generator types, and

b) Definitions for waste sorting categories, which are shown below in the same order as they appear on the waste sorting form.

c) Definitions specific to the mixed organics tests.

A. WASTE GENERATORS

For the purposes of this study, all waste disposed in Thurston County was categorized into one of six sources, including four types of residential waste generators (single-family, multi-family, self-haul and satellite stations) and two types of non-residential (self-haul and commercial). In addition, samples were taken from four county buildings and this data was kept separate from the other results.

Residential Self-Haul: residential waste delivered to WARC by a homeowner, renter or landlord, typically using cars, vans, jeeps, pick-up trucks, rented trucks and trailers.

Non-Residential Self-Haul: non-residential waste delivered to WARC by the same company that created the waste, including construction and demolition waste brought in by contractors.

Rural Dropboxes: wastes collected at the Rainier and Rochester satellite facilities.

Single-Family Homes: waste originating from single-family homes and mobile home parks. To be counted in this category, the waste must have been delivered to WARC by a municipal collection crew, private garbage hauler, or manager/owner of a mobile home park.

Multi-Family: wastes collected from apartment buildings. To be counted in this category, the waste must have been delivered by a municipal collection crew or private garbage hauler (Waste Connections).

Commercial: waste from businesses, industries and institutions, delivered by a municipal collection crew or private garbage hauler.

Olympia Single-Family, Multi-Family and Commercial: additional samples of waste (in addition to samples randomly chosen as part of the base project) taken from single-family homes, multi-family apartments, and from businesses, industries and institutions.

County Offices: additional samples of waste taken from one of three Thurston County facilities: the County Courthouse, the Public Health office and the Family Justice Center.

B. WASTE SORTING CATEGORIES

Paper

Newspaper: printed groundwood newsprint, including glossy ads and Sunday edition magazines that are delivered with the newspaper (unless these are found separately during sorting).

Cardboard: unwaxed kraft paper corrugated containers and boxes, unless poly- or foil-laminated. Note that this category did not include brown kraft paper bags.

Mixed Waste Paper: high- and low-grade potentially recyclable papers, including colored papers, office paper, notebook or other lined paper, envelopes with plastic windows, non-corrugated paperboard, frozen food packaging, carbonless copy paper, egg cartons, magazines, and junk mail.

Phone Books: printed and bound phone books made primarily of groundwood paper.

Milk Cartons and Other Aseptic Containers: milk cartons and similar gable-top containers (such as orange juice cartons), and juice drink boxes.

Compostable Paper: non-recyclable papers that could be composted, such as towels, plates, cups, pizza boxes, waxed paper, and waxed cardboard. This category included paper that was contaminated or soiled with food or liquid in its normal use.

Non-Recyclable Paper: contaminated papers and non-recyclable types of papers such as carbon paper, tissues, laminated paper, paper packaging with metal or plastic parts, and hardcover books.

Plastic

PET Bottles: polyethylene terephthalate (PET) bottles, including soda, oil, liquor and other types of bottles. No attempt was made to remove base cups, caps, or wrappers. The SPI code for PET is 1.

HDPE Bottles: high density polyethylene (HDPE) milk, juice, detergent, and other bottles. This category did not include motor oil bottles. The SPI code for HDPE is 2.

Bottles Types 3 - 7: all other bottles that were not PET or HDPE, where the neck of the container is narrower than the body. Included SPI codes 3 - 7.

Tubs: plastic containers of all resin types that were as wide or wider at the top than at the bottom.

Carryout Bags: thin plastic bags provided by retail establishments at the point of sale or departure. Did not include newspaper bags, dry cleaning bags, bags used by customers for bulk foods, bags used for prescription drugs or deli carryout, or film used to wrap meats and other damp products.

Other Film and Bags: all other plastic packaging films and bags. To be counted in this category, the material must have been flexible (i.e., can be bent without making a noise).

Plastic Packaging: all other plastic packaging (besides tubs, bottles, film and bags), and shipping materials and other plastic items which were not themselves finished consumer products, including thermoplastics and thermosetting plastics used for packaging. Also included HDPE motor oil bottles.

Plastic Products: finished plastic products such as toys, toothbrushes, vinyl hose and shower curtains, including non-C&D fiberglass resin products and materials (see "fiberglass insulation" and "other fiberglass" under C&D Wastes, below).

Expanded Polystyrene: packaging and finished products made of expanded polystyrene. The SPI code for polystyrene (PS) is 6.

Metal

Aluminum Cans: aluminum beverage cans.

Aluminum Foil: aluminum foil and food trays.

Tin Cans: tin-coated steel food containers. This category included bi-metal beverage cans, but not paint cans or other types of cans.

Mixed Metals: small appliances, motors, insulated wire and finished products containing a mixture of metals and/or other materials, but which were greater than 50% metal.

Ferrous Metals: products and pieces made from metal to which a magnet adhered (but including stainless steel), and which were not significantly contaminated with other metals or materials (in the latter case, the item was instead included under "mixed metals/materials"). This category included paint cans and other non-food cans.

White Goods: large household appliances or parts thereof. Special note was taken if any of these were found still containing refrigerant.

Non-Ferrous Metals: metallic products and pieces not derived from iron (i.e., to which a magnet did not adhere) and which were not significantly contaminated with other metals or materials (in the last case, the item was instead included under "mixed metals/materials").

Aerosol Cans: metal cans used for containing and applying products under pressure. If the can was full or partially full, with the contents making up more than 25% of the total weight, it was included under the category appropriate for the contents.

Special Wastes

Latex Paint: water-based paints.

Oil-Based Paint: solvent-based paints.

Solvents: included chlorinated or flammable solvents, paint strippers, solvents contaminated with other products such as paints, degreasers, other cleaners if the primary ingredient was a solvent, and alcohols such as methanol and isopropanol. Alcoholic beverages intended for human consumption were included in food waste or categorized based on the type of container if empty.

Adhesives and Glues: glues and adhesives of various sorts, including rubber cement, wood putty, glazing and spackling compounds, caulking compounds, grout, and joint fillers.

Cleaners and Corrosives: included various acids and bases whose primary purpose is to clean surfaces, unclog drains, and perform other functions.

Medical Waste: wastes related to medical activities, including syringes, tubing, bandages, medicine, and other wastes, and not restricted to just those wastes regulated as pathogenic or infectious.

Motor Oil, Other: used or new lubricating oils, primarily those used in cars but possibly also including other materials with similar characteristics.

Oil Filters: used filters such as those used in cars but including similar filters from other applications.

Gasoline and Fuel Oil: gasoline, diesel fuel and light fuel oils, such as those used for home heating.

Antifreeze: automobile and other antifreeze mixtures based on ethylene or propylene glycol, also brake and other fluids if glycol-based.

Other Automotive Maintenance: other products used for automobile maintenance, generally of a non-hazardous nature, such as car wax, polishes, autobody fillers, etc.

Car Batteries: car, motorcycle, and other lead-acid batteries used for motorized vehicles.

Household Batteries: batteries of various sizes and types, as commonly used in households.

Animal Excrement: feces and associated wastes from animals, such as bags of used kitty litter.

Animal Carcasses: carcasses of small animals and pieces of larger animals unless the item is the result of food preparation.

Gas Cylinders: pressurized gas cylinders with the contents making up more than 25% of the total weight (if less than 25% or empty, the gas cylinders were counted as metal).

Pesticides and Herbicides: included poisons whose purpose is to discourage or kill pests, weeds or microorganisms. Fungicides and wood preservatives, such as pentachlorophenol, were also included in this category.

Fertilizers with Pesticides/Herbicides: fertilizers that contain weed killer or other ingredients designed to eliminate weeds and/or pests.

Fertilizers without Pesticides/Herbicides: fertilizers without herbicide or pesticide additives.

Other Hazardous and Special Waste: problem wastes that did not fall into one of the above categories, such as asbestos-containing wastes (if this was the primary hazard associated with the waste), gunpowder, other unspent ammunition, and radioactive materials.

Organics

Edible Food: All food, such as vegetables, fruits, breads, meats, pastas, that appeared to be edible or that appeared to have been edible when discarded. For this category, foods with small blemishes were still considered as edible, but scraps of food already removed from the edible portion (such as apple peels and the ends of romaine lettuce) were not be counted here. A reasonable attempt was made to separate the food from any packaging, but if that was not possible then the item was placed in whichever category appeared to represent greater than 50% of the weight.

Inedible Food: All other food not included in the previous category, including coffee filters and tea bags. A reasonable attempt was made to separate the food from any packaging, but if that was not possible then the item was placed in whichever category appeared to represent greater than 50% of the weight.

Yard and Garden: grass clippings, leaves and weeds, and prunings four inches or less in diameter.

Glass

Clear, Green and Brown Glass Containers: these were three separate categories for bottles and jars that are clear, green or brown in color. Blue glass containers were included with green glass.

Light Bulbs: light bulbs of all types, including incandescent, CFL's, other fluorescent bulbs, and other types of light bulbs. The type of light bulb found was specified on the sample data form.

Non-Recyclable Glass: window glass, glassware, mirrors, and other glass that was not recyclable. Ceramics (plates and knickknacks) were not included here but were placed under "miscellaneous inorganics" (see below).

Other Wastes

E-Wastes: electronic wastes as defined by Washington's State law (Chapter 173-900 WAC), including computers (base units and monitors), televisions, laptops, and other products with video displays greater than four inches diagonally. Actual items found for each sample were noted on the sample data form.

Other Electronics: other products that contained circuit boards and other electronic components (as a significant portion of the product), such as radios and similar products, and including loose circuit boards. Actual items found for each sample were noted on the sample data form.

Tires: vehicle tires of all types, including bicycle tires and including rims if attached.

Rubber Products: finished products and scrap materials made of rubber, such as bath mats, inner tubes, rubber hose, latex gloves, and foam rubber (except carpet padding, see "carpeting", below).

Cosmetics: cosmetics, shampoo, other hair care products, and other health care products, where the weight of the product was greater than the weight of the container (i.e., the product was more than 50% of the total weight of the item).

Pharmaceuticals: pills, prescription drugs, medications, salves and lotions with active ingredients (such as antibiotics), in any amount of active ingredient or product (except minor amounts of residues inside squeeze tubes and similar items).

Disposable Diapers: disposable diapers, feminine hygiene products, and protective adult undergarments.

Textiles: cloth, clothing, rope, tennis shoes, and rubberized cloth.

Carpeting: pieces of carpeting.

Carpet Padding: foam rubber and other materials used as padding under carpets.

Furniture: furniture made of various materials and in any condition.

Mattresses: mattresses made of various materials and in any condition.

Ash and Dust: fireplace, burn barrel or firepit ash, as well as bags of vacuum cleaner dust.

Miscellaneous Organics: miscellaneous organic materials that could be sorted out of the sample but that did not fit into another category, such as wax.

Miscellaneous Inorganics: miscellaneous inorganic materials that could be sorted out of the sample but that did not fit into another category, such as ceramic products.

Residuals: mixed waste that remained on the sorting table after all the materials that could practicably be removed had been sorted out. This material consisted primarily of small pieces of various types of paper and plastic, but also contained small pieces of broken glass and other materials.

Wood Wastes

Dimension Lumber: wood commonly used in construction for framing, such as 2x4's and 2x6's.

Pallets: partial or whole pallets and similar shipping containers.

Treated Wood: wood treated with preservatives such as creosote, including dimension lumber if treated, but not including painted or varnished wood. This category also included some plywood (especially "marine plywood"), and other treated wood.

Roofing: wood that is commonly used for roofing of buildings, such as cedar shingles or shakes. Roofing made from non-wood materials was classified under other categories (see "roofing wastes" under C&D, below).

Contaminated Wood: wood that was contaminated with other wastes in such a way that it could not easily be separated, but consisting primarily (over 50%) of wood.

Stumps and Other Bulky Wood: stumps of trees and shrubs, with the adhering soil (if any), and other natural woods in excess of four inches in diameter (such as logs and branches).

Plywood: a wood product built up of two or more veneer sheets glued or cemented together under pressure.

Particle Board / Fiberboard: building material made up of fibers of various substances (but typically made from wood chips) pressed together to form large sheets or boards.

Wood Products: goods and products fabricated primarily (over 50% by weight) from wood, including toys, household items, and similar goods. Did not include building materials or furniture.

Other Wood Waste: other types of wood that did not fit into the above categories.

Construction and Demolition (C&D) Wastes

Ceramics, Porcelain, and China: used toilets and sinks. Non-C&D ceramics, such as plates and other dishes, were included under "miscellaneous inorganics."

Rocks and Brick: rock, gravel, and bricks of various types and sizes.

Concrete: cement (mixed or unmixed), concrete blocks, and similar wastes.

Soil, Dirt, and Non-Distinct Fines: soil, sand, dirt and similar materials, where these could be recovered separately from the residuals measured as part of the normal sorting procedure.

Gypsum Board: used or new gypsum wallboard, sheetrock or drywall present in recoverable amounts or pieces (generally any piece larger than two inches square was recovered from the sample).

Fiberglass Insulation: did not include other types of insulation or other fiberglass products.

Other Fiberglass: durable, large products such as shower stalls and bathtubs. Small, non-C&D objects were categorized with "other plastic products".

Roofing Waste: asphalt and fiberglass shingles, tar paper, and similar wastes from demolition or installation of roofs. Did not include cedar shingle or shakes (see wood subcategory, "roofing wood").

Asphalt: restricted to asphalt paving material.

Other C&D: C&D materials that were not included in the above categories.

C. MIXED ORGANICS DEFINITIONS

Organics samples were sorted into the categories defined below. If there was any doubt about the identity of an item, plastic and paper materials were placed into the corresponding non-compostable category. To the extent possible, Cedar Grove guidelines were used for the compostable paper and plastic categories.

Organics

Edible food: All food (such as vegetables, fruits, breads, meats, and pastas), that was edible or that appeared to have been edible when discarded. Foods with small blemishes were still considered edible, but scraps of food already removed from the edible portion (such as apple peels and the ends of romaine lettuce) were not counted here. A reasonable attempt was made to separate the food from any packaging, but if that was not possible then the item was placed in whichever category appeared to represent greater than 50% of the weight.

Inedible food: All other food scraps not included in the previous category, and including coffee filters and tea bags.

Yard debris: Leaves, grass clippings, sod, garden debris, brush, prunings, branches and logs less than 8" in diameter, soil, and small stones. Homegrown fruit along with the leaves and prunings from fruit trees were included in this category, as well as bouquets and houseplants.

Untreated wood: Dimensional lumber, pallets, crates, and natural wood over 8" in diameter.

Compostable Paper

Waxed OCC: Waxed corrugated cardboard boxes.

Pizza boxes: Cardboard boxes without a plastic or foil liner that were used for delivering pizza. This included similar packaging for other products (such as breadsticks and chicken wings) from pizza shops.

Paper, wood, or fiber-based serviceware items: Bowls, plates, serving boats, wood corks and wooden utensils including chop sticks, coffee stirrers, and toothpicks that were either clearly labeled "compostable" or unlabeled but without a plastic lining or coating. Paper cups that were clearly labeled as compostable and waxed food serviceware items like parchment paper were included here.

Shredded paper: Bags of shredded paper, and loose amounts of shredded paper if recoverable.

Other compostable paper: Paper packaging and products not included above, and that did not contain a plastic coating. Examples included paper towels and napkins. Also included soiled

newspapers and kraft bags that had been used to hold food scraps.

Compostable Plastics

Compostable plastic bags, approved: Plastic bags that were made of materials such as corn starch or soy and that were designed to compostable at commercial composting facilities. Approved bags were BPI-labeled and were typically semi-translucent.

Compostable plastic bags, non-approved: Brown or green, compostable-looking bags. May have been unmarked or labeled "degradable." These bags did not have the BPI label.

Compostable plastic utensils: Plastic utensils clearly labeled "compostable."

Compostable plastic beverage cups: Plastic cups designed to be used for beverages or food and clearly labeled "compostable."

Other compostable plastic food serviceware: Clamshells, meat trays, and salad trays clearly labeled "compostable."

Curbside Recyclables

Uncoated OCC: Corrugated cardboard boxes without a wax coating.

Recyclable paper: Other types of recyclable paper, including clean newspaper, mixed waste paper, office paper, magazines, catalogs, phone books, glossy junk mail, polycoated cartons (e.g., milk, juice), boxboard (e.g., cereal boxes), egg cartons, and aseptic containers.

Recyclable plastic: Plastic bottles, tubs, and buckets (5 gallons or smaller).

Recyclable glass: Glass bottles and jars.

Recyclable metal: Aluminum cans and foil, tin and steel food cans, empty dry metal paint cans and empty aerosol cans, and scrap metal.

Non-Compostable Materials

Non-compostable paper: Non-recyclable, non-compostable paper, including papers coated with plastic. Examples include some types of fast food wrapping, foil-lined paper products, plastic-coated take-out containers, and plastic-coated plates and bowls. Most paper cups, plates and serving "boats" went in this category, unless marked as compostable or clearly not coated.

Non-compostable plastic bags: Plastic bags not made of materials that would compost or biodegrade, including trash bags, produce bags, and shopping bags.

Non-compostable plastic packaging and products: Plastic packaging and products that were not labeled as "compostable," including utensils, clamshells, straws, salad trays, corks, food service items made of Styrofoam, cup lids and other plastic containers and products that did not fit into the recyclable plastic definition and were not clearly labeled "compostable."

Non-bag plastic film: Plastic sheeting, food handling gloves, and other non-bag plastic film.

Bags of Garbage: Intact bags of garbage. Contents were confirmed as garbage, but not sorted.

Other materials: Any material that did not fit into the above categories, including textiles, grease, non-food service Styrofoam, pet waste (including kitty litter and animal bedding), stumps, large rocks, concrete, demolition debris, hazardous wastes (e.g., fluorescent light bulbs, paint, motor oil), and non-recyclable materials.

APPENDIX A

WASTE COMPOSITION DATA FOR THE CITY OF OLYMPIA

CITY OF OLYMPIA
WASTE COMPOSITION STUDY

DECEMBER 2014

GREEN SOLUTIONS

GREEN SOLUTIONS

ENVIRONMENTAL CONSULTING

CITY OF OLYMPIA
WASTE COMPOSITION STUDY
2013 - 2014

prepared for

Public Works Waste ReSources
Olympia, Washington

prepared by

Green Solutions, LLC
South Prairie, Washington 98385
360-897-9533
rick@green-solutions.biz

December 2014

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SECTION I

INTRODUCTION

A. SCOPE AND OBJECTIVES

This report provides the results of a study of the quantity and composition of solid waste (garbage) disposed by the City of Olympia, Washington during 2013 - 2014. The primary objectives of this study were to provide:

- Data specific to the City of Olympia.
- Accurate data on the composition and quantity of disposed materials for evaluating current waste diversion programs.
- Data that can be used for planning future programs.

This waste composition study was conducted by the environmental consulting firm of Green Solutions, with assistance from Environmental Practices and DGB Consulting. Additional assistance was provided by Waste Connections, Thurston County, and the City of Olympia. This study was conducted as part of a larger study conducted for Thurston County. The main study was primarily organized by Thurston County, but the City of Olympia provided funds for additional data collection to allow better data to be gathered about the City's residential and commercial waste streams.

B. BACKGROUND

City of Olympia employees and trucks collect garbage, recyclables and organics from residential and commercial waste generators in the city. There are three basic types of waste generators collected by the City: single-family, multi-family and commercial. Residential and commercial waste generators may also "self-haul" their wastes and recyclables to various facilities. For garbage, the primary facility used by self-haulers from Olympia is the Thurston County Waste and Recovery Center (WARC) in Lacey, Washington. Self-hauled wastes are not addressed in this report, but are included in the report prepared for Thurston County. Information on the composition and quantities of the mixed organics (food scraps and yard debris) collected by the City is also provided in a separate report.

The wastes generated by commercial establishments and multi-family buildings are collected either in dumpsters and carts (which are emptied by City crews once per week or more often if necessary) or in roll-offs and compactors (which may be emptied less than weekly, depending on the size of the container and the amount of waste).

Single-family homes in Olympia are served by a variety of waste and recycling collection programs. There are about 13,600 residential garbage customers in Olympia. The garbage from these residential customers is collected Tuesday through Friday of one week, and recyclables are collected Tuesday through Friday of alternating weeks. Organics are collected on alternating Mondays (half of the city is collected on one Monday, and the other half on the next Monday). The monthly fee paid by single-family customers is based on the size of the garbage container they choose, and four sizes are offered (20, 35, 65 and 95-gallon carts). This volume-based approach, coupled with the alternating weekly schedule, helps to encourage participation in waste reduction and recycling programs.

For the curbside recycling program, Olympia offers three sizes of recycling carts for single-family residential customers. The three sizes of carts are 35-, 65- and 95-gallon. The recycling program uses a single-stream approach (all recyclables can be placed in one cart, including glass and cardboard).

The organics collection program is voluntary, with the choice of either a 35-gallon or 95-gallon green cart (at the same cost for either size, currently at $8.18 per month per cart) for the organics collection program. Currently, about 56% of the residential garbage customers have signed up for the organics collection program.

SECTION II

CHARACTERIZATION OF OLYMPIA'S WASTE STREAM

A. INTRODUCTION

This section provides waste quantity and composition results for the three types of waste generators served by the City of Olympia's collection system.

B. OVERVIEW OF PROCEDURES

This study examined the solid waste brought for disposal to the Thurston County Waste and Recovery Center (WARC). This report addresses only the solid wastes brought to WARC by the City of Olympia, and does not include the waste brought there by self-haul customers from the City or the mixed organics brought there by City crews.

Types of Waste Generators

The intent of this study was to provide data for the waste collected by the City of Olympia's system, both in aggregate and for specific sources. The three sources, or **waste generators**, from Olympia include:

- **Single-Family**: waste that is collected from single-family homes. This waste is typically bagged before collection and consists of many different types of materials. This waste is collected Tuesday through Friday on alternating weeks.

- **Multi-Family**: waste that is collected from apartment buildings. This waste consists of small pieces of many different types of materials, plus some bulky items, and is collected Monday through Friday. Multi-Family waste is collected using dumpsters as well as roll-offs and compactors, and is mixed with Commercial waste when collected by the trucks that empty dumpsters.

- **Commercial**: waste that is collected from businesses (commercial and industrial) and institutions (schools, hospitals, government offices, etc.). These wastes are collected Monday through Friday using front- and rear-loading garbage trucks (for emptying dumpsters and carts) and by trucks carrying roll-off containers and compactors.

For this study, construction and demolition (C&D) wastes and other special wastes were included in the above categories based on the source and delivery method. C&D

wastes may have been collected using roll-off containers from construction sites (which was defined as Commercial waste), or smaller amounts of C&D wastes may have been in the waste from any one of the three types of waste generators.

Waste Quantity Procedures

The quantity (tonnage) of solid waste disposed by each type of generator was determined by applying the results of a survey of incoming trucks to transaction data from scalehouse records. The survey data was used to allocate the collection tonnages from the City into the three categories of waste generators: Single-Family, Multi-Family and Commercial wastes. Collection tonnages for each type of generator for a two-week period each season were determined in this way (a two-week period was necessary due to the alternating collection schedule for the Single-Family waste). These figures were used to calculate weighted averages for the annual composition figures for each type of waste generator, so that seasonal fluctuations in waste quantities are taken into account when calculating the annual composition of each generator's waste stream. The annual tonnages for the three types of waste generators were determined by analyzing a year's worth of transaction data from the scalehouse records, and applying the survey results to that data. The results of this analysis were adjusted based on data from City staff on the amount of Multi-Family waste. The resulting figures were used to combine the composition data from each of the three types of generators to determine the annual average for the City's entire waste stream.

Waste Composition Procedures

The composition of the City's solid waste stream was determined by randomly selecting and sorting samples of waste at WARC. Sampling was conducted for six days each quarter. Each sample was sorted into 88 categories of materials. The Glossary provides additional detail on the definitions used for the categories of materials.

C. RESULTS, WASTE QUANTITIES

Total Waste Quantities

Table 1 shows the results of the waste quantity analysis. As can be seen in Table 1, the annual amounts of both residential streams together amount to 40% of the City-collected wastes, and Commercial waste contributes the remaining 60%.

Table 1
ANNUAL QUANTITIES OF DISPOSED WASTES BY TYPE OF GENERATOR

Type of Generator	Annual Amount, Tons	Percentage of Total
Single-Family	6,105	23.5%
Multi-Family	4,324	16.6%
Residential Subtotal	**10,429**	**40.1%**
Commercial	15,566	59.9%
Totals	**25,996**	**100.0%**

Note: The annual amounts correspond to a period from September 1, 2013 through August 31, 2014, as this period most closely corresponds to the timing of the study.

D. RESULTS, WASTE COMPOSITION

Number of Samples

The composition of the City's waste stream was determined by randomly selecting and sorting a total of 75 samples of waste. The number of samples taken each season is shown in Table 2.

Table 2
ALLOCATION OF SAMPLES BY TYPE OF GENERATOR

Type of Generator	October 2014	January 2014	May 2014	August 2014	Total Samples	
					Number	Percent
Single-Family	6	6	6	6	24	32%
Multi-Family	6	6	6	6	24	32%
Residential Subtotal	**12**	**12**	**12**	**12**	**48**	**64%**
Commercial	7	7	7	6	27	36%
Totals	**19**	**19**	**19**	**18**	**75**	**100%**

Waste Composition Results

Table 3 shows the composition data (annual averages) for each generator and for the City's collection system altogether. The results for the entire City collection system are also illustrated in Figure 1.

The figures shown in Table 3 have a specific degree of error associated with them. As with all sampling and survey procedures, a certain degree of error is unavoidable but quantifiable (see Appendix D of the Thurston County report for more details on the statistical certainty of the results).

As can be seen in Table 3, there are substantial differences in the composition of wastes from the different sources. These differences can be explained by the different activities that created the wastes. Waste from Single-Family Homes is influenced by the activities associated with owning and maintaining a home. The waste from apartments (Multi-Family) reflects a more mobile lifestyle and lower recycling participation (as indicated by the larger amounts of recyclable paper, plastic bottles, aluminum and tin cans, and glass bottles). Commercial waste is closely related to the type of business activities that produced the wastes.

The results for each generator are illustrated in Figures 2 through 4.

E. WOOD, C&D AND SPECIAL WASTES

Additional data on the breakdown of wood, construction and demolition (C&D) wastes, and special wastes is shown in Table 4. Most of this data does not have the same level of statistical certainty as the primary categories due to the lower quantities and greater variability of these materials in the waste stream, but may still be useful for future planning activities focused on these types of wastes.

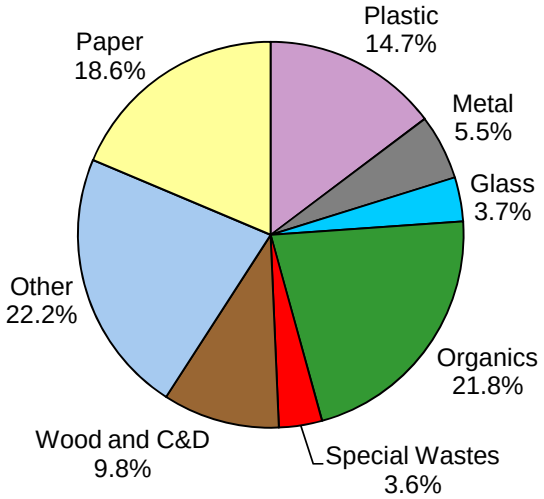
Included in the breakdown for special wastes is an assessment of the amount of materials that could be classified as hazardous waste. These materials are shown as a separate figure near the bottom of both Tables 3 and 4 (see "Actual Hazardous Wastes"). The materials included in this figure are also included in other special waste categories (such as motor oil or oil paint). In other words, the figure for "Actual Hazardous Wastes" is a separate subtotal that only includes the items in the other categories that met the criteria for hazardous wastes.

Table 3
WASTE COMPOSITION RESULTS FOR THE
CITY OF OLYMPIA'S WASTE COLLECTION SYSTEM

		Single-Family Homes	Multi-Family Residential	Commercial	Average for City Collections
PAPER	Newspaper	0.58%	0.72%	0.92%	0.81%
	Cardboard	0.99%	2.99%	4.73%	3.56%
	Mixed Waste Paper	4.25%	7.33%	6.16%	5.91%
	Phone Books	0.10%	0.03%	0%	0.03%
	Milk Cartons, Other	0.33%	0.27%	0.22%	0.25%
	Compostable	4.36%	3.29%	6.45%	5.43%
	Non-Recyclable Paper	2.20%	1.88%	3.05%	2.66%
	Paper Subtotal	**12.81%**	**16.51%**	**21.53%**	**18.65%**
PLASTIC	PET Bottles	0.72%	1.79%	0.76%	0.92%
	HDPE Bottles	0.36%	0.89%	0.71%	0.65%
	Bottles 3-7	0.06%	0.10%	0.04%	0.05%
	Tubs	0.57%	0.37%	0.25%	0.34%
	Carryout Bags	0.86%	0.94%	0.30%	0.54%
	Bags and Film	6.11%	3.93%	6.33%	5.88%
	Plastic Packaging	2.00%	1.65%	2.66%	2.34%
	Other Plastic Products	2.49%	2.44%	4.20%	3.51%
	Expanded Polystyrene	0.47%	0.48%	0.48%	0.48%
	Plastic Subtotal	**13.63%**	**12.58%**	**15.74%**	**14.72%**
METAL	Aluminum Cans	0.26%	0.98%	0.42%	0.48%
	Aluminum Foil	0.28%	0.19%	0.12%	0.17%
	Tin Cans	0.86%	1.17%	0.43%	0.65%
	Mixed Metals	2.26%	2.33%	3.59%	3.07%
	Ferrous Metals	0.81%	0.30%	0.80%	0.72%
	White Goods	0%	0%	0%	0%
	Non-Ferrous Metals	0.10%	0.03%	0.26%	0.18%
	Aerosol Cans	0.24%	0.24%	0.16%	0.19%
	Metal Subtotal	**4.81%**	**5.23%**	**5.79%**	**5.47%**
ORGANICS	Food Waste	25.83%	20.70%	17.23%	19.83%
	Yard Debris	2.86%	1.04%	1.89%	1.98%
	Organics Subtotal	**28.70%**	**21.74%**	**19.12%**	**21.80%**
GLASS	Clear Bottles	1.15%	2.06%	0.79%	1.09%
	Brown Bottles	1.05%	0.98%	0.52%	0.72%
	Green Bottles	0.37%	0.53%	0.25%	0.33%
	Light Bulbs	0.06%	0.03%	0.02%	0.03%
	Non-Recyclable Glass	0.30%	0.50%	2.32%	1.54%
	Glass Subtotal	**2.94%**	**4.10%**	**3.91%**	**3.71%**
OTHER WASTES	E-Waste	0%	0.15%	0.04%	0.05%
	Other Electronics	0.10%	0.09%	0.35%	0.25%
	Tires	0%	0.71%	0%	0.12%
	Rubber	0.35%	0.14%	0.92%	0.66%
	Cosmetics	0.30%	0.54%	0.18%	0.26%
	Pharmaceuticals	0.07%	0.11%	0.02%	0.04%
	Diapers	5.92%	6.01%	1.07%	3.03%
	Textiles	5.31%	7.55%	2.16%	3.79%
	Carpet	0.29%	0.43%	0.64%	0.52%
	Carpet Padding	0.11%	0.31%	0%	0.08%
	Furniture	0%	0%	2.61%	1.56%
	Mattresses	0%	1.16%	0.00%	0.19%
	Ash, Dust	0.16%	0.12%	0.74%	0.50%
	Miscellaneous Organics	0.15%	0.02%	0.04%	0.06%
	Miscellaneous Inorganics	0.43%	0.61%	1.05%	0.83%
	Residuals	12.99%	9.01%	9.57%	10.28%
	Other Waste Subtotal	**26.17%**	**26.95%**	**19.37%**	**22.23%**
WOOD and C&D	Wood	2.18%	5.36%	8.51%	6.50%
	Construction and Demolition	1.04%	1.70%	4.61%	3.28%
	Wood, C&D Subtotal	**3.22%**	**7.06%**	**13.12%**	**9.79%**
SPECIAL WASTES	Paints and Solvents	0.06%	0.25%	0.25%	0.21%
	Automotive	0.04%	0.00%	0.11%	0.08%
	Home and Garden	0.01%	0.003%	0%	0.003%
	Other	7.60%	5.57%	1.06%	3.35%
	Actual Hazardous Wastes	0.05%	0.02%	0.12%	0.09%
	Special Waste Subtotal	**7.72%**	**5.83%**	**1.42%**	**3.63%**
TOTALS		**100.0%**	**100.0%**	**100.0%**	**100.0%**
	Tons Collected per Year:	**6,105**	**4,324**	**15,566**	**25,995**
	Pounds of Samples Sorted:	5,206	5,168	5,546	15,919
	Number of Samples Sorted:	24	24	27	75

Notes: All figures are percent by weight (except for the bottom three rows).

Figure 1
CITY-WIDE RESULTS FOR OLYMPIA



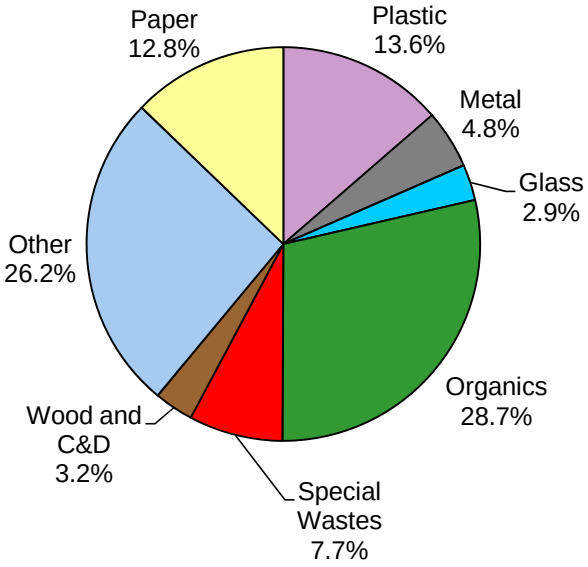
SUMMARY OF RESULTS:

PAPER	**Percent**	**TPY**
Newspaper	0.8%	210
Cardboard	3.6%	930
Other Recyclable Paper	6.2%	1,610
Compostable Paper	5.4%	1,410
Non-Recyclable Paper	2.7%	690
Paper Subtotal	**18.6%**	**4,850**
PLASTIC		
Plastic Bottles	1.6%	420
Film and Bags	6.4%	1,670
Other Plastic	6.7%	1,730
Plastic Subtotal	**14.7%**	**3,830**
METAL		
Aluminum Cans	0.5%	120
Tin Cans	0.7%	170
Other Metals	4.3%	1,130
Metal Subtotal	**5.5%**	**1,420**
GLASS		
Glass Bottles	2.1%	550
Other Glass	1.6%	410
Glass Subtotal	**3.7%**	**970**

WOOD AND C&D	**Percent**	**TPY**
Wood	6.5%	1,690
Construction, Demolition	3.3%	850
Wood, C&D Subtotal	**9.8%**	**2,540**
SPECIAL WASTES		
Animal Excrement	2.9%	760
Other Special Wastes	0.7%	190
Special Waste Subtotal	**3.6%**	**940**
ORGANICS		
Food Waste	19.8%	5,150
Yard Debris	2.0%	510
Organics Subtotal	**21.8%**	**5,670**
OTHER		
Disposable Diapers	3.0%	790
Textiles	3.8%	990
Carpet and Padding	0.6%	160
Miscellaneous (1)	14.8%	3,850
Other Subtotal	**22.2%**	**5,780**
TOTALS	**100.0%**	**25,995**

Notes: Percentage figures are percent by weight. TPY = tons per year.
1) "Miscellaneous" includes e-waste, other electronics, tires, other rubber products, cosmetics, pharmaceuticals, furniture, mattresses, ash, dust, miscellaneous organics, miscellaneous inorganics and residuals.

Figure 2
OLYMPIA SINGLE-FAMILY WASTE



SUMMARY OF RESULTS:

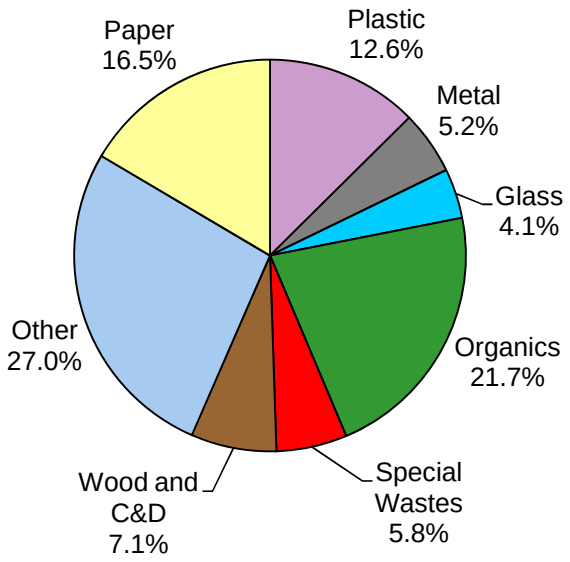
PAPER	**Percent**	**TPY**
Newspaper	0.6%	40
Cardboard	1.0%	60
Other Recyclable Paper	4.7%	290
Compostable Paper	4.4%	270
Non-Recyclable Paper	2.2%	130
Paper Subtotal	**12.8%**	**780**
PLASTIC		
Plastic Bottles	1.1%	70
Film and Bags	7.0%	430
Other Plastic	5.5%	340
Plastic Subtotal	**13.6%**	**830**
METAL		
Aluminum Cans	0.3%	20
Tin Cans	0.9%	50
Other Metals	3.7%	230
Metal Subtotal	**4.8%**	**290**
GLASS		
Glass Bottles	2.6%	160
Other Glass	0.4%	20
Glass Subtotal	**2.9%**	**180**

WOOD AND C&D	**Percent**	**TPY**
Wood	2.2%	130
Construction, Demolition	1.0%	60
Wood, C&D Subtotal	**3.2%**	**200**
SPECIAL WASTES		
Animal Excrement	7.2%	440
Other Special Wastes	0.5%	30
Special Waste Subtotal	**7.7%**	**470**
ORGANICS		
Food Waste	25.8%	1,580
Yard Debris	2.9%	170
Organics Subtotal	**28.7%**	**1,750**
OTHER		
Disposable Diapers	5.9%	360
Textiles	5.3%	320
Carpet and Padding	0.4%	20
Miscellaneous (1)	14.5%	890
Other Subtotal	**26.2%**	**1,600**
TOTALS	**100.0%**	**6,105**

Notes: Percentage figures are percent by weight. TPY = tons per year.

1) "Miscellaneous" includes e-waste, other electronics, tires, other rubber products, cosmetics, pharmaceuticals, furniture, mattresses, ash, dust, miscellaneous organics, miscellaneous inorganics and residuals.

Figure 3
OLYMPIA MULTI-FAMILY WASTE



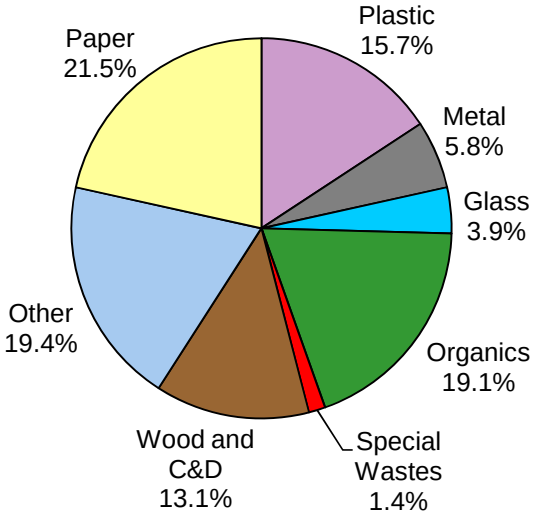
SUMMARY OF RESULTS:

PAPER	**Percent**	**TPY**
Newspaper	0.7%	30
Cardboard	3.0%	130
Other Recyclable Paper	7.6%	330
Compostable Paper	3.3%	140
Non-Recyclable Paper	1.9%	80
Paper Subtotal	**16.5%**	**710**
PLASTIC		
Plastic Bottles	2.8%	120
Film and Bags	4.9%	210
Other Plastic	4.9%	210
Plastic Subtotal	**12.6%**	**540**
METAL		
Aluminum Cans	1.0%	40
Tin Cans	1.2%	50
Other Metals	3.1%	130
Metal Subtotal	**5.2%**	**230**
GLASS		
Glass Bottles	3.6%	150
Other Glass	0.5%	20
Glass Subtotal	**4.1%**	**180**

WOOD AND C&D	**Percent**	**TPY**
Wood	5.4%	230
Construction, Demolition	1.7%	70
Wood, C&D Subtotal	**7.1%**	**310**
SPECIAL WASTES		
Animal Excrement	5.2%	220
Other Special Wastes	0.6%	30
Special Waste Subtotal	**5.8%**	**250**
ORGANICS		
Food Waste	20.7%	900
Yard Debris	1.0%	40
Organics Subtotal	**21.7%**	**940**
OTHER		
Disposable Diapers	6.0%	260
Textiles	7.6%	330
Carpet and Padding	0.7%	30
Miscellaneous (1)	12.7%	550
Other Subtotal	**27.0%**	**1,170**
TOTALS	**100.0%**	**4,324**

Notes: Percentage figures are percent by weight. TPY = tons per year.
1) "Miscellaneous" includes e-waste, other electronics, tires, other rubber products, cosmetics, pharmaceuticals, furniture, mattresses, ash, dust, miscellaneous organics, miscellaneous inorganics and residuals.

Figure 4
OLYMPIA COMMERCIAL WASTE



SUMMARY OF RESULTS:

PAPER	**Percent**	**TPY**
Newspaper	0.9%	140
Cardboard	4.7%	740
Other Recyclable Paper	6.4%	990
Compostable Paper	6.4%	1,000
Non-Recyclable Paper	3.0%	470
Paper Subtotal	**21.5%**	**3,350**
PLASTIC		
Plastic Bottles	1.5%	230
Film and Bags	6.6%	1,030
Other Plastic	7.6%	1,180
Plastic Subtotal	**15.7%**	**2,450**
METAL		
Aluminum Cans	0.4%	70
Tin Cans	0.4%	70
Other Metals	4.9%	770
Metal Subtotal	**5.8%**	**900**
GLASS		
Glass Bottles	1.6%	240
Other Glass	2.3%	360
Glass Subtotal	**3.9%**	**610**

WOOD AND C&D	**Percent**	**TPY**
Wood	8.5%	1,330
Construction, Demolition	4.6%	720
Wood, C&D Subtotal	**13.1%**	**2,040**
SPECIAL WASTES		
Animal Excrement	0.6%	90
Other Special Wastes	0.8%	130
Special Waste Subtotal	**1.4%**	**220**
ORGANICS		
Food Waste	17.2%	2,680
Yard Debris	1.9%	290
Organics Subtotal	**19.1%**	**2,980**
OTHER		
Disposable Diapers	1.1%	170
Textiles	2.2%	340
Carpet and Padding	0.6%	100
Miscellaneous (1)	15.5%	2,410
Other Subtotal	**19.4%**	**3,020**
TOTALS	**100.0%**	**5,546**

Notes: Percentage figures are percent by weight. TPY = tons per year.
1) "Miscellaneous" includes e-waste, other electronics, tires, other rubber products, cosmetics, pharmaceuticals, furniture, mattresses, ash, dust, miscellaneous organics, miscellaneous inorganics and residuals.

Table 4
BREAKDOWN OF WOOD, C&D AND SPECIAL WASTES FOR CITY OF OLYMPIA WASTE STREAMS

	Single-Family Homes	Multi-Family Residential	Commercial	Average for City Collections
WOOD WASTE				
Dimension Lumber	0.92%	1.70%	0.62%	0.87%
Pallets, Crates	0%	0%	0.23%	0.14%
Treated Wood	0.31%	0.04%	0%	0.08%
Roofing	0%	0%	0%	0%
Contaminated	0.02%	0.13%	1.10%	0.69%
Stumps, Other Bulky Wood	0%	0%	0%	0%
Plywood	0.28%	0.80%	0.65%	0.59%
Particleboard, Fiberboard	0.50%	2.33%	5.80%	3.98%
Wood Products	0.17%	0.36%	0.09%	0.15%
Other Wood	0%	0%	0.02%	0.01%
Total Wood Waste	**2.18%**	**5.36%**	**8.51%**	**6.50%**
CONSTRUCTION AND DEMOLITION (C&D) WASTE				
Ceramics, Porcelain, China	0.12%	0%	0.70%	0.446%
Rocks, Bricks	0.05%	0%	0%	0.01%
Concrete	0.09%	0.43%	0.21%	0%
Soil, Dirt, Fines	0.45%	0.92%	0.03%	0.28%
Gypsum Board	0.21%	0.07%	0.54%	0.39%
Fiberglass Insulation	0%	0.002%	0%	0.0004%
Other Fiberglass	0%	0%	0.07%	0.043%
Roofing	0.08%	0.08%	1.50%	0.93%
Asphalt	0%	0%	0.34%	0.20%
Other C&D	0.05%	0.20%	1.22%	0.77%
Total C&D Waste	**1.04%**	**1.70%**	**4.61%**	**3.3%**
SPECIAL WASTES				
Paints and Solvents;				
Latex Paint	0.06%	0.25%	0.25%	0.20%
Oil-Based Paint	0%	0%	0%	0%
Solvents	0%	0.01%	0%	0.001%
Automotive Wastes;				
Motor Oil, Other Oils	0%	0%	0%	0%
Oil Filters	0%	0%	0.11%	0.07%
Gasoline, Fuel Oil	0%	0%	0%	0%
Antifreeze	0%	0%	0%	0%
Other Auto Maintenance	0%	0%	0%	0%
Batteries, Car	0.04%	0.005%	0%	0.01%
Home and Garden;				
Pesticides, Herbicides	0.01%	0%	0%	0.002%
Fertilizer w/Pest. and Herb.	0%	0%	0%	0%
Fertilizer w/o Pest., Herb.	0%	0.003%	0%	0.0005%
Other;				
Adhesives, Glues	0.10%	0%	0.02%	0.04%
Cleaners, Corrosives	0%	0.04%	0.01%	0.01%
Medical Wastes	0.04%	0.01%	0.30%	0.19%
Household Batteries	0.19%	0.34%	0.08%	0.15%
Animal Excrement	7.19%	5.18%	0.60%	2.91%
Animal Carcasses	0.08%	0%	0%	0.02%
Gas Cylinders	0%	0%	0%	0%
Other Special Wastes	0.004%	0%	0.04%	0.03%
Actual Hazardous Waste	**0.05%**	**0.02%**	**0.12%**	**0.09%**
Total Special Waste	**7.72%**	**5.83%**	**1.42%**	**3.63%**

Notes: All figures are percent by weight.

SECTION III

CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

Weight of Materials Disposed

The waste quantity and composition results can be combined to show the total weight of disposed materials. Table 5 provides this information for the three waste generators and for the City's entire collection system.

The data shown in Table 5 can be useful for planning recovery programs for specific materials by more clearly indicating where specific materials are being generated. For example, the composition results for Multi-Family wastes show a higher percentage of mixed waste paper (7.33%) than in the Commercial waste stream (6.16%), but because there is significantly more Commercial waste (15,566 tons per year versus 4,324 tons per year for Multi-Family), there are more tons of mixed waste paper being disposed by Commercial generators than Multi-Family generators (960 versus 317 tons per year).

Amount of Waste per Capita and per Employee

Another way to examine the amounts of materials disposed is to express the results based on the number of residents or employees that disposed the waste. Table 6 provides this information for the City's waste streams. The data shown in Table 6 is based on information from the City of Olympia for the number of residents in single-family homes (37,330 residents) and multi-family units (11,150 residents). The number of employees (51,345) is a 2010 estimate from the Thurston Regional Planning Council.

Analysis of Waste Composition Trends

Table 7 shows the current results for the entire waste stream compared to the results from the previous study that was completed in 2009. A few adjustments had to be made in the data to provide results that could be directly compared:

- carryout bags, which were treated as a separate category in the current study, were combined with other bags and film for the 2014 data.
- auto parts, which were treated as a separate category in 2009 but not in the current study, were combined with mixed metals for the 2009 data.
- mattresses were added to furniture for the current study.

Table 5
WEIGHT OF DISPOSED MATERIALS
FOR CITY OF OLYMPIA WASTE STREAMS

		Single-Family Homes	Multi-Family Residential	Commercial	Totals for City Collections
PAPER	Newspaper	36	31	143	210
	Cardboard	60	129	736	925
	Mixed Waste Paper	259	317	960	1,536
	Phone Books	6	1	0	7
	Milk Cartons, Other	20	11	34	65
	Compostable	266	142	1,004	1,412
	Non-Recyclable Paper	134	81	475	690
	Paper Subtotal	**782**	**714**	**3,351**	**4,847**
PLASTIC	PET Bottles	44	77	118	239
	HDPE Bottles	22	38	110	170
	Bottles 3-7	4	4	6	14
	Tubs	35	16	39	90
	Carryout Bags	53	41	47	141
	Bags and Film	373	170	986	1,529
	Plastic Packaging	122	72	414	608
	Other Plastic Products	152	106	654	912
	Expanded Polystyrene	28	21	75	124
	Plastic Subtotal	**832**	**544**	**2,451**	**3,827**
METAL	Aluminum Cans	16	42	66	124
	Aluminum Foil	17	8	19	44
	Tin Cans	53	51	67	171
	Mixed Metals	138	101	559	798
	Ferrous Metals	49	13	124	186
	White Goods	0	0	0	0
	Non-Ferrous Metals	6	1	40	47
	Aerosol Cans	15	10	25	50
	Metal Subtotal	**294**	**226**	**901**	**1,421**
ORGANICS	Food Waste	1,577	895	2,682	5,154
	Yard Debris	175	45	294	514
	Organics Subtotal	**1,752**	**940**	**2,976**	**5,668**
GLASS	Clear Bottles	70	89	123	282
	Brown Bottles	64	42	81	187
	Green Bottles	22	23	39	84
	Light Bulbs	4	1	3	8
	Non-Recyclable Glass	19	21	361	401
	Glass Subtotal	**180**	**177**	**608**	**965**
OTHER WASTES	E-Waste	0	6	5	11
	Other Electronics	6	4	55	65
	Tires	0	31	0	31
	Rubber	21	6	143	170
	Cosmetics	18	23	27	68
	Pharmaceuticals	4	5	2	11
	Diapers	362	260	167	789
	Textiles	324	327	336	987
	Carpet	18	18	100	136
	Carpet Padding	7	13	0	20
	Furniture	0	0	407	407
	Mattresses	0	50	0	50
	Ash, Dust	10	5	115	130
	Miscellaneous Organics	9	1	6	16
	Miscellaneous Inorganics	26	27	163	216
	Residuals	793	389	1,489	2,671
	Other Waste Subtotal	**1,598**	**1,165**	**3,016**	**5,779**
WOOD and C&D	Wood	133	232	1,325	1,690
	Construction and Demolition	63	73	717	853
	Wood, C&D Subtotal	**197**	**305**	**2,042**	**2,544**
SPECIAL WASTES	Paints and Solvents	4	11	39	54
	Automotive	3	0	18	21
	Home and Garden	1	0	0	1
	Other	464	241	165	870
	Actual Hazardous Wastes	3	1	19	23
	Special Waste Subtotal	**471**	**252**	**222**	**945**
TOTALS		**6,105**	**4,324**	**15,566**	**25,995**

Notes: All figures are tons per year.

Table 6
DISPOSAL RATES PER CAPITA AND PER EMPLOYEE
FOR CITY OF OLYMPIA WASTE STREAMS

		Single-Family Residents	Multi-Family Residents	Employees
PAPER	Newspaper	1.9	5.6	5.6
	Cardboard	3.2	23.1	28.7
	Mixed Waste Paper	13.9	56.9	37.4
	Phone Books	0.3	0.2	0.0
	Milk Cartons, Other	1.1	2.0	1.3
	Compostable	14.3	25.5	39.1
	Non-Recyclable Paper	7.2	14.5	18.5
	Paper Subtotal	**41.9**	**128.1**	**130.5**
PLASTIC	PET Bottles	2.4	13.8	4.6
	HDPE Bottles	1.2	6.8	4.3
	Bottles 3-7	0.2	0.7	0.2
	Tubs	1.9	2.9	1.5
	Carryout Bags	2.8	7.4	1.8
	Bags and Film	20.0	30.5	38.4
	Plastic Packaging	6.5	12.9	16.1
	Other Plastic Products	8.1	19.0	25.5
	Expanded Polystyrene	1.5	3.8	2.9
	Plastic Subtotal	**44.6**	**97.6**	**95.5**
METAL	Aluminum Cans	0.9	7.5	2.6
	Aluminum Foil	0.9	1.4	0.7
	Tin Cans	2.8	9.1	2.6
	Mixed Metals	7.4	18.1	21.8
	Ferrous Metals	2.6	2.3	4.8
	White Goods	0.0	0.0	0.0
	Non-Ferrous Metals	0.3	0.2	1.6
	Aerosol Cans	0.8	1.8	1.0
	Metal Subtotal	**15.8**	**40.5**	**35.1**
ORGANICS	Food Waste	84.5	160.5	104.5
	Yard Debris	9.4	8.1	11.5
	Organics Subtotal	**93.9**	**168.6**	**115.9**
GLASS	Clear Bottles	3.8	16.0	4.8
	Brown Bottles	3.4	7.5	3.2
	Green Bottles	1.2	4.1	1.5
	Light Bulbs	0.2	0.2	0.1
	Non-Recyclable Glass	1.0	3.8	14.1
	Glass Subtotal	**9.6**	**31.7**	**23.7**
OTHER WASTES	E-Waste	0.0	1.1	0.2
	Other Electronics	0.3	0.7	2.1
	Tires	0.0	5.6	0.0
	Rubber	1.1	1.1	5.6
	Cosmetics	1.0	4.1	1.1
	Pharmaceuticals	0.2	0.9	0.1
	Diapers	19.4	46.6	6.5
	Textiles	17.4	58.7	13.1
	Carpet	1.0	3.2	3.9
	Carpet Padding	0.4	2.3	0.0
	Furniture	0.0	0.0	15.9
	Mattresses	0.0	9.0	0.0
	Ash, Dust	0.5	0.9	4.5
	Miscellaneous Organics	0.5	0.2	0.2
	Miscellaneous Inorganics	1.4	4.8	6.3
	Residuals	42.5	69.8	58.0
	Other Waste Subtotal	**85.6**	**209.0**	**117.5**
WOOD and C&D	Wood	7.1	41.6	51.6
	Construction and Demolition	3.4	13.1	27.9
	Wood, C&D Subtotal	**10.6**	**54.7**	**79.5**
SPECIAL WASTES	Paints and Solvents	0.2	2.0	1.5
	Automotive	0.2	0.0	0.7
	Home and Garden	0.1	0.0	0.0
	Other	24.9	43.2	6.4
	Actual Hazardous Wastes	0.2	0.2	0.7
	Special Waste Subtotal	**25.2**	**45.2**	**8.6**
TOTALS		**327.1**	**775.6**	**606.3**
TOTAL RESIDENTS OR EMPLOYEES		**37,330**	**11,150**	**51,345**

Notes: All figures (except for the bottom row) are pounds per year per resident or employee.

Table 7
COMPARISON OF RESULTS TO PREVIOUS STUDY
FOR CITY OF OLYMPIA WASTE STREAMS

		Percent by Weight		Tons per Year	
		2009	2014	2009	2014
PAPER	Newspaper	1.23%	0.81%	350	210
	Cardboard	3.77%	3.56%	1,080	930
	Mixed Waste Paper	8.12%	5.91%	2,320	1,540
	Phone Books	0.14%	0.03%	40	10
	Milk Cartons, Other	0.39%	0.25%	110	70
	Compostable	7.95%	5.43%	2,270	1,410
	Non-Recyclable Paper	1.50%	2.66%	430	690
	Paper Subtotal	**23.10%**	**18.65%**	**6,610**	**4,850**
PLASTIC	PET Bottles	0.96%	0.92%	280	240
	HDPE Bottles	0.85%	0.65%	240	170
	Bottles 3-7	0.04%	0.05%	10	10
	Tubs	0.28%	0.34%	80	90
	Bags and Film	6.66%	6.42%	1,900	1,670
	Plastic Packaging	1.90%	2.34%	540	610
	Other Plastic Products	2.51%	3.51%	720	910
	Expanded Polystyrene	0.61%	0.48%	170	120
	Plastic Subtotal	**13.82%**	**14.72%**	**3,950**	**3,830**
METAL	Aluminum Cans	0.53%	0.48%	150	120
	Aluminum Foil	0.17%	0.17%	50	40
	Tin Cans	0.84%	0.65%	240	170
	Mixed Metals	3.30%	3.07%	940	800
	Ferrous Metals	1.41%	0.72%	400	190
	White Goods	0.23%	0.00%	70	0
	Non-Ferrous Metals	0.08%	0.18%	20	50
	Aerosol Cans	0.19%	0.19%	50	50
	Metal Subtotal	**6.76%**	**5.47%**	**1,930**	**1,420**
ORGANICS	Food Waste	22.17%	19.83%	6,340	5,160
	Yard Debris	3.36%	1.98%	960	510
	Organics Subtotal	**25.54%**	**21.80%**	**7,300**	**5,670**
GLASS	Clear Bottles	1.50%	1.09%	430	280
	Brown Bottles	0.57%	0.72%	160	190
	Green Bottles	0.37%	0.33%	110	80
	Light Bulbs	0.03%	0.03%	10	10
	Non-Recyclable Glass	0.47%	1.54%	130	400
	Glass Subtotal	**2.94%**	**3.71%**	**840**	**970**
OTHER WASTES	E-Waste	0.37%	0.05%	110	10
	Other Electronics	0.38%	0.25%	110	60
	Tires	0.02%	0.12%	10	30
	Rubber Products	0.80%	0.66%	230	170
	Cosmetics	0.16%	0.26%	50	70
	Pharmaceuticals	0.04%	0.04%	10	10
	Disposable Diapers	3.02%	3.03%	860	790
	Textiles	2.86%	3.79%	820	990
	Carpeting	0.78%	0.52%	220	140
	Carpet Padding	0.50%	0.08%	140	20
	Furniture and Mattresses	1.41%	1.76%	400	460
	Ash, Dust	0.20%	0.50%	60	130
	Miscellaneous Organics	0.10%	0.06%	30	20
	Miscellaneous Inorganics	0.60%	0.83%	170	220
	Residuals	7.65%	10.28%	2,190	2,670
	Other Subtotal	**18.90%**	**22.23%**	**5,410**	**5,780**
WOOD and C&D	Wood	4.72%	6.50%	1,350	1,690
	Construction, Demolition	1.56%	3.28%	450	850
	Wood, C&D Subtotal	**6.28%**	**9.79%**	**1,800**	**2,540**
SPECIAL WASTES		**2.65%**	**3.63%**	**760**	**940**
TOTAL WASTE STREAM		**100.0%**	**100.0%**	**28,600**	**26,000**

When examining the data in Table 7, it is important to bear in mind that:

- The amount of waste disposed in the past year is lower than the 2009 amount, despite a slight increase in population in the past five years. This is probably due to a combination of the current economy, which may still be recovering from the recession, and new diversion programs, which have led to increases in the amounts of materials recycled and composted. A lower overall amount of waste could cause lower results for individual materials.

- The figures in the first set of columns in Table 7 are percentages, and these figures could change due solely to changes in other materials. For example, the annual tonnage of a material such as brown glass bottles could remain at about the same amount, but the percentage of this material would change due to a large increase or decrease in another materials.

Bearing in mind the difficulty of drawing firm conclusions from this data, some interesting trends can still be observed for each of the major categories:

- **Paper**: the amounts for all of the recyclable and compostable grades of paper have decreased since the previous study, while the amount of non-recyclable paper has increased. Looking back on the results for individual generators in the previous study, the decrease in recyclable and compostable grades of paper appears to have occurred for all three generators and for every type of material. While the decrease in newspaper might be the result of decreasing subscriptions, the decrease in other materials could be result of increased recycling levels.

- **Plastic**: the amounts of plastic bottles have also decreased since the last study, again possibly due to increased recycling. In comparing the current results for individual generators to the previous study, however, it appears that the amount of plastic PET bottles in the Multi-Family waste stream has increased and the total amount of plastics has also increased.

- **Metal**: the amount of metal in Thurston County's waste stream has generally been in decline over the past 15 years, presumably due to a combination of factors such as increased recycling and lower consumption of this material for packaging and other applications, and the City's results appear to reflect the same pattern here.

- **Organics**: the amount of food waste and yard debris in the City's waste stream has decreased significantly compared to the previous study, presumably the result of diverting food waste through the mixed organics program and an increased subscription rate for the organics collection service.

- **Glass**: the amount of clear glass bottles has decreased while brown glass has increased and green glass has decreased slightly but stayed almost the same. Looking back at the results of the previous study, it appears that both of the residential generators (Single-Family and Multi-Family) are disposing of greater amounts of all colors of glass bottles while Commercial generators are disposing of less.

- **Wood and Construction/Demolition (C&D) Wastes**: the percentage and tonnages of wood and C&D wastes in the City's waste stream show an increase in the current study compared to the previous study. This increase appears to be true for all generators but not for all materials. The cause for this is uncertain, but a likely explanation could be increased construction and remodeling activities.

- **Other Wastes and Special Wastes**: these categories include a variety of different materials and it's difficult to draw firm conclusions from the results for many of these. Some notable differences appear to exist, however, including a decrease in e-waste from 0.37% in 2009 to 0.05% in 2014. It's also interesting to note that textiles have increased from 2.86% in 2009 to 3.79% in 2014. For special wastes, another significant change appears to have occurred for animal excrement ("kitty litter" and other pet wastes), which increased from 2.21% in 2009 to 2.91% in 2014.

Recycling Potential Assessment

One of the key reasons for conducting a study such as this is to determine how much recyclable materials remain in the waste stream (see Table 8 and Figure 5). In addition to examining "typical" recyclable materials (those materials that are collected through the curbside and commercial recycling programs), other potentially-recyclable materials can also be examined. This data provides important information for planning new or expanded recycling and composting programs.

Materials have been broadly grouped into three categories for this analysis:

- **Typical Recyclables**: these are the materials that are typically collected through curbside and commercial programs. The list of materials for this group is based on Olympia's curbside recycling program.

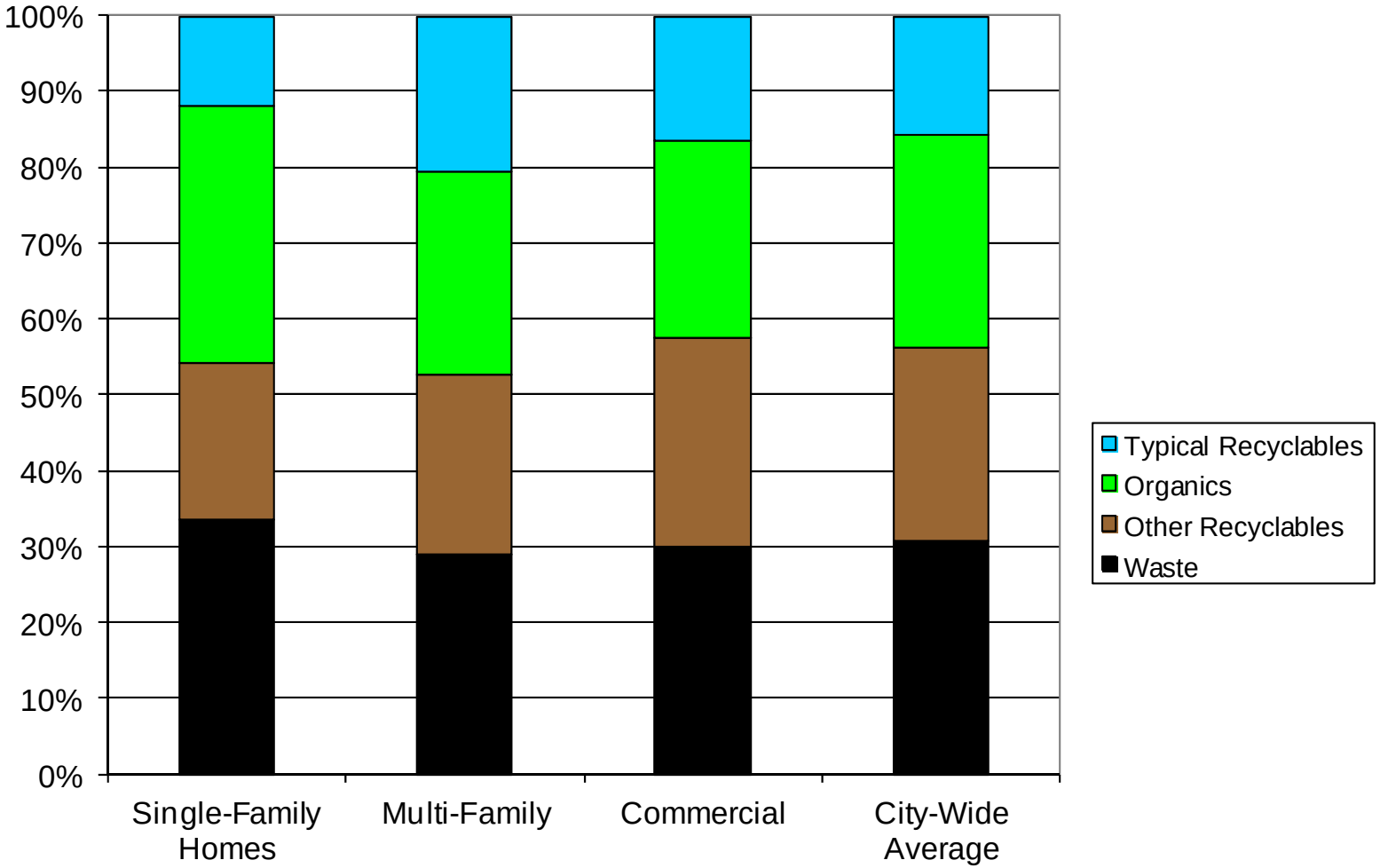
- **Organics**: these are the materials that are collected through the "expanded organics" collection program used in Olympia. Although other materials could potentially be considered compostable (such as other types of wood), these are not included here because current composting systems are not equipped to handle those materials.

Table 8
RECYCLING POTENTIAL ASSESSMENT
FOR CITY OF OLYMPIA WASTE STREAMS

	Single-Family Homes		Multi-Family Residential		Commercial		Totals for City Collections	
	%	TPY	%	TPY	%	TPY	%	TPY
Typical Recyclables:								
Newspaper	0.58%	36	0.72%	31	0.92%	143	0.81%	210
Cardboard	0.99%	60	2.99%	129	4.73%	736	3.56%	925
Mixed Waste Paper	4.25%	259	7.33%	317	6.16%	960	5.91%	1,536
Phone Books	0.10%	6	0.03%	1	0.00%	0	0.03%	7
Milk Cartons, Other	0.33%	20	0.27%	11	0.22%	34	0.25%	65
PET Bottles	0.72%	44	1.79%	77	0.76%	118	0.92%	239
HDPE Bottles	0.36%	22	0.89%	38	0.71%	110	0.65%	170
Bottles 3-7	0.06%	4	0.10%	4	0.04%	6	0.05%	14
Tubs	0.57%	35	0.37%	16	0.25%	39	0.34%	90
Aluminum Cans	0.26%	16	0.98%	42	0.42%	66	0.48%	124
Tin Cans	0.86%	53	1.17%	51	0.43%	67	0.65%	171
Aerosol Cans	0.24%	15	0.24%	10	0.16%	25	0.19%	50
Glass Bottles	2.57%	156	3.58%	154	1.56%	243	2.13%	553
Subtotal	**11.9%**	**726**	**20.4%**	**881**	**16.4%**	**2,547**	**16.0%**	**4,154**
Organics								
Compostable Paper	4.36%	266	3.29%	142	6.45%	1,004	5.43%	1,412
Food Waste	25.83%	1,577	20.70%	895	17.23%	2,682	19.83%	5,154
Yard Debris	2.86%	175	1.04%	45	1.89%	294	1.98%	514
Dimension Lumber	0.92%	56	1.70%	74	0.62%	96	0.87%	226
Pallets, Crates	0%	0	0%	0	0.23%	36	0.14%	36
Subtotal	**34.0%**	**2,074**	**26.7%**	**1,156**	**26.4%**	**4,112**	**28.2%**	**7,342**
Other Recyclables								
Plastic Bags and Film	6.98%	426	4.86%	211	6.64%	1,033	6.42%	1,670
Plastic Packaging	2.00%	122	1.65%	72	2.66%	414	2.34%	608
Expanded Polystyrene	0.47%	28	0.48%	21	0.48%	75	0.48%	124
Mixed Metals	2.26%	138	2.33%	101	3.59%	559	3.07%	798
Ferrous Metals	0.81%	49	0.30%	13	0.80%	124	0.72%	186
Non-Ferrous Metals	0.10%	6	0.03%	1	0.26%	40	0.18%	47
Light Bulbs	0.06%	4	0.03%	1	0.02%	3	0.03%	8
E-Waste	0%	0	0.15%	6	0.04%	5	0.05%	11
Other Electronics	0.10%	6	0.09%	4	0.35%	55	0.25%	65
Tires	0%	0	0.71%	31	0%	0	0.12%	31
Textiles	5.31%	324	7.55%	327	2.16%	336	3.79%	987
Carpet	0.29%	18	0.43%	18	0.64%	100	0.52%	136
Carpet Padding	0.11%	7	0.31%	13	0%	0	0.08%	20
Plywood	0.28%	17	0.80%	34	0.65%	101	0.59%	153
Particleboard, Fiberboard	0.50%	30	2.33%	101	5.80%	903	3.98%	1,034
Ceramics, Porcelain, China	0.12%	7	0%	0	0.70%	109	0.45%	116
Rocks, Bricks	0.05%	3	0%	0	0.0%	0	0.01%	3
Concrete	0.09%	5	0.43%	18	0.21%	33	0.22%	57
Soil, Dirt, Fines	0.45%	27	0.92%	40	0.03%	5	0.28%	72
Gypsum Board	0.21%	13	0.07%	3	0.54%	84	0.39%	100
Roofing (Asphalt)	0.08%	5	0.08%	3	1.50%	233	0.93%	241
Oil Filters	0%	0	0%	0	0.11%	18	0.07%	18
Household Batteries	0.19%	11	0.34%	15	0.08%	13	0.15%	39
Subtotal	**20.4%**	**1,247**	**23.9%**	**1,034**	**27.3%**	**4,242**	**25.1%**	**6,523**
Other Materials (Wastes)	**33.7%**	**2,058**	**28.9%**	**1,254**	**30.0%**	**4,664**	**30.7%**	**7,976**
Total Annual Amount Disposed		**6,105**		**4,324**		**15,566**		**25,995**

Notes: TPY = tons per year. Percentage figures are percentage by weight.

Figure 5
RECYCLING POTENTIAL ASSESSMENT
FOR CITY OF OLYMPIA WASTE STREAMS



- **Other Recyclables**: the third group includes materials that could potentially be recycled through existing or new recycling programs. This group includes materials that:
  - are recycled currently through programs that are conducted separately from the City's programs (such as textiles, plastic bags, wood and carpeting).
  - are being diverted to applications that do not strictly meet the definition of recycling (such as wood converted to hog fuel).

Materials not included in one of the three categories above combined as "other materials" (or waste).

As can be seen in Table 8 and Figure 5, a significant amount of recyclable and compostable materials remain in the City's waste streams. If all of the recyclable, compostable and potentially-recyclable materials could be diverted from disposal, only 30.7% of the City's current waste would remain. It should be noted that there is no approach that can recover 100% of a recyclable material (although a combination of mandatory requirements together with financial incentives, such as is used for car batteries, can come close).

Waste Composition Conclusions

There are distinct differences in the wastes from different types of waste generators (see Tables 3, 4 and 5). A few noteworthy conclusions can be drawn for each generator:

- **Single-Family**: the largest categories of materials present in this waste stream are:

  - food waste, 25.8%,
  - animal excrement, 7.2%,
  - plastic bags and film, 7.0%,
  - disposable diapers, 5.9%,
  - compostable paper, 4.4%,
  - mixed waste paper, 4.2%,
  - textiles, 5.3%, and
  - yard debris, 2.9%.

  Significant quantities of recyclable and compostable materials remain in this waste stream despite the widespread availability of recycling and organics collection programs for single-family homes. If residents recycled all of the materials currently accepted through the existing recycling and organics collection programs, an additional 45.9% of the Single-Family waste stream could be diverted from disposal. This is the equivalent of 2,800 tons per year of additional recyclable and compostable materials.

- **Multi-Family** (apartments): the largest categories of materials present in the waste stream for this generator are:

  - food waste, 20.7%,
  - textiles, 7.6%,
  - mixed waste paper, 7.3%,
  - disposable diapers, 6.0%,
  - animal excrement, 5.2%,
  - plastic bags and film, 4.9%, and
  - compostable paper, 3.3%.

  The percentage of recyclable materials in apartment wastes is higher than for Single-Family wastes, although the tonnage figure for recyclable materials is lower due to the smaller waste quantities disposed by Multi-Family generators. The amount of compostable organics is also lower than Single-Family waste, on both a percentage and tonnage basis. The Multi-Family waste stream contains 47.1% or 2,037 tons per year of recyclable and compostable materials.

- **Commercial**: the largest categories of materials present in the waste from this source are:

  - food waste, 17.2%,
  - plastic bags and film, 6.6%,
  - compostable paper, 6.4%,
  - mixed waste paper, 6.2%,
  - particle board, 5.8%, and
  - cardboard, 4.7%.

  The Commercial waste stream contains 42.8% recyclable and compostable materials, or about 6,659 tons per year. This is an improvement compared to the previous waste composition study, which showed this waste stream to contain 56.6% recyclable and compostable materials, or 10,544 tons per year. It appears that the greatest reductions have occurred in mixed waste paper, glass bottles, compostable paper, food waste and yard debris.

- **Total Waste Stream**: overall, the City's waste stream contains significant amounts of:

  - food waste, 19.8%,
  - plastic bags and film, 6.4%,
  - mixed waste paper, 5.9%,
  - compostable paper, 5.4%,
  - particle board, 4.0%,
  - textiles, 3.8%, and
  - cardboard, 3.6%.

The overall amount of recyclable and compostable materials that could be handled through existing programs and facilities is 44.2% or 11,496 tons per year. This is an improvement compared to the previous waste composition study, which showed this waste stream to contain 53.5% recyclable and compostable materials, or 15,287 tons per year. It appears that the greatest reductions have occurred in the recyclable grades of paper, HDPE bottles, tin cans, glass bottles, and all of the organics.

B. RECOMMENDATIONS

The following recommendations are based on the results of this study:

- There continues to be a significant amount of recyclable materials disposed in the City of Olympia's waste streams. The City could increase waste diversion without creating new infrastructure or programs since a significant portion of the disposed waste stream consists of standard recyclable materials. If the City of Olympia desires to increase the recycling rate substantially over current levels, however, a different approach may be needed. Alternative approaches could include mandatory recycling or targeted programs such as disposal bans for specific materials.

- Recent steps have been taken to increase food waste diversion, but for now large amounts of this material remain in the waste stream. More publicity and/or diversion programs for food waste should be considered.

GLOSSARY

INTRODUCTION

This glossary provides the definitions used for waste sorting categories.

WASTE SORTING CATEGORIES

Paper

Newspaper: printed groundwood newsprint, including glossy ads and Sunday edition magazines that are delivered with the newspaper (unless these are found separately during sorting).

Cardboard: unwaxed kraft paper corrugated containers and boxes, unless poly- or foil-laminated. Note that this category did not include brown kraft paper bags.

Mixed Waste Paper: high- and low-grade potentially recyclable papers, including colored papers, office paper, notebook or other lined paper, envelopes with plastic windows, non-corrugated paperboard, frozen food packaging, carbonless copy paper, egg cartons, magazines, and junk mail.

Phone Books: printed and bound phone books made primarily of groundwood paper.

Milk Cartons and Other Aseptic Containers: milk cartons and similar gable-top containers (such as orange juice cartons), and juice drink boxes.

Compostable Paper: non-recyclable papers that could be composted, such as towels, plates, cups, pizza boxes, waxed paper, and waxed cardboard. This category included paper that was contaminated or soiled with food or liquid in its normal use.

Non-Recyclable Paper: contaminated papers and non-recyclable types of papers such as carbon paper, tissues, laminated paper, paper packaging with metal or plastic parts, and hardcover books.

Plastic

PET Bottles: polyethylene terephthalate (PET) bottles, including soda, oil, liquor and other types of bottles. No attempt was made to remove base cups, caps, or wrappers. The SPI code for PET is 1.

HDPE Bottles: high density polyethylene (HDPE) milk, juice, detergent, and other bottles. This category did not include motor oil bottles. The SPI code for HDPE is 2.

Bottles Types 3 - 7: all other bottles that were not PET or HDPE, where the neck of the container is narrower than the body. Included SPI codes 3 - 7.

Tubs: plastic containers of all resin types that were as wide or wider at the top than at the bottom.

Carryout Bags: thin plastic bags provided by retail establishments at the point of sale or departure. Did not include newspaper bags, dry cleaning bags, bags used by customers for

bulk foods, bags used for prescription drugs or deli carryout, or film used to wrap meats and other damp products.

Other Film and Bags: all other plastic packaging films and bags. To be counted in this category, the material must have been flexible (i.e., can be bent without making a noise).

Plastic Packaging: all other plastic packaging (besides tubs, bottles, film and bags), and shipping materials and other plastic items which were not themselves finished consumer products, including thermoplastics and thermosetting plastics used for packaging. Also included HDPE motor oil bottles.

Plastic Products: finished plastic products such as toys, toothbrushes, vinyl hose and shower curtains, including non-C&D fiberglass resin products and materials (see "fiberglass insulation" and "other fiberglass" under C&D Wastes, below).

Expanded Polystyrene: packaging and finished products made of expanded polystyrene. The SPI code for polystyrene (PS) is 6.

Metal

Aluminum Cans: aluminum beverage cans.

Aluminum Foil: aluminum foil and food trays.

Tin Cans: tin-coated steel food containers. This category included bi-metal beverage cans, but not paint cans or other types of cans.

Mixed Metals/Materials: small appliances, motors, insulated wire and finished products containing a mixture of metals and/or other materials, but which were greater than 50% metal.

Ferrous Metals: products and pieces made from metal to which a magnet adhered (but including stainless steel), and which were not significantly contaminated with other metals or materials (in the latter case, the item was instead included under "mixed metals/materials"). This category included paint cans and other non-food cans.

White Goods: large household appliances or parts thereof. Special note was taken if any of these were found still containing refrigerant.

Non-Ferrous Metals: metallic products and pieces not derived from iron (i.e., to which a magnet did not adhere) and which were not significantly contaminated with other metals or materials (in the last case, the item was instead included under "mixed metals/materials").

Aerosol Cans: metal cans used for containing and applying products under pressure. If the can was full or partially full, with the contents making up more than 25% of the total weight, it was included under the category appropriate for the contents.

Special Wastes

Latex Paint: water-based paints.

Oil-Based Paint: solvent-based paints.

Solvents: included chlorinated or flammable solvents, paint strippers, solvents contaminated with other products such as paints, degreasers, other cleaners if the primary ingredient was a solvent, and alcohols such as methanol and isopropanol. Alcoholic beverages intended for

human consumption were included in food waste or categorized based on the container if empty.

Adhesives and Glues: glues and adhesives of various sorts, including rubber cement, wood putty, glazing and spackling compounds, caulking compounds, grout, and joint fillers.

Cleaners and Corrosives: included various acids and bases whose primary purpose is to clean surfaces, unclog drains, and perform other functions.

Medical Waste: wastes related to medical activities, including syringes, tubing, bandages, medicine, and other wastes, and not restricted to just those wastes regulated as pathogenic or infectious.

Motor Oil, Other: used or new lubricating oils, primarily those used in cars but possibly also including other materials with similar characteristics.

Oil Filters: used filters such as those used in cars but including similar filters from other applications.

Gasoline and Fuel Oil: gasoline, diesel fuel and light fuel oils, such as those used for home heating.

Antifreeze: automobile and other antifreeze mixtures based on ethylene or propylene glycol, also brake and other fluids if glycol-based.

Other Automotive Maintenance: other products used for automobile maintenance, generally of a non-hazardous nature, such as car wax, polishes, autobody fillers, etc.

Car Batteries: car, motorcycle, and other lead-acid batteries used for motorized vehicles.

Household Batteries: batteries of various sizes and types, as commonly used in households.

Animal Excrement: feces and associated wastes from animals, such as bags of used kitty litter.

Animal Carcasses: carcasses of small animals and pieces of larger animals unless the item is the result of food preparation.

Gas Cylinders: pressurized gas cylinders with the contents making up more than 25% of the total weight (if less than 25% or empty, the gas cylinders were counted as metal).

Pesticides and Herbicides: included poisons whose purpose is to discourage or kill pests, weeds or microorganisms. Fungicides and wood preservatives, such as pentachlorophenol, were also included in this category.

Fertilizers with Pesticides/Herbicides: fertilizers that contain weed killer or other ingredients designed to eliminate weeds and/or pests.

Fertilizers without Pesticides/Herbicides: fertilizers without herbicide or pesticide additives.

Other Hazardous and Special Waste: problem wastes that did not fall into one of the above categories, such as asbestos-containing wastes (if this was the primary hazard associated with the waste), gunpowder, other unspent ammunition, and radioactive materials.

Organics

Edible Food: All food, such as vegetables, fruits, breads, meats, pastas, that appeared to be edible or that appeared to have been edible when discarded. For this category, foods with small blemishes were still considered as edible, but scraps of food already removed from the edible

portion (such as apple peels and the ends of romaine lettuce) were not be counted here. A reasonable attempt was made to separate the food from any packaging, but if that was not possible then the item was placed in whichever category appeared to represent greater than 50% of the weight.

Inedible Food: All other food not included in the previous category, including coffee filters and tea bags. A reasonable attempt was made to separate the food from any packaging, but if that was not possible then the item was placed in whichever category appeared to represent greater than 50% of the weight.

Yard and Garden: grass clippings, leaves and weeds, and prunings four inches or less in diameter.

Glass

Clear, Green and Brown Glass Containers: these were three separate categories for bottles and jars that are clear, green or brown in color. Blue glass containers were included with green glass.

Light Bulbs: light bulbs of all types, including incandescent, CFL's, other fluorescent bulbs, and other types of light bulbs. The type of light bulb found was specified on the sample data form.

Non-Recyclable Glass: window glass, glassware, mirrors, and other glass that was not recyclable. Ceramics (plates and knickknacks) were not included here but were placed under "miscellaneous inorganics" (see below).

Other Wastes

E-Wastes: electronic wastes as defined by Washington's State law (Chapter 173-900 WAC), including computers (base units and monitors), televisions, laptops, and other products with video displays greater than four inches diagonally. Actual items found for each sample were noted on the sample data form.

Other Electronics: other products that contained circuit boards and other electronic components (as a significant portion of the product), such as radios and similar products, and including loose circuit boards. Actual items found for each sample were noted on the sample data form.

Tires: vehicle tires of all types, including bicycle tires and including rims if attached.

Rubber Products: finished products and scrap materials made of rubber, such as bath mats, inner tubes, rubber hose, latex gloves, and foam rubber (except carpet padding, see "carpeting", below).

Cosmetics: cosmetics, shampoo, other hair care products, and other health care products, where the weight of the product was greater than the weight of the container (i.e., the product was more than 50% of the total weight of the item).

Pharmaceuticals: pills, prescription drugs, medications, salves and lotions with active ingredients (such as antibiotics), in any amount of active ingredient or product (except minor amounts of residues inside squeeze tubes and similar items).

Disposable Diapers: disposable diapers, feminine hygiene products, and protective adult undergarments.

Textiles: cloth, clothing, rope, tennis shoes, and rubberized cloth.

Carpeting: pieces of carpeting.

Carpet Padding: foam rubber and other materials used as padding under carpets.

Furniture: furniture made of various materials and in any condition.

Mattresses: mattresses made of various materials and in any condition.

Ash and Dust: fireplace, burn barrel or firepit ash, as well as bags of vacuum cleaner dust.

Miscellaneous Organics: miscellaneous organic materials that could be sorted out of the sample but that did not fit into another category, such as wax.

Miscellaneous Inorganics: miscellaneous inorganic materials that could be sorted out of the sample but that did not fit into another category, such as ceramic products.

Residuals: mixed waste that remained on the sorting table after all the materials that could practicably be removed had been sorted out. This material consisted primarily of small pieces of various types of paper and plastic, but also contained small pieces of broken glass and other materials.

Wood Wastes

Dimension Lumber: wood commonly used in construction for framing, such as 2x4's and 2x6's.

Pallets: partial or whole pallets and similar shipping containers.

Treated Wood: wood treated with preservatives such as creosote, including dimension lumber if treated. Did not include painted or varnished wood. This category also included some plywood (especially "marine plywood"), and other wood.

Roofing: wood that is commonly used for roofing of buildings, such as cedar shingles or shakes. Roofing made from non-wood materials was classified under other categories (see "roofing wastes" under C&D, below).

Contaminated Wood: wood that was contaminated with other wastes in such a way that it could not easily be separated, but consisting primarily (over 50%) of wood.

Stumps and Other Bulky Wood: stumps of trees and shrubs, with the adhering soil (if any), and other natural woods in excess of four inches in diameter (such as logs and branches).

Plywood: a wood product built up of two or more veneer sheets glued or cemented together under pressure.

Particle Board / Fiberboard: building material made up of fibers of various substances (but typically made from wood chips) pressed together to form large sheets or boards.

Wood Products: goods and products fabricated primarily (over 50% by weight) from wood, including toys, household items, and similar goods. Did not include building materials or furniture.

Other Wood Waste: other types of wood that did not fit into the above categories.

Construction and Demolition (C&D) Wastes

Ceramics, Porcelain, and China: used toilets and sinks. Non-C&D ceramics, such as plates and other dishes, were included under "miscellaneous inorganics."

Rocks and Brick: rock, gravel, and bricks of various types and sizes.

Concrete: cement (mixed or unmixed), concrete blocks, and similar wastes.

Soil, Dirt, and Non-Distinct Fines: soil, sand, dirt and similar materials, where these could be recovered separately from the residuals measured as part of the normal sorting procedure.

Gypsum Board: used or new gypsum wallboard, sheetrock or drywall present in recoverable amounts or pieces (generally any piece larger than two inches square was recovered from the sample).

Fiberglass Insulation: did not include other types of insulation or other fiberglass products.

Other Fiberglass: durable, large products such as shower stalls and bathtubs. Small, non-C&D objects were categorized with "other plastic products".

Roofing Waste: asphalt and fiberglass shingles, tar paper, and similar wastes from demolition or installation of roofs. Did not include cedar shingle or shakes (see wood subcategory, "roofing wood").

Asphalt: restricted to asphalt paving material.

Other C&D: C&D materials that were not included in the above categories.

APPENDIX B

COMPOSITION DATA FOR THURSTON COUNTY BUILDINGS

COMPOSITION DATA FOR THURSTON COUNTY BUILDINGS

A. INTRODUCTION

This appendix shows the composition data from samples that were taken each quarter from three Thurston County buildings.

B. METHODOLOGY

In order to determine the composition of wastes from County offices, Thurston County staff assisted with the arrangements necessary to sample three county facilities each quarter. The three facilities were:

- Family Justice center,
- Public Health offices, and
- County Courthouse.

One sample was taken each quarter from each of these buildings, except in October when a sample from the Family Justice Center was not available and a sample from Building E of the County's offices was tested instead. In most cases, the entire contents of the dumpsters for these facilities was brought separately to WARC and sorted there. The waste container for the County Courthouse was a roll-off container, however, so that container was dumped at WARC per normal procedures and a 200-pound sample taken from it.

The results of these samples are shown in Table B-1.

Table B - 1
QUARTERLY DATA AND ANNUAL AVERAGES FOR COUNTY BUILDINGS

		Family Justice Center					Public Health				
		October	January	May	August	Average	October	January	May	August	Average
PAPER	Newspaper	NA	0.07%	0.60%	0.80%	0.49%	0%	0%	0.42%	0.25%	0.17%
	Cardboard	NA	0.42%	2.11%	1.42%	1.31%	0.31%	0.84%	1.01%	0.71%	0.72%
	Mixed Waste Paper	NA	2.26%	3.74%	10.56%	5.52%	2.34%	4.66%	4.72%	7.48%	4.80%
	Phone Books	NA	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Milk Cartons, Other	NA	1.36%	2.20%	2.22%	1.93%	0.46%	0.70%	0%	1.01%	0.54%
	Compostable	NA	6.71%	12.74%	14.17%	11.21%	15.06%	24.31%	16.34%	26.80%	20.63%
	Non-Recyclable Paper	NA	1.03%	4.31%	3.47%	2.94%	18.99%	2.79%	6.45%	3.54%	7.94%
	Paper Subtotal	NA	**11.84%**	**25.70%**	**32.64%**	**23.40%**	**37.16%**	**33.30%**	**28.94%**	**39.80%**	**34.80%**
PLASTIC	PET Bottles	NA	0.56%	2.30%	1.84%	1.57%	1.08%	1.21%	1.94%	1.21%	1.36%
	HDPE Bottles	NA	0.04%	0.84%	0.64%	0.51%	0.98%	1.21%	0.84%	0.51%	0.89%
	Bottles 3-7	NA	0.14%	0.12%	0%	0.09%	0%	1.63%	0%	0.05%	0.42%
	Tubs	NA	0.45%	3.72%	0.62%	1.60%	0.39%	1.68%	1.26%	0.76%	1.02%
	Carryout Bags	NA	0.19%	0.67%	0.43%	0.43%	0.49%	0.65%	0.51%	0.30%	0.49%
	Bags and Film	NA	5.35%	3.54%	5.81%	4.90%	6.58%	7.64%	8.25%	10.21%	8.17%
	Plastic Packaging	NA	0.92%	4.53%	1.70%	2.38%	2.64%	4.75%	1.52%	4.45%	3.34%
	Other Plastic Products	NA	0.14%	1.08%	2.13%	1.12%	2.69%	3.40%	5.64%	0.76%	3.12%
	Expanded Polystyrene	NA	0.14%	0.19%	0.09%	0.14%	0.77%	0.35%	0.84%	2.93%	1.22%
	Plastic Subtotal	NA	**7.93%**	**17.00%**	**13.26%**	**12.73%**	**15.62%**	**22.52%**	**20.81%**	**21.19%**	**20.03%**
METAL	Aluminum Cans	NA	0.18%	0.00%	0.53%	0.24%	0.31%	0.35%	2.70%	0.38%	0.94%
	Aluminum Foil	NA	0.07%	0.12%	0.35%	0.18%	0.31%	0.35%	0.42%	0.64%	0.43%
	Tin Cans	NA	0.14%	0.48%	0.18%	0.27%	0.31%	0.47%	0.64%	0.38%	0.45%
	Mixed Metals	NA	8.49%	0%	0.09%	2.86%	0%	0.59%	0%	0.64%	0.31%
	Ferrous Metals	NA	0%	0.12%	0.00%	0.04%	0.31%	0%	0%	0.38%	0.17%
	White Goods	NA	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Non-Ferrous Metals	NA	0.0%	0.0%	0.0%	0.0%	0%	0%	0%	0%	0%
	Aerosol Cans	NA	0.14%	0.36%	0.00%	0.17%	0.37%	0.59%	0.42%	0%	0.34%
	Metal Subtotal	NA	**9.02%**	**1.09%**	**1.16%**	3.76%	**1.60%**	**2.35%**	**4.18%**	**2.43%**	**2.64%**
HHW and SPECIAL	Latex Paint	NA	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Oil-Based Paint	NA	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Solvents	NA	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Adhesives, Glues	NA	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Cleaners, Corrosives	NA	0%	0.48%	0%	0.16%	0%	2.33%	0%	0%	0.58%
	Medical Wastes	NA	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Motor Oil, Other	NA	0%	0%	0%	0%	0%	0.12%	0%	0%	0.03%
	Oil Filters	NA	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Gasoline, Fuel Oi	NA	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Antifreeze	NA	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Other Auto Maintenance	NA	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Batteries, Car	NA	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Household Batteries	NA	0.04%	0%	0.09%	0.04%	0%	0%	1.68%	0.13%	0.45%
	Animal Excrement	NA	0%	0%	0.07%	0.02%	0%	0%	0%	0%	0%
	Animal Carcasses	NA	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Gas Cylinders	NA	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Pesticides, Herbicides	NA	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Fertilizer with Pesticides	NA	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Fertilizer w/o Pesticides	NA	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Other Hazardous Wsates	NA	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Actual Hazardous Wastes	NA	0%	0%	0%	0%	0%	0.12%	1.68%	0%	0.45%
	Special Waste Subtotal	NA	**0.04%**	**0.48%**	**0.16%**	0.23%	**0%**	**2.45%**	**1.68%**	**0.13%**	**1.07%**
ORGANICS	Food Waste	NA	16.38%	30.65%	38.82%	28.62%	27.57%	25.89%	28.86%	27.05%	27.34%
	Yard Debris	NA	0%	0%	0.78%	0.26%	0.08%	0.00%	4.72%	0.25%	1.26%
	Organics Subtotal	NA	**16.38%**	**30.65%**	**39.60%**	28.88%	**27.65%**	**25.89%**	**33.57%**	**27.31%**	**28.61%**
GLASS	Clear Bottles	NA	0.31%	0.36%	1.24%	0.64%	0.92%	1.52%	1.90%	2.02%	1.59%
	Brown Bottles	NA	0.25%	0%	0%	0.08%	0%	0%	0%	0%	0%
	Green Bottles	NA	0%	0%	0%	0%	0.46%	0%	0%	0%	0.12%
	Light Bulbs	NA	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Non-Recyclable Glass	NA	0.35%	0%	0%	0.12%	0%	0%	0%	0%	0%
	Glass Subtotal	NA	**0.91%**	**0.36%**	**1.24%**	0.84%	**1.38%**	**1.52%**	**1.90%**	**2.02%**	**1.71%**
OTHER WASTES	E-Waste	NA	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Other Electronics	NA	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Tires	NA	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Rubber	NA	0.84%	4.20%	1.06%	2.03%	0.31%	1.52%	1.06%	0.25%	0.78%
	Cosmetics	NA	0%	0.12%	0.45%	0.19%	0%	0.05%	0%	0%	0.01%
	Pharmaceuticals	NA	0%	0%	0.09%	0.03%	0%	0.12%	0%	0.05%	0.04%
	Diapers	NA	0%	0.72%	1.56%	0.76%	0%	0.23%	0.22%	0%	0.11%
	Textiles	NA	46.82%	6.13%	0.92%	17.96%	0%	0.28%	1.68%	1.11%	0.77%
	Carpet	NA	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Carpet Padding	NA	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Furniture	NA	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Mattresses	NA	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Ash, Dust	NA	0%	1.56%	0%	0.52%	0%	0.37%	0%	0%	0.09%
	Miscellaneous Organics	NA	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Miscellaneous Inorganics	NA	0%	0%	0%	0%	0.61%	0%	0%	3.29%	0.98%
	Residuals	NA	6.24%	11.59%	7.87%	8.57%	11.25%	9.41%	5.73%	2.33%	7.18%
	Other Waste Subtotal	NA	**53.89%**	**24.32%**	**11.95%**	**30.05%**	**12.17%**	**11.98%**	**8.69%**	**7.03%**	**9.97%**
WOOD	Dimension Lumber	NA	0%	0.38%	0%	0.13%	0%	0%	0%	0%	0%
	Pallets/Crates	NA	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Treated Wood	NA	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Roofing	NA	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Contaminated	NA	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Stumps/Other Bulky Wood	NA	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Plywood	NA	0%	0%	0%	0%	4.43%	0%	0%	0%	1.11%
	Particleboard/Fiberboard	NA	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Wood Products	NA	0%	0%	0%	0%	0%	0%	0.22%	0.10%	0.08%
	Other Wood	NA	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Wood Subtotal	NA	**0.00%**	**0.38%**	**0.00%**	**0.13%**	**4.43%**	**0.00%**	**0.22%**	**0.10%**	**1.19%**
C&D	Ceramics, Porcelain, China	NA	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Rocks, Bricks	NA	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Concrete	NA	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Soil, Dirt, Fines	NA	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Gypsum Board	NA	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Fiberglass Insulation	NA	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Other Fiberglass	NA	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Roofing	NA	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Asphalt	NA	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Other C&D	NA	0%	0%	0%	0%	0%	0%	0%	0%	0%
	C&D Subtotal	NA	**0.00%**	**0.00%**	**0.00%**	**0.00%**	**0%**	**0%**	**0%**	**0%**	**0%**
	TOTAL	NA	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Table B - 1
QUARTERLY DATA AND ANNUAL AVERAGES FOR COUNTY BUILDINGS, PAGE TWO

		County Courthouse					Bldg. E,
		October	January	May	August	Average	October
PAPER	Newspaper	2.21%	0.18%	1.27%	1.27%	1.23%	0%
	Cardboard	0.40%	3.33%	1.88%	6.13%	2.93%	0%
	Mixed Waste Paper	11.27%	5.04%	2.96%	6.99%	6.57%	15.28%
	Phone Books	0%	0%	0%	0%	0%	0%
	Milk Cartons, Other	0.25%	1.24%	2.36%	0.48%	1.08%	0%
	Compostable	16.06%	7.79%	15.82%	14.32%	13.50%	23.25%
	Non-Recyclable Paper	3.67%	1.43%	1.82%	5.26%	3.04%	11.29%
	Paper Subtotal	**33.87%**	**19.00%**	**26.11%**	**34.45%**	**28.36%**	**49.82%**
PLASTIC	PET Bottles	2.67%	0.67%	2.22%	1.40%	1.74%	0.33%
	HDPE Bottles	0.70%	0.88%	0.67%	1.03%	0.82%	0%
	Bottles 3-7	0%	0%	0%	0.12%	0.03%	0.17%
	Tubs	0.38%	0.48%	0.34%	0.48%	0.42%	0%
	Carryout Bags	0.15%	0%	0.13%	0.10%	0.10%	0.17%
	Bags and Film	8.30%	8.32%	4.78%	8.10%	7.38%	9.96%
	Plastic Packaging	0.96%	0.19%	0.20%	1.88%	0.81%	1.00%
	Other Plastic Products	2.52%	4.30%	1.10%	3.04%	2.74%	1.16%
	Expanded Polystyrene	0.25%	1.95%	1.08%	1.35%	1.16%	0.43%
	Plastic Subtotal	**15.93%**	**16.78%**	**10.52%**	**17.50%**	**15.18%**	**13.22%**
METAL	Aluminum Cans	0.19%	0.06%	0.34%	0.42%	0.25%	0.43%
	Aluminum Foil	0.07%	0.48%	0.09%	0.24%	0.22%	0.43%
	Tin Cans	0.25%	0.54%	0.42%	0.12%	0.33%	0%
	Mixed Metals	0.50%	0%	0%	0.24%	0.19%	0%
	Ferrous Metals	0%	0%	0%	0.24%	0.06%	0.43%
	White Goods	0%	0%	0%	0%	0%	0%
	Non-Ferrous Metals	0.07%	0%	0%	0%	0.02%	0.43%
	Aerosol Cans	0.07%	0.18%	0%	0.12%	0.09%	0%
	Metal Subtotal	**1.14%**	**1.25%**	**0.85%**	**1.39%**	**1.16%**	**1.73%**
HHW and SPECIAL	Latex Paint	0%	0%	0%	0%	0%	0%
	Oil-Based Paint	0%	0%	0%	0%	0%	0%
	Solvents	0%	0%	0%	0%	0%	0%
	Adhesives, Glues	0%	0%	0%	0%	0%	0%
	Cleaners, Corrosives	0%	0%	0%	0%	0%	0%
	Medical Wastes	0%	0%	0%	0%	0%	0%
	Motor Oil, Other	0%	0%	0%	0%	0%	0%
	Oil Filters	0%	0%	0%	0%	0%	0%
	Gasoline, Fuel Oi	0%	0%	0%	0%	0%	0%
	Antifreeze	0%	0%	0%	0%	0%	0%
	Other Auto Maintenance	0%	0%	0%	0%	0%	0%
	Batteries, Car	0%	0%	0%	0%	0%	0%
	Household Batteries	0.03%	0%	0.03%	0%	0.01%	0%
	Animal Excrement	0%	0%	0%	3.52%	0.88%	0%
	Animal Carcasses	0%	0%	0%	0%	0%	0%
	Gas Cylinders	0%	0%	0%	0%	0%	0%
	Pesticides, Herbicides	0%	0%	0%	0%	0%	0%
	Fertilizer with Pesticides	0%	0%	0%	0%	0%	0%
	Fertilizer w/o Pesticides	0%	0%	0%	0%	0%	0%
	Other Hazardous Wsates	0%	0%	0%	1.45%	0.36%	0%
	Actual Hazardous Wastes	0%	0%	0%	1.45%	0.36%	0%
	Special Waste Subtotal	**0.03%**	**0%**	**0.03%**	**4.97%**	**1.26%**	**0%**
ORGANICS	Food Waste	16.37%	53.51%	31.86%	21.44%	30.80%	25.91%
	Yard Debris	0.07%	0%	14.68%	0.06%	3.70%	0.43%
	Organics Subtotal	**16.44%**	**53.51%**	**46.54%**	**21.50%**	**34.50%**	**26.34%**
GLASS	Clear Bottles	0%	0.48%	0.67%	0.48%	0.41%	0%
	Brown Bottles	0%	0%	0%	0%	0%	0%
	Green Bottles	0%	0%	0%	0%	0%	0%
	Light Bulbs	0%	0%	0%	0.06%	0.02%	0%
	Non-Recyclable Glass	0%	0%	0%	0%	0%	0%
	Glass Subtotal	**0%**	**0.48%**	**0.67%**	**0.55%**	**0.42%**	**0%**
OTHER WASTES	E-Waste	0%	0%	0%	0%	0%	0%
	Other Electronics	0.50%	0%	0%	0%	0.13%	0%
	Tires	0%	0%	0%	0%	0%	0%
	Rubber	1.45%	1.25%	3.87%	0.42%	1.75%	1.26%
	Cosmetics	1.83%	0.48%	3.03%	0.12%	1.36%	0%
	Pharmaceuticals	0.07%	0%	0%	0.96%	0.26%	0%
	Diapers	0.05%	0.18%	0.17%	0.39%	0.20%	0.66%
	Textiles	17.20%	1.14%	2.02%	1.64%	5.50%	0.33%
	Carpet	0%	0%	0%	0%	0%	0%
	Carpet Padding	0%	0%	0%	0%	0%	0%
	Furniture	0%	0%	0%	0%	0%	0%
	Mattresses	0%	0%	0%	0%	0%	0%
	Ash, Dust	0%	0%	0%	0%	0%	0%
	Miscellaneous Organics	0%	0%	0%	0%	0%	0%
	Miscellaneous Inorganics	0%	0%	0%	0%	0%	0%
	Residuals	11.43%	5.94%	6.19%	15.58%	9.78%	6.64%
	Other Waste Subtotal	**32.52%**	**8.99%**	**15.28%**	**19.11%**	**18.98%**	**8.90%**
WOOD	Dimension Lumber	0%	0%	0%	0.53%	0.13%	0%
	Pallets/Crates	0%	0%	0%	0%	0%	0%
	Treated Wood	0%	0%	0%	0%	0%	0%
	Roofing	0%	0%	0%	0%	0%	0%
	Contaminated	0%	0%	0%	0%	0%	0%
	Stumps/Other Bulky	0%	0%	0%	0%	0%	0%
	Plywood	0%	0%	0%	0%	0%	0%
	Particleboard/Fiberboard	0%	0%	0%	0%	0%	0%
	Wood Products	0.07%	0%	0%	0%	0.02%	0%
	Other Wood	0%	0%	0%	0%	0%	0%
	Wood Subtotal	**0.07%**	**0%**	**0%**	**0.53%**	**0.15%**	**0%**
C&D	Ceramics, Porcelain, China	0%	0%	0%	0%	0%	0%
	Rocks, Bricks	0%	0%	0%	0%	0%	0%
	Concrete	0%	0%	0%	0%	0%	0%
	Soil, Dirt, Fines	0%	0%	0%	0%	0%	0%
	Gypsum Board	0%	0%	0%	0%	0%	0%
	Fiberglass Insulation	0%	0%	0%	0%	0%	0%
	Other Fiberglass	0%	0%	0%	0%	0%	0%
	Roofing	0%	0%	0%	0%	0%	0%
	Asphalt	0%	0%	0%	0%	0%	0%
	Other C&D	0%	0%	0%	0%	0%	0%
	C&D Subtotal	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**
	TOTAL	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

APPENDIX C

MIXED ORGANICS RESULTS

THURSTON COUNTY
WASHINGTON
SINCE 1852

COMPOSITION OF THE MIXED ORGANICS

IN THURSTON COUNTY

DECEMBER 2014

GREEN SOLUTIONS

GREEN SOLUTIONS

ENVIRONMENTAL CONSULTING

COMPOSITION of the MIXED ORGANICS in Thurston County

prepared for

Thurston County Solid Waste
Olympia, Washington
360-867-2491
www.ThurstonSolidWaste.org

prepared by

Green Solutions, LLC
South Prairie, Washington 98385
360-897-9533
rick@green-solutions.biz

December 2014

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SECTION I

INTRODUCTION

A. SCOPE AND OBJECTIVES

This report provides the results of a characterization study conducted on the mixed organics (food scraps and yard debris) collected in Thurston County in 2014. The primary objectives of this study were to provide:

- Data on the composition of the residential and commercial mixed organics collected by the City of Olympia and Waste Connections.
- Data on the amount of contamination present in the mixed organics streams.
- Improved data on the quantities of the mixed organics streams.

This study was conducted by the environmental consulting firm of Green Solutions, with assistance from Waste Connections, Thurston County, and the City of Olympia.

B. BACKGROUND

The solid waste collection and transfer system for Thurston County consists of one large transfer station, the Thurston County Waste and Recovery Center (WARC), and two satellite stations (or rural dropboxes). The two rural dropboxes are the Rainier Dropbox and Rochester Dropbox. WARC is owned by Thurston County and operated by Waste Connections. This facility includes:

- A waste transfer operation, where waste is compacted into transfer trailers and exported out of the county to the Allied Waste landfill in Klickitat County, Washington.
- A yard debris and mixed organics collection and transfer operation.
- An extensive recycling drop-off center.
- A moderate risk waste collection facility (the "HazoHouse").
- Special collection programs for electronic wastes, appliances and other materials.

The waste collection system in Thurston County is operated by one municipal collector (the City of Olympia) and one private collection company (Waste Connections). The City of Olympia provides garbage collection, curbside recycling and mixed organics collection services to the homes and businesses within city limits, and Waste Connections provides the same services to the rest of Thurston County.

Most Thurston County residents and businesses have had access to mixed organics collection since 2008, and had yard waste collection service before that. Subscription to residential curbside and commercial mixed organics collection service is voluntary and is provided at an additional cost over other waste collection services. The list of acceptable materials for the mixed organics collection program in Thurston County includes:

- yard debris, including leaves, grass clippings, and branches and logs up to 8" in diameter,
- food scraps, all types, including meat and dairy products,
- compostable paper, including paper towels and napkins, paper plates, pizza boxes, paper cups, waxed cups and waxed cardboard,
- shredded paper,
- clean lumber, including pallets and wooden boxes, and
- compostable plastic bags and some types of compostable plastic serviceware.

The mixed organics collected by the City of Olympia and Waste Connections are brought to a special area of WARC that is not open to the public. The mixed organics are dropped off at a location where berms of shredded materials have been placed to prevent any liquids from escaping. The mixed organics are generally covered shortly after being dropped off and are also processed soon thereafter so as to prevent birds and animals from having access to the materials. Processing typically consists of grinding and mixing with other woody or organic materials. Depending on the nature of the material, after processing it may be shipped to Silver Springs in Yelm, Royal Organics in eastern Washington, Lenz Enterprises in Stanwood, or shipped out as mulch or hog fuel.

Self-haul customers at WARC are not allowed to drop off mixed organics, although the list of acceptable materials for the public yard waste drop-off area does include untreated lumber, plywood and particleboard.

SECTION II

CHARACTERIZATION RESULTS FOR THE MIXED ORGANICS

A. INTRODUCTION

This section provides waste quantity and composition results for the four sources of mixed organics collected in Thurston County.

B. OVERVIEW OF PROCEDURES

The analysis of mixed organics was added to an ongoing waste composition study for Thurston County. The waste composition study was being conducted on a quarterly basis to encompass seasonal variations in the waste stream, and one of the quarters had already been completed (in October 2013) when the mixed organics tests began. Hence, the mixed organics tests were conducted for the remaining three quarters (February, May and August, 2014). The waste composition study was conducted for six days each quarter (Monday through Saturday), and the mixed organics tests were conducted in the following week to take advantage of the existing setup, crew experience and other cost-effective measures. At the end of the waste sorting activities on each Saturday, the sorting crew simply moved the tent and other equipment to the mixed organics area (see Photo 1) and resumed work the following Monday. An important aspect of this approach is that a few samples of the mixed organics could be taken the week before the actual testing of this material began, which helped spread out the sampling effort and also helped to capture additional sources and types of loads.

The sampling and other fieldwork for the mixed organics had to take into account the collection schedule for this material. At the time of this study, the City of Olympia only collected residential and commercial organics on Mondays. The other collector, Waste Connections, collected mixed organics from residential sources Monday through Friday and from commercial sources Monday through Thursday.

The sampling and sorting procedures for the mixed organics were performed in a similar fashion to the procedures used for waste samples. Incoming vehicles carrying mixed organics were randomly selected, except in the case of the commercial organics. In the case of commercial organics, there were only one or two trucks per day carrying this type of waste and so those trucks were specifically targeted for sampling. In some cases, two samples were taken from these trucks, in order to have enough samples for this source. Sampling locations within the load were randomly chosen, and the samples were taken after the load was dropped off in the normal receiving area (see Photo 2). Each sample was sorted into 25 categories of materials. The Glossary provides additional detail on the definitions used for the sorting categories.

Photo 1. Sorting setup for the mixed organics. Yard debris from the public drop-off area is shown in the background, and the mixed organics receiving area is to the right (not shown in the picture). Photo taken May 27, 2014.

Photo 2. Load of residential organics from northeastern Thurston County shown in foreground, with a commercial load behind it. Photo taken May 26, 2014.

Sources of Mixed Organics

The mixed organics collected in Thurston County are easily divided into four sources:

City Residential: organics collected by the City of Olympia from single-family homes in Olympia.

County Residential: organics collected by Waste Connections from single-family homes in the rest of Thurston County.

City Commercial: commercial organics collected by the City of Olympia.

County Commercial: commercial organics collected by Waste Connections.

These four sources are collected separately from each other due to the different service areas and routes used to collect from each. Residential mixed organics are typically collected from 35- to 95-gallons carts using side-loading or rear-loading garbage trucks. Commercial organics are collected using similar equipment (or rarely, using stationary compactors and roll-off trucks).

Waste Quantity Procedures

An important step for characterizing the mixed organics stream was to determine the amounts of mixed organics generated by the four sources. This data allows the annual averages for each source to be determined with the use of a weighted average that takes into account seasonal variations in quantity and composition. The quantity figures also allow a weighted average to be determined for the entire stream, by taking into account the relative quantities from each of the four sources.

The quantities delivered by the City of Olympia (for the City Residential and City Commercial sources) were determined using scalehouse transaction records. This approach did not work as well for the quantities delivered by Waste Connections (for the County Residential and County Commercial sources) and so instead reports from Waste Connections were used for those sources. For the City of Olympia loads, a survey of incoming trucks helped to confirm that the transaction data from scalehouse records were correctly reporting the type of material (mixed organics versus other materials) and source (residential or commercial). The transaction data identified loads of mixed organics with the use of a code for "material type" that distinguished these loads from loads of other yard debris and waste materials. The appropriate code for the material type for each load was entered by the driver of the truck when arriving at the scalehouse at WARC. The survey data, along with truck numbers and the account names for Olympia (Olympia uses separate accounts for commercial, dropbox and residential trucks), was used to allocate the collection tonnages to residential and commercial sources for each quarter and annually. The quarterly figures were used to

calculate weighted averages for each individual source, so that seasonal fluctuations in waste quantities could be taken into account when calculating the average composition for each source. The annual tonnages for all four sources were used to combine the composition data from each source to determine an annual weighted average for the County's entire mixed organics stream.

Number of Samples

The composition of the mixed organics was determined by randomly selecting and sorting a total of 48 samples of waste. The target number of samples for the mixed organics was 24 samples each for the residential and commercial sources. This number of samples (24) was chosen based on experience from other studies that has shown that 20 to 30 samples are necessary to characterize a specific source with an acceptable degree of accuracy. The 24 samples were allocated to city and county sources based on the estimated amount of each (about one-third from the City of Olympia and two-thirds from the rest of Thurston County). The number of samples taken each season is shown in Table 1.

Table 1
ALLOCATION OF SAMPLES BY SOURCE

Source	January 2014	May 2014	August 2014	Total Samples	
				Number	Percent
City Residential	3	3	3	9	19%
County Residential	5	5	5	15	31%
Residential Subtotal	**8**	**8**	**8**	**24**	**50%**
City Commercial	3	3	3	9	19%
County Commercial	5	4	6	15	31%
Commercial Subtotal	**8**	**7**	**9**	**24**	**50%**
Totals	**16**	**15**	**17**	**48**	**100%**

C. RESULTS, WASTE QUANTITIES

Total Waste Quantities

Table 2 shows the results of the waste quantity analysis. As can be seen in Table 2, there are significant seasonal variations in the amount of residential organics, whereas the commercial organics are relatively stable.

Table 2
QUARTERLY AND ANNUAL QUANTITIES OF MIXED ORGANICS BY SOURCE

Source	Quarterly Amounts				Annual Amounts, Tons	Percentage of Annual Total
	October, 2013	February, 2014	May, 2014	August, 2014		
City Residential	303.1	111.7	292.3	144.9	5,279	27.2%
County Residential	513.3	160.5	732.1	583.3	12,853	66.3%
Residential Subtotal	**816.4**	**272.2**	**1,024.4**	**728.2**	**18,132**	**93.5%**
City Commercial	22.2	16.7	23.0	18.3	563	2.9%
County Commercial	36.1	21.7	24.5	25.0	694	3.6%
Commercial Subtotal	**58.3**	**38.4**	**47.5**	**43.3**	**1,257**	**6.5%**
TOTALS	**874.8**	**310.7**	**1,072.0**	**771.5**	**19,389**	**100.0%**
Subtotal for Olympia	**325.4**	**128.5**	**315.4**	**163.2**	**5,842**	**30.1%**
Subtotal for Waste Connections	**549.4**	**182.2**	**756.6**	**608.3**	**13,547**	**69.9%**

Notes: The figures shown for the quarterly amounts are for a two-week period each quarter. The annual amounts are for the period from September 1, 2013 through August 31, 2014, as this period corresponds to the timing of the waste composition study.

D. RESULTS, WASTE COMPOSITION

Table 3 shows the composition data for each source and for the mixed organics stream overall. The results shown are the weighted averages for each source and for the annual amount. As can be seen from the results, most of the material from residential sources is yard debris, with only relatively small amounts of food scraps, compostable paper and wood. Both of the commercial sources have much higher amounts of food scraps and compostable paper. The results are also illustrated in Figures 1 and 2.

The results shown in Table 3 for the curbside recyclables category have been divided into compostable and non-compostable materials. This has been done to highlight the materials that would actually be a problem for the composting process. Although it would be better to recycle the cardboard and other types of recyclable paper where possible, these materials can also be composted without a problem (although a small amount of milk cartons and aseptic cartons may be included in the recyclable paper category and these would be a problem for the composting process). The recyclable plastics, glass and metals would be a problem for the composting process and should be considered a contaminant (along with the materials in the "non-compostable materials" category).

The figures shown in Table 3 have a specific degree of error associated with them. As with all sampling and survey procedures, a certain degree of error is unavoidable but quantifiable (see Appendix A for more details on the statistical certainty of the results).

E. RESULTS, WEIGHT OF MATERIALS DISPOSED

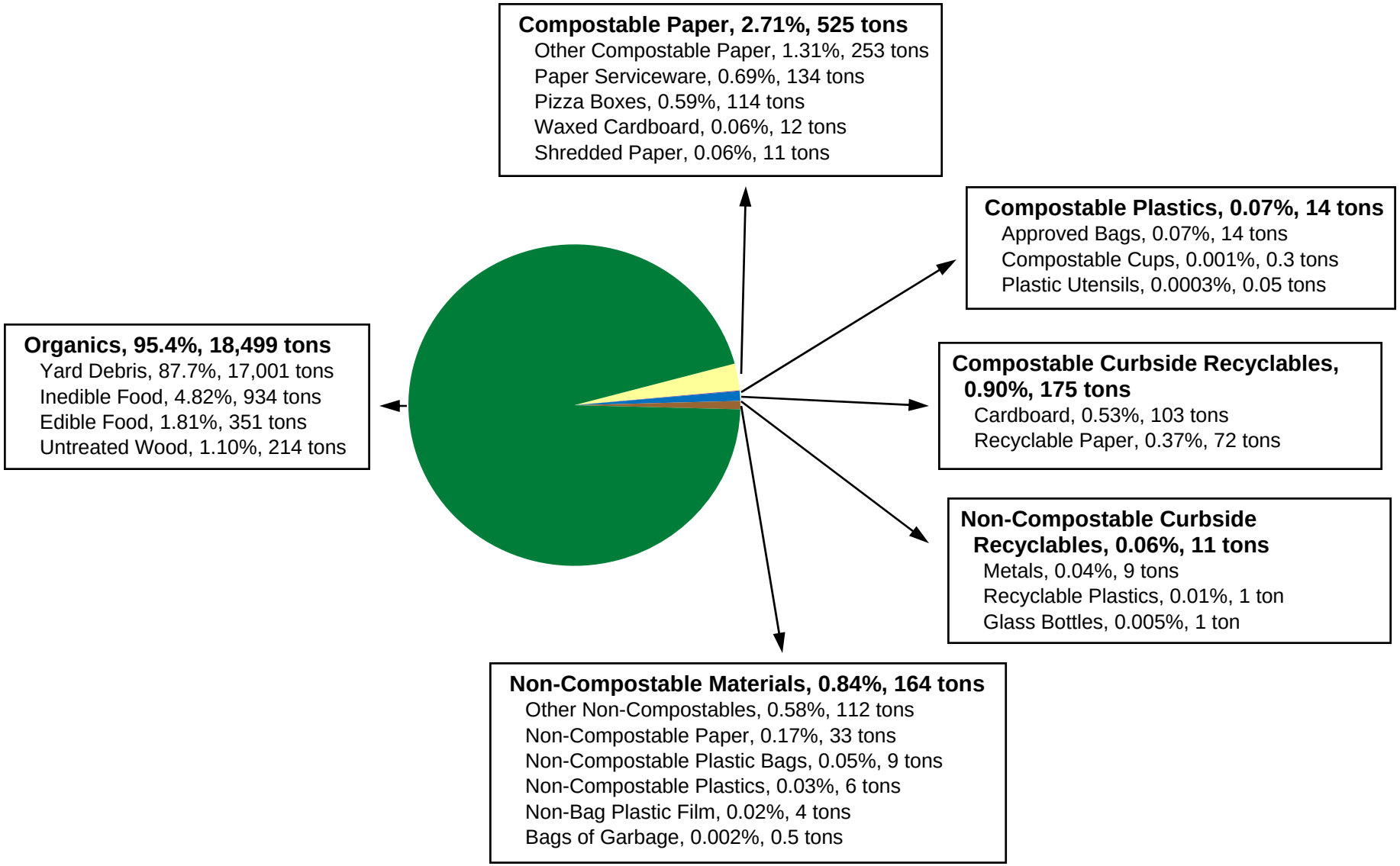
The quantity and composition results can be combined to show the total weight of the materials in the mixed organics. Table 4 provides this information for the four sources, for the residential and commercial subtotals, and for the overall mixed organics stream.

Table 3
COMPOSITION RESULTS FOR MIXED ORGANICS

		City Residential	County Residential	Residential Subtotal	City Commercial	County Commercial	Commercial Subtotal	Average for Entire Stream
ORGANICS	Edible Food	0.44%	0.37%	0.39%	17.1%	26.5%	22.3%	1.81%
	Inedible Food	2.43%	2.06%	2.17%	37.1%	47.8%	43.0%	4.82%
	Yard Debris	94.1%	92.3%	92.8%	14.3%	13.4%	13.8%	87.7%
	Untreated Wood	0.70%	1.28%	1.11%	0.19%	1.54%	0.93%	1.10%
	Organics Subtotal	**97.7%**	**96.0%**	**96.5%**	**68.8%**	**89.2%**	**80.0%**	**95.4%**
COMPOSTABLE PAPER	Waxed Cardboard	0%	0%	0%	1.98%	0.17%	0.98%	0.06%
	Pizza Boxes	0.21%	0.74%	0.59%	1.22%	0.09%	0.60%	0.59%
	Paper Serviceware	0%	1.03%	0.73%	0.22%	0.01%	0.10%	0.69%
	Shredded Paper	0.19%	0.01%	0.06%	0.03%	0.07%	0.05%	0.06%
	Other Compostable Paper	0.80%	0.67%	0.71%	12.6%	7.69%	9.88%	1.31%
	Compostable Paper Subtotal	**1.20%**	**2.46%**	**2.09%**	**16.0%**	**8.03%**	**11.6%**	**2.71%**
COMPOSTABLE PLASTICS	Approved Bags	0.02%	0.03%	0.03%	0.19%	1.05%	0.66%	0.07%
	Non-Approved Bags	0%	0%	0%	0%	0%	0%	0%
	Utensils	0%	0%	0%	0.01%	0%	0.004%	0.0003%
	Compostable Plastic Cups	0%	0%	0%	0.03%	0.01%	0.02%	0.001%
	Compostable Plastic Serviceware	0%	0%	0%	0%	0%	0%	0%
	Compostable Plastics Subtotal	**0.02%**	**0.03%**	**0.03%**	**0.23%**	**1.06%**	**0.69%**	**0.07%**
CURBSIDE RECYCLABLES	**Compostable Recyclables:**							
	Cardboard	0.17%	0.35%	0.30%	8.65%	0.14%	3.96%	0.53%
	Recyclable Paper	0.36%	0.23%	0.26%	3.87%	0.40%	1.96%	0.37%
	Non-Compostable Recyclables:							
	Recyclable Plastics	0%	0.01%	0.004%	0.07%	0.04%	0.05%	0.01%
	Glass Bottles	0%	0%	0%	0.11%	0.04%	0.07%	0.005%
	Metals	0%	0.06%	0.04%	0.08%	0.06%	0.07%	0.04%
	Curbside Recyclables Subtotal	**0.52%**	**0.64%**	**0.61%**	**12.8%**	**0.69%**	**6.11%**	**0.96%**
NON-COMPOSTABLE MATERIALS	Non-Compostable Paper	0.08%	0.14%	0.12%	1.22%	0.51%	0.83%	0.17%
	Non-Compostable Plastic Bags	0.05%	0.03%	0.04%	0.17%	0.13%	0.15%	0.05%
	Non-Compostable Plastics	0.02%	0.02%	0.02%	0.23%	0.15%	0.19%	0.03%
	Non-Bag Plastic Film	0.01%	0.01%	0.01%	0.25%	0.06%	0.15%	0.02%
	Bags of Garbage	0%	0%	0%	0.05%	0.03%	0.04%	0.002%
	Other	0.39%	0.69%	0.60%	0.28%	0.13%	0.20%	0.58%
	Non-Compostable Subtotal	**0.55%**	**0.89%**	**0.80%**	**2.19%**	**1.02%**	**1.55%**	**0.84%**
TOTALS		**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
Subtotal, All Compostable Materials		**99.45%**	**99.04%**	**99.16%**	**97.55%**	**98.84%**	**98.26%**	**99.10%**
Subtotal, All Non-Compostable Materials		**0.55%**	**0.96%**	**0.84%**	**2.45%**	**1.16%**	**1.74%**	**0.90%**
	Pounds of Samples Sorted:	2,159	3,114	5,273	1,929	3,228	5,156	10,430
	Number of Samples Sorted:	9	15	24	9	15	24	48

Note: All figures are percent by weight (except for the bottom two rows).

Figure 1
MIXED ORGANICS COMPOSITION RESULTS, COUNTYWIDE AVERAGE



Note: Figures are percent by weight or tons per year.

Figure 2
COMPOSITION RESULTS FOR MIXED ORGANICS

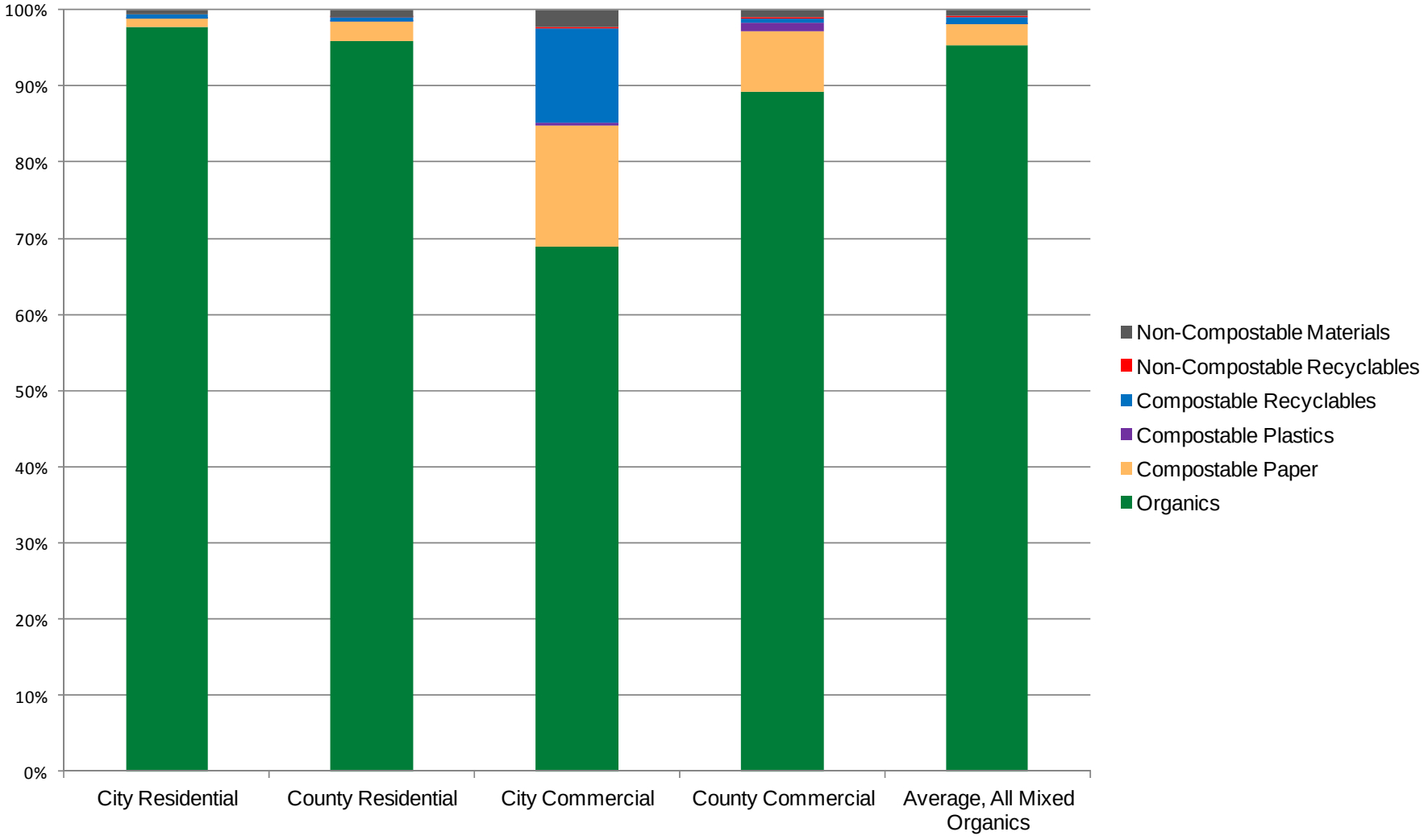


Table 4
WEIGHT OF DIVERTED MATERIALS

		City Residential	County Residential	Residential Subtotal	City Commercial	County Commercial	Commercial Subtotal	Average for Entire Stream
ORGANICS	Edible Food	23	47	71	96	184	280	351
	Inedible Food	128	265	393	209	332	541	934
	Yard Debris	4,969	11,858	16,827	81	93	174	17,001
	Untreated Wood	37	165	202	1	11	12	214
	Organics Subtotal	**5,157**	**12,335**	**17,493**	**387**	**619**	**1,006**	**18,499**
COMPOSTABLE PAPER	Waxed Cardboard	0	0	0	11	1	12	12
	Pizza Boxes	11	96	107	7	1	7	114
	Paper Serviceware	0	133	133	1	0	1	134
	Shredded Paper	10	1	11	0	0	1	11
	Other Compostable Paper	42	87	129	71	53	124	253
	Compostable Paper Subtotal	**63**	**316**	**379**	**90**	**56**	**146**	**525**
COMPOSTABLE PLASTICS	Approved Bags	1	4	5	1	7	8	14
	Non-Approved Bags	0	0	0	0	0	0	0
	Utensils	0	0	0	0.05	0	0.05	0.05
	Compostable Plastic Cups	0	0	0	0.2	0.1	0.3	0.3
	Compostable Plastic Serviceware	0	0	0	0	0	0	0
	Compostable Plastics Subtotal	**1**	**4**	**5**	**1**	**7**	**9**	**14**
CURBSIDE RECYCLABLES	**Compostable Recyclables:**							
	Cardboard	9	45	54	49	1	50	103
	Recyclable Paper	19	29	48	22	3	25	72
	Non-Compostable Recyclables:							
	Recyclable Plastics	0	1	1	0.4	0.3	1	1
	Glass Bottles	0	0	0	1	0	1	1
	Metals	0	8	8	0.4	0.4	1	9
	Curbside Recyclables Subtotal	**28**	**82**	**110**	**72**	**5**	**77**	**187**
NON-COMPOSTABLE MATERIALS	Non-Compostable Paper	4	18	22	7	4	10	33
	Non-Compostable Plastic Bags	3	4	7	1	1	2	9
	Non-Compostable Plastics	1	2	3	1	1	2	6
	Non-Bag Plastic Film	1	2	2	1	0	2	4
	Bags of Garbage	0	0	0	0.3	0.2	0.5	0.5
	Other	21	88	109	2	1	2	112
	Non-Compostable Subtotal	**29**	**115**	**144**	**12**	**7**	**19**	**164**
TOTALS		**5,279**	**12,853**	**18,132**	**563**	**694**	**1,257**	**19,388**
Subtotal, All Compostable Materials		**5,250**	**12,729**	**17,979**	**549**	**685**	**1,235**	**19,214**
Subtotal, All Non-Compostable Materials		**29**	**124**	**153**	**14**	**8**	**22**	**175**

Note: All figures are tons per year.

SECTION III

CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

Diversion Rates

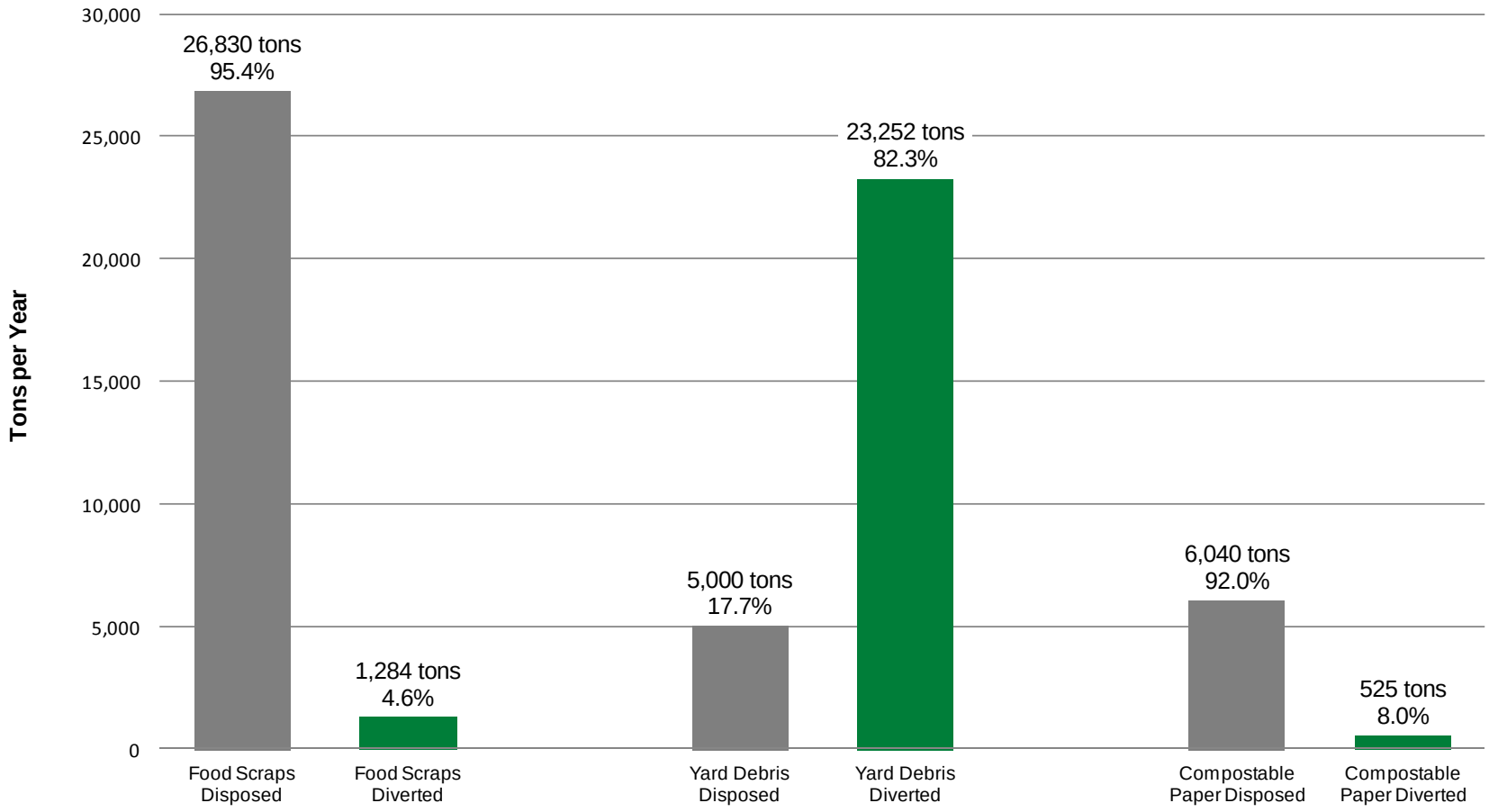
The data shown in Table 4 can be compared to data from the waste composition study to determine the diversion rates for specific materials. Table 5 shows the results for the materials that can be evaluated for diversion rates, and these results are also illustrated in Figure 3. As can be seen in Table 5 and Figure 3, the diversion rate for yard debris is relatively high, at 82.3%, while the diversion rates for food waste and compostable paper are only 4.6% and 8.0%, respectively.

For a variety of reasons, not all of the materials measured in the mixed organics samples can be evaluated in this manner. The waste composition study did not use a detailed breakdown for compostable paper, for instance, so these materials must be treated as an aggregate amount. The waste composition study also did not measure the compostable plastic materials, although it should be noted that little or none of these were observed in the garbage samples. The calculation of diversion rates does not work well for the curbside recyclables and non-compostable materials, since only nominal amounts of these were found in the mixed organics. For the curbside recyclables and non-compostable materials, the idea of a diversion rate is not applicable since these

Table 5
DIVERSION RATES FOR ORGANICS

Type of Material	Amount Diverted, TPY	Amount Disposed, TPY	Percent Diversion
Food Scraps			
Edible Food	351	12,488	2.7%
Inedible Food	934	14,343	6.1%
All Food Scraps	**1,284**	**26,831**	**4.6%**
Yard Debris			
In Mixed Organics	17,001		
Other Yard Debris	6,251		
All Yard Debris	**23,252**	**5,000**	**82.3%**
Compostable Paper	**525**	**6,040**	**8.0%**
Totals	**25,060**	**37,870**	**39.8%**

Figure 3
DIVERSION RATES FOR ORGANICS



materials are not supposed to be in the mixed organics. Finally, the evaluation of a diversion rate for yard debris is complicated by the fact that a substantial amount of yard debris is brought to WARC by self-haulers, and also by Waste Connections and the City of Olympia separately from the mixed organics loads. This yard debris contains small amounts of wood and other materials, but the yard debris was not tested and so no data is available on the precise amounts of these other materials. Hence, for the purpose of this analysis it is assumed that the material dropped off at WARC as source-separated yard debris is 100% yard debris.

Waste Composition Conclusions

A number of observations and conclusions can be drawn from the composition data:

- **Food Scraps Diversion**: despite the fact that food scraps have been allowed as part of the yard waste program for several years now in most of Thurston County, the recovery rate for food scraps is less than 5%. Only 1,284 tons of food scraps were found in the mixed organics while 26,830 tons of food scraps are being disposed each year in the solid waste.

- **Edible Food**: a significant amount of the food scraps found in the mixed organics was "edible food." For the residential streams, the amount of edible food was 15% of the total amount of food scraps, for non-residential generators this was 34% and the overall average was 27%. Based on the results of the waste composition study, 43% of the food waste in Thurston County's waste stream is (or was) edible food. Altogether, 12,840 tons of edible food are being discarded annually in the mixed organics or in the solid waste stream in Thurston County. This amounts to 4.4 pounds per household per week of wasted food.

- **Cardboard and Recyclable Paper in the Mixed Organics**: A significant amount of cardboard and other types of recyclable paper are being placed into the mixed organics stream by County Residential and City Commercial participants. This is not a significant problem for the composting process, since the cardboard and most types of recyclable papers will break down in the composting process, and is still a better option than landfilling this material. Where possible, however, recycling of the cardboard and other recyclable papers would be a better use of these materials.

  In addition, the two streams with the higher amounts of curbside recyclables also have higher amounts of non-compostable contaminants, suggesting that there is a link between the two factors or at least a need for more education for these two types of participants.

- **Contamination Level**: The results of the composition tests show that the amount of contaminants contained in the mixed organics is reasonably low. The category for

"non-compostable materials" was less than 1% (0.84%) for the average results. Part of this amount was non-compostable and non-recyclable grades of paper, which included the wrong types of paper cups and other types of coated papers that could not be composted. The bulk of this category was "other," which included a variety of waste materials that were accidentally included in the mixed organics, such as crayons, rubber gloves, plastic objects ("non-compostable plastics"), and treated or painted wood. The majority of these materials (115 tons out of 164 per year, or 70%) came from the County Residential source.

The other major source of contamination was the materials measured as "curbside recyclables." These materials were also less than 1% (0.96%), and the bulk of this amount was cardboard and other recyclable paper that would not actually be detrimental to the composting process. The materials that could be a problem for composting (recyclable plastics, glass and metals) only amounted to 0.06%. Hence, the total amount of non-compostable materials found in the mixed organics was only 0.9%.

B. RECOMMENDATIONS

The following recommendations are based on the results of this study:

- Most of the food scraps generated in Olympia and Thurston County are being disposed as garbage, not diverted to composting, and more publicity and other steps should be considered to encourage residents and businesses to divert this material. The other steps that could be taken include approaches such as steeper rate incentives, mandatory measures, more commercial waste audits, and even diversion to mixed waste processing systems for select types of businesses (in other words, collecting and composting all of the waste from businesses such as restaurants).

- Both residential and commercial participants should be encouraged to recycle cardboard and other recyclable paper rather than placing it in the mixed organics collection system.

- Although the total amount of contamination in the mixed organics was only 0.9% (including both the "non-compostable materials" category and the non-compostable materials from the "curbside recyclables" category), public education will be needed on an ongoing basis to keep these contaminants to a minimum.

GLOSSARY

INTRODUCTION

This glossary provides the definitions used for the sorting categories for the mixed organics. If there was any doubt about the identity of an item, plastic and paper materials were sorted into the corresponding non-compostable category. To the extent possible, Cedar Grove guidelines were used for the compostable paper and plastic categories.

SORTING CATEGORIES

Organics

Edible food: All food (such as vegetables, fruits, breads, meats, and pastas), that was edible or that appeared to have been edible when discarded. Foods with small blemishes were still considered edible, but scraps of food already removed from the edible portion (such as apple peels and the ends of romaine lettuce) were not counted here. A reasonable attempt was made to separate the food from any packaging, but if that was not possible then the item was placed in whichever category appeared to represent greater than 50% of the weight.

Inedible food: All other food scraps not included in the previous category, and including coffee filters and tea bags.

Yard debris: Leaves, grass clippings, sod, garden debris, brush, prunings, branches and logs less than 8" in diameter, soil, and small stones. Homegrown fruit along with the leaves and prunings from fruit trees were included in this category, as well as bouquets and houseplants.

Untreated wood: Dimensional lumber, pallets, crates, and natural wood over 8" in diameter.

Compostable Paper

Waxed OCC: Waxed corrugated cardboard boxes.

Pizza boxes: Cardboard boxes without a plastic or foil liner that were used for delivering pizza. This included similar packaging for other products (such as breadsticks and chicken wings) from pizza shops.

Paper, wood, or fiber-based serviceware items: Bowls, plates, serving boats, wood corks and wooden utensils including chop sticks, coffee stirrers, and toothpicks that were either clearly labeled "compostable" or unlabeled but without a plastic lining or coating. Paper cups that were clearly labeled as compostable and waxed food serviceware items like parchment paper were included here.

Shredded paper: Bags of shredded paper, and loose amounts of shredded paper if recoverable.

Other compostable paper: Paper packaging and products not included above, and that did not contain a plastic coating. Examples included paper towels and napkins. Also included soiled newspapers and kraft bags that had been used to hold food scraps.

Compostable Plastics

Compostable plastic bags, approved: Plastic bags that were made of materials such as corn starch or soy and that were designed to compostable at commercial composting facilities. Approved bags were BPI-labeled and were typically semi-translucent.

Compostable plastic bags, non-approved: Brown or green, compostable-looking bags. May have been unmarked or labeled "degradable." These bags did not have the BPI label.

Compostable plastic utensils: Plastic utensils clearly labeled "compostable."

Compostable plastic beverage cups: Plastic cups designed to be used for beverages or food and clearly labeled "compostable."

Other compostable plastic food serviceware: Clamshells, meat trays, and salad trays clearly labeled "compostable."

Compostable Curbside Recyclables

Uncoated OCC: Corrugated cardboard boxes without a wax coating.

Recyclable paper: Other types of recyclable paper, including clean newspaper, mixed waste paper, office paper, magazines, catalogs, phone books, glossy junk mail, polycoated cartons (e.g., milk, juice), boxboard (e.g., cereal boxes), egg cartons, and aseptic containers.

Non-Compostable Curbside Recyclables

Recyclable plastic: Plastic bottles, tubs, and buckets (5 gallons or smaller).

Recyclable glass: Glass bottles and jars.

Recyclable metal: Aluminum cans and foil, tin and steel food cans, empty dry metal paint cans and empty aerosol cans, and scrap metal.

Non-Compostable Materials

Non-compostable paper: Non-recyclable, non-compostable paper, including papers coated with plastic. Examples include some types of fast food wrapping, foil-lined paper products, plastic-coated take-out containers, and plastic-coated plates and bowls. Most paper cups, plates and serving "boats" went in this category, unless marked as compostable or clearly not coated.

Non-compostable plastic bags: Plastic bags not made of materials that would compost or biodegrade, including trash bags, produce bags, and shopping bags.

Non-compostable plastic packaging and products: Plastic packaging and products that were not labeled as "compostable," including utensils, clamshells, straws, salad trays, corks, food service items made of Styrofoam, cup lids and other plastic containers and products that did not fit into the recyclable plastic definition and were not clearly labeled "compostable."

Non-bag plastic film: Plastic sheeting, food handling gloves, and other non-bag plastic film.

Bags of Garbage: Intact bags of garbage. Contents were confirmed as garbage, but not sorted.

Other materials: Any material that did not fit into the above categories, including textiles, grease, non-food service Styrofoam, pet waste (including kitty litter and animal bedding), stumps, large rocks, concrete, demolition debris, hazardous wastes (e.g., fluorescent light bulbs, paint, motor oil), and non-recyclable materials.

STATISTICAL CERTAINTY OF RESULTS

A. INTRODUCTION

This appendix shows the confidence intervals associated with mixed organics composition results.

B. METHODOLOGY

For this type of study, statistical certainty can be expressed using confidence intervals. Confidence intervals are the range of values for which one can be confident (to a given degree, such as 90% confident) that the true value falls within. The confidence limits are sometimes shown as a "+ or – value," such as "5% inedible food +/- 1%." For this study, a confidence interval of 90% was used, so that in this example one could be 90% confident that the true value for inedible food falls between 4% and 6%.

The calculation of confidence intervals for this study is complicated slightly by the use of weighted averages. The calculation of confidence intervals for weighted averages begins with calculating standard deviations for each material for each generator and for each season. The standard deviation is then converted to the standard error of the mean (SEM) by dividing the standard deviation by the square root of the number of samples. Once the SEM has been determined for each material, each season and each waste generator, it can be manipulated in the same way as the composition figures by using weighted averages as appropriate for the data being combined. The SEM's are multiplied by a factor of 1.64 and then added or subtracted from the average composition values to derive the upper and lower confidence limits, respectively. The factor of 1.64 is determined by the choice of a 90% confidence interval.

C. RESULTS

Table A-1 shows the confidence limits associated with the composition results for each source and for the entire mixed organics stream.

Table A-1
CONFIDENCE LIMITS BY SOURCE

		City Residential			County Residential			City Commercial		
		Average	LCL	UCL	Average	LCL	UCL	Average	LCL	UCL
ORGANICS	Edible Food	0.44%	0.13%	0.75%	0.37%	0.18%	0.56%	17.08%	4.47%	29.70%
	Inedible Food	2.43%	1.71%	3.15%	2.06%	0.81%	3.31%	37.15%	18.30%	55.99%
	Yard Debris	94.13%	92.75%	95.51%	92.26%	88.42%	96.10%	14.33%	0.00%	30.36%
	Untreated Wood	0.70%	0.00%	1.40%	1.28%	0.12%	2.45%	0.19%	0.03%	0.36%
	Organics Subtotal	**97.70%**	**97.06%**	**98.34%**	**95.97%**	**93.40%**	**98.55%**	**68.76%**	**55.74%**	**81.78%**
COMPOSTABLE PAPER	Waxed Cardboard	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.98%	0.51%	3.46%
	Pizza Boxes	0.21%	0.13%	0.29%	0.74%	0.00%	1.64%	1.22%	0.00%	2.50%
	Paper Serviceware	0.00%	0.00%	0.00%	1.03%	0.00%	2.53%	0.22%	0.00%	0.43%
	Shredded Paper	0.19%	0.00%	0.40%	0.01%	0.00%	0.01%	0.03%	0.00%	0.07%
	Other Compostable Paper	0.80%	0.44%	1.17%	0.67%	0.37%	0.97%	12.58%	6.76%	18.40%
	Compostable Paper Subtotal	**1.20%**	**0.62%**	**1.79%**	**2.46%**	**0.02%**	**4.89%**	**16.03%**	**9.17%**	**22.89%**
COMPOSTABLE PLASTICS	Approved Bags	0.02%	0.01%	0.03%	0.03%	0.01%	0.05%	0.19%	0.04%	0.34%
	Non-Approved Bags	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Utensils	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%	0.02%
	Compostable Plastic Cups	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.03%	0.00%	0.08%
	Plastic Serviceware	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Compostable Plastic Subtotal	**0.02%**	**0.01%**	**0.03%**	**0.03%**	**0.01%**	**0.05%**	**0.23%**	**0.05%**	**0.41%**
CURBSIDE RECYCLABLES	Cardboard	0.00%	0.00%	0.18%	0.00%	0.00%	0.37%	8.65%	2.08%	15.23%
	Recyclable Paper	0.36%	0.12%	0.59%	0.23%	0.10%	0.35%	3.87%	2.07%	5.67%
	Recyclable Plastics	0.00%	0.00%	0.00%	0.01%	0.00%	0.01%	0.07%	0.00%	0.15%
	Glass Bottles	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.11%	0.00%	0.23%
	Metals	0.00%	0.00%	0.00%	0.06%	0.00%	0.15%	0.08%	0.02%	0.14%
	Curbside Recyclables Subtotal	**0.52%**	**0.23%**	**0.82%**	**0.64%**	**0.15%**	**1.13%**	**12.78%**	**6.27%**	**19.30%**
NON-COMPOSTABLE MATERIALS	Non-Compostable Paper	0.08%	0.00%	0.15%	0.14%	0.09%	0.20%	1.22%	0.58%	1.86%
	Non-Compostable Plastic Bags	0.05%	0.00%	0.10%	0.03%	0.00%	0.07%	0.17%	0.00%	0.36%
	Non-Compostable Plastics	0.02%	0.00%	0.05%	0.02%	0.00%	0.04%	0.23%	0.07%	0.39%
	Non-Bag Plastics	0.01%	0.00%	0.03%	0.01%	0.00%	0.03%	0.25%	0.00%	0.54%
	Bags of Garbage	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.05%	0.00%	0.11%
	Other	0.39%	0.18%	0.61%	0.69%	0.14%	1.24%	0.28%	0.05%	0.50%
	Non-Compostable Subtotal	**0.55%**	**0.24%**	**0.86%**	**0.89%**	**0.33%**	**1.46%**	**2.19%**	**1.54%**	**2.84%**
ALL COMPOSTABLE MATERIALS		**99.45%**	**99.14%**	**99.76%**	**99.04%**	**98.47%**	**99.60%**	**97.55%**	**96.76%**	**98.34%**
ALL NON-COMPOSTABLE MATERIALS		**0.55%**	**0.24%**	**0.86%**	**0.96%**	**0.40%**	**1.53%**	**2.45%**	**1.66%**	**3.24%**

Notes:
LCL = Lower Confidence Limit for 90% confidence interval.
UCL = Upper Confidence Limit for 90% confidence interval.
All figures are percentages by weight.

Table A-1, continued
CONFIDENCE LIMITS BY SOURCE

		County Commercial			Average for Entire Stream		
		Average	LCL	UCL	Average	LCL	UCL
ORGANICS	Edible Food	26.46%	13.60%	39.32%	1.81%	0.77%	2.84%
	Inedible Food	47.80%	31.85%	63.75%	4.82%	2.67%	6.96%
	Yard Debris	13.40%	2.85%	23.96%	87.69%	83.92%	91.45%
	Untreated Wood	1.54%	0.01%	3.06%	1.10%	0.08%	2.13%
	Organics Subtotal	**89.20%**	**85.23%**	**93.17%**	**95.41%**	**93.01%**	**97.81%**
COMPOSTABLE PAPER	Waxed Cardboard	0.17%	0.00%	0.42%	0.06%	0.01%	0.12%
	Pizza Boxes	0.09%	0.00%	0.22%	0.59%	0.00%	1.24%
	Paper Serviceware	0.01%	0.00%	0.03%	0.69%	0.00%	1.69%
	Shredded Paper	0.07%	0.00%	0.16%	0.06%	0.00%	0.12%
	Other Compostable Paper	7.69%	4.04%	11.34%	1.31%	0.71%	1.91%
	Compostable Paper Subtotal	**8.03%**	**4.41%**	**11.65%**	**2.71%**	**0.60%**	**4.81%**
COMPOSTABLE PLASTICS	Approved Bags	1.05%	0.51%	1.59%	0.07%	0.03%	0.11%
	Non-Approved Bags	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Utensils	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Compostable Plastic Cups	0.01%	0.00%	0.02%	0.00%	0.00%	0.00%
	Plastic Serviceware	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Compostable Plastic Subtotal	**1.06%**	**0.51%**	**1.60%**	**0.07%**	**0.03%**	**0.11%**
CURBSIDE RECYCLABLES	Cardboard	0.14%	0.01%	0.27%	0.53%	0.04%	1.02%
	Recyclable Paper	0.40%	0.24%	0.57%	0.37%	0.17%	0.58%
	Recyclable Plastics	0.04%	0.00%	0.09%	0.01%	0.00%	0.02%
	Glass Bottles	0.04%	0.00%	0.09%	0.00%	0.00%	0.01%
	Metals	0.06%	0.03%	0.08%	0.04%	0.00%	0.11%
	Curbside Recyclables Subtotal	**0.69%**	**0.42%**	**0.95%**	**0.96%**	**0.36%**	**1.57%**
NON-COMPOSTABLE MATERIALS	Non-Compostable Paper	0.51%	0.25%	0.77%	0.17%	0.08%	0.25%
	Non-Compostable Plastic Bags	0.13%	0.08%	0.18%	0.05%	0.00%	0.09%
	Non-Compostable Plastics	0.15%	0.04%	0.26%	0.03%	0.00%	0.06%
	Non-Bag Plastics	0.06%	0.01%	0.12%	0.02%	0.00%	0.05%
	Bags of Garbage	0.03%	0.00%	0.08%	0.00%	0.00%	0.01%
	Other	0.13%	0.00%	0.27%	0.58%	0.14%	1.01%
	Non-Compostable Subtotal	**1.02%**	**0.64%**	**1.41%**	**0.84%**	**0.35%**	**1.34%**
ALL COMPOSTABLE MATERIALS		**98.84%**	**98.37%**	**99.30%**	**99.10%**	**98.60%**	**99.60%**
ALL NON-COMPOSTABLE MATERIALS		**1.16%**	**0.70%**	**1.63%**	**0.90%**	**0.40%**	**1.40%**

Notes:
LCL = Lower Confidence Limit for 90% confidence interval.
UCL = Upper Confidence Limit for 90% confidence interval.
All figures are percentages by weight.

APPENDIX D

STATISTICAL CERTAINTY OF RESULTS

STATISTICAL CERTAINTY OF RESULTS

A. INTRODUCTION

This appendix shows the confidence intervals associated with the waste composition results.

B. METHODOLOGY

For this type of study, statistical certainty can be expressed using confidence intervals. Confidence intervals are the range of values for which one can be confident (to a given degree, such as 90% confident) that the true value falls within. The confidence limits are sometimes shown as a "+ or – value", such as "5% newspaper +/- 1%." For this study, a confidence interval of 90% was used, so that in this example one can be 90% confident that the true value for newspaper falls between 4% and 6%.

The calculation of confidence intervals for this study is complicated slightly by the use of weighted averages. The calculation of confidence intervals for weighted averages begins with calculating standard deviations for each material for each generator and for each season. The standard deviation is then converted to the standard error of the mean (SEM) by dividing the standard deviation by the square root of the number of samples. Once the SEM has been determined for each material, each season and each waste generator, it can be manipulated in the same way as the composition figures by using weighted averages as appropriate for the data being combined. The final SEM's are multiplied by a factor of 1.64 and then added or subtracted from the average composition values to derive the upper and lower confidence limits, respectively. The factor of 1.64 is determined by the choice of a 90% confidence interval.

C. RESULTS

Table D-1 shows the confidence limits associated with the composition results for each generator and for the entire County.

Table D-1
CONFIDENCE LIMITS BY TYPE OF GENERATOR

		Residential Self-Haul			Non-Residential Self-Haul			Rural Dropboxes		
		Average	LCL	UCL	Average	LCL	UCL	Average	LCL	UCL
PAPER	Newspaper	0.55%	0.00%	1.17%	0.03%	0.00%	0.06%	0.13%	0.04%	0.22%
	Cardboard	4.38%	0.85%	7.90%	4.73%	0.46%	9.00%	1.74%	0.81%	2.68%
	Mixed Waste Paper	4.30%	1.90%	6.71%	0.86%	0.11%	1.61%	4.35%	2.38%	6.32%
	Phone Books	0.06%	0.00%	0.14%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Milk Cartons, Other	0.10%	0.01%	0.20%	0.01%	0.00%	0.02%	0.13%	0.02%	0.23%
	Compostable	1.47%	0.43%	2.51%	0.49%	0.00%	1.19%	1.30%	0.63%	1.97%
	Non-Recyclable Paper	1.02%	0.45%	1.59%	1.38%	0.00%	3.00%	2.40%	0.17%	4.63%
	Paper Subtotal	**11.89%**	**6.02%**	**17.75%**	**7.49%**	**1.16%**	**13.81%**	**10.05%**	**5.22%**	**14.88%**
PLASTIC	PET Bottles	0.83%	0.15%	1.51%	0.17%	0.03%	0.31%	0.61%	0.35%	0.87%
	HDPE Bottles	0.28%	0.10%	0.47%	0.03%	0.00%	0.06%	0.40%	0.18%	0.63%
	Bottles 3-7	0.10%	0.01%	0.20%	0.01%	0.00%	0.03%	0.04%	0.00%	0.10%
	Tubs	0.17%	0.04%	0.31%	0.07%	0.00%	0.16%	0.16%	0.08%	0.23%
	Carryout Bags	0.33%	0.09%	0.58%	0.04%	0.00%	0.08%	0.36%	0.16%	0.55%
	Bags and Film	2.25%	1.09%	3.41%	1.14%	0.40%	1.89%	2.63%	1.78%	3.48%
	Plastic Packaging	1.24%	0.61%	1.86%	0.27%	0.03%	0.51%	1.25%	0.59%	1.91%
	Other Plastic Products	3.33%	1.34%	5.31%	1.88%	0.00%	3.83%	4.39%	1.68%	7.10%
	Expanded Polystyrene	0.36%	0.06%	0.66%	2.25%	0.00%	5.53%	0.19%	0.07%	0.31%
	Plastic Subtotal	**8.90%**	**5.33%**	**12.47%**	**5.85%**	**0.37%**	**11.33%**	**10.03%**	**6.36%**	**13.70%**
METAL	Aluminum Cans	0.37%	0.05%	0.69%	0.05%	0.00%	0.09%	0.35%	0.09%	0.61%
	Aluminum Foil	0.13%	0.02%	0.24%	0.04%	0.00%	0.09%	0.36%	0.00%	0.75%
	Tin Cans	0.64%	0.21%	1.08%	0.05%	0.00%	0.10%	0.55%	0.25%	0.84%
	Mixed Metals	4.87%	1.57%	8.17%	0.72%	0.05%	1.39%	7.53%	0.89%	14.16%
	Ferrous Metals	1.86%	0.00%	3.80%	1.11%	0.14%	2.08%	2.62%	0.22%	5.01%
	White Goods	0.00%	0.00%	0.00%	0.63%	0.00%	1.62%	0.65%	0.00%	1.58%
	Non-Ferrous Metals	0.31%	0.00%	0.64%	0.15%	0.00%	0.33%	0.07%	0.00%	0.16%
	Aerosol Cans	0.21%	0.07%	0.34%	0.05%	0.00%	0.12%	0.21%	0.02%	0.40%
	Metal Subtotal	**8.39%**	**4.05%**	**12.74%**	**2.80%**	**0.43%**	**5.17%**	**12.34%**	**4.70%**	**19.97%**
ORGANICS	Food Waste	11.07%	4.54%	17.60%	0.60%	0.00%	1.42%	7.71%	4.12%	11.30%
	Yard Debris	2.08%	0.00%	4.98%	1.06%	0.00%	2.36%	3.71%	0.00%	7.61%
	Organics Subtotal	**13.15%**	**5.40%**	**20.90%**	**1.66%**	**0.00%**	**3.54%**	**11.43%**	**6.38%**	**16.47%**
GLASS	Clear Bottles	2.37%	0.25%	4.48%	0.27%	0.00%	0.55%	1.02%	0.33%	1.72%
	Brown Bottles	3.44%	0.00%	7.65%	0.05%	0.00%	0.12%	1.37%	0.00%	3.03%
	Green Bottles	0.31%	0.00%	0.71%	0.05%	0.00%	0.11%	0.34%	0.01%	0.68%
	Light Bulbs	0.16%	0.00%	0.34%	0.02%	0.00%	0.04%	0.02%	0.00%	0.04%
	Non-Recyclable Glass	1.52%	0.00%	3.36%	4.53%	0.00%	9.57%	0.15%	0.02%	0.28%
	Glass Subtotal	**7.79%**	**2.50%**	**13.08%**	**4.91%**	**0.00%**	**10.20%**	**2.91%**	**0.40%**	**5.42%**
OTHER WASTES	E-Waste	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Other Electronics	0.23%	0.00%	0.51%	0.00%	0.00%	0.00%	0.21%	0.00%	0.50%
	Tires	0.11%	0.00%	0.28%	0.00%	0.00%	0.00%	4.88%	0.00%	11.64%
	Rubber	0.36%	0.00%	0.75%	0.56%	0.00%	1.43%	2.80%	0.00%	6.65%
	Cosmetics	0.33%	0.02%	0.64%	0.01%	0.00%	0.03%	0.11%	0.00%	0.23%
	Pharmaceuticals	0.07%	0.00%	0.17%	0.00%	0.00%	0.00%	0.01%	0.00%	0.02%
	Diapers	0.58%	0.00%	1.20%	0.08%	0.00%	0.21%	2.12%	0.23%	4.01%
	Textiles	4.39%	1.39%	7.38%	0.76%	0.00%	1.73%	3.87%	1.08%	6.66%
	Carpet	3.82%	0.00%	8.69%	6.27%	0.00%	15.85%	4.65%	1.17%	8.12%
	Carpet Padding	2.05%	0.00%	5.25%	0.69%	0.00%	1.78%	0.03%	0.00%	0.07%
	Furniture	6.03%	0.00%	13.78%	8.31%	0.00%	19.05%	0.33%	0.00%	0.80%
	Mattresses	1.68%	0.00%	4.19%	0.35%	0.00%	0.89%	2.78%	0.00%	6.72%
	Ash, Dust	1.19%	0.00%	2.84%	0.00%	0.00%	0.00%	1.78%	0.30%	3.27%
	Miscellaneous Organics	0.03%	0.00%	0.07%	0.00%	0.00%	0.00%	0.13%	0.00%	0.26%
	Misc. Inorganics	0.21%	0.00%	0.42%	0.07%	0.00%	0.18%	0.18%	0.05%	0.32%
	Residuals	3.01%	1.37%	4.66%	1.33%	0.00%	2.67%	4.83%	3.06%	6.60%
	Other Wastes Subtotal	**24.09%**	**9.79%**	**38.39%**	**18.45%**	**3.25%**	**33.65%**	**28.71%**	**16.73%**	**40.70%**
WOOD and C&D	**Wood**	**18.10%**	**5.92%**	**30.29%**	**24.19%**	**9.28%**	**39.09%**	**14.40%**	**2.02%**	**26.78%**
	Construction, Demo.	**5.24%**	**0.00%**	**10.86%**	**34.49%**	**15.49%**	**53.48%**	**8.61%**	**4.04%**	**13.17%**
SPECIAL	**Special Waste**	**2.44%**	**0.00%**	**5.22%**	**0.16%**	**0.00%**	**0.41%**	**1.53%**	**0.00%**	**3.10%**

Notes:
LCL = Lower Confidence Limit for 90% confidence interval.
UCL = Upper Confidence Limit for 90% confidence interval.
All figures are percentages by weight.

Table D-1, continued
CONFIDENCE LIMITS BY TYPE OF GENERATOR

		Single-Family, County			Single-Family, Olympia			Multi-Family, County		
		Average	LCL	UCL	Average	LCL	UCL	Average	LCL	UCL
PAPER	Newspaper	0.39%	0.25%	0.53%	0.58%	0.30%	0.86%	1.28%	0.82%	1.73%
	Cardboard	1.62%	0.56%	2.68%	0.99%	0.45%	1.52%	2.38%	0.99%	3.77%
	Mixed Waste Paper	5.06%	3.43%	6.69%	4.25%	3.35%	5.15%	6.90%	5.12%	8.68%
	Phone Books	0.09%	0.00%	0.20%	0.10%	0.00%	0.25%	0.28%	0.00%	0.66%
	Milk Cartons, Other	0.33%	0.20%	0.47%	0.33%	0.25%	0.41%	0.42%	0.22%	0.63%
	Compostable	3.90%	2.97%	4.83%	4.36%	3.44%	5.27%	3.71%	2.79%	4.64%
	Non-Recyclable Paper	1.87%	1.25%	2.48%	2.20%	1.75%	2.65%	3.11%	1.25%	4.97%
	Paper Subtotal	**13.27%**	**10.51%**	**16.03%**	**12.81%**	**11.01%**	**14.61%**	**18.08%**	**16.41%**	**19.76%**
PLASTIC	PET Bottles	0.90%	0.54%	1.25%	0.72%	0.58%	0.85%	2.04%	1.60%	2.48%
	HDPE Bottles	0.48%	0.26%	0.70%	0.36%	0.25%	0.46%	0.93%	0.55%	1.31%
	Bottles 3-7	0.06%	0.01%	0.10%	0.06%	0.01%	0.11%	0.13%	0.01%	0.24%
	Tubs	0.42%	0.35%	0.49%	0.57%	0.41%	0.73%	0.35%	0.20%	0.50%
	Carryout Bags	0.72%	0.54%	0.91%	0.86%	0.70%	1.02%	0.92%	0.64%	1.21%
	Bags and Film	4.94%	4.32%	5.56%	6.11%	5.52%	6.70%	4.09%	3.29%	4.90%
	Plastic Packaging	1.62%	1.27%	1.98%	2.00%	1.60%	2.40%	1.76%	1.44%	2.08%
	Other Plastic Products	2.18%	1.16%	3.20%	2.49%	1.30%	3.67%	1.22%	0.37%	2.06%
	Expanded Polystyrene	0.60%	0.39%	0.82%	0.47%	0.33%	0.60%	0.99%	0.41%	1.56%
	Plastic Subtotal	**11.92%**	**10.10%**	**13.75%**	**13.63%**	**12.37%**	**14.89%**	**12.43%**	**10.35%**	**14.51%**
METAL	Aluminum Cans	0.30%	0.17%	0.42%	0.26%	0.16%	0.36%	1.21%	0.55%	1.86%
	Aluminum Foil	0.22%	0.12%	0.33%	0.28%	0.19%	0.37%	0.35%	0.18%	0.51%
	Tin Cans	1.02%	0.73%	1.32%	0.86%	0.58%	1.14%	1.23%	1.00%	1.46%
	Mixed Metals	1.21%	0.34%	2.08%	2.26%	0.55%	3.96%	1.14%	0.36%	1.92%
	Ferrous Metals	0.57%	0.00%	1.25%	0.81%	0.00%	1.74%	0.15%	0.02%	0.28%
	White Goods	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Non-Ferrous Metals	0.17%	0.00%	0.40%	0.10%	0.00%	0.22%	0.08%	0.00%	0.19%
	Aerosol Cans	0.21%	0.07%	0.35%	0.24%	0.13%	0.35%	0.24%	0.11%	0.36%
	Metal Subtotal	**3.71%**	**2.53%**	**4.89%**	**4.81%**	**3.23%**	**6.40%**	**4.40%**	**2.94%**	**5.86%**
ORGANICS	Food Waste	22.49%	18.55%	26.42%	25.83%	22.23%	29.44%	23.81%	17.94%	29.69%
	Yard Debris	7.94%	2.52%	13.35%	2.86%	0.67%	5.06%	3.07%	0.00%	7.31%
	Organics Subtotal	**30.42%**	**23.66%**	**37.19%**	**28.70%**	**24.19%**	**33.20%**	**26.89%**	**18.87%**	**34.91%**
GLASS	Clear Bottles	1.71%	1.15%	2.26%	1.15%	0.71%	1.60%	3.90%	2.60%	5.20%
	Brown Bottles	1.25%	0.48%	2.03%	1.05%	0.51%	1.59%	1.98%	0.81%	3.16%
	Green Bottles	0.55%	0.09%	1.01%	0.37%	0.02%	0.72%	1.11%	0.28%	1.94%
	Light Bulbs	0.05%	0.03%	0.07%	0.06%	0.03%	0.10%	0.02%	0.00%	0.04%
	Non-Recyclable Glass	0.19%	0.04%	0.35%	0.30%	0.10%	0.50%	0.07%	0.00%	0.17%
	Glass Subtotal	**3.75%**	**2.46%**	**5.03%**	**2.94%**	**1.99%**	**3.89%**	**7.08%**	**4.55%**	**9.61%**
OTHER WASTES	E-Waste	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Other Electronics	0.09%	0.00%	0.19%	0.10%	0.00%	0.23%	0.09%	0.01%	0.16%
	Tires	0.03%	0.00%	0.07%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Rubber	0.64%	0.00%	1.42%	0.35%	0.02%	0.68%	0.14%	0.00%	0.27%
	Cosmetics	0.34%	0.07%	0.60%	0.30%	0.12%	0.47%	0.31%	0.08%	0.54%
	Pharmaceuticals	0.11%	0.00%	0.26%	0.07%	0.00%	0.14%	0.02%	0.02%	0.03%
	Diapers	4.83%	2.86%	6.81%	5.92%	2.50%	9.35%	6.07%	3.00%	9.14%
	Textiles	4.68%	2.85%	6.50%	5.31%	3.78%	6.83%	4.37%	2.00%	6.74%
	Carpet	0.43%	0.00%	1.05%	0.29%	0.00%	0.69%	0.61%	0.00%	1.59%
	Carpet Padding	0.00%	0.00%	0.00%	0.11%	0.00%	0.21%	1.86%	0.00%	5.23%
	Furniture	0.65%	0.00%	1.60%	0.00%	0.00%	0.00%	1.00%	0.00%	2.81%
	Mattresses	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Ash, Dust	0.20%	0.02%	0.38%	0.16%	0.02%	0.31%	0.27%	0.03%	0.51%
	Miscellaneous Organics	0.03%	0.00%	0.06%	0.15%	0.00%	0.32%	0.00%	0.00%	0.00%
	Misc. Inorganics	0.25%	0.06%	0.43%	0.43%	0.12%	0.74%	0.17%	0.00%	0.36%
	Residuals	13.12%	10.40%	15.84%	12.99%	11.05%	14.92%	9.62%	7.20%	12.05%
	Other Wastes Subtotal	**25.39%**	**21.77%**	**29.02%**	**26.17%**	**22.91%**	**29.43%**	**24.52%**	**18.67%**	**30.36%**
WOOD and C&D	**Wood**	**2.58%**	**0.16%**	**5.00%**	**2.18%**	**0.50%**	**3.86%**	**1.49%**	**0.75%**	**2.23%**
	Construction, Demo.	**1.34%**	**0.36%**	**2.33%**	**1.04%**	**0.09%**	**1.99%**	**0.28%**	**0.00%**	**0.71%**
SPECIAL	**Special Waste**	**7.62%**	**3.20%**	**12.03%**	**7.72%**	**3.56%**	**11.87%**	**4.83%**	**1.05%**	**8.62%**

Notes:
LCL = Lower Confidence Limit for 90% confidence interval.
UCL = Upper Confidence Limit for 90% confidence interval.
All figures are percentages by weight.

Table D-1, continued
CONFIDENCE LIMITS BY TYPE OF GENERATOR

		Multi-Family, Olympia			Commercial, County			Commercial, Olympia		
		Average	LCL	UCL	Average	LCL	UCL	Average	LCL	UCL
PAPER	Newspaper	0.72%	0.46%	0.98%	0.39%	0.10%	0.67%	0.92%	0.00%	1.90%
	Cardboard	2.99%	1.94%	4.04%	3.88%	1.94%	5.81%	4.73%	1.08%	8.37%
	Mixed Waste Paper	7.33%	6.00%	8.66%	7.22%	2.62%	11.83%	6.16%	3.82%	8.51%
	Phone Books	0.03%	0.00%	0.07%	0.05%	0.00%	0.12%	0.00%	0.00%	0.00%
	Milk Cartons, Other	0.27%	0.16%	0.37%	0.47%	0.09%	0.86%	0.22%	0.11%	0.33%
	Compostable	3.29%	2.35%	4.23%	5.53%	2.71%	8.35%	6.45%	3.45%	9.44%
	Non-Recyclable Paper	1.88%	1.27%	2.49%	3.72%	1.93%	5.51%	3.05%	1.51%	4.59%
	Paper Subtotal	**16.51%**	**13.91%**	**19.11%**	**21.27%**	**13.83%**	**28.71%**	**21.53%**	**14.99%**	**28.06%**
PLASTIC	PET Bottles	1.79%	1.36%	2.21%	0.90%	0.46%	1.33%	0.76%	0.48%	1.04%
	HDPE Bottles	0.89%	0.63%	1.14%	0.51%	0.25%	0.76%	0.71%	0.41%	1.01%
	Bottles 3-7	0.10%	0.06%	0.15%	0.06%	0.00%	0.11%	0.04%	0.00%	0.08%
	Tubs	0.37%	0.26%	0.47%	0.26%	0.10%	0.42%	0.25%	0.12%	0.38%
	Carryout Bags	0.94%	0.70%	1.18%	0.34%	0.15%	0.54%	0.30%	0.14%	0.47%
	Bags and Film	3.93%	3.23%	4.62%	6.03%	3.67%	8.39%	6.33%	4.28%	8.39%
	Plastic Packaging	1.65%	1.30%	2.01%	1.99%	1.06%	2.93%	2.66%	0.97%	4.35%
	Other Plastic Products	2.44%	1.20%	3.68%	2.74%	0.00%	5.56%	4.20%	1.99%	6.42%
	Expanded Polystyrene	0.48%	0.31%	0.64%	0.31%	0.10%	0.52%	0.48%	0.14%	0.83%
	Plastic Subtotal	**12.58%**	**10.70%**	**14.46%**	**13.14%**	**8.94%**	**17.34%**	**15.74%**	**12.68%**	**18.80%**
METAL	Aluminum Cans	0.98%	0.56%	1.40%	0.40%	0.21%	0.60%	0.42%	0.21%	0.63%
	Aluminum Foil	0.19%	0.13%	0.26%	0.11%	0.04%	0.17%	0.12%	0.05%	0.20%
	Tin Cans	1.17%	0.82%	1.52%	0.51%	0.11%	0.91%	0.43%	0.12%	0.74%
	Mixed Metals	2.33%	1.07%	3.58%	1.50%	0.00%	3.00%	3.59%	0.00%	7.21%
	Ferrous Metals	0.30%	0.00%	0.61%	1.11%	0.04%	2.19%	0.80%	0.00%	1.77%
	White Goods	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Non-Ferrous Metals	0.03%	0.00%	0.05%	0.43%	0.00%	1.06%	0.26%	0.00%	0.61%
	Aerosol Cans	0.24%	0.10%	0.38%	0.16%	0.01%	0.31%	0.16%	0.05%	0.28%
	Metal Subtotal	**5.23%**	**3.85%**	**6.62%**	**4.22%**	**1.28%**	**7.17%**	**5.79%**	**2.05%**	**9.52%**
ORGANICS	Food Waste	20.70%	16.75%	24.65%	19.64%	11.25%	28.02%	17.23%	9.80%	24.66%
	Yard Debris	1.04%	0.00%	2.17%	0.72%	0.00%	1.61%	1.89%	0.00%	4.06%
	Organics Subtotal	**21.74%**	**17.43%**	**26.04%**	**20.36%**	**12.19%**	**28.52%**	**19.12%**	**11.64%**	**26.60%**
GLASS	Clear Bottles	2.06%	1.26%	2.87%	0.74%	0.21%	1.26%	0.79%	0.15%	1.42%
	Brown Bottles	0.98%	0.40%	1.57%	0.44%	0.06%	0.82%	0.52%	0.00%	1.08%
	Green Bottles	0.53%	0.09%	0.97%	0.12%	0.00%	0.24%	0.25%	0.00%	0.55%
	Light Bulbs	0.03%	0.01%	0.05%	0.03%	0.00%	0.08%	0.02%	0.00%	0.04%
	Non-Recyclable Glass	0.50%	0.19%	0.80%	1.12%	0.00%	2.72%	2.32%	0.00%	5.59%
	Glass Subtotal	**4.10%**	**2.60%**	**5.60%**	**2.45%**	**0.46%**	**4.45%**	**3.91%**	**0.07%**	**7.74%**
OTHER WASTES	E-Waste	0.15%	0.00%	0.36%	0.00%	0.00%	0.00%	0.04%	0.00%	0.09%
	Other Electronics	0.09%	0.00%	0.19%	0.05%	0.00%	0.12%	0.35%	0.00%	0.83%
	Tires	0.71%	0.00%	1.71%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Rubber	0.14%	0.06%	0.21%	0.45%	0.11%	0.79%	0.92%	0.20%	1.64%
	Cosmetics	0.54%	0.24%	0.83%	0.07%	0.00%	0.15%	0.18%	0.00%	0.39%
	Pharmaceuticals	0.11%	0.00%	0.23%	0.03%	0.00%	0.07%	0.02%	0.00%	0.03%
	Diapers	6.01%	3.89%	8.12%	2.81%	0.33%	5.28%	1.07%	0.00%	2.25%
	Textiles	7.55%	3.98%	11.12%	3.44%	0.15%	6.72%	2.16%	0.47%	3.85%
	Carpet	0.43%	0.00%	0.99%	7.17%	0.00%	15.97%	0.64%	0.00%	1.60%
	Carpet Padding	0.31%	0.00%	1.00%	2.01%	0.00%	4.83%	0.00%	0.00%	0.00%
	Furniture	0.00%	0.00%	0.00%	0.04%	0.00%	0.11%	2.61%	0.00%	6.36%
	Mattresses	1.16%	0.00%	2.80%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Ash, Dust	0.12%	0.03%	0.22%	0.30%	0.00%	0.64%	0.74%	0.00%	1.69%
	Miscellaneous Organics	0.02%	0.00%	0.06%	0.06%	0.00%	0.15%	0.04%	0.00%	0.08%
	Misc. Inorganics	0.61%	0.09%	1.14%	0.28%	0.00%	0.60%	1.05%	0.00%	2.47%
	Residuals	9.01%	7.04%	10.98%	8.65%	5.59%	11.71%	9.57%	7.03%	12.11%
	Other Wastes Subtotal	**26.95%**	**22.23%**	**31.67%**	**25.36%**	**14.89%**	**35.83%**	**19.37%**	**13.66%**	**25.09%**
WOOD and C&D	**Wood**	**5.36%**	**0.99%**	**9.73%**	**7.23%**	**0.16%**	**14.31%**	**8.51%**	**1.15%**	**15.88%**
	Construction, Demo.	**1.70%**	**0.61%**	**2.79%**	**5.31%**	**0.00%**	**11.64%**	**4.61%**	**0.48%**	**8.73%**
SPECIAL	**Special Waste**	**5.83%**	**3.36%**	**8.30%**	**0.66%**	**0.00%**	**1.34%**	**1.42%**	**0.16%**	**2.69%**

Notes:
LCL = Lower Confidence Limit for 90% confidence interval.
UCL = Upper Confidence Limit for 90% confidence interval.
All figures are percentages by weight.

Table D-1, continued
CONFIDENCE LIMITS BY TYPE OF GENERATOR

		Average for Entire County		
		Average	LCL	UCL
PAPER	Newspaper	0.46%	0.13%	0.80%
	Cardboard	3.31%	1.07%	5.56%
	Mixed Waste Paper	5.24%	2.76%	7.73%
	Phone Books	0.06%	0.00%	0.14%
	Milk Cartons, Other	0.29%	0.11%	0.47%
	Compostable	3.81%	2.18%	5.43%
	Non-Recyclable Paper	2.38%	1.18%	3.59%
	Paper Subtotal	**15.56%**	**10.35%**	**20.76%**
PLASTIC	PET Bottles	0.84%	0.46%	1.22%
	HDPE Bottles	0.45%	0.24%	0.66%
	Bottles 3-7	0.06%	0.01%	0.11%
	Tubs	0.28%	0.16%	0.40%
	Carryout Bags	0.46%	0.27%	0.64%
	Bags and Film	4.51%	3.17%	5.84%
	Plastic Packaging	1.63%	0.95%	2.30%
	Other Plastic Products	2.68%	0.77%	4.59%
	Expanded Polystyrene	0.67%	0.06%	1.27%
	Plastic Subtotal	**11.57%**	**8.29%**	**14.85%**
METAL	Aluminum Cans	0.37%	0.17%	0.56%
	Aluminum Foil	0.16%	0.07%	0.25%
	Tin Cans	0.66%	0.34%	0.97%
	Mixed Metals	2.17%	0.38%	3.95%
	Ferrous Metals	1.01%	0.00%	2.05%
	White Goods	0.09%	0.00%	0.22%
	Non-Ferrous Metals	0.26%	0.00%	0.59%
	Aerosol Cans	0.18%	0.05%	0.31%
	Metal Subtotal	**4.87%**	**2.23%**	**7.52%**
ORGANICS	Food Waste	16.91%	11.38%	22.43%
	Yard Debris	3.15%	0.42%	5.88%
	Organics Subtotal	**20.06%**	**13.42%**	**26.69%**
GLASS	Clear Bottles	1.32%	0.56%	2.09%
	Brown Bottles	1.13%	0.08%	2.18%
	Green Bottles	0.32%	0.02%	0.62%
	Light Bulbs	0.05%	0.00%	0.10%
	Non-Recyclable Glass	1.35%	0.00%	3.00%
	Glass Subtotal	**4.17%**	**1.37%**	**6.97%**
OTHER WASTES	E-Waste	0.01%	0.00%	0.02%
	Other Electronics	0.12%	0.00%	0.26%
	Tires	0.15%	0.00%	0.35%
	Rubber	0.57%	0.00%	1.19%
	Cosmetics	0.21%	0.03%	0.39%
	Pharmaceuticals	0.05%	0.00%	0.12%
	Diapers	2.84%	1.11%	4.57%
	Textiles	3.67%	1.33%	6.01%
	Carpet	3.51%	0.00%	8.08%
	Carpet Padding	0.98%	0.00%	2.45%
	Furniture	2.26%	0.00%	5.26%
	Mattresses	0.36%	0.00%	0.89%
	Ash, Dust	0.42%	0.00%	0.93%
	Miscellaneous Organics	0.04%	0.00%	0.09%
	Misc. Inorganics	0.32%	0.00%	0.67%
	Residuals	8.40%	5.99%	10.81%
	Other Wastes Subtotal	**23.92%**	**15.17%**	**32.68%**
WOOD and C&D	**Wood**	**9.32%**	**2.19%**	**16.45%**
	Construction, Demo.	**7.25%**	**1.72%**	**12.78%**
SPECIAL	**Special Waste**	**3.28%**	**1.04%**	**5.52%**

Notes:
LCL = Lower Confidence Limit for 90% confidence interval.
UCL = Upper Confidence Limit for 90% confidence interval.
All figures are percentages by weight.