
Washington State Department of Ecology

Rural Waste Characterization Report

Final Report

prepared by
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in cooperation with
Green Solutions, Inc.

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Table of Contents

1.	Executive Summary _____	1
2.	Introduction and Background _____	4
3.	County Profiles _____	8
3.1	Introduction	8
3.2	Overview of Methodology	8
3.3	Findings	8
3.3.1	Grant County	10
3.3.2	Okanogan County	15
4.	Statewide Waste Generation Estimates for Selected Rural-based Industry Groups	20
4.1	Introduction	20
4.2	Overview of Methodology	21
4.3	Findings	23
4.3.1	Field Crops	24
4.3.2	Orchards	27
4.3.3	Vegetables	30
4.3.4	Livestock	33
4.3.5	Mining	36
4.3.6	C&D	39
4.3.7	Paper	41
4.3.8	Logging & Primary Wood Products	43
4.3.9	Food Processing	45
Appendix A: Waste Classes and Definitions		
Appendix B: Disposal Site Waste Characterization Methodology		
Appendix C: Detailed Generator Waste Characterization Methodology		
Appendix D: Field Forms		
Appendix E: Detailed County Waste Composition Profiles by Sector		
Appendix F: Detailed Waste Composition by Industry Group		

Table of Tables

Table 1-1: Summary of Amounts Disposed by Disposal Type for each Industrial Group	3
Table 3-1: Numbers of Samples Characterized at Disposal Facilities	8
Table 3-2: Landfilled Quantities, Grant County	10
Table 3-3: Top Ten Components in Landfilled Waste – Grant County, Overall	11
Table 3-4: Top Ten Components in Landfilled Waste – Grant County, Commercial	12
Table 3-5: Top Ten Components in Landfilled Waste – Grant County, Industrial.....	13
Table 3-6: Top Ten Components in Landfilled Waste – Grant County, Consumer.....	14
Table 3-7: Landfilled Quantities, Okanogan County.....	15
Table 3-8: Top Ten Components in Landfilled Waste – Okanogan County, Overall	16
Table 3-9: Top Ten Components in Landfilled Waste – Okanogan County, Commercial	17
Table 3-10: Top Ten Components in Landfilled Waste – Okanogan County, Industrial.....	18
Table 3-11: Top Ten Components in Landfilled Waste – Okanogan County, Consumer.....	19
Table 4-1: Overall Targeted versus Actual Generator-based Samples Collected by Industry Group	22
Table 4-2: Top Five Components – Landfilled	25
Table 4-3: Top Five Components – Beneficial Use	26
Table 4-4: Top Five Components – Landfilled	28
Table 4-5: Top Five Components – Other Disposal	29
Table 4-6: Top Five Components – Beneficial Use	29
Table 4-7: Top Five Components – Landfilled	31
Table 4-8: Top Five Components – Beneficial Use	32
Table 4-9: Top Five Components – Landfilled	34
Table 4-10: Top Five Components – Beneficial Use	35
Table 4-11: Top Five Components - Landfilled	37
Table 4-12: Top Five Components – Beneficial Use	38
Table 4-13: Top Five Components – Landfilled	40
Table 4-14: Top Five Components – Landfilled	42
Table 4-15: Top Five Components - Landfilled	44
Table 4-16: Top Five Components – Landfilled	46
Table 4-17: Top Five Components – Beneficial Use	47

Table of Figures

Figure 1-1: Composition Summary for Landfilled Waste – Grant County, Overall.....	2
Figure 1-2: Composition Summary for Landfilled Waste – Okanogan County, Overall	2
Figure 3-1: Composition Summary for Landfilled Waste – Grant County, Overall.....	11
Figure 3-2: Composition Summary for Landfilled Waste – Grant County, Commercial	12
Figure 3-3: Composition Summary for Landfilled Waste – Grant County, Industrial	13
Figure 3-4: Composition Summary for Landfilled Waste – Grant County, Consumer	14
Figure 3-5: Composition Summary for Landfilled Waste – Okanogan County, Overall	16
Figure 3-6: Composition Summary for Landfilled Waste – Okanogan County, Commercial	17
Figure 3-7: Composition Summary for Landfilled Waste – Okanogan County, Industrial.....	18
Figure 3-8: Composition Summary for Landfilled Waste – Okanogan County, Consumer.....	19
Figure 4-1: Summary of Waste Handling Methods – Field Crops.....	24
Figure 4-2: Composition Summary – Field Crops	25
Figure 4-3: Summary of Waste Handling Methods – Orchards	27
Figure 4-4: Composition Summary - Orchards.....	28
Figure 4-5: Summary of Waste Handling Methods – Vegetables	30
Figure 4-6: Composition Summary - Vegetables	31
Figure 4-7: Summary of Waste Handling Methods – Livestock	33
Figure 4-8: Composition Summary – Livestock.....	34
Figure 4-9: Summary of Waste Handling Methods – Mining.....	36
Figure 4-10: Composition Summary – Mining	37
Figure 4-11: Summary of Waste Handling Methods – C&D.....	39
Figure 4-12: Composition Summary – C&D	40
Figure 4-13: Summary of Waste Handling Methods – Paper.....	41
Figure 4-14: Composition Summary – Paper	42
Figure 4-15: Summary of Waste Handling Methods – Logging & Primary Wood Products.....	43
Figure 4-16: Composition Summary – Logging & Primary Wood Products	44
Figure 4-17: Summary of Waste Handling Methods – Food Processors.....	45
Figure 4-18: Composition Summary – Food Processors	46

1. EXECUTIVE SUMMARY

The Washington Department of Ecology commissioned this waste characterization study for two purposes – first, to gather data on waste disposal in rural Washington counties, and second, to gather data on types of waste disposal that traditionally have not received attention in waste characterization studies.

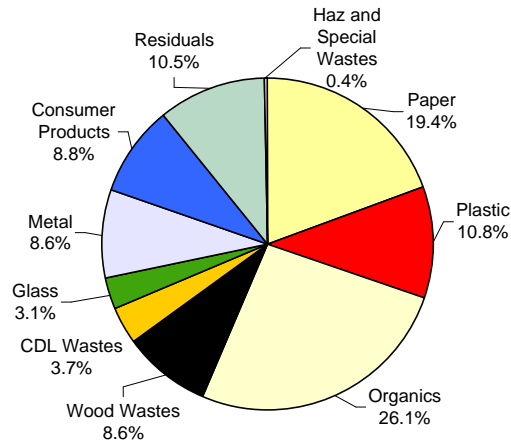
Until now, few comprehensive waste characterization studies have been conducted for rural Washington counties, and none have been conducted for rural counties in central and eastern Washington. The present study represents the beginning of a compilation of waste characterization and quantity data to reflect disposal patterns in rural counties east of the Cascade Mountains.

This study describes two important aspects of solid waste. First, it characterizes waste that is taken to disposal facilities (transfer stations and landfills) from commercial, consumer, and agricultural/industrial sources in Grant and Okanogan Counties. Second, the study addresses waste that is not taken to transfer stations or landfills. Data was collected to reflect a variety of agricultural and industrial disposal practices that, in addition to directing waste to landfills, included putting waste to beneficial use or finding other methods of disposal. This approach was used to examine the complete disposal practices of representatives of nine types of business that represent agricultural and industrial enterprises typically found in rural Washington counties.

In many ways, this study represents the most comprehensive waste characterization study ever conducted of rural waste generation and disposal, as well as industrial and agricultural waste generation and disposal. However, the study also should be seen as a starting point rather than the final word on waste generation in those settings. Waste composition and generation are highly variable, depending on the exact type of business or household that generates it, and depending on numerous other factors, such as season, economic conditions, and the prevailing character of the community where the study takes place. Therefore, more data ultimately will be necessary in order to form a complete and well-rounded picture of waste generation and disposal patterns in rural Washington.

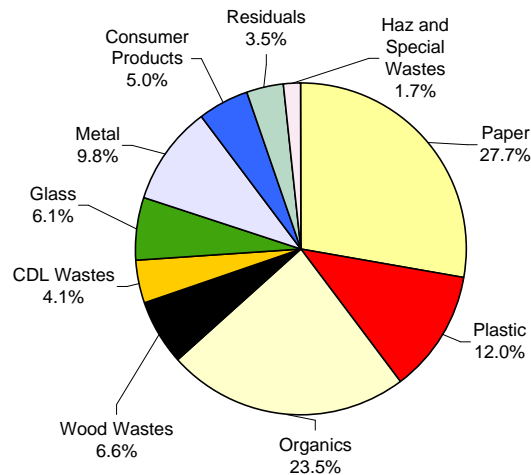
Approximately 77,500 tons of solid waste were landfilled in Grant County in 2002. Of that waste, about 45% was from commercial sources, 22% was from industrial or agricultural sources, and 33% was from residential sources. Figure 1-1, below, presents the composition of landfilled waste in Grant County in terms of ten major categories of materials. Food waste, which is part of the Organics material category, is the largest single component of landfilled waste in Grant County, accounting for approximately 13,400 tons (17.3%) of landfilled waste in 2002.

Figure 1-1: Composition Summary for Landfilled Waste – Grant County, Overall



Approximately 22,500 tons of solid waste were landfilled in Okanagan County in 2002, of which 35% was from commercial sources, 3% was industrial/agricultural, and 32% was residential sources. Figure 1-2 depicts the composition of landfilled waste in Okanagan County. Again, food waste is the largest single component of landfilled waste. It accounted for approximately 3,550 tons (15.7%) of Okanagan County's landfilled waste in 2002.

Figure 1-2: Composition Summary for Landfilled Waste – Okanagan County, Overall



In the portion of this study that examined waste generated by industries and agricultural businesses typical of rural Washington counties, quantity estimates were developed for waste that is sent to landfills and disposed through other methods. The study endeavored to quantify and characterize all types of waste disposed (or recycled, reused, etc.) through all means for each of nine industrial and agricultural groups.

Data was collected by visiting selected locations belonging to each of the nine groups and quantifying and characterizing each type of waste that was observed. Locations in Grant, Okanogan, and Clallam Counties were visited. Data from the participating businesses in those counties were used to extrapolate statewide quantity and composition estimates for waste generated by rural industries and agricultural activities.

The amount of waste estimated to be generated by each of the nine targeted industry groups is summarized in the table below. *Beneficial use* is defined as directing what would otherwise be waste to some purpose, including waste-to-energy, replenishment of soil nutrients, recycling, etc. This study concludes that *beneficial use* represents the largest means of handling waste generated by the industry groups that were examined. *Other disposal* is defined as any disposition of waste other than sending it to landfills or putting it to *beneficial use*. To put the disposal figures of the table in context, it is estimated that about 4.5 million tons of solid waste were landfilled in Washington in 2001.¹

Figure 1-3: Tons of Waste Generated by Selected Industrial Groups in Washington

Industry Group	Landfilled		Other Disposal		Beneficial Use		Total Waste	
	Tons	%	Tons	%	Tons	%	Tons	%
Field Crops	9,900	0.0%	17,000	0.1%	24,000,000	99.9%	24,000,000	100%
Orchards	6,600	0.7%	15,000	1.6%	890,000	97.6%	910,000	100%
Vegetables	220	0.0%	-	0.0%	583,000	100.0%	580,000	100%
Livestock	4,200	0.1%	920,000	26.3%	2,600,000	73.6%	3,500,000	100%
Mining	1,400	0.0%	190	0.0%	4,100,000	100.0%	4,100,000	100%
Construction & Demolition	900,000	91.8%	5,300	0.5%	80,000	7.6%	980,000	100%
Paper and Allied Products	240,000	9.2%	714,000	27.5%	1,600,000	63.3%	2,600,000	100%
Logging, Lumber, & Primary Wood Products	17,000	0.2%	33,000	0.4%	8,800,000	99.4%	8,900,000	100%
Food and Kindred Products	62,000	4.8%	620	0.0%	1,300,000	95.2%	1,300,000	100%

¹ Solid Waste in Washington State, 11th Annual Report, Washington Department of Ecology publication #02-07-19, page 92.

2. INTRODUCTION AND BACKGROUND

The Washington Department of Ecology commissioned this waste characterization study for two purposes – first, to gather data on waste disposal in rural Washington counties, and second, to gather data on types of waste disposal that traditionally have not received attention in waste characterization studies.

Until now, few comprehensive waste characterization studies have been conducted for rural Washington counties, and none have been conducted for rural counties in central and eastern Washington. The present study represents the beginning of a compilation of waste characterization and quantity data to reflect disposal patterns in rural counties east of the Cascade Mountains. Grant and Okanogan Counties were selected as being representative of rural counties in central and eastern Washington, because of their low population density, and because they contain representative businesses belonging to diverse industrial and agricultural groups. They are highlighted in the map in Figure 1-1.

Grant County has a population of approximately 76,221,² and density of about 28.5 people per square mile.³ Grant County was chosen partly due to the large agricultural presence there. 64% of the land in the County is farm land.⁴ Of the estimated 2.5 million acres of wheat in the State, Grant County has about 180,000 acres. It has the second greatest number of acres devoted to orchards and the largest number of acres for potatoes in the State. It also ranks second of any county in the State for the number of cattle. After agriculture/forestry/fishing, the second largest industry, by employment, is manufacturing, particularly food processing. It ranks 32nd in the State for average income per capita, which is estimated to be \$19,424 annually.

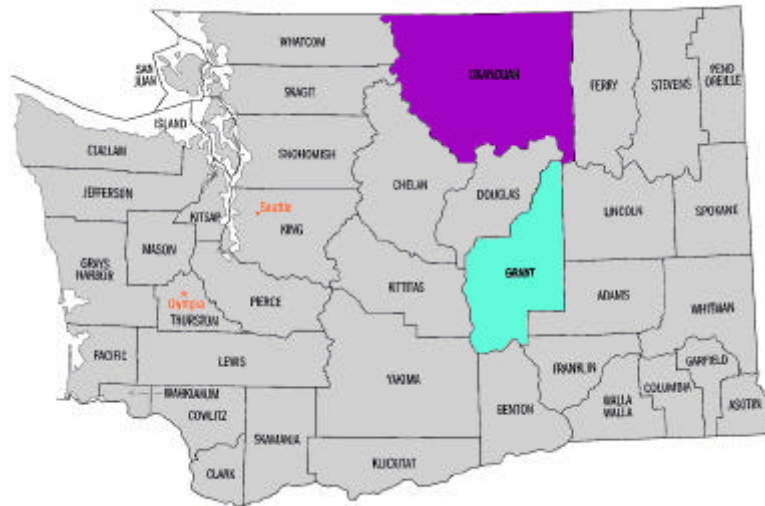
With a population of approximately 39,543 in 2001, Okanogan County has a population density of about 7.6 people per square mile. The largest industries, by employment, in the County include agriculture/forestry/fishing, government, and services, such as hotel and medical services. It ranks fifth in the State for both the number of acres in orchards and the number of cattle. About 35% of land in the County is farm land. With an average per capita income of \$20,068, Okanogan County ranks 30th in the State.

² 2001 U.S. Census Bureau estimate, <http://quickfacts.census.gov/qfd/states/53/53025.html>

³ State of Washington, Office of Financial Management, <http://www.ofm.wa.gov/popden/rural.htm>

⁴ 1992 Census of Agriculture, <http://www.nass.usda.gov/wa/counties/cnty025.htm>

Figure 2-1: Washington State



In Grant and Okanogan Counties, this study characterized waste that is taken to disposal facilities (transfer stations and landfills) from commercial, consumer, and agricultural/industrial sources.

In addition, the study addressed waste that is not taken to transfer stations or landfills. Data was collected to reflect a variety of agricultural and industrial disposal practices that, in addition to directing waste to landfills, included putting waste to beneficial use or finding other methods of disposal. In this way, the study represents a more comprehensive approach to understanding waste disposal than has ever been tried in the State of Washington. This approach was used to examine the complete disposal practices of representatives of nine types of business that represent agricultural and industrial enterprises typically found in rural Washington counties. Data from agricultural and industrial locations in Grant, Okanogan, and Clallam Counties contributed to this portion of the study.

Because the study addressed multiple parts of a complex waste stream, it is helpful to clarify terms used in the study. The entire solid waste stream is envisioned as including numerous *sectors*. The sectors that were the focus of this study are depicted in the following diagram and are described below.

Destinations of Solid Waste

		Landfill	Beneficial Use	Other Disposal
		<u>Sources of Solid Waste</u>	Agricultural/ Industrial	Examined at disposal facilities <hr/> Examined on location for nine industry groups
Commercial	Commercially collected commercial waste		Self-hauled commercial waste	
Consumer	Single-family commercially collected		Multi-family	
	Single-family self-haul			

The entire solid waste stream includes waste directed to three *destinations*:

- waste that is disposed in permitted disposal facilities, such as landfills
- waste that is disposed through other methods, such as leaving it at the site where it was generated
- waste that is somehow transformed or directed to beneficial use, such as recycling.

It also includes waste that comes from three identified *sources*:

- agricultural and industrial waste is generated through the activities of any industry entity classified as belonging to Standard Industrial Classification (SIC) codes 1 through 20
- commercial waste is generated through the activities of any commercial, institutional, or governmental entity not classified as agricultural/industrial
- consumer waste is generated by households.

Waste originating from commercial and consumer sources was quantified and characterized to the extent that it is disposed in landfills. Waste originating from agricultural/industrial sources was quantified and characterized according to disposal destination for each of nine *industry groups*:

- field crops
- orchards
- vegetables
- livestock
- mining
- construction & demolition
- paper and allied industries
- logging & primary wood products
- food manufacturing, processing and packaging

In many ways, this study represents the most comprehensive waste characterization study ever conducted of rural waste generation and disposal, as well as industrial and agricultural waste generation and disposal. However, the study also should be seen as a starting point rather than the final word on waste generation in those settings. Waste composition and generation are highly variable, depending on the exact type of business or household that generates it, and depending on numerous other factors, such as season, economic conditions, and the prevailing character of the community where the study takes place. Therefore, more data ultimately will be necessary in order to form a complete and well-rounded picture of waste generation and disposal patterns in rural Washington.

In conjunction with implementing the current waste characterization study, the consultant was commissioned to develop guidelines⁵ for conducting waste characterization studies in the future. The use of those guidelines at the city, county or state levels will produce data that later can be added to the data that was gathered as part of the current study. It is hoped that additional data will provide a picture of waste disposal in parts of Washington beyond the three counties that were the focus of the present study and for commercial and industry groups that were not covered in the present study. It is also hoped that additional waste samples and generation measurements can be added to the existing data to produce a more precise picture of waste disposal for each sector of the waste stream.

Section 3 of this document presents quantity and composition estimates of commercial, agricultural/industrial, and consumer waste that is disposed in landfills in Grant and Okanogan Counties. Overall composition profiles for all landfilled waste in each county are presented, followed by closer examinations of waste from each source.

Section 4 of this document presents the estimated quantity and composition of waste statewide that is sent to landfill, employed for beneficial use, or disposed in other ways from each of the nine industry groups mentioned above. The findings are based on data collected in Clallam County⁶, Grant County, and Okanogan County and are “scaled up” to the statewide level based on statewide data for the number of acres of each crop, the number of each type of farm animal, the number of employees of particular industries, etc.

⁵ *Guidelines for Waste Characterization Studies in the State of Washington.*

⁶ In concert with the Washington Department of Ecology, Clallam County is conducting its own waste characterization study. Data gathered as part of the Clallam County study, from selected agricultural and industrial sites in Clallam County, was used along with data from sites in Grant and Okanogan Counties to develop the statewide waste composition and quantity profiles that are presented in the current study, in Section 4, for selected agricultural and industry groups.

3. COUNTY PROFILES

3.1 INTRODUCTION

This section presents characterization findings for waste disposed in landfills in Grant County and Okanogan County. In each county, waste was quantified for each source through the use of survey techniques and through examination of records maintained for disposal facilities. The composition of waste was determined by examining waste samples and characterizing them using hand-sorting or visual characterization methods.

The county profiles of landfilled waste that were developed for this study represent a new step toward understanding waste disposal in the State of Washington. No comprehensive waste characterization efforts had been conducted in central or eastern Washington landfills prior to this study. The data collected in the present study are representative of waste disposal across all seasons, and they represent waste originating from commercial, agricultural/industrial, and residential sources. In addition, the data represent waste that is transported to disposal facilities both by commercial haulers and through self-haul by residents and businesses.

The sections below provide an brief description of the methods used in this portion of the study, followed by presentation of findings for waste quantity and composition associated with each sector of waste disposed at landfills in the two counties. In all cases, the largest components of the landfilled waste in each sector are highlighted using “top ten” tables.

3.2 OVERVIEW OF METHODOLOGY

This section presents a brief summary of the data collection methods and calculation procedures used to develop county-specific waste characterization profiles for Grant and Okanogan Counties. The complete methodology can be found in Appendix B.

3.2.1 ALLOCATION OF SAMPLES

A total of 117 samples were captured and sorted in Grant and Okanogan Counties in summer and autumn 2002 and winter and Spring 2003. The allocation of waste samples to waste sectors in the two counties is depicted in the table below.

Figure 3-1: Numbers of Samples Characterized at Disposal Facilities

Source of waste	Grant County	Okanogan County
Commercial	42	22
Agricultural/Industrial	11	7
Consumer	18	17

Besides the 18 agricultural/industrial samples that were intercepted at the disposal facilities and that are reflected in Table 1, additional information collected from 32 business locations was brought into the analysis to reflect the composition and quantity of agricultural/industrial waste that is sent to landfill. The information from business locations was a summary of composition and quantity data for waste sent to landfills by certain agricultural and industrial business groups. The data had been collected as part of the waste-generator portion of the current study.

3.2.2 COLLECTION OF COMPOSITION AND QUANTITY DATA

Cascadia selected waste loads and characterized samples on 10 days between August 2002 and March 2003. The data collection crew used a random selection procedure to identify certain vehicles entering the disposal facility (Ephrata Landfill in Grant County and Okanogan Central Landfill and Ellisforde Transfer Station in Okanogan County). The crew supervisor verified information about each selected vehicle and verified that the load was needed to meet each day's sampling quotas. The waste loads were then tipped, and samples of waste weighing an average of 232 pounds were selected from within each load using a process that ensured random selection of a portion of the tipped pile. The samples were sorted into 91 material categories (belonging to 10 main material classes), and the material in each category was weighed for each sample. The material weights and other information associated with each sample were recorded on paper field forms.

Data also was collected from each facility to estimate the tonnage associated with each of the waste sources shown in Table 1, above. In Okanogan County, this information was provided by the Okanogan County Department of Public Works based on their records of usage of the County's drop boxes. In Grant County, this information was collected through a survey of vehicle drivers that was designed by Cascadia and implemented by County staff.

3.2.3 CALCULATION PROCEDURES

The general approach to developing the waste composition estimates included in this report was to calculate the *percent composition* of each material in the landfilled waste stream in each of the two counties for each source of waste described in Table 1, above. Results for the sources of waste also were aggregated using a weighted averaging technique to develop composition and quantity estimates for *all* landfilled waste disposed in each county. All composition estimates presented in this section of the report were calculated at a 90% confidence level. (Please see Appendix B for more detail.)

Tonnage data from collected or provided by the two counties reflected the calendar year 2002. In addition, wherever possible, the tonnage estimates developed for individual agricultural and industrial sites (data from which was included in the county-specific analysis) was calculated specifically to reflect material sent to landfills during 2002.

3.3 FINDINGS

In the following sections, composition and quantity profiles are presented for waste disposed at MSW landfills in Grant and Okanogan Counties. For each county, four sectors are presented: overall, commercial, industrial, and consumer. Each profile is presented in two ways:

1. A pie chart depicts the composition of landfilled waste in terms of ten main material classes: *paper, plastic, organics, wood wastes, CDL wastes, glass, metal, consumer products, residuals, and haz and special wastes*;
2. A table lists the ten largest material components, by weight.

The detailed composition tables for each County and waste sector can be found in Appendix E. These tables list the estimated tons and percentages for each material component for each county, overall and for each of the sectors. Material classes and component definitions are presented in Appendix A.

3.3.1 GRANT COUNTY

This section profiles both quantity and composition data from waste disposed at Grant County's MSW landfills. Seventy-one samples were sorted in Grant County. Overall waste stream information is presented first and is followed by commercial, industrial, and consumer waste profiles. Figure 3-2 illustrates the quantities disposed by each of the three sectors and overall. Together, commercial and industrial waste accounted for approximately two-thirds of the waste landfilled in Grant County.

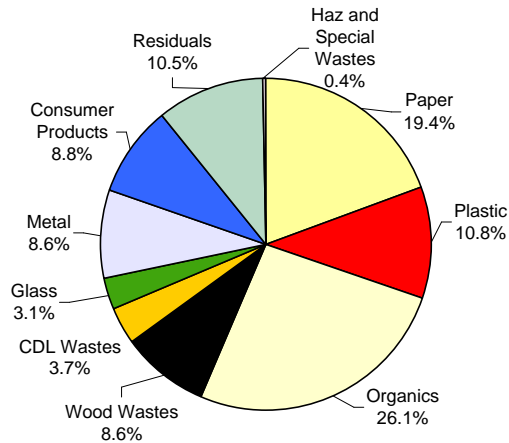
Figure 3-2: Landfilled Quantities, Grant County

	<i>Tons</i>	<i>%</i>
Commercial	34,793	45%
Industrial	17,293	22%
Consumer	25,443	33%
Overall	77,529	100%

3.3.1.1 OVERALL WASTE

Figure 3-3 summarizes the composition of overall landfilled waste for Grant County by the ten main material classes. *Organics* and *paper* together make up nearly half of the overall waste. *Plastic*, *residuals*, *consumer products*, *metals*, and *wood wastes* each account for about 10% of the total.

Figure 3-3: Composition Summary for Landfilled Waste – Grant County, Overall



The ten largest components, listed in Figure 3-4, together account for about 63% of the overall waste stream. *Food waste* is the largest single component; it accounts for roughly 17%. About 10% of the waste is comprised of *sludge and other industrial waste*. *Yard and garden prunings*, *dimensional lumber*, and *plastic film and bags* each compose about 5% of the waste.

Figure 3-4: Top Ten Components in Landfilled Waste – Grant County, Overall

Component	Mean	Cum. %	Tons
Food Waste	17.3%	17.3%	13,406
Sludge and Other Industrial	9.8%	27.1%	7,573
Yard Garden and Prunings	5.2%	32.2%	4,014
Dimensional Lumber	5.1%	37.3%	3,956
Plastic Film and Bags	5.1%	42.4%	3,933
Mixed/Low-grade Paper	4.3%	46.7%	3,358
Compostable Paper	4.3%	51.0%	3,307
Other Ferrous Metals	4.1%	55.1%	3,197
Cardboard	3.8%	59.0%	2,979
Tires and Other Rubber	3.7%	62.7%	2,885
Total	62.7%		48,608

3.3.1.2 COMMERCIAL WASTE

Figure 3-5 presents the composition of commercial waste for Grant County by the ten main material classes. *Organics* and *paper* are the two largest material classes and, together, make up about one-half of landfilled commercial waste. *Consumer products* and *plastic* are each about 14%.

Figure 3-5: Composition Summary for Landfilled Waste – Grant County, Commercial

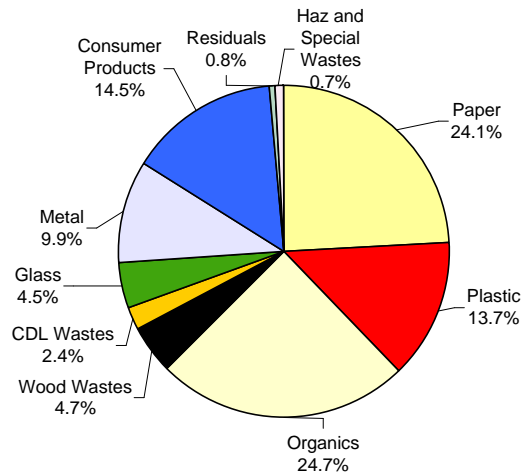


Figure 3-6 lists the top ten components found in Grant County's commercial waste stream. The largest component, *food waste*, makes up about 18% of the waste. *Tires and other rubber, plastic film and bags, compostable paper, cardboard, and other ferrous metal* each account for more than 5% of the total, by weight.

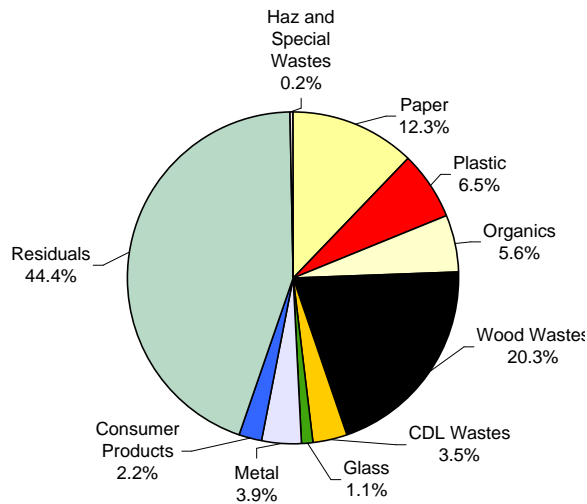
Figure 3-6: Top Ten Components in Landfilled Waste – Grant County, Commercial

Component	Mean	Cum. %	Tons
Food Waste	17.7%	17.7%	6,158
Tires and Other Rubber	7.9%	25.6%	2,733
Plastic Film and Bags	6.6%	32.2%	2,313
Compostable Paper	5.8%	38.0%	2,031
Cardboard	5.4%	43.5%	1,891
Other Ferrous Metals	5.2%	48.7%	1,804
Mixed/Low-grade Paper	4.8%	53.5%	1,684
Yard Garden and Prunings	3.8%	57.3%	1,326
Remainder/Composite Metals	3.4%	60.8%	1,199
Other Plastic Products	3.4%	64.2%	1,184
Total	64.2%		22,324

3.3.1.3 INDUSTRIAL WASTE

Residuals account for nearly half of landfilled industrial waste, as shown in Figure 3-7. *Wood wastes* and *paper* together make up about one-third of the total. *Plastic* and *organics* are each more than 5%. The *residuals* main material class includes the components *ash, dust, fines/sorting residues, and sludges and other special industrial wastes*.

Figure 3-7: Composition Summary for Landfilled Waste – Grant County, Industrial



Sludge and other industrial waste is the largest single item of the landfilled industrial waste stream, accounting for nearly 44% of the total. *Dimensional lumber* makes up about 15%. The top ten components for industrial waste are listed in Figure 3-8.

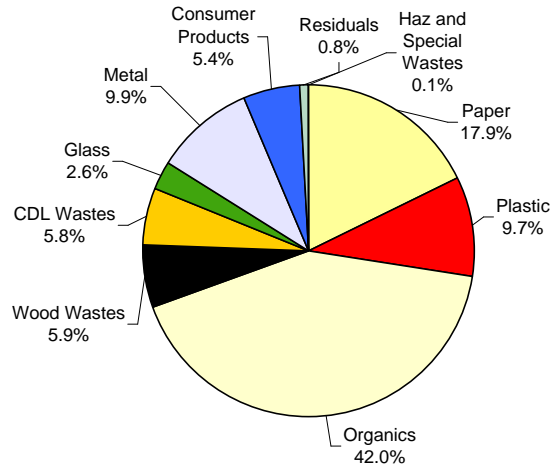
Figure 3-8: Top Ten Components in Landfilled Waste – Grant County, Industrial

Component	Mean	Cum. %	Tons
Sludge and Other Industrial	43.8%	43.8%	7,573
Dimensional Lumber	14.9%	58.7%	2,579
Food Waste	4.1%	62.8%	704
Plastic Film and Bags	3.8%	66.6%	659
Remainder/Composite Paper	3.8%	70.4%	658
Wood Packaging	2.9%	73.3%	508
Cardboard	2.2%	75.6%	386
Other Ferrous Metals	2.2%	77.7%	377
Mixed/Low-grade Paper	2.0%	79.8%	351
High-grade Paper	1.4%	81.2%	248
Total	81.2%		14,044

3.3.1.4 CONSUMER WASTE

Over 40% of Grant County’s landfilled consumer waste, as shown in Figure 3-9, is composed of *organics*. Another 20% is made up of *paper*.

Figure 3-9: Composition Summary for Landfilled Waste – Grant County, Consumer



As shown in Figure 3-10, *food waste* is the largest component, making up about one-quarter of the landfilled consumer waste stream for Grant County, and *yard, garden and prunings* is about 10%. The top ten materials account for nearly 68% of the total, by weight.

Figure 3-10: Top Ten Components in Landfilled Waste – Grant County, Consumer

Component	Mean	Cum. %	Tons
Food Waste	25.7%	25.7%	6,544
Yard Garden and Prunings	10.0%	35.7%	2,540
Mixed/Low-grade Paper	5.2%	40.9%	1,323
Disposable Diapers	5.1%	46.0%	1,302
Compostable Paper	4.2%	50.2%	1,069
Other Ferrous Metals	4.0%	54.2%	1,016
Plastic Film and Bags	3.8%	58.0%	961
Remainder/Composite Metals	3.4%	61.4%	872
Dimensional Lumber	3.4%	64.8%	864
Cardboard	2.8%	67.6%	703
Total	67.6%		17,193

3.3.2 OKANOGAN COUNTY

This section profiles both quantity and composition data for waste disposed at MSW landfills in Okanogan County. A total of 46 samples were captured and sorted. Overall waste stream information is presented first and is followed by commercial, industrial, and consumer waste profiles. As shown in Figure 3-11, each sector accounts for approximately one-third of Okanogan County's overall waste stream.

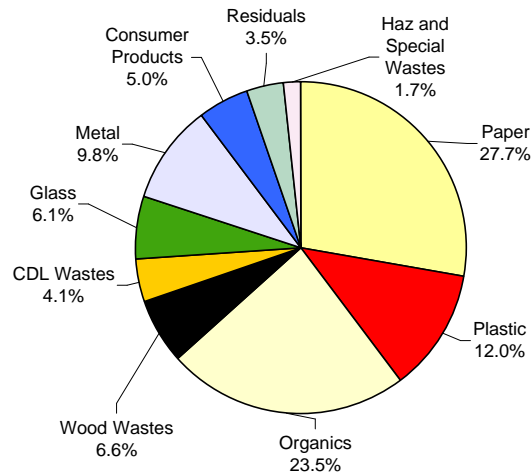
Figure 3-11: Landfilled Quantities, Okanogan County

	<i>Tons</i>	<i>%</i>
Commercial	7,924	35%
Industrial	7,350	33%
Consumer	7,320	32%
Overall	22,594	100%

3.3.2.1 OVERALL WASTE

Figure 3-12 shows the relative proportions of the main material classes in the waste landfilled in Okanogan County. The two largest material classes, *paper* and *organics*, account for 28% and 24%, respectively. *Plastic* is about 12% of the total.

Figure 3-12: Composition Summary for Landfilled Waste – Okanogan County, Overall



The top ten material components are listed in Figure 3-13 for Okanogan County's overall disposed waste stream. *Food waste* is the largest single component, accounting for about 16% of the total, by weight. *Compostable paper*, *mixed/low-grade paper*, *cardboard*, and *yard garden and prunings* each make up 5% or more of the waste stream. The ten largest materials account for almost 60% of the tonnage of Okanogan's overall waste stream.

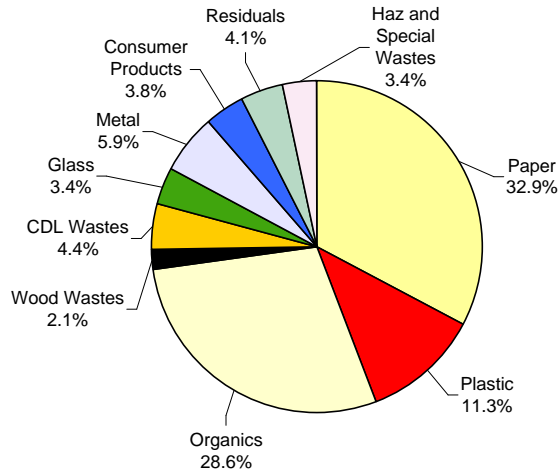
Figure 3-13: Top Ten Components in Landfilled Waste – Okanogan County, Overall

Component	Mean	Cum. %	Tons
Food Waste	15.7%	15.7%	3,557
Compostable Paper	6.9%	22.7%	1,569
Mixed/Low-grade Paper	6.2%	28.9%	1,402
Cardboard	5.8%	34.7%	1,306
Yard Garden and Prunings	5.0%	39.7%	1,135
Plastic Film and Bags	4.8%	44.5%	1,084
Remainder/Composite Metals	4.5%	49.0%	1,026
Dimensional Lumber	4.5%	53.6%	1,024
Fines/Sorting Residues	2.8%	56.4%	641
Other Ferrous Metals	2.5%	58.9%	573
Total	58.9%		13,317

3.3.2.2 COMMERCIAL WASTE

Figure 3-14 illustrates the composition of landfilled commercial waste by the main material classes. *Paper* and *organics* together make up more than 60% of the total. Approximately 11% comes from *plastic*.

Figure 3-14: Composition Summary for Landfilled Waste – Okanogan County, Commercial



As shown in Figure 3-15, *food waste* is the largest component of landfilled commercial waste, making up almost 20% of the waste. The second largest is *cardboard*, which accounts for about 10%.

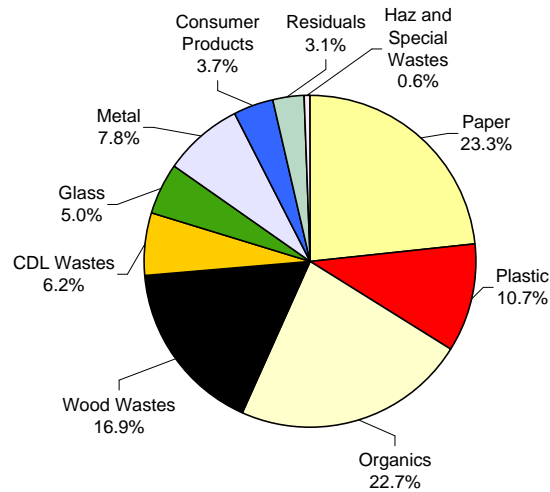
Figure 3-15: Top Ten Components in Landfilled Waste – Okanogan County, Commercial

Component	Mean	Cum. %	Tons
Food Waste	18.1%	18.1%	1,434
Cardboard	10.0%	28.1%	795
Compostable Paper	8.0%	36.1%	632
Yard Garden and Prunings	7.7%	43.8%	608
Plastic Film and Bags	6.3%	50.1%	497
Mixed/Low-grade Paper	5.7%	55.7%	449
Remainder/Composite Paper	4.1%	59.8%	324
Fines/Sorting Residues	2.8%	62.6%	219
Disposable Diapers	2.3%	64.8%	179
Other Ferrous Metals	2.2%	67.0%	173
Total	67.0%		5,310

3.3.2.3 INDUSTRIAL WASTE

The composition of industrial waste is presented in Figure 3-16 as it is comprised of the ten main material classes. *Paper*, *organics*, *wood wastes*, and *plastic* together make up almost three-fourths of the waste.

Figure 3-16: Composition Summary for Landfilled Waste – Okanogan County, Industrial



The ten largest material components of Okanogan County's landfilled industrial waste make up about 61% of the total, as seen in Figure 3-17. Together, *food waste* and *dimensional lumber* make up almost 30% of this waste stream. *Compostable paper* and *mixed/low-grade paper* each represent about 6%.

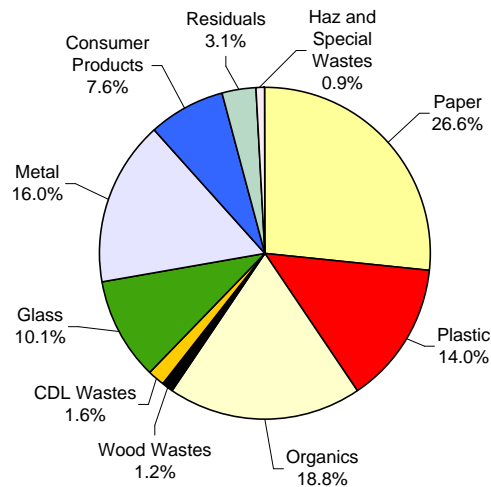
Figure 3-17: Top Ten Components in Landfilled Waste – Okanogan County, Industrial

Component	Mean	Cum. %	Tons
Food Waste	15.6%	15.6%	1,149
Dimensional Lumber	13.5%	29.1%	990
Compostable Paper	6.4%	35.5%	469
Mixed/Low-grade Paper	6.0%	41.4%	438
Yard Garden and Prunings	4.2%	45.7%	311
Plastic Film and Bags	4.0%	49.7%	295
Remainder/Composite Metals	3.4%	53.1%	249
Cardboard	2.9%	56.0%	214
Fines/Sorting Residues	2.9%	58.8%	210
Newspaper	2.5%	61.3%	182
Total	61.3%		4,507

3.3.2.4 CONSUMER WASTE

Figure 3-18 shows the percentages of the main material classes that make up the overall consumer waste stream. *Paper*, at about 27%, is the largest main material class. Together, *organics*, *metal*, and *plastic* make up about half of the total, by weight. *Glass* and *consumer products* account for about 10% and 8%, respectively.

Figure 3-18: Composition Summary for Landfilled Waste – Okanogan County, Consumer



As presented in Figure 3-19, the top ten materials in the consumer waste stream account for almost 60% of the total. The largest component, *food waste*, makes up about 13%. *Remainder/composite metals*, *mixed/low-grade paper*, *compostable paper*, and *clear glass container* each account for more than 5% of the total, by weight.

Figure 3-19: Top Ten Components in Landfilled Waste – Okanogan County, Consumer

Component	Mean	Cum. %	Tons
Food Waste	13.3%	13.3%	974
Remainder/Composite Metals	9.2%	22.5%	673
Mixed/Low-grade Paper	7.0%	29.5%	514
Compostable Paper	6.4%	35.9%	468
Clear Glass Container	5.3%	41.3%	391
Cardboard	4.1%	45.3%	297
Plastic Film and Bags	4.0%	49.3%	292
Other Ferrous Metals	3.5%	52.8%	258
Magazines	3.3%	56.1%	239
Yard Garden and Prunings	3.0%	59.1%	217
Total	59.1%		4,323

4. STATEWIDE WASTE GENERATION ESTIMATES FOR SELECTED RURAL-BASED INDUSTRY GROUPS

4.1 INTRODUCTION

In addition to characterizing waste sent to landfills in Grant and Okanogan Counties, this study examined waste generated by industries and agricultural businesses that are typical of rural Washington counties. This generator-based portion of the study included, but was not limited to, waste sent to landfills. The study endeavored to quantify and characterize all types of waste disposed (or recycled, reused, etc.) through all means for each of nine industrial and agricultural groups.

Data was collected by visiting selected locations belonging to each of the nine groups and quantifying and characterizing each type of waste that was observed. Locations in Grant, Okanogan, and Clallam Counties were visited. Data from the participating businesses in those counties were used to extrapolate statewide quantity and composition estimates for waste generated by rural industries and agricultural activities.

The industrial and agricultural groups that were examined are defined in the following table.

Group	SIC Codes	Description
Field Crops	0111 through 0161	Includes growers of wheat, barley, oats, potatoes, corn for grain or silage, hay, and herbs.
Orchards	0174 and 0175	Includes growers of tree fruits, such as apples, pears, and cherries.
Vegetables	0161	Includes growers of asparagus, onions, green peas, and sweet corn.
Livestock	0211 through 0291	Includes businesses that raise animals such as cattle, sheep, hogs, and horses.
Mining	1041 through 1459	Includes mining companies and related services.
C&D	1521 through 1799	Includes construction and demolition contractors and related services.
Paper	2653 through 2676	Includes manufacturers of paper and allied products.
Logging & Primary Wood Products	2411 through 2621	Includes businesses involved in logging, lumber, & primary wood products, such as logging companies, sawmills, cabinetmakers, and particleboard plants.
Food Processing	2011 through 2099	Includes manufacturers of food and kindred products.

For each industry group, quantity and composition estimates were developed for the following types of disposal:

- waste sent to landfill, which includes waste that is disposed in permitted solid waste disposal facilities.
- waste put to beneficial use, including materials that are recycled, reused, or incorporated into another manufacturing or agricultural process, and it includes any material that is used for some beneficial purpose.
- waste disposed in other ways, which is defined as any waste disposed under conditions not described above. This typically means material that is left on the ground for no beneficial purpose.

4.2 OVERVIEW OF METHODOLOGY

For most of the industry groups studied, the data collection methodology consisted of the phases and steps described below.

Recruitment of participants

- First, the industry groups were defined, and the number of samples that could be afforded by the study (159 samples in total) were apportioned to the groups within each county.
- Second, the consultant created a list of all businesses belonging to each industry group in each county. In most cases, the lists were obtained from Dun and Bradstreet, a national provider of mailing and marketing lists.
- Third, each list was placed in random order, and businesses were contacted by going down the list and calling by telephone. Businesses were asked to participate in the study on an anonymous basis.

Collection of data

- Each participating business was visited, and the management at the business was interviewed in order to ensure that the data collection team could obtain and characterize representative samples of waste and could quantify each type of waste produced by the business.
- Measurements were taken and estimates of waste quantity were constructed based on observed amounts of waste corresponding to an elapsed time of waste generation. This produced estimates of waste generation rates for each type of waste at each business. Data also were collected to reflect the number of acres, animals, or employees associated with each type of waste at each business.
- The estimated waste generation rates were expressed in terms of tons per acre per year, tons per animal per year, or tons per employee per year.
- Samples of each type of waste at each business were characterized, either by visual inspection or by hand sorting, using a standardized list of 91 materials that are defined in Appendix A.

Figure 4-1: Overall Targeted versus Actual Generator-based Samples Collected by Industry Group

	Overall Target	Overall Actual
Industrial	150-180	159
Field Crops	16	20
Orchards	16	23
Vegetables	16	9
Livestock	16	18
Mining	16	21
C&D	16	22
Paper & Allied Products	16	18
Logging & Primary Wood Products	16	10
Food & Kindred Products	16	18

Analysis

- First, the total annual quantity of each individual waste *material* (e.g., corrugated cardboard, tin cans, etc.) sent to each *destination* (i.e., landfill, beneficial use, or *other disposal*) was calculated for the participants in each industry group. For example, this resulted in estimates of the total pounds of cardboard sent to landfill by participating vegetable farmers, and the total pounds of tin cans sent to landfill by the same farmers, etc.
- Next, the total number of acres, animals, or employees was calculated for participants in each industry group.
- Then, for each industry group, waste destination, and waste material, a figure was calculated to reflect annual tons disposed per acre, animal, or employee.
- Finally, the statewide numbers of acres, animals, or employees corresponding to each industry group were used to extrapolate the tons of each material sent to each destination by each industry.

A slightly different analytical method was used to extrapolate the amount of waste disposed by the Construction and Demolition industry group.

- Based on vehicle surveys conducted at landfills (in Grant and Okanogan Counties) and on C&D disposal reported by the landfill (in Clallam County), a figure was calculated for total annual tonnage of C&D waste disposed at landfills in each county. These figures were added together and divided by the total 2002 construction wages in the three counties, producing a figure for average landfilled tons of C&D waste per dollar of construction wages.
- The average figure was then used to extrapolate statewide landfilling of C&D waste based on statewide construction and demolition wages.

- Construction and demolition sites were visited in Clallam County, and annual figures for beneficial use and other disposal of waste were calculated for the visited sites on a per-permit-dollar basis. The results were extrapolated for all of Clallam County, and then were expressed in terms of tons of waste per construction and demolition wage dollar. The results were then extrapolated statewide.

In the section below, findings from the analysis are expressed for each industry group, in terms of statewide annual tons and composition of waste sent to each destination.

4.3 FINDINGS

This section summarizes the findings from the characterization of waste from the nine industry groups. First, a chart summarizes how waste from each industry group is disposed, either through *landfilling*, *other disposal*, or *beneficial use*. Second, a pie chart shows the percentages of each of the ten main material classes: *paper*, *plastic*, *organics*, *wood wastes*, *CDL wastes*, *glass*, *metal*, *consumer products*, *residuals*, and *haz and special wastes*. Next, tables display the five largest components for each of the three disposal methods: *landfilling*, *other disposal*, and *beneficial use*. The detailed composition tables for each industry group can be found in Appendix F. These tables list estimated tons and percentages for each material component for total waste generated by each industry group. Material classes and component definitions are presented in Appendix A.

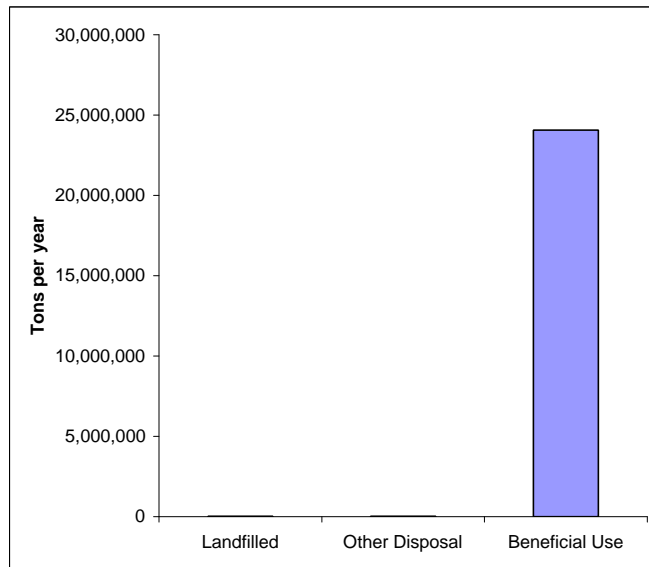
4.3.1 FIELD CROPS

The *field crops* agricultural group includes growers of wheat, barley, oats, potatoes, corn for grain or silage, hay, and herbs. A total of 20 samples were collected for this group. Statewide estimates were derived by scaling up sampling quantity and composition data by statewide acreage data.

4.3.1.1 QUANTITY AND DISPOSITION OF WASTE

Figure 4-2 summarizes waste quantities by disposal method for *field crop* businesses. The majority of the estimated 24 million tons generated by this agricultural group statewide is *beneficially used*. About 9,900 tons is *landfilled* and roughly 17,000 tons is handled through *other disposal* methods.

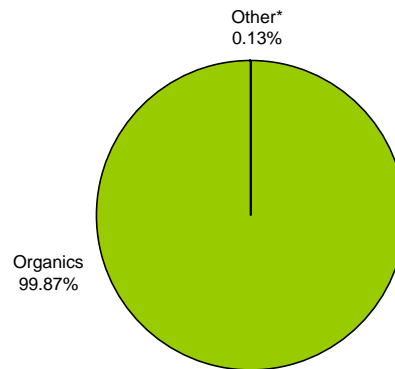
Figure 4-2: Summary of Waste Handling Methods – Field Crops



4.3.1.2 OVERALL COMPOSITION

The percentages of each broad waste class disposed by *field crop* businesses are shown in Figure 4-3. At over 99%, *organics* makes up the bulk of the waste stream. The other nine main material classes account for less than 1% of the waste.

Figure 4-3: Composition Summary – Field Crops



**Other* is comprised of material categories that account for less than 1.0% of the total, including *Paper, Plastic, Metal, Glass, Wood Wastes, Consumer Products, CDL, and Hazardous Waste*.

4.3.1.3 LANDFILLED

As shown in Figure 4-4, the five largest components together account for approximately 81% of the *landfilled* waste for *field crop* businesses. *Food waste*, the largest component, accounts for about 20% of the total. The landfilled portion of waste for this agricultural group includes a large amount of household waste as many farms have homes at the same site.

Figure 4-4: Top Five Components – Landfilled

Component	Mean	Cum. %	Tons
Food Waste	18.52%	18.52%	1,827
Compostable Paper	7.71%	26.23%	761
Mixed/Low-grade Paper	7.00%	33.23%	690
Cardboard	5.65%	38.88%	557
Yard, Garden and Prunings	5.08%	43.96%	501
Total	43.96%		4,336

4.3.1.4 OTHER DISPOSAL

Two materials were reported by this industry group as being disposed through *other* methods: *synthetic textiles* and *cardboard*. Used twine from bales of hay and used cardboard are typically burned.

4.3.1.5 BENEFICIAL USE

Figure 4-5 summarizes the top five components that are *beneficially used* by *field crops* businesses as estimated from locations visited during this study. Almost 99% of the *beneficially used* waste is *crop residues*. These are primarily left in the fields to return nutrients to the soil. *Food waste beneficially used* from this industry group includes food waste materials from packing houses that are sent to other companies for processing. The other three components in Figure 4-5 are recycled.

Figure 4-5: Top Five Components – Beneficial Use

Component	Mean	Cum. %	Tons
Crop Residues	99.32%	99.32%	23,905,027
Food Waste	0.65%	99.97%	156,322
Other Ferrous Metal	0.02%	99.99%	5,865
White Goods	0.00%	100.00%	1,130
Tires and Other Rubber	0.00%	100.00%	640
Total	100.00%		24,068,984

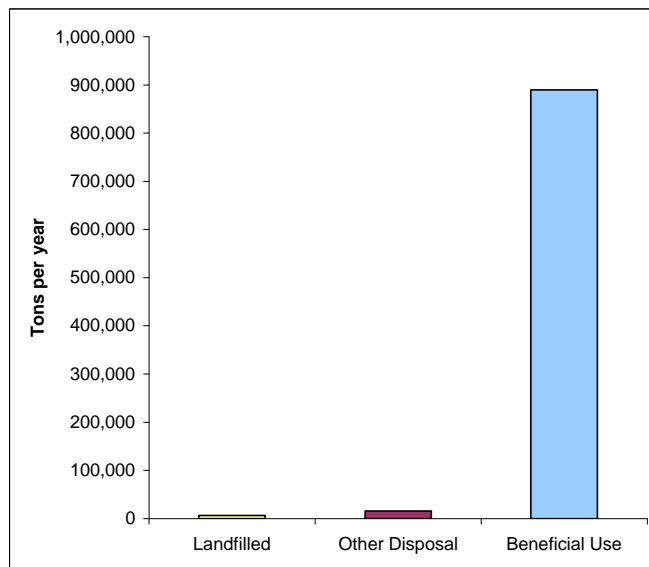
4.3.2 ORCHARDS

The *orchards* agricultural group includes growers of tree fruits, such as apples, pears, and cherries. A total of 26 samples were collected for this group. Quantities and composition estimates were derived by scaling up sampling data by statewide *orchards* acreage.

4.3.2.1 QUANTITY AND DISPOSITION OF WASTE

Waste disposed by the *orchards* agricultural group through the three disposal methods is shown in Figure 4-6. Based on the samples, almost 900,000 tons of the waste generated by *orchards* statewide is estimated to be *beneficially used*. An estimated 15,000 tons of the waste is disposed of through *other disposal* methods and about 7,000 tons are *landfilled* annually.

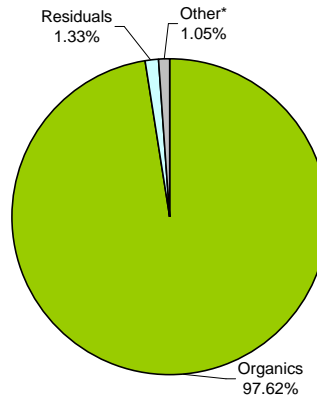
Figure 4-6: Summary of Waste Handling Methods – Orchards



4.3.2.2 OVERALL COMPOSITION

Organics is the largest main material class of this agricultural group's waste (Figure 4-7). *Residuals* represents about 1% of the waste and may include *ash, dust* and *finest/sorting residues*.

Figure 4-7: Composition Summary - Orchards



**Other* is comprised of material categories that account for less than 1.0% of the total, including *Paper, Plastic, Metal, Glass, Wood Wastes, Consumer Products, CDL, and Hazardous Waste*.

4.3.2.3 LANDFILLED

The largest five material components of the *landfilled* waste for the *orchards* agricultural group are shown in Figure 4-8. *Food waste*, the largest single component, makes up about 20% of the waste. As with *field crops*, much of the waste *landfilled* by *orchards* is household waste.

Figure 4-8: Top Five Components – Landfilled

Component	Mean	Cum. %	Tons
Food Waste	20.06%	20.06%	1,320
Mixed/Low-grade Paper	7.10%	27.16%	467
Compostable Paper	7.02%	34.18%	462
Plastic Film and Bags	6.38%	40.57%	420
Yard, Garden and Prunings	4.73%	45.30%	311
Total	45.30%		2,981

4.3.2.4 OTHER DISPOSAL

Figure 4-9 shows the top five components disposed of through *other disposal* for *orchards*. *Ash*, from burning fruit trees, is the largest component, accounting for more than 78% of the total, by weight. Tree removal generates piles of *yard, garden and prunings* that make up about 20% of the total waste disposed of through *other disposal*. Construction activities created the other three largest material components; these are typically stockpiled on-site.

Figure 4-9: Top Five Components – Other Disposal

Component	Mean	Cum. %	Tons
Ash	78.09%	78.09%	11,918
Yard, Garden and Prunings	21.73%	99.83%	3,317
Wood Packaging	0.10%	99.93%	15
Drywall	0.05%	99.97%	7
Engineered Wood	0.01%	99.99%	2
Total	99.99%		15,259

4.3.2.5 BENEFICIAL USE

Figure 4-10 shows the top five components of *orchards* waste that is *beneficially used*. The largest component, *crop residues*, makes up nearly 80% of the *beneficially used* waste generated by *orchards* statewide. The next largest material component is *yard, garden, and prunings*, which accounts for nearly 20%. *Crop residues* and *yard, garden and prunings* are left in the orchards as mulch. The white goods include appliances that are recycled from households that are located in the orchards. *Food waste* comes from fruit packing houses and is transferred to other companies for processing. *Tires and other rubber* from *orchards* (and other agricultural groups) are from farming equipment and are recycled.

Figure 4-10: Top Five Components – Beneficial Use

Component	Mean	Cum. %	Tons
Crop Residues	79.34%	79.34%	705,854
Yard, Garden and Prunings	19.90%	99.23%	177,004
White Goods	0.22%	99.46%	2,001
Food Waste	0.19%	99.65%	1,729
Tires and Other Rubber	0.17%	99.82%	1,487
Total	99.82%		888,076

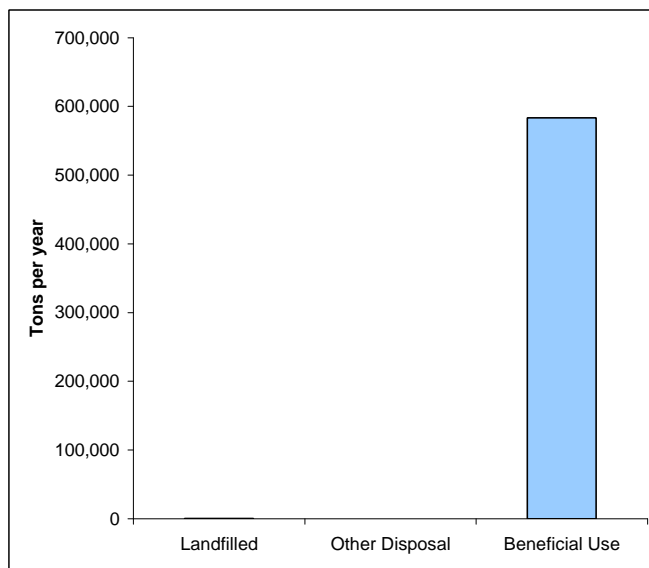
4.3.3 VEGETABLES

The *vegetables* agricultural group includes growers of asparagus, onions, green peas, and sweet corn. Twelve samples were collected for this group. Quantity and composition data were estimated for the State by scaling up the sampling data by with statewide acreage figures.

4.3.3.1 QUANTITY AND DISPOSITION OF WASTE

As illustrated in Figure 4-11, this study's analysis shows that nearly all of the 580,000 tons of waste generated by the *vegetables* agricultural group statewide is *beneficially used*. Approximately 220 tons is *landfilled* annually.

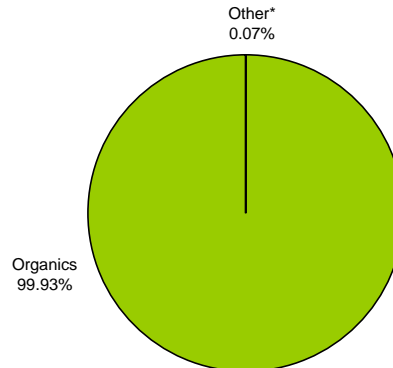
Figure 4-11: Summary of Waste Handling Methods – Vegetables



4.3.3.2 OVERALL COMPOSITION

As shown in Figure 4-12, *organics* accounts for more than 99% of the overall waste generated by this industry group.

Figure 4-12: Composition Summary - Vegetables



**Other* is comprised of material categories that account for less than 1.0% of the total, including *Paper, Plastic, Metal, Glass, Wood Wastes, Consumer Products, CDL, and Hazardous Waste*.

4.3.3.3 LANDFILLED

Of the waste *landfilled* by the *vegetables* industry, *food waste* accounts for approximately 18%. Similar to the other agricultural groups, *landfilled* waste from this group includes a large amount of household waste.

Figure 4-13: Top Five Components – Landfilled

Component	Mean	Cum. %	Tons
Food Waste	18.21%	18.21%	41
Compostable Paper	7.61%	25.82%	17
Mixed/Low-grade Paper	6.88%	32.70%	15
Cardboard	5.92%	38.62%	13
Yard, Garden and Prunings	4.99%	43.61%	11
Total	43.61%		97

4.3.3.4 OTHER DISPOSAL

None of the businesses visited in this agricultural group reported using *other disposal* as a method of handling their waste.

4.3.3.5 BENEFICIAL USE

As seen in Figure 4-14, *crop residues* account for more than 99% of waste that is estimated to be *beneficially used*. The other top five materials that are *beneficially used*, *other ferrous metal*, *white goods*, *tires and other rubber*, and *colored HDPE bottles from pesticides*, are recycled.

Figure 4-14: Top Five Components – Beneficial Use

Component	Mean	Cum. %	Tons
Crop Residues	99.96%	99.96%	583,235
Other Ferrous Metal	0.03%	99.99%	151
White Goods	0.01%	99.99%	30
Tires and Other Rubber	0.00%	100.00%	21
HDPE Bottles, Colored	0.00%	100.00%	14
Total	100.00%		583,450

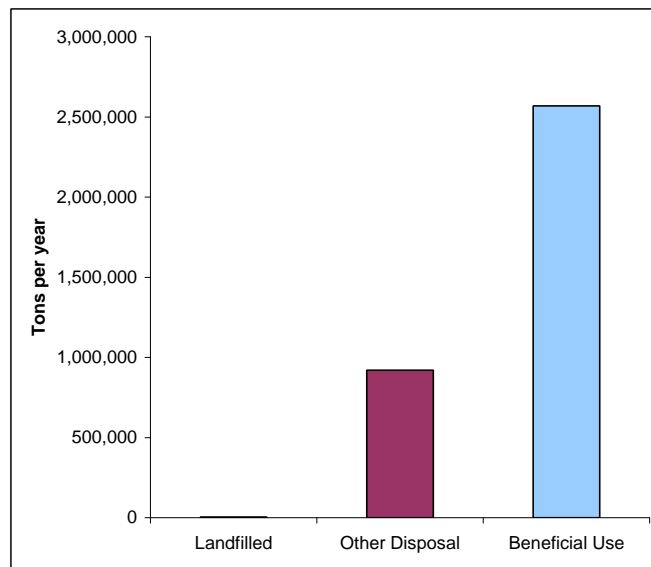
4.3.4 LIVESTOCK

The *livestock* industrial group includes businesses that raise animals such as cows, sheep, hogs, and horses. A total of 18 samples were collected for this group. Using the samples along with statewide livestock data, quantities and composition data were estimated for the State.

4.3.4.1 QUANTITY AND DISPOSITION OF WASTE

About 2.6 million tons of the 3.5 million tons of waste generated annually by *livestock* businesses statewide is *beneficially used*. Approximately 920,000 tons is disposed of through *other disposal* methods, and slightly more than 4,000 tons is *landfilled*. Figure 4-15 summarizes the disposal methods used by the *livestock* industrial group.

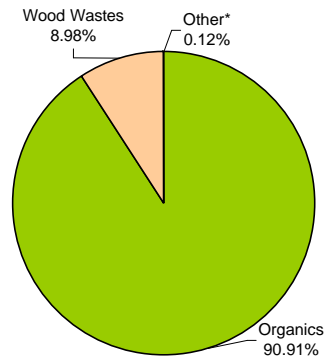
Figure 4-15: Summary of Waste Handling Methods – Livestock



4.3.4.2 OVERALL COMPOSITION

As displayed in Figure 4-16, the study found that *organics* composes over 90% of the waste generated by the *livestock* industry statewide.

Figure 4-16: Composition Summary – Livestock



**Other* is comprised of material categories that account for less than 1.0% of the total, including *Paper, Plastic, Metal, Residuals, Glass, Consumer Products, CDL, and Hazardous Waste.*

4.3.4.3 LANDFILLED

Accounting for almost 28%, *cardboard* makes up the majority of the *landfilled* waste from this agricultural group. *Compostable paper, plastic film and bags, other plastic products, and food waste* each make up from 8 to 12%. Like the other agricultural groups, *landfilled* waste includes a large amount of household waste.

Figure 4-17: Top Five Components – Landfilled

Component	Mean	Cum. %	Tons
Cardboard	27.98%	27.98%	1,180
Compostable Paper	11.71%	39.69%	494
Plastic Film and Bags	9.62%	49.31%	406
Other Plastic Products	8.35%	57.67%	352
Food Waste	8.23%	65.90%	347
Total	65.90%		2,778

4.3.4.4 OTHER DISPOSAL

Over 900,000 tons of *manure* are estimated to be left in the field each year and are considered to reflect *other disposal*. Quantities of *manures* that are composted or spread for fertilizer were treated as *beneficial use*. *Carcasses, offal* is the only other material reportedly disposed of through *other disposal*; and it is buried. Carcasses transferred to rendering plants were considered to be *beneficially used*.

4.3.4.5 BENEFICIAL USE

The top five components of *livestock* industrial waste that are *beneficially used* are presented in Figure 4-18. The largest component is *manure* that is composted or used as fertilizer. *Wood byproducts* make up about 12% of the total; this material is the sawdust from animal bedding that is combined with manures for composting purposes. *Carcasses and offal* includes carcasses sent to rendering plants. Feedbags, classified as *plastic film and bags*, are reused on-site. *Yard, garden and prunings* from hay or grass clippings are composted on-site.

Figure 4-18: Top Five Components – Beneficial Use

Component	Mean	Cum. %	Tons
Manures	87.20%	87.20%	2,240,394
Wood Byproducts	12.20%	99.40%	313,504
Carcasses, Offal	0.58%	99.98%	14,802
Plastic Film and Bags	0.01%	99.98%	141
Yard, Garden and Prunings	0.00%	99.99%	118
Total	99.99%		2,568,959

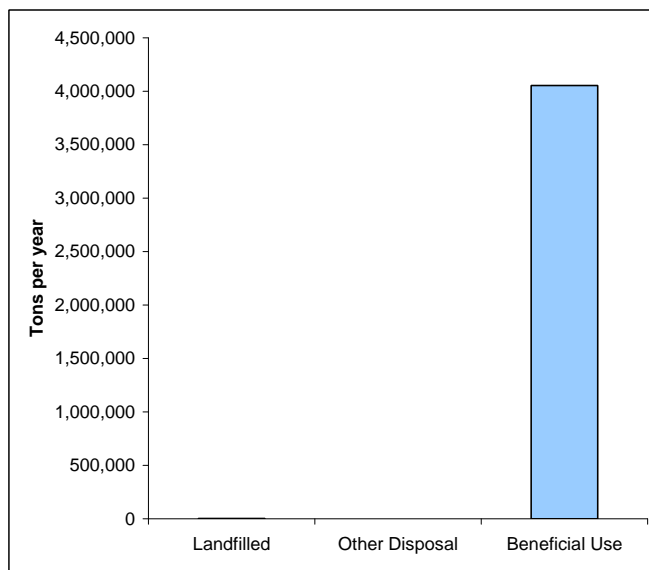
4.3.5 MINING

The *mining* industrial group includes mining companies and related services. There were a total of 15 samples collected for this group. Statewide quantity and composition estimates were derived by scaling up the sampling data by statewide *mining* employment data.

4.3.5.1 QUANTITY AND DISPOSITION OF WASTE

As seen in Figure 4-19, more than 4 million tons of *mining* industry waste is estimated to be *beneficially used* in the State each year. Compared to *beneficial use*, *landfilled* and *other disposal* account for small amounts of waste, approximately 1,400 tons and 190 tons, respectively.

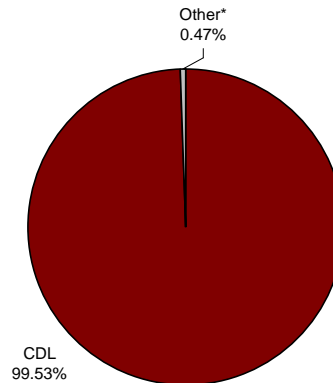
Figure 4-19: Summary of Waste Handling Methods – Mining



4.3.5.2 OVERALL COMPOSITION

Over 99% of the waste from the *mining* group is composed of materials found in the CDL material class, such as *soil, rocks, and sand* (Figure 4-20).

Figure 4-20: Composition Summary – Mining



**Other* is comprised of material categories that account for less than 1.0% of the total, including Paper, Plastic, Metal, Glass, Wood Wastes, Consumer Products, and Hazardous Waste.

4.3.5.3 LANDFILLED

The five material components in Figure 4-21 make up about 82% of the *landfilled* waste of *mining* companies. The two largest components, *plastic film and bags* and *food waste*, together make up more than half of the *landfilled* waste. *Compostable paper* and *rejected products* are each at least 10%. *Mixed/low-grade paper* accounts for about 6% of *landfilled* waste.

Figure 4-21: Top Five Components - Landfilled

Component	Mean	Cum. %	Tons
Plastic Film and Bags	29.72%	29.72%	417
Food Waste	22.01%	51.73%	309
Compostable Paper	13.78%	65.52%	194
Rejected Products	10.28%	75.80%	144
Mixed/Low-grade Paper	6.28%	82.08%	88
Total	82.08%		1,152

4.3.5.4 OTHER DISPOSAL

About 190 tons of pallets and crates, classified as *wood packaging*, are estimated to be burned or stockpiled in the state each year by businesses in the *mining* industry.

4.3.5.5 BENEFICIAL USE

Soil, rocks, and sand account for over 99% of the waste that is estimated to be *beneficially used*. This material is typically used for re-filling the mining pits to restore the land to its original condition following a project. *Rejected products* are also regularly returned to the land. The remaining top five materials, *wood packaging, tires and other rubber, and cardboard*, are recycled or donated.

Figure 4-22: Top Five Components – Beneficial Use

Component	Mean	Cum. %	Tons
Soil, Rocks and Sand	99.57%	99.57%	4,035,544
Rejected Products	0.26%	99.83%	10,587
Wood Packaging	0.09%	99.91%	3,460
Tires and Other Rubber	0.08%	99.99%	3,301
Cardboard	0.01%	100.00%	233
Total	100.00%		4,053,124

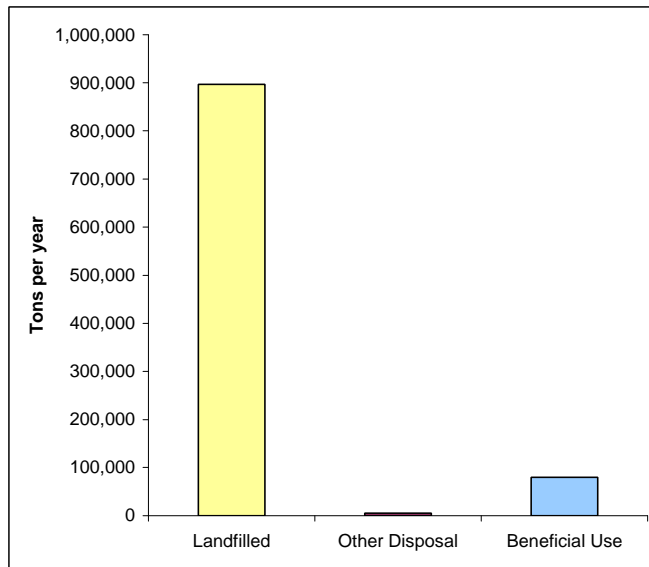
4.3.6 CONSTRUCTION AND DEMOLITION

Businesses in the C&D industry group include construction and demolition contractors and related services. Twenty-two samples were collected from businesses in this industry group. Quantities and composition data were estimated statewide by scaling up the data from sampling by statewide C&D wages.

4.3.6.1 QUANTITY AND DISPOSITION OF WASTE

Figure 4-23 illustrates that the majority of the waste from the C&D industry is landfilled: approximately 900,000 tons of a total estimated 980,000 tons. Approximately 80,000 tons is *beneficially used* and only about 5,300 tons is estimated to be disposed through *other disposal*.

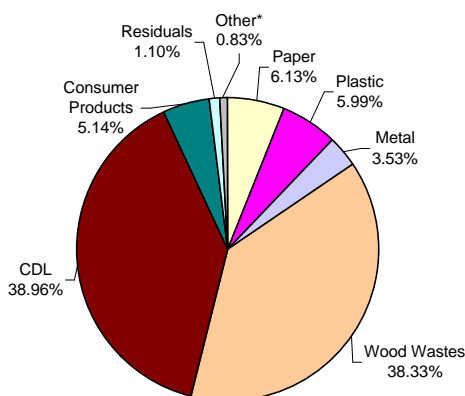
Figure 4-23: Summary of Waste Handling Methods – C&D



4.3.6.2 OVERALL COMPOSITION

Figure 4-24 summarizes the percentages of broad material classes that make up the C&D waste stream. The two largest material classes, CDL wastes and wood wastes, together make up more than 75% of the total.

Figure 4-24: Composition Summary – C&D



**Other* is comprised of material categories that account for less than 1.0% of the total, including Glass, Organics, and Hazardous Waste.

4.3.6.3 LANDFILLED

As seen in the top five table, Figure 4-25, roofing waste makes up about 30% of the landfilled waste for the C&D industry group. The other four large components, drywall, engineered wood, treated wood, and dimensional lumber, each contribute at least 8% to the total.

Figure 4-25: Top Five Components – Landfilled

Component	Mean	Cum. %	Tons
Roofing Waste	28.14%	28.14%	252,259
Drywall	11.71%	39.85%	104,968
Engineered Wood	9.72%	49.56%	87,125
Treated Wood	8.71%	58.27%	78,049
Dimensional Lumber	8.15%	66.42%	73,054
Total	66.42%		595,456

4.3.6.4 OTHER DISPOSAL

Concrete is the only material reported to be disposed of through other disposal. Approximately 5,300 tons is used for on-site fill annually.

4.3.6.5 BENEFICIAL USE

Dimensional lumber accounts for about 98% the waste that is beneficially used. This material is reused or burned off-site for heating. Other ferrous metal and other plastics products are also reported to be beneficially used. Other ferrous metal in this instance includes plumbing pipes that are recycled. Other plastic products includes plastic tarps that are reused.

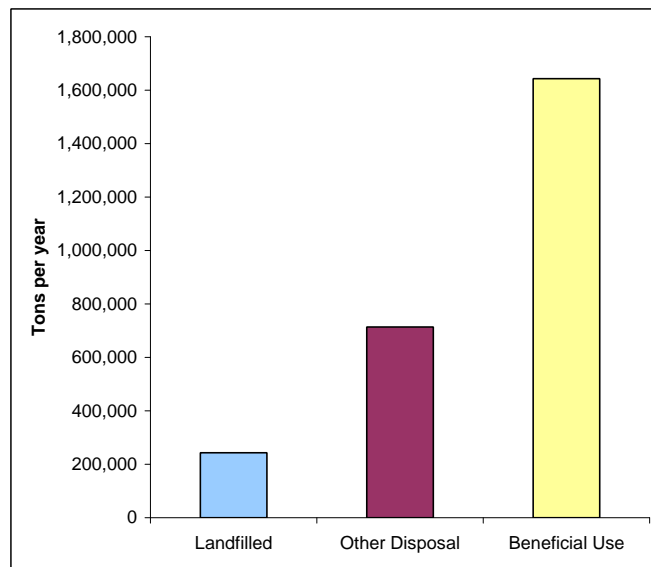
4.3.7 PAPER

Manufacturers of paper and allied products make up the *paper* industry group. Eighteen samples were collected from the *paper* industry group, although all of the samples came from only one business. Quantities and composition data were estimated for the State by scaling up the samples by statewide employment data.

4.3.7.1 QUANTITY AND DISPOSITION OF WASTE

Based on this study's analysis, this industry group relies on *beneficial use* most frequently to handle waste. Statewide, about 1.6 million tons of waste is estimated to be *beneficially used* each year. Waste disposed of through *other disposal* accounts for over 700,000 tons, and an estimated 240,000 tons are *landfilled* annually.

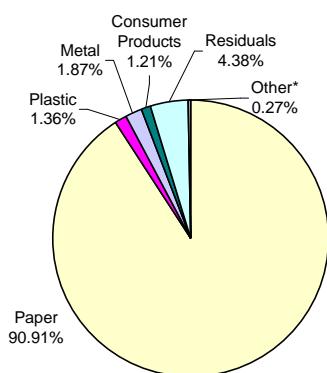
Figure 4-26: Summary of Waste Handling Methods – Paper



4.3.7.2 OVERALL COMPOSITION

The percentages of each broad waste class disposed by *paper* businesses are shown in Figure 4-27. *Paper* is by far the largest class, making up slightly more than 90% of the waste from this industry group.

Figure 4-27: Composition Summary – Paper



**Other* is comprised of material categories that account for less than 1.0% of the total, including *Organics, Metal, Glass, Wood Wastes, CDL, and Hazardous Waste*.

4.3.7.3 LANDFILLED

The largest component, *sludge and other industrial waste*, of this industry's *landfilled* waste makes up about 44% of the total. In this case *sludge and other industrial waste* is the contaminants that are mixed with recycled paper when it comes into the mill. *Rejected products* makes up about 10% or 25,000 tons of the *landfilled* waste. The other three top five materials, *plastic film and bags, mixed/low grade paper, and tin cans* each contribute about 5% to the *landfilled* waste.

Figure 4-28: Top Five Components – Landfilled

Component	Mean	Cum. %	Tons
Sludge and Other Industrial	44.20%	44.20%	107,262
Rejected Products	10.31%	54.51%	25,025
Plastic Film and Bags	5.55%	60.06%	13,464
Mixed/Low-grade Paper	5.42%	65.48%	13,158
Tin Cans	5.07%	70.55%	12,306
Total	70.55%		171,216

4.3.7.4 OTHER DISPOSAL

Only one component, *process sludge/other industrial paper* is reported to be disposed of through *other disposal* for this group. This material is ash and is hauled to a monofill.

4.3.7.5 BENEFICIAL USE

Process sludge/other industrial paper is the largest component *beneficially used*. After being dewatered, this pulp is burned for energy recovery. The other material in this category, *other ferrous metal*, consists of bale wire and scrap metal and is recycled.

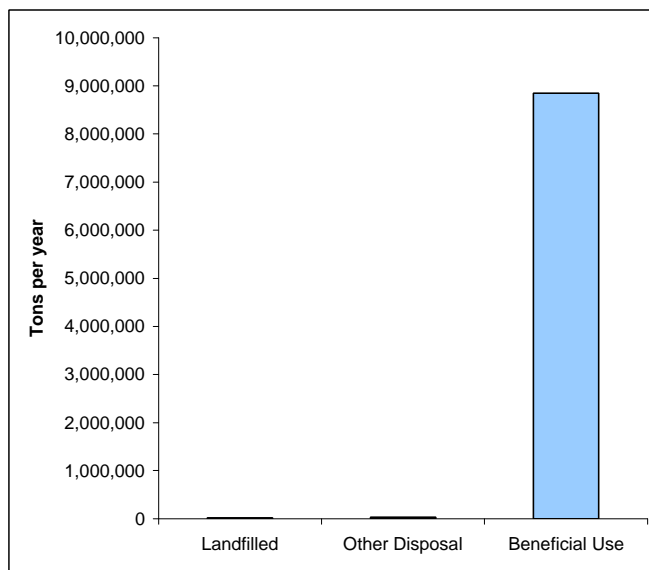
4.3.8 LOGGING & PRIMARY WOOD PRODUCTS

Included in this industry group are businesses such as logging companies, sawmills, cabinetmakers, and particleboard plants. Ten samples were collected from the *logging & primary wood products* industry group. Quantities and composition data were estimated at the statewide level using state employment data to scale up sampling data.

4.3.8.1 QUANTITY AND DISPOSITION OF WASTE

As shown in Figure 4-29, nearly all of the 8.9 million tons of waste generated by *logging* companies statewide is *beneficially used*. About 32,000 tons is estimated to be disposed through *other disposal* methods and an estimated 17,000 tons are *landfilled*.

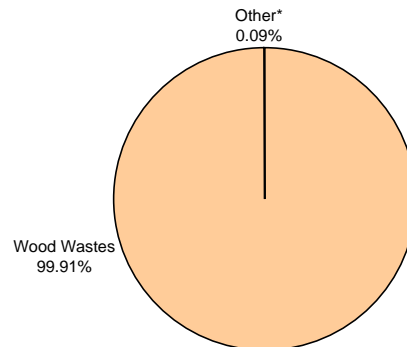
Figure 4-29: Summary of Waste Handling Methods – Logging & Primary Wood Products



4.3.8.2 OVERALL COMPOSITION

The percentage of each broad waste material class disposed by *logging* businesses is shown in Figure 4-30. *Wood wastes* are estimated to make up over 99% of the waste produced by this industry group.

Figure 4-30: Composition Summary – Logging & Primary Wood Products



**Other* is comprised of material categories that account for less than 1.0% of the total, including Paper, Plastic, Metal, Glass, Organics, CDL, Consumer Products, Residuals, and Hazardous Waste.

4.3.8.3 LANDFILLED

Accounting for approximately 22.5%, *wood byproducts* is the largest component of *landfilled* waste for the *logging* industry group. *Treated wood*, *other non-hazardous waste*, and *dimensional lumber* each make up over 10% of the waste going to landfills. *Other non-hazardous waste* includes gasoline, solvents, gunpowder, and fertilizers.

Figure 4-31: Top Five Components - Landfilled

Component	Mean	Cum. %	Tons
Wood Byproducts	22.50%	22.50%	3,884
Treated Wood	15.99%	38.49%	2,761
Other Non-hazardous Waste	13.56%	52.05%	2,341
Dimensional Lumber	11.45%	63.50%	1,976
Sludge and Other Industrial	5.68%	69.18%	980
Total	69.18%		11,942

4.3.8.4 OTHER DISPOSAL

Natural wood is reported to be disposed through *other disposal*. This estimate represents the logging “slash” left in the woods after a logging operation.

4.3.8.5 BENEFICIAL USE

Wood by-products is reported to be used beneficially by the *logging & primary wood products* industry group. Sawdust, shavings, and wood chips are burned as hog fuel or sent to other companies for processing.

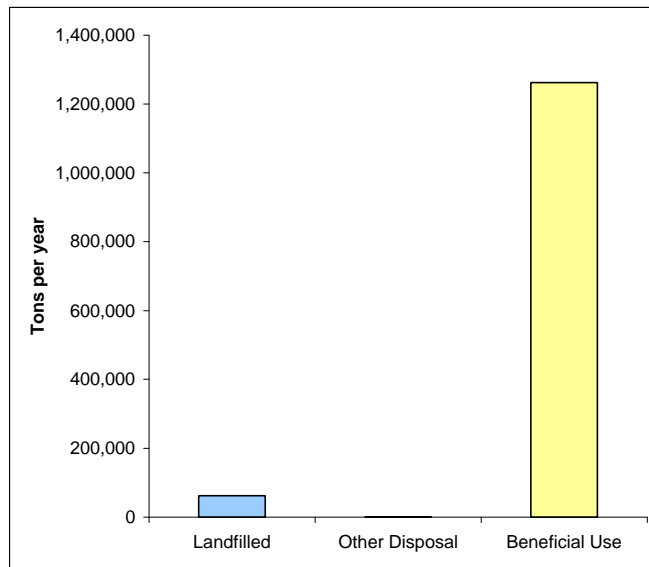
4.3.9 FOOD PROCESSING

Eighteen samples were collected from businesses in the *food processing* industry group, which includes manufacturers of food and kindred products. Statewide employment was used to scale up sampling data to derive statewide quantity and composition estimates.

4.3.9.1 QUANTITY AND DISPOSITION OF WASTE

As presented in Figure 4-32, about 1.3 million tons of waste are estimated to be *beneficially used* by the *food processing* industry each year. *Landfilled* waste amounts to 62,000 tons annually and waste disposed of through *other disposal* adds about 620 tons.

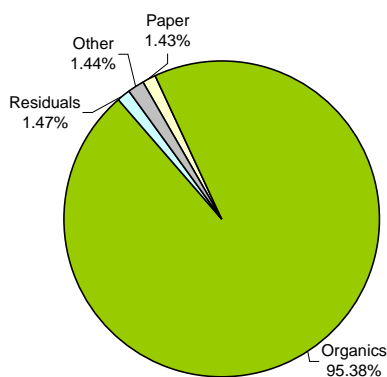
Figure 4-32: Summary of Waste Handling Methods – Food Processors



4.3.9.2 OVERALL COMPOSITION

The overall waste composition by broad material classes for *food processors* is shown in Figure 4-33. *Organics* makes up the largest proportion of the waste: almost 96%. *Paper* and *residuals* each account for slightly more than 1%.

Figure 4-33: Composition Summary – Food Processors



**Other* is comprised of material categories that account for less than 1.0% of the total, including *Plastic, Metal, Glass, Wood Wastes, Consumer Products, CDL, and Hazardous Waste*.

4.3.9.3 LANDFILLED

Almost one-third of the *landfilled* waste is made up of *sludge and other industrial wastes*, as shown in Figure 4-32. For *food processors*, this *sludge and other industrial waste* material is expended diatomaceous earth, a filtering material. *Remainder/composite paper, plastic film and bags, and wood packaging* each make up from 9 to 11% of the *landfilled* waste.

Figure 4-34: Top Five Components – Landfilled

Component	Mean	Cum. %	Tons
Sludge and Other Industrial	31.36%	31.36%	19,394
Remainder/Composite Paper	11.33%	42.68%	7,004
Plastic Film and Bags	10.20%	52.88%	6,307
Wood Packaging	9.76%	62.64%	6,038
Cardboard	4.91%	67.55%	3,035
Total	67.55%		41,777

4.3.9.4 OTHER DISPOSAL

Approximately 620 tons of waste were estimated to be disposed through *other disposal* by this industry group. Most of this amount, about 88%, by weight, is comprised of broken pallets, *wood packaging*, that are stockpiled by businesses in this group. *Newspaper and compostable paper* make up the remainder of *other disposal*; each of these materials are burned on site.

4.3.9.5 BENEFICIAL USE

As displayed in Figure 4-35 *food waste* accounts for almost 99% of the *beneficially used* waste generated by *food processors*. This material is typically donated or sold as a fertilizer for agricultural fields. *Remainder/composite organics* includes husks and spent grains that are donated to cattle farmers.

Figure 4-35: Top Five Components – Beneficial Use

Component	Mean	Cum. %	Tons
Food Waste	98.29%	98.29%	1,240,514
Remainder/Composite Organics	1.57%	99.85%	19,753
Cardboard	0.12%	99.97%	1,452
Green Glass Beverage	0.02%	99.99%	245
Mixed/Low-grade Paper	0.01%	99.99%	81
Total	99.99%		1,262,044

APPENDIX A: WASTE CLASSES AND DEFINITIONS

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 includes brown kraft paper bags.

Other Groundwood: other products made from groundwood paper, including phone books, paperback books, and egg cartons.

High-Grade Paper: high-grade white or light-colored bond and copy machine papers and envelopes, and continuous-feed computer printouts and forms of all types, except multiple-copy carbonless paper.

Magazines: magazines, catalogs and similar products with glossy paper.

Mixed/Low-Grade Paper: low-grade recyclable papers, including colored papers, notebook or other lined paper, envelopes with plastic windows, non-corrugated paperboard, carbonless copy paper, polycoated paperboard packaging, and junk mail.

Compostable: Paper cups, pizza boxes and papers that can be composted such as paper towels, tissues, paper plates, and waxed cardboard. This category includes all paper that is contaminated or soiled with food or liquid in its normal use.

Residual/Composite Paper: non-recyclable and non-compostable types of papers such as carbon paper and hardcover books, and composite materials such as paper packaging with metal or plastic parts.

Processing Sludges, Other Industrial: paper-based materials from industrial sources that do not easily fit into the above categories, such as sludges.

PLASTIC

PET Bottles: polyethylene terephthalate (PET) bottles, including soda, oil, liquor and other types of bottles. No attempt will be made to remove base cups, caps, or wrappers, although these materials will be categorized separately if received separately. The SPI code for PET is 1.

HDPE Bottles, Clear: high density polyethylene (HDPE) milk and other bottles that are not colored. The SPI code for HDPE is 2.

HDPE Bottles, Pigmented: high density polyethylene (HDPE) juice, detergent, and other bottles that are colored. The SPI code for HDPE is 2.

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

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

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

Other Rigid Plastic Packaging: all plastic packaging that is not a bottle and is not film or bag.

Other Plastic Products: finished plastic products such as toys, toothbrushes, vinyl hose and shower curtains. In cases where there is a large amount of a single type of product, the name of the product should be noted on the data collection form.

Residual/Composite Plastic: other types of plastic that do not fit into the above categories and items that are composites of plastic and other materials.

ORGANICS

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

Food Waste: food waste and scraps, including bones, rinds, etc., and including the food container when the container weight is not appreciable compared to the food inside.

Manures: animal manures and human feces, including kitty litter and any materials contaminated with manures and feces.

Disposable Diapers: disposable baby diapers and protective undergarments for adults (including feminine hygiene products).

Carcasses, Offal: carcasses and pieces of small and large animal, unless the item is the result of food preparation in a household or commercial setting. For instance, fish or chicken entrails from food preparation and raw, plucked chickens will typically be classified as food, not as an animal carcass, unless the material is from an agricultural or industrial source.

Crop Residues: vegetative materials that are left over from growing crops, and that are treated as a waste.

Septage: the liquid or semi-liquid material removed from septic tanks.

Residual/Composite: other organics that do not easily fit into the above categories, must note identity of whatever material is placed in this category.

WOOD WASTES

Natural Wood: wood that is not been processed, including stumps of trees and shrubs, with the adhering soil (if any), and other natural woods, such as logs and branches in excess of six inches in diameter.

Treated Wood: wood treated with preservatives such as creosote, CCA and ACQ. This includes dimensional lumber and posts if treated, but does not include painted or varnished wood. This category may also include some plywood (especially "marine plywood"), strandboard, and other wood.

Painted Wood: wood that has been painted, varnished or coated in similar ways.

Dimensional Lumber: wood commonly used in construction for framing and related uses, including 2 x 4's, 2 x 6's and posts/headers (4x8's, etc.).

Engineered: building materials that have been manufactured and that generally include adhesive as one or more layers. Examples include plywood (sheets of wood built up of two or more veneer sheets glued or cemented together under pressure), particle board (wood chips pressed together to form large sheets or boards), fiberboard (like particle board but with fibers), "glu-lam" beams and boards (built up from dimensional or smaller lumber), and similar products.

Packaging: partial or whole pallets, crates and similar shipping containers.

Other Untreated Wood: other types of wood products and materials that do not fit into the above categories, excluding composite materials (See Residual/Composites, below).

Wood Byproducts: sawdust and shavings, not otherwise identifiable.

Residuals/Composites: items that consist primarily of wood but that do not fit into the above categories, including composite materials that consist primarily (over 50%) of wood. Examples of composites include wood with sheetrock nailed to it or with tiles glued to it (such that the materials cannot be easily separated)

CONSTRUCTION, DEMOLITION AND LAND CLEARING (CDL) WASTES

Insulation: Include all pad, roll, or blown-in types of insulation. Do not include expanded polystyrene.

Asphalt: asphalt paving material.

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

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

Soil, Rocks and Sand: rock, gravel, soil, sand and similar naturally-occurring materials.

Roofing Waste: asphalt and fiberglass shingles, tar paper, and similar wastes from demolition or installation of roofs. Does not include wooden shingle or shakes.

Ceramics: includes clay, porcelain bricks and tiles, such as used toilets, sinks and bricks of various types and sizes.

Residual/Composites: other construction and demolition materials that do not fit easily into the above categories or that are composites made up of two or more different materials.

GLASS

Clear, Green and Brown Beverage Glass: these are three separate categories for bottles and jars that are clear, green or brown in color. Note that blue glass will be included with brown glass.

Other Glass Containers; Clear, Green and Brown: these are three separate categories for bottles and jars that are clear, green or brown in color. Note that blue glass will be included with brown glass.

Plate Glass: flat glass products such as windows, mirrors, and flat products.

Residual/Composite Glass: other types of glass products and scrap that do not fit into the above categories, including light bulbs, glassware and non-C&D fiberglass. Note that ceramics (plates and knickknacks) will not be included here but will be placed in “Non-Glass Ceramics” below.

Non-glass Ceramics: Ceramics not composed of true glass and not typically used as building materials. Examples include Pyrex, dishes, etc.

METAL

Aluminum Cans: aluminum beverage cans.

Aluminum Foil/Containers: aluminum foil, food trays and similar items.

Other Aluminum: aluminum scrap and products that do not fit into the above two categories.

Copper: copper scrap and products, excluding composites such as electrical wire.

Other Non-Ferrous Metals: metallic products and pieces that are not aluminum or copper and not derived from iron (see “other ferrous”) and which are not significantly contaminated with other metals or materials (see “residual/composite”).

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

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

Other Ferrous: products and pieces made from metal to which a magnet will adhere (but including stainless steel), and which are not significantly contaminated with other metals or

materials (in the latter case, the item will instead be included under “residual/composite”). This category will include paint and other non-food “tin cans”, as well as aerosol cans.

Residual/Composite: items made of a mixture of ferrous and non-ferrous or a mixture of metal and non-metallic materials (as long as these are primarily metal). Examples include small appliances, motors, and insulated wire.

CONSUMER PRODUCTS

Computers: computers and parts of computers, including monitors, base units, keyboards, other accessories and laptops.

Other Electronics: other appliances and products that contain circuit boards and other electronic components (as a significant portion of the product), such as televisions, microwave ovens and similar products.

Textiles, Synthetic: cloth, clothing, and rope made of synthetic materials.

Textiles, Organic: cloth, clothing, and rope made of 100% cotton, leather, wool or other naturally-occurring fibers. Composites of several different naturally-occurring fibers (such as a wool jacket with a cotton liner) can be included in this category, but not if the item has zippers or buttons made from a different material. The working guideline for this category should be whether the item could be composted without leaving an identifiable residue or part.

Textiles, Mixed or Unknown: cloth, clothing, and rope made of unknown fibers or made from a mixture of synthetic and natural materials, or containing non-textile parts such as metal zippers or plastic buttons.

Shoes: all shoes and boots, whether made of leather, rubber, other materials, or a combination thereof.

Tires and Other Rubber: vehicle tires of all types, including bicycle tires and including the rims if present, and finished products and scrap materials made of rubber, such as bath mats, inner tubes, rubber hose and foam rubber (except carpet padding, see below).

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

Carpet: pieces of carpet and rugs made of similar material.

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

Rejected Products: for industrial samples only, various products that failed internal QA/QC tests.

Returned Products: for industrial samples only, various products that were returned by the consumer who purchased the item.

Other Composite: This is a catch-all category for objects consisting of more than one material.

RESIDUALS

Ash: fireplace, burn barrel or firepit ash, as well as boiler and ash from industrial sources.

Dust: baghouse and other dusts from industrial sources, as well as bags of vacuum cleaner dust.

Fines/Sorting Residues: mixed waste that remains on the sorting table after all the materials that can practicably be removed have been sorted out. This material will consist primarily of small pieces of various types of paper and plastic, but will also contain small pieces of broken glass and other materials. May also include material less than one-half inch in diameter that falls through a bottom screen during sorting, for those using sorting boxes with screens, and if the material cannot otherwise be identified.

Sludges and Other Special Industrial Wastes: sludges and other wastes from industrial sources that cannot easily be fit into any of the above categories. Can include liquids and semi-solids but only if these materials are treated as a solid waste.

HAZARDOUS AND SPECIAL WASTES

Used Oil: used or new lubricating oils and related products, primarily those used in cars but possibly also including other materials with similar characteristics.

Oil Filters: used oil filters, primarily those used in cars but possibly including similar filters from other types of vehicles and other applications.

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

Auto 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.

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

Latex Paint: water-based paints.

Oil Paint: solvent-based paints.

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

Fluorescent Tubes: in addition to the typical fluorescent tubes (including fluorescent light bulbs and other forms), this category includes mercury vapor and other lamps listed as universal wastes.

Asbestos: pure asbestos, and asbestos-containing products where the asbestos present is the most distinguishing characteristic of the material.

Other Hazardous Waste: problem wastes that do not fall into one of the above categories, such as gasoline, solvents, gunpowder, other unspent ammunition, fertilizers, and radioactive materials.

Other Non-Hazardous Waste: problem wastes that do not fall into one of the above categories, but that are not hazardous, such as adhesives, weak acids and bases (cleaners), automotive products (car wax, etc.)

APPENDIX B: DISPOSAL SITE WASTE CHARACTERIZATION METHODOLOGY

This appendix presents the data collection methods and calculation procedures used to develop disposal site waste characterization profiles for Grant and Okanogan Counties.

GENERAL APPROACH

Each of the collection companies operating in Grant and Okanogan Counties were interviewed to determine the *universe* or the number of vehicles expected to arrive to the disposal facility each day of the week. Using this data, Cascadia then developed sampling quotas by substream (commercial, agricultural/industrial, and consumer) for each day of sampling. Table A-1 shows the number of samples sorted and characterized at the disposal facilities in Grant and Okanogan Counties.¹

Table A-1: Numbers of Samples Characterized at Disposal Facilities

Source of waste	Grant County	Okanogan County
Commercial	42	22
Agricultural/Industrial	11	7
Consumer	18	17

FIELD PROCEDURES

According to the prepared sampling quotas and vehicle selection intervals for each day, the Sorting Crew Manager identified the sample vehicle as it entered the facility and interviewed the driver to determine the substream. The driver was then directed to tip the load in a designated sampling area. Commercially collected loads that were designated for sorting and delivered in compactors or roll-off containers were dumped in an elongated pile. The sample was selected using an imaginary 16-cell grid superimposed over the dumped material. The Manager then identified a randomly pre-selected cell to be sorted. If the designated cell was blocked due to site constraints, an alternate cell was randomly selected. Then, approximately 200 to 300 pounds of waste was extracted by a loader from the designated cell and placed on a tarp.

Samples from large (greater than 500 pounds) self-hauled loads were selected in much the same manner as commercially collected loads, using a random and/or representative cell selection. If the self-hauled load weighed less than 300 pounds, the entire load was sorted as a sample.

¹ In addition to the 18 agricultural/industrial samples that were intercepted at the disposal facilities and that are reflected in Table 1, information collected from 32 business locations was brought into the analysis to reflect the composition and quantity of agricultural/industrial waste that is sent to landfill. The information from business locations was a summary of composition and quantity data for waste sent to landfills by certain agricultural and industrial business groups. The data had been collected as part of the waste-generator portion of the current study.

After the extracted material was deposited on the tarp, the Manager checked the weight of each sample manually. If judged to be too light, additional material was pulled from the same cell area until the desired weight was achieved. Samples judged to be excessively heavy were pared down by removing a homogenous slice of material from the tarp.

The use of a grid-selection process to identify sample cells helps ensure that bulky items are included. Occasionally, however, bulky items in a sample may result in a sample weight in excess of 500 pounds. If the contents were too bulky to be reasonably and accurately separated, either the entire load was sorted and weighed, or the weight of the bulky item(s) was estimated and combined with data from the sorted portion of the load.

Once a sample had been selected, extracted from the load, and placed on a clean tarp, it was sorted by hand into the prescribed component categories (refer to Appendix A for the complete list). Components were placed in plastic laundry baskets to be weighed and recorded. Sorting crewmembers typically specialize in groups of materials, but each is trained in the full list of components. Each crew person directed materials to the appropriate specialist.

The Manager monitored the homogeneity of the component baskets as material accumulated, rejecting items, which may be improperly classified. Open laundry baskets allowed the Manager to see the material at all times. The Manager also verified the purity of each component as it was weighed, before recording the weight on the sampling form.

All sampling records were checked for accuracy, completeness and legibility, then entered into a Microsoft Access database that was customized for this project.

CALCULATIONS

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

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

where: r = ratio of components' weight to the total sample weight

c = weight of particular component

w = sum of all component weights

for i = 1 to n, where n = number of selected samples

for j = 1 to m, where m = number of components

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

$$V_{r_j}^2 = \left(\frac{1}{n}\right) \cdot \left(\frac{1}{\bar{w}^2}\right) \cdot \left(\frac{\sum_i (c_{ij} - r_j w_i)^2}{n-1}\right)$$

where:

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

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

$$r_j \pm \left(t \cdot \sqrt{V_{r_j}^2}\right)$$

where:

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

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

TONNAGE ESTIMATES

For this analysis, Okanogan and Grant County staff members provided data on the quantity of material disposed for calendar year 2002. For Okanogan County, this data is recorded in tons; for Grant County, the volume data was converted to tons using the county's standard volume to weight conversions.

The total tonnage of waste landfilled in each county was apportioned to the primary waste sectors (residential, commercial, and industrial) based on surveys conducted by Grant County and Okanogan County staff with drivers of vehicles bringing waste to landfills and transfer stations.

WEIGHTED AVERAGES

Weighted averages were used to calculate the waste composition estimates for each County's overall disposed waste stream and the commercial, agricultural/industrial, and consumer substreams. Each substream's composition estimate was calculated using weighted averages by vehicle type. The overall composition estimates for each county were calculated using weighted averages by vehicle type *and* substream.

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

$$O_j = (p_1 \cdot r_{j1}) + (p_2 \cdot r_{j2}) + (p_3 \cdot r_{j3}) + \dots$$

where:

p = proportion of tonnage contributed by the noted substream

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

for j = 1 to m

where m = number of components

The **variance of the weighted average** is calculated:

$$VarO_j = (p_1^2 \cdot \hat{V}_{r_{j1}}) + (p_2^2 \cdot \hat{V}_{r_{j2}}) + (p_3^2 \cdot \hat{V}_{r_{j3}}) + \dots$$

where:

\hat{V} = ratio estimator's variance in the noted substream

APPENDIX C: GENERATOR WASTE CHARACTERIZATION METHODOLOGY

GENERAL APPROACH

The generator-focused portion of the rural waste characterization study involved developing estimates for the quantity and composition of all solid waste produced by selected industries and types of agriculture that are typical of rural Washington counties. The basic steps involved in developing the estimates were as follows:

- defining the targeted industry groups; deciding how many waste samples or waste characterization “observations” to conduct to represent the waste disposed by each industry group; deciding how many samples would be obtained from each participating county
- using a random selection and recruitment method to identify industrial and agricultural businesses to participate in the study
- contacting and visiting the recruited businesses to conduct measurements of waste generation and to characterize each waste stream produced by each business
- combining the composition and quantity data from each site to form a broader picture of all waste produced by each industrial/agricultural group
- “scaling up” the quantity estimates for each industrial/agricultural group in the participating counties to reflect waste generated by that group statewide

These steps are described in more detail in the sections below.

Throughout the study, the consultant adhered to certain key principles. First, representative businesses from each industrial and agricultural group were selected at random from available lists. Second, the study endeavored to classify and quantify all segments of the entire solid waste stream generated by each business, including solid waste that is taken to landfills, recycled, reused, or disposed through other methods. Third, the study applied a consistent protocol of sampling and characterization – through either hand-sorting, visual estimation of contents, or identification of pure material streams – to each type of waste encountered at each business that participated the study.

ALLOCATION OF SAMPLES TO INDUSTRY GROUPS

During the study design phase, an 16 waste characterization samples were allocated to each industrial/agricultural group. In practice, some groups ended up having more samples assigned to them, while some received fewer than the planned 16. The differences were the result of the vagaries of recruiting eligible and willing businesses from each group in the participating counties. The planned and actual number of characterization samples for each group is presented in the table below.

Table A-2: Planned and Actual Numbers of Samples by Industry

	Overall Target	Overall Actual
Industrial	150-180	159
Field Crops	16	20
Orchards	16	23
Vegetables	16	9
Livestock	16	18
Mining	16	21
C&D	16	22
Paper & Allied Products	16	18
Logging & Primary Wood Products	16	10
Food & Kindred Products	16	18

In addition, the study design included a plan to obtain samples from each of three counties – Grant, Okanogan, and Clallam – in proportions that reflected the presence of each industry in each county and that reflected the resources that each county was devoting to the study. Cascadia Consulting Group conducted the industrial sampling in Grant and Okanogan Counties while Green Solutions, Inc. collected industrial samples in Clallam County.

RECRUITING BUSINESSES TO PARTICIPATE

The first step in recruiting businesses was to obtain a list of sites from a commercial list provider. Then, sites were contacted and screened to determine their cooperativeness and suitability for the study. If a site met the study's criteria, arrangements were made to obtain waste generation and composition information. The process is described more thoroughly in the sections below.

SELECTION OF BUSINESS SITES

A list of businesses in the State of Washington was obtained from NameFinders, a research organization that supplies business lists and other data collected by Dun and Bradstreet. An industry designation was given to businesses with SIC codes that were included in the nine targeted industry groups. A database record was created for each site in the list, and the records were placed in a random order. Businesses within each industry group were contacted by phone in the order that they occurred in the randomized list.

RECRUITING OF BUSINESSES

Recruitment was accomplished through the following steps, although the steps may have varied in sequence for particular candidates.

Step 1. Make contact. The consultant contacted the randomly selected business, explained the purpose of the study, and asked to speak to the person who is knowledgeable about the types and quantities of wastes the business generates. The consultant recorded the name, phone number, and other contact information for the person who was best able to provide information.

Step 2. Gather industry group and size information. The consultant confirmed what the business does as its primary activity and that it fit with its assigned industry group. The consultant then determined the number of employees that work at the site, or, if the business was engaged in agriculture, how many acres or animals it manages.

Step 3. Arrange a visit. The consultant made arrangements to visit the site of the business to obtain waste quantity measurements and waste composition data.

Step 4. Classify waste streams. The consultant used the interview process to find out about materials that are generated at each site as by-products of the main business activity. Information that could quantify each type of waste was sought, or plans were made to conduct direct measurements during the scheduled visit. The nature and disposition of each waste stream was noted.

VISITING SITES

A visit was arranged with each business. Each visit began with an interview to verify information obtained previously and to discover whether any waste types had been overlooked during the initial phone conversation. Usually, the sampling crew talked through the operation of the business with the representative to confirm that all waste types were mentioned. After it was confirmed that all of the waste had been identified, it was determined which waste could be sampled and sorted and which waste could be quantified and characterized merely by observation or examination of records. The way the waste was “disposed” determined how to sample it. The waste was categorized by three types of “disposal”: landfilled, *other disposal*, or used beneficially.

Landfilled waste. Landfilled waste was generally the easiest type to attach a quantity to. If the business self-hauled the waste, they generally knew the number of trips they made to the landfill each week, month, or year and they knew approximately how much waste they hauled each trip. If the trash was picked up by a commercial hauler, the size of the

dumpster and frequency of pick-up was determined. If there was currently waste in the dumpster, that waste was manually sorted and weighed, if possible. Otherwise, it was characterized visually. Finally, if there was no waste to be sampled at that time, a representative of the business was interviewed to describe the type of waste generated. The annual amount of waste was estimated based on the interview, and a composition profile from other similar sites was applied to the estimated amount.

Other disposal. In most cases, businesses used other disposal to handle infrequent wastes. Examples of other disposal include stockpiling or burying waste. In a few cases, businesses consistently used burning as an alternative (other disposal) method of handling refuse. Stockpiled material, such as old equipment or old tires, was easily measured.

Beneficial use. While all businesses generally had some type of waste being sent to a landfill, the types and amounts of waste being used beneficially tended to be specific to the industry group. For instance, *field crops*, *orchards*, and *veggies* industry groups had some sort of crop residues that were returned to the field. In most cases, it was possible to obtain a measurement of the amount of material being sent to beneficial use. For example, if a crop had recently been harvested, then a sample of crop residue could be collected and weighed. If it was not possible to obtain an actual measurement of the amount of waste disposed through beneficial use, then an estimate was constructed based on information obtained during the interview with the representative of the business. For example, a business might have records on the amount of waste used beneficially if the waste was transferred to another company for processing.

CALCULATIONS

GENERATION TIME

First, each sample was associated with a generation time. The method of determining generation time depended on the type of disposal.

For *landfilled* wastes, if they were commercially collected, the time since the last pick-up was used to estimate generation time, and the amount of waste observed in the waste container was taken to be the amount of waste that had accumulated during that generation time. For example, if the trash was collected on Monday morning and the consultant visited the site on Wednesday morning, the observed quantity would be associated with two days of waste generation. This quantity would then be scaled up to a year. For other *landfilled* samples, such as self-hauled waste, representatives of participating businesses were interviewed to determine the frequency with which they transported waste to the landfill.

Other disposal frequently included stockpiled materials. For such samples, the business representative was asked to estimate the accumulation time associated with the material if the material had been accumulating at a regular rate for the whole time. For instance, a pile of tires might have taken two years to accumulate. This quantity would be divided by two to calculate an annual estimate. If the material did not accumulate at a steady rate, but, instead, was generated as the result of one event, the interviewer asked how often this amount of waste was generated. For example, a pile of trees at an orchard was estimated by the orchard representative to result from tree removals that occur once every ten years. For this reason, the measured quantity was divided by ten to obtain an annual estimate.

Creating annual estimates for *beneficially used* waste required a more varied approach than for *landfilled* or *other disposal* samples. For instance, for the industrial group *field crops*, a type of *beneficially used* waste common to all generators was *crop residues*. For crops that had been recently harvested, residues were measured by raking up remaining residues within a 625 square foot area. This quantity was first scaled up to an acre then to the total acres at that farm. The resulting quantity represented the quantity of *crop residues* associated with that crop for that farm. All businesses in the industry group *livestock* disposed of *manures*. If they were left in a field, this was considered to be stockpiling. When *manures* were collected for composting, this material was considered to be *beneficially used*. Similar to stockpiled materials, if the *manures* were gathered in one area for composting, the interviewer asked what time it took for the livestock to generate that quantity of *manures*. This quantity was scaled up to a year based on the estimated generation for that sample. This way, *manure* generation was estimated for that business for the year.

VERIFYING COMPLETENESS OF SAMPLES

All businesses were assumed to have *landfilled* waste. If *landfilled* waste was not sampled from a business (for example, if the waste had already been picked up on the day of the visit), then a quantity and composition was estimated for the business through interviewing the representative regarding the size of the dumpster, frequency of pick-up, and type of materials disposed of in the dumpster.

For certain industry groups, there were types of waste considered crucial to include estimates for. For instance, for the industrial group *field crops*, *crop residues* were included for each business. If a sample was not obtained (perhaps because that crop had not recently been harvested), another business' estimate was used if there existed another sample for this type of material. Otherwise, a literature value was used to supplement the field data. For example, no samples were collected for alfalfa, which is estimated to grow on approximately 810,000 acres of in the State. A National Resources Conservation Service (NRCS) estimate of 2,600 pounds per acre of crop residues was used to fill in this gap in the field data. In this way, *crop residues* were estimated for different crops when actual samples had not been collected. For *livestock* industrial group, *manures* was completed for each business. For *orchards*, prunings left on the ground as well as periodic tree removals were both estimated for each business in this category as these were known to occur in every instance.

DIVISIONS WITHIN INDUSTRY GROUPS

Some industry groups were determined to have important divisions with unique waste. All of the agricultural industry groups, *field crops*, *orchards*, *vegetables*, and *livestock*, were divided further for the purposes of characterizing all types of waste in these groups. The *field crops* group was divided into alfalfa, potatoes, wheat, herbs, and "all other field crops." Because the *crucial* type of waste for this group was *crop residues*, it was verified that there was an estimate of *crop residues* for each type of *field crop*. The estimates for the material *manures* for *livestock* also were specific to the animal: llamas, beef cows, dairy cows, other adult cows, calves, sheep, pigs, horses, and chickens. The only animal that *manures* was not estimated for was fish in fish farms.

SCALING UP TO STATEWIDE LEVEL

When all businesses and industry groups were considered to represent complete profiles of the waste, quantities of materials were summed across industry groups by types of disposal (*landfilled, other disposal, beneficial use*). A factor or unit was chosen specific to each industry group to scale up the quantities. For *field crops, orchards, and vegetables*, that unit was acres. For *livestock*, it was number of animals. Within each division, samples were scaled up to the State and then summed. In other words, total waste generated in the State was calculated separately for alfalfa, potatoes, wheat, herbs, and “all other field crops” and then summed. This was estimated to be the waste for the entire *field crops* industrial group.

The unit for scaling for *mining, paper, logging, and food processing* was number of employees. For *construction & demolition*, quantities were scaled up by construction wages. This was the only data available for this industry at both the county and state level.

For each type of waste generated by each industry group, statewide quantities were estimated through the following general steps.

- First, the total amount of each type of waste associated with an industry group was calculated for the participating businesses. For example, of the fruit orchards that were visited, the consultant calculated a total amount of material that was sent to beneficial use annually.
- Second, the total amount of each type of waste was divided by the total number of employees, acres, animals, etc., at the participating businesses. For example, the total number of acres in production for the visited orchards was calculated.
- Third, the per-employee, per-acre, etc. generation figure was multiplied by the numbers of similar employees, acres, etc. throughout the state to develop a statewide generation estimate for the particular type of waste. In our example of orchards, the average per-acre figure for waste generation through beneficial use was applied to the total known acreage of fruit orchards throughout the state.

APPENDIX D: FIELD FORMS

Field forms used in this study are included in the following order.

- Facility Vehicle Survey Sheet
- Waste Sorting Tally Sheet

Figure D-1: Facility Vehicle Survey Sheet

Date _____

Surveyor: _____

Page _____ of _____

Site _____

Customer Type	Source	For Mixed Res and Biz loads		Net Volume of Load (in yards)	Surveyor's Notes
		% Res	% Biz		
S = self-haul C = comm'l or public	R = residential B = business M = mixed R & B CD = const/demo I = industrial* TS = transfer trailer O = other	Ask driver to estimate % of load that is Res and Biz (Must total to 100%)			
1	S C	R B M CD I TS O			
2	S C	R B M CD I TS O			
3	S C	R B M CD I TS O			
4	S C	R B M CD I TS O			
5	S C	R B M CD I TS O			
6	S C	R B M CD I TS O			
7	S C	R B M CD I TS O			
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23	S C	R B M CD I TS O			
24	S C	R B M CD I TS O			
25	S C	R B M CD I TS O			

1. Start a new survey sheet for each day of the week-long survey period.
2. Complete a survey entry for each vehicle that enters the facility.
3. Make entries neatly in pen.
4. Enter the information at the top of each page. Enter total # of pages on each page at the end of the day.
5. If you circle the mixed source ask the driver for the % of each.
6. If you make an error on an entry, draw a line through the entire entry and start over on a new line.
- *7. Industrial includes: 1) loads from agriculture, livestock, mining and logging operations and 2) loads from manufacturing operations such as food processing, milling, pulp & paper etc. If uncertain, write the company name in "surveyor's notes."

Figure D-2: Waste Sorting Tally Sheet (Front)

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Figure D-3: Waste Sorting Tally Sheet (Back)

LOAD INFORMATION

Generator Type:

Residential

Commercial

Industrial

Vehicle Type:

Packer

Drop Box

Other/SH

Load Origin:

Net Weight:
(Okanogan) _____

Net Volume:
(Grant) _____

APPENDIX E: DETAILED COUNTY WASTE COMPOSITION PROFILES BY SECTOR

This appendix presents detailed waste composition and quantity profiles for Grant and Okanogan Counties. Within each County, an overall composition table is first and is followed by detailed tables for the commercial, industrial, and consumer sectors. The profiles are a result of on-site disposal sampling, industrial sampling, and transfer station surveys.

Table E-1: Composition by Weight – Grant County, Overall

Calculated at a 90% confidence level

	Tons	Mean	+/-		Tons	Mean	+/-
Paper	15,063	19.4%		Glass	2,413	3.1%	
Newspaper	1,274	1.6%	0.4%	Clear Glass Beverage	559	0.7%	0.3%
Cardboard	2,979	3.8%	0.6%	Green Glass Beverage	68	0.1%	0.0%
Other Groundwood Paper	736	0.9%	0.5%	Brown Glass Beverage	768	1.0%	0.4%
High-grade Paper	1,288	1.7%	0.7%	Clear Glass Container	305	0.4%	0.2%
Magazines	689	0.9%	0.5%	Green Glass Container	4	0.0%	0.0%
Mixed/Low-grade Paper	3,358	4.3%	0.8%	Brown Glass Container	3	0.0%	0.0%
Compostable Paper	3,307	4.3%	0.8%	Plate Glass	471	0.6%	0.9%
Remainder/Composite Paper	1,265	1.6%	0.2%	Remainder/Composite Glass	225	0.3%	0.3%
Process Sludge/Other Industrial	166	0.2%	0.2%	Non-glass Ceramics	10	0.0%	0.0%
Plastic	8,357	10.8%		Metal	6,651	8.6%	
PET Bottles	528	0.7%	0.1%	Aluminum Cans	401	0.5%	0.1%
HDPE Bottles, Clear	277	0.4%	0.1%	Aluminum Foil/Containers	54	0.1%	0.0%
HDPE Bottles, Colored	291	0.4%	0.2%	Other Aluminum	125	0.2%	0.2%
Plastic Film and Bags	3,933	5.1%	0.9%	Copper	2	0.0%	0.0%
Plastic Bottles Types 3 - 7	45	0.1%	0.0%	Other Non-ferrous Metals	48	0.1%	0.1%
Expanded Polystyrene	207	0.3%	0.1%	Tin Cans	592	0.8%	0.1%
Other Rigid Plastic Packaging	525	0.7%	0.1%	White Goods	0	0.0%	0.0%
Other Plastic Products	1,455	1.9%	0.7%	Other Ferrous Metals	3,197	4.1%	2.0%
Remainder/Composite Plastic	1,096	1.4%	0.4%	Remainder/Composite Metals	2,233	2.9%	1.6%
Organics	20,231	26.1%		Consumer Products	6,801	8.8%	
Yard Garden and Prunings	4,014	5.2%	2.1%	Computers	45	0.1%	0.1%
Food Waste	13,406	17.3%	2.4%	Other Electronics	199	0.3%	0.3%
Manures	232	0.3%	0.4%	Textiles, Synthetic	212	0.3%	0.1%
Disposable Diapers	1,837	2.4%	0.6%	Textiles, Organic	588	0.8%	0.2%
Carcasses, Offal	5	0.0%	0.0%	Textiles, Mixed/Unknown	796	1.0%	0.4%
Crop Residues	591	0.8%	1.2%	Shoes	240	0.3%	0.1%
Septage	0	0.0%	0.0%	Tires and Other Rubber	2,885	3.7%	3.3%
Remainder/Composite Organics	145	0.2%	0.0%	Furniture and Mattresses	833	1.1%	0.7%
Wood Wastes	6,651	8.6%		Carpet	873	1.1%	0.8%
Natural Wood	63	0.1%	0.1%	Carpet Padding	3	0.0%	0.0%
Treated Wood	37	0.0%	0.1%	Rejected Products	4	0.0%	0.0%
Painted Wood	538	0.7%	0.7%	Returned Products	0	0.0%	0.0%
Dimensional Lumber	3,956	5.1%	1.8%	Other Composite Consumer Products	123	0.2%	0.2%
Engineered Wood	849	1.1%	1.1%	Residuals	8,159	10.5%	
Wood Packaging	917	1.2%	0.5%	Ash	0	0.0%	0.0%
Other Untreated Wood	14	0.0%	0.0%	Dust	21	0.0%	0.0%
Wood Byproducts	17	0.0%	0.0%	Fines/Sorting Residues	565	0.7%	0.3%
Remainder/Composite Wood	258	0.3%	0.2%	Sludge and Other Industrial	7,573	9.8%	0.0%
CDL Wastes	2,897	3.7%		Haz and Special Wastes	306	0.4%	
Insulation	5	0.0%	0.0%	Used Oil	23	0.0%	0.0%
Asphalt	0	0.0%	0.0%	Oil Filters	60	0.1%	0.1%
Concrete	237	0.3%	0.3%	Antifreeze	0	0.0%	0.0%
Drywall	764	1.0%	1.3%	Auto Batteries	120	0.2%	0.3%
Soil, Rocks and Sand	1,570	2.0%	1.1%	Household Batteries	18	0.0%	0.0%
Roofing Waste	222	0.3%	0.1%	Pesticides and Herbicides	10	0.0%	0.0%
Ceramics	18	0.0%	0.0%	Latex Paint	16	0.0%	0.0%
Remainder/Composite CDL	82	0.1%	0.2%	Oil Paint	12	0.0%	0.0%
				Medical Waste	27	0.0%	0.0%
				Fluorescent Tubes	2	0.0%	0.0%
Sample Count	71			Asbestos	5	0.0%	0.0%
				Other Hazardous Waste	8	0.0%	0.0%
Total Tons	77,528			Other Non-hazardous Waste	4	0.0%	0.0%

Table E-2: Composition by Weight – Grant County, Commercial

Calculated at a 90% confidence level

	Tons	Mean	+/-		Tons	Mean	+/-
Paper	8,384	24.1%		Glass	1,554	4.5%	
Newspaper	724	2.1%	0.7%	Clear Glass Beverage	366	1.1%	0.6%
Cardboard	1,891	5.4%	1.1%	Green Glass Beverage	12	0.0%	0.0%
Other Groundwood Paper	306	0.9%	0.3%	Brown Glass Beverage	491	1.4%	0.8%
High-grade Paper	821	2.4%	1.5%	Clear Glass Container	158	0.5%	0.3%
Magazines	389	1.1%	1.1%	Green Glass Container	1	0.0%	0.0%
Mixed/Low-grade Paper	1,684	4.8%	1.7%	Brown Glass Container	0	0.0%	0.0%
Compostable Paper	2,031	5.8%	1.7%	Plate Glass	471	1.4%	2.0%
Remainder/Composite Paper	409	1.2%	0.5%	Remainder/Composite Glass	55	0.2%	0.1%
Process Sludge/Other Industrial	129	0.4%	0.4%	Non-glass Ceramics	1	0.0%	0.0%
Plastic	4,772	13.7%		Metal	3,459	9.9%	
PET Bottles	218	0.6%	0.2%	Aluminum Cans	181	0.5%	0.2%
HDPE Bottles, Clear	103	0.3%	0.1%	Aluminum Foil/Containers	30	0.1%	0.0%
HDPE Bottles, Colored	75	0.2%	0.1%	Other Aluminum	32	0.1%	0.1%
Plastic Film and Bags	2,313	6.6%	2.0%	Copper	1	0.0%	0.0%
Plastic Bottles Types 3 - 7	7	0.0%	0.0%	Other Non-ferrous Metals	13	0.0%	0.0%
Expanded Polystyrene	103	0.3%	0.1%	Tin Cans	199	0.6%	0.2%
Other Rigid Plastic Packaging	263	0.8%	0.2%	White Goods	0	0.0%	0.0%
Other Plastic Products	1,184	3.4%	1.5%	Other Ferrous Metals	1,804	5.2%	3.4%
Remainder/Composite Plastic	506	1.5%	0.8%	Remainder/Composite Metals	1,199	3.4%	2.0%
Organics	8,595	24.7%		Consumer Products	5,056	14.5%	
Yard Garden and Prunings	1,326	3.8%	2.3%	Computers	45	0.1%	0.2%
Food Waste	6,158	17.7%	4.7%	Other Electronics	161	0.5%	0.7%
Manures	21	0.1%	0.1%	Textiles, Synthetic	80	0.2%	0.1%
Disposable Diapers	476	1.4%	0.7%	Textiles, Organic	292	0.8%	0.3%
Carcasses, Offal	0	0.0%	0.0%	Textiles, Mixed/Unknown	444	1.3%	0.9%
Crop Residues	591	1.7%	2.7%	Shoes	130	0.4%	0.3%
Septage	0	0.0%	0.0%	Tires and Other Rubber	2,733	7.9%	7.3%
Remainder/Composite Organics	22	0.1%	0.0%	Furniture and Mattresses	577	1.7%	1.1%
Wood Wastes	1,625	4.7%		Carpet	521	1.5%	1.6%
Natural Wood	57	0.2%	0.3%	Carpet Padding	0	0.0%	0.0%
Treated Wood	36	0.1%	0.1%	Rejected Products	0	0.0%	0.0%
Painted Wood	300	0.9%	0.6%	Returned Products	0	0.0%	0.0%
Dimensional Lumber	514	1.5%	0.8%	Other Composite Consumer Products	73	0.2%	0.3%
Engineered Wood	75	0.2%	0.2%	Residuals	279	0.8%	
Wood Packaging	408	1.2%	1.2%	Ash	0	0.0%	0.0%
Other Untreated Wood	9	0.0%	0.0%	Dust	0	0.0%	0.0%
Wood Byproducts	0	0.0%	0.0%	Fines/Sorting Residues	279	0.8%	0.4%
Remainder/Composite Wood	226	0.6%	0.5%	Sludge and Other Industrial	0	0.0%	0.0%
CDL Wastes	825	2.4%		Haz and Special Wastes	244	0.7%	
Insulation	2	0.0%	0.0%	Used Oil	8	0.0%	0.0%
Asphalt	0	0.0%	0.0%	Oil Filters	50	0.1%	0.2%
Concrete	62	0.2%	0.3%	Antifreeze	0	0.0%	0.0%
Drywall	102	0.3%	0.3%	Auto Batteries	120	0.3%	0.6%
Soil, Rocks and Sand	568	1.6%	2.0%	Household Batteries	12	0.0%	0.0%
Roofing Waste	1	0.0%	0.0%	Pesticides and Herbicides	0	0.0%	0.0%
Ceramics	17	0.1%	0.1%	Latex Paint	16	0.0%	0.1%
Remainder/Composite CDL	72	0.2%	0.3%	Oil Paint	11	0.0%	0.0%
				Medical Waste	24	0.1%	0.1%
				Fluorescent Tubes	0	0.0%	0.0%
Sample Count	42			Asbestos	0	0.0%	0.0%
				Other Hazardous Waste	0	0.0%	0.0%
Total Tons	34,793			Other Non-hazardous Waste	1	0.0%	0.0%

Table E-3: Composition by Weight – Grant County, Industrial

Calculated at a 90% confidence level

	Tons	Mean	+/-		Tons	Mean	+/-
Paper	2,127	12.3%		Glass	197	1.1%	
Newspaper	100	0.6%	0.0%	Clear Glass Beverage	62	0.4%	0.0%
Cardboard	386	2.2%	0.0%	Green Glass Beverage	16	0.1%	0.0%
Other Groundwood Paper	50	0.3%	0.0%	Brown Glass Beverage	46	0.3%	0.0%
High-grade Paper	248	1.4%	0.0%	Clear Glass Container	53	0.3%	0.0%
Magazines	128	0.7%	0.0%	Green Glass Container	3	0.0%	0.0%
Mixed/Low-grade Paper	351	2.0%	0.0%	Brown Glass Container	1	0.0%	0.0%
Compostable Paper	206	1.2%	0.0%	Plate Glass	0	0.0%	0.0%
Remainder/Composite Paper	658	3.8%	0.0%	Remainder/Composite Glass	7	0.0%	0.0%
Process Sludge/Other Industrial	0	0.0%	0.0%	Non-glass Ceramics	9	0.1%	0.0%
Plastic	1,119	6.5%		Metal	673	3.9%	
PET Bottles	49	0.3%	0.0%	Aluminum Cans	17	0.1%	0.0%
HDPE Bottles, Clear	31	0.2%	0.0%	Aluminum Foil/Containers	3	0.0%	0.0%
HDPE Bottles, Colored	67	0.4%	0.0%	Other Aluminum	25	0.1%	0.3%
Plastic Film and Bags	659	3.8%	0.0%	Copper	1	0.0%	0.0%
Plastic Bottles Types 3 - 7	21	0.1%	0.0%	Other Non-ferrous Metals	9	0.1%	0.0%
Expanded Polystyrene	24	0.1%	0.0%	Tin Cans	81	0.5%	0.0%
Other Rigid Plastic Packaging	39	0.2%	0.0%	White Goods	0	0.0%	0.0%
Other Plastic Products	80	0.5%	0.0%	Other Ferrous Metals	377	2.2%	0.3%
Remainder/Composite Plastic	149	0.9%	0.0%	Remainder/Composite Metals	161	0.9%	0.0%
Organics	962	5.6%		Consumer Products	380	2.2%	
Yard Garden and Prunings	148	0.9%	0.0%	Computers	0	0.0%	0.0%
Food Waste	704	4.1%	0.0%	Other Electronics	15	0.1%	0.0%
Manures	9	0.0%	0.0%	Textiles, Synthetic	13	0.1%	0.0%
Disposable Diapers	59	0.3%	0.0%	Textiles, Organic	29	0.2%	0.0%
Carcasses, Offal	2	0.0%	0.0%	Textiles, Mixed/Unknown	197	1.1%	0.0%
Crop Residues	0	0.0%	0.0%	Shoes	24	0.1%	0.0%
Septage	0	0.0%	0.0%	Tires and Other Rubber	40	0.2%	0.0%
Remainder/Composite Organics	40	0.2%	0.0%	Furniture and Mattresses	4	0.0%	0.0%
Wood Wastes	3,519	20.3%		Carpet	0	0.0%	0.0%
Natural Wood	4	0.0%	0.0%	Carpet Padding	3	0.0%	0.0%
Treated Wood	1	0.0%	0.0%	Rejected Products	4	0.0%	0.0%
Painted Wood	190	1.1%	3.1%	Returned Products	0	0.0%	0.0%
Dimensional Lumber	2,579	14.9%	6.1%	Other Composite Consumer Products	50	0.3%	0.0%
Engineered Wood	216	1.2%	3.5%	Residuals	7,680	44.4%	
Wood Packaging	508	2.9%	0.0%	Ash	0	0.0%	0.0%
Other Untreated Wood	0	0.0%	0.0%	Dust	6	0.0%	0.0%
Wood Byproducts	17	0.1%	0.0%	Fines/Sorting Residues	102	0.6%	0.0%
Remainder/Composite Wood	3	0.0%	0.0%	Sludge and Other Industrial	7,573	43.8%	0.1%
CDL Wastes	601	3.5%		Haz and Special Wastes	34	0.2%	
Insulation	3	0.0%	0.0%	Used Oil	1	0.0%	0.0%
Asphalt	0	0.0%	0.0%	Oil Filters	10	0.1%	0.0%
Concrete	21	0.1%	0.0%	Antifreeze	0	0.0%	0.0%
Drywall	23	0.1%	0.0%	Auto Batteries	0	0.0%	0.0%
Soil, Rocks and Sand	323	1.9%	0.0%	Household Batteries	4	0.0%	0.0%
Roofing Waste	220	1.3%	0.5%	Pesticides and Herbicides	2	0.0%	0.0%
Ceramics	0	0.0%	0.0%	Latex Paint	0	0.0%	0.0%
Remainder/Composite CDL	10	0.1%	0.0%	Oil Paint	0	0.0%	0.0%
				Medical Waste	0	0.0%	0.0%
				Fluorescent Tubes	2	0.0%	0.0%
Sample Count	11			Asbestos	5	0.0%	0.0%
				Other Hazardous Waste	8	0.0%	0.0%
Total Tons	17,293			Other Non-hazardous Waste	3	0.0%	0.0%

Table E-4: Composition by Weight – Grant County, Consumer

Calculated at a 90% confidence level

	Tons	Mean	+/-		Tons	Mean	+/-
Paper	4,552	17.9%		Glass	662	2.6%	
Newspaper	451	1.8%	0.8%	Clear Glass Beverage	130	0.5%	0.2%
Cardboard	703	2.8%	0.8%	Green Glass Beverage	40	0.2%	0.1%
Other Groundwood Paper	381	1.5%	1.4%	Brown Glass Beverage	231	0.9%	0.4%
High-grade Paper	219	0.9%	0.5%	Clear Glass Container	95	0.4%	0.3%
Magazines	172	0.7%	0.4%	Green Glass Container	0	0.0%	0.0%
Mixed/Low-grade Paper	1,323	5.2%	1.0%	Brown Glass Container	2	0.0%	0.0%
Compostable Paper	1,069	4.2%	0.7%	Plate Glass	0	0.0%	0.0%
Remainder/Composite Paper	198	0.8%	0.4%	Remainder/Composite Glass	164	0.6%	1.0%
Process Sludge/Other Industrial	37	0.1%	0.2%	Non-glass Ceramics	1	0.0%	0.0%
Plastic	2,466	9.7%		Metal	2,518	9.9%	
PET Bottles	261	1.0%	0.1%	Aluminum Cans	203	0.8%	0.1%
HDPE Bottles, Clear	143	0.6%	0.1%	Aluminum Foil/Containers	22	0.1%	0.0%
HDPE Bottles, Colored	149	0.6%	0.4%	Other Aluminum	68	0.3%	0.4%
Plastic Film and Bags	961	3.8%	0.9%	Copper	0	0.0%	0.0%
Plastic Bottles Types 3 - 7	17	0.1%	0.0%	Other Non-ferrous Metals	25	0.1%	0.2%
Expanded Polystyrene	79	0.3%	0.1%	Tin Cans	312	1.2%	0.3%
Other Rigid Plastic Packaging	224	0.9%	0.2%	White Goods	0	0.0%	0.0%
Other Plastic Products	191	0.8%	0.5%	Other Ferrous Metals	1,016	4.0%	3.9%
Remainder/Composite Plastic	441	1.7%	0.8%	Remainder/Composite Metals	872	3.4%	3.9%
Organics	10,675	42.0%		Consumer Products	1,365	5.4%	
Yard Garden and Prunings	2,540	10.0%	5.6%	Computers	0	0.0%	0.0%
Food Waste	6,544	25.7%	3.4%	Other Electronics	22	0.1%	0.1%
Manures	202	0.8%	1.2%	Textiles, Synthetic	119	0.5%	0.4%
Disposable Diapers	1,302	5.1%	1.5%	Textiles, Organic	267	1.1%	0.4%
Carcasses, Offal	4	0.0%	0.0%	Textiles, Mixed/Unknown	155	0.6%	0.3%
Crop Residues	0	0.0%	0.0%	Shoes	86	0.3%	0.2%
Septage	0	0.0%	0.0%	Tires and Other Rubber	112	0.4%	0.1%
Remainder/Composite Organics	83	0.3%	0.1%	Furniture and Mattresses	252	1.0%	1.6%
Wood Wastes	1,507	5.9%		Carpet	352	1.4%	1.0%
Natural Wood	2	0.0%	0.0%	Carpet Padding	0	0.0%	0.0%
Treated Wood	0	0.0%	0.0%	Rejected Products	0	0.0%	0.0%
Painted Wood	49	0.2%	0.2%	Returned Products	0	0.0%	0.0%
Dimensional Lumber	864	3.4%	3.6%	Other Composite Consumer Products	0	0.0%	0.0%
Engineered Wood	559	2.2%	2.4%	Residuals	200	0.8%	
Wood Packaging	0	0.0%	0.0%	Ash	0	0.0%	0.0%
Other Untreated Wood	5	0.0%	0.0%	Dust	16	0.1%	0.1%
Wood Byproducts	0	0.0%	0.0%	Fines/Sorting Residues	184	0.7%	0.6%
Remainder/Composite Wood	29	0.1%	0.1%	Sludge and Other Industrial	0	0.0%	0.0%
CDL Wastes	1,471	5.8%		Haz and Special Wastes	28	0.1%	
Insulation	0	0.0%	0.0%	Used Oil	14	0.1%	0.1%
Asphalt	0	0.0%	0.0%	Oil Filters	0	0.0%	0.0%
Concrete	154	0.6%	1.0%	Antifreeze	0	0.0%	0.0%
Drywall	639	2.5%	3.9%	Auto Batteries	0	0.0%	0.0%
Soil, Rocks and Sand	678	2.7%	2.0%	Household Batteries	3	0.0%	0.0%
Roofing Waste	0	0.0%	0.0%	Pesticides and Herbicides	8	0.0%	0.1%
Ceramics	0	0.0%	0.0%	Latex Paint	0	0.0%	0.0%
Remainder/Composite CDL	0	0.0%	0.0%	Oil Paint	0	0.0%	0.0%
				Medical Waste	3	0.0%	0.0%
				Fluorescent Tubes	0	0.0%	0.0%
Sample Count	18			Asbestos	0	0.0%	0.0%
				Other Hazardous Waste	0	0.0%	0.0%
Total Tons	25,443			Other Non-hazardous Waste	0	0.0%	0.0%

Table E-5: Composition by Weight – Okanogan County, Overall

Calculated at a 90% confidence level

	Tons	Mean	+/-		Tons	Mean	+/-
Paper	6,264	27.7%		Glass	1,384	6.1%	
Newspaper	525	2.3%	0.5%	Clear Glass Beverage	273	1.2%	0.3%
Cardboard	1,306	5.8%	0.8%	Green Glass Beverage	77	0.3%	0.1%
Other Groundwood Paper	140	0.6%	0.2%	Brown Glass Beverage	397	1.8%	1.1%
High-grade Paper	277	1.2%	0.2%	Clear Glass Container	556	2.5%	1.0%
Magazines	495	2.2%	0.6%	Green Glass Container	0	0.0%	0.0%
Mixed/Low-grade Paper	1,402	6.2%	0.7%	Brown Glass Container	18	0.1%	0.1%
Compostable Paper	1,569	6.9%	1.0%	Plate Glass	0	0.0%	0.0%
Remainder/Composite Paper	543	2.4%	1.0%	Remainder/Composite Glass	22	0.1%	0.1%
Process Sludge/Other Industrial	7	0.0%	0.0%	Non-glass Ceramics	41	0.2%	0.1%
Plastic	2,704	12.0%		Metal	2,214	9.8%	
PET Bottles	192	0.8%	0.1%	Aluminum Cans	125	0.6%	0.2%
HDPE Bottles, Clear	85	0.4%	0.1%	Aluminum Foil/Containers	25	0.1%	0.0%
HDPE Bottles, Colored	166	0.7%	0.3%	Other Aluminum	53	0.2%	0.1%
Plastic Film and Bags	1,084	4.8%	0.6%	Copper	3	0.0%	0.0%
Plastic Bottles Types 3 - 7	67	0.3%	0.1%	Other Non-ferrous Metals	15	0.1%	0.0%
Expanded Polystyrene	144	0.6%	0.2%	Tin Cans	393	1.7%	0.4%
Other Rigid Plastic Packaging	348	1.5%	0.5%	White Goods	0	0.0%	0.0%
Other Plastic Products	325	1.4%	0.4%	Other Ferrous Metals	573	2.5%	1.3%
Remainder/Composite Plastic	294	1.3%	0.3%	Remainder/Composite Metals	1,026	4.5%	2.1%
Organics	5,311	23.5%		Consumer Products	1,129	5.0%	
Yard Garden and Prunings	1,135	5.0%	2.0%	Computers	26	0.1%	0.2%
Food Waste	3,557	15.7%	2.2%	Other Electronics	144	0.6%	0.5%
Manures	56	0.2%	0.1%	Textiles, Synthetic	60	0.3%	0.1%
Disposable Diapers	449	2.0%	0.7%	Textiles, Organic	164	0.7%	0.2%
Carcasses, Offal	0	0.0%	0.0%	Textiles, Mixed/Unknown	326	1.4%	0.5%
Crop Residues	0	0.0%	0.0%	Shoes	190	0.8%	0.3%
Septage	0	0.0%	0.0%	Tires and Other Rubber	137	0.6%	0.4%
Remainder/Composite Organics	113	0.5%	0.2%	Furniture and Mattresses	49	0.2%	0.3%
Wood Wastes	1,496	6.6%		Carpet	1	0.0%	0.0%
Natural Wood	11	0.0%	0.0%	Carpet Padding	13	0.1%	0.0%
Treated Wood	13	0.1%	0.1%	Rejected Products	0	0.0%	0.0%
Painted Wood	115	0.5%	0.9%	Returned Products	0	0.0%	0.0%
Dimensional Lumber	1,024	4.5%	1.8%	Other Composite Consumer Products	19	0.1%	0.1%
Engineered Wood	114	0.5%	1.0%	Residuals	783	3.5%	
Wood Packaging	207	0.9%	0.7%	Ash	99	0.4%	0.5%
Other Untreated Wood	0	0.0%	0.0%	Dust	42	0.2%	0.1%
Wood Byproducts	0	0.0%	0.0%	Fines/Sorting Residues	641	2.8%	0.9%
Remainder/Composite Wood	12	0.1%	0.0%	Sludge and Other Industrial	1	0.0%	0.0%
CDL Wastes	923	4.1%		Haz and Special Wastes	388	1.7%	
Insulation	24	0.1%	0.1%	Used Oil	9	0.0%	0.0%
Asphalt	0	0.0%	0.0%	Oil Filters	28	0.1%	0.1%
Concrete	0	0.0%	0.0%	Antifreeze	0	0.0%	0.0%
Drywall	13	0.1%	0.1%	Auto Batteries	0	0.0%	0.0%
Soil, Rocks and Sand	459	2.0%	0.6%	Household Batteries	21	0.1%	0.0%
Roofing Waste	98	0.4%	0.2%	Pesticides and Herbicides	6	0.0%	0.0%
Ceramics	229	1.0%	1.1%	Latex Paint	1	0.0%	0.0%
Remainder/Composite CDL	99	0.4%	0.3%	Oil Paint	1	0.0%	0.0%
				Medical Waste	266	1.2%	1.0%
				Fluorescent Tubes	0	0.0%	0.0%
Sample Count	46			Asbestos	2	0.0%	0.0%
				Other Hazardous Waste	41	0.2%	0.1%
Total Tons	22,595			Other Non-hazardous Waste	12	0.1%	0.0%

Table E-6: Composition by Weight – Okanogan County, Commercial

Calculated at a 90% confidence level

	Tons	Mean	+/-		Tons	Mean	+/-
Paper	2,607	32.9%		Glass	272	3.4%	
Newspaper	155	2.0%	0.9%	Clear Glass Beverage	87	1.1%	0.6%
Cardboard	795	10.0%	2.2%	Green Glass Beverage	6	0.1%	0.1%
Other Groundwood Paper	51	0.6%	0.4%	Brown Glass Beverage	122	1.5%	1.7%
High-grade Paper	94	1.2%	0.6%	Clear Glass Container	40	0.5%	0.4%
Magazines	99	1.3%	0.7%	Green Glass Container	0	0.0%	0.0%
Mixed/Low-grade Paper	449	5.7%	1.0%	Brown Glass Container	12	0.2%	0.2%
Compostable Paper	632	8.0%	1.7%	Plate Glass	0	0.0%	0.0%
Remainder/Composite Paper	324	4.1%	3.0%	Remainder/Composite Glass	2	0.0%	0.0%
Process Sludge/Other Industrial	7	0.1%	0.1%	Non-glass Ceramics	3	0.0%	0.0%
Plastic	893	11.3%		Metal	471	5.9%	
PET Bottles	57	0.7%	0.2%	Aluminum Cans	46	0.6%	0.3%
HDPE Bottles, Clear	23	0.3%	0.1%	Aluminum Foil/Containers	8	0.1%	0.0%
HDPE Bottles, Colored	30	0.4%	0.2%	Other Aluminum	15	0.2%	0.2%
Plastic Film and Bags	497	6.3%	1.5%	Copper	0	0.0%	0.0%
Plastic Bottles Types 3 - 7	7	0.1%	0.0%	Other Non-ferrous Metals	3	0.0%	0.0%
Expanded Polystyrene	55	0.7%	0.2%	Tin Cans	121	1.5%	0.4%
Other Rigid Plastic Packaging	78	1.0%	0.3%	White Goods	0	0.0%	0.0%
Other Plastic Products	75	0.9%	0.4%	Other Ferrous Metals	173	2.2%	2.0%
Remainder/Composite Plastic	70	0.9%	0.5%	Remainder/Composite Metals	105	1.3%	0.9%
Organics	2,266	28.6%		Consumer Products	298	3.8%	
Yard Garden and Prunings	608	7.7%	4.8%	Computers	26	0.3%	0.5%
Food Waste	1,434	18.1%	5.4%	Other Electronics	6	0.1%	0.1%
Manures	16	0.2%	0.3%	Textiles, Synthetic	6	0.1%	0.1%
Disposable Diapers	179	2.3%	1.8%	Textiles, Organic	24	0.3%	0.2%
Carcasses, Offal	0	0.0%	0.0%	Textiles, Mixed/Unknown	105	1.3%	1.1%
Crop Residues	0	0.0%	0.0%	Shoes	9	0.1%	0.1%
Septage	0	0.0%	0.0%	Tires and Other Rubber	104	1.3%	1.0%
Remainder/Composite Organics	29	0.4%	0.3%	Furniture and Mattresses	0	0.0%	0.0%
Wood Wastes	164	2.1%		Carpet	0	0.0%	0.0%
Natural Wood	2	0.0%	0.0%	Carpet Padding	0	0.0%	0.0%
Treated Wood	11	0.1%	0.2%	Rejected Products	0	0.0%	0.0%
Painted Wood	31	0.4%	0.4%	Returned Products	0	0.0%	0.0%
Dimensional Lumber	26	0.3%	0.4%	Other Composite Consumer Products	18	0.2%	0.2%
Engineered Wood	20	0.3%	0.3%	Residuals	328	4.1%	
Wood Packaging	73	0.9%	1.6%	Ash	99	1.2%	1.3%
Other Untreated Wood	0	0.0%	0.0%	Dust	10	0.1%	0.1%
Wood Byproducts	0	0.0%	0.0%	Fines/Sorting Residues	219	2.8%	2.2%
Remainder/Composite Wood	1	0.0%	0.0%	Sludge and Other Industrial	0	0.0%	0.0%
CDL Wastes	351	4.4%		Haz and Special Wastes	273	3.4%	
Insulation	1	0.0%	0.0%	Used Oil	2	0.0%	0.0%
Asphalt	0	0.0%	0.0%	Oil Filters	2	0.0%	0.0%
Concrete	0	0.0%	0.0%	Antifreeze	0	0.0%	0.0%
Drywall	11	0.1%	0.2%	Auto Batteries	0	0.0%	0.0%
Soil, Rocks and Sand	46	0.6%	0.8%	Household Batteries	4	0.0%	0.0%
Roofing Waste	3	0.0%	0.1%	Pesticides and Herbicides	0	0.0%	0.0%
Ceramics	229	2.9%	3.1%	Latex Paint	0	0.0%	0.0%
Remainder/Composite CDL	61	0.8%	0.8%	Oil Paint	0	0.0%	0.0%
Sample Count	22			Medical Waste	265	3.3%	2.9%
Total Tons	7,924			Fluorescent Tubes	0	0.0%	0.0%
				Asbestos	0	0.0%	0.0%
				Other Hazardous Waste	0	0.0%	0.0%
				Other Non-hazardous Waste	0	0.0%	0.0%

Table E-7: Composition by Weight – Okanogan County, Industrial

Calculated at a 90% confidence level

	Tons	Mean	+/-		Tons	Mean	+/-
Paper	1,710	23.3%		Glass	368	5.0%	
Newspaper	182	2.5%	0.0%	Clear Glass Beverage	89	1.2%	0.0%
Cardboard	214	2.9%	0.0%	Green Glass Beverage	36	0.5%	0.0%
Other Groundwood Paper	39	0.5%	0.0%	Brown Glass Beverage	88	1.2%	0.0%
High-grade Paper	102	1.4%	0.0%	Clear Glass Container	125	1.7%	0.0%
Magazines	156	2.1%	0.0%	Green Glass Container	0	0.0%	0.0%
Mixed/Low-grade Paper	438	6.0%	0.0%	Brown Glass Container	2	0.0%	0.0%
Compostable Paper	469	6.4%	0.0%	Plate Glass	0	0.0%	0.0%
Remainder/Composite Paper	110	1.5%	0.0%	Remainder/Composite Glass	9	0.1%	0.0%
Process Sludge/Other Industrial	0	0.0%	0.0%	Non-glass Ceramics	20	0.3%	0.0%
Plastic	785	10.7%		Metal	575	7.8%	
PET Bottles	64	0.9%	0.0%	Aluminum Cans	33	0.4%	0.0%
HDPE Bottles, Clear	30	0.4%	0.0%	Aluminum Foil/Containers	6	0.1%	0.0%
HDPE Bottles, Colored	49	0.7%	0.0%	Other Aluminum	20	0.3%	0.3%
Plastic Film and Bags	295	4.0%	0.0%	Copper	2	0.0%	0.0%
Plastic Bottles Types 3 - 7	32	0.4%	0.0%	Other Non-ferrous Metals	7	0.1%	0.0%
Expanded Polystyrene	32	0.4%	0.0%	Tin Cans	117	1.6%	0.0%
Other Rigid Plastic Packaging	90	1.2%	0.0%	White Goods	0	0.0%	0.0%
Other Plastic Products	109	1.5%	0.0%	Other Ferrous Metals	143	1.9%	0.3%
Remainder/Composite Plastic	84	1.1%	0.0%	Remainder/Composite Metals	249	3.4%	0.0%
Organics	1,670	22.7%		Consumer Products	273	3.7%	
Yard Garden and Prunings	311	4.2%	0.0%	Computers	0	0.0%	0.0%
Food Waste	1,149	15.6%	0.0%	Other Electronics	36	0.5%	0.0%
Manures	20	0.3%	0.0%	Textiles, Synthetic	32	0.4%	0.0%
Disposable Diapers	140	1.9%	0.0%	Textiles, Organic	67	0.9%	0.0%
Carcasses, Offal	0	0.0%	0.0%	Textiles, Mixed/Unknown	72	1.0%	0.0%
Crop Residues	0	0.0%	0.0%	Shoes	46	0.6%	0.0%
Septage	0	0.0%	0.0%	Tires and Other Rubber	0	0.0%	0.0%
Remainder/Composite Organics	50	0.7%	0.0%	Furniture and Mattresses	10	0.1%	0.0%
Wood Wastes	1,244	16.9%		Carpet	1	0.0%	0.0%
Natural Wood	3	0.0%	0.0%	Carpet Padding	8	0.1%	0.0%
Treated Wood	1	0.0%	0.0%	Rejected Products	0	0.0%	0.0%
Painted Wood	75	1.0%	2.8%	Returned Products	0	0.0%	0.0%
Dimensional Lumber	990	13.5%	5.5%	Other Composite Consumer Products	1	0.0%	0.0%
Engineered Wood	89	1.2%	3.2%	Residuals	224	3.1%	
Wood Packaging	81	1.1%	0.0%	Ash	0	0.0%	0.0%
Other Untreated Wood	0	0.0%	0.0%	Dust	13	0.2%	0.0%
Wood Byproducts	0	0.0%	0.0%	Fines/Sorting Residues	210	2.9%	0.0%
Remainder/Composite Wood	5	0.1%	0.0%	Sludge and Other Industrial	1	0.0%	0.0%
CDL Wastes	456	6.2%		Haz and Special Wastes	45	0.6%	
Insulation	7	0.1%	0.0%	Used Oil	1	0.0%	0.0%
Asphalt	0	0.0%	0.0%	Oil Filters	6	0.1%	0.0%
Concrete	0	0.0%	0.0%	Antifreeze	0	0.0%	0.0%
Drywall	1	0.0%	0.0%	Auto Batteries	0	0.0%	0.0%
Soil, Rocks and Sand	333	4.5%	0.0%	Household Batteries	7	0.1%	0.0%
Roofing Waste	89	1.2%	0.5%	Pesticides and Herbicides	4	0.0%	0.0%
Ceramics	0	0.0%	0.0%	Latex Paint	1	0.0%	0.0%
Remainder/Composite CDL	26	0.4%	0.0%	Oil Paint	0	0.0%	0.0%
				Medical Waste	0	0.0%	0.0%
				Fluorescent Tubes	0	0.0%	0.0%
Sample Count	7			Asbestos	2	0.0%	0.0%
				Other Hazardous Waste	18	0.2%	0.0%
Total Tons	7,350			Other Non-hazardous Waste	6	0.1%	0.0%

Table E-8: Composition by Weight – Okanogan County, Consumer

Calculated at a 90% confidence level

	Tons	Mean	+/-		Tons	Mean	+/-
Paper	1,946	26.6%		Glass	743	10.1%	
Newspaper	188	2.6%	1.2%	Clear Glass Beverage	97	1.3%	0.7%
Cardboard	297	4.1%	0.4%	Green Glass Beverage	35	0.5%	0.3%
Other Groundwood Paper	50	0.7%	0.4%	Brown Glass Beverage	187	2.6%	2.9%
High-grade Paper	81	1.1%	0.3%	Clear Glass Container	391	5.3%	3.2%
Magazines	239	3.3%	1.6%	Green Glass Container	0	0.0%	0.0%
Mixed/Low-grade Paper	514	7.0%	1.9%	Brown Glass Container	3	0.0%	0.0%
Compostable Paper	468	6.4%	2.4%	Plate Glass	0	0.0%	0.0%
Remainder/Composite Paper	109	1.5%	0.4%	Remainder/Composite Glass	11	0.2%	0.2%
Process Sludge/Other Industrial	0	0.0%	0.0%	Non-glass Ceramics	18	0.2%	0.2%
Plastic	1,027	14.0%		Metal	1,168	16.0%	
PET Bottles	70	1.0%	0.3%	Aluminum Cans	46	0.6%	0.3%
HDPE Bottles, Clear	32	0.4%	0.2%	Aluminum Foil/Containers	11	0.2%	0.1%
HDPE Bottles, Colored	87	1.2%	1.0%	Other Aluminum	18	0.2%	0.3%
Plastic Film and Bags	292	4.0%	0.9%	Copper	1	0.0%	0.0%
Plastic Bottles Types 3 - 7	28	0.4%	0.4%	Other Non-ferrous Metals	4	0.1%	0.1%
Expanded Polystyrene	57	0.8%	0.4%	Tin Cans	155	2.1%	1.0%
Other Rigid Plastic Packaging	180	2.5%	1.7%	White Goods	0	0.0%	0.0%
Other Plastic Products	141	1.9%	1.1%	Other Ferrous Metals	258	3.5%	3.5%
Remainder/Composite Plastic	140	1.9%	0.9%	Remainder/Composite Metals	673	9.2%	6.5%
Organics	1,375	18.8%		Consumer Products	559	7.6%	
Yard Garden and Prunings	217	3.0%	3.0%	Computers	0	0.0%	0.0%
Food Waste	974	13.3%	3.6%	Other Electronics	101	1.4%	1.4%
Manures	20	0.3%	0.2%	Textiles, Synthetic	22	0.3%	0.3%
Disposable Diapers	131	1.8%	0.9%	Textiles, Organic	73	1.0%	0.5%
Carcasses, Offal	0	0.0%	0.0%	Textiles, Mixed/Unknown	149	2.0%	0.9%
Crop Residues	0	0.0%	0.0%	Shoes	135	1.8%	1.1%
Septage	0	0.0%	0.0%	Tires and Other Rubber	33	0.5%	0.3%
Remainder/Composite Organics	34	0.5%	0.4%	Furniture and Mattresses	40	0.5%	0.9%
Wood Wastes	88	1.2%		Carpet	0	0.0%	0.0%
Natural Wood	6	0.1%	0.1%	Carpet Padding	5	0.1%	0.1%
Treated Wood	1	0.0%	0.0%	Rejected Products	0	0.0%	0.0%
Painted Wood	9	0.1%	0.2%	Returned Products	0	0.0%	0.0%
Dimensional Lumber	8	0.1%	0.1%	Other Composite Consumer Products	0	0.0%	0.0%
Engineered Wood	5	0.1%	0.1%	Residuals	230	3.1%	
Wood Packaging	54	0.7%	1.1%	Ash	0	0.0%	0.0%
Other Untreated Wood	0	0.0%	0.0%	Dust	19	0.3%	0.3%
Wood Byproducts	0	0.0%	0.0%	Fines/Sorting Residues	212	2.9%	1.6%
Remainder/Composite Wood	6	0.1%	0.1%	Sludge and Other Industrial	0	0.0%	0.0%
CDL Wastes	115	1.6%		Haz and Special Wastes	69	0.9%	
Insulation	16	0.2%	0.3%	Used Oil	6	0.1%	0.1%
Asphalt	0	0.0%	0.0%	Oil Filters	19	0.3%	0.4%
Concrete	0	0.0%	0.0%	Antifreeze	0	0.0%	0.0%
Drywall	1	0.0%	0.0%	Auto Batteries	0	0.0%	0.0%
Soil, Rocks and Sand	81	1.1%	1.8%	Household Batteries	11	0.1%	0.1%
Roofing Waste	5	0.1%	0.1%	Pesticides and Herbicides	2	0.0%	0.1%
Ceramics	0	0.0%	0.0%	Latex Paint	0	0.0%	0.0%
Remainder/Composite CDL	12	0.2%	0.3%	Oil Paint	0	0.0%	0.0%
				Medical Waste	1	0.0%	0.0%
Sample Count	17			Fluorescent Tubes	0	0.0%	0.0%
				Asbestos	0	0.0%	0.0%
Total Tons	7,320			Other Hazardous Waste	23	0.3%	0.3%
				Other Non-hazardous Waste	6	0.1%	0.1%

APPENDIX F: DETAILED WASTE GENERATION RATES AND COMPOSITION BY INDUSTRY GROUP

Figure E-1, below, compares waste generation rates for the industrial and agricultural groups that were the focus of this study, in terms of tons of waste generated annually per acre, per animal, per employee.

Figure E-1: Summary of Waste Generation by Industry Group

Industry Group	Units	Landfilled	Other Disposal	Beneficial Use
Field Crops		<0.01	<0.01	5.32
Orchards	<i>tons/acre/ year</i>	0.03	0.06	3.47
Vegetables		<0.01	-	3.37
Livestock	<i>tons/animal/ year</i>	<0.01	0.41	1.14
Mining		0.42	0.06	1,215.34
Construction & Demolition		6.00	0.04	0.53
Paper and Allied Products	<i>tons/employee/ year</i>	16.32	48.00	110.50
Logging, Lumber, & Primary Wood Products		0.57	1.07	291.79
Food and Kindred Products		1.57	0.02	32.04

Detailed composition tables, with quantities, are presented below for the nine industrial/agricultural groups: *field crops, orchards, vegetables, livestock, mining, construction & demolition (C&D), paper, logging, and food processing*. These tables reflect all the waste generated by each industry group including landfilled, other disposal, and beneficially used waste.

Table F-1: Composition by Weight – Field Crops

Calculated at a 90% confidence level

	Tons	Mean		Tons	Mean
Paper	7,471	0.0%	Glass	592	0.0%
Newspaper	285	0.0%	Clear Glass Beverage	142	0.0%
Cardboard	5,118	0.0%	Green Glass Beverage	57	0.0%
Other Groundwood Paper	60	0.0%	Brown Glass Beverage	142	0.0%
High-grade Paper	159	0.0%	Clear Glass Container	201	0.0%
Magazines	243	0.0%	Green Glass Container	0	0.0%
Mixed/Low-grade Paper	690	0.0%	Brown Glass Container	4	0.0%
Compostable Paper	761	0.0%	Plate Glass	0	0.0%
Remainder/Composite Paper	154	0.0%	Remainder/Composite Glass	13	0.0%
Process Sludge/Other Industrial	0	0.0%	Non-glass Ceramics	33	0.0%
Plastic	1,898	0.0%	Metal	7,837	0.0%
PET Bottles	137	0.0%	Aluminum Cans	52	0.0%
HDPE Bottles, Clear	47	0.0%	Aluminum Foil/Containers	10	0.0%
HDPE Bottles, Colored	488	0.0%	Other Aluminum	21	0.0%
Plastic Film and Bags	478	0.0%	Copper	3	0.0%
Plastic Bottles Types 3 - 7	52	0.0%	Other Non-ferrous Metals	37	0.0%
Expanded Polystyrene	127	0.0%	Tin Cans	185	0.0%
Other Rigid Plastic Packaging	145	0.0%	White Goods	1,130	0.0%
Other Plastic Products	305	0.0%	Other Ferrous Metal	6,006	0.0%
Remainder/Composite Plastic	119	0.0%	Remainder/Composite Metals	395	0.0%
Organics	24,063,980	99.9%	Consumer Products	13,341	0.1%
Yard, Garden and Prunings	501	0.0%	Computers	0	0.0%
Food Waste	158,149	0.7%	Other Electronics	59	0.0%
Manures	33	0.0%	Textiles, Synthetic	12,198	0.1%
Disposable Diapers	226	0.0%	Textiles, Organic	109	0.0%
Carcasses, Offal	0	0.0%	Textiles, Mixed/Unknown	168	0.0%
Crop Residues	23,905,027	99.2%	Shoes	75	0.0%
Septage	0	0.0%	Tires and Other Rubber	640	0.0%
Remainder/Composite Organics	45	0.0%	Furniture and Mattresses	16	0.0%
Wood Wastes	169	0.0%	Carpet	1	0.0%
Natural Wood	5	0.0%	Carpet Padding	13	0.0%
Treated Wood	1	0.0%	Rejected Products	0	0.0%
Painted Wood	4	0.0%	Returned Products	0	0.0%
Dimensional Lumber	15	0.0%	Other Composite Consumer Products	63	0.0%
Engineered Wood	11	0.0%	Residuals	359	0.0%
Wood Packaging	125	0.0%	Ash	0	0.0%
Other Untreated Wood	0	0.0%	Dust	21	0.0%
Wood Byproducts	0	0.0%	Fines/Sorting Residues	338	0.0%
Remainder/Composite Wood	8	0.0%	Sludge and Other Industrial	0	0.0%
CDL Wastes	120	0.0%	Haz and Special Wastes	134	0.0%
Insulation	11	0.0%	Used Oil	2	0.0%
Asphalt	0	0.0%	Oil Filters	74	0.0%
Concrete	0	0.0%	Antifreeze	0	0.0%
Drywall	2	0.0%	Auto Batteries	0	0.0%
Soil, Rocks and Sand	32	0.0%	Household Batteries	11	0.0%
Roofing Waste	46	0.0%	Pesticides and Herbicides	6	0.0%
Ceramics	0	0.0%	Latex Paint	1	0.0%
Remainder/Composite CDL	29	0.0%	Oil Paint	1	0.0%
			Medical Waste	0	0.0%
			Fluorescent Tubes	0	0.0%
			Asbestos	1	0.0%
			Other Hazardous Waste	28	0.0%
			Other Non-hazardous Waste	10	0.0%
Sample Count	20				
Total Tons	24,095,901				

Table F-2: Composition by Weight – Orchards

Calculated at a 90% confidence level

	Tons	Mean		Tons	Mean
Paper	1,967	0.2%	Glass	374	0.0%
Newspaper	182	0.0%	Clear Glass Beverage	94	0.0%
Cardboard	264	0.0%	Green Glass Beverage	36	0.0%
Other Groundwood Paper	46	0.0%	Brown Glass Beverage	89	0.0%
High-grade Paper	117	0.0%	Clear Glass Container	124	0.0%
Magazines	167	0.0%	Green Glass Container	0	0.0%
Mixed/Low-grade Paper	467	0.1%	Brown Glass Container	2	0.0%
Compostable Paper	465	0.1%	Plate Glass	0	0.0%
Remainder/Composite Paper	259	0.0%	Remainder/Composite Glass	9	0.0%
Process Sludge/Other Industrial	0	0.0%	Non-glass Ceramics	20	0.0%
Plastic	2,491	0.3%	Metal	2,550	0.3%
PET Bottles	67	0.0%	Aluminum Cans	33	0.0%
HDPE Bottles, Clear	34	0.0%	Aluminum Foil/Containers	6	0.0%
HDPE Bottles, Colored	1,620	0.2%	Other Aluminum	13	0.0%
Plastic Film and Bags	420	0.0%	Copper	2	0.0%
Plastic Bottles Types 3 - 7	34	0.0%	Other Non-ferrous Metals	7	0.0%
Expanded Polystyrene	31	0.0%	Tin Cans	122	0.0%
Other Rigid Plastic Packaging	89	0.0%	White Goods	2,001	0.2%
Other Plastic Products	91	0.0%	Other Ferrous Metal	110	0.0%
Remainder/Composite Plastic	105	0.0%	Remainder/Composite Metals	257	0.0%
Organics	889,846	97.6%	Consumer Products	1,848	0.2%
Yard, Garden and Prunings	180,632	19.8%	Computers	0	0.0%
Food Waste	3,050	0.3%	Other Electronics	36	0.0%
Manures	20	0.0%	Textiles, Synthetic	31	0.0%
Disposable Diapers	138	0.0%	Textiles, Organic	86	0.0%
Carcasses, Offal	0	0.0%	Textiles, Mixed/Unknown	131	0.0%
Crop Residues	705,854	77.4%	Shoes	46	0.0%
Septage	0	0.0%	Tires and Other Rubber	1,487	0.2%
Remainder/Composite Organics	152	0.0%	Furniture and Mattresses	10	0.0%
Wood Wastes	182	0.0%	Carpet	1	0.0%
Natural Wood	3	0.0%	Carpet Padding	8	0.0%
Treated Wood	1	0.0%	Rejected Products	0	0.0%
Painted Wood	2	0.0%	Returned Products	0	0.0%
Dimensional Lumber	14	0.0%	Other Composite Consumer Products	12	0.0%
Engineered Wood	9	0.0%	Residuals	12,141	1.3%
Wood Packaging	148	0.0%	Ash	11,918	1.3%
Other Untreated Wood	0	0.0%	Dust	13	0.0%
Wood Byproducts	0	0.0%	Fines/Sorting Residues	210	0.0%
Remainder/Composite Wood	5	0.0%	Sludge and Other Industrial	0	0.0%
CDL Wastes	73	0.0%	Haz and Special Wastes	44	0.0%
Insulation	7	0.0%	Used Oil	1	0.0%
Asphalt	0	0.0%	Oil Filters	6	0.0%
Concrete	6	0.0%	Antifreeze	0	0.0%
Drywall	15	0.0%	Auto Batteries	0	0.0%
Soil, Rocks and Sand	20	0.0%	Household Batteries	7	0.0%
Roofing Waste	8	0.0%	Pesticides and Herbicides	4	0.0%
Ceramics	0	0.0%	Latex Paint	1	0.0%
Remainder/Composite CDL	18	0.0%	Oil Paint	0	0.0%
			Medical Waste	0	0.0%
Sample Count	23		Fluorescent Tubes	0	0.0%
			Asbestos	0	0.0%
Total Tons	911,515		Other Hazardous Waste	18	0.0%
			Other Non-hazardous Waste	6	0.0%

Table F-3: Composition by Weight – Veggies

Calculated at a 90% confidence level

	Tons	Mean		Tons	Mean
Paper	71	0.0%	Glass	13	0.0%
Newspaper	6	0.0%	Clear Glass Beverage	3	0.0%
Cardboard	18	0.0%	Green Glass Beverage	1	0.0%
Other Groundwood Paper	1	0.0%	Brown Glass Beverage	3	0.0%
High-grade Paper	4	0.0%	Clear Glass Container	4	0.0%
Magazines	5	0.0%	Green Glass Container	0	0.0%
Mixed/Low-grade Paper	15	0.0%	Brown Glass Container	0	0.0%
Compostable Paper	17	0.0%	Plate Glass	0	0.0%
Remainder/Composite Paper	3	0.0%	Remainder/Composite Glass	0	0.0%
Process Sludge/Other Industrial	0	0.0%	Non-glass Ceramics	1	0.0%
Plastic	50	0.0%	Metal	200	0.0%
PET Bottles	3	0.0%	Aluminum Cans	1	0.0%
HDPE Bottles, Clear	1	0.0%	Aluminum Foil/Containers	0	0.0%
HDPE Bottles, Colored	18	0.0%	Other Aluminum	0	0.0%
Plastic Film and Bags	11	0.0%	Copper	0	0.0%
Plastic Bottles Types 3 - 7	1	0.0%	Other Non-ferrous Metals	1	0.0%
Expanded Polystyrene	3	0.0%	Tin Cans	4	0.0%
Other Rigid Plastic Packaging	3	0.0%	White Goods	30	0.0%
Other Plastic Products	7	0.0%	Other Ferrous Metal	154	0.0%
Remainder/Composite Plastic	3	0.0%	Remainder/Composite Metals	9	0.0%
Organics	583,294	99.9%	Consumer Products	34	0.0%
Yard, Garden and Prunings	11	0.0%	Computers	0	0.0%
Food Waste	41	0.0%	Other Electronics	1	0.0%
Manures	1	0.0%	Textiles, Synthetic	1	0.0%
Disposable Diapers	5	0.0%	Textiles, Organic	2	0.0%
Carcasses, Offal	0	0.0%	Textiles, Mixed/Unknown	4	0.0%
Crop Residues	583,235	99.9%	Shoes	2	0.0%
Septage	0	0.0%	Tires and Other Rubber	21	0.0%
Remainder/Composite Organics	1	0.0%	Furniture and Mattresses	0	0.0%
Wood Wastes	4	0.0%	Carpet	0	0.0%
Natural Wood	0	0.0%	Carpet Padding	0	0.0%
Treated Wood	0	0.0%	Rejected Products	0	0.0%
Painted Wood	0	0.0%	Returned Products	0	0.0%
Dimensional Lumber	0	0.0%	Other Composite Consumer Products	2	0.0%
Engineered Wood	0	0.0%	Residuals	8	0.0%
Wood Packaging	3	0.0%	Ash	0	0.0%
Other Untreated Wood	0	0.0%	Dust	0	0.0%
Wood Byproducts	0	0.0%	Fines/Sorting Residues	8	0.0%
Remainder/Composite Wood	0	0.0%	Sludge and Other Industrial	0	0.0%
CDL Wastes	3	0.0%	Haz and Special Wastes	2	0.0%
Insulation	0	0.0%	Used Oil	0	0.0%
Asphalt	0	0.0%	Oil Filters	1	0.0%
Concrete	0	0.0%	Antifreeze	0	0.0%
Drywall	0	0.0%	Auto Batteries	0	0.0%
Soil, Rocks and Sand	1	0.0%	Household Batteries	0	0.0%
Roofing Waste	1	0.0%	Pesticides and Herbicides	0	0.0%
Ceramics	0	0.0%	Latex Paint	0	0.0%
Remainder/Composite CDL	1	0.0%	Oil Paint	0	0.0%
			Medical Waste	0	0.0%
Sample Count	9		Fluorescent Tubes	0	0.0%
			Asbestos	0	0.0%
Total Tons	583,679		Other Hazardous Waste	1	0.0%
			Other Non-hazardous Waste	0	0.0%

Table F-4: Composition by Weight – Livestock

Calculated at a 90% confidence level

	Tons	Mean		Tons	Mean
Paper	2,346	0.1%	Glass	106	0.0%
Newspaper	51	0.0%	Clear Glass Beverage	25	0.0%
Cardboard	1,242	0.0%	Green Glass Beverage	10	0.0%
Other Groundwood Paper	323	0.0%	Brown Glass Beverage	25	0.0%
High-grade Paper	29	0.0%	Clear Glass Container	36	0.0%
Magazines	44	0.0%	Green Glass Container	0	0.0%
Mixed/Low-grade Paper	136	0.0%	Brown Glass Container	1	0.0%
Compostable Paper	494	0.0%	Plate Glass	0	0.0%
Remainder/Composite Paper	28	0.0%	Remainder/Composite Glass	2	0.0%
Process Sludge/Other Industrial	0	0.0%	Non-glass Ceramics	6	0.0%
Plastic	1,102	0.0%	Metal	195	0.0%
PET Bottles	23	0.0%	Aluminum Cans	9	0.0%
HDPE Bottles, Clear	8	0.0%	Aluminum Foil/Containers	2	0.0%
HDPE Bottles, Colored	22	0.0%	Other Aluminum	4	0.0%
Plastic Film and Bags	547	0.0%	Copper	0	0.0%
Plastic Bottles Types 3 - 7	9	0.0%	Other Non-ferrous Metals	5	0.0%
Expanded Polystyrene	19	0.0%	Tin Cans	33	0.0%
Other Rigid Plastic Packaging	97	0.0%	White Goods	45	0.0%
Other Plastic Products	352	0.0%	Other Ferrous Metal	25	0.0%
Remainder/Composite Plastic	25	0.0%	Remainder/Composite Metals	71	0.0%
Organics	3,175,641	90.9%	Consumer Products	191	0.0%
Yard, Garden and Prunings	208	0.0%	Computers	0	0.0%
Food Waste	347	0.0%	Other Electronics	11	0.0%
Manures	3,159,831	90.5%	Textiles, Synthetic	82	0.0%
Disposable Diapers	41	0.0%	Textiles, Organic	20	0.0%
Carcasses, Offal	15,207	0.4%	Textiles, Mixed/Unknown	27	0.0%
Crop Residues	0	0.0%	Shoes	13	0.0%
Septage	0	0.0%	Tires and Other Rubber	28	0.0%
Remainder/Composite Organics	8	0.0%	Furniture and Mattresses	3	0.0%
Wood Wastes	313,626	9.0%	Carpet	0	0.0%
Natural Wood	1	0.0%	Carpet Padding	2	0.0%
Treated Wood	0	0.0%	Rejected Products	0	0.0%
Painted Wood	1	0.0%	Returned Products	0	0.0%
Dimensional Lumber	3	0.0%	Other Composite Consumer Products	6	0.0%
Engineered Wood	2	0.0%	Residuals	65	0.0%
Wood Packaging	115	0.0%	Ash	0	0.0%
Other Untreated Wood	0	0.0%	Dust	4	0.0%
Wood Byproducts	313,504	9.0%	Fines/Sorting Residues	61	0.0%
Remainder/Composite Wood	1	0.0%	Sludge and Other Industrial	0	0.0%
CDL Wastes	20	0.0%	Haz and Special Wastes	19	0.0%
Insulation	2	0.0%	Used Oil	0	0.0%
Asphalt	0	0.0%	Oil Filters	9	0.0%
Concrete	0	0.0%	Antifreeze	0	0.0%
Drywall	0	0.0%	Auto Batteries	0	0.0%
Soil, Rocks and Sand	6	0.0%	Household Batteries	2	0.0%
Roofing Waste	6	0.0%	Pesticides and Herbicides	1	0.0%
Ceramics	0	0.0%	Latex Paint	0	0.0%
Remainder/Composite CDL	5	0.0%	Oil Paint	0	0.0%
			Medical Waste	0	0.0%
Sample Count	18		Fluorescent Tubes	0	0.0%
			Asbestos	0	0.0%
Total Tons	3,493,312		Other Hazardous Waste	5	0.0%
			Other Non-hazardous Waste	2	0.0%

Table F-5: Composition by Weight – Mining

Calculated at a 90% confidence level

	Tons	Mean		Tons	Mean
Paper	654	0.0%	Glass	0	0.0%
Newspaper	2	0.0%	Clear Glass Beverage	0	0.0%
Cardboard	287	0.0%	Green Glass Beverage	0	0.0%
Other Groundwood Paper	0	0.0%	Brown Glass Beverage	0	0.0%
High-grade Paper	83	0.0%	Clear Glass Container	0	0.0%
Magazines	1	0.0%	Green Glass Container	0	0.0%
Mixed/Low-grade Paper	88	0.0%	Brown Glass Container	0	0.0%
Compostable Paper	194	0.0%	Plate Glass	0	0.0%
Remainder/Composite Paper	0	0.0%	Remainder/Composite Glass	0	0.0%
Process Sludge/Other Industrial	0	0.0%	Non-glass Ceramics	0	0.0%
Plastic	429	0.0%	Metal	56	0.0%
PET Bottles	0	0.0%	Aluminum Cans	1	0.0%
HDPE Bottles, Clear	0	0.0%	Aluminum Foil/Containers	0	0.0%
HDPE Bottles, Colored	0	0.0%	Other Aluminum	5	0.0%
Plastic Film and Bags	417	0.0%	Copper	17	0.0%
Plastic Bottles Types 3 - 7	0	0.0%	Other Non-ferrous Metals	0	0.0%
Expanded Polystyrene	0	0.0%	Tin Cans	0	0.0%
Other Rigid Plastic Packaging	11	0.0%	White Goods	0	0.0%
Other Plastic Products	0	0.0%	Other Ferrous Metal	33	0.0%
Remainder/Composite Plastic	0	0.0%	Remainder/Composite Metals	0	0.0%
Organics	309	0.0%	Consumer Products	14,039	0.3%
Yard, Garden and Prunings	0	0.0%	Computers	0	0.0%
Food Waste	309	0.0%	Other Electronics	0	0.0%
Manures	0	0.0%	Textiles, Synthetic	0	0.0%
Disposable Diapers	0	0.0%	Textiles, Organic	7	0.0%
Carcasses, Offal	0	0.0%	Textiles, Mixed/Unknown	0	0.0%
Crop Residues	0	0.0%	Shoes	0	0.0%
Septage	0	0.0%	Tires and Other Rubber	3,301	0.1%
Remainder/Composite Organics	0	0.0%	Furniture and Mattresses	0	0.0%
Wood Wastes	3,645	0.1%	Carpet	0	0.0%
Natural Wood	0	0.0%	Carpet Padding	0	0.0%
Treated Wood	0	0.0%	Rejected Products	10,731	0.3%
Painted Wood	0	0.0%	Returned Products	0	0.0%
Dimensional Lumber	1	0.0%	Other Composite Consumer Products	0	0.0%
Engineered Wood	0	0.0%	Residuals	2	0.0%
Wood Packaging	3,644	0.1%	Ash	0	0.0%
Other Untreated Wood	0	0.0%	Dust	0	0.0%
Wood Byproducts	0	0.0%	Fines/Sorting Residues	2	0.0%
Remainder/Composite Wood	0	0.0%	Sludge and Other Industrial	0	0.0%
CDL Wastes	4,035,544	99.5%	Haz and Special Wastes	68	0.0%
Insulation	0	0.0%	Used Oil	0	0.0%
Asphalt	0	0.0%	Oil Filters	4	0.0%
Concrete	0	0.0%	Antifreeze	0	0.0%
Drywall	0	0.0%	Auto Batteries	0	0.0%
Soil, Rocks and Sand	4,035,544	99.5%	Household Batteries	0	0.0%
Roofing Waste	0	0.0%	Pesticides and Herbicides	0	0.0%
Ceramics	0	0.0%	Latex Paint	0	0.0%
Remainder/Composite CDL	0	0.0%	Oil Paint	0	0.0%
			Medical Waste	0	0.0%
Sample Count	21		Fluorescent Tubes	64	0.0%
			Asbestos	0	0.0%
Total Tons	4,054,747		Other Hazardous Waste	0	0.0%
			Other Non-hazardous Waste	0	0.0%

Table F-6: Composition by Weight – C&D

Calculated at a 90% confidence level

	Tons	Mean		Tons	Mean
Paper	60,149	6.1%	Glass	1,133	0.1%
Newspaper	245	0.0%	Clear Glass Beverage	396	0.0%
Cardboard	28,963	3.0%	Green Glass Beverage	616	0.1%
Other Groundwood Paper	169	0.0%	Brown Glass Beverage	0	0.0%
High-grade Paper	167	0.0%	Clear Glass Container	0	0.0%
Magazines	135	0.0%	Green Glass Container	0	0.0%
Mixed/Low-grade Paper	3,587	0.4%	Brown Glass Container	0	0.0%
Compostable Paper	787	0.1%	Plate Glass	0	0.0%
Remainder/Composite Paper	26,096	2.7%	Remainder/Composite Glass	71	0.0%
Process Sludge/Other Industrial	0	0.0%	Non-glass Ceramics	50	0.0%
Plastic	58,769	6.0%	Metal	34,680	3.5%
PET Bottles	1,117	0.1%	Aluminum Cans	371	0.0%
HDPE Bottles, Clear	67	0.0%	Aluminum Foil/Containers	175	0.0%
HDPE Bottles, Colored	280	0.0%	Other Aluminum	0	0.0%
Plastic Film and Bags	16,259	1.7%	Copper	37	0.0%
Plastic Bottles Types 3 - 7	0	0.0%	Other Non-ferrous Metals	0	0.0%
Expanded Polystyrene	1,009	0.1%	Tin Cans	874	0.1%
Other Rigid Plastic Packaging	3,712	0.4%	White Goods	14,839	1.5%
Other Plastic Products	35,662	3.6%	Other Ferrous Metal	17,129	1.7%
Remainder/Composite Plastic	662	0.1%	Remainder/Composite Metals	1,253	0.1%
Organics	6,972	0.7%	Consumer Products	50,408	5.1%
Yard, Garden and Prunings	0	0.0%	Computers	0	0.0%
Food Waste	6,864	0.7%	Other Electronics	0	0.0%
Manures	0	0.0%	Textiles, Synthetic	0	0.0%
Disposable Diapers	107	0.0%	Textiles, Organic	564	0.1%
Carcasses, Offal	0	0.0%	Textiles, Mixed/Unknown	451	0.0%
Crop Residues	0	0.0%	Shoes	0	0.0%
Septage	0	0.0%	Tires and Other Rubber	0	0.0%
Remainder/Composite Organics	0	0.0%	Furniture and Mattresses	0	0.0%
Wood Wastes	376,095	38.3%	Carpet	23,024	2.3%
Natural Wood	0	0.0%	Carpet Padding	26,368	2.7%
Treated Wood	78,049	8.0%	Rejected Products	0	0.0%
Painted Wood	56,906	5.8%	Returned Products	0	0.0%
Dimensional Lumber	151,238	15.4%	Other Composite Consumer Products	0	0.0%
Engineered Wood	87,125	8.9%	Residuals	10,822	1.1%
Wood Packaging	0	0.0%	Ash	0	0.0%
Other Untreated Wood	2,740	0.3%	Dust	37	0.0%
Wood Byproducts	0	0.0%	Fines/Sorting Residues	10,786	1.1%
Remainder/Composite Wood	37	0.0%	Sludge and Other Industrial	0	0.0%
CDL Wastes	382,299	39.0%	Haz and Special Wastes	0	0.0%
Insulation	13,975	1.4%	Used Oil	0	0.0%
Asphalt	0	0.0%	Oil Filters	0	0.0%
Concrete	7,403	0.8%	Antifreeze	0	0.0%
Drywall	104,968	10.7%	Auto Batteries	0	0.0%
Soil, Rocks and Sand	0	0.0%	Household Batteries	0	0.0%
Roofing Waste	252,259	25.7%	Pesticides and Herbicides	0	0.0%
Ceramics	270	0.0%	Latex Paint	0	0.0%
Remainder/Composite CDL	3,424	0.3%	Oil Paint	0	0.0%
			Medical Waste	0	0.0%
Sample Count	22		Fluorescent Tubes	0	0.0%
			Asbestos	0	0.0%
Total Tons	981,327		Other Hazardous Waste	0	0.0%
			Other Non-hazardous Waste	0	0.0%

Table F-7: Composition by Weight – Paper

Calculated at a 90% confidence level

	Tons	Mean		Tons	Mean
Paper	2,363,324	90.9%	Glass	0	0.0%
Newspaper	72	0.0%	Clear Glass Beverage	0	0.0%
Cardboard	1,634	0.1%	Green Glass Beverage	0	0.0%
Other Groundwood Paper	29	0.0%	Brown Glass Beverage	0	0.0%
High-grade Paper	39	0.0%	Clear Glass Container	0	0.0%
Magazines	75	0.0%	Green Glass Container	0	0.0%
Mixed/Low-grade Paper	13,158	0.5%	Brown Glass Container	0	0.0%
Compostable Paper	395	0.0%	Plate Glass	0	0.0%
Remainder/Composite Paper	5,740	0.2%	Remainder/Composite Glass	0	0.0%
Process Sludge/Other Industrial	2,342,183	90.1%	Non-glass Ceramics	0	0.0%
Plastic	35,376	1.4%	Metal	48,632	1.9%
PET Bottles	5,234	0.2%	Aluminum Cans	5,420	0.2%
HDPE Bottles, Clear	5,659	0.2%	Aluminum Foil/Containers	376	0.0%
HDPE Bottles, Colored	1,462	0.1%	Other Aluminum	133	0.0%
Plastic Film and Bags	13,464	0.5%	Copper	250	0.0%
Plastic Bottles Types 3 - 7	423	0.0%	Other Non-ferrous Metals	10,750	0.4%
Expanded Polystyrene	448	0.0%	Tin Cans	12,306	0.5%
Other Rigid Plastic Packaging	6,300	0.2%	White Goods	0	0.0%
Other Plastic Products	1,847	0.1%	Other Ferrous Metal	17,918	0.7%
Remainder/Composite Plastic	539	0.0%	Remainder/Composite Metals	1,480	0.1%
Organics	2,529	0.1%	Consumer Products	31,371	1.2%
Yard, Garden and Prunings	74	0.0%	Computers	0	0.0%
Food Waste	1,321	0.1%	Other Electronics	0	0.0%
Manures	372	0.0%	Textiles, Synthetic	377	0.0%
Disposable Diapers	762	0.0%	Textiles, Organic	438	0.0%
Carcasses, Offal	0	0.0%	Textiles, Mixed/Unknown	2,809	0.1%
Crop Residues	0	0.0%	Shoes	0	0.0%
Septage	0	0.0%	Tires and Other Rubber	2,301	0.1%
Remainder/Composite Organics	0	0.0%	Furniture and Mattresses	0	0.0%
Wood Wastes	4,079	0.2%	Carpet	420	0.0%
Natural Wood	0	0.0%	Carpet Padding	0	0.0%
Treated Wood	0	0.0%	Rejected Products	25,025	1.0%
Painted Wood	702	0.0%	Returned Products	0	0.0%
Dimensional Lumber	1,983	0.1%	Other Composite Consumer Products	0	0.0%
Engineered Wood	198	0.0%	Residuals	113,891	4.4%
Wood Packaging	0	0.0%	Ash	2,225	0.1%
Other Untreated Wood	17	0.0%	Dust	0	0.0%
Wood Byproducts	0	0.0%	Fines/Sorting Residues	4,403	0.2%
Remainder/Composite Wood	1,180	0.0%	Sludge and Other Industrial	107,262	4.1%
CDL Wastes	399	0.0%	Haz and Special Wastes	141	0.0%
Insulation	0	0.0%	Used Oil	0	0.0%
Asphalt	0	0.0%	Oil Filters	0	0.0%
Concrete	0	0.0%	Antifreeze	0	0.0%
Drywall	0	0.0%	Auto Batteries	0	0.0%
Soil, Rocks and Sand	43	0.0%	Household Batteries	105	0.0%
Roofing Waste	0	0.0%	Pesticides and Herbicides	0	0.0%
Ceramics	71	0.0%	Latex Paint	0	0.0%
Remainder/Composite CDL	284	0.0%	Oil Paint	0	0.0%
			Medical Waste	0	0.0%
Sample Count	18		Fluorescent Tubes	0	0.0%
			Asbestos	0	0.0%
Total Tons	2,599,741		Other Hazardous Waste	14	0.0%
			Other Non-hazardous Waste	21	0.0%

Table F-8: Composition by Weight – Logging

Calculated at a 90% confidence level

	Tons	Mean		Tons	Mean
Paper	1,165	0.0%	Glass	91	0.0%
Newspaper	142	0.0%	Clear Glass Beverage	62	0.0%
Cardboard	282	0.0%	Green Glass Beverage	6	0.0%
Other Groundwood Paper	6	0.0%	Brown Glass Beverage	1	0.0%
High-grade Paper	61	0.0%	Clear Glass Container	0	0.0%
Magazines	52	0.0%	Green Glass Container	0	0.0%
Mixed/Low-grade Paper	181	0.0%	Brown Glass Container	0	0.0%
Compostable Paper	268	0.0%	Plate Glass	2	0.0%
Remainder/Composite Paper	172	0.0%	Remainder/Composite Glass	17	0.0%
Process Sludge/Other Industrial	0	0.0%	Non-glass Ceramics	2	0.0%
Plastic	654	0.0%	Metal	761	0.0%
PET Bottles	96	0.0%	Aluminum Cans	39	0.0%
HDPE Bottles, Clear	10	0.0%	Aluminum Foil/Containers	14	0.0%
HDPE Bottles, Colored	20	0.0%	Other Aluminum	0	0.0%
Plastic Film and Bags	229	0.0%	Copper	0	0.0%
Plastic Bottles Types 3 - 7	3	0.0%	Other Non-ferrous Metals	7	0.0%
Expanded Polystyrene	35	0.0%	Tin Cans	376	0.0%
Other Rigid Plastic Packaging	33	0.0%	White Goods	0	0.0%
Other Plastic Products	207	0.0%	Other Ferrous Metal	238	0.0%
Remainder/Composite Plastic	21	0.0%	Remainder/Composite Metals	87	0.0%
Organics	921	0.0%	Consumer Products	642	0.0%
Yard, Garden and Prunings	16	0.0%	Computers	0	0.0%
Food Waste	438	0.0%	Other Electronics	0	0.0%
Manures	0	0.0%	Textiles, Synthetic	0	0.0%
Disposable Diapers	0	0.0%	Textiles, Organic	312	0.0%
Carcasses, Offal	0	0.0%	Textiles, Mixed/Unknown	105	0.0%
Crop Residues	0	0.0%	Shoes	0	0.0%
Septage	0	0.0%	Tires and Other Rubber	26	0.0%
Remainder/Composite Organics	466	0.0%	Furniture and Mattresses	0	0.0%
Wood Wastes	8,888,205	99.9%	Carpet	0	0.0%
Natural Wood	32,411	0.4%	Carpet Padding	0	0.0%
Treated Wood	2,761	0.0%	Rejected Products	157	0.0%
Painted Wood	0	0.0%	Returned Products	0	0.0%
Dimensional Lumber	1,976	0.0%	Other Composite Consumer Products	41	0.0%
Engineered Wood	676	0.0%	Residuals	1,123	0.0%
Wood Packaging	0	0.0%	Ash	0	0.0%
Other Untreated Wood	0	0.0%	Dust	0	0.0%
Wood Byproducts	8,850,381	99.5%	Fines/Sorting Residues	143	0.0%
Remainder/Composite Wood	0	0.0%	Sludge and Other Industrial	980	0.0%
CDL Wastes	221	0.0%	Haz and Special Wastes	2,376	0.0%
Insulation	0	0.0%	Used Oil	6	0.0%
Asphalt	0	0.0%	Oil Filters	12	0.0%
Concrete	0	0.0%	Antifreeze	0	0.0%
Drywall	0	0.0%	Auto Batteries	0	0.0%
Soil, Rocks and Sand	49	0.0%	Household Batteries	0	0.0%
Roofing Waste	0	0.0%	Pesticides and Herbicides	0	0.0%
Ceramics	0	0.0%	Latex Paint	10	0.0%
Remainder/Composite CDL	172	0.0%	Oil Paint	6	0.0%
			Medical Waste	0	0.0%
Sample Count	10		Fluorescent Tubes	0	0.0%
			Asbestos	0	0.0%
Total Tons	8,896,158		Other Hazardous Waste	0	0.0%
			Other Non-hazardous Waste	2,341	0.0%

Table F-9: Composition by Weight – Food Processing

Calculated at a 90% confidence level

	Tons	Mean		Tons	Mean
Paper	18,905	1.4%	Glass	710	0.1%
Newspaper	567	0.0%	Clear Glass Beverage	282	0.0%
Cardboard	4,486	0.3%	Green Glass Beverage	260	0.0%
Other Groundwood Paper	427	0.0%	Brown Glass Beverage	97	0.0%
High-grade Paper	2,315	0.2%	Clear Glass Container	0	0.0%
Magazines	965	0.1%	Green Glass Container	34	0.0%
Mixed/Low-grade Paper	2,328	0.2%	Brown Glass Container	0	0.0%
Compostable Paper	813	0.1%	Plate Glass	0	0.0%
Remainder/Composite Paper	7,004	0.5%	Remainder/Composite Glass	37	0.0%
Process Sludge/Other Industrial	0	0.0%	Non-glass Ceramics	0	0.0%
Plastic	8,720	0.7%	Metal	3,638	0.3%
PET Bottles	195	0.0%	Aluminum Cans	35	0.0%
HDPE Bottles, Clear	210	0.0%	Aluminum Foil/Containers	0	0.0%
HDPE Bottles, Colored	210	0.0%	Other Aluminum	0	0.0%
Plastic Film and Bags	6,307	0.5%	Copper	0	0.0%
Plastic Bottles Types 3 - 7	86	0.0%	Other Non-ferrous Metals	30	0.0%
Expanded Polystyrene	14	0.0%	Tin Cans	412	0.0%
Other Rigid Plastic Packaging	1	0.0%	White Goods	0	0.0%
Other Plastic Products	526	0.0%	Other Ferrous Metal	2,519	0.2%
Remainder/Composite Plastic	1,170	0.1%	Remainder/Composite Metals	642	0.0%
Organics	1,263,421	95.4%	Consumer Products	2,366	0.2%
Yard, Garden and Prunings	175	0.0%	Computers	0	0.0%
Food Waste	1,243,170	93.9%	Other Electronics	0	0.0%
Manures	0	0.0%	Textiles, Synthetic	0	0.0%
Disposable Diapers	0	0.0%	Textiles, Organic	0	0.0%
Carcasses, Offal	0	0.0%	Textiles, Mixed/Unknown	1,816	0.1%
Crop Residues	0	0.0%	Shoes	49	0.0%
Septage	0	0.0%	Tires and Other Rubber	0	0.0%
Remainder/Composite Organics	20,077	1.5%	Furniture and Mattresses	0	0.0%
Wood Wastes	6,738	0.5%	Carpet	0	0.0%
Natural Wood	33	0.0%	Carpet Padding	0	0.0%
Treated Wood	0	0.0%	Rejected Products	0	0.0%
Painted Wood	0	0.0%	Returned Products	0	0.0%
Dimensional Lumber	127	0.0%	Other Composite Consumer Products	500	0.0%
Engineered Wood	0	0.0%	Residuals	19,537	1.5%
Wood Packaging	6,575	0.5%	Ash	0	0.0%
Other Untreated Wood	0	0.0%	Dust	0	0.0%
Wood Byproducts	3	0.0%	Fines/Sorting Residues	143	0.0%
Remainder/Composite Wood	0	0.0%	Sludge and Other Industrial	19,394	1.5%
CDL Wastes	530	0.0%	Haz and Special Wastes	17	0.0%
Insulation	0	0.0%	Used Oil	0	0.0%
Asphalt	0	0.0%	Oil Filters	0	0.0%
Concrete	241	0.0%	Antifreeze	0	0.0%
Drywall	260	0.0%	Auto Batteries	0	0.0%
Soil, Rocks and Sand	9	0.0%	Household Batteries	9	0.0%
Roofing Waste	0	0.0%	Pesticides and Herbicides	0	0.0%
Ceramics	0	0.0%	Latex Paint	0	0.0%
Remainder/Composite CDL	20	0.0%	Oil Paint	0	0.0%
			Medical Waste	0	0.0%
Sample Count	18		Fluorescent Tubes	0	0.0%
			Asbestos	0	0.0%
Total Tons	1,324,583		Other Hazardous Waste	8	0.0%
			Other Non-hazardous Waste	0	0.0%