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SOUTHCENTRAL REGION MSW COMPOSITION

Introduction

DEP manages Pennsylvania’s waste stream via a network of six regional offices. An objective of this study was to derive results for each of the regions in the Commonwealth. Aggregate State-wide results are provided in Section 4 of this report. The purpose of this section is to provide detailed results specifically for the Southcentral Region. A map of the Southcentral region is shown in Figure 1.

Figure 1 Southcentral Region Map

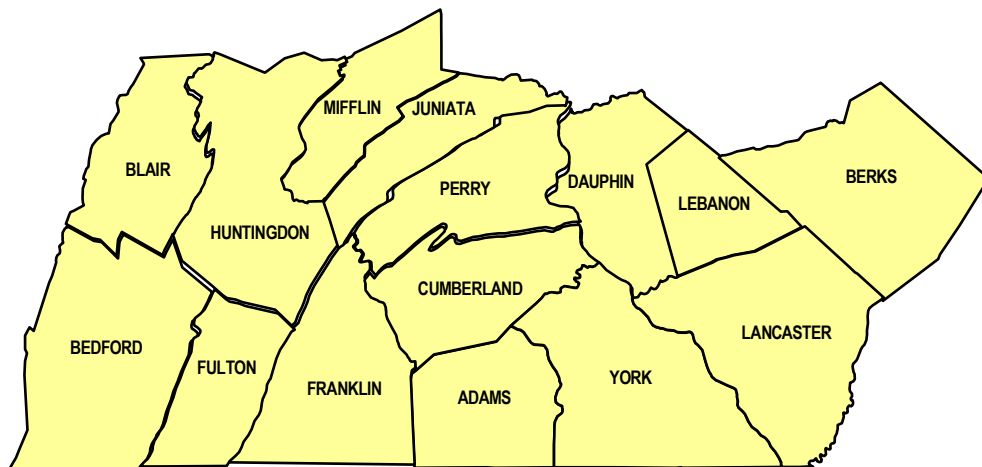


Table 1 summarizes the demographic and economic characteristics of the Southcentral region.

Table 1 Southcentral Region Demographic Summary

	Urban	Suburban	Rural	Total
Communities [1]	5	108	437	550
Population [1]	276,890	926,053	1,181,392	2,384,335
Housing Units [1]	110,266	369,733	467,418	947,417
Employment [2]	145,774	434,103	332,718	912,595

[1] Source: 2001 U.S. Census data provided by DEP

[2] Source: 2001 estimates provided by ESRI-BIS, Arlington, VA, based on U.S. Census data.

Table 2 summarizes the waste that was reported by the Commonwealth’s landfills (and incinerators) to have been disposed from each County within the Southcentral region in 2001.

Table 2 Southcentral Region Waste Disposal Summary [1]

County	MSW Disposed (tons)
Adams	39,970
Bedford	20,851
Berks	273,437
Blair	124,742
Cumberland	167,209
Dauphin	200,222
Franklin	88,593
Fulton	5,279
Huntingdon	18,602
Juniata	10,250
Lancaster	312,881
Lebanon	70,817
Mifflin	21,690
Perry	13,501
York	268,148
Total	1,636,192

[1] Source: County-level disposal quantity estimates are based on the 2001 DEP landfill disposal database

In order to aggregate the MSW composition data that was collected in this study, it was necessary to develop estimates of waste generation by county within the region. This was performed in the following steps:

- 1) Surveying urban, suburban, and rural communities across the Commonwealth to compile urban, suburban and rural residential MSW disposal factors (tons of disposed MSW per household per year);
- 2) Applying the residential generation factors to the total households in the region to estimate total disposed residential waste;
- 3) Estimating total regional waste disposed based on a statistical analysis of reported county-level waste disposal records relative to county-level population and employment; and
- 4) Netting out residential waste to calculate disposed commercial waste quantities.

The results of this process are shown in Table 3 for the Southcentral Region.

Table 3 Southcentral Region Disposed MSW Summary (tons) [1]

Waste Generating Sector	Tons of Waste Disposed			
	Urban	Suburban	Rural	Total
Residential generators	99,317	422,542	478,951	1,000,810
Commercial generators	87,603	265,304	282,474	635,382
Total	186,920	687,846	761,425	1,636,192

[1] Source: 2001 DEP database of disposed tons as reported by Pennsylvania disposal facilities.

In order to develop composition estimates for each of these demographic areas and generating sectors, field sampling was performed at two waste processing and disposal facilities:

- Lancaster RRF (Lancaster, Lancaster County); and
- Mountain View Landfill (Greencastle, Franklin County).

Sampling at these facilities was performed across four seasons to account for seasonal variation in MSW composition. Table 4 summarizes the sampling summary for the Southcentral Region.

Table 4 Southcentral Region Sampling Summary

Waste Generating Sector	Number of Samples			
	Urban	Suburban	Rural	Total
Physical MSW Samples				
Residential	38	29	41	108
Commercial	28	33	37	98
Subtotal—physical samples	66	62	78	206
Visual Bulk Waste Samples	28	18	55	101
Total Samples	94	80	133	307

Regional Aggregate Results

The remainder of this section presents a graphical and tabular summary of the Southcentral region’s disposed MSW composition. Specific figures and tables are summarized below.

- Figure 2 is a pie chart that shows the percentage composition of major material groups in the aggregate regional waste stream.
- Figure 3 is a bar chart that shows the estimated mean quantities of material disposed (or incinerated) from the region, again by major material group.

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- Figure 4 compares the incidence of recyclable materials as targeted in Act 101 that were found to be disposed by residential and commercial generators in the region.
- Figure 5 shows the 10 most prevalent materials being disposed in the region, by weight.
- Table 5 contains a detailed statistical presentation of the aggregate MSW composition in the region. This tabular summary includes the statistical mean composition, as well as the standard deviation, upper and lower confidence intervals, and a “sampling error”. The sampling error indicates the width of the confidence intervals relative to the mean. Lower sampling error signifies narrower confidence intervals (and therefore greater certainty of the mean composition shown).
- Figure 6 compares the percentage of disposed MSW landfilled from urban, suburban and rural communities within the region.
- Table 6 compares the mean composition of disposed MSW from urban, suburban and rural communities within the region.

Results by Generating Sector

An objective of the study was to compare and contrast the composition of residential and commercial waste within the region.

- Figure 7 and Figure 8 summarize the percentage of MSW landfilled by major material group for residential generators and commercial generators, respectively.
- Tables 7 and 8, like Table 6, compare the mean composition of urban, suburban, and rural waste. Table 7 focuses on residential generators in the region, while Table 8 shows the same comparison for commercial generators.

Bulky Waste

The State-wide MSW sort primarily targeted residential and commercial compacting vehicles, as well as commercial compacting and open-top roll-offs carrying non-C&D and non-industrial waste. These loads make up the majority of loads entering the Commonwealth’s disposal facilities. However, it was expected at the outset of the study that some incoming loads of MSW—primarily those in open-top roll-off vehicles—would contain bulky waste that was not conducive to physical sorting. Therefore, the study methodology allowed for selected visual, volumetric sampling of bulky loads to the extent they were observed during the sampling and sorting process.

- Figure 9 shows the weight percentage composition of bulky items by major material group. Bulky loads were found to include a range of materials, including multi-family move-outs, residential and commercial clean-outs, miscellaneous commercial waste, and some renovation and construction type waste (although pure C&D loads were excluded from the analysis).

- Figure 10 lists the top 10 most prevalent bulky materials disposed during the study.

Self Haul Waste

Self haulers were found to deliver only a small fraction of waste to disposal facilities during the study. Our sampling plan allowed for selected sampling of self-haulers, which include: residential haulers of renovation and/or clean-out waste, and commercial contractors hauling small renovation, construction, land clearing, and/or clean-out type waste. Note that an insufficient number of self-haul samples were obtained to develop region-specific results.

Figure 2
Southcentral Region Aggregate MSW Composition

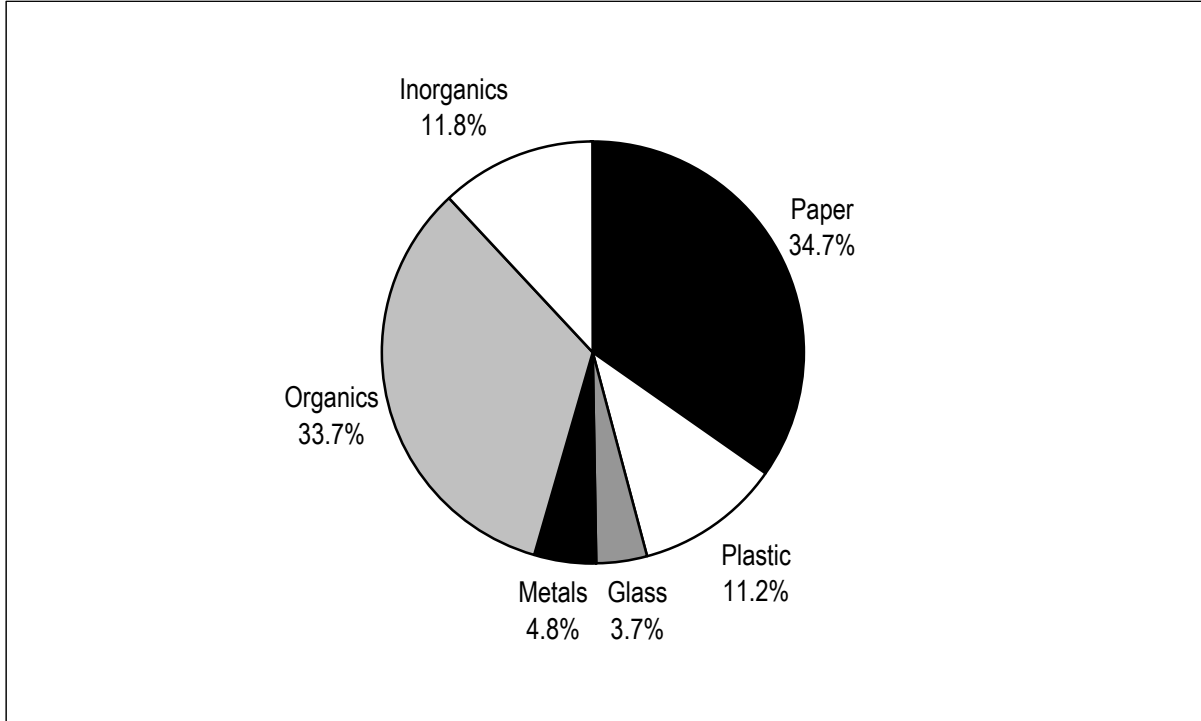


Figure 3
Southcentral Region Aggregate MSW Tons Disposed

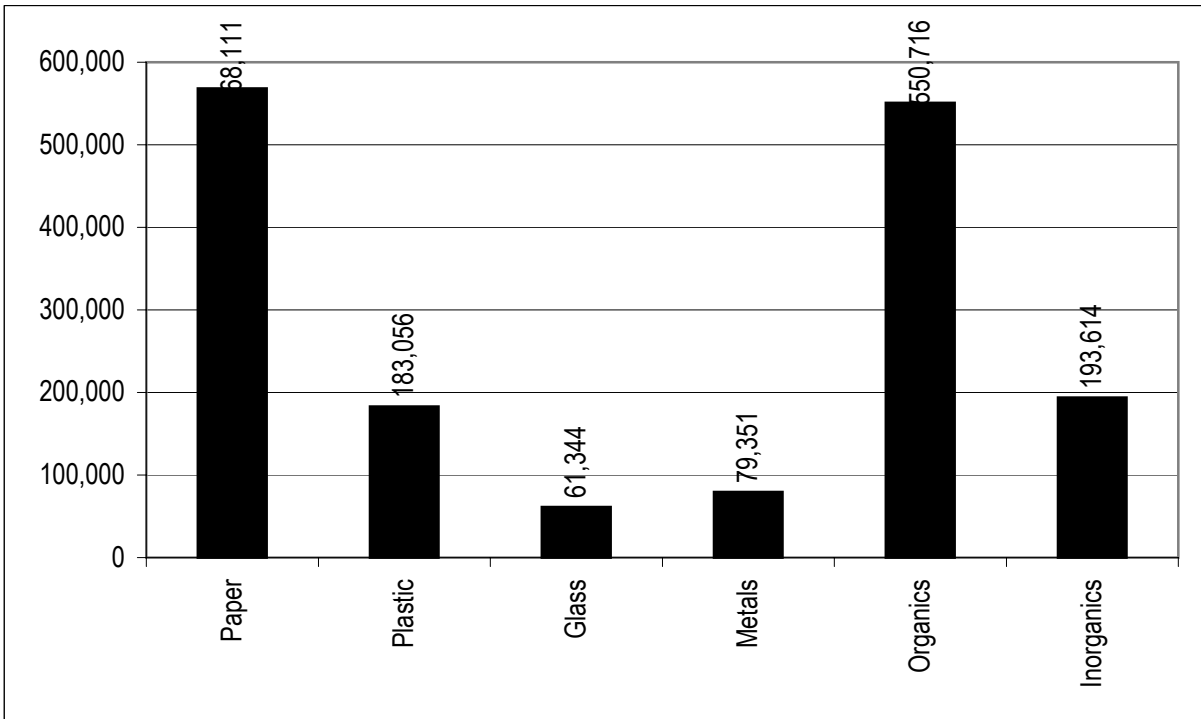


Figure 4
Act 101- Recyclables in Disposed MSW (tons)

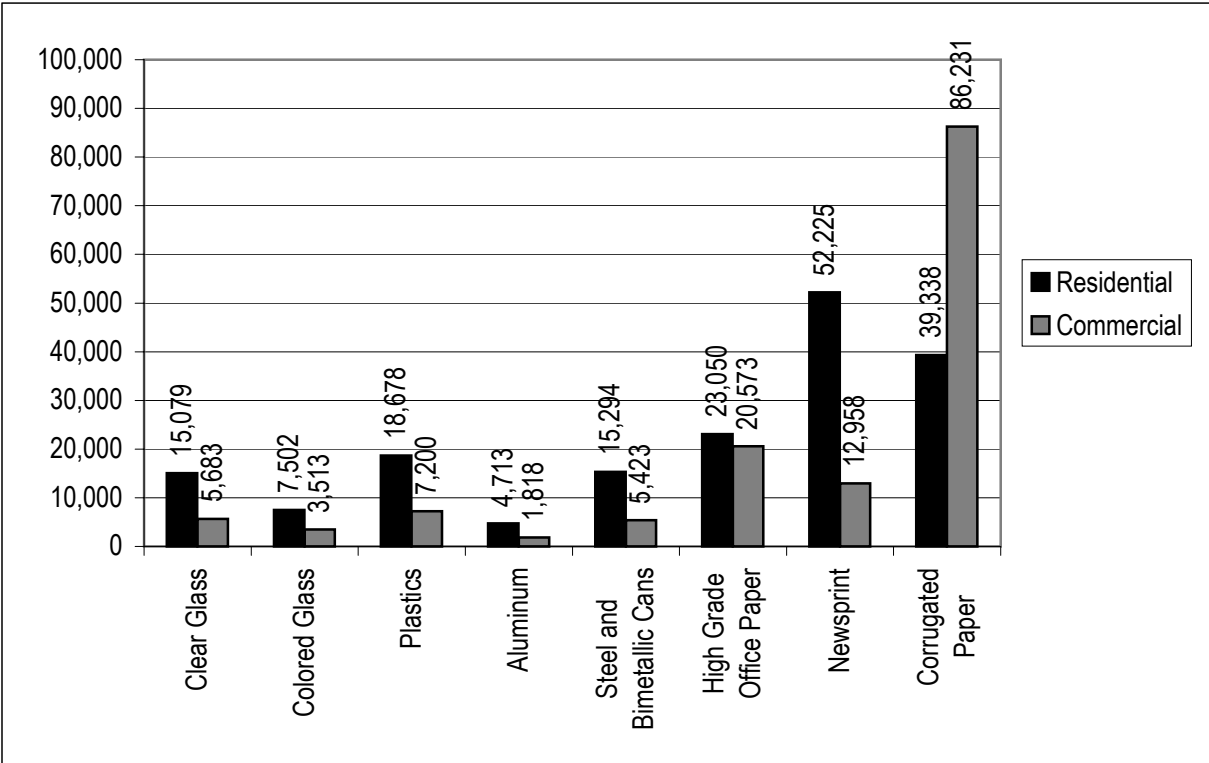
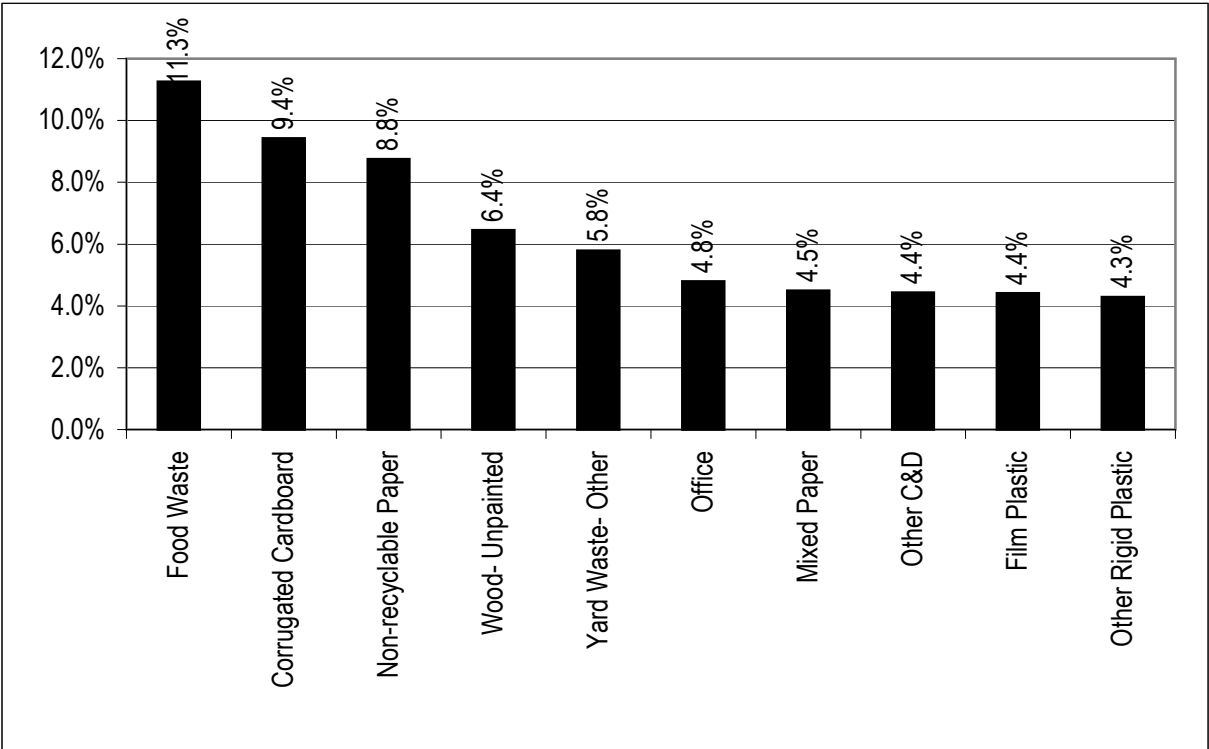


Figure 5
Southcentral Region Top 10 Most Prevalent Materials



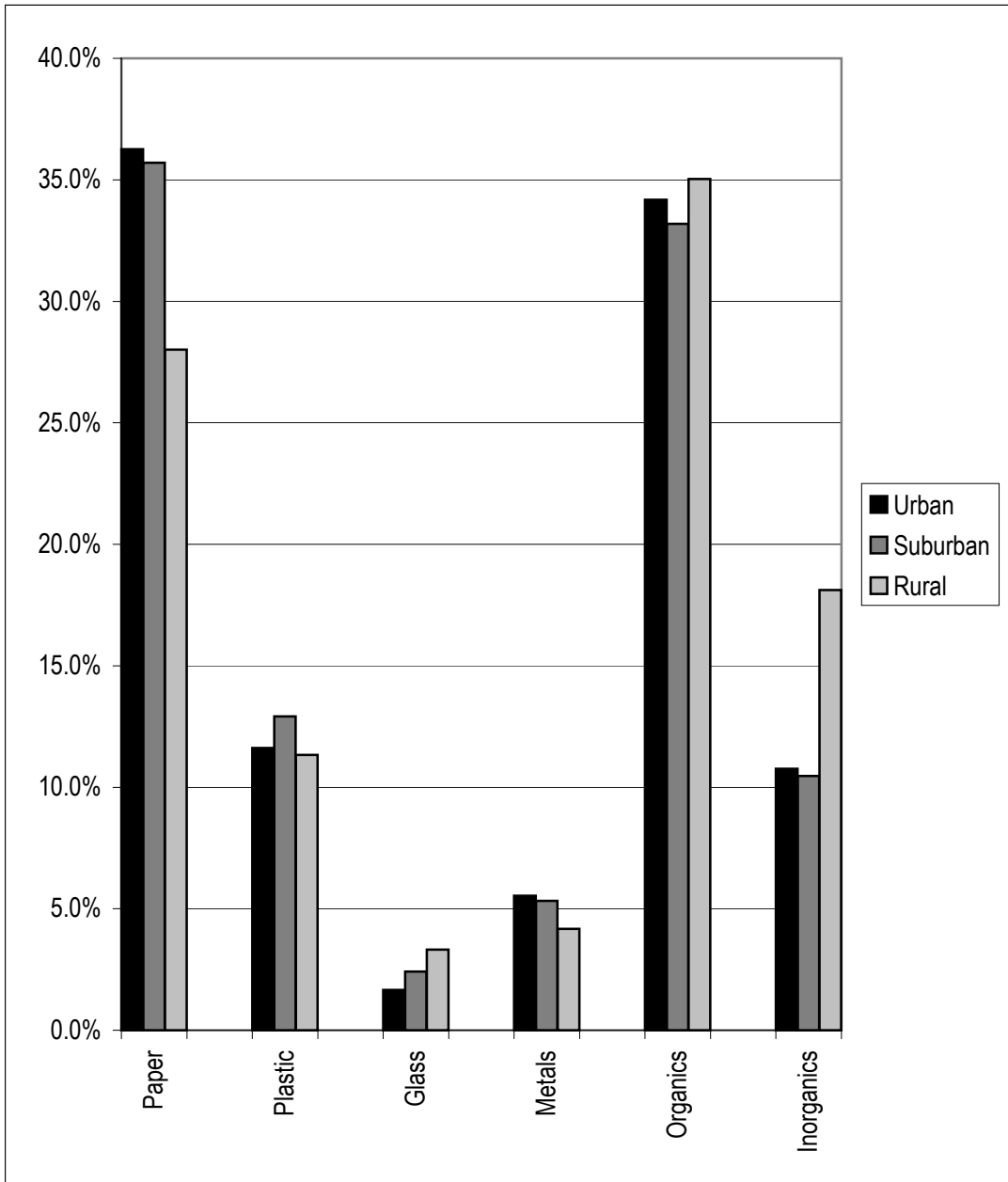
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**Table 5
Southcentral Region Aggregate Landfilled MSW Composition Detail (Weight Percent)**

	Material Categories	Tons Disposed	Mean Composition	Standard Deviation	Confidence Interval		Sampling Error
					Lower (%)	Upper (%)	
Paper		568,111	34.7%	19.2%	31.7%	38.0%	9.1%
	1 Newspaper	59,388	3.6%	3.8%	3.1%	4.3%	16.4%
	2 Corrugated Cardboard	154,192	9.4%	9.4%	8.1%	11.3%	16.7%
	3 Office	78,425	4.8%	6.3%	3.8%	6.3%	26.5%
	4 Magazine/ Glossy	50,690	3.1%	3.0%	2.7%	3.7%	17.0%
	5 Polycoated/Aseptic Containers	8,738	0.5%	1.4%	0.4%	0.7%	20.7%
	6 Mixed Paper	73,505	4.5%	4.6%	4.0%	5.2%	14.0%
	7 Non-recyclable Paper	143,173	8.8%	6.2%	7.8%	10.1%	13.2%
Plastic		183,056	11.2%	9.1%	10.0%	12.5%	11.2%
	8 #1 PET Bottles	15,150	0.9%	0.6%	0.8%	1.1%	15.5%
	9 #2 HDPE Bottles	8,614	0.5%	0.8%	0.5%	0.6%	15.8%
	10 #3-#7 Bottles	3,117	0.2%	0.3%	0.2%	0.2%	24.7%
	11 Expanded Polystyrene	13,824	0.8%	0.9%	0.7%	1.0%	19.2%
	12 Film Plastic	72,152	4.4%	5.5%	3.9%	5.1%	13.9%
	13 Other Rigid Plastic	70,198	4.3%	5.0%	3.7%	5.1%	15.2%
Glass		61,344	3.7%	4.0%	3.2%	4.4%	15.9%
	14 Clear Glass	26,181	1.6%	1.5%	1.4%	1.9%	18.2%
	15 Green Glass	10,648	0.7%	0.5%	0.5%	0.9%	28.1%
	16 Amber Glass	16,871	1.0%	0.7%	0.8%	1.3%	22.0%
	17 Non-recyclable Glass	7,644	0.5%	3.1%	0.4%	0.6%	29.6%
Metals		79,351	4.8%	7.8%	4.3%	5.5%	13.2%
	18 Steel Cans	12,590	0.8%	1.3%	0.7%	0.9%	16.5%
	19 Aluminum Cans	9,303	0.6%	0.4%	0.5%	0.7%	18.3%
	20 Other Ferrous	45,540	2.8%	7.7%	2.3%	3.5%	20.1%
	21 Other Aluminum	5,985	0.4%	1.1%	0.3%	0.5%	20.4%
	22 Other Non-Ferrous	5,933	0.4%	0.4%	0.3%	0.5%	32.2%
Organics		550,716	33.7%	23.9%	30.8%	36.7%	8.8%
	23 Yard Waste- Grass	11,432	0.7%	4.9%	0.5%	1.1%	45.6%
	24 Yard Waste- Other	94,718	5.8%	6.4%	4.6%	7.5%	25.2%
	25 Wood- Unpainted	105,462	6.4%	14.5%	5.2%	8.3%	23.8%
	26 Wood- Painted	30,653	1.9%	14.4%	1.5%	2.5%	27.9%
	27 Food Waste	184,097	11.3%	12.5%	9.9%	13.1%	14.5%
	28 Textiles	57,448	3.5%	5.0%	3.0%	4.2%	17.2%
	29 Diapers	30,170	1.8%	2.7%	1.6%	2.2%	18.8%
	30 Fines	13,986	0.9%	1.2%	0.7%	1.0%	14.9%
	31 Other Organics	22,750	1.4%	7.5%	1.1%	1.8%	23.0%
Inorganics		193,614	11.8%	28.8%	10.0%	13.9%	16.7%
	32 Electronics	31,611	1.9%	3.2%	1.5%	2.6%	27.5%
	33 Carpet	21,947	1.3%	8.9%	0.9%	2.2%	47.6%
	34 Drywall	15,057	0.9%	7.7%	0.7%	1.3%	34.3%
	35 Other C&D	72,465	4.4%	20.5%	3.4%	5.9%	28.9%
	36 HHW	3,832	0.2%	1.5%	0.2%	0.3%	22.7%
	37 Other Inorganics	23,307	1.4%	5.2%	1.2%	1.8%	20.7%
	38 Furniture	25,396	1.6%	11.9%	1.1%	2.3%	38.0%
	Total	1,636,192	100.0%				

Figure 6

Landfilled Aggregate Waste Composition Results by Demographic Sector (Weight Percent)



Material Group	Demographic Sector			
	Urban	Suburban	Rural	Aggregate
Paper	36.3%	35.7%	28.0%	34.7%
Plastic	11.6%	12.9%	11.3%	11.2%
Glass	1.7%	2.4%	3.3%	3.7%
Metals	5.5%	5.3%	4.2%	4.8%
Organics	34.2%	33.2%	35.0%	33.7%
Other Waste	10.8%	10.5%	18.1%	11.8%
Total	100.0%	100.0%	100.0%	100.0%

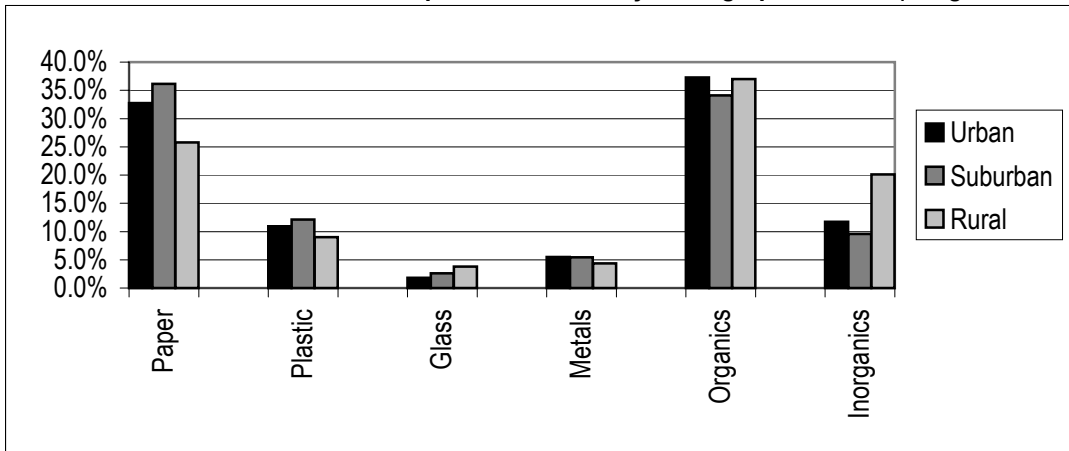
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**Table 6
Landfilled Aggregate MSW Composition Detail by Demographic Sector (Weight Percent)**

	Material Categories	Urban	Suburban	Rural	Aggregate
Paper		36.3%	35.7%	28.0%	34.7%
	1 Newspaper	3.5%	4.5%	3.6%	3.6%
	2 Corrugated Cardboard	9.4%	7.4%	7.5%	9.4%
	3 Office	3.9%	3.3%	1.8%	4.8%
	4 Magazine/ Glossy	3.9%	3.5%	2.3%	3.1%
	5 Polycoated/Aseptic Containers	0.8%	0.5%	0.5%	0.5%
	6 Mixed Paper	3.1%	6.6%	5.6%	4.5%
7 Non-recyclable Paper	11.7%	9.9%	6.8%	8.8%	
Plastic		11.6%	12.9%	11.3%	11.2%
	8 #1 PET Bottles	0.6%	0.8%	0.7%	0.9%
	9 #2 HDPE Bottles	0.9%	0.9%	0.8%	0.5%
	10 #3-#7 Bottles	0.1%	0.1%	0.2%	0.2%
	11 Expanded Polystyrene	0.5%	0.8%	0.5%	0.8%
	12 Film Plastic	5.7%	6.4%	5.2%	4.4%
13 Other Rigid Plastic	3.7%	4.0%	3.9%	4.3%	
Glass		1.7%	2.4%	3.3%	3.7%
	14 Clear Glass	0.8%	1.3%	1.4%	1.6%
	15 Green Glass	0.3%	0.2%	0.2%	0.7%
	16 Amber Glass	0.4%	0.4%	0.5%	1.0%
17 Non-recyclable Glass	0.2%	0.5%	1.2%	0.5%	
Metals		5.5%	5.3%	4.2%	4.8%
	18 Steel Cans	0.9%	1.4%	1.3%	0.8%
	19 Aluminum Cans	0.4%	0.5%	0.3%	0.6%
	20 Other Ferrous	3.7%	2.9%	2.0%	2.8%
	21 Other Aluminum	0.3%	0.4%	0.5%	0.4%
22 Other Non-Ferrous	0.2%	0.1%	0.1%	0.4%	
Organics		34.2%	33.2%	35.0%	33.7%
	23 Yard Waste- Grass	0.3%	1.0%	1.7%	0.7%
	24 Yard Waste- Other	3.5%	4.1%	2.1%	5.8%
	25 Wood- Unpainted	3.9%	2.9%	6.4%	6.4%
	26 Wood- Painted	1.9%	2.7%	3.2%	1.9%
	27 Food Waste	12.1%	12.7%	13.7%	11.3%
	28 Textiles	4.4%	3.3%	2.8%	3.5%
	29 Diapers	3.7%	2.6%	1.7%	1.8%
	30 Fines	2.3%	1.2%	0.8%	0.9%
31 Other Organics	2.1%	2.6%	2.7%	1.4%	
Inorganics		10.8%	10.5%	18.1%	11.8%
	32 Electronics	1.4%	1.3%	0.7%	1.9%
	33 Carpet	1.6%	2.4%	1.8%	1.3%
	34 Drywall	0.2%	1.2%	1.6%	0.9%
	35 Other C&D	3.7%	2.7%	7.9%	4.4%
	36 HHW	1.1%	0.5%	0.3%	0.2%
	37 Other Inorganics	1.6%	1.7%	2.2%	1.4%
38 Furniture	1.1%	0.7%	3.6%	1.6%	
	Total	100.0%	100.0%	100.0%	100.0%

Figure 7

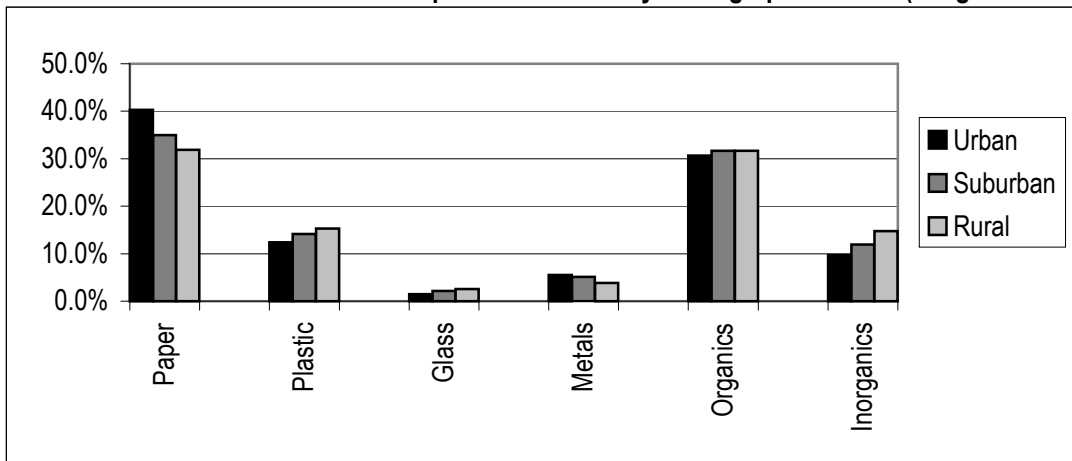
Landfilled Residential MSW Composition Results by Demographic Sector (Weight Percent)



Generator	Demographic Sector			
	Urban	Suburban	Rural	Aggregate
Paper	32.7%	36.2%	25.8%	30.8%
Plastic	10.9%	12.1%	9.0%	10.5%
Glass	1.8%	2.6%	3.8%	3.1%
Metals	5.5%	5.4%	4.4%	4.9%
Organics	37.3%	34.1%	37.0%	35.8%
Other Waste	11.7%	9.6%	20.1%	14.8%
Total	100.0%	100.0%	100.0%	100.0%

Figure 8

Landfilled Commercial MSW Composition Results by Demographic Sector (Weight Percent)



Generator	Demographic Sector			
	Urban	Suburban	Rural	Aggregate
Paper	40.3%	35.0%	31.9%	34.3%
Plastic	12.4%	14.1%	15.3%	14.4%
Glass	1.5%	2.2%	2.5%	2.2%
Metals	5.5%	5.2%	3.9%	4.6%
Organics	30.6%	31.7%	31.7%	31.6%
Other Waste	9.7%	11.9%	14.8%	12.9%
Total	100.0%	100.0%	100.0%	100.0%

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Table 7

Landfilled Residential MSW Composition Detail by Demographic Sector (Weight Percent)

	Material Categories	Urban	Suburban	Rural	Aggregate
Paper		32.7%	36.2%	25.8%	30.8%
	1 Newspaper	4.2%	6.1%	4.7%	5.2%
	2 Corrugated Cardboard	5.4%	3.9%	3.7%	3.9%
	3 Office	2.7%	3.0%	1.6%	2.3%
	4 Magazine/ Glossy	4.2%	4.3%	3.0%	3.7%
	5 Polycoated/Aseptic Containers	0.5%	0.6%	0.4%	0.5%
	6 Mixed Paper	3.2%	7.5%	5.6%	6.2%
	7 Non-recyclable Paper	12.5%	10.8%	6.8%	9.0%
Plastic		10.9%	12.1%	9.0%	10.5%
	8 #1 PET Bottles	0.8%	0.9%	0.8%	0.8%
	9 #2 HDPE Bottles	1.1%	1.1%	1.0%	1.0%
	10 #3-#7 Bottles	0.1%	0.1%	0.2%	0.2%
	11 Expanded Polystyrene	0.5%	0.8%	0.4%	0.6%
	12 Film Plastic	5.5%	5.5%	3.7%	4.6%
	13 Other Rigid Plastic	2.9%	3.8%	2.9%	3.3%
Glass		1.8%	2.6%	3.8%	3.1%
	14 Clear Glass	1.1%	1.6%	1.5%	1.5%
	15 Green Glass	0.2%	0.3%	0.2%	0.2%
	16 Amber Glass	0.4%	0.4%	0.6%	0.5%
	17 Non-recyclable Glass	0.2%	0.3%	1.5%	0.8%
Metals		5.5%	5.4%	4.4%	4.9%
	18 Steel Cans	1.1%	1.5%	1.6%	1.5%
	19 Aluminum Cans	0.4%	0.6%	0.4%	0.5%
	20 Other Ferrous	3.5%	2.8%	1.6%	2.3%
	21 Other Aluminum	0.4%	0.4%	0.6%	0.5%
	22 Other Non-Ferrous	0.0%	0.0%	0.1%	0.1%
Organics		37.3%	34.1%	37.0%	35.8%
	23 Yard Waste- Grass	0.5%	1.7%	2.7%	2.1%
	24 Yard Waste- Other	4.2%	5.2%	3.2%	4.1%
	25 Wood- Unpainted	2.7%	0.8%	4.9%	2.9%
	26 Wood- Painted	2.5%	2.3%	2.9%	2.6%
	27 Food Waste	11.9%	12.4%	13.4%	12.8%
	28 Textiles	5.5%	3.7%	3.0%	3.5%
	29 Diapers	4.3%	3.6%	2.3%	3.0%
	30 Fines	3.0%	1.5%	1.0%	1.4%
	31 Other Organics	2.6%	2.9%	3.7%	3.2%
Inorganics		11.7%	9.6%	20.1%	14.8%
	32 Electronics	2.4%	1.6%	1.0%	1.4%
	33 Carpet	0.9%	2.8%	1.3%	1.9%
	34 Drywall	0.1%	1.9%	0.5%	1.0%
	35 Other C&D	4.1%	0.7%	9.3%	5.1%
	36 HHW	0.7%	0.5%	0.4%	0.4%
	37 Other Inorganics	1.9%	1.1%	2.3%	1.7%
	38 Furniture	1.6%	1.0%	5.4%	3.2%
	Total	100.0%	100.0%	100.0%	100.0%

Table 8
Landfilled Commercial MSW Composition Detail by Demographic Sector (Weight Percent)

	Material Categories	Urban	Suburban	Rural	Aggregate
Paper		40.3%	35.0%	31.9%	34.3%
	1 Newspaper	2.7%	1.9%	1.9%	2.0%
	2 Corrugated Cardboard	14.1%	13.0%	13.9%	13.6%
	3 Office	5.2%	3.9%	2.0%	3.2%
	4 Magazine/ Glossy	3.5%	2.2%	1.0%	1.8%
	5 Polycoated/Aseptic Containers	1.1%	0.4%	0.7%	0.6%
	6 Mixed Paper	3.0%	5.0%	5.6%	5.0%
7 Non-recyclable Paper	10.7%	8.6%	6.7%	8.0%	
Plastic		12.4%	14.1%	15.3%	14.4%
	8 #1 PET Bottles	0.5%	0.6%	0.6%	0.6%
	9 #2 HDPE Bottles	0.7%	0.6%	0.5%	0.6%
	10 #3-#7 Bottles	0.1%	0.1%	0.2%	0.1%
	11 Expanded Polystyrene	0.5%	0.7%	0.7%	0.7%
	12 Film Plastic	6.0%	7.8%	7.8%	7.5%
	13 Other Rigid Plastic	4.7%	4.4%	5.6%	5.0%
Glass		1.5%	2.2%	2.5%	2.2%
	14 Clear Glass	0.5%	0.7%	1.2%	0.9%
	15 Green Glass	0.4%	0.1%	0.2%	0.2%
	16 Amber Glass	0.3%	0.4%	0.4%	0.4%
17 Non-recyclable Glass	0.2%	1.0%	0.8%	0.8%	
Metals		5.5%	5.2%	3.9%	4.6%
	18 Steel Cans	0.7%	1.1%	0.7%	0.9%
	19 Aluminum Cans	0.4%	0.3%	0.3%	0.3%
	20 Other Ferrous	3.9%	3.1%	2.6%	3.0%
	21 Other Aluminum	0.2%	0.5%	0.3%	0.4%
22 Other Non-Ferrous	0.4%	0.3%	0.0%	0.2%	
Organics		30.6%	31.7%	31.7%	31.6%
	23 Yard Waste- Grass	0.0%	0.0%	0.0%	0.0%
	24 Yard Waste- Other	2.8%	2.4%	0.2%	1.5%
	25 Wood- Unpainted	5.2%	6.3%	8.9%	7.3%
	26 Wood- Painted	1.1%	3.3%	3.5%	3.1%
	27 Food Waste	12.2%	13.2%	14.3%	13.6%
	28 Textiles	3.3%	2.5%	2.4%	2.6%
	29 Diapers	3.0%	0.9%	0.8%	1.1%
	30 Fines	1.5%	0.8%	0.4%	0.7%
31 Other Organics	1.6%	2.2%	1.1%	1.6%	
Inorganics		9.7%	11.9%	14.8%	12.9%
	32 Electronics	0.3%	0.7%	0.3%	0.5%
	33 Carpet	2.4%	1.7%	2.7%	2.3%
	34 Drywall	0.3%	0.2%	3.5%	1.7%
	35 Other C&D	3.3%	5.9%	5.5%	5.3%
	36 HHW	1.4%	0.5%	0.3%	0.5%
	37 Other Inorganics	1.3%	2.8%	2.0%	2.2%
38 Furniture	0.6%	0.2%	0.5%	0.4%	
	Total	100.0%	100.0%	100.0%	100.0%

Figure 9

Soutcentral Region Aggregate Composition of Bulky Loads (Visual Samples)

Material Group	% Weight
Paper	11.5%
Plastic	4.9%
Glass	1.1%
Metals	4.3%
Organics	36.8%
Inorganics	41.3%
Total	100.0%

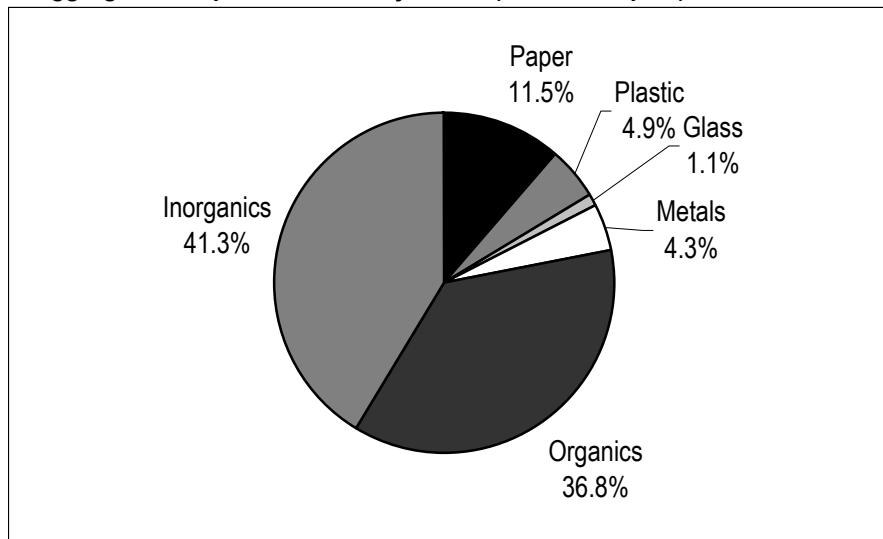


Figure 10

Southcentral Region Top 10 Most Prevalent Bulky Materials

