California Integrated Waste Management Board

Statewide Waste Characterization Study

Results and Final Report

prepared by
Cascadia Consulting Group, Inc.
Sky Valley Associates, Inc.
Sheri Eiker-Wiles Associates
Pacific Waste Consulting Group
Veterans Assistance Network
E. Tseng and Associates
E. Ashley Steel

in cooperation with
California Integrated Waste Management Board staff

December 1999

STATE OF CALIFORNIA

Gray Davis
Governor

Winston Hickox
Secretary, California Environmental Protection Agency

•

INTEGRATED WASTE MANAGEMENT BOARD

Dan Eaton
Board Chairman

Steven R. Jones
Board Member

Linda Moulton-Patterson
Board Member

Daniel G. Pennington
Board Member

David A. Roberti
Board Member

•

Ralph E. Chandler
Executive Director

For additional copies of this publication, contact:

Integrated Waste Management Board
Public Affairs Office
8800 Cal Center Drive, MS 12
Sacramento, CA 95826

www.ciwmb.ca.gov/Publications/
(800) CA-WASTE (California only) or (916) 255-2296

Publication #340-00-009
Printed on Recycled Paper

Prepared under contract number IWM-C8014 ($635,700).

This study would not have been possible without the cooperation and assistance of solid waste management companies, disposal sites, waste haulers, and commercial enterprises throughout the State of California.

Table of Contents

1. Executive Summary **ES - 1**

1.1 Introduction and Objectives ***ES - 1***

1.2 Study Methodology ***ES - 1***

1.3 Results ***ES - 2***

---

2. Introduction and Overview **1**

2.1 Objectives of the Study ***1***

2.2 Contributing Consultants ***1***

2.3 Preparation for Sampling ***2***

2.4 Waste Sectors ***2***

2.5 Dividing the State Into Regions ***3***

2.6 Selection of Sites ***5***

2.7 Capture and Sorting of Waste Samples ***5***

2.7.1 Commercial Generator Samples 7

2.7.2 Residential Samples 7

2.7.3 Self-Haul Samples 8

2.8 Vehicle Surveys ***8***

3. Results **8**

3.1 Composition of California's Overall Waste Stream ***8***

3.2 Statewide Tonnages by Sector ***12***

3.2.1 Vehicle Survey 12

3.2.2 Statewide Percentages and Tonnages by Sector 13

3.2.3 Commercial Self-haul Activities 14

3.3 Commercial Waste ***14***

3.3.1 The Overall Commercial Sector 14

3.3.2 Composition by Industry Group 22

3.4 Residential Waste ***50***

3.4.1 The Overall Residential Sector 50

3.4.2 Single-Family Residential Waste 53

3.4.3 Multifamily Residential Waste 57

3.5 Self-haul Waste ***60***

3.5.1 The Overall Self-Haul Sector 60

3.5.2 Commercial Self-Haul Waste 64

3.5.3 Residential Self-Haul Waste 67

3.6 RPPC Study ***70***

3.6.1 Introduction and Background 70
3.6.2 Methodology 71
3.6.3 Results 72

Appendix A: Detailed Methodology A - 1

A.1 Introduction A - 1

A.2 Selection of Regions, Disposal Sites & Waste Sheds A - 1
A.2.1 Selection of Regions A - 2
A.2.2 Selection of Sites A - 6
A.2.3 Communications Plan A - 11

A.3 Discussion of Numbers of Samples A - 11

A.4 Generator Selection and Capture Procedures A - 13
A.4.1 Commercial Generator Samples A - 13
A.4.2 Multifamily Residential Samples A - 19
A.4.3 Volume and Density Measurements for Generator Samples A - 21

A.5 Disposal Site Sample Selection A - 22
A.5.1 Single-Family Residential Waste A - 22
A.5.2 Residential Self-haul and Commercial Self-haul Waste A - 22

A.6 Sample Sorting and Data Recording A - 23
A.6.1 Waste Sorting Procedures A - 23
A.6.2 Health and Safety Protection A - 24

A.7 Vehicle Survey A - 25
A.7.1 Survey Approach A - 25

A.8 Base Population and Disposal Data A - 26
A.8.1 Annual Tonnage Estimates for Each Region and Statewide A - 26
A.8.2 Number of Apartments in Each Region and Statewide A - 27

A.9 Quality Control Procedures A - 27
A.9.1 Identification of Commercial and Multi-Family Generators A - 27
A.9.2 Vehicle Surveys A - 28
A.9.3 Waste Sampling A - 28

A.10 Description of statistical procedures used A - 29
A.10.1 Vehicle surveys A - 29
A.10.2 Calculating composition percentages from samples A - 33
A.10.3 Calculating tons per employee per year (TPEPY) A - 38
A.10.4 Calculating average volume and average density by industry group A - 41
A.10.5 Variance calculations A - 41
A.10.5 RPPC study A - 43

Appendix B: List and Definitions of Material Types B - 1

B.1 List of Standard Material Categories B - 1

B.2 Definitions of Standard Material Categories B - 3
Paper B - 3
Glass B - 4
Metal B - 5
Plastic B - 6
Other Organic B - 7

Construction And Demolition B - 9
Household Hazardous Waste B - 9
Special Waste B - 10
Mixed Residue B - 11

B.3 List and Examples of RPPCs ***B - 12***

Appendix C: CIWMB Standard Method **C - 1**

C.1 Draft Regulations Governing Disposal Characterization Studies ***C - 1***

C.2 Guidelines Governing Health and Safety Measures ***C - 21***

C.3 Guidelines Governing Solid Waste Sorting Procedures ***C - 28***

Appendix D: Forms Used in the Study **D - 1**
Form Used for Vehicle Surveys D - 1
Snapshot of Generator Recruitment Database D - 2
Snapshots of Database for Entry of Component Weights in the Field D - 3

Appendix E: Definitions of Business Groups **E - 1**

Appendix F: Distribution of Employment by Business Group and Region **F - 1**

Appendix G: Numbers of Samples by Sector, Site, Region, and Season **G - 1**

Disposal Site Samples ***G - 1***

Generator Samples ***G - 2***

Appendix H: Numbers of Vehicles Surveyed by Site, Region, and Season **H - 1**

Appendix I: Paper on Calculating RPPC Contamination Rates **I - 1**

Appendix J: County Demographic Data Used in Selection of Regions **J - 1**

Appendix K: Questions Used to Determine Suitability of Sorting Sites **K - 1**

Appendix L: Data Elements of the Study **L - 1**

Table of Tables

Table ES - 1: Estimated Contribution of Each Sector to the Overall Waste Stream ES - 2
Table ES - 2: Top 10 Materials in the Overall Waste Stream ES - 3
Table ES - 3: Composition of the Overall Waste Stream by Material Type ES - 5

Table 1: Overview of Consultants' Responsibilities 2
Table 2: Overview of Waste Disposal Sectors and Subsectors 3
Table 3: Numbers of Samples Collected from Each Sector 6
Table 4: Most Prevalent Materials in the Overall Waste Stream 10
Table 5: Composition of Overall Waste Stream 11
Table 6: Numbers of Vehicles Surveyed by Region and Season 12
Table 7: Statewide Tonnage and Percentage of Waste Stream by Sector 13
Table 8: Annual Residential Disposed Waste Per-Capita for Each Region 13
Table 9: Contribution of Specific Activities to the Commercial Self-Haul Subsector 14
Table 10: Numbers of Commercial Samples Collected by Industry Group and Region 15
Table 11: Distribution of the Number of Employees at Commercial Sites that were Sampled 16
Table 12: Annual Disposal Volume and Waste Density by Industry Group 17
Table 13: Per-Employee Disposal Rate and Estimated Contribution of Each Industry Group to Commercial Waste 18
Table 14: Relative Contribution of Each Industry Group to Commercial Waste 19
Table 15: Most Prevalent Materials in Commercial Waste 20
Table 16: Composition of Commercial Waste 21
Table 17: Composition of Waste from Group A: Finance / Insurance / Real Estate / Legal 24
Table 18: Composition of Waste from Group B: Retail Trade - Restaurants 25
Table 19: Composition of Waste from Group C: Retail Trade - Other 26
Table 20: Composition of Waste from Group D: Services - Other Misc. 27
Table 21: Composition of Waste from Group E: Wholesale Trade - Nondurable Goods 28
Table 22: Composition of Waste from Group F: Retail Trade - Automotive Dealers & Service Stations 29
Table 23: Composition of Waste from Group G: Services - Other Professional 30
Table 24: Composition of Waste from Group H: Retail Trade - Food Store 31
Table 25: Composition of Waste from Group I: Construction 32
Table 26: Composition of Waste from Group J: Services - Medical / Health 33
Table 27: Composition of Waste from Group K: Manufacturing - Printing / Publishing 34
Table 28: Composition of Waste from Group L: Services - Business Services 35
Table 29: Composition of Waste from Group M: Services - Education 36
Table 30: Composition of Waste from Group N: Public Administration 37
Table 31: Composition of Waste from Group O: Services - Hotels / Lodging 38
Table 32: Composition of Waste from Group P: Trucking & Warehousing 39
Table 33: Composition of Waste from Group Q: Wholesale Trade - Durable Goods 40

Table 34: Composition of Waste from Group R: Manufacturing - Other 41
Table 35: Composition of Waste from Group S: Transportation - Other 42
Table 36: Composition of Waste from Group T: Manufacturing - Electronic Equipment 43
Table 37: Composition of Waste from Group U: Manufacturing - Food / Kindred 44
Table 38: Composition of Waste from Group V: Manufacturing - Lumber & Wood Products 45
Table 39: Composition of Waste from Group W: Manufacturing - Transportation Equipment 46
Table 40: Composition of Waste from Group X: Retail Trade - Building Material & Garden 47
Table 41: Composition of Waste from Group Y: Manufacturing - Industrial / Machinery 48
Table 42: Composition of Waste from Groups Z through AM: Lumped Group 49
Table 43: Most Prevalent Materials in Overall Residential Waste 51
Table 44: Composition of Overall Residential Waste 52
Table 45: Single-Family Residential Samples Obtained, by Region and Season 53
Table 46: Most Prevalent Materials in Single-Family Residential Waste 55
Table 47: Composition of Single-Family Residential Waste 56
Table 48: Multifamily Residential Samples Obtained, by Region and Season 57
Table 49: Most Prevalent Materials in Multifamily Residential Waste 58
Table 50: Composition of Multifamily Residential Waste 59
Table 51: Self-Haul Samples Obtained, by Region and Season 60
Table 52: Most Prevalent Materials in Overall Self-Haul Waste 62
Table 53: Composition of Overall Self-Haul Waste 63
Table 54: Commercial Self-Haul Samples Obtained, by Region and Season 64
Table 55: Most Prevalent Materials in Commercial Self-Haul Waste 65
Table 56: Composition of Commercial Self-Haul Waste 66
Table 57: Residential Self-Haul Samples Obtained, by Region and Season 67
Table 58: Most Prevalent Materials in Residential Self-Haul Waste 68
Table 59: Composition of Residential Self-Haul Waste 69
Table 60: Field Weight to Clean Weight Conversion Factors for RPPCs 71
Table 61: RPPC Composition of Overall Waste Stream 73
Table 62: RPPC Composition for Commercial Waste 73
Table 63: RPPC Composition in Residential Waste 74
Table 64: RPPC Composition in Self-Haul Waste 74

Table 65: Counties in the Five Sampling Regions A - 4
Table 66: Primary Factors for Selection of Sampling Regions A - 5
Table 67: Secondary Factors for Selection of Sampling Regions A - 5
Table 68: Suitable Sampling Sites in Each Region A - 7
Table 69: Selected Sampling Sites A - 8
Table 70: Sorting Site Characteristics A - 9
Table 71: Sorting Sites, Seasons, and Locations A - 10
Table 72: Numbers of Samples Collected from Each Sector A - 12
Table 73: Targeted Distribution of Commercial Samples, Based on Regional Employment A - 14
Table 74: Commercial Samples Collected by Region, Winter Season A - 17
Table 75: Commercial Samples Collected by Region, Summer Season A - 18

Table 76: Total Waste Disposal (Tons) in Each County and Region, 1998 A - 26
Table 77: Numbers of Multifamily Units by County and Region, 1998 A - 27
Table 78: Description of Industry Groups Designated in the Study E - 1
Table 79: Numbers of Employees by Industry Group in Each Region F - 1
Table 80: Numbers of Businesses by Industry Group in Each Region F - 2

Table of Figures

Figure ES - 1: Material Classes in the Overall Waste Stream ES - 4
Figure ES - 2: Material Classes in the Commercial Waste Stream ES - 4
Figure ES - 3: Material Classes in the Residential Waste Stream ES - 4
Figure ES - 4: Material Classes in the Self-Haul Waste Stream ES - 4

Figure 1: Regions Used in the Study 4
Figure 2: Overview of Overall Waste Stream 9
Figure 3: Overview of Commercial Waste 20
Figure 4: Overview of Overall Residential Waste 51
Figure 5: Overview of Single-Family Residential Waste 54
Figure 6: Overview of Multifamily Residential Waste 58
Figure 7: Overview of Overall Self-Haul Waste 61
Figure 8: Overview of Commercial Self-Haul Waste 65
Figure 9: Overview of Residential Self-Haul Waste 68

Figure 10: Regions Considered in the Study A - 3
Figure 11: Translation of Field Sorting Categories to Study Categories of Plastics A - 24

1. EXECUTIVE SUMMARY

1.1 INTRODUCTION AND OBJECTIVES

During 1999 the California Integrated Waste Management Board (CIWMB) conducted a statewide study whose primary objective was to obtain information on the types and amounts of materials still being disposed in the state. The first such study of this magnitude, it encompassed gathering data from the commercial, residential, and self-haul waste streams throughout California. No information was gathered on materials diverted from disposal through source reduction, recycling, or composting. The standard methods contained in the California Uniform Waste Disposal Characterization Method were used.

In addition, the study was designed to determine a defensible estimate of the amount of Rigid Plastic Packaging Containers (RPPCs) disposed in California. This information is needed to calculate the recycling rate for RPPCs, which is required by state law. Also, data was gathered on the types and quantities of commercial waste disposed by 26 different types of businesses and institutions. This data will be added to the CIWMB Waste Characterization Database to serve as a resource to local governments.

1.2 STUDY METHODOLOGY

For study purposes, the waste stream was divided into three sectors: residential, commercial, and self-haul. The residential sector was further sub-divided into single and multifamily subsectors, and the self-haul into residential and commercial subsectors. The state was divided into five regions based on similarity of demographics and geographic features. A statistically-derived number of samples was allocated to each region to ensure adequate representation. In each region, five disposal sites (landfills and transfer stations) were randomly selected as sampling sites for the single family residential and self-haul waste streams. Collections at these sites totaled 148 single family residential and 247 self-haul samples. A total of 1207 commercial generator and 80 multifamily residential samples were collected from randomly selected businesses and apartment complexes within the geographical areas surrounding the selected disposal sites. Waste sampling was divided between winter and summer to account for any seasonal variations in waste disposal patterns. Each sample was hand sorted and characterized using the 57 material types found in the California Uniform Waste Disposal Characterization Method, as well as eight specific RPPC categories identified for this study.

Additionally, vehicle surveys were used to estimate the portion of California's waste contributed by each of the residential, commercial, and self-haul sectors. The surveys were conducted at 24 of the 25 sites that were visited for disposal site sampling, and on the same days that sampling occurred. All vehicles bringing waste to the site during a pre-determined eight-hour period were surveyed. The generating sector represented by the waste was identified, and the net weight of each load was recorded. A total of 3,648 surveys were completed.

1.3 RESULTS

The data gathered during the sampling efforts was reduced and statistical analyses were performed in order to extrapolate the findings to statewide estimates. The Final Report includes detailed findings for the following areas:

- Disposed waste composition and tonnage for the state's overall waste stream and the commercial, residential, and self-haul sectors;
- Disposed waste composition and tonnage for 26 industry groups;
- Disposed waste composition and tonnage of both single-family and multi-family subsectors;
- Disposed waste composition and tonnage of commercial self-haul and residential self-haul subsectors;
- Disposed waste composition and tonnage for RPPCs.

The findings show that, statewide, the commercial sector comprises 48.8% of the waste stream, the residential sector (single-family plus multifamily) represents 38.1%, and the self-haul sector is responsible for the remaining 13.1 percent. The data also show that 377,010 tons of RPPCs are being disposed statewide, equating to 1.06% of the overall waste stream. Table ES - 1 depicts the estimated contribution to the overall waste stream of each sector. Figures ES - 1 through ES - 4 display the breakdown of the waste stream by nine major categories in the overall, as well as each of the main sectors sampled. Finally, Table ES - 2 lists the ten most prevalent materials in the overall waste stream, which account for nearly 65% of California's disposed waste, while Table ES - 3 provides a complete breakdown of the composition of the overall waste stream by material type.

Table ES - 1: Estimated Contribution of Each Sector to the Overall Disposed Waste Stream

	Est. Percent of Waste Stream	Est. Tons Statewide
Commercial	48.8%	17,358,359
Residential	38.1%	13,525,504
Single-family residential	*28.0%*	*9,955,739*
Multifamily residential	*10.0%*	*3,569,888*
Self-haul	13.1%	4,651,591
Commercial self-haul	*10.5%*	*3,739,696*
Residential self-haul	*2.6%*	*911,770*
Totals	**100.0%**	**35,535,453**

Source: 1999 vehicle survey findings applied to CIWMB Disposal Reporting System 1998 tonnage figures.

Table ES - 2: Top 10 Materials in the Overall Disposed Waste Stream

Material Type	Est. Pct.	Est. Tons	Cumulative Pct.
Food	15.7%	5,584,506	15.7%
Remainder/Composite Paper	9.6%	3,416,281	25.3%
Leaves & Grass	7.9%	2,808,692	33.2%
Remainder/Composite Organic	6.9%	2,453,912	40.1%
Lumber	4.9%	1,746,001	45.1%
Uncoated Corrugated Cardboard	4.6%	1,630,348	49.6%
Other Miscellaneous Paper	4.4%	1,565,454	54.0%
Newspaper	4.3%	1,521,186	58.3%
Film Plastic	3.9%	1,377,438	62.2%
Other Ferrous Metal	2.4%	866,716	64.6%

Any differences between *cumulative percent* figures and the sum of *estimated percent* figures are due to rounding.

Figure ES - 1: Material Classes in the Overall Disposed Waste Stream

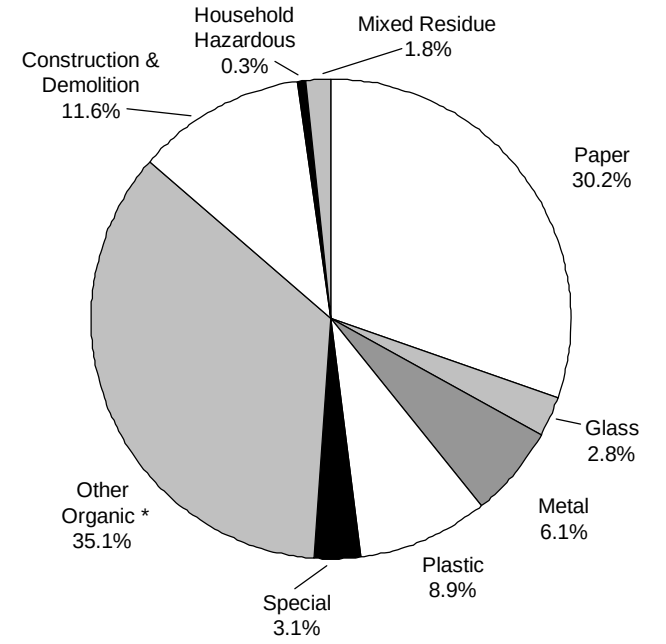


Figure ES - 2: Material Classes in the Commercial Disposed Waste Stream

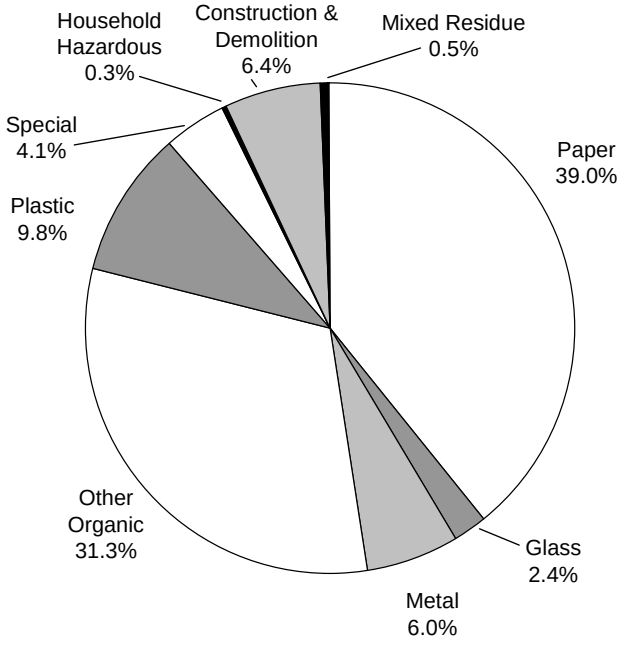


Figure ES - 3: Material Classes in the Residential Disposed Waste Stream

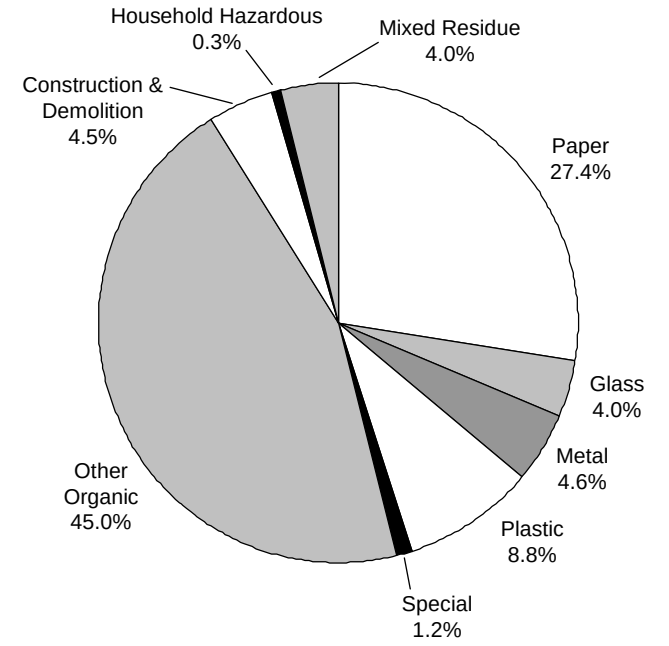
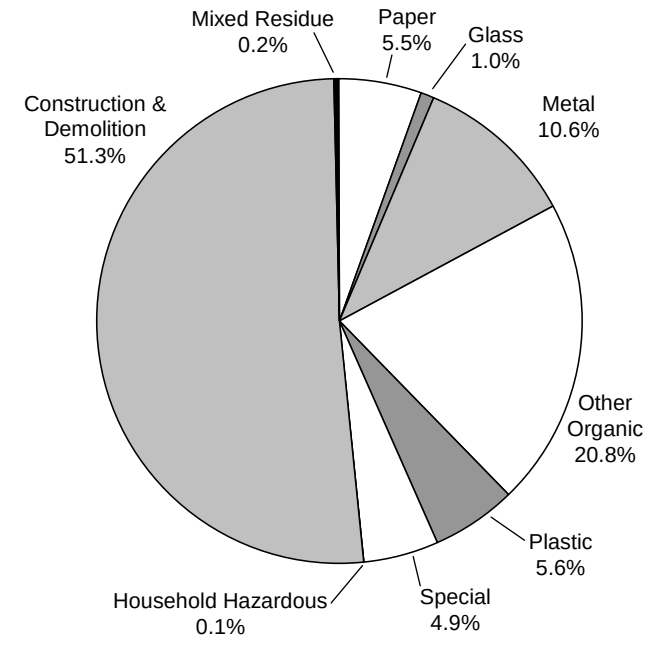


Figure ES - 4: Material Classes in the Self-Haul Disposed Waste Stream



* The class *Other Organic Waste* includes materials such as food, yard waste, textiles, carpet, and rubber.

Table ES - 3: Composition of the Overall Disposed Waste Stream by Material Type

	Est. Pct.	+ / -	Est. Tons
Paper	**30.2%**		**10,742,707**
Uncoated Corrugated Cardboard	4.6%	0.2%	1,630,348
Paper Bags	0.7%	0.0%	261,563
Newspaper	4.3%	0.3%	1,521,186
White Ledger Paper	2.3%	0.2%	812,752
Colored Ledger Paper	0.2%	0.0%	60,270
Computer Paper	0.3%	0.1%	114,545
Other Office Paper	1.7%	0.2%	591,080
Magazines and Catalogs	1.9%	0.1%	669,434
Phone Books and Directories	0.3%	0.1%	99,793
Other Miscellaneous Paper	4.4%	0.2%	1,565,454
Remainder/Composite Paper	9.6%	0.4%	3,416,281
Glass	**2.8%**		**1,011,441**
Clear Glass Bottles & Containers	1.4%	0.1%	506,214
Green Glass Bottles & Containers	0.4%	0.1%	154,191
Brown Glass Bottles & Containers	0.5%	0.0%	167,529
Other Colored Glass Bottles & Containers	0.0%	0.0%	6,859
Flat Glass	0.1%	0.0%	23,206
Remainer/Composite Glass	0.4%	0.1%	153,443
Metal	**6.1%**		**2,164,080**
Tin/Steel Cans	1.0%	0.1%	339,570
Major Appliances	0.1%	0.0%	23,257
Other Ferrous Metal	2.4%	0.3%	866,716
Aluminum Cans	0.2%	0.0%	87,086
Other Non-Ferrous Metal	0.3%	0.0%	93,548
Remainder/Composite Metal	2.1%	0.3%	753,903
Plastic	**8.9%**		**3,161,711**
HDPE Containers	0.8%	0.0%	275,944
PETE Containers	0.5%	0.0%	160,615
Miscellaneous Plastic Containers	0.7%	0.1%	239,954
Film Plastic	3.9%	0.2%	1,377,438
Durable Plastic Items	1.8%	0.2%	631,536
Remainder/Composite Plastic	1.3%	0.1%	476,224
Sample count: 1,682			

	Est. Pct.	+ / -	Est. Tons
Other Organic	**35.1%**		**12,490,171**
Food	15.7%	0.6%	5,584,506
Leaves & Grass	7.9%	0.7%	2,808,692
Prunings & Trimmings	2.2%	0.4%	790,727
Branches & Stumps	0.1%	0.1%	52,940
Agricultural Crop Residues	0.0%	0.0%	1,765
Manures	0.1%	0.1%	49,291
Textiles	2.1%	0.3%	748,336
Remainder/Composite Organic	6.9%	0.5%	2,453,912
Construction & Demolition	**11.6%**		**4,110,526**
Concrete	1.2%	0.2%	418,600
Asphalt Paving	0.1%	0.1%	49,614
Asphalt Roofing	0.7%	0.2%	252,254
Lumber	4.9%	0.5%	1,746,001
Gypsum Board	1.1%	0.2%	402,784
Rock, Soil & Fines	1.3%	0.3%	461,437
Remainder/Composite C&D	2.2%	0.3%	779,836
Household Hazardous Waste	**0.3%**		**106,497**
Paint	0.1%	0.0%	42,167
Vehicle & Equipment Fluids	0.0%	0.0%	13,596
Used Oil	0.0%	0.0%	1,579
Batteries	0.1%	0.0%	30,929
Remainder/Composite HHW	0.1%	0.0%	18,226
Special Waste	**3.1%**		**1,110,383**
Ash	0.1%	0.0%	21,464
Sewage Solids	0.0%	0.0%	0
Industrial Sludge	0.0%	0.0%	18
Treated Medical Waste	0.0%	0.0%	6,478
Bulky Items	1.8%	0.6%	656,509
Tires	0.4%	0.2%	145,899
Remainder/Composite Special Waste	0.8%	0.3%	280,017
Mixed Residue	**1.8%**	**0.2%**	**637,938**
Totals	**100.0%**		**35,535,453**

Confidence intervals calculated at the 90% confidence level. Percentages for materials may not total 100% due to rounding.

2. INTRODUCTION AND OVERVIEW

The California Integrated Waste Management Board (CIWMB) commissioned a Statewide Waste Disposal Characterization Study in order to obtain data to characterize the residential, commercial, and self-haul waste streams. Information on the types and amounts of materials disposed in these waste streams was gathered through sampling of the waste delivered to disposal sites and waste collected directly from commercial generators (individual businesses) and apartment buildings. This study did not gather information on materials diverted through source reduction, recycling, or composting.

The Study provides detailed information on the composition of waste disposed in California during 1999. The design for the Study was prepared by a team of consultants led by the Cascadia Consulting Group, under the direction of CIWMB staff. In addition, an Advisory Group appointed by the CIWMB reviewed and approved the design.

A study like this is challenging because it seeks to apply pure statistical methods within the real-world limitations imposed by budgeting and time considerations, the day-to-day operations of solid waste transfer and disposal sites, and business operations. This study sought to find the proper balance – a statistically valid analysis that was cost-effective and a process for gathering data that was not disruptive to facility operators or their customers, or individual businesses.

2.1 OBJECTIVES OF THE STUDY

The primary objective of this project was to characterize California's municipal solid waste using the standard methods contained in the California Uniform Waste Disposal Characterization Method. These standard methods include statistically reliable methods to determine sample sizes, categories of waste to be measured, analytical techniques, field procedures, and other methodologies. These standard methods were the basis for many of the decisions made in the project design.

In addition, there were two secondary project objectives. First, the state wanted to determine a defensible estimate of the amount of Rigid Plastic Packaging Containers (RPPCs) disposed in California. This is needed to calculate the recycling rate for RPPCs, which is required by state law. Second, data was gathered on the type and quantity of commercial waste disposed by numerous categories of commercial generators. These data will be added to the CIWMB Waste Characterization database to serve as a resource to local governments.

2.2 CONTRIBUTING CONSULTANTS

The Cascadia Consulting Group, Inc., a Seattle-based environmental consulting firm, was the prime contractor and manager of this Study. The roles of Cascadia and the other consultants are described briefly in Table 1.

Table 1: Overview of Consultants' Responsibilities

Consultant	Overview of Major Responsibilities
Cascadia Consulting Group, Inc.	Project management, study design, data management and analysis, reporting
Sky Valley Associates, Inc. (SVA)	Conduct waste sampling
Sheri Eiker-Wiles Associates (SEWA)	Select & survey commercial waste generators
E. Tseng and Associates	Technical advice and review
E. Ashley Steel	Provide advice on developing statistically valid sampling procedures; assist in analysis
Pacific Waste Consulting Group (PWCG)	Assist with site selection plan; conduct vehicle surveys
Veterans Assistance Network (VAN)	Verify data on selected commercial generators; enter data from waste sampling and vehicle surveys

2.3 PREPARATION FOR SAMPLING

Planning for a comprehensive waste characterization study requires careful consideration of many factors. This study was designed to ensure representative data from across the state of California, as well as to gather data that will be useful for analyses by local governments. To accomplish this, the project used a stratified random sampling methodology. Waste was sampled from numerous subgroups (strata) to develop a waste composition profile for each stratum. Then the data were aggregated in a way that reflects each stratum's relative contribution to the overall waste stream, thus producing overall waste composition information.

Strata considered in this study include the geographical region, the waste sector (residential, commercial or self-haul), the activity that generated the waste, the type of business or institution that generated the waste, and the size of business or institution that generated the waste.

2.4 WASTE SECTORS

Waste was characterized for three sectors: residential waste, commercial waste, and self-haul waste. Within each sector, waste was divided into sub-sectors, as shown in Table 2.

Table 2: Overview of Waste Disposal Sectors and Subsectors

Commercial Waste	**Waste disposed by businesses, industries, and public organizations that is collected and transported by professional waste haulers**
— 26 industry groups	Waste disposed by specific industry groups, based on SIC codes. (See appendix E.)
Residential Waste	**Waste disposed by households that is collected and transported by professional waste haulers**
— Single-Family Residential	Waste that is collected from single-family residences
— Multifamily Residential	Waste that is collected from apartments or condominiums
Self-Haul Waste	**Waste that is transported to the disposal site by someone whose primary business is NOT waste hauling**
— Residential Self-Haul	Waste hauled to a disposal site by a resident from their home
— Commercial Self-Haul	Waste hauled to a disposal site by a commercial enterprise (e.g. landscaper, contractor, etc.), even if source of waste was from residential dwellings. Commercial self-haul was further broken down into four types: roofing, landscaping, construction/demolition and other
— *Roofing*	*Waste generated by professionals who install or replace roofs*
— *Landscaping*	*Waste generated by professionals who landscape or do other yard care activities*
— *Construction/Demolition*	*Waste generated by professionals who construct or demolish buildings*
— *Other*	*All other commercial self-haul waste that cannot be categorized as either roofing, landscaping, or construction/demolition*

In this study, the single-family residential subsector and the self-haul waste sector were sampled at disposal sites (transfer stations and landfills). Samples were obtained from randomly selected loads regularly arriving at these sites. For the 26 industry groups for commercial waste and for multifamily waste, samples were obtained from individual generators (businesses and apartment complexes) at their individual locations.

2.5 DIVIDING THE STATE INTO REGIONS

The state was divided into five regions to ensure adequate geographical and demographic representation throughout the state. The disposal sites were selected randomly within each

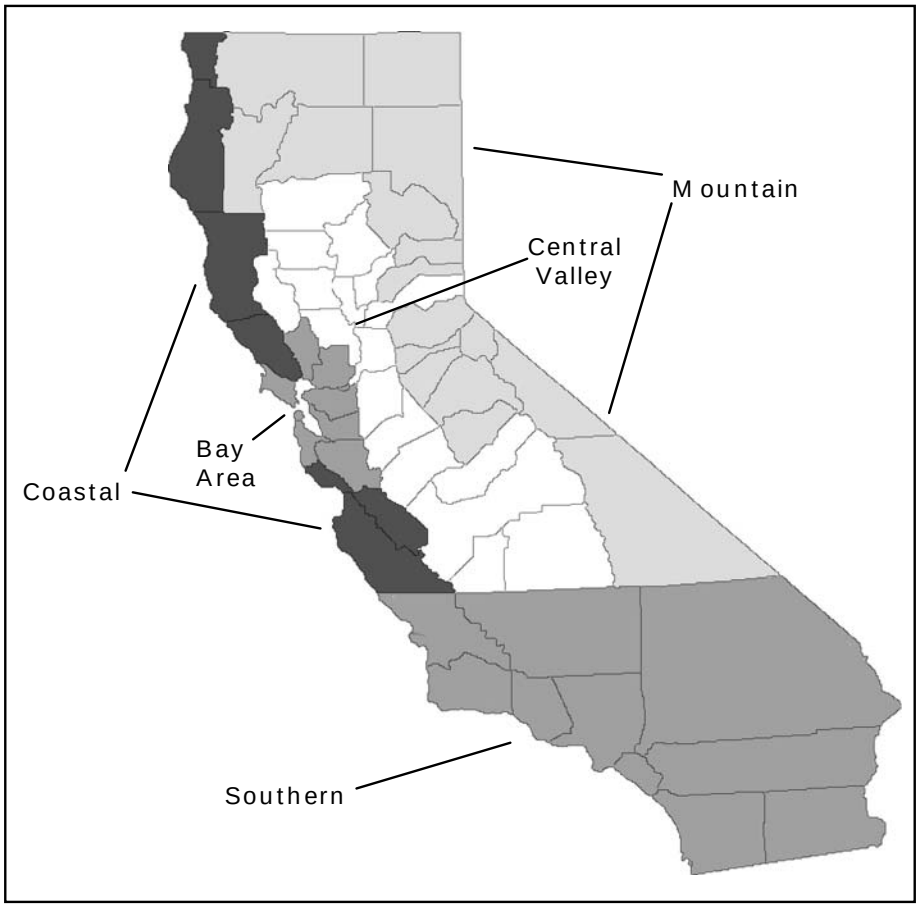
region to ensure that the waste samples were representative of the region as a whole and to allow for statistical analysis of the data. The stratified sampling plan targeted an equal number of disposal site samples for each region, ensuring that the information collected would be comparable statewide and that it would represent the breadth of communities within the state.

Three steps were used to select the regions:

1. Identification of areas of the state with similar demographics and geographic features and tentative assignment of counties to regions.
2. Review of data on all of the counties in the state to confirm the original assignment.
3. Review of the designation of regions by the Advisory Group.

Generator samples for each industry group and for the multifamily residential sectors were allocated to each region based approximately on the numbers of employees in each industry group in each region, or based on the number of apartment units in each region. (See Appendix A for details of the allocation of generator samples.)

Figure 1: Regions Used in the Study



The five regions are shown in Figure 1 and are characterized as follows:

Coastal – includes the counties on the coast that are not in either the Bay Area or Southern regions. The Coastal region is more populated than the rural Mountain region and has a large agricultural component similar to the Central Valley.

Bay Area – includes the counties in the San Francisco Bay Area, which are the more metropolitan counties with a strong industrial component in the economy.

Southern – includes counties that are strongly industrial with large populations and important agricultural influences.

Mountain – includes counties that are primarily rural, with strong agricultural economies, low population density, and a low industrial base.

Central Valley – includes counties between the Sierra Nevada mountains and the Coast Range that have a major agricultural base with important population centers and some manufacturing.

In general, regions were designated so that selected counties were contiguous. The process for assigning counties to each region is described in more detail in Appendix A.

2.6 SELECTION OF SITES

Disposal sites for study were randomly selected from a comprehensive list of facilities in the state. Within each region, potential sites were eliminated from the list if they did not meet the minimum criteria required of sampling sites. The minimum criteria were that the site handles waste destined for final disposal (i.e. is not subject to any further processing or sorting), that it was possible to obtain credible tonnage data from all three waste sectors (i.e. commercial, residential and self-haul), and that it was possible to perform composition sampling for the residential and self-haul sectors.

Of the sites meeting the minimum criteria, the first five randomly selected sites in each region were considered to be initial candidates for selection as sampling sites. The initial candidates were contacted and more detailed information on daily operations was obtained. In cases where a site was found to be unsuitable or unavailable, the next site on the random selection list was contacted until the required number of suitable sites were confirmed.

After confirming the sampling sites, another randomization process was used to determine whether sampling at each site would occur during the winter or summer. Once sites were assigned to seasons, one site in each region in each season was selected as an area (waste shed) for generator sampling. In the Southern and Bay Area regions, an extra site was chosen where generator sampling would occur in both seasons, in order to expand the sampling areas in these larger regions.

2.7 CAPTURE AND SORTING OF WASTE SAMPLES

Waste from the single-family residential sector and the self-haul (residential and commercial) sector were gathered at five disposal sites (landfills or transfer stations) in each region, for a total of 25 sites. For businesses and multifamily residences, waste samples

were collected directly from these generators rather than at a disposal site. This allowed for more detailed analysis of these waste streams. CIWMB staff randomly selected two to three disposal sites per region for generator sampling. Waste samples were drawn from businesses and apartment/condominiums within a 20 mile radius of the selected sites. The geographic area from which generator samples were collected were called waste sheds. (See Table 71 in Appendix A for a list of waste sheds). Table 3 shows the number of samples that were collected for each sector.

Table 3: Numbers of Samples Collected from Each Sector

Sector	Number of Samples
Commercial	1,207
Residential	228
Single-Family Residential	*148*
Multifamily Residential	*80*
Self-Haul	247
Commercial Self-Haul	*162*
Residential Self-Haul	*85*
Total	**1,682**

See Appendix G for the detailed sampling scheme.

Waste sampling occurred during two seasons to account for any seasonal variations in waste disposal patterns. The winter sampling occurred during February, March and April of 1999, and the summer sampling occurred during July, August, and September. Twelve sites were visited during the winter and thirteen during the summer for a total of 25 site visits.

The waste was sorted and characterized into the categories included on California's List of 57 Material Subtypes for Waste Sorting plus eight RPPC categories, as described in Appendix B. The material types include:

- 11 categories of paper;
- 6 categories of glass;
- 6 categories of metals;
- 6 categories of plastics;
- 8 categories of organic waste;
- 7 categories of construction/demolition waste;
- 5 categories of household hazardous waste;
- 7 categories of special waste; and
- 1 category of mixed residues that were too small to sort.

Plastic waste was further categorized into eight kinds of RPPCs. (See Figure 11 for a diagram of how plastics were sorted in the field.) These categories were proposed by CIWMB staff and approved by the Advisory Group.

2.7.1 COMMERCIAL GENERATOR SAMPLES

The objectives of this task were 1) to estimate the composition of commercially collected waste that is disposed by commercial, industrial, and institutional generators in California and 2) to develop composition profiles for 26 types of generators, or business groups. (See Appendix E for a description of the groups.)

Twelve-hundred samples were allocated among the 26 business groups. This ensured that the minimum number of samples required by the California Uniform Waste Disposal Characterization Method were collected from each business group. The samples were further allocated among the five regions of the state based on the relative contribution of each region to the statewide employment in each business group. Within each region, samples were allocated evenly between the two sampling seasons. For the Southern and Bay Area regions, two waste sheds were sampled during each season. Therefore, samples were further allocated among waste sheds based on the relative contribution of each waste shed to the regional employment in each business group.

Within each business group in each waste shed, samples were distributed so that the majority of the samples were drawn from businesses who contribute large amounts of waste. This was accomplished using the 80/20 rule as a guide. This rule states that generally, 80% of the waste disposed by a group came from the largest businesses which make up about 20% of the group, and 20% of the waste came from the remaining 80% of the (smaller) businesses. This is explained more fully in Appendix A.

Specific businesses were selected randomly using NameFinders, a research organization that uses Dun and Bradstreet business data. Over 10,000 business names were obtained to draw from, in order to ensure that a minimum of 1200 samples could be collected. The specific procedures used to identify, contact, and collect samples from businesses is described in Appendix A.

Following the completion of each season of commercial generator sampling, subcontractor Veterans Assistance Network (VAN) contacted each of the sampled business sites to verify its SIC classification, and the number of employees working at the site.

2.7.2 RESIDENTIAL SAMPLES

The objective of the residential waste sampling task was to estimate the composition of residential waste that is set out by single-family and multifamily residences for collection by professional waste haulers.

Samples of single-family waste were gathered at the randomly selected disposal sites (see Appendix A). A total of 150 samples were targeted—30 in each of the five regions. This ensured that the minimum number of samples required by the California Uniform Waste Disposal Characterization Method were collected from each region. The 30 samples targeted in each region were evenly distributed among five different sites in the region. Thus, six samples were targeted at each of the 25 selected sites throughout the state.

Samples of multifamily waste were gathered at randomly selected multifamily complexes in the state. This type of generator sampling was used because of the difficulty in obtaining pure loads of multifamily waste at disposal facilities – multifamily waste collected by haulers is often mixed with waste from businesses. The same areas used for commercial generator

sampling were used for multifamily generator sampling. Apartment complexes were selected randomly from available lists of complexes within each waste shed.

A total of 80 multifamily samples was targeted, and samples were allocated among the regions based on the number of multifamily units in each region.

2.7.3 SELF-HAUL SAMPLES

The objective of this task was to estimate the composition of waste disposed by residential and commercial self-haulers in California[1]. A total of 250 self-haul samples was targeted, or 50 samples per region. Due to the high variability in self-haul waste composition, more samples were collected from this sector than from single-family residences. Approximately two-thirds of the self-haul samples were allocated to commercial self-haul and one-third to residential self-haul because generally most of the tonnage in the self-haul stream is from commercial sources. The samples were collected at the five selected sites in each region for a total of 25 sites. Approximately 6 commercial and 4 residential samples were taken at each site for a total of ten samples per site.

2.8 VEHICLE SURVEYS

The objective of the vehicle surveys was to estimate the portion of California's waste contributed by each of the residential, commercial, and self-haul sectors. The surveys provided an estimate of the fraction of the overall waste stream contributed by the residential, self-haul, and commercial sectors.

To collect this data, vehicles were surveyed at the 25 randomly selected sampling sites (see Appendix A). All drivers entering the site during the survey period were interviewed.[2] Drivers were asked to identify the sector source(s) of the waste in the load they were hauling, and the net weight of each load was recorded. A total of 3,648 surveys were completed.

3. RESULTS

3.1 COMPOSITION OF CALIFORNIA'S OVERALL WASTE STREAM

The objective of this portion of the study was to characterize the state's entire disposed municipal solid waste stream, which combines all of the sectors and subsectors considered elsewhere in this study.

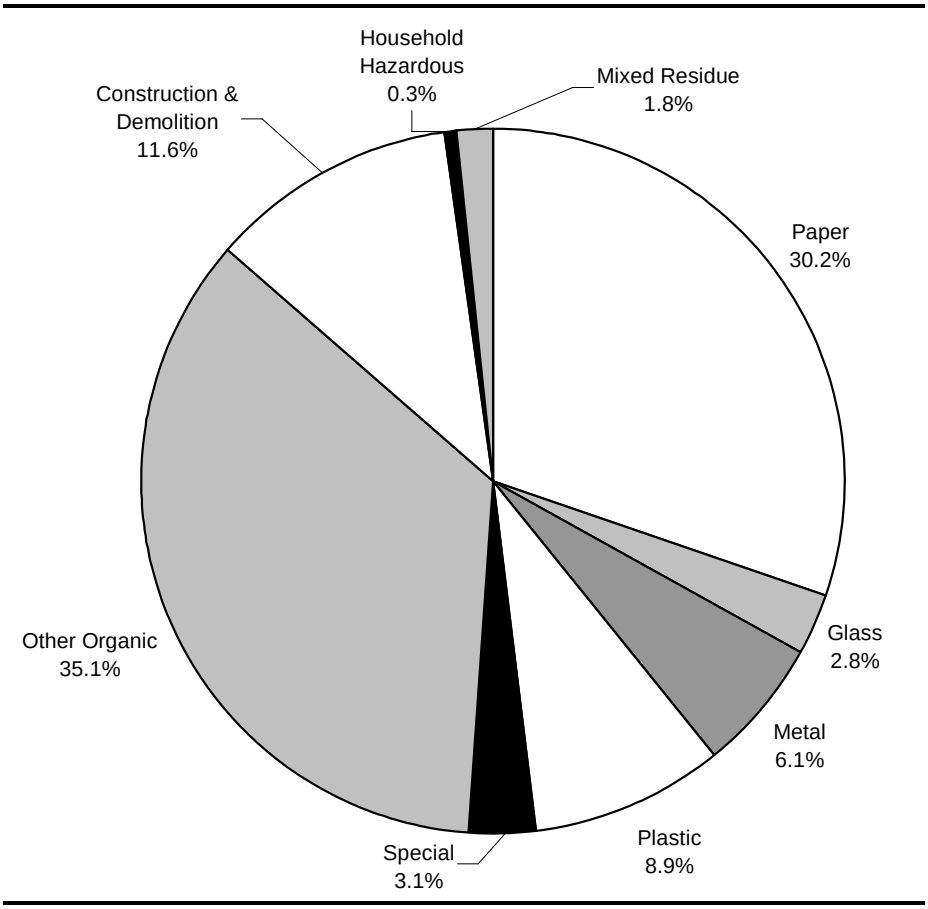
Composition results for the overall waste stream are illustrated in Figure 2 and described in detail in Table 5. The material class *Other Organic Waste* accounts for approximately 35%

[1] For purposes of this study, commercial self-haul loads were those hauled by a commercial enterprise (e.g. contractor, landscaper, etc.) even if the source of the waste was a residential dwelling. Residential self-haul loads were those loads transported by a resident from their home to the disposal site.

[2] In rare cases, it was necessary to skip some vehicles to maintain safe and efficient traffic flows.

of disposed waste, and the *Paper* class accounts for about 30%. (See Table 5 for lists of materials belonging to each class, and see Appendix B for definitions of the materials.)

Figure 2: Overview of Overall Waste Stream



Food, a component of *Other Organic Waste* is the most prevalent material, representing 15.7% of the overall waste stream. *Remainder/Composite Paper* is also present in large amounts, representing 9.6% of the waste stream, and *Leaves and Grass* represents 7.9%. Together, materials from the *Paper* and *Other Organic Waste* classes comprise seven of the top ten materials in the overall waste stream. Table 4 presents the materials that account for approximately 65% of overall waste.

Table 4: Most Prevalent Materials in the Overall Waste Stream

Material Type	Est. Pct.	Est. Tons	Cumulative Pct.
Food	15.7%	5,584,506	15.7%
Remainder/Composite Paper	9.6%	3,416,281	25.3%
Leaves & Grass	7.9%	2,808,692	33.2%
Remainder/Composite Organic	6.9%	2,453,912	40.1%
Lumber	4.9%	1,746,001	45.1%
Uncoated Corrugated Cardboard	4.6%	1,630,348	49.6%
Other Miscellaneous Paper	4.4%	1,565,454	54.0%
Newspaper	4.3%	1,521,186	58.3%
Film Plastic	3.9%	1,377,438	62.2%
Other Ferrous Metal	2.4%	866,716	64.6%

Any differences between *cumulative percent* figures and the sum of *estimated percent* figures are due to rounding.

Table 5: Composition of Overall Waste Stream

	Est. Pct.	+ / -	Est. Tons
Paper	**30.2%**		**10,742,707**
Uncoated Corrugated Cardboard	4.6%	0.2%	1,630,348
Paper Bags	0.7%	0.0%	261,563
Newspaper	4.3%	0.3%	1,521,186
White Ledger Paper	2.3%	0.2%	812,752
Colored Ledger Paper	0.2%	0.0%	60,270
Computer Paper	0.3%	0.1%	114,545
Other Office Paper	1.7%	0.2%	591,080
Magazines and Catalogs	1.9%	0.1%	669,434
Phone Books and Directories	0.3%	0.1%	99,793
Other Miscellaneous Paper	4.4%	0.2%	1,565,454
Remainder/Composite Paper	9.6%	0.4%	3,416,281
Glass	**2.8%**		**1,011,441**
Clear Glass Bottles & Containers	1.4%	0.1%	506,214
Green Glass Bottles & Containers	0.4%	0.1%	154,191
Brown Glass Bottles & Containers	0.5%	0.0%	167,529
Other Colored Glass Bottles & Containers	0.0%	0.0%	6,859
Flat Glass	0.1%	0.0%	23,206
Remainer/Composite Glass	0.4%	0.1%	153,443
Metal	**6.1%**		**2,164,080**
Tin/Steel Cans	1.0%	0.1%	339,570
Major Appliances	0.1%	0.0%	23,257
Other Ferrous Metal	2.4%	0.3%	866,716
Aluminum Cans	0.2%	0.0%	87,086
Other Non-Ferrous Metal	0.3%	0.0%	93,548
Remainder/Composite Metal	2.1%	0.3%	753,903
Plastic	**8.9%**		**3,161,711**
HDPE Containers	0.8%	0.0%	275,944
PETE Containers	0.5%	0.0%	160,615
Miscellaneous Plastic Containers	0.7%	0.1%	239,954
Film Plastic	3.9%	0.2%	1,377,438
Durable Plastic Items	1.8%	0.2%	631,536
Remainder/Composite Plastic	1.3%	0.1%	476,224
Sample count: 1,682			

	Est. Pct.	+ / -	Est. Tons
Other Organic	**35.1%**		**12,490,171**
Food	15.7%	0.6%	5,584,506
Leaves & Grass	7.9%	0.7%	2,808,692
Prunings & Trimmings	2.2%	0.4%	790,727
Branches & Stumps	0.1%	0.1%	52,940
Agricultural Crop Residues	0.0%	0.0%	1,765
Manures	0.1%	0.1%	49,291
Textiles	2.1%	0.3%	748,336
Remainder/Composite Organic	6.9%	0.5%	2,453,912
Construction & Demolition	**11.6%**		**4,110,526**
Concrete	1.2%	0.2%	418,600
Asphalt Paving	0.1%	0.1%	49,614
Asphalt Roofing	0.7%	0.2%	252,254
Lumber	4.9%	0.5%	1,746,001
Gypsum Board	1.1%	0.2%	402,784
Rock, Soil & Fines	1.3%	0.3%	461,437
Remainder/Composite C&D	2.2%	0.3%	779,836
Household Hazardous Waste	**0.3%**		**106,497**
Paint	0.1%	0.0%	42,167
Vehicle & Equipment Fluids	0.0%	0.0%	13,596
Used Oil	0.0%	0.0%	1,579
Batteries	0.1%	0.0%	30,929
Remainder/Composite HHW	0.1%	0.0%	18,226
Special Waste	**3.1%**		**1,110,383**
Ash	0.1%	0.0%	21,464
Sewage Solids	0.0%	0.0%	0
Industrial Sludge	0.0%	0.0%	18
Treated Medical Waste	0.0%	0.0%	6,478
Bulky Items	1.8%	0.6%	656,509
Tires	0.4%	0.2%	145,899
Remainder/Composite Special Waste	0.8%	0.3%	280,017
Mixed Residue	**1.8%**	**0.2%**	**637,938**
Totals	**100.0%**		**35,535,453**

Confidence intervals calculated at the 90% confidence level. Percentages for materials may not total 100% due to rounding.

3.2 STATEWIDE TONNAGES BY SECTOR

3.2.1 VEHICLE SURVEY

Vehicle surveys were used to estimate the percent contribution of each sector to the overall waste stream. Vehicle surveys were conducted at 24 of the 25 disposal facilities where disposal site waste samples were collected, and they were conducted on the same days as the collection of disposal site samples. (See Table 71 for a list of the sites that were visited.) Surveys were conducted for an approximately eight-hour period at each gatehouse leading into the particular facility. Surveyors recorded the net weight of each load and the sector and subsector to which it belonged. For loads that represented more than one sector/subsector (such as mixed commercial and multifamily waste), surveyors recorded the percentage of the load represented by each kind of waste, as estimated by the vehicle driver. A total of 2000 vehicle surveys were targeted for this study in order to provide adequate data. However, the actual number of surveys completed exceeded the target, as shown in Table 6.

To determine the tons of waste disposed from each sector, the percentages that were obtained from vehicle surveys were applied to the 1998 tons of waste disposed in each region, as recorded in the CIWMB's Disposal Reporting System.

Tonnage allocations across sectors and subsectors were determined by

1. keeping track of the tons of waste belonging to each sector and subsector that entered each facility on the appropriate survey day,
2. applying the proportions found at the facility level to the known 1998 tons of waste disposed in each region, with weighting according to the amount of waste that entered each facility in 1998,
3. applying the proportions found at the regional level to the known 1998 statewide tons of waste (35,535,453 tons), with weighting according to the amount of waste disposed in each region in 1998.

See Section A.10 of Appendix A for an explanation of the calculations. Both the percentages and tonnage ascribed to each sector/subsector are presented in Table 7.

Table 6: Numbers of Vehicles Surveyed by Region and Season

	Coastal	Bay Area	Southern [3]	Mountain	Central	Totals
Winter	262	324	813	371	198	**1,968**
Summer	281	845	84	116	354	**1,680**
Totals	**543**	**1,169**	**897**	**487**	**552**	**3,648**

[3] There were two reasons for the relatively small number of vehicle surveys conducted in the Southern region during the summer. First, both of the sites that were selected for summer sampling and surveying had fairly light vehicle traffic compared to other sites considered in this study. Second, it was determined that the surveys taken at one of the Southern region sites, Universal Refuse Removal and Recycling, were not representative of the entire spectrum of waste entering that site. The 16 vehicles surveyed at the Universal Refuse site are not included in Table 6 and were not included in the analysis of vehicle surveys.

3.2.2 STATEWIDE PERCENTAGES AND TONNAGES BY SECTOR

Table 7 shows the estimated contributions of each sector of the waste stream.

Table 7: Statewide Tonnage and Percentage of Waste Stream by Sector [4]

	Est. Percent of Waste Stream	+ / -	Est. Tons Statewide
Commercial	48.8%	2.8%	17,358,359
Residential	38.1%	3.0%	13,525,504
Single-family residential	*28.0%*	*2.7%*	*9,955,739*
Multifamily residential	*10.0%*	*1.6%*	*3,569,888*
Self-haul	13.1%	1.5%	4,651,591
Commercial self-haul	*10.5%*	*1.4%*	*3,739,696*
Residential self-haul	*2.6%*	*0.4%*	*911,770*
Totals	**100.0%**		**35,535,453**

Confidence intervals calculated at the 90% confidence level. Numbers may not total 100% due to rounding. Tonnages are based on 1998 tons reported, by region, through California's Disposal Reporting System.

Commercial waste and residential waste include all waste collected and transported to disposal sites by professional waste haulers. Self-haul waste includes both commercial and residential wastes that are hauled by an individual or business other than a professional waste hauler whose primary business is not hauling waste (e.g. an individual, a construction company, a landscaper, etc). For purposes of this study, commercial self-haul loads were those hauled by a commercial enterprise (e.g. contractor, landscaper, etc.) even if the source of the waste was a residential dwelling. Residential self-haul loads were those loads transported by a resident from their home to the disposal site.

Residential waste from all sources accounts for 40.7% of the state's waste stream, while 59.3% comes from non-residential sources. Overall, the per-capita disposal rate for the state was approximately 1.07 tons per person per year in 1999. The per-capita disposal rate for residential waste (single-family and multifamily) was approximately 0.41 tons per person per year. Table 8 shows the residential per-capita disposal rates for each region.

Table 8: Annual Residential Disposed Waste Per-Capita for Each Region

Region	Population	Residential Disposed Tons	Per-Capita Residential Disposal Rate (Tons per Resident per Year)
Coastal	1,363,600	604,752	0.44
Bay Area	6,256,500	2,655,988	0.42
Southern	20,340,700	8,437,874	0.41
Mountain	698,910	172,179	0.25
Central	4,590,800	1,646,735	0.36
Statewide	**33,250,510**	**13,517,528**	**0.41**

Numbers may not total exactly due to rounding.

[4] These figures were calculated based on vehicle surveys conducted in 1999 and applied to statewide tonnage as reported in 1998 through the CIWMB's Disposal Reporting System.

3.2.3 COMMERCIAL SELF-HAUL ACTIVITIES

Drivers of commercial self-haul vehicles were also asked to describe the origin of their waste as either roofing, landscaping, construction/demolition, or other commercial activities. Table 9 shows the results.

Table 9: Contribution of Specific Activities to the Commercial Self-Haul Subsector

	Est. Percent of Waste Stream	+ / -	Est. Tons Statewide
Construction & Demolition	4.5%	1.0%	1,584,303
Roofing	1.1%	0.8%	391,881
Landscaping	0.9%	0.3%	320,649
Other Commercial	4.1%	1.0%	1,442,862
Totals	**10.5%**	**1.4%**	**3,739,696**

Confidence intervals calculated at the 90% confidence level. Numbers may not total exactly due to rounding.

3.3 COMMERCIAL WASTE

The objective of this portion of the study was to characterize California's commercial waste stream at the state level. Commercial waste is defined as waste disposed by businesses, industries, and public organizations that is collected and transported by professional waste haulers. This section presents composition findings for the statewide commercial sector as a whole, as well as findings for individual industry groups. As shown in Table 7 (page 13), the commercial sector accounts for approximately 48.8% of California's municipal solid waste stream.

3.3.1 THE OVERALL COMMERCIAL SECTOR

DESCRIPTION OF SAMPLES

Samples of commercial waste were obtained at generator sites (the sites of individual businesses, organizations, and institutions) after arrangements were made with the managers of each site. Appendix A describes the site arrangements and sampling logistics for this process. In total, 1,207 waste samples were collected from generators belonging to the 26 industry groups discussed in this report. Table 10 provides a breakdown of the commercial generator samples by region and industry group, and Table 11 provides a profile of the numbers of employees at the commercial sites that were sampled.

There were 532 samples in the winter and 675 samples in the summer. Samples were distributed among regions based on employment in each industry group in each region. (See Appendix A for a full description of the allocation, capture, and analysis of waste samples. See Appendix F for employment data for each industry group in each region and statewide.)

Table 10: Numbers of Commercial Samples Collected by Industry Group and Region

	Coastal	Bay Area	Southern	Mountain	Central	Totals
A - Finance / Insurance / Real Estate / Legal	2	11	27	2	6	**48**
B - Retail Trade - Restaurants	2	11	30	2	6	**51**
C - Retail Trade - Other	2	14	28	2	5	**51**
D - Services - Other Misc.	2	11	29	2	6	**50**
E - Wholesale Trade - Nondurable Goods	5	8	28	4	8	**53**
F - Retail Trade - Automotive Dealers & Service Stations	2	9	31	4	7	**53**
G - Services - Other Professional	3	11	27	2	6	**49**
H - Retail Trade - Food Store	3	9	30	2	8	**52**
I - Construction	3	9	24	2	7	**45**
J - Services - Medical / Health	2	10	27	2	9	**50**
K - Manufacturing - Printing / Publishing	3	10	26	3	4	**46**
L - Services - Business Services	1	12	24	2	4	**43**
M - Services - Education	2	7	24	2	7	**42**
N - Public Administration	4	8	23	2	6	**43**
O - Services - Hotels / Lodging	2	9	23	3	4	**41**
P - Trucking & Warehousing	1	7	22	3	9	**42**
Q - Wholesale Trade - Durable Goods	2	9	25	2	4	**42**
R - Manufacturing - Other	2	5	31	2	5	**45**
S - Transportation - Other	3	11	21	2	4	**41**
T - Manufacturing - Electronic Equipment	3	19	19		3	**44**
U - Manufacturing - Food / Kindred	3	7	14	2	15	**41**
V - Manufacturing - Lumber & Wood Products	6	5	15	3	11	**40**
W - Manufacturing - Transportation Equipment	3	7	32	1	3	**46**
X - Retail Trade - Building Material & Garden	2	9	21	2	7	**41**
Y - Manufacturing - Industrial / Machinery	3	20	20		5	**48**
Z - AM Lumped Group	7	21	12	5	15	**60**
Totals	**73**	**269**	**633**	**58**	**174**	**1,207**

Table 11: Distribution of the Number of Employees at Commercial Sites that were Sampled

	1-4	5-9	10-19	20-49	50-99	100-499	500-999	1000+	Totals
A - Finance / Insurance / Real Estate / Legal	8	12	10	7	3	5	1	2	**48**
B - Retail Trade - Restaurants	6	7	19	17		2			**51**
C - Retail Trade - Other	20	12	10	9					**51**
D - Services - Other Misc.	11	19	8	9	2	1			**50**
E - Wholesale Trade - Nondurable Goods	9	9	16	15	1	3			**53**
F - Retail Trade - Automotive Dealers & Service Stations	12	20	9	7	4	1			**53**
G - Services - Other Professional	19	10	10	5	3	2			**49**
H - Retail Trade - Food Store	14	8	7	13	6	4			**52**
I - Construction	13	16	4	11		1			**45**
J - Services - Medical / Health	12	10	7	11	4	5	1		**50**
K - Manufacturing - Printing / Publishing	7	8	13	12	3	3			**46**
L - Services - Business Services	8	5	7	14	3	6			**43**
M - Services - Education	2	2	3	10	10	12	1	2	**42**
N - Public Administration	1	3		10	5	19	1	4	**43**
O - Services - Hotels / Lodging	2	2	8	7	2	20			**41**
P - Trucking & Warehousing	9	8	6	11	4	4			**42**
Q - Wholesale Trade - Durable Goods	8	16	8	8	2				**42**
R - Manufacturing - Other	6	1	11	12	7	7		1	**45**
S - Transportation - Other	5	9	11	6	4	6			**41**
T - Manufacturing - Electronic Equipment	2	2	2	4	9	22	3		**44**
U - Manufacturing - Food / Kindred		1	7	6	6	19	1	1	**41**
V - Manufacturing - Lumber & Wood Products	9	5	13	9	2	2			**40**
W - Manufacturing - Transportation Equipment	1	5	2	5	9	16	2	6	**46**
X - Retail Trade - Building Material & Garden	9	14	9	8		1			**41**
Y - Manufacturing - Industrial / Machinery	6	4	11	7	6	6	5	3	**48**
Z - AM Lumped Group	7	3	8	11	14	14		3	**60**
Totals	**206**	**211**	**219**	**244**	**109**	**181**	**15**	**22**	**1,207**

VOLUME AND DENSITY FINDINGS

Table 12 shows the estimated average disposal volume and average waste density for each industry group considered in the study. These figures were calculated based on information collected about the waste density (sample weight per volume), dumpster volume, dumpster fullness, frequency of waste pick-up, and number of employees at each participating generator site. (See Appendix A for a description of how the base information was collected and used.)

Table 12: Annual Disposal Volume and Waste Density by Industry Group

Industry Group	Avg. Disp. Vol. (annual cu. yds per employee)	+ / -	Avg. Waste Density (pounds per cu. yd.)	+ / -
A - Finance / Insurance / Real Estate / Legal	5.1	8.5	87.6	11.1
B - Retail Trade - Restaurants	47.4	48.8	109.0	28.1
C - Retail Trade - Other	44.0	36.5	72.1	14.8
D - Services - Other Misc.	16.1	12.7	89.5	13.0
E - Wholesale Trade - Nondurable Goods	18.1	8.0	86.8	25.1
F - Retail Trade - Auto Dealers & Svc. Stations	12.6	6.0	83.5	19.2
G - Services - Other Professional	19.8	14.8	104.4	22.5
H - Retail Trade - Food Store	56.9	31.9	84.4	16.8
I - Construction	43.7	41.4	116.2	26.0
J - Services - Medical / Health	34.0	13.9	74.7	8.1
K - Manufacturing - Printing / Publishing	15.1	5.4	87.5	19.8
L - Services - Business Services	32.1	31.4	87.1	20.9
M - Services - Education	19.3	8.0	72.5	11.2
N - Public Administration	8.0	3.8	88.9	21.6
O - Services - Hotels / Lodging	35.7	11.5	97.1	14.0
P - Trucking & Warehousing	33.2	25.8	94.6	37.3
Q - Wholesale Trade - Durable Goods	23.9	18.5	64.5	23.1
R - Manufacturing - Other	42.9	75.6	121.7	23.8
S - Transportation - Other	28.7	27.0	73.4	23.8
T - Manufacturing - Electronic Equipment	13.8	9.6	62.5	8.7
U - Manufacturing - Food / Kindred	35.8	23.7	73.5	15.3
V - Manufacturing - Lumber & Wood Products	39.1	16.4	134.2	36.8
W - Manufacturing - Transportation Equipment	8.5	9.2	75.9	33.7
X - Retail Trade - Building Material & Garden	46.1	30.5	121.2	31.5
Y - Manufacturing - Industrial / Machinery	5.1	2.9	69.0	14.2
Z - AM Lumped Group	17.8	13.5	67.2	21.8
Overall Means	**25.2**	**3.7**	**84.4**	**4.4**

Confidence intervals calculated at the 90% confidence level.

AVERAGE DISPOSAL RATES

Table 13 shows the estimated average per-employee disposal rate and estimated statewide disposal for each industry group considered in the study. These figures were calculated based on information collected about the waste density (sample weight per volume), dumpster volume, dumpster fullness, frequency of waste pick-up, and number of employees at each participating generator site. Table 14 shows the relative contribution of each industry group to the state's entire Commercial sector waste. (See Appendix A for a description of how the base information was collected and used.)

Table 13: Per-Employee Disposal Rate and Estimated Contribution of Each Industry Group to Commercial Waste

Industry Group	Avg. Disp. Rate (tons per employee per year)	Statewide Employment	Est. Statewide Disposal (tons per year)
A - Finance / Insurance / Real Estate / Legal	0.3	1,208,364	322,502
B - Retail Trade - Restaurants	3.1	853,496	2,622,515
C - Retail Trade - Other	1.9	836,028	1,577,262
D - Services - Other Misc.	0.9	1,070,033	919,135
E - Wholesale Trade - Nondurable Goods	0.9	410,917	382,924
F - Retail Trade - Auto Dealers & Svc. Stations	0.6	280,545	175,403
G - Services - Other Professional	1.2	663,374	814,533
H - Retail Trade - Food Store	2.9	351,497	1,003,044
I - Construction	3.0	458,468	1,386,113
J - Services - Medical / Health	1.5	1,349,874	2,040,526
K - Manufacturing - Printing / Publishing	0.8	211,145	165,594
L - Services - Business Services	1.7	611,082	1,015,819
M - Services - Education	0.8	919,623	763,817
N - Public Administration	0.4	659,925	278,112
O - Services - Hotels / Lodging	2.1	223,203	459,789
P - Trucking & Warehousing	1.9	131,347	245,569
Q - Wholesale Trade - Durable Goods	0.9	617,125	566,863
R - Manufacturing - Other	3.1	167,736	520,486
S - Transportation - Other	1.3	161,146	202,160
T - Manufacturing - Electronic Equipment	0.5	266,397	136,275
U - Manufacturing - Food / Kindred	1.6	152,800	238,668
V - Manufacturing - Lumber & Wood Products	3.1	34,339	107,251
W - Manufacturing - Transportation Equipment	0.4	137,964	52,606
X - Retail Trade - Building Material & Garden	3.3	134,247	446,541
Y - Manufacturing - Industrial / Machinery	0.2	221,676	46,172
Z - AM Lumped Group	0.7	1,221,000	868,681
Overall Mean and Totals	**1.3**	**13,353,351**	**17,358,359**

Employment figures were based on 1998 employment data, the most recent data available. Disposal tons in this table may not match exactly the tons reported in industry group composition tables because of rounding.

Table 14: Relative Contribution of Each Industry Group to Commercial Waste

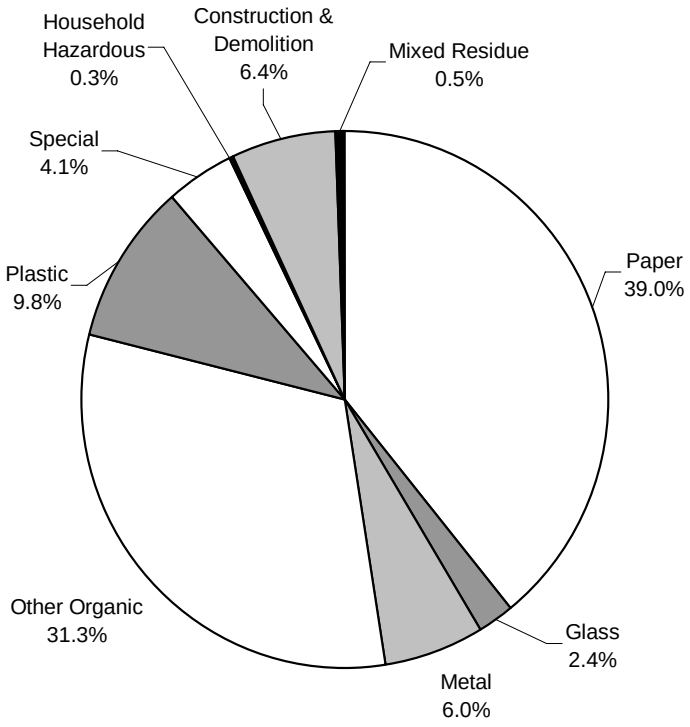
Industry Group	Est. Statewide Disposal (tons per year)	Est. Percentage of Commercial Sector Waste
B - Retail Trade - Restaurants	2,622,515	15.1%
J - Services - Medical / Health	2,040,526	11.8%
C - Retail Trade - Other	1,577,262	9.1%
I - Construction	1,386,113	8.0%
L - Services - Business Services	1,015,819	5.9%
H - Retail Trade - Food Store	1,003,044	5.8%
D - Services - Other Misc.	919,135	5.3%
Z - AM Lumped Group	868,681	5.0%
G - Services - Other Professional	814,533	4.7%
M - Services - Education	763,817	4.4%
Q - Wholesale Trade - Durable Goods	566,863	3.3%
R - Manufacturing - Other	520,486	3.0%
O - Services - Hotels / Lodging	459,789	2.6%
X - Retail Trade - Building Material & Garden	446,541	2.6%
E - Wholesale Trade - Nondurable Goods	382,924	2.2%
A - Finance / Insurance / Real Estate / Legal	322,502	1.9%
N - Public Administration	278,112	1.6%
P - Trucking & Warehousing	245,569	1.4%
U - Manufacturing - Food / Kindred	238,668	1.4%
S - Transportation - Other	202,160	1.2%
F - Retail Trade - Auto Dealers & Svc. Stations	175,403	1.0%
K - Manufacturing - Printing / Publishing	165,594	1.0%
T - Manufacturing - Electronic Equipment	136,275	0.8%
V - Manufacturing - Lumber & Wood Products	107,251	0.6%
W - Manufacturing - Transportation Equipment	52,606	0.3%
Y - Manufacturing - Industrial / Machinery	46,172	0.3%
Total	**17,358,359**	**100.0%**

Disposal tons in this table may not match exactly the tons reported in industry group composition tables because of rounding.

OVERALL COMMERCIAL WASTE COMPOSITION

Composition results for commercial waste are illustrated in Figure 3 and described in detail in Table 16. The overall commercial composition was developed by aggregating data from each of the 26 industry groups (see Section A.10). The material class *Paper* accounts for approximately 39% of disposed commercial waste, and the class *Other Organic* accounts for about 31%. (See Table 16 for lists of materials belonging to each class, and see Appendix B for definitions of the materials.)

Figure 3: Overview of Commercial Waste



Food, a component of *Other Organic Waste* is the most prevalent material, representing 16.3% of commercial waste. *Remainder/Composite Paper* is also present in large amounts, representing 13.2% of the sector's waste. Together, materials from the *Paper* and *Other Organic Waste* classes comprise eight of the top ten materials in commercial waste. Table 15 presents the materials that account for approximately 68% of commercial waste.

Table 15: Most Prevalent Materials in Commercial Waste

Material Type	Est. Pct.	Est. Tons	Cumulative Pct.
Food	16.3%	2,829,194	16.3%
Remainder/Composite Paper	13.2%	2,282,775	29.4%
Leaves & Grass	6.9%	1,205,147	36.4%
Uncoated Corrugated Cardboard	6.6%	1,137,254	42.9%
Other Miscellaneous Paper	5.0%	860,479	47.9%
Remainder/Composite Organic	4.6%	792,085	52.5%
Film Plastic	4.5%	772,721	56.9%
White Ledger Paper	4.2%	729,144	61.1%
Lumber	3.8%	658,061	64.9%
Newspaper	3.6%	629,836	68.5%

Any differences between *cumulative percent* figures and the sum of *estimated percent* figures are due to rounding.

Table 16: Composition of Commercial Waste

	Est. Pct.	+ / -	Est. Tons
Paper	**39.0%**		**6,776,011**
Uncoated Corrugated Cardboard	6.6%	0.5%	1,137,254
Paper Bags	0.7%	0.1%	121,339
Newspaper	3.6%	0.3%	629,836
White Ledger Paper	4.2%	0.5%	729,144
Colored Ledger Paper	0.3%	0.0%	51,279
Computer Paper	0.6%	0.1%	109,639
Other Office Paper	2.4%	0.3%	420,616
Magazines and Catalogs	2.3%	0.3%	393,755
Phone Books and Directories	0.2%	0.1%	39,896
Other Miscellaneous Paper	5.0%	0.3%	860,479
Remainder/Composite Paper	13.2%	0.8%	2,282,774
Glass	**2.4%**		**417,841**
Clear Glass Bottles & Containers	1.3%	0.1%	224,863
Green Glass Bottles & Containers	0.3%	0.0%	43,951
Brown Glass Bottles & Containers	0.3%	0.1%	52,098
Other Colored Glass Bottles & Containers	0.0%	0.0%	4,483
Flat Glass	0.0%	0.0%	8,480
Remainer/Composite Glass	0.5%	0.1%	83,965
Metal	**6.0%**		**1,043,196**
Tin/Steel Cans	0.9%	0.1%	147,891
Major Appliances	0.0%	0.0%	8,180
Other Ferrous Metal	2.3%	0.4%	401,099
Aluminum Cans	0.2%	0.0%	35,236
Other Non-Ferrous Metal	0.2%	0.0%	41,923
Remainder/Composite Metal	2.4%	0.4%	408,868
Plastic	**9.8%**		**1,707,033**
HDPE Containers	0.7%	0.1%	114,828
PETE Containers	0.4%	0.0%	74,793
Miscellaneous Plastic Containers	0.7%	0.1%	127,347
Film Plastic	4.5%	0.4%	772,721
Durable Plastic Items	1.9%	0.3%	325,297
Remainder/Composite Plastic	1.7%	0.1%	292,047
Sample count: 1,207			

	Est. Pct.	+ / -	Est. Tons
Other Organic	**31.3%**		**5,437,472**
Food	16.3%	1.0%	2,829,194
Leaves & Grass	6.9%	1.0%	1,205,147
Prunings & Trimmings	1.1%	0.4%	197,398
Branches & Stumps	0.0%	0.0%	2,103
Agricultural Crop Residues	0.0%	0.0%	1,506
Manures	0.3%	0.3%	49,291
Textiles	2.1%	0.5%	360,747
Remainder/Composite Organic	4.6%	0.6%	792,085
Construction & Demolition	**6.4%**		**1,118,116**
Concrete	0.4%	0.2%	77,650
Asphalt Paving	0.1%	0.1%	14,819
Asphalt Roofing	0.0%	0.0%	675
Lumber	3.8%	0.7%	658,061
Gypsum Board	0.4%	0.1%	69,970
Rock, Soil & Fines	0.8%	0.2%	133,556
Remainder/Composite C&D	0.9%	0.2%	163,386
Household Hazardous Waste	**0.3%**		**56,828**
Paint	0.0%	0.0%	8,564
Vehicle & Equipment Fluids	0.1%	0.1%	13,540
Used Oil	0.0%	0.0%	660
Batteries	0.1%	0.1%	20,238
Remainder/Composite HHW	0.1%	0.0%	13,826
Special Waste	**4.1%**		**716,524**
Ash	0.1%	0.0%	12,122
Sewage Solids	0.0%	0.0%	0
Industrial Sludge	0.0%	0.0%	18
Treated Medical Waste	0.0%	0.0%	2,756
Bulky Items	2.4%	1.1%	418,530
Tires	0.4%	0.2%	72,255
Remainder/Composite Special Waste	1.2%	0.5%	210,844
Mixed Residue	**0.5%**	**0.1%**	**85,338**
Totals	**100.0%**		**17,358,359**

Confidence intervals calculated at the 90% confidence level. Percentages for materials may not total 100% due to rounding.

3.3.2 COMPOSITION BY INDUSTRY GROUP

The study called for 1,200 commercial generator samples, which were allocated to 26 industry groups organized according to Standard Industrial Classification (SIC) codes (see Appendix E for definitions of these groups). The following industry groups were included:

- A - Finance / Insurance / Real Estate / Legal
- B - Retail Trade - Restaurants
- C - Retail Trade - Other
- D - Services - Other Misc.
- E - Wholesale Trade - Nondurable Goods
- F - Retail Trade - Automotive Dealers & Service Stations
- G - Services - Other Professional
- H - Retail Trade - Food Store
- I - Construction
- J - Services - Medical / Health
- K - Manufacturing - Printing / Publishing
- L - Services - Business Services
- M - Services – Education
- N - Public Administration
- O - Services - Hotels / Lodging
- P - Trucking & Warehousing
- Q - Wholesale Trade - Durable Goods
- R - Manufacturing - Other
- S - Transportation - Other
- T - Manufacturing - Electronic Equipment
- U - Manufacturing - Food / Kindred
- V - Manufacturing - Lumber & Wood Products
- W - Manufacturing - Transportation Equipment
- X - Retail Trade - Building Material & Garden
- Y - Manufacturing - Industrial / Machinery
- Z - AM Lumped Group

The last grouping, "Z - AM Lumped Group" includes several industry groups, each of which contributes relatively little to the state's commercial waste stream. The lumped group includes the following industries:

- Z - Agriculture / Fisheries
- AA - Manufacturing - Instruments / Related
- AB - Communications
- AC - Manufacturing - Primary / Fabricated Metal
- AD - Manufacturing - Apparel / Textile
- AE - Manufacturing - Furniture / Fixtures
- AF - Services - Motion Pictures
- AG - Manufacturing - Chemical / Allied
- AH - Retail Trade - General Merchandise Store
- AI - Mining
- AJ - Transportation - Air
- AK - Utilities
- AL - Manufacturing - Paper / Allied
- AM - Forestry

Samples were allocated to each industry group and then were allocated to each of the state's five regions based on the relative contribution of each region to the employment in each industry group. (See Table 73 of Appendix A for a breakdown of the original sample

allocation by region and industry group, and see Table 10 of this section for a count of the samples actually obtained by region and industry group. Appendix A also contains a detailed description of sample allocation procedures.) Samples were further allocated to the selected waste sheds within each region based on the relative contribution of each waste shed to the employment in each industry group.

Table 17 through Table 42 present the detailed composition results for each of 26 industry groups.

Table 17: Composition of Waste from Group A: Finance / Insurance / Real Estate / Legal

	Est. Pct.	+ / -	Est. Tons
Paper	**50.4%**		**162,494**
Uncoated Corrugated Cardboard	7.8%	2.2%	25,074
Paper Bags	0.5%	0.1%	1,751
Newspaper	4.4%	1.0%	14,109
White Ledger Paper	11.2%	2.9%	36,039
Colored Ledger Paper	0.4%	0.1%	1,308
Computer Paper	0.9%	0.7%	2,842
Other Office Paper	4.1%	1.5%	13,357
Magazines and Catalogs	3.7%	1.4%	11,887
Phone Books and Directories	0.3%	0.1%	841
Other Miscellaneous Paper	6.0%	1.2%	19,324
Remainder/Composite Paper	11.2%	1.4%	35,961
Glass	**2.7%**		**8,569**
Clear Glass Bottles & Containers	1.7%	0.5%	5,418
Green Glass Bottles & Containers	0.2%	0.1%	800
Brown Glass Bottles & Containers	0.3%	0.1%	853
Other Colored Glass Bottles & Containers	0.1%	0.0%	216
Flat Glass	0.0%	0.0%	0
Remainer/Composite Glass	0.4%	0.3%	1,281
Metal	**3.8%**		**12,143**
Tin/Steel Cans	0.4%	0.1%	1,180
Major Appliances	0.0%	0.0%	0
Other Ferrous Metal	2.3%	1.2%	7,574
Aluminum Cans	0.3%	0.1%	1,024
Other Non-Ferrous Metal	0.2%	0.1%	535
Remainder/Composite Metal	0.6%	0.2%	1,831
Plastic	**6.7%**		**21,694**
HDPE Containers	0.4%	0.1%	1,140
PETE Containers	0.4%	0.1%	1,271
Miscellaneous Plastic Containers	0.7%	0.1%	2,309
Film Plastic	3.2%	0.5%	10,273
Durable Plastic Items	0.5%	0.1%	1,675
Remainder/Composite Plastic	1.6%	0.4%	5,025
Sample count: 48			

	Est. Pct.	+ / -	Est. Tons
Other Organic	**25.6%**		**82,560**
Food	15.0%	3.9%	48,285
Leaves & Grass	6.1%	3.6%	19,725
Prunings & Trimmings	0.4%	0.3%	1,293
Branches & Stumps	0.0%	0.0%	0
Agricultural Crop Residues	0.0%	0.0%	0
Manures	0.0%	0.0%	0
Textiles	1.0%	0.5%	3,077
Remainder/Composite Organic	3.2%	1.5%	10,181
Construction & Demolition	**4.3%**		**13,796**
Concrete	0.0%	0.0%	32
Asphalt Paving	0.0%	0.0%	0
Asphalt Roofing	0.0%	0.0%	0
Lumber	3.0%	2.8%	9,763
Gypsum Board	0.0%	0.0%	0
Rock, Soil & Fines	0.0%	0.0%	52
Remainder/Composite C&D	1.2%	0.8%	3,949
Household Hazardous Waste	**1.0%**		**3,231**
Paint	0.0%	0.0%	7
Vehicle & Equipment Fluids	0.5%	0.5%	1,645
Used Oil	0.0%	0.0%	0
Batteries	0.5%	0.4%	1,579
Remainder/Composite HHW	0.0%	0.0%	0
Special Waste	**5.0%**		**16,047**
Ash	0.3%	0.2%	1,072
Sewage Solids	0.0%	0.0%	0
Industrial Sludge	0.0%	0.0%	0
Treated Medical Waste	0.0%	0.0%	0
Bulky Items	4.6%	3.5%	14,893
Tires	0.0%	0.0%	0
Remainder/Composite Special Waste	0.0%	0.0%	81
Mixed Residue	**0.6%**	**0.4%**	**1,968**
Totals	**100.0%**		**322,501**

Confidence intervals calculated at the 90% confidence level. Percentages for materials may not total 100% due to rounding.

Table 18: Composition of Waste from Group B: Retail Trade - Restaurants

	Est. Pct.	+ / -	Est. Tons
Paper	**25.0%**		**655,769**
Uncoated Corrugated Cardboard	5.9%	1.0%	154,654
Paper Bags	0.5%	0.1%	13,234
Newspaper	2.5%	0.7%	66,732
White Ledger Paper	0.2%	0.1%	5,264
Colored Ledger Paper	0.1%	0.1%	2,566
Computer Paper	0.2%	0.2%	4,553
Other Office Paper	0.3%	0.1%	7,342
Magazines and Catalogs	0.2%	0.1%	4,520
Phone Books and Directories	0.0%	0.0%	80
Other Miscellaneous Paper	2.2%	0.4%	57,893
Remainder/Composite Paper	12.9%	2.1%	338,933
Glass	**3.2%**		**82,748**
Clear Glass Bottles & Containers	1.7%	0.3%	43,759
Green Glass Bottles & Containers	0.7%	0.2%	18,565
Brown Glass Bottles & Containers	0.6%	0.1%	14,994
Other Colored Glass Bottles & Containers	0.1%	0.0%	1,314
Flat Glass	0.0%	0.0%	0
Remainer/Composite Glass	0.2%	0.1%	4,115
Metal	**3.4%**		**88,675**
Tin/Steel Cans	1.9%	0.5%	49,215
Major Appliances	0.0%	0.0%	0
Other Ferrous Metal	0.1%	0.1%	3,282
Aluminum Cans	0.1%	0.0%	2,594
Other Non-Ferrous Metal	0.4%	0.2%	9,490
Remainder/Composite Metal	0.9%	0.8%	24,095
Plastic	**7.0%**		**183,924**
HDPE Containers	0.8%	0.1%	20,911
PETE Containers	0.2%	0.0%	4,649
Miscellaneous Plastic Containers	0.4%	0.1%	9,187
Film Plastic	4.4%	0.5%	116,537
Durable Plastic Items	0.7%	0.3%	17,254
Remainder/Composite Plastic	0.6%	0.1%	15,385
Sample count: 51			

	Est. Pct.	+ / -	Est. Tons
Other Organic	**56.8%**		**1,490,550**
Food	56.0%	3.2%	1,467,819
Leaves & Grass	0.2%	0.1%	4,743
Prunings & Trimmings	0.0%	0.0%	300
Branches & Stumps	0.0%	0.0%	0
Agricultural Crop Residues	0.0%	0.0%	0
Manures	0.0%	0.0%	0
Textiles	0.3%	0.1%	7,957
Remainder/Composite Organic	0.4%	0.1%	9,731
Construction & Demolition	**4.4%**		**115,783**
Concrete	0.0%	0.0%	0
Asphalt Paving	0.8%	0.8%	20,835
Asphalt Roofing	0.0%	0.0%	0
Lumber	0.7%	0.5%	19,330
Gypsum Board	0.2%	0.2%	5,478
Rock, Soil & Fines	0.0%	0.0%	0
Remainder/Composite C&D	2.7%	1.2%	70,141
Household Hazardous Waste	**0.0%**		**88**
Paint	0.0%	0.0%	0
Vehicle & Equipment Fluids	0.0%	0.0%	0
Used Oil	0.0%	0.0%	0
Batteries	0.0%	0.0%	82
Remainder/Composite HHW	0.0%	0.0%	6
Special Waste	**0.0%**		**177**
Ash	0.0%	0.0%	177
Sewage Solids	0.0%	0.0%	0
Industrial Sludge	0.0%	0.0%	0
Treated Medical Waste	0.0%	0.0%	0
Bulky Items	0.0%	0.0%	0
Tires	0.0%	0.0%	0
Remainder/Composite Special Waste	0.0%	0.0%	0
Mixed Residue	**0.2%**	**0.1%**	**4,804**
Totals	**100.0%**		**2,622,518**

Confidence intervals calculated at the 90% confidence level. Percentages for materials may not total 100% due to rounding.

Table 19: Composition of Waste from Group C: Retail Trade - Other

	Est. Pct.	+ / -	Est. Tons
Paper	**39.8%**		**628,523**
Uncoated Corrugated Cardboard	12.0%	2.6%	190,057
Paper Bags	0.7%	0.1%	11,169
Newspaper	4.0%	1.1%	63,357
White Ledger Paper	2.0%	0.9%	32,081
Colored Ledger Paper	0.1%	0.0%	1,708
Computer Paper	1.7%	0.9%	26,809
Other Office Paper	1.3%	0.3%	20,705
Magazines and Catalogs	1.4%	0.4%	21,994
Phone Books and Directories	0.1%	0.1%	1,803
Other Miscellaneous Paper	7.5%	2.0%	118,614
Remainder/Composite Paper	8.9%	1.5%	140,225
Glass	**2.4%**		**37,849**
Clear Glass Bottles & Containers	1.6%	0.5%	25,307
Green Glass Bottles & Containers	0.3%	0.1%	4,748
Brown Glass Bottles & Containers	0.3%	0.2%	4,869
Other Colored Glass Bottles & Containers	0.0%	0.0%	261
Flat Glass	0.1%	0.1%	1,360
Remainer/Composite Glass	0.1%	0.0%	1,303
Metal	**7.7%**		**121,511**
Tin/Steel Cans	0.3%	0.1%	5,342
Major Appliances	0.0%	0.0%	0
Other Ferrous Metal	4.9%	3.7%	76,853
Aluminum Cans	0.2%	0.1%	3,548
Other Non-Ferrous Metal	0.1%	0.0%	1,807
Remainder/Composite Metal	2.2%	0.9%	33,961
Plastic	**10.0%**		**157,725**
HDPE Containers	0.6%	0.2%	9,333
PETE Containers	0.6%	0.1%	9,014
Miscellaneous Plastic Containers	0.4%	0.1%	6,886
Film Plastic	4.7%	1.4%	74,703
Durable Plastic Items	1.4%	0.3%	21,560
Remainder/Composite Plastic	2.3%	0.6%	36,229
Sample count: 51			

	Est. Pct.	+ / -	Est. Tons
Other Organic	**30.6%**		**483,265**
Food	8.0%	1.8%	125,943
Leaves & Grass	2.9%	1.5%	46,047
Prunings & Trimmings	0.9%	0.5%	13,623
Branches & Stumps	0.0%	0.0%	0
Agricultural Crop Residues	0.0%	0.0%	0
Manures	4.9%	4.5%	77,762
Textiles	6.0%	4.7%	94,150
Remainder/Composite Organic	8.0%	4.0%	125,741
Construction & Demolition	**6.4%**		**101,510**
Concrete	0.1%	0.1%	2,059
Asphalt Paving	0.0%	0.0%	0
Asphalt Roofing	0.0%	0.0%	14
Lumber	4.9%	1.6%	77,745
Gypsum Board	0.1%	0.1%	1,505
Rock, Soil & Fines	1.2%	1.2%	18,903
Remainder/Composite C&D	0.1%	0.1%	1,284
Household Hazardous Waste	**0.3%**		**4,597**
Paint	0.1%	0.1%	1,647
Vehicle & Equipment Fluids	0.0%	0.0%	0
Used Oil	0.0%	0.0%	0
Batteries	0.2%	0.1%	2,950
Remainder/Composite HHW	0.0%	0.0%	0
Special Waste	**2.0%**		**30,881**
Ash	0.0%	0.0%	0
Sewage Solids	0.0%	0.0%	0
Industrial Sludge	0.0%	0.0%	0
Treated Medical Waste	0.0%	0.0%	0
Bulky Items	1.8%	1.7%	27,646
Tires	0.0%	0.0%	0
Remainder/Composite Special Waste	0.2%	0.2%	3,235
Mixed Residue	**0.7%**	**0.3%**	**11,405**
Totals	**100.0%**		**1,577,267**

Confidence intervals calculated at the 90% confidence level. Percentages for materials may not total 100% due to rounding.

Table 20: Composition of Waste from Group D: Services - Other Misc.

	Est. Pct.	+ / -	Est. Tons
Paper	**33.2%**		**304,891**
Uncoated Corrugated Cardboard	6.8%	0.9%	62,512
Paper Bags	0.7%	0.1%	6,630
Newspaper	6.1%	1.9%	56,021
White Ledger Paper	1.2%	0.4%	11,417
Colored Ledger Paper	0.1%	0.0%	1,178
Computer Paper	0.3%	0.2%	2,443
Other Office Paper	1.0%	0.2%	9,358
Magazines and Catalogs	1.6%	0.6%	15,039
Phone Books and Directories	0.3%	0.2%	2,557
Other Miscellaneous Paper	3.5%	0.5%	31,954
Remainder/Composite Paper	11.5%	2.0%	105,781
Glass	**2.5%**		**22,733**
Clear Glass Bottles & Containers	1.2%	0.4%	11,417
Green Glass Bottles & Containers	0.4%	0.2%	3,425
Brown Glass Bottles & Containers	0.2%	0.1%	1,547
Other Colored Glass Bottles & Containers	0.0%	0.0%	0
Flat Glass	0.0%	0.0%	0
Remainer/Composite Glass	0.7%	0.4%	6,344
Metal	**14.5%**		**132,850**
Tin/Steel Cans	1.9%	0.5%	17,410
Major Appliances	0.0%	0.0%	0
Other Ferrous Metal	5.2%	2.1%	47,826
Aluminum Cans	0.2%	0.0%	1,919
Other Non-Ferrous Metal	0.4%	0.1%	3,611
Remainder/Composite Metal	6.8%	2.9%	62,084
Plastic	**10.1%**		**93,028**
HDPE Containers	1.5%	0.4%	13,398
PETE Containers	0.6%	0.1%	5,274
Miscellaneous Plastic Containers	0.5%	0.1%	4,576
Film Plastic	4.6%	0.8%	42,726
Durable Plastic Items	1.8%	0.5%	16,218
Remainder/Composite Plastic	1.2%	0.2%	10,836
Sample count: 50			

	Est. Pct.	+ / -	Est. Tons
Other Organic	**30.3%**		**278,498**
Food	12.6%	3.4%	115,963
Leaves & Grass	6.0%	2.5%	54,780
Prunings & Trimmings	1.1%	0.8%	10,543
Branches & Stumps	0.0%	0.0%	0
Agricultural Crop Residues	0.0%	0.0%	0
Manures	0.0%	0.0%	0
Textiles	4.7%	2.7%	43,247
Remainder/Composite Organic	5.9%	1.1%	53,965
Construction & Demolition	**4.8%**		**44,261**
Concrete	0.0%	0.0%	0
Asphalt Paving	0.0%	0.0%	0
Asphalt Roofing	0.0%	0.0%	0
Lumber	3.2%	1.5%	29,019
Gypsum Board	0.0%	0.0%	0
Rock, Soil & Fines	1.3%	1.2%	11,725
Remainder/Composite C&D	0.4%	0.2%	3,518
Household Hazardous Waste	**0.5%**		**4,479**
Paint	0.0%	0.0%	455
Vehicle & Equipment Fluids	0.0%	0.0%	0
Used Oil	0.0%	0.0%	36
Batteries	0.0%	0.0%	378
Remainder/Composite HHW	0.4%	0.4%	3,610
Special Waste	**3.7%**		**33,762**
Ash	0.0%	0.0%	195
Sewage Solids	0.0%	0.0%	0
Industrial Sludge	0.0%	0.0%	0
Treated Medical Waste	0.0%	0.0%	0
Bulky Items	1.2%	1.1%	11,246
Tires	2.4%	1.9%	21,764
Remainder/Composite Special Waste	0.1%	0.0%	558
Mixed Residue	**0.5%**	**0.2%**	**4,640**
Totals	**100.0%**		**919,142**

Confidence intervals calculated at the 90% confidence level. Percentages for materials may not total 100% due to rounding.

Table 21: Composition of Waste from Group E: Wholesale Trade - Nondurable Goods

	Est. Pct.	+ / -	Est. Tons
Paper	**38.2%**		**146,139**
Uncoated Corrugated Cardboard	11.9%	2.9%	45,719
Paper Bags	0.5%	0.2%	1,870
Newspaper	2.6%	1.1%	9,852
White Ledger Paper	3.1%	1.2%	11,867
Colored Ledger Paper	0.3%	0.1%	1,025
Computer Paper	0.6%	0.2%	2,120
Other Office Paper	1.6%	0.5%	6,168
Magazines and Catalogs	3.6%	1.7%	13,686
Phone Books and Directories	0.2%	0.1%	908
Other Miscellaneous Paper	6.2%	2.8%	23,806
Remainder/Composite Paper	7.6%	1.3%	29,116
Glass	**2.0%**		**7,477**
Clear Glass Bottles & Containers	1.1%	0.6%	4,167
Green Glass Bottles & Containers	0.1%	0.0%	200
Brown Glass Bottles & Containers	0.8%	0.6%	2,994
Other Colored Glass Bottles & Containers	0.0%	0.0%	11
Flat Glass	0.0%	0.0%	0
Remainer/Composite Glass	0.0%	0.0%	104
Metal	**3.3%**		**12,597**
Tin/Steel Cans	0.8%	0.3%	2,875
Major Appliances	0.0%	0.0%	0
Other Ferrous Metal	1.7%	0.7%	6,459
Aluminum Cans	0.1%	0.0%	437
Other Non-Ferrous Metal	0.1%	0.0%	345
Remainder/Composite Metal	0.6%	0.4%	2,481
Plastic	**13.7%**		**52,368**
HDPE Containers	0.3%	0.1%	1,320
PETE Containers	0.2%	0.1%	919
Miscellaneous Plastic Containers	0.2%	0.1%	844
Film Plastic	8.0%	1.4%	30,564
Durable Plastic Items	3.6%	2.3%	13,730
Remainder/Composite Plastic	1.3%	0.4%	4,991
Sample count: 53			

	Est. Pct.	+ / -	Est. Tons
Other Organic	**31.3%**		**119,876**
Food	22.4%	5.9%	85,607
Leaves & Grass	7.4%	5.2%	28,299
Prunings & Trimmings	0.1%	0.1%	345
Branches & Stumps	0.0%	0.0%	0
Agricultural Crop Residues	0.0%	0.0%	0
Manures	0.0%	0.0%	0
Textiles	0.4%	0.2%	1,419
Remainder/Composite Organic	1.1%	0.4%	4,206
Construction & Demolition	**5.9%**		**22,580**
Concrete	0.0%	0.0%	12
Asphalt Paving	0.0%	0.0%	2
Asphalt Roofing	0.0%	0.0%	0
Lumber	4.4%	1.7%	16,756
Gypsum Board	0.0%	0.0%	0
Rock, Soil & Fines	1.5%	1.5%	5,810
Remainder/Composite C&D	0.0%	0.0%	0
Household Hazardous Waste	**0.0%**		**66**
Paint	0.0%	0.0%	0
Vehicle & Equipment Fluids	0.0%	0.0%	0
Used Oil	0.0%	0.0%	0
Batteries	0.0%	0.0%	66
Remainder/Composite HHW	0.0%	0.0%	0
Special Waste	**5.3%**		**20,367**
Ash	0.0%	0.0%	0
Sewage Solids	0.0%	0.0%	0
Industrial Sludge	0.0%	0.0%	0
Treated Medical Waste	0.0%	0.0%	0
Bulky Items	0.1%	0.1%	541
Tires	0.7%	0.6%	2,716
Remainder/Composite Special Waste	4.5%	4.2%	17,109
Mixed Residue	**0.4%**	**0.1%**	**1,456**
Totals	**100.0%**		**382,925**

Confidence intervals calculated at the 90% confidence level. Percentages for materials may not total 100% due to rounding.

Table 22: Composition of Waste from Group F: Retail Trade - Automotive Dealers & Service Stations

	Est. Pct.	+ / -	Est. Tons
Paper	**33.9%**		**59,497**
Uncoated Corrugated Cardboard	10.4%	1.6%	18,310
Paper Bags	0.5%	0.1%	960
Newspaper	4.8%	1.2%	8,361
White Ledger Paper	1.6%	0.6%	2,890
Colored Ledger Paper	0.0%	0.0%	82
Computer Paper	0.5%	0.2%	867
Other Office Paper	1.4%	0.4%	2,473
Magazines and Catalogs	0.5%	0.1%	937
Phone Books and Directories	0.2%	0.1%	386
Other Miscellaneous Paper	4.4%	0.6%	7,637
Remainder/Composite Paper	9.5%	1.7%	16,593
Glass	**3.9%**		**6,884**
Clear Glass Bottles & Containers	1.9%	0.4%	3,260
Green Glass Bottles & Containers	0.3%	0.1%	524
Brown Glass Bottles & Containers	0.3%	0.1%	477
Other Colored Glass Bottles & Containers	0.1%	0.0%	142
Flat Glass	0.0%	0.0%	0
Remainer/Composite Glass	1.4%	0.8%	2,481
Metal	**13.2%**		**23,093**
Tin/Steel Cans	0.7%	0.1%	1,170
Major Appliances	0.0%	0.0%	0
Other Ferrous Metal	8.2%	2.5%	14,452
Aluminum Cans	0.3%	0.1%	527
Other Non-Ferrous Metal	1.0%	0.4%	1,759
Remainder/Composite Metal	3.0%	0.7%	5,185
Plastic	**10.4%**		**18,270**
HDPE Containers	2.4%	0.5%	4,195
PETE Containers	0.7%	0.1%	1,305
Miscellaneous Plastic Containers	0.6%	0.1%	1,005
Film Plastic	3.5%	0.5%	6,083
Durable Plastic Items	2.1%	1.1%	3,671
Remainder/Composite Plastic	1.1%	0.2%	2,013
Sample count: 53			

	Est. Pct.	+ / -	Est. Tons
Other Organic	**13.5%**		**23,727**
Food	6.1%	1.1%	10,625
Leaves & Grass	3.0%	1.3%	5,320
Prunings & Trimmings	0.1%	0.1%	149
Branches & Stumps	0.0%	0.0%	0
Agricultural Crop Residues	0.0%	0.0%	0
Manures	0.0%	0.0%	0
Textiles	0.7%	0.2%	1,183
Remainder/Composite Organic	3.7%	1.1%	6,450
Construction & Demolition	**14.9%**		**26,149**
Concrete	0.7%	0.7%	1,206
Asphalt Paving	0.0%	0.0%	0
Asphalt Roofing	0.0%	0.0%	0
Lumber	6.1%	3.4%	10,787
Gypsum Board	0.0%	0.0%	0
Rock, Soil & Fines	2.3%	1.6%	3,998
Remainder/Composite C&D	5.8%	3.9%	10,157
Household Hazardous Waste	**0.2%**		**430**
Paint	0.0%	0.0%	0
Vehicle & Equipment Fluids	0.0%	0.0%	0
Used Oil	0.2%	0.2%	346
Batteries	0.0%	0.0%	84
Remainder/Composite HHW	0.0%	0.0%	0
Special Waste	**9.5%**		**16,705**
Ash	0.0%	0.0%	0
Sewage Solids	0.0%	0.0%	0
Industrial Sludge	0.0%	0.0%	0
Treated Medical Waste	0.0%	0.0%	0
Bulky Items	0.0%	0.0%	0
Tires	9.3%	4.7%	16,248
Remainder/Composite Special Waste	0.3%	0.2%	458
Mixed Residue	**0.4%**	**0.1%**	**650**
Totals	**100.0%**		**175,406**

Confidence intervals calculated at the 90% confidence level. Percentages for materials may not total 100% due to rounding.

Table 23: Composition of Waste from Group G: Services - Other Professional

	Est. Pct.	+ / -	Est. Tons
Paper	**40.8%**		**332,114**
Uncoated Corrugated Cardboard	3.8%	1.0%	30,986
Paper Bags	0.5%	0.1%	3,681
Newspaper	2.9%	0.8%	23,769
White Ledger Paper	5.3%	1.7%	43,207
Colored Ledger Paper	1.0%	0.5%	7,860
Computer Paper	0.3%	0.2%	2,750
Other Office Paper	2.0%	0.6%	15,918
Magazines and Catalogs	4.1%	2.1%	33,105
Phone Books and Directories	0.1%	0.1%	912
Other Miscellaneous Paper	5.3%	0.8%	43,548
Remainder/Composite Paper	15.5%	2.1%	126,378
Glass	**3.0%**		**24,338**
Clear Glass Bottles & Containers	1.4%	0.4%	11,245
Green Glass Bottles & Containers	0.5%	0.4%	3,790
Brown Glass Bottles & Containers	0.3%	0.2%	2,110
Other Colored Glass Bottles & Containers	0.0%	0.0%	0
Flat Glass	0.0%	0.0%	0
Remainer/Composite Glass	0.9%	0.6%	7,194
Metal	**2.8%**		**23,205**
Tin/Steel Cans	0.4%	0.1%	3,077
Major Appliances	0.0%	0.0%	0
Other Ferrous Metal	0.2%	0.1%	1,544
Aluminum Cans	0.1%	0.0%	1,146
Other Non-Ferrous Metal	0.1%	0.0%	1,196
Remainder/Composite Metal	2.0%	1.1%	16,242
Plastic	**7.4%**		**59,956**
HDPE Containers	0.6%	0.2%	5,189
PETE Containers	0.4%	0.1%	3,365
Miscellaneous Plastic Containers	0.4%	0.1%	3,281
Film Plastic	2.3%	0.3%	18,568
Durable Plastic Items	2.3%	1.0%	18,842
Remainder/Composite Plastic	1.3%	0.3%	10,712
Other Organic	**38.3%**		**312,085**
Food	11.8%	2.3%	95,909
Leaves & Grass	19.9%	5.7%	162,003
Prunings & Trimmings	1.9%	1.1%	15,486
Branches & Stumps	0.0%	0.0%	0
Agricultural Crop Residues	0.0%	0.0%	0
Manures	0.0%	0.0%	0
Textiles	0.3%	0.1%	2,750
Remainder/Composite Organic	4.4%	1.9%	35,937
Construction & Demolition	**6.2%**		**50,500**
Concrete	1.2%	1.1%	9,839
Asphalt Paving	0.0%	0.0%	0
Asphalt Roofing	0.0%	0.0%	322
Lumber	1.8%	0.9%	14,453
Gypsum Board	0.4%	0.4%	2,970
Rock, Soil & Fines	2.0%	1.2%	16,020
Remainder/Composite C&D	0.8%	0.5%	6,896
Household Hazardous Waste	**0.4%**		**3,614**
Paint	0.0%	0.0%	0
Vehicle & Equipment Fluids	0.0%	0.0%	0
Used Oil	0.0%	0.0%	0
Batteries	0.1%	0.0%	530
Remainder/Composite HHW	0.4%	0.4%	3,085
Special Waste	**0.6%**		**5,149**
Ash	0.2%	0.2%	1,465
Sewage Solids	0.0%	0.0%	0
Industrial Sludge	0.0%	0.0%	0
Treated Medical Waste	0.0%	0.0%	0
Bulky Items	0.1%	0.1%	576
Tires	0.0%	0.0%	0
Remainder/Composite Special Waste	0.4%	0.4%	3,108
Mixed Residue	**0.4%**	**0.2%**	**3,580**
Sample count: 49			**Totals** **100.0%** **814,541**

Confidence intervals calculated at the 90% confidence level. Percentages for materials may not total 100% due to rounding.

Table 24: Composition of Waste from Group H: Retail Trade - Food Store

	Est. Pct.	+ / -	Est. Tons
Paper	**27.5%**		**275,717**
Uncoated Corrugated Cardboard	8.2%	2.0%	82,333
Paper Bags	0.6%	0.1%	6,258
Newspaper	2.7%	1.1%	27,118
White Ledger Paper	0.6%	0.4%	6,458
Colored Ledger Paper	0.0%	0.0%	196
Computer Paper	0.2%	0.1%	1,821
Other Office Paper	0.3%	0.1%	3,297
Magazines and Catalogs	0.3%	0.1%	3,337
Phone Books and Directories	0.1%	0.1%	1,425
Other Miscellaneous Paper	2.5%	0.6%	25,044
Remainder/Composite Paper	11.8%	1.8%	118,431
Glass	**1.6%**		**15,784**
Clear Glass Bottles & Containers	0.9%	0.2%	9,071
Green Glass Bottles & Containers	0.3%	0.2%	3,148
Brown Glass Bottles & Containers	0.2%	0.1%	2,481
Other Colored Glass Bottles & Containers	0.0%	0.0%	0
Flat Glass	0.0%	0.0%	0
Remainer/Composite Glass	0.1%	0.1%	1,085
Metal	**4.7%**		**46,685**
Tin/Steel Cans	0.9%	0.3%	9,461
Major Appliances	0.0%	0.0%	0
Other Ferrous Metal	0.4%	0.2%	3,933
Aluminum Cans	0.1%	0.0%	1,274
Other Non-Ferrous Metal	0.2%	0.1%	1,576
Remainder/Composite Metal	3.0%	2.3%	30,441
Plastic	**11.3%**		**113,315**
HDPE Containers	1.1%	0.3%	10,586
PETE Containers	0.2%	0.1%	2,361
Miscellaneous Plastic Containers	0.4%	0.2%	4,346
Film Plastic	7.1%	1.7%	71,358
Durable Plastic Items	0.5%	0.2%	5,205
Remainder/Composite Plastic	1.9%	0.8%	19,459
Sample count: 52			

	Est. Pct.	+ / -	Est. Tons
Other Organic	**43.3%**		**434,383**
Food	39.8%	5.3%	399,222
Leaves & Grass	0.8%	0.5%	8,327
Prunings & Trimmings	0.2%	0.2%	2,362
Branches & Stumps	0.3%	0.3%	3,217
Agricultural Crop Residues	0.0%	0.0%	0
Manures	0.0%	0.0%	0
Textiles	0.7%	0.3%	6,564
Remainder/Composite Organic	1.5%	0.9%	14,691
Construction & Demolition	**10.8%**		**107,955**
Concrete	0.5%	0.5%	5,107
Asphalt Paving	0.3%	0.3%	3,253
Asphalt Roofing	0.0%	0.0%	0
Lumber	2.1%	0.8%	21,401
Gypsum Board	7.7%	5.2%	77,176
Rock, Soil & Fines	0.0%	0.0%	0
Remainder/Composite C&D	0.1%	0.1%	1,018
Household Hazardous Waste	**0.0%**		**39**
Paint	0.0%	0.0%	17
Vehicle & Equipment Fluids	0.0%	0.0%	0
Used Oil	0.0%	0.0%	0
Batteries	0.0%	0.0%	22
Remainder/Composite HHW	0.0%	0.0%	0
Special Waste	**0.8%**		**8,257**
Ash	0.0%	0.0%	0
Sewage Solids	0.0%	0.0%	0
Industrial Sludge	0.0%	0.0%	0
Treated Medical Waste	0.0%	0.0%	0
Bulky Items	0.8%	0.8%	8,257
Tires	0.0%	0.0%	0
Remainder/Composite Special Waste	0.0%	0.0%	0
Mixed Residue	**0.1%**	**0.0%**	**899**
Totals	**100.0%**		**1,003,035**

Confidence intervals calculated at the 90% confidence level. Percentages for materials may not total 100% due to rounding.

Table 25: Composition of Waste from Group I: Construction

	Est. Pct.	+ / -	Est. Tons
Paper	**20.4%**		**283,064**
Uncoated Corrugated Cardboard	5.5%	1.4%	76,864
Paper Bags	0.3%	0.1%	4,103
Newspaper	3.2%	1.0%	44,524
White Ledger Paper	2.8%	1.4%	38,330
Colored Ledger Paper	0.1%	0.1%	1,596
Computer Paper	0.0%	0.0%	442
Other Office Paper	0.9%	0.4%	13,122
Magazines and Catalogs	1.0%	0.4%	13,535
Phone Books and Directories	0.3%	0.2%	4,770
Other Miscellaneous Paper	3.2%	0.8%	44,414
Remainder/Composite Paper	3.0%	0.9%	41,363
Glass	**3.9%**		**54,066**
Clear Glass Bottles & Containers	0.3%	0.1%	4,348
Green Glass Bottles & Containers	0.0%	0.0%	457
Brown Glass Bottles & Containers	0.1%	0.0%	754
Other Colored Glass Bottles & Containers	0.0%	0.0%	0
Flat Glass	1.7%	0.9%	23,663
Remainer/Composite Glass	1.8%	1.5%	24,843
Metal	**9.6%**		**132,613**
Tin/Steel Cans	0.4%	0.1%	5,485
Major Appliances	0.6%	0.4%	7,705
Other Ferrous Metal	5.4%	1.8%	74,746
Aluminum Cans	0.1%	0.0%	1,766
Other Non-Ferrous Metal	0.4%	0.2%	5,380
Remainder/Composite Metal	2.7%	1.2%	37,531
Plastic	**5.1%**		**70,415**
HDPE Containers	0.9%	0.4%	13,057
PETE Containers	0.2%	0.1%	2,507
Miscellaneous Plastic Containers	0.2%	0.0%	2,084
Film Plastic	1.5%	0.4%	20,954
Durable Plastic Items	1.9%	0.7%	25,728
Remainder/Composite Plastic	0.4%	0.1%	6,085
Sample count: 45			

	Est. Pct.	+ / -	Est. Tons
Other Organic	**17.0%**		**235,671**
Food	2.5%	0.7%	35,064
Leaves & Grass	4.4%	2.3%	60,895
Prunings & Trimmings	1.8%	1.4%	24,356
Branches & Stumps	0.0%	0.0%	422
Agricultural Crop Residues	0.0%	0.0%	0
Manures	0.0%	0.0%	0
Textiles	1.8%	0.9%	24,779
Remainder/Composite Organic	6.5%	2.1%	90,155
Construction & Demolition	**39.5%**		**547,012**
Concrete	1.2%	0.7%	16,055
Asphalt Paving	0.0%	0.0%	0
Asphalt Roofing	0.0%	0.0%	63
Lumber	16.2%	3.9%	224,459
Gypsum Board	5.4%	3.1%	74,254
Rock, Soil & Fines	5.4%	4.2%	75,401
Remainder/Composite C&D	11.3%	4.4%	156,778
Household Hazardous Waste	**0.2%**		**2,668**
Paint	0.0%	0.0%	0
Vehicle & Equipment Fluids	0.0%	0.0%	0
Used Oil	0.0%	0.0%	0
Batteries	0.1%	0.1%	1,055
Remainder/Composite HHW	0.1%	0.1%	1,614
Special Waste	**4.2%**		**58,591**
Ash	0.0%	0.0%	0
Sewage Solids	0.0%	0.0%	0
Industrial Sludge	0.0%	0.0%	0
Treated Medical Waste	0.0%	0.0%	0
Bulky Items	3.8%	3.1%	52,892
Tires	0.0%	0.0%	0
Remainder/Composite Special Waste	0.4%	0.4%	5,699
Mixed Residue	**0.1%**	**0.1%**	**2,018**
Totals	**100.0%**		**1,386,117**

Confidence intervals calculated at the 90% confidence level. Percentages for materials may not total 100% due to rounding.

Table 26: Composition of Waste from Group J: Services - Medical / Health

	Est. Pct.	+ / -	Est. Tons
Paper	**47.5%**		**968,729**
Uncoated Corrugated Cardboard	4.9%	1.1%	100,745
Paper Bags	0.8%	0.3%	16,582
Newspaper	2.9%	0.6%	59,174
White Ledger Paper	4.2%	1.0%	84,794
Colored Ledger Paper	0.3%	0.1%	5,534
Computer Paper	0.6%	0.2%	12,833
Other Office Paper	4.9%	1.2%	100,393
Magazines and Catalogs	4.0%	0.8%	81,073
Phone Books and Directories	0.3%	0.2%	5,667
Other Miscellaneous Paper	5.3%	0.7%	109,124
Remainder/Composite Paper	19.3%	2.2%	392,809
Glass	**2.1%**		**42,704**
Clear Glass Bottles & Containers	1.3%	0.2%	26,283
Green Glass Bottles & Containers	0.0%	0.0%	692
Brown Glass Bottles & Containers	0.1%	0.0%	1,797
Other Colored Glass Bottles & Containers	0.0%	0.0%	601
Flat Glass	0.0%	0.0%	430
Remainer/Composite Glass	0.6%	0.4%	12,900
Metal	**3.4%**		**69,972**
Tin/Steel Cans	0.6%	0.1%	11,405
Major Appliances	0.0%	0.0%	0
Other Ferrous Metal	1.3%	0.8%	26,785
Aluminum Cans	0.2%	0.0%	3,701
Other Non-Ferrous Metal	0.3%	0.1%	5,702
Remainder/Composite Metal	1.1%	0.6%	22,379
Plastic	**8.1%**		**165,024**
HDPE Containers	0.6%	0.1%	11,411
PETE Containers	0.4%	0.1%	7,890
Miscellaneous Plastic Containers	0.5%	0.1%	10,848
Film Plastic	3.4%	0.3%	68,564
Durable Plastic Items	1.4%	0.3%	29,229
Remainder/Composite Plastic	1.8%	0.3%	37,083
Sample count: 50			

	Est. Pct.	+ / -	Est. Tons
Other Organic	**26.6%**		**543,426**
Food	12.1%	2.4%	247,134
Leaves & Grass	5.1%	2.0%	103,178
Prunings & Trimmings	1.5%	1.1%	31,068
Branches & Stumps	0.0%	0.0%	0
Agricultural Crop Residues	0.0%	0.0%	0
Manures	0.0%	0.0%	0
Textiles	0.6%	0.2%	11,543
Remainder/Composite Organic	7.4%	2.0%	150,504
Construction & Demolition	**1.5%**		**30,812**
Concrete	0.0%	0.0%	0
Asphalt Paving	0.0%	0.0%	0
Asphalt Roofing	0.0%	0.0%	0
Lumber	0.7%	0.4%	13,762
Gypsum Board	0.5%	0.4%	11,021
Rock, Soil & Fines	0.2%	0.1%	3,816
Remainder/Composite C&D	0.1%	0.0%	2,213
Household Hazardous Waste	**0.2%**		**3,299**
Paint	0.1%	0.1%	1,599
Vehicle & Equipment Fluids	0.0%	0.0%	0
Used Oil	0.0%	0.0%	0
Batteries	0.0%	0.0%	997
Remainder/Composite HHW	0.0%	0.0%	703
Special Waste	**10.4%**		**213,207**
Ash	0.0%	0.0%	0
Sewage Solids	0.0%	0.0%	0
Industrial Sludge	0.0%	0.0%	0
Treated Medical Waste	0.1%	0.1%	1,840
Bulky Items	7.4%	5.7%	150,670
Tires	0.0%	0.0%	0
Remainder/Composite Special Waste	3.0%	1.2%	60,697
Mixed Residue	**0.2%**	**0.0%**	**3,354**
Totals	**100.0%**		**2,040,527**

Confidence intervals calculated at the 90% confidence level. Percentages for materials may not total 100% due to rounding.

Table 27: Composition of Waste from Group K: Manufacturing - Printing / Publishing

	Est. Pct.	+ / -	Est. Tons
Paper	**66.3%**		**109,737**
Uncoated Corrugated Cardboard	9.8%	3.4%	16,221
Paper Bags	0.7%	0.2%	1,168
Newspaper	5.3%	2.6%	8,767
White Ledger Paper	5.2%	1.5%	8,660
Colored Ledger Paper	0.8%	0.3%	1,332
Computer Paper	0.3%	0.2%	457
Other Office Paper	4.2%	1.2%	7,031
Magazines and Catalogs	12.2%	3.5%	20,202
Phone Books and Directories	0.3%	0.2%	443
Other Miscellaneous Paper	11.7%	3.9%	19,452
Remainder/Composite Paper	15.7%	3.9%	26,002
Glass	**0.7%**		**1,099**
Clear Glass Bottles & Containers	0.6%	0.2%	968
Green Glass Bottles & Containers	0.0%	0.0%	43
Brown Glass Bottles & Containers	0.0%	0.0%	71
Other Colored Glass Bottles & Containers	0.0%	0.0%	0
Flat Glass	0.0%	0.0%	0
Remainer/Composite Glass	0.0%	0.0%	17
Metal	**5.0%**		**8,351**
Tin/Steel Cans	2.1%	0.6%	3,438
Major Appliances	0.0%	0.0%	0
Other Ferrous Metal	2.7%	1.7%	4,499
Aluminum Cans	0.1%	0.0%	87
Other Non-Ferrous Metal	0.0%	0.0%	53
Remainder/Composite Metal	0.2%	0.1%	274
Plastic	**10.4%**		**17,270**
HDPE Containers	1.3%	0.9%	2,138
PETE Containers	0.1%	0.0%	225
Miscellaneous Plastic Containers	0.3%	0.1%	468
Film Plastic	3.2%	0.8%	5,222
Durable Plastic Items	1.9%	1.1%	3,228
Remainder/Composite Plastic	3.6%	2.2%	5,987
Sample count: 46			

	Est. Pct.	+ / -	Est. Tons
Other Organic	**7.0%**		**11,663**
Food	3.4%	1.2%	5,672
Leaves & Grass	0.5%	0.4%	847
Prunings & Trimmings	0.0%	0.0%	22
Branches & Stumps	0.0%	0.0%	0
Agricultural Crop Residues	0.0%	0.0%	0
Manures	0.0%	0.0%	0
Textiles	1.7%	1.5%	2,870
Remainder/Composite Organic	1.4%	0.5%	2,253
Construction & Demolition	**7.4%**		**12,231**
Concrete	0.0%	0.0%	0
Asphalt Paving	0.0%	0.0%	0
Asphalt Roofing	0.0%	0.0%	0
Lumber	7.3%	4.1%	12,104
Gypsum Board	0.0%	0.0%	0
Rock, Soil & Fines	0.0%	0.0%	0
Remainder/Composite C&D	0.1%	0.1%	127
Household Hazardous Waste	**0.5%**		**870**
Paint	0.5%	0.4%	864
Vehicle & Equipment Fluids	0.0%	0.0%	0
Used Oil	0.0%	0.0%	0
Batteries	0.0%	0.0%	6
Remainder/Composite HHW	0.0%	0.0%	0
Special Waste	**2.2%**		**3,654**
Ash	0.0%	0.0%	0
Sewage Solids	0.0%	0.0%	0
Industrial Sludge	0.0%	0.0%	0
Treated Medical Waste	0.0%	0.0%	0
Bulky Items	2.2%	2.1%	3,653
Tires	0.0%	0.0%	0
Remainder/Composite Special Waste	0.0%	0.0%	1
Mixed Residue	**0.4%**	**0.2%**	**724**
Totals	**100.0%**		**165,599**

Confidence intervals calculated at the 90% confidence level. Percentages for materials may not total 100% due to rounding.

Table 28: Composition of Waste from Group L: Services - Business Services

	Est. Pct.	+ / -	Est. Tons
Paper	**40.8%**		**414,935**
Uncoated Corrugated Cardboard	6.7%	1.8%	67,924
Paper Bags	0.9%	0.2%	9,093
Newspaper	2.2%	0.5%	22,098
White Ledger Paper	4.9%	1.2%	50,001
Colored Ledger Paper	0.3%	0.1%	2,967
Computer Paper	0.8%	0.4%	7,969
Other Office Paper	2.0%	0.5%	20,758
Magazines and Catalogs	1.5%	0.5%	15,245
Phone Books and Directories	0.0%	0.0%	0
Other Miscellaneous Paper	7.5%	1.3%	76,146
Remainder/Composite Paper	14.1%	3.5%	142,735
Glass	**3.1%**		**31,409**
Clear Glass Bottles & Containers	1.4%	0.4%	14,228
Green Glass Bottles & Containers	1.0%	0.8%	9,781
Brown Glass Bottles & Containers	0.2%	0.1%	1,615
Other Colored Glass Bottles & Containers	0.0%	0.0%	312
Flat Glass	0.0%	0.0%	0
Remainer/Composite Glass	0.5%	0.3%	5,473
Metal	**7.3%**		**74,535**
Tin/Steel Cans	0.2%	0.1%	1,857
Major Appliances	0.0%	0.0%	0
Other Ferrous Metal	0.3%	0.1%	3,237
Aluminum Cans	0.2%	0.1%	1,871
Other Non-Ferrous Metal	0.1%	0.1%	1,341
Remainder/Composite Metal	6.5%	4.3%	66,228
Plastic	**11.0%**		**111,551**
HDPE Containers	0.7%	0.3%	7,347
PETE Containers	0.5%	0.1%	4,785
Miscellaneous Plastic Containers	0.6%	0.2%	5,608
Film Plastic	6.4%	2.0%	65,114
Durable Plastic Items	1.7%	0.7%	17,445
Remainder/Composite Plastic	1.1%	0.3%	11,252
Sample count: 43			

	Est. Pct.	+ / -	Est. Tons
Other Organic	**31.1%**		**315,511**
Food	6.9%	2.0%	69,825
Leaves & Grass	6.4%	5.4%	64,771
Prunings & Trimmings	0.1%	0.1%	828
Branches & Stumps	0.0%	0.0%	0
Agricultural Crop Residues	0.0%	0.0%	0
Manures	0.0%	0.0%	0
Textiles	16.6%	6.6%	169,118
Remainder/Composite Organic	1.1%	0.6%	10,969
Construction & Demolition	**3.9%**		**39,673**
Concrete	0.0%	0.0%	482
Asphalt Paving	0.0%	0.0%	265
Asphalt Roofing	0.0%	0.0%	0
Lumber	2.6%	1.7%	26,159
Gypsum Board	0.3%	0.3%	2,884
Rock, Soil & Fines	0.7%	0.6%	7,251
Remainder/Composite C&D	0.3%	0.2%	2,632
Household Hazardous Waste	**0.7%**		**7,257**
Paint	0.7%	0.6%	6,820
Vehicle & Equipment Fluids	0.0%	0.0%	0
Used Oil	0.0%	0.0%	0
Batteries	0.0%	0.0%	438
Remainder/Composite HHW	0.0%	0.0%	0
Special Waste	**1.0%**		**10,482**
Ash	0.0%	0.0%	0
Sewage Solids	0.0%	0.0%	0
Industrial Sludge	0.0%	0.0%	0
Treated Medical Waste	0.0%	0.0%	0
Bulky Items	0.8%	0.4%	8,427
Tires	0.0%	0.0%	0
Remainder/Composite Special Waste	0.2%	0.2%	2,055
Mixed Residue	**1.0%**	**0.4%**	**10,459**
Totals	**100.0%**		**1,015,811**

Confidence intervals calculated at the 90% confidence level. Percentages for materials may not total 100% due to rounding.

Table 29: Composition of Waste from Group M: Services - Education

	Est. Pct.	+ / -	Est. Tons
Paper	**30.7%**		**234,788**
Uncoated Corrugated Cardboard	2.9%	0.8%	22,309
Paper Bags	1.0%	0.4%	7,399
Newspaper	1.3%	0.4%	10,235
White Ledger Paper	3.6%	0.8%	27,448
Colored Ledger Paper	0.8%	0.3%	5,766
Computer Paper	1.5%	1.2%	11,243
Other Office Paper	2.1%	0.8%	16,395
Magazines and Catalogs	1.0%	0.2%	7,907
Phone Books and Directories	0.2%	0.1%	1,437
Other Miscellaneous Paper	6.0%	1.2%	45,559
Remainder/Composite Paper	10.4%	1.8%	79,089
Glass	**1.3%**		**10,163**
Clear Glass Bottles & Containers	1.0%	0.4%	7,394
Green Glass Bottles & Containers	0.0%	0.0%	251
Brown Glass Bottles & Containers	0.3%	0.2%	2,145
Other Colored Glass Bottles & Containers	0.0%	0.0%	124
Flat Glass	0.0%	0.0%	0
Remainer/Composite Glass	0.0%	0.0%	249
Metal	**5.1%**		**38,932**
Tin/Steel Cans	1.2%	0.7%	9,267
Major Appliances	0.4%	0.3%	3,353
Other Ferrous Metal	1.8%	1.1%	13,554
Aluminum Cans	0.2%	0.0%	1,499
Other Non-Ferrous Metal	0.3%	0.1%	2,131
Remainder/Composite Metal	1.2%	0.7%	9,128
Plastic	**9.8%**		**75,116**
HDPE Containers	0.3%	0.1%	2,431
PETE Containers	0.8%	0.3%	5,988
Miscellaneous Plastic Containers	1.4%	0.4%	10,376
Film Plastic	4.0%	0.7%	30,885
Durable Plastic Items	2.4%	0.8%	17,992
Remainder/Composite Plastic	1.0%	0.2%	7,444
Sample count: 42			

	Est. Pct.	+ / -	Est. Tons
Other Organic	**51.3%**		**391,545**
Food	20.3%	4.0%	155,313
Leaves & Grass	23.0%	6.7%	175,809
Prunings & Trimmings	4.3%	3.5%	32,931
Branches & Stumps	0.0%	0.0%	0
Agricultural Crop Residues	0.0%	0.0%	0
Manures	0.0%	0.0%	0
Textiles	0.2%	0.1%	1,653
Remainder/Composite Organic	3.4%	1.5%	25,839
Construction & Demolition	**0.5%**		**3,569**
Concrete	0.1%	0.0%	384
Asphalt Paving	0.0%	0.0%	168
Asphalt Roofing	0.0%	0.0%	0
Lumber	0.3%	0.2%	2,177
Gypsum Board	0.0%	0.0%	0
Rock, Soil & Fines	0.0%	0.0%	40
Remainder/Composite C&D	0.1%	0.1%	800
Household Hazardous Waste	**0.1%**		**640**
Paint	0.0%	0.0%	4
Vehicle & Equipment Fluids	0.0%	0.0%	0
Used Oil	0.0%	0.0%	149
Batteries	0.1%	0.1%	487
Remainder/Composite HHW	0.0%	0.0%	0
Special Waste	**0.9%**		**6,691**
Ash	0.0%	0.0%	0
Sewage Solids	0.0%	0.0%	0
Industrial Sludge	0.0%	0.0%	0
Treated Medical Waste	0.0%	0.0%	0
Bulky Items	0.9%	0.8%	6,691
Tires	0.0%	0.0%	0
Remainder/Composite Special Waste	0.0%	0.0%	0
Mixed Residue	**0.3%**	**0.1%**	**2,376**
Totals	**100.0%**		**763,820**

Confidence intervals calculated at the 90% confidence level. Percentages for materials may not total 100% due to rounding.

Table 30: Composition of Waste from Group N: Public Administration

	Est. Pct.	+ / -	Est. Tons
Paper	**39.4%**		**109,493**
Uncoated Corrugated Cardboard	4.6%	0.8%	12,768
Paper Bags	0.5%	0.1%	1,369
Newspaper	5.5%	1.1%	15,375
White Ledger Paper	6.5%	1.5%	18,023
Colored Ledger Paper	0.4%	0.1%	1,076
Computer Paper	0.2%	0.1%	662
Other Office Paper	2.0%	0.4%	5,550
Magazines and Catalogs	1.7%	0.3%	4,602
Phone Books and Directories	0.2%	0.1%	598
Other Miscellaneous Paper	4.1%	0.6%	11,383
Remainder/Composite Paper	13.7%	2.2%	38,087
Glass	**2.8%**		**7,752**
Clear Glass Bottles & Containers	1.0%	0.2%	2,717
Green Glass Bottles & Containers	0.1%	0.1%	288
Brown Glass Bottles & Containers	1.5%	1.3%	4,072
Other Colored Glass Bottles & Containers	0.0%	0.0%	133
Flat Glass	0.0%	0.0%	0
Remainer/Composite Glass	0.2%	0.1%	542
Metal	**4.8%**		**13,445**
Tin/Steel Cans	0.4%	0.1%	1,055
Major Appliances	0.0%	0.0%	0
Other Ferrous Metal	1.3%	0.7%	3,686
Aluminum Cans	0.3%	0.0%	710
Other Non-Ferrous Metal	0.2%	0.0%	434
Remainder/Composite Metal	2.7%	1.6%	7,559
Plastic	**10.9%**		**30,180**
HDPE Containers	0.2%	0.0%	549
PETE Containers	0.6%	0.1%	1,582
Miscellaneous Plastic Containers	0.6%	0.1%	1,589
Film Plastic	4.4%	1.3%	12,219
Durable Plastic Items	3.6%	1.4%	10,078
Remainder/Composite Plastic	1.5%	0.3%	4,165
Other Organic	**27.7%**		**77,117**
Food	9.8%	1.7%	27,299
Leaves & Grass	16.1%	5.4%	44,735
Prunings & Trimmings	0.1%	0.1%	286
Branches & Stumps	0.0%	0.0%	0
Agricultural Crop Residues	0.0%	0.0%	0
Manures	0.0%	0.0%	0
Textiles	1.0%	0.5%	2,662
Remainder/Composite Organic	0.8%	0.3%	2,135
Construction & Demolition	**12.9%**		**35,945**
Concrete	7.0%	3.5%	19,351
Asphalt Paving	0.0%	0.0%	0
Asphalt Roofing	0.0%	0.0%	0
Lumber	5.0%	2.4%	13,915
Gypsum Board	0.2%	0.2%	691
Rock, Soil & Fines	0.1%	0.1%	163
Remainder/Composite C&D	0.7%	0.5%	1,826
Household Hazardous Waste	**0.2%**		**577**
Paint	0.0%	0.0%	2
Vehicle & Equipment Fluids	0.0%	0.0%	0
Used Oil	0.0%	0.0%	0
Batteries	0.2%	0.1%	466
Remainder/Composite HHW	0.0%	0.0%	109
Special Waste	**1.1%**		**3,186**
Ash	0.0%	0.0%	0
Sewage Solids	0.0%	0.0%	0
Industrial Sludge	0.0%	0.0%	0
Treated Medical Waste	0.0%	0.0%	0
Bulky Items	0.0%	0.0%	0
Tires	0.0%	0.0%	0
Remainder/Composite Special Waste	1.1%	1.1%	3,186
Mixed Residue	**0.2%**	**0.0%**	**421**
Sample count: 43			**Totals** **100.0%** **278,116**

Confidence intervals calculated at the 90% confidence level. Percentages for materials may not total 100% due to rounding.

Table 31: Composition of Waste from Group O: Services - Hotels / Lodging

	Est. Pct.	+ / -	Est. Tons
Paper	**37.1%**		**170,737**
Uncoated Corrugated Cardboard	5.7%	1.0%	26,079
Paper Bags	0.8%	0.1%	3,572
Newspaper	12.7%	1.9%	58,412
White Ledger Paper	0.8%	0.2%	3,805
Colored Ledger Paper	0.1%	0.0%	354
Computer Paper	0.7%	0.2%	3,050
Other Office Paper	0.4%	0.1%	2,037
Magazines and Catalogs	1.7%	0.4%	7,935
Phone Books and Directories	1.1%	0.7%	4,865
Other Miscellaneous Paper	4.4%	0.5%	20,137
Remainder/Composite Paper	8.8%	0.8%	40,491
Glass	**9.8%**		**45,282**
Clear Glass Bottles & Containers	4.3%	0.8%	19,739
Green Glass Bottles & Containers	1.6%	0.3%	7,292
Brown Glass Bottles & Containers	3.5%	0.7%	16,014
Other Colored Glass Bottles & Containers	0.0%	0.0%	107
Flat Glass	0.0%	0.0%	0
Remainer/Composite Glass	0.5%	0.1%	2,130
Metal	**3.2%**		**14,619**
Tin/Steel Cans	0.7%	0.2%	3,251
Major Appliances	0.0%	0.0%	0
Other Ferrous Metal	1.4%	0.7%	6,526
Aluminum Cans	0.5%	0.1%	2,259
Other Non-Ferrous Metal	0.2%	0.0%	854
Remainder/Composite Metal	0.4%	0.2%	1,729
Plastic	**10.4%**		**47,915**
HDPE Containers	0.9%	0.2%	4,310
PETE Containers	0.9%	0.1%	4,184
Miscellaneous Plastic Containers	0.6%	0.1%	2,761
Film Plastic	4.9%	0.3%	22,328
Durable Plastic Items	1.3%	0.4%	5,854
Remainder/Composite Plastic	1.8%	0.4%	8,478
Sample count: 41			

	Est. Pct.	+ / -	Est. Tons
Other Organic	**37.1%**		**170,437**
Food	28.0%	3.5%	128,703
Leaves & Grass	2.6%	1.5%	12,091
Prunings & Trimmings	1.7%	1.4%	7,683
Branches & Stumps	0.0%	0.0%	0
Agricultural Crop Residues	0.0%	0.0%	0
Manures	0.0%	0.0%	0
Textiles	2.0%	0.5%	9,079
Remainder/Composite Organic	2.8%	0.5%	12,880
Construction & Demolition	**1.2%**		**5,590**
Concrete	0.1%	0.1%	425
Asphalt Paving	0.0%	0.0%	0
Asphalt Roofing	0.0%	0.0%	0
Lumber	0.1%	0.0%	346
Gypsum Board	0.0%	0.0%	0
Rock, Soil & Fines	0.1%	0.1%	611
Remainder/Composite C&D	0.9%	0.6%	4,207
Household Hazardous Waste	**0.0%**		**107**
Paint	0.0%	0.0%	0
Vehicle & Equipment Fluids	0.0%	0.0%	0
Used Oil	0.0%	0.0%	0
Batteries	0.0%	0.0%	107
Remainder/Composite HHW	0.0%	0.0%	0
Special Waste	**0.4%**		**1,786**
Ash	0.0%	0.0%	0
Sewage Solids	0.0%	0.0%	0
Industrial Sludge	0.0%	0.0%	0
Treated Medical Waste	0.0%	0.0%	0
Bulky Items	0.0%	0.0%	0
Tires	0.4%	0.4%	1,767
Remainder/Composite Special Waste	0.0%	0.0%	19
Mixed Residue	**0.7%**	**0.3%**	**3,315**
Totals	**100.0%**		**459,788**

Confidence intervals calculated at the 90% confidence level. Percentages for materials may not total 100% due to rounding.

Table 32: Composition of Waste from Group P: Trucking & Warehousing

	Est. Pct.	+ / -	Est. Tons
Paper	**34.9%**		**85,443**
Uncoated Corrugated Cardboard	7.0%	1.3%	17,228
Paper Bags	1.2%	0.8%	2,978
Newspaper	2.9%	1.0%	7,001
White Ledger Paper	9.6%	6.0%	23,444
Colored Ledger Paper	0.1%	0.0%	176
Computer Paper	0.7%	0.3%	1,800
Other Office Paper	3.0%	0.8%	7,357
Magazines and Catalogs	1.0%	0.3%	2,549
Phone Books and Directories	0.3%	0.2%	767
Other Miscellaneous Paper	3.3%	0.8%	8,055
Remainder/Composite Paper	5.8%	1.5%	14,087
Glass	**2.8%**		**6,818**
Clear Glass Bottles & Containers	0.9%	0.3%	2,317
Green Glass Bottles & Containers	0.1%	0.1%	303
Brown Glass Bottles & Containers	0.1%	0.0%	184
Other Colored Glass Bottles & Containers	0.0%	0.0%	0
Flat Glass	0.5%	0.3%	1,105
Remainer/Composite Glass	1.2%	0.8%	2,909
Metal	**12.4%**		**30,270**
Tin/Steel Cans	0.5%	0.1%	1,169
Major Appliances	0.0%	0.0%	0
Other Ferrous Metal	7.2%	3.9%	17,629
Aluminum Cans	0.2%	0.1%	525
Other Non-Ferrous Metal	0.3%	0.1%	618
Remainder/Composite Metal	4.2%	1.6%	10,330
Plastic	**6.4%**		**15,570**
HDPE Containers	0.7%	0.2%	1,661
PETE Containers	0.3%	0.1%	653
Miscellaneous Plastic Containers	0.9%	0.5%	2,137
Film Plastic	2.9%	0.9%	7,113
Durable Plastic Items	0.5%	0.1%	1,296
Remainder/Composite Plastic	1.1%	0.3%	2,712
Sample count: 42			

	Est. Pct.	+ / -	Est. Tons
Other Organic	**12.2%**		**29,790**
Food	4.0%	1.0%	9,720
Leaves & Grass	0.5%	0.4%	1,345
Prunings & Trimmings	1.8%	1.1%	4,451
Branches & Stumps	0.0%	0.0%	0
Agricultural Crop Residues	0.0%	0.0%	0
Manures	0.0%	0.0%	0
Textiles	0.8%	0.3%	1,889
Remainder/Composite Organic	5.1%	3.5%	12,384
Construction & Demolition	**23.7%**		**58,048**
Concrete	4.9%	3.5%	11,992
Asphalt Paving	0.0%	0.0%	0
Asphalt Roofing	0.0%	0.0%	5
Lumber	13.5%	4.5%	33,049
Gypsum Board	3.1%	2.4%	7,469
Rock, Soil & Fines	0.1%	0.1%	336
Remainder/Composite C&D	2.1%	1.8%	5,196
Household Hazardous Waste	**0.9%**		**2,196**
Paint	0.0%	0.0%	0
Vehicle & Equipment Fluids	0.0%	0.0%	0
Used Oil	0.0%	0.0%	0
Batteries	0.0%	0.0%	12
Remainder/Composite HHW	0.9%	0.9%	2,184
Special Waste	**6.5%**		**15,910**
Ash	0.3%	0.3%	649
Sewage Solids	0.0%	0.0%	0
Industrial Sludge	0.0%	0.0%	0
Treated Medical Waste	0.0%	0.0%	0
Bulky Items	6.2%	3.9%	15,189
Tires	0.0%	0.0%	0
Remainder/Composite Special Waste	0.0%	0.0%	72
Mixed Residue	**0.3%**	**0.1%**	**830**
Totals	**100.0%**		**244,874**

Confidence intervals calculated at the 90% confidence level. Percentages for materials may not total 100% due to rounding.

Table 33: Composition of Waste from Group Q: Wholesale Trade - Durable Goods

	Est. Pct.	+ / -	Est. Tons
Paper	**33.3%**		**188,782**
Uncoated Corrugated Cardboard	9.9%	2.2%	55,882
Paper Bags	0.6%	0.2%	3,486
Newspaper	2.1%	0.7%	11,883
White Ledger Paper	2.9%	0.9%	16,558
Colored Ledger Paper	0.2%	0.1%	1,035
Computer Paper	0.4%	0.3%	2,483
Other Office Paper	1.7%	0.5%	9,444
Magazines and Catalogs	2.0%	1.2%	11,152
Phone Books and Directories	0.5%	0.3%	2,760
Other Miscellaneous Paper	4.7%	1.6%	26,848
Remainder/Composite Paper	8.3%	2.9%	47,251
Glass	**2.4%**		**13,356**
Clear Glass Bottles & Containers	0.5%	0.2%	2,858
Green Glass Bottles & Containers	0.0%	0.0%	279
Brown Glass Bottles & Containers	0.1%	0.1%	613
Other Colored Glass Bottles & Containers	0.0%	0.0%	0
Flat Glass	0.0%	0.0%	0
Remainer/Composite Glass	1.7%	1.6%	9,606
Metal	**9.9%**		**56,183**
Tin/Steel Cans	0.6%	0.2%	3,340
Major Appliances	0.0%	0.0%	0
Other Ferrous Metal	4.0%	1.3%	22,718
Aluminum Cans	0.1%	0.0%	466
Other Non-Ferrous Metal	0.1%	0.1%	683
Remainder/Composite Metal	5.1%	3.2%	28,976
Plastic	**15.3%**		**86,668**
HDPE Containers	0.3%	0.2%	1,976
PETE Containers	0.3%	0.1%	1,502
Miscellaneous Plastic Containers	0.2%	0.1%	1,269
Film Plastic	3.4%	0.9%	19,051
Durable Plastic Items	7.8%	5.8%	44,160
Remainder/Composite Plastic	3.3%	1.6%	18,709
Other Organic	**23.6%**		**133,957**
Food	3.2%	1.2%	18,071
Leaves & Grass	8.6%	6.1%	48,673
Prunings & Trimmings	0.6%	0.6%	3,666
Branches & Stumps	0.0%	0.0%	0
Agricultural Crop Residues	0.0%	0.0%	0
Manures	0.0%	0.0%	0
Textiles	3.9%	3.3%	22,159
Remainder/Composite Organic	7.3%	5.9%	41,389
Construction & Demolition	**13.1%**		**74,272**
Concrete	0.0%	0.0%	0
Asphalt Paving	0.0%	0.0%	0
Asphalt Roofing	0.0%	0.0%	0
Lumber	12.1%	3.5%	68,681
Gypsum Board	0.0%	0.0%	0
Rock, Soil & Fines	0.9%	0.7%	4,951
Remainder/Composite C&D	0.1%	0.1%	640
Household Hazardous Waste	**0.1%**		**444**
Paint	0.0%	0.0%	174
Vehicle & Equipment Fluids	0.0%	0.0%	202
Used Oil	0.0%	0.0%	0
Batteries	0.0%	0.0%	32
Remainder/Composite HHW	0.0%	0.0%	36
Special Waste	**1.2%**		**6,758**
Ash	0.0%	0.0%	142
Sewage Solids	0.0%	0.0%	0
Industrial Sludge	0.0%	0.0%	0
Treated Medical Waste	0.0%	0.0%	0
Bulky Items	1.2%	1.2%	6,616
Tires	0.0%	0.0%	0
Remainder/Composite Special Waste	0.0%	0.0%	0
Mixed Residue	**1.1%**	**0.3%**	**6,435**
Sample count: 42	**Totals**	**100.0%**	**566,855**

Confidence intervals calculated at the 90% confidence level. Percentages for materials may not total 100% due to rounding.

Table 34: Composition of Waste from Group R: Manufacturing - Other

	Est. Pct.	+ / -	Est. Tons
Paper	**28.5%**		**148,263**
Uncoated Corrugated Cardboard	6.9%	2.8%	35,666
Paper Bags	0.4%	0.2%	2,051
Newspaper	1.2%	0.4%	6,291
White Ledger Paper	2.2%	1.0%	11,319
Colored Ledger Paper	0.6%	0.6%	3,306
Computer Paper	0.4%	0.2%	1,903
Other Office Paper	0.5%	0.1%	2,639
Magazines and Catalogs	3.0%	1.8%	15,439
Phone Books and Directories	0.6%	0.4%	3,298
Other Miscellaneous Paper	4.1%	1.6%	21,575
Remainder/Composite Paper	8.6%	1.8%	44,775
Glass	**2.3%**		**11,992**
Clear Glass Bottles & Containers	0.3%	0.1%	1,570
Green Glass Bottles & Containers	0.0%	0.0%	54
Brown Glass Bottles & Containers	0.0%	0.0%	16
Other Colored Glass Bottles & Containers	0.0%	0.0%	0
Flat Glass	0.2%	0.2%	858
Remainer/Composite Glass	1.8%	1.1%	9,493
Metal	**6.4%**		**33,146**
Tin/Steel Cans	0.7%	0.4%	3,678
Major Appliances	0.0%	0.0%	0
Other Ferrous Metal	2.9%	1.3%	15,168
Aluminum Cans	0.1%	0.0%	303
Other Non-Ferrous Metal	0.0%	0.0%	226
Remainder/Composite Metal	2.6%	1.0%	13,772
Plastic	**17.5%**		**91,185**
HDPE Containers	0.4%	0.1%	1,865
PETE Containers	0.2%	0.0%	864
Miscellaneous Plastic Containers	0.3%	0.2%	1,786
Film Plastic	2.9%	0.9%	15,010
Durable Plastic Items	11.4%	4.2%	59,304
Remainder/Composite Plastic	2.4%	1.2%	12,356
Other Organic	**17.6%**		**91,612**
Food	2.2%	0.7%	11,496
Leaves & Grass	4.3%	3.3%	22,317
Prunings & Trimmings	0.1%	0.1%	560
Branches & Stumps	0.0%	0.0%	0
Agricultural Crop Residues	0.0%	0.0%	0
Manures	0.0%	0.0%	0
Textiles	4.0%	2.0%	20,692
Remainder/Composite Organic	7.0%	2.5%	36,548
Construction & Demolition	**17.9%**		**92,958**
Concrete	0.3%	0.2%	1,382
Asphalt Paving	0.0%	0.0%	0
Asphalt Roofing	0.0%	0.0%	204
Lumber	14.7%	4.9%	76,588
Gypsum Board	1.3%	1.3%	6,986
Rock, Soil & Fines	1.1%	0.8%	5,962
Remainder/Composite C&D	0.4%	0.2%	1,835
Household Hazardous Waste	**0.0%**		**180**
Paint	0.0%	0.0%	0
Vehicle & Equipment Fluids	0.0%	0.0%	0
Used Oil	0.0%	0.0%	0
Batteries	0.0%	0.0%	141
Remainder/Composite HHW	0.0%	0.0%	38
Special Waste	**8.2%**		**42,913**
Ash	0.0%	0.0%	0
Sewage Solids	0.0%	0.0%	0
Industrial Sludge	0.0%	0.0%	0
Treated Medical Waste	0.0%	0.0%	0
Bulky Items	0.5%	0.5%	2,552
Tires	1.0%	1.0%	5,215
Remainder/Composite Special Waste	6.8%	3.8%	35,145
Mixed Residue	**1.6%**	**1.0%**	**8,242**
Totals	**100.0%**		**520,490**

Sample count: 45

Confidence intervals calculated at the 90% confidence level. Percentages for materials may not total 100% due to rounding.

Table 35: Composition of Waste from Group S: Transportation - Other

	Est. Pct.	+ / -	Est. Tons
Paper	**44.6%**		**90,095**
Uncoated Corrugated Cardboard	6.7%	1.5%	13,580
Paper Bags	0.9%	0.2%	1,781
Newspaper	6.9%	2.1%	13,870
White Ledger Paper	4.6%	1.0%	9,332
Colored Ledger Paper	0.3%	0.1%	512
Computer Paper	1.0%	0.3%	2,046
Other Office Paper	6.1%	1.7%	12,429
Magazines and Catalogs	2.2%	0.5%	4,469
Phone Books and Directories	0.2%	0.1%	312
Other Miscellaneous Paper	3.3%	0.5%	6,757
Remainder/Composite Paper	12.4%	1.5%	25,008
Glass	**4.2%**		**8,441**
Clear Glass Bottles & Containers	1.2%	0.3%	2,526
Green Glass Bottles & Containers	0.5%	0.3%	974
Brown Glass Bottles & Containers	0.2%	0.1%	334
Other Colored Glass Bottles & Containers	0.0%	0.0%	2
Flat Glass	0.2%	0.2%	432
Remainer/Composite Glass	2.1%	1.6%	4,173
Metal	**6.4%**		**12,851**
Tin/Steel Cans	0.4%	0.1%	779
Major Appliances	0.0%	0.0%	0
Other Ferrous Metal	2.4%	1.0%	4,899
Aluminum Cans	0.3%	0.1%	599
Other Non-Ferrous Metal	0.3%	0.1%	576
Remainder/Composite Metal	3.0%	1.4%	5,998
Plastic	**12.7%**		**25,667**
HDPE Containers	0.3%	0.1%	616
PETE Containers	0.6%	0.1%	1,162
Miscellaneous Plastic Containers	0.6%	0.1%	1,270
Film Plastic	8.5%	2.5%	17,283
Durable Plastic Items	1.2%	0.4%	2,364
Remainder/Composite Plastic	1.5%	0.3%	2,972
Other Organic	**13.2%**		**26,622**
Food	7.0%	1.3%	14,097
Leaves & Grass	1.1%	0.6%	2,301
Prunings & Trimmings	0.0%	0.0%	0
Branches & Stumps	0.0%	0.0%	0
Agricultural Crop Residues	0.0%	0.0%	0
Manures	0.0%	0.0%	0
Textiles	0.6%	0.2%	1,270
Remainder/Composite Organic	4.4%	1.3%	8,954
Construction & Demolition	**16.6%**		**33,564**
Concrete	0.0%	0.0%	0
Asphalt Paving	0.0%	0.0%	0
Asphalt Roofing	0.0%	0.0%	0
Lumber	11.0%	3.5%	22,186
Gypsum Board	4.0%	2.9%	8,084
Rock, Soil & Fines	0.1%	0.1%	268
Remainder/Composite C&D	1.5%	0.9%	3,026
Household Hazardous Waste	**0.1%**		**123**
Paint	0.0%	0.0%	0
Vehicle & Equipment Fluids	0.0%	0.0%	0
Used Oil	0.0%	0.0%	0
Batteries	0.1%	0.0%	123
Remainder/Composite HHW	0.0%	0.0%	1
Special Waste	**0.2%**		**305**
Ash	0.1%	0.1%	207
Sewage Solids	0.0%	0.0%	0
Industrial Sludge	0.0%	0.0%	0
Treated Medical Waste	0.0%	0.0%	0
Bulky Items	0.0%	0.0%	59
Tires	0.0%	0.0%	0
Remainder/Composite Special Waste	0.0%	0.0%	40
Mixed Residue	**2.2%**	**1.1%**	**4,486**
Sample count: 41	**Totals**	**100.0%**	**202,155**

Confidence intervals calculated at the 90% confidence level. Percentages for materials may not total 100% due to rounding.

Table 36: Composition of Waste from Group T: Manufacturing - Electronic Equipment

	Est. Pct.	+ / -	Est. Tons
Paper	**41.9%**		**57,045**
Uncoated Corrugated Cardboard	6.6%	1.1%	9,013
Paper Bags	0.9%	0.2%	1,253
Newspaper	3.3%	0.6%	4,474
White Ledger Paper	4.6%	1.0%	6,227
Colored Ledger Paper	0.1%	0.0%	142
Computer Paper	0.7%	0.2%	887
Other Office Paper	1.2%	0.4%	1,674
Magazines and Catalogs	3.5%	1.9%	4,768
Phone Books and Directories	0.2%	0.2%	239
Other Miscellaneous Paper	4.4%	0.9%	5,935
Remainder/Composite Paper	16.5%	2.9%	22,434
Glass	**3.5%**		**4,826**
Clear Glass Bottles & Containers	1.6%	0.4%	2,224
Green Glass Bottles & Containers	0.2%	0.1%	243
Brown Glass Bottles & Containers	0.2%	0.1%	326
Other Colored Glass Bottles & Containers	0.0%	0.0%	53
Flat Glass	0.2%	0.2%	298
Remainer/Composite Glass	1.2%	0.7%	1,682
Metal	**11.5%**		**15,608**
Tin/Steel Cans	0.9%	0.4%	1,235
Major Appliances	0.0%	0.0%	0
Other Ferrous Metal	6.2%	2.8%	8,392
Aluminum Cans	0.2%	0.1%	324
Other Non-Ferrous Metal	0.4%	0.1%	589
Remainder/Composite Metal	3.7%	2.1%	5,069
Plastic	**17.0%**		**23,172**
HDPE Containers	0.8%	0.2%	1,053
PETE Containers	0.4%	0.1%	569
Miscellaneous Plastic Containers	0.8%	0.3%	1,071
Film Plastic	8.5%	2.2%	11,610
Durable Plastic Items	2.7%	1.0%	3,729
Remainder/Composite Plastic	3.8%	0.7%	5,139
Sample count: 44			

	Est. Pct.	+ / -	Est. Tons
Other Organic	**10.8%**		**14,723**
Food	6.4%	1.1%	8,664
Leaves & Grass	1.2%	0.6%	1,600
Prunings & Trimmings	0.0%	0.0%	29
Branches & Stumps	0.0%	0.0%	0
Agricultural Crop Residues	0.0%	0.0%	0
Manures	0.0%	0.0%	0
Textiles	0.8%	0.3%	1,092
Remainder/Composite Organic	2.4%	1.1%	3,339
Construction & Demolition	**13.1%**		**17,821**
Concrete	3.1%	2.8%	4,228
Asphalt Paving	0.0%	0.0%	0
Asphalt Roofing	0.0%	0.0%	0
Lumber	5.1%	2.1%	6,960
Gypsum Board	1.8%	1.6%	2,428
Rock, Soil & Fines	0.5%	0.3%	682
Remainder/Composite C&D	2.6%	1.7%	3,522
Household Hazardous Waste	**0.3%**		**358**
Paint	0.0%	0.0%	0
Vehicle & Equipment Fluids	0.0%	0.0%	0
Used Oil	0.0%	0.0%	0
Batteries	0.0%	0.0%	32
Remainder/Composite HHW	0.2%	0.2%	327
Special Waste	**1.2%**		**1,669**
Ash	0.0%	0.0%	0
Sewage Solids	0.0%	0.0%	0
Industrial Sludge	0.0%	0.0%	0
Treated Medical Waste	0.0%	0.0%	0
Bulky Items	0.7%	0.7%	991
Tires	0.0%	0.0%	23
Remainder/Composite Special Waste	0.5%	0.3%	656
Mixed Residue	**0.8%**	**0.2%**	**1,057**
Totals	**100.0%**		**136,280**

Confidence intervals calculated at the 90% confidence level. Percentages for materials may not total 100% due to rounding.

Table 37: Composition of Waste from Group U: Manufacturing - Food / Kindred

	Est. Pct.	+ / -	Est. Tons
Paper	**36.3%**		**86,580**
Uncoated Corrugated Cardboard	5.9%	1.2%	14,156
Paper Bags	0.9%	0.3%	2,252
Newspaper	0.8%	0.2%	1,799
White Ledger Paper	1.3%	0.6%	3,130
Colored Ledger Paper	0.3%	0.3%	776
Computer Paper	0.2%	0.1%	396
Other Office Paper	0.7%	0.3%	1,715
Magazines and Catalogs	1.9%	1.6%	4,608
Phone Books and Directories	1.0%	0.9%	2,480
Other Miscellaneous Paper	4.6%	1.0%	11,000
Remainder/Composite Paper	18.5%	4.4%	44,269
Glass	**1.2%**		**2,748**
Clear Glass Bottles & Containers	0.8%	0.2%	1,793
Green Glass Bottles & Containers	0.0%	0.0%	98
Brown Glass Bottles & Containers	0.3%	0.2%	620
Other Colored Glass Bottles & Containers	0.0%	0.0%	0
Flat Glass	0.0%	0.0%	0
Remainer/Composite Glass	0.1%	0.1%	236
Metal	**5.4%**		**12,890**
Tin/Steel Cans	1.0%	0.6%	2,304
Major Appliances	0.0%	0.0%	0
Other Ferrous Metal	2.6%	1.9%	6,113
Aluminum Cans	0.1%	0.0%	192
Other Non-Ferrous Metal	0.1%	0.0%	191
Remainder/Composite Metal	1.7%	1.2%	4,090
Plastic	**18.8%**		**44,816**
HDPE Containers	1.1%	0.5%	2,680
PETE Containers	0.5%	0.2%	1,133
Miscellaneous Plastic Containers	0.2%	0.1%	549
Film Plastic	12.5%	2.1%	29,860
Durable Plastic Items	1.3%	0.6%	3,162
Remainder/Composite Plastic	3.1%	1.2%	7,433
Other Organic	**28.6%**		**68,178**
Food	22.4%	4.5%	53,533
Leaves & Grass	0.0%	0.0%	0
Prunings & Trimmings	0.5%	0.4%	1,112
Branches & Stumps	0.0%	0.0%	0
Agricultural Crop Residues	0.0%	0.0%	0
Manures	0.0%	0.0%	0
Textiles	4.8%	3.9%	11,466
Remainder/Composite Organic	0.9%	0.3%	2,066
Construction & Demolition	**7.9%**		**18,773**
Concrete	0.6%	0.6%	1,536
Asphalt Paving	0.0%	0.0%	0
Asphalt Roofing	0.0%	0.0%	0
Lumber	6.5%	2.1%	15,397
Gypsum Board	0.7%	0.6%	1,655
Rock, Soil & Fines	0.0%	0.0%	60
Remainder/Composite C&D	0.1%	0.0%	125
Household Hazardous Waste	**0.0%**		**110**
Paint	0.0%	0.0%	0
Vehicle & Equipment Fluids	0.0%	0.0%	0
Used Oil	0.0%	0.0%	0
Batteries	0.0%	0.0%	58
Remainder/Composite HHW	0.0%	0.0%	52
Special Waste	**1.7%**		**3,998**
Ash	0.0%	0.0%	0
Sewage Solids	0.0%	0.0%	0
Industrial Sludge	0.0%	0.0%	0
Treated Medical Waste	0.3%	0.3%	811
Bulky Items	0.0%	0.0%	0
Tires	0.0%	0.0%	0
Remainder/Composite Special Waste	1.3%	1.2%	3,187
Mixed Residue	**0.2%**	**0.1%**	**567**
Sample count: 41	**Totals**	**100.0%**	**238,660**

Confidence intervals calculated at the 90% confidence level. Percentages for materials may not total 100% due to rounding.

Table 38: Composition of Waste from Group V: Manufacturing - Lumber & Wood Products

	Est. Pct.	+ / -	Est. Tons
Paper	**16.3%**		**17,486**
Uncoated Corrugated Cardboard	4.5%	1.4%	4,806
Paper Bags	0.4%	0.2%	444
Newspaper	0.5%	0.2%	515
White Ledger Paper	1.0%	0.4%	1,049
Colored Ledger Paper	0.1%	0.0%	76
Computer Paper	0.0%	0.0%	37
Other Office Paper	1.0%	0.4%	1,026
Magazines and Catalogs	0.9%	0.3%	975
Phone Books and Directories	0.3%	0.2%	293
Other Miscellaneous Paper	3.8%	1.6%	4,047
Remainder/Composite Paper	3.9%	1.0%	4,217
Glass	**1.5%**		**1,557**
Clear Glass Bottles & Containers	0.4%	0.1%	477
Green Glass Bottles & Containers	0.3%	0.2%	271
Brown Glass Bottles & Containers	0.1%	0.0%	64
Other Colored Glass Bottles & Containers	0.0%	0.0%	0
Flat Glass	0.0%	0.0%	0
Remainer/Composite Glass	0.7%	0.5%	744
Metal	**10.1%**		**10,799**
Tin/Steel Cans	0.7%	0.2%	761
Major Appliances	0.0%	0.0%	0
Other Ferrous Metal	5.7%	2.6%	6,165
Aluminum Cans	0.1%	0.0%	74
Other Non-Ferrous Metal	0.3%	0.2%	331
Remainder/Composite Metal	3.2%	2.0%	3,468
Plastic	**3.0%**		**3,256**
HDPE Containers	0.3%	0.2%	369
PETE Containers	0.2%	0.0%	163
Miscellaneous Plastic Containers	0.1%	0.0%	144
Film Plastic	1.2%	0.3%	1,239
Durable Plastic Items	0.8%	0.3%	870
Remainder/Composite Plastic	0.4%	0.1%	471
Sample count: 40			

	Est. Pct.	+ / -	Est. Tons
Other Organic	**22.3%**		**23,959**
Food	1.3%	0.4%	1,401
Leaves & Grass	0.4%	0.3%	382
Prunings & Trimmings	0.2%	0.2%	218
Branches & Stumps	0.0%	0.0%	0
Agricultural Crop Residues	0.0%	0.0%	0
Manures	0.0%	0.0%	0
Textiles	0.6%	0.2%	634
Remainder/Composite Organic	19.9%	5.8%	21,325
Construction & Demolition	**44.1%**		**47,314**
Concrete	0.0%	0.0%	0
Asphalt Paving	0.0%	0.0%	0
Asphalt Roofing	0.0%	0.0%	0
Lumber	34.7%	5.9%	37,197
Gypsum Board	0.0%	0.0%	0
Rock, Soil & Fines	2.1%	1.9%	2,233
Remainder/Composite C&D	7.4%	4.8%	7,884
Household Hazardous Waste	**0.4%**		**381**
Paint	0.4%	0.3%	379
Vehicle & Equipment Fluids	0.0%	0.0%	0
Used Oil	0.0%	0.0%	0
Batteries	0.0%	0.0%	3
Remainder/Composite HHW	0.0%	0.0%	0
Special Waste	**1.8%**		**1,893**
Ash	0.0%	0.0%	0
Sewage Solids	0.0%	0.0%	0
Industrial Sludge	1.2%	1.1%	1,294
Treated Medical Waste	0.0%	0.0%	0
Bulky Items	0.5%	0.5%	588
Tires	0.0%	0.0%	0
Remainder/Composite Special Waste	0.0%	0.0%	11
Mixed Residue	**0.6%**	**0.2%**	**611**
Totals	**100.0%**		**107,257**

Confidence intervals calculated at the 90% confidence level. Percentages for materials may not total 100% due to rounding.

Table 39: Composition of Waste from Group W: Manufacturing - Transportation Equipment

	Est. Pct.	+ / -	Est. Tons
Paper	**43.0%**		**22,622**
Uncoated Corrugated Cardboard	10.0%	1.9%	5,268
Paper Bags	0.9%	0.3%	476
Newspaper	2.7%	0.6%	1,406
White Ledger Paper	4.5%	1.6%	2,374
Colored Ledger Paper	0.0%	0.0%	21
Computer Paper	1.0%	0.6%	542
Other Office Paper	3.0%	1.3%	1,572
Magazines and Catalogs	2.3%	0.6%	1,185
Phone Books and Directories	0.9%	0.8%	473
Other Miscellaneous Paper	5.2%	1.5%	2,761
Remainder/Composite Paper	12.4%	2.0%	6,546
Glass	**1.3%**		**664**
Clear Glass Bottles & Containers	1.0%	0.2%	516
Green Glass Bottles & Containers	0.1%	0.1%	58
Brown Glass Bottles & Containers	0.0%	0.0%	5
Other Colored Glass Bottles & Containers	0.0%	0.0%	4
Flat Glass	0.1%	0.0%	26
Remainer/Composite Glass	0.1%	0.1%	53
Metal	**8.0%**		**4,220**
Tin/Steel Cans	0.4%	0.1%	220
Major Appliances	0.0%	0.0%	0
Other Ferrous Metal	4.8%	1.9%	2,550
Aluminum Cans	0.2%	0.0%	111
Other Non-Ferrous Metal	1.3%	0.8%	688
Remainder/Composite Metal	1.2%	0.8%	652
Plastic	**13.1%**		**6,876**
HDPE Containers	0.4%	0.1%	186
PETE Containers	0.4%	0.1%	220
Miscellaneous Plastic Containers	0.3%	0.1%	172
Film Plastic	5.1%	1.0%	2,683
Durable Plastic Items	3.9%	2.1%	2,054
Remainder/Composite Plastic	3.0%	0.7%	1,561
Other Organic	**12.4%**		**6,513**
Food	4.5%	0.8%	2,373
Leaves & Grass	0.1%	0.1%	61
Prunings & Trimmings	1.0%	0.8%	519
Branches & Stumps	0.0%	0.0%	0
Agricultural Crop Residues	0.0%	0.0%	0
Manures	0.0%	0.0%	0
Textiles	3.6%	1.7%	1,881
Remainder/Composite Organic	3.2%	1.6%	1,680
Construction & Demolition	**17.4%**		**9,157**
Concrete	0.0%	0.0%	0
Asphalt Paving	0.0%	0.0%	0
Asphalt Roofing	0.0%	0.0%	9
Lumber	14.7%	4.0%	7,715
Gypsum Board	0.0%	0.0%	0
Rock, Soil & Fines	2.4%	2.2%	1,256
Remainder/Composite C&D	0.3%	0.2%	177
Household Hazardous Waste	**1.0%**		**528**
Paint	0.0%	0.0%	24
Vehicle & Equipment Fluids	0.0%	0.0%	0
Used Oil	0.0%	0.0%	0
Batteries	0.1%	0.1%	54
Remainder/Composite HHW	0.9%	0.8%	450
Special Waste	**2.0%**		**1,055**
Ash	0.0%	0.0%	0
Sewage Solids	0.0%	0.0%	0
Industrial Sludge	0.0%	0.0%	0
Treated Medical Waste	0.0%	0.0%	0
Bulky Items	1.2%	1.1%	609
Tires	0.0%	0.0%	0
Remainder/Composite Special Waste	0.8%	0.8%	446
Mixed Residue	**1.9%**	**0.8%**	**978**
Sample count: 46			
Totals	**100.0%**		**52,613**

Confidence intervals calculated at the 90% confidence level. Percentages for materials may not total 100% due to rounding.

Table 40: Composition of Waste from Group X: Retail Trade - Building Material & Garden

	Est. Pct.	+ / -	Est. Tons
Paper	**21.4%**		**95,517**
Uncoated Corrugated Cardboard	10.3%	4.4%	46,104
Paper Bags	1.0%	0.3%	4,355
Newspaper	1.0%	0.2%	4,510
White Ledger Paper	1.0%	0.6%	4,606
Colored Ledger Paper	0.1%	0.0%	348
Computer Paper	0.2%	0.1%	924
Other Office Paper	1.1%	0.2%	4,974
Magazines and Catalogs	0.6%	0.2%	2,636
Phone Books and Directories	0.0%	0.0%	128
Other Miscellaneous Paper	2.9%	0.6%	12,855
Remainder/Composite Paper	3.2%	0.7%	14,077
Glass	**8.4%**		**37,374**
Clear Glass Bottles & Containers	0.5%	0.1%	2,126
Green Glass Bottles & Containers	0.0%	0.0%	208
Brown Glass Bottles & Containers	0.0%	0.0%	95
Other Colored Glass Bottles & Containers	0.0%	0.0%	0
Flat Glass	1.3%	1.1%	5,926
Remainer/Composite Glass	6.5%	4.5%	29,018
Metal	**6.0%**		**26,999**
Tin/Steel Cans	0.3%	0.1%	1,133
Major Appliances	0.0%	0.0%	0
Other Ferrous Metal	3.9%	1.1%	17,273
Aluminum Cans	0.1%	0.0%	421
Other Non-Ferrous Metal	0.8%	0.5%	3,723
Remainder/Composite Metal	1.0%	0.4%	4,449
Plastic	**6.9%**		**30,980**
HDPE Containers	0.2%	0.1%	1,043
PETE Containers	0.5%	0.5%	2,302
Miscellaneous Plastic Containers	0.2%	0.1%	1,049
Film Plastic	3.5%	1.3%	15,638
Durable Plastic Items	1.4%	0.5%	6,057
Remainder/Composite Plastic	1.1%	0.3%	4,892
Sample count: 41			

	Est. Pct.	+ / -	Est. Tons
Other Organic	**15.0%**		**67,182**
Food	1.7%	0.6%	7,681
Leaves & Grass	6.4%	3.1%	28,500
Prunings & Trimmings	0.5%	0.2%	2,394
Branches & Stumps	0.0%	0.0%	0
Agricultural Crop Residues	0.0%	0.0%	0
Manures	3.0%	2.7%	13,184
Textiles	0.2%	0.1%	924
Remainder/Composite Organic	3.2%	1.3%	14,499
Construction & Demolition	**38.5%**		**171,970**
Concrete	5.1%	2.9%	22,610
Asphalt Paving	0.0%	0.0%	0
Asphalt Roofing	0.4%	0.4%	1,733
Lumber	16.3%	3.7%	72,624
Gypsum Board	2.7%	2.3%	12,196
Rock, Soil & Fines	10.1%	5.1%	45,148
Remainder/Composite C&D	4.0%	1.9%	17,658
Household Hazardous Waste	**0.0%**		**28**
Paint	0.0%	0.0%	0
Vehicle & Equipment Fluids	0.0%	0.0%	0
Used Oil	0.0%	0.0%	0
Batteries	0.0%	0.0%	28
Remainder/Composite HHW	0.0%	0.0%	0
Special Waste	**0.5%**		**2,113**
Ash	0.1%	0.1%	606
Sewage Solids	0.0%	0.0%	0
Industrial Sludge	0.0%	0.0%	0
Treated Medical Waste	0.0%	0.0%	0
Bulky Items	0.3%	0.3%	1,508
Tires	0.0%	0.0%	0
Remainder/Composite Special Waste	0.0%	0.0%	0
Mixed Residue	**3.2%**	**2.6%**	**14,381**
Totals	**100.0%**		**446,544**

Confidence intervals calculated at the 90% confidence level. Percentages for materials may not total 100% due to rounding.

Table 41: Composition of Waste from Group Y: Manufacturing - Industrial / Machinery

	Est. Pct.	+ / -	Est. Tons
Paper	**36.9%**		**17,051**
Uncoated Corrugated Cardboard	9.5%	1.6%	4,389
Paper Bags	0.9%	0.2%	429
Newspaper	2.9%	0.6%	1,332
White Ledger Paper	2.8%	0.6%	1,279
Colored Ledger Paper	0.1%	0.0%	38
Computer Paper	2.1%	1.6%	966
Other Office Paper	1.2%	0.3%	553
Magazines and Catalogs	1.5%	0.4%	695
Phone Books and Directories	1.0%	0.5%	482
Other Miscellaneous Paper	6.8%	2.2%	3,149
Remainder/Composite Paper	8.1%	1.4%	3,739
Glass	**1.4%**		**665**
Clear Glass Bottles & Containers	1.1%	0.3%	504
Green Glass Bottles & Containers	0.1%	0.0%	34
Brown Glass Bottles & Containers	0.2%	0.1%	91
Other Colored Glass Bottles & Containers	0.0%	0.0%	0
Flat Glass	0.0%	0.0%	18
Remainer/Composite Glass	0.0%	0.0%	18
Metal	**15.9%**		**7,362**
Tin/Steel Cans	0.3%	0.1%	150
Major Appliances	0.0%	0.0%	0
Other Ferrous Metal	10.6%	3.1%	4,873
Aluminum Cans	0.2%	0.1%	107
Other Non-Ferrous Metal	0.2%	0.1%	79
Remainder/Composite Metal	4.7%	2.3%	2,152
Plastic	**13.7%**		**6,311**
HDPE Containers	0.6%	0.3%	292
PETE Containers	0.3%	0.0%	116
Miscellaneous Plastic Containers	0.3%	0.1%	146
Film Plastic	6.5%	1.3%	2,980
Durable Plastic Items	2.2%	0.6%	1,035
Remainder/Composite Plastic	3.8%	1.1%	1,742
Other Organic	**12.8%**		**5,898**
Food	3.0%	0.6%	1,387
Leaves & Grass	2.2%	0.9%	1,032
Prunings & Trimmings	0.0%	0.0%	15
Branches & Stumps	1.6%	1.4%	735
Agricultural Crop Residues	0.0%	0.0%	0
Manures	0.0%	0.0%	0
Textiles	1.4%	0.5%	623
Remainder/Composite Organic	4.6%	2.0%	2,106
Construction & Demolition	**12.2%**		**5,647**
Concrete	2.1%	1.8%	965
Asphalt Paving	0.0%	0.0%	0
Asphalt Roofing	0.0%	0.0%	9
Lumber	8.7%	2.1%	4,033
Gypsum Board	0.0%	0.0%	0
Rock, Soil & Fines	0.8%	0.7%	373
Remainder/Composite C&D	0.6%	0.5%	268
Household Hazardous Waste	**0.8%**		**363**
Paint	0.0%	0.0%	0
Vehicle & Equipment Fluids	0.8%	0.8%	357
Used Oil	0.0%	0.0%	0
Batteries	0.0%	0.0%	6
Remainder/Composite HHW	0.0%	0.0%	0
Special Waste	**5.6%**		**2,576**
Ash	2.0%	1.9%	924
Sewage Solids	0.0%	0.0%	0
Industrial Sludge	0.0%	0.0%	0
Treated Medical Waste	0.0%	0.0%	0
Bulky Items	0.4%	0.4%	168
Tires	1.8%	1.7%	828
Remainder/Composite Special Waste	1.4%	1.4%	656
Mixed Residue	**0.7%**	**0.2%**	**300**
Sample count: 48			**Totals** **100.0%** **46,173**

Confidence intervals calculated at the 90% confidence level. Percentages for materials may not total 100% due to rounding.

Table 42: Composition of Waste from Groups Z through AM: Lumped Group

	Est. Pct.	+ / -	Est. Tons
Paper	**41.0%**		**356,433**
Uncoated Corrugated Cardboard	6.9%	1.2%	59,650
Paper Bags	1.0%	0.3%	8,344
Newspaper	4.4%	1.3%	38,354
White Ledger Paper	3.4%	1.0%	29,321
Colored Ledger Paper	0.1%	0.0%	652
Computer Paper	0.3%	0.1%	2,526
Other Office Paper	2.0%	0.5%	17,340
Magazines and Catalogs	1.3%	0.3%	10,947
Phone Books and Directories	0.3%	0.2%	2,403
Other Miscellaneous Paper	4.6%	1.0%	40,307
Remainder/Composite Paper	16.9%	5.6%	146,588
Glass	**1.3%**		**11,364**
Clear Glass Bottles & Containers	1.0%	0.3%	8,962
Green Glass Bottles & Containers	0.1%	0.1%	466
Brown Glass Bottles & Containers	0.1%	0.1%	988
Other Colored Glass Bottles & Containers	0.0%	0.0%	0
Flat Glass	0.0%	0.0%	27
Remainer/Composite Glass	0.1%	0.1%	921
Metal	**5.4%**		**46,671**
Tin/Steel Cans	0.7%	0.4%	6,234
Major Appliances	0.0%	0.0%	0
Other Ferrous Metal	1.6%	0.8%	14,200
Aluminum Cans	0.3%	0.1%	2,207
Other Non-Ferrous Metal	0.1%	0.0%	909
Remainder/Composite Metal	2.7%	1.4%	23,121
Plastic	**17.3%**		**150,519**
HDPE Containers	0.6%	0.2%	5,645
PETE Containers	0.4%	0.1%	3,242
Miscellaneous Plastic Containers	2.3%	1.3%	20,079
Film Plastic	8.4%	3.6%	73,179
Durable Plastic Items	2.2%	0.6%	19,260
Remainder/Composite Plastic	3.4%	1.2%	29,114
Sample count: 60			

	Est. Pct.	+ / -	Est. Tons
Other Organic	**15.5%**		**134,618**
Food	5.1%	1.1%	44,648
Leaves & Grass	1.2%	0.5%	10,102
Prunings & Trimmings	1.3%	1.1%	10,967
Branches & Stumps	0.0%	0.0%	0
Agricultural Crop Residues	0.1%	0.1%	810
Manures	0.0%	0.0%	0
Textiles	1.4%	0.7%	12,454
Remainder/Composite Organic	6.4%	2.4%	55,637
Construction & Demolition	**12.7%**		**110,135**
Concrete	0.2%	0.2%	1,610
Asphalt Paving	0.0%	0.0%	0
Asphalt Roofing	0.0%	0.0%	100
Lumber	10.2%	4.8%	88,214
Gypsum Board	0.0%	0.0%	0
Rock, Soil & Fines	2.0%	1.8%	17,730
Remainder/Composite C&D	0.3%	0.2%	2,480
Household Hazardous Waste	**0.1%**		**691**
Paint	0.0%	0.0%	80
Vehicle & Equipment Fluids	0.0%	0.0%	0
Used Oil	0.0%	0.0%	0
Batteries	0.0%	0.0%	281
Remainder/Composite HHW	0.0%	0.0%	330
Special Waste	**5.8%**		**49,991**
Ash	0.0%	0.0%	0
Sewage Solids	0.0%	0.0%	0
Industrial Sludge	0.0%	0.0%	0
Treated Medical Waste	0.0%	0.0%	0
Bulky Items	0.0%	0.0%	0
Tires	0.5%	0.5%	4,521
Remainder/Composite Special Waste	5.2%	4.7%	45,470
Mixed Residue	**1.0%**	**0.2%**	**8,260**
Totals	**100.0%**		**868,682**

Confidence intervals calculated at the 90% confidence level. Percentages for materials may not total 100% due to rounding.

3.4 RESIDENTIAL WASTE

The objective of this portion of the study was to characterize California's residential waste stream at the state level. Residential waste is defined as waste disposed by households that is collected and transported by professional waste haulers. This section presents composition findings for the statewide residential sector as a whole, as well as findings for single-family residential waste and multifamily residential waste.

As shown in Table 7 (page 13), the residential sector accounts for approximately 38.1% of California's municipal solid waste stream. The single-family residential subsector accounts for approximately 28.0%, and the multifamily residential subsector accounts for approximately 10.0%.

As with many waste composition studies, this study considered single-family residential waste separately from multifamily residential waste. Multifamily waste is typically collected along with commercial waste, and it becomes impractical to separate the multifamily from the commercial waste for sampling at disposal sites. The present study therefore captured multifamily waste at the point of generation (apartment complexes) through a method that closely resembled the capture of commercial waste samples from generating businesses.

3.4.1 THE OVERALL RESIDENTIAL SECTOR

DESCRIPTION OF SAMPLES

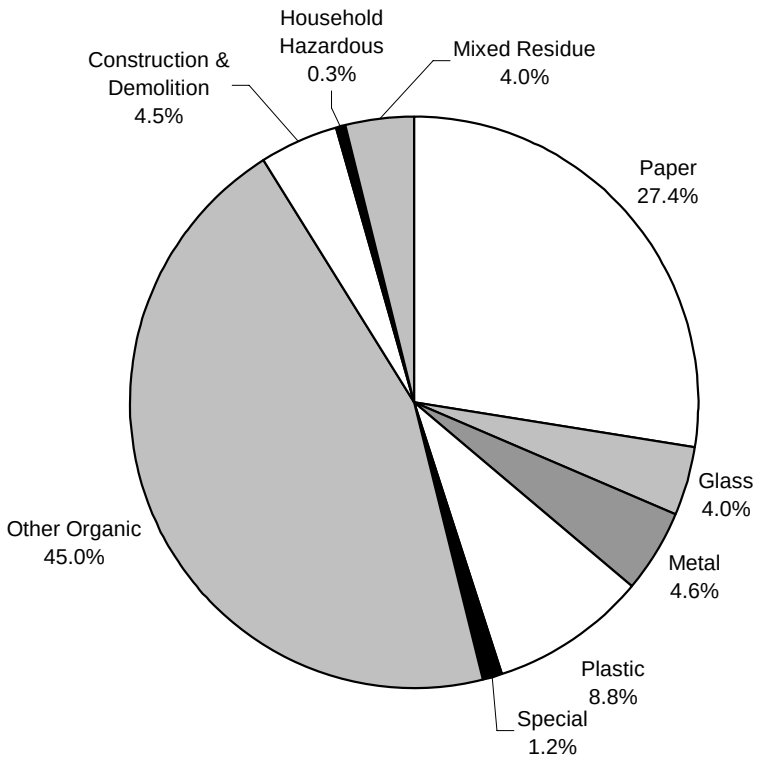
Samples of single-family residential waste were obtained from randomly selected vehicles at the landfills and transfer stations employed in this study. Samples of multifamily residential waste were collected at multifamily complexes that were selected randomly from within the waste sheds considered in this study. Composition percents and estimated tons for each material were derived separately for the single-family residential and multifamily residential subsectors. The estimates for the two subsectors were then combined, with weighting proportionate to the prevalence of each subsector in the overall waste stream, as revealed by the vehicle surveys. (See Appendix A for a description of the methods used in selecting, sorting, and analyzing samples. See Section A.10 of Appendix A for the methodology of combining data from the single-family residential and multifamily residential subsectors to obtain information about the composition of the whole residential sector.)

Tables Table 45 and Table 48 present the numbers of samples that were obtained in each region and each season for single-family residential waste and multifamily residential waste, respectively. In all, 228 samples of residential waste were analyzed (148 single-family and 80 multifamily).

OVERALL RESIDENTIAL WASTE COMPOSITION

Composition results for residential waste are illustrated in Figure 4 and described in detail in Table 44. The broad material class *Other Organic Waste* accounts for approximately 45% of disposed residential waste, and the broad class *Paper* accounts more than a quarter of it. (See Table 44 for lists of materials belonging to each class, and see Appendix B for definitions of the materials.)

Figure 4: Overview of Overall Residential Waste



Food, a component of *Other Organic Waste*, is the single most prevalent material in residential waste, comprising 20.0%. *Leaves and Grass* and *Remainder/Composite Organic* materials also are prevalent, representing 10.5% and 9.5% of the sector's waste, respectively. In all, materials from the *Other Organic Waste* and *Paper* classes comprise eight of the top ten materials in this subsector. Table 43 presents the materials that account for approximately 73% of residential waste. (See Appendix B for definitions of the materials.) Table 44 presents the detailed composition results for the residential sector.

Table 43: Most Prevalent Materials in Overall Residential Waste

Material Type	Est. Pct.	Est. Tons	Cumulative Pct.
Food	20.0%	2,705,226	20.0%
Leaves & Grass	10.5%	1,417,730	30.5%
Remainder/Composite Organic	9.5%	1,282,074	40.0%
Remainder/Composite Paper	8.1%	1,090,003	48.0%
Newspaper	6.5%	880,581	54.5%
Other Miscellaneous Paper	4.8%	644,372	59.3%
Film Plastic	4.2%	570,893	63.5%
Mixed Residue	4.0%	541,223	67.5%
Uncoated Corrugated Cardboard	3.0%	403,930	70.5%
Prunings & Trimmings	2.5%	342,644	73.0%

Any differences between *cumulative percent* figures and the sum of *estimated percent* figures are due to rounding.

Table 44: Composition of Overall Residential Waste

	Est. Pct.	+ / -	Est. Tons
Paper	**27.4%**		**3,712,747**
Uncoated Corrugated Cardboard	3.0%	0.2%	403,930
Paper Bags	1.0%	0.1%	130,225
Newspaper	6.5%	0.6%	880,581
White Ledger Paper	0.6%	0.1%	80,509
Colored Ledger Paper	0.1%	0.0%	8,821
Computer Paper	0.0%	0.0%	4,763
Other Office Paper	1.1%	0.1%	144,021
Magazines and Catalogs	2.0%	0.2%	268,365
Phone Books and Directories	0.4%	0.1%	57,158
Other Miscellaneous Paper	4.8%	0.2%	644,372
Remainder/Composite Paper	8.1%	0.3%	1,090,003
Glass	**4.0%**		**545,888**
Clear Glass Bottles & Containers	2.0%	0.1%	271,318
Green Glass Bottles & Containers	0.7%	0.1%	94,350
Brown Glass Bottles & Containers	0.8%	0.1%	113,183
Other Colored Glass Bottles & Containers	0.0%	0.0%	2,282
Flat Glass	0.0%	0.0%	4,248
Remainer/Composite Glass	0.4%	0.1%	60,505
Metal	**4.6%**		**625,800**
Tin/Steel Cans	1.4%	0.1%	185,073
Major Appliances	0.0%	0.0%	0
Other Ferrous Metal	1.1%	0.2%	153,360
Aluminum Cans	0.4%	0.0%	50,714
Other Non-Ferrous Metal	0.3%	0.0%	38,764
Remainder/Composite Metal	1.5%	0.3%	197,889
Plastic	**8.8%**		**1,196,514**
HDPE Containers	1.1%	0.1%	149,363
PETE Containers	0.6%	0.0%	83,734
Miscellaneous Plastic Containers	0.8%	0.1%	109,747
Film Plastic	4.2%	0.2%	570,893
Durable Plastic Items	1.0%	0.1%	132,292
Remainder/Composite Plastic	1.1%	0.1%	150,486
Sample count: 228			

	Est. Pct.	+ / -	Est. Tons
Other Organic	**45.0%**		**6,086,136**
Food	20.0%	0.8%	2,705,226
Leaves & Grass	10.5%	1.3%	1,417,730
Prunings & Trimmings	2.5%	0.6%	342,644
Branches & Stumps	0.1%	0.0%	7,301
Agricultural Crop Residues	0.0%	0.0%	0
Manures	0.0%	0.0%	0
Textiles	2.4%	0.2%	331,161
Remainder/Composite Organic	9.5%	0.6%	1,282,074
Construction & Demolition	**4.5%**		**605,744**
Concrete	0.2%	0.1%	29,554
Asphalt Paving	0.0%	0.0%	2,756
Asphalt Roofing	0.0%	0.0%	1,832
Lumber	1.4%	0.3%	193,636
Gypsum Board	0.6%	0.3%	78,515
Rock, Soil & Fines	1.3%	0.4%	174,761
Remainder/Composite C&D	0.9%	0.2%	124,689
Household Hazardous Waste	**0.3%**		**43,718**
Paint	0.2%	0.1%	29,643
Vehicle & Equipment Fluids	0.0%	0.0%	50
Used Oil	0.0%	0.0%	509
Batteries	0.1%	0.0%	10,255
Remainder/Composite HHW	0.0%	0.0%	3,262
Special Waste	**1.2%**		**167,735**
Ash	0.1%	0.0%	7,933
Sewage Solids	0.0%	0.0%	0
Industrial Sludge	0.0%	0.0%	0
Treated Medical Waste	0.0%	0.0%	715
Bulky Items	0.4%	0.2%	55,607
Tires	0.3%	0.2%	36,607
Remainder/Composite Special Waste	0.5%	0.1%	66,873
Mixed Residue	**4.0%**	**0.4%**	**541,223**
Totals	**100.0%**		**13,525,504**

Confidence intervals calculated at the 90% confidence level. Percentages for materials may not total 100% due to rounding.

3.4.2 SINGLE-FAMILY RESIDENTIAL WASTE

The objective of this portion of the study was to characterize California's single-family residential waste stream at the state level. This sector includes waste that is collected by haulers from single-family residences.

DESCRIPTION OF SAMPLES

Samples of single-family residential waste were obtained from randomly selected vehicles at the landfills and transfer stations employed in this study. Approximately 30 samples were obtained from each of the five regions of the state, and approximately six samples were obtained from each disposal facility that was visited. (See Appendix A for a description of the methods used in selecting, sorting, and analyzing samples.)

Table 45 presents the numbers of samples that were obtained in each region and each season. For the whole state, 148 samples of single-family residential were sorted (69 in the winter and 79 in the summer).

Table 45: Single-Family Residential Samples Obtained, by Region and Season

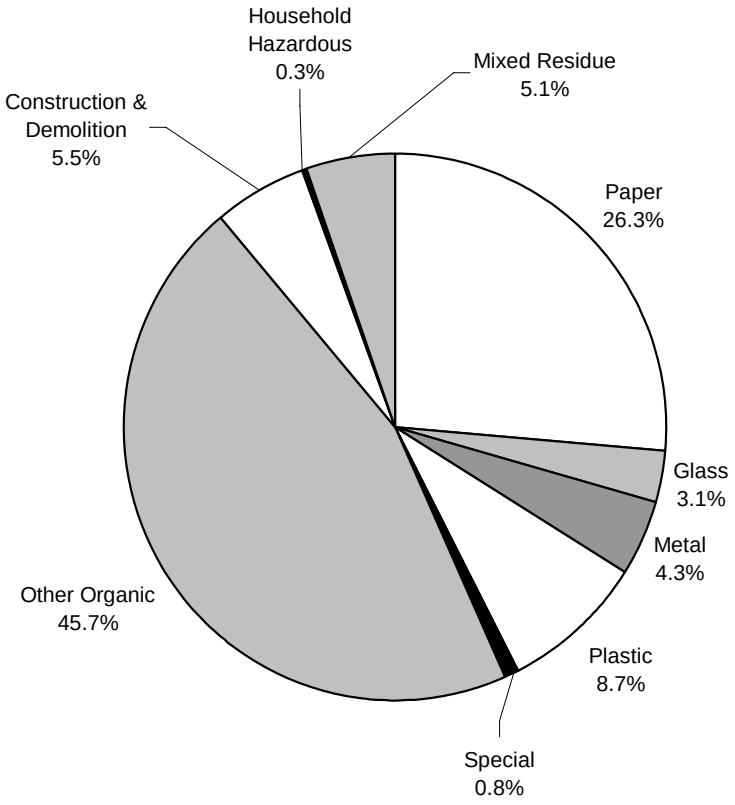
	Coastal	Bay Area	Southern	Mountain	Central	**Totals**
Winter	12	11	16	18	12	**69**
Summer	17	19	11	12	20	**79**
Totals	**29**	**30**	**27**	**30**	**32**	**148**

Sampling was conducted at five disposal facilities in each region of the state. See Table 71 for the names and locations of the disposal facilities that were visited.

SINGLE-FAMILY RESIDENTIAL WASTE COMPOSITION

Composition results for single-family residential waste are illustrated in Figure 5 and described in detail in Table 47. Notably, the broad material class *Other Organic Waste* accounts for nearly half of disposed single-family residential waste, and the broad class *Paper* accounts for more than a quarter of it. (See Table 47 for lists of materials belonging to each class, and see Appendix B for definitions of the materials.)

Figure 5: Overview of Single-Family Residential Waste



Food, a component of the *Organics* class, is the single most prevalent material in single-family residential waste, comprising 17.4%. It is followed by *Leaves and Grass* (12.7%), which is also part of the *Organics* class. *Remainder/Composite Paper* (8.2%) and *Newspaper* (5.2%), both components of the *Paper* class, also were present in relatively large amounts. Table 46 presents the materials that account for approximately 75% of single-family residential waste. (See Appendix B for definitions of the materials.) Table 47 presents the detailed composition results for the single-family residential sector.

Table 46: Most Prevalent Materials in Single-Family Residential Waste

Material Type	Est. Pct.	Est. Tons	Cumulative Pct.
Food	17.4%	1,733,702	17.4%
Leaves & Grass	12.7%	1,269,149	30.2%
Remainder/Composite Organic	9.5%	945,543	39.7%
Remainder/Composite Paper	8.2%	815,931	47.9%
Newspaper	5.2%	519,477	53.1%
Mixed Residue	5.1%	512,342	58.2%
Other Miscellaneous Paper	4.6%	459,418	62.8%
Film Plastic	4.2%	419,097	67.0%
Prunings & Trimmings	3.3%	330,834	70.4%
Uncoated Corrugated Cardboard	3.0%	294,541	73.3%

Any differences between *cumulative percent* figures and the sum of *estimated percent* figures are due to rounding.

During sorting, visual observations were made on the *Leaves and Grass* material type to estimate the portion of the category that each represented. For single-family residential waste, grass was estimated to be 57 percent, and leaves were estimated to be 43 percent of the *Leaves and Grass* category by weight. These should be considered rough estimates, and no statistical treatment was applied to the breakdown of *Leaves and Grass* into its two components.

Table 47: Composition of Single-Family Residential Waste

	Est. Pct.	+ / -	Est. Tons
Paper	**26.3%**		**2,618,976**
Uncoated Corrugated Cardboard	3.0%	0.3%	294,541
Paper Bags	1.0%	0.1%	96,823
Newspaper	5.2%	0.6%	519,477
White Ledger Paper	0.6%	0.1%	64,330
Colored Ledger Paper	0.1%	0.0%	6,927
Computer Paper	0.0%	0.0%	4,328
Other Office Paper	1.3%	0.1%	124,788
Magazines and Catalogs	2.0%	0.2%	202,656
Phone Books and Directories	0.3%	0.1%	29,756
Other Miscellaneous Paper	4.6%	0.2%	459,418
Remainder/Composite Paper	8.2%	0.4%	815,931
Glass	**3.1%**		**313,007**
Clear Glass Bottles & Containers	1.6%	0.1%	156,103
Green Glass Bottles & Containers	0.5%	0.1%	48,373
Brown Glass Bottles & Containers	0.7%	0.1%	67,852
Other Colored Glass Bottles & Containers	0.0%	0.0%	2,282
Flat Glass	0.0%	0.0%	2,041
Remainer/Composite Glass	0.4%	0.1%	36,355
Metal	**4.3%**		**429,162**
Tin/Steel Cans	1.4%	0.1%	137,740
Major Appliances	0.0%	0.0%	0
Other Ferrous Metal	1.0%	0.1%	101,328
Aluminum Cans	0.4%	0.0%	35,498
Other Non-Ferrous Metal	0.3%	0.0%	27,430
Remainder/Composite Metal	1.3%	0.2%	127,165
Plastic	**8.7%**		**870,561**
HDPE Containers	1.0%	0.1%	95,693
PETE Containers	0.6%	0.0%	56,559
Miscellaneous Plastic Containers	0.8%	0.1%	81,885
Film Plastic	4.2%	0.2%	419,097
Durable Plastic Items	1.0%	0.1%	102,037
Remainder/Composite Plastic	1.2%	0.1%	115,289
Sample count: 162			

	Est. Pct.	+ / -	Est. Tons
Other Organic	**45.7%**		**4,547,610**
Food	17.4%	0.9%	1,733,702
Leaves & Grass	12.7%	1.7%	1,269,149
Prunings & Trimmings	3.3%	0.8%	330,834
Branches & Stumps	0.1%	0.1%	7,302
Agricultural Crop Residues	0.0%	0.0%	0
Manures	0.0%	0.0%	0
Textiles	2.6%	0.3%	261,080
Remainder/Composite Organic	9.5%	0.8%	945,543
Construction & Demolition	**5.5%**		**551,449**
Concrete	0.3%	0.1%	29,557
Asphalt Paving	0.0%	0.0%	2,756
Asphalt Roofing	0.0%	0.0%	1,759
Lumber	1.7%	0.4%	172,023
Gypsum Board	0.8%	0.4%	76,394
Rock, Soil & Fines	1.7%	0.5%	168,640
Remainder/Composite C&D	1.0%	0.3%	100,320
Household Hazardous Waste	**0.3%**		**30,969**
Paint	0.2%	0.1%	20,292
Vehicle & Equipment Fluids	0.0%	0.0%	50
Used Oil	0.0%	0.0%	455
Batteries	0.1%	0.0%	7,110
Remainder/Composite HHW	0.0%	0.0%	3,062
Special Waste	**0.8%**		**81,664**
Ash	0.0%	0.0%	3,922
Sewage Solids	0.0%	0.0%	0
Industrial Sludge	0.0%	0.0%	0
Treated Medical Waste	0.0%	0.0%	715
Bulky Items	0.5%	0.2%	47,808
Tires	0.1%	0.1%	8,939
Remainder/Composite Special Waste	0.2%	0.1%	20,280
Mixed Residue	**5.1%**	**0.6%**	**512,342**
Totals	**100.0%**		**9,955,739**

Confidence intervals calculated at the 90% confidence level. Percentages for materials may not total 100% due to rounding.

3.4.3 MULTIFAMILY RESIDENTIAL WASTE

The objective of this portion of the study was to characterize California's multifamily residential waste stream at the state level. This sector includes waste that is collected by haulers from apartments or condominiums.

DESCRIPTION OF SAMPLES

Samples of multifamily residential waste were obtained from apartment complexes that were selected randomly from within the waste sheds considered in this study. (See Table 71 for a list of waste sheds.) Eighty samples of multifamily waste were apportioned to the five regions of the state in approximate correlation to the multifamily-dwelling population of each region. (See Appendix A for a description of how multifamily samples were apportioned among regions and chosen within each waste shed, as well as the methods used in capturing and sorting samples of multifamily waste.)

Table 48 presents the numbers of samples that were obtained in each region and each season. Of the 80 samples captured statewide, 36 were captured in the winter and 44 in the summer.

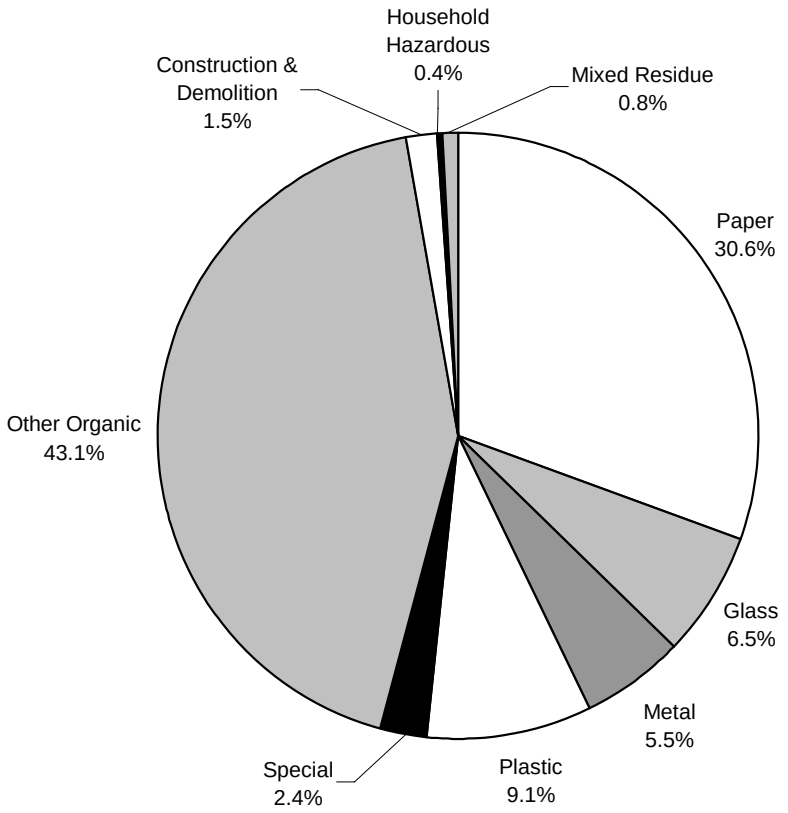
Table 48: Multifamily Residential Samples Obtained, by Region and Season

	Coastal	Bay Area	Southern	Mountain	Central	**Totals**
Winter	1	8	22	1	4	**36**
Summer	2	16	22	1	3	**44**
Totals	**3**	**24**	**44**	**2**	**7**	**80**

MULTIFAMILY RESIDENTIAL WASTE COMPOSITION

Composition results for multifamily residential waste are illustrated in Figure 6 and described in detail in Table 50. Notably, the broad material class *Other Organic Waste* accounts for approximately 43% of disposed multifamily residential waste, and the broad class *Paper* accounts for approximately 30% of it. (See Table 50 for lists of materials belonging to each class, and see Appendix B for definitions of the materials.)

Figure 6: Overview of Multifamily Residential Waste



Food, a component of the *Organics* class, is the single most prevalent material in multifamily residential waste, comprising 27.2%. It is followed by *Newspaper* (10.1%), *Remainder/ Composite Organic Waste* (9.4%), and *Remainder/Composite Paper* (7.7%). Materials in the *Organics* and *Paper* classes comprise seven of the top ten materials in multifamily residential waste. Table 49 presents the materials that account for approximately 76% of multifamily residential waste. (See Appendix B for definitions of the materials.) Table 50 presents the detailed composition results for the multifamily residential sector.

Table 49: Most Prevalent Materials in Multifamily Residential Waste

Material Type	Est. Pct.	Est. Tons	Cumulative Pct.
Food	27.2%	971,463	27.2%
Newspaper	10.1%	361,069	37.3%
Remainder/Composite Organic	9.4%	336,543	46.8%
Remainder/Composite Paper	7.7%	274,086	54.4%
Other Miscellaneous Paper	5.2%	184,955	59.6%
Film Plastic	4.3%	151,800	63.9%
Leaves & Grass	4.2%	148,669	68.0%
Clear Glass Bottles & Containers	3.2%	115,203	71.3%
Uncoated Corrugated Cardboard	3.1%	109,391	74.3%
Remainder/Composite Metal	2.0%	70,719	76.3%

Any differences between *cumulative percent* figures and the sum of *estimated percent* figures are due to rounding.

Table 50: Composition of Multifamily Residential Waste

	Est. Pct.	+ / -	Est. Tons
Paper	**30.6%**		**1,093,767**
Uncoated Corrugated Cardboard	3.1%	0.5%	109,391
Paper Bags	0.9%	0.1%	33,403
Newspaper	10.1%	1.4%	361,069
White Ledger Paper	0.5%	0.1%	16,182
Colored Ledger Paper	0.1%	0.0%	1,894
Computer Paper	0.0%	0.0%	434
Other Office Paper	0.5%	0.1%	19,240
Magazines and Catalogs	1.8%	0.4%	65,713
Phone Books and Directories	0.8%	0.4%	27,399
Other Miscellaneous Paper	5.2%	0.5%	184,955
Remainder/Composite Paper	7.7%	0.5%	274,086
Glass	**6.5%**		**232,856**
Clear Glass Bottles & Containers	3.2%	0.4%	115,203
Green Glass Bottles & Containers	1.3%	0.3%	45,971
Brown Glass Bottles & Containers	1.3%	0.3%	45,327
Other Colored Glass Bottles & Containers	0.0%	0.0%	0
Flat Glass	0.1%	0.0%	2,206
Remainer/Composite Glass	0.7%	0.2%	24,148
Metal	**5.5%**		**196,633**
Tin/Steel Cans	1.3%	0.1%	47,335
Major Appliances	0.0%	0.0%	0
Other Ferrous Metal	1.5%	0.5%	52,030
Aluminum Cans	0.4%	0.1%	15,216
Other Non-Ferrous Metal	0.3%	0.0%	11,334
Remainder/Composite Metal	2.0%	0.8%	70,719
Plastic	**9.1%**		**325,961**
HDPE Containers	1.5%	0.1%	53,666
PETE Containers	0.8%	0.1%	27,174
Miscellaneous Plastic Containers	0.8%	0.1%	27,863
Film Plastic	4.3%	0.3%	151,800
Durable Plastic Items	0.8%	0.1%	30,257
Remainder/Composite Plastic	1.0%	0.1%	35,200
Sample count: 80			

	Est. Pct.	+ / -	Est. Tons
Other Organic	**43.1%**		**1,538,604**
Food	27.2%	1.7%	971,463
Leaves & Grass	4.2%	1.3%	148,669
Prunings & Trimmings	0.3%	0.2%	11,839
Branches & Stumps	0.0%	0.0%	0
Agricultural Crop Residues	0.0%	0.0%	0
Manures	0.0%	0.0%	0
Textiles	2.0%	0.3%	70,090
Remainder/Composite Organic	9.4%	1.1%	336,543
Construction & Demolition	**1.5%**		**54,335**
Concrete	0.0%	0.0%	0
Asphalt Paving	0.0%	0.0%	0
Asphalt Roofing	0.0%	0.0%	73
Lumber	0.6%	0.3%	21,625
Gypsum Board	0.1%	0.1%	2,128
Rock, Soil & Fines	0.2%	0.1%	6,136
Remainder/Composite C&D	0.7%	0.5%	24,373
Household Hazardous Waste	**0.4%**		**12,749**
Paint	0.3%	0.2%	9,351
Vehicle & Equipment Fluids	0.0%	0.0%	0
Used Oil	0.0%	0.0%	54
Batteries	0.1%	0.0%	3,144
Remainder/Composite HHW	0.0%	0.0%	200
Special Waste	**2.4%**		**86,059**
Ash	0.1%	0.1%	4,011
Sewage Solids	0.0%	0.0%	0
Industrial Sludge	0.0%	0.0%	0
Treated Medical Waste	0.0%	0.0%	0
Bulky Items	0.2%	0.2%	7,803
Tires	0.8%	0.6%	27,662
Remainder/Composite Special Waste	1.3%	0.4%	46,584
Mixed Residue	**0.8%**	**0.2%**	**28,924**
Totals	**100.0%**		**3,569,888**

Confidence intervals calculated at the 90% confidence level. Percentages for materials may not total 100% due to rounding.

3.5 SELF-HAUL WASTE

The objective of this portion of the study was to characterize California's self-haul waste stream at the state level. Self-haul waste is waste that is transported to the disposal site by someone whose primary business is not waste hauling. This section presents composition findings for the statewide self-haul sector as a whole, as well as findings for commercial self-haul waste and residential self-haul waste.

As shown in Table 7 (page 13), the self-haul waste sector accounts for approximately 13.1% of California's municipal solid waste stream. The commercial self-haul and residential self-haul subsectors make up approximately 10.5% and 2.6% respectively.

As part of the vehicle survey, drivers of vehicles carrying commercial self-haul waste to disposal facilities were asked to classify the activity that generated the waste. Based on their responses, it is estimated that commercial self-haul waste from construction and demolition activities represents 4.5% of the overall waste stream. Similarly, waste from roofing and waste from landscaping respectively represent about 1.1% and 0.9% of the overall waste stream. Other miscellaneous commercial activities generate commercial self-haul waste that represents approximately 4.1% of the overall waste stream. These results are shown in Table 9 (page 14).

3.5.1 THE OVERALL SELF-HAUL SECTOR

DESCRIPTION OF SAMPLES

Samples of self-haul waste were obtained from randomly selected vehicles at the landfills and transfer stations employed in this study. Approximately 50 samples were obtained from each of the five regions of the state, and approximately ten samples were obtained from each disposal facility that was visited. One third of the samples were from residential sources, and two thirds from commercial self-haul sources. Overall self-haul composition results are based on an average of the two subsectors, weighted at the regional level. (See Appendix A for a description of the methods used in selecting, sorting, and analyzing samples.)

Table 51 presents the numbers of samples that were obtained in each region and each season. For the whole state, 247 samples of self-haul waste were sorted (118 in the winter and 129 in the summer).

Table 51: Self-Haul Samples Obtained, by Region and Season

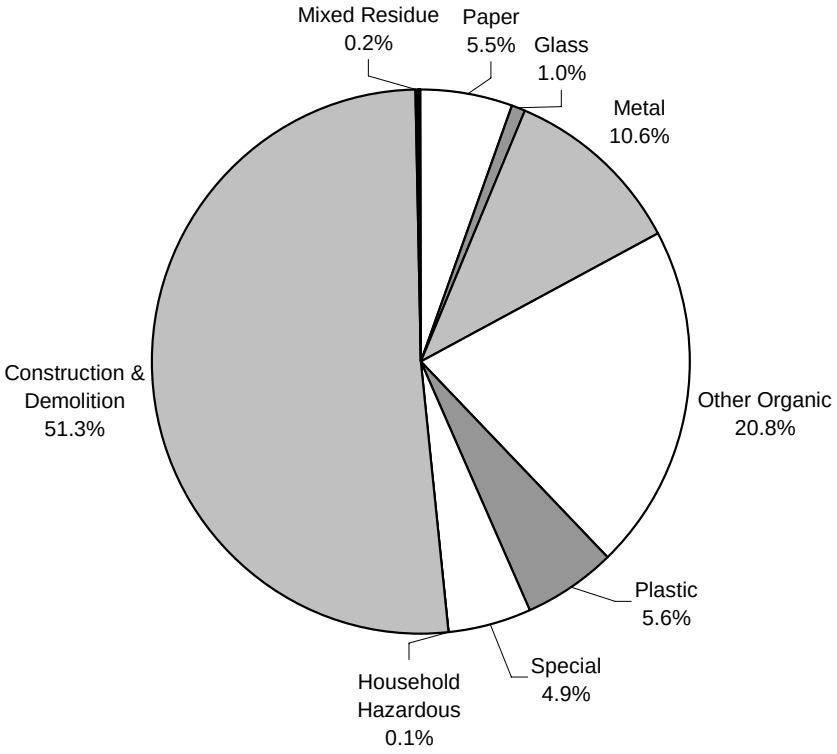
	Coastal	Bay Area	Southern	Mountain	Central	**Totals**
Winter	20	20	30	28	20	**118**
Summer	30	29	20	17	33	**129**
Totals	**50**	**49**	**50**	**45**	**53**	**247**

Sampling was conducted at five disposal facilities in each region of the state. See Table 71 for the names and locations of the disposal facilities that were visited.

OVERALL SELF-HAUL WASTE COMPOSITION

Composition results for self-haul waste are illustrated in Figure 7 and described in detail in Table 53. Notably, the broad material class *Construction and Demolition Waste* accounts for more than half of disposed self-haul waste, as would be expected since a large segment of self-haul tonnage comes from construction, demolition, and roofing activities (see Table 9 on page 14). The broad class *Other Organic Waste* is the next largest category, accounting for approximately a fifth of self-haul waste. (See Table 53 for lists of materials belonging to each class, and see Appendix B for definitions of the materials.)

Figure 7: Overview of Overall Self-Haul Waste



Lumber, a component of the *Construction and Demolition Waste* class, is the single most prevalent material in self-haul waste, comprising 19.2%. In all, materials from the *Construction and Demolition Waste* class, the *Metals* class, and the *Other Organics* class comprise nine of the top ten materials in this subsector. Table 52 presents the materials that account for approximately 75% of self-haul waste. (See Appendix B for definitions of the materials.) Table 53 presents the detailed composition results for the overall self-haul sector.

Table 52: Most Prevalent Materials in Overall Self-Haul Waste

Material Type	Est. Pct.	Est. Tons	Cumulative Pct.
Lumber	19.2%	894,304	19.2%
Remainder/Composite Construction & Demolition	10.6%	491,760	29.8%
Remainder/Composite Organic	8.2%	379,753	38.0%
Other Ferrous Metal	6.7%	312,257	44.7%
Concrete	6.7%	311,396	51.4%
Gypsum Board	5.5%	254,298	56.8%
Prunings & Trimmings	5.4%	250,685	62.2%
Asphalt Roofing	5.4%	249,748	67.6%
Leaves & Grass	4.0%	185,816	71.6%
Bulky Items	3.9%	182,372	75.5%

Any differences between *cumulative percent* figures and the sum of *estimated percent* figures are due to rounding.

During sorting, visual observations were made on the *Leaves and Grass* material type to estimate the portion of the category that each represented in the overall self-haul sector. During the winter, leaves made up 66% of the *Leaves and Grass* category by weight, and grass made up 34% of the category. During the summer, leaves comprised only 49% of the category, while grass comprised 51%. In self-haul samples from both seasons considered together, leaves represented 54%, and grass represented 46%. These should be considered rough estimates, and no statistical treatment was applied to the breakdown of *Leaves and Grass* into its two components.

Table 53: Composition of Overall Self-Haul Waste

	Est. Pct.	+ / -	Est. Tons
Paper	**5.5%**		**253,949**
Uncoated Corrugated Cardboard	1.9%	0.3%	89,165
Paper Bags	0.2%	0.1%	10,000
Newspaper	0.2%	0.0%	10,768
White Ledger Paper	0.1%	0.0%	3,099
Colored Ledger Paper	0.0%	0.0%	170
Computer Paper	0.0%	0.0%	144
Other Office Paper	0.6%	0.3%	26,444
Magazines and Catalogs	0.2%	0.0%	7,313
Phone Books and Directories	0.1%	0.0%	2,739
Other Miscellaneous Paper	1.3%	0.4%	60,603
Remainder/Composite Paper	0.9%	0.2%	43,504
Glass	**1.0%**		**47,713**
Clear Glass Bottles & Containers	0.2%	0.1%	10,032
Green Glass Bottles & Containers	0.3%	0.3%	15,890
Brown Glass Bottles & Containers	0.0%	0.0%	2,247
Other Colored Glass Bottles & Containers	0.0%	0.0%	93
Flat Glass	0.2%	0.1%	10,478
Remainer/Composite Glass	0.2%	0.1%	8,973
Metal	**10.6%**		**495,084**
Tin/Steel Cans	0.1%	0.1%	6,607
Major Appliances	0.3%	0.2%	15,077
Other Ferrous Metal	6.7%	1.4%	312,257
Aluminum Cans	0.0%	0.0%	1,136
Other Non-Ferrous Metal	0.3%	0.1%	12,861
Remainder/Composite Metal	3.2%	0.9%	147,146
Plastic	**5.6%**		**258,164**
HDPE Containers	0.3%	0.1%	11,753
PETE Containers	0.0%	0.0%	2,088
Miscellaneous Plastic Containers	0.1%	0.0%	2,860
Film Plastic	0.7%	0.1%	33,824
Durable Plastic Items	3.7%	1.1%	173,948
Remainder/Composite Plastic	0.7%	0.3%	33,691
Sample count: 247			

	Est. Pct.	+ / -	Est. Tons
Other Organic	**20.8%**		**966,563**
Food	1.1%	0.3%	50,086
Leaves & Grass	4.0%	1.4%	185,816
Prunings & Trimmings	5.4%	1.7%	250,685
Branches & Stumps	0.9%	0.4%	43,537
Agricultural Crop Residues	0.0%	0.0%	259
Manures	0.0%	0.0%	0
Textiles	1.2%	0.6%	56,428
Remainder/Composite Organic	8.2%	2.5%	379,753
Construction & Demolition	**51.3%**		**2,386,666**
Concrete	6.7%	1.7%	311,396
Asphalt Paving	0.7%	0.4%	32,040
Asphalt Roofing	5.4%	1.7%	249,748
Lumber	19.2%	2.2%	894,304
Gypsum Board	5.5%	1.4%	254,298
Rock, Soil & Fines	3.3%	1.4%	153,120
Remainder/Composite C&D	10.6%	2.2%	491,760
Household Hazardous Waste	**0.1%**		**5,951**
Paint	0.1%	0.1%	3,960
Vehicle & Equipment Fluids	0.0%	0.0%	6
Used Oil	0.0%	0.0%	411
Batteries	0.0%	0.0%	436
Remainder/Composite HHW	0.0%	0.0%	1,138
Special Waste	**4.9%**		**226,125**
Ash	0.0%	0.0%	1,408
Sewage Solids	0.0%	0.0%	0
Industrial Sludge	0.0%	0.0%	0
Treated Medical Waste	0.1%	0.1%	3,007
Bulky Items	3.9%	1.2%	182,372
Tires	0.8%	0.7%	37,037
Remainder/Composite Special Waste	0.0%	0.0%	2,300
Mixed Residue	**0.2%**	**0.1%**	**11,377**
Totals	**100.0%**		**4,651,591**

Confidence intervals calculated at the 90% confidence level. Percentages for materials may not total 100% due to rounding.

3.5.2 COMMERCIAL SELF-HAUL WASTE

The objective of this portion of the study was to characterize California's commercial self-haul waste stream at the state level. This sector includes waste hauled to a disposal site by a commercial enterprise, such as a landscaper or contractor, even if the source of waste was residential dwellings.

DESCRIPTION OF SAMPLES

Samples of commercial self-haul waste were obtained from randomly selected vehicles at the landfills and transfer stations employed in this study. Approximately 32 samples were obtained from each of the five regions of the state, and approximately six samples were obtained from each disposal facility that was visited. (See Appendix A for a description of the methods used in selecting, sorting, and analyzing samples.)

Table 54 presents the numbers of samples that were obtained in each region and each season. For the whole state, 162 samples of commercial self-haul waste were sorted (79 in the winter and 83 in the summer).

Table 54: Commercial Self-Haul Samples Obtained, by Region and Season

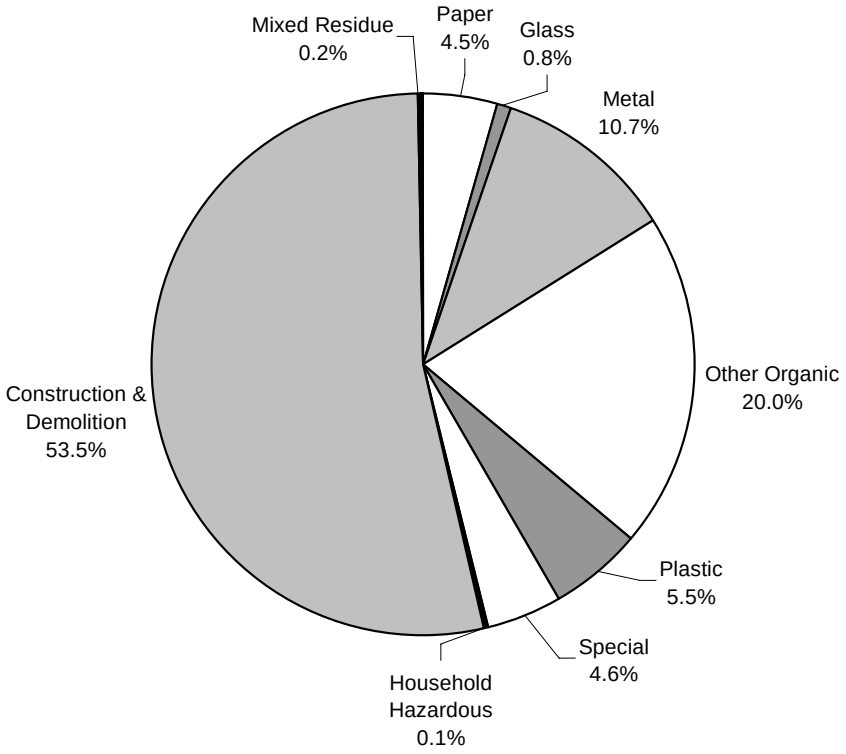
	Coastal	Bay Area	Southern	Mountain	Central	**Totals**
Winter	17	16	19	15	12	**79**
Summer	19	20	12	12	20	**83**
Totals	**36**	**36**	**31**	**27**	**32**	**162**

Sampling was conducted at five disposal facilities in each region of the state. See Table 71 for the names and locations of the disposal facilities that were visited.

COMMERCIAL SELF-HAUL WASTE COMPOSITION

Composition results for commercial self-haul waste are illustrated in Figure 8 and described in detail in Table 56. The broad material class *Construction and Demolition Waste* accounts for more than half of disposed commercial self-haul waste, and the broad class *Other Organic Waste* accounts for a fifth of it. (See Table 56 for lists of materials belonging to each class, and see Appendix B for definitions of the materials.)

Figure 8: Overview of Commercial Self-Haul Waste



Lumber, a component of the *Construction and Demolition Waste* class, is the single most prevalent material in commercial self-haul waste, comprising 19.4%. In all, materials from the *Construction and Demolition Waste* class, the *Metals* class, and the *Other Organics* class (primarily yard waste) comprise nine of the top ten materials in this subsector. Table 55 presents the materials that account for approximately 77% of commercial self-haul waste. (See Appendix B for definitions of the materials.) Table 56 presents the detailed composition results for the commercial self-haul sector.

Table 55: Most Prevalent Materials in Commercial Self-Haul Waste

Material Type	Est. Pct.	Est. Tons	Cumulative Pct.
Lumber	19.4%	724,030	19.4%
Remainder/Composite Construction & Demolition	11.0%	409,860	30.3%
Remainder/Composite Organic	8.2%	306,248	38.5%
Concrete	7.1%	265,650	45.6%
Other Ferrous Metal	7.0%	260,762	52.6%
Gypsum Board	6.0%	226,196	58.6%
Asphalt Roofing	6.0%	223,226	64.6%
Prunings & Trimmings	5.0%	185,348	69.6%
Leaves & Grass	4.0%	150,325	73.6%
Durable Plastic Items	3.9%	145,966	77.5%

Any differences between *cumulative percent* figures and the sum of *estimated percent* figures are due to rounding.

Table 56: Composition of Commercial Self-Haul Waste

	Est. Pct.	+ / -	Est. Tons
Paper	**4.5%**		**168,986**
Uncoated Corrugated Cardboard	1.6%	0.4%	60,833
Paper Bags	0.2%	0.1%	8,323
Newspaper	0.2%	0.1%	7,151
White Ledger Paper	0.0%	0.0%	1,427
Colored Ledger Paper	0.0%	0.0%	74
Computer Paper	0.0%	0.0%	15
Other Office Paper	0.3%	0.5%	10,108
Magazines and Catalogs	0.1%	0.1%	3,948
Phone Books and Directories	0.0%	0.1%	1,716
Other Miscellaneous Paper	1.2%	0.9%	46,720
Remainder/Composite Paper	0.8%	0.3%	28,671
Glass	**0.8%**		**31,704**
Clear Glass Bottles & Containers	0.1%	0.1%	3,668
Green Glass Bottles & Containers	0.4%	0.7%	13,150
Brown Glass Bottles & Containers	0.0%	0.0%	779
Other Colored Glass Bottles & Containers	0.0%	0.0%	20
Flat Glass	0.2%	0.2%	8,137
Remainer/Composite Glass	0.2%	0.3%	5,949
Metal	**10.7%**		**401,635**
Tin/Steel Cans	0.1%	0.1%	4,760
Major Appliances	0.4%	0.6%	13,485
Other Ferrous Metal	7.0%	2.9%	260,762
Aluminum Cans	0.0%	0.0%	692
Other Non-Ferrous Metal	0.3%	0.1%	10,258
Remainder/Composite Metal	3.0%	2.1%	111,678
Plastic	**5.5%**		**206,942**
HDPE Containers	0.2%	0.1%	8,437
PETE Containers	0.0%	0.0%	1,210
Miscellaneous Plastic Containers	0.1%	0.1%	1,966
Film Plastic	0.6%	0.3%	23,417
Durable Plastic Items	3.9%	2.6%	145,966
Remainder/Composite Plastic	0.7%	0.7%	25,945
Sample count: 162			

	Est. Pct.	+ / -	Est. Tons
Other Organic	**20.0%**		**747,404**
Food	0.9%	0.9%	33,197
Leaves & Grass	4.0%	3.5%	150,325
Prunings & Trimmings	5.0%	5.1%	185,348
Branches & Stumps	0.8%	0.9%	31,429
Agricultural Crop Residues	0.0%	0.0%	0
Manures	0.0%	0.0%	0
Textiles	1.1%	1.5%	40,857
Remainder/Composite Organic	8.2%	5.6%	306,248
Construction & Demolition	**53.5%**		**1,999,103**
Concrete	7.1%	3.6%	265,650
Asphalt Paving	0.8%	1.0%	29,326
Asphalt Roofing	6.0%	3.7%	223,226
Lumber	19.4%	4.2%	724,030
Gypsum Board	6.0%	2.8%	226,196
Rock, Soil & Fines	3.2%	3.1%	120,815
Remainder/Composite C&D	11.0%	4.0%	409,860
Household Hazardous Waste	**0.1%**		**4,184**
Paint	0.1%	0.2%	3,508
Vehicle & Equipment Fluids	0.0%	0.0%	0
Used Oil	0.0%	0.0%	0
Batteries	0.0%	0.0%	189
Remainder/Composite HHW	0.0%	0.0%	487
Special Waste	**4.6%**		**170,730**
Ash	0.0%	0.0%	822
Sewage Solids	0.0%	0.0%	0
Industrial Sludge	0.0%	0.0%	0
Treated Medical Waste	0.0%	0.0%	0
Bulky Items	3.7%	2.5%	136,610
Tires	0.8%	1.8%	31,633
Remainder/Composite Special Waste	0.0%	0.1%	1,665
Mixed Residue	**0.2%**	**0.2%**	**9,009**
Totals	**100.0%**		**3,739,696**

Confidence intervals calculated at the 90% confidence level. Percentages for materials may not total 100% due to rounding.

3.5.3 RESIDENTIAL SELF-HAUL WASTE

The objective of this portion of the study was to characterize California's residential self-haul waste stream at the state level. This sector includes waste that is hauled to a disposal site by a resident from their home.

DESCRIPTION OF SAMPLES

Samples of residential self-haul waste were obtained from randomly selected vehicles at the landfills and transfer stations employed in this study. Approximately 17 samples were obtained from each of the five regions of the state, and approximately three to four samples were obtained from each disposal facility that was visited. (See Appendix A for a description of the methods used in selecting, sorting, and analyzing samples.)

Table 57 presents the numbers of samples that were obtained in each region and each season. For the whole state, 85 samples of residential self-haul waste were sorted (39 in the winter and 46 in the summer).

Table 57: Residential Self-Haul Samples Obtained, by Region and Season

	Coastal	Bay Area	Southern	Mountain	Central	**Totals**
Winter	3	4	11	13	8	**39**
Summer	11	9	8	5	13	**46**
Totals	**14**	**13**	**19**	**18**	**21**	**85**

Sampling was conducted at five disposal facilities in each region of the state. See Table 71 for the names and locations of the disposal facilities that were visited.

RESIDENTIAL SELF-HAUL WASTE COMPOSITION

Composition results for residential self-haul waste are illustrated in Figure 9 and described in detail in Table 59. The broad material class *Construction and Demolition Waste* accounts for more than one-third of disposed residential self-haul waste, and the broad class *Other Organic Waste* accounts for a quarter of it. (See Table 59 for lists of materials belonging to each class, and see Appendix B for definitions of the materials.)

Figure 9: Overview of Residential Self-Haul Waste

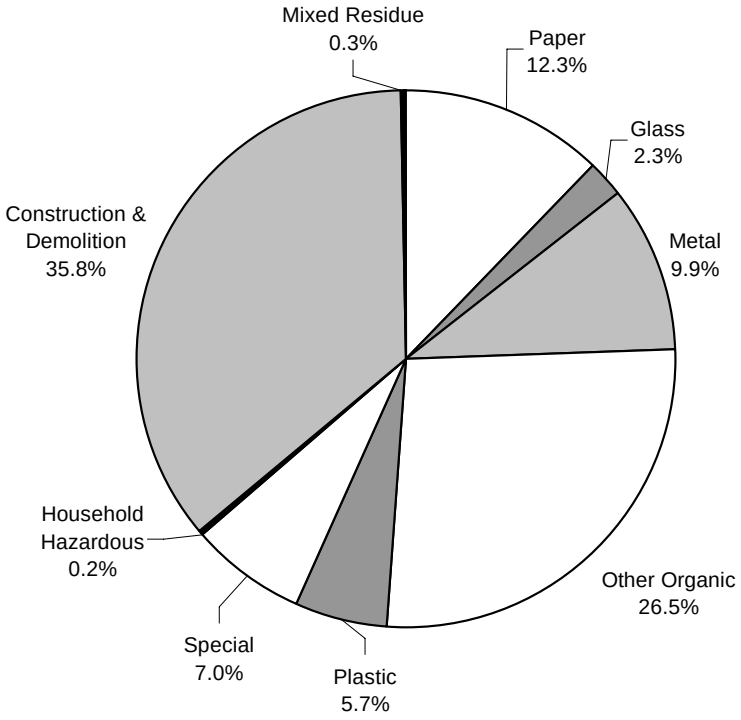


Table 58: Most Prevalent Materials in Residential Self-Haul Waste

Material Type	Est. Pct.	Est. Tons	Cumulative Pct.
Lumber	18.3%	166,415	18.3%
Prunings & Trimmings	8.5%	77,642	26.8%
Remainder/Composite Organic	8.0%	72,778	34.7%
Remainder/Composite Construction & Demolition	7.8%	70,860	42.5%
Bulky Items	5.9%	53,366	48.4%
Other Ferrous Metal	4.8%	44,098	53.2%
Remainder/Composite Metal	4.4%	40,499	57.7%
Uncoated Corrugated Cardboard	4.0%	36,580	61.7%
Leaves & Grass	3.8%	34,773	65.5%
Concrete	3.7%	34,106	69.2%

Any differences between *cumulative percent* figures and the sum of *estimated percent* figures are due to rounding.

Table 59: Composition of Residential Self-Haul Waste

	Est. Pct.	+ / -	Est. Tons
Paper	**12.3%**		**111,703**
Uncoated Corrugated Cardboard	4.0%	1.9%	36,580
Paper Bags	0.2%	0.0%	1,462
Newspaper	0.5%	0.1%	4,763
White Ledger Paper	0.3%	0.1%	2,480
Colored Ledger Paper	0.0%	0.0%	144
Computer Paper	0.0%	0.0%	204
Other Office Paper	2.7%	2.3%	24,814
Magazines and Catalogs	0.5%	0.2%	4,834
Phone Books and Directories	0.2%	0.1%	1,392
Other Miscellaneous Paper	1.7%	0.5%	15,404
Remainder/Composite Paper	2.2%	0.7%	19,625
Glass	**2.3%**		**21,068**
Clear Glass Bottles & Containers	1.1%	0.5%	9,706
Green Glass Bottles & Containers	0.3%	0.2%	2,453
Brown Glass Bottles & Containers	0.2%	0.1%	2,250
Other Colored Glass Bottles & Containers	0.0%	0.0%	114
Flat Glass	0.3%	0.2%	2,559
Remainer/Composite Glass	0.4%	0.2%	3,985
Metal	**9.9%**		**90,694**
Tin/Steel Cans	0.2%	0.1%	2,265
Major Appliances	0.1%	0.1%	555
Other Ferrous Metal	4.8%	1.4%	44,098
Aluminum Cans	0.1%	0.0%	613
Other Non-Ferrous Metal	0.3%	0.1%	2,664
Remainder/Composite Metal	4.4%	1.2%	40,499
Plastic	**5.7%**		**51,679**
HDPE Containers	0.4%	0.1%	4,086
PETE Containers	0.1%	0.0%	1,233
Miscellaneous Plastic Containers	0.1%	0.0%	1,147
Film Plastic	1.5%	0.5%	13,276
Durable Plastic Items	2.6%	0.6%	23,325
Remainder/Composite Plastic	0.9%	0.3%	8,611
Sample count: 85			

	Est. Pct.	+ / -	Est. Tons
Other Organic	**26.5%**		**241,695**
Food	2.4%	0.9%	22,263
Leaves & Grass	3.8%	1.4%	34,773
Prunings & Trimmings	8.5%	3.5%	77,642
Branches & Stumps	1.6%	1.6%	14,822
Agricultural Crop Residues	0.0%	0.0%	418
Manures	0.0%	0.0%	0
Textiles	2.1%	0.6%	18,998
Remainder/Composite Organic	8.0%	1.8%	72,778
Construction & Demolition	**35.8%**		**326,434**
Concrete	3.7%	1.5%	34,106
Asphalt Paving	0.0%	0.0%	0
Asphalt Roofing	1.0%	0.7%	9,455
Lumber	18.3%	4.5%	166,415
Gypsum Board	1.3%	0.5%	11,558
Rock, Soil & Fines	3.7%	2.1%	34,041
Remainder/Composite C&D	7.8%	3.2%	70,860
Household Hazardous Waste	**0.2%**		**2,224**
Paint	0.0%	0.0%	205
Vehicle & Equipment Fluids	0.0%	0.0%	10
Used Oil	0.1%	0.1%	662
Batteries	0.0%	0.0%	371
Remainder/Composite HHW	0.1%	0.1%	976
Special Waste	**7.0%**		**63,801**
Ash	0.1%	0.1%	822
Sewage Solids	0.0%	0.0%	0
Industrial Sludge	0.0%	0.0%	0
Treated Medical Waste	0.5%	0.5%	4,846
Bulky Items	5.9%	1.9%	53,366
Tires	0.4%	0.3%	3,992
Remainder/Composite Special Waste	0.1%	0.1%	775
Mixed Residue	**0.3%**	**0.1%**	**2,473**
Totals	**100.0%**		**911,770**

Confidence intervals calculated at the 90% confidence level. Percentages for materials may not total 100% due to rounding.

3.6 RPPC STUDY

3.6.1 INTRODUCTION AND BACKGROUND

In 1991 the California legislature passed the Rigid Plastic Packaging Container (RPPC) Act, Senate Bill 235. This act requires all RPPCs sold or offered for sale in California to meet one of the following criteria, if the overall recycling rate of 25% is not met: (1) contain 25% recycled post-consumer content, (2) meet a brand-specific recycling rate, (3) be reusable or refillable five times, or (4) be source-reduced by 10%. This act also requires the CIWMB to calculate an aggregate recycling rate for RPPCs each year.

An RPPC is defined by the act as any container that meets ALL of the following criteria:

- It is made entirely of plastic, except that caps, lids, and labels may be made of some other material;
- It is a packaging container in which a product is sold, offered for sale or distributed in California;
- It is capable of maintaining its shape while holding a product;
- It is capable of multiple re-closures with an attached or unattached lid or cap;
- It contains a minimum of eight fluid ounces but no more than five gallons; and
- It is normally used to store a product for at least seven days (i.e., from the time the container is filled).

In 1995 Cascadia Consulting Group was commissioned by the American Plastics Council, working under the direction of the CIWMB, to calculate the aggregated recycling rate for rigid plastic packaging containers. This study was conducted to determine if product manufacturers were in compliance with one of the requirements of Senate Bill 235, the aggregated RPPC recycling rate of at least 25%.

For the 1995 study the RPPC recycling rate calculation was expressed as:

$$\text{RPPC Recycling Rate} = \frac{\text{Quantity of RPPCs Recycled}}{\text{Quantity of RPPCs Generated}}$$

The quantity of RPPCs generated was assumed to be equal to the quantity disposed plus the quantity recycled.

In order to estimate the quantity of RPPCs disposed, Cascadia conducted an extensive waste characterization study of RPPCs disposed in 1995. Sampling occurred at 24 sites across the state receiving waste from 138 jurisdictions. A total of 889 samples were sorted and weighed. Of those samples, 299 were washed and dried and re-weighed to determine contamination levels. Contamination rates were then calculated for each type of RPPC and for each sector: residential, commercial and self-haul.

In the 1995 analysis final estimates of disposed RPPCs were adjusted to compensate for contamination. Dirty “field weights” were adjusted down, using the calculated contamination rates, so that “clean weights” of disposed RPPCs could be compared with clean recycled tonnage, to determine an accurate 1995 RPPC recycling rate.

One of the objectives of California's 1999 statewide waste composition study was to improve and update the estimate of the amount of disposed RPPCs statewide. This new estimate is to be used in calculating the 1998, 1999 and 2000 RPPC recycling rate.

3.6.2 METHODOLOGY

During the course of the 1999 study, dirty "field weights" were recorded for eight categories of RPPCs during the sorting of waste samples. The eight categories of RPPC included in the present study are:

- #1 PET soda bottles
- #1 PET custom bottles
- #1 PET non-bottle rigids
- #2 HDPE natural bottles
- #2 HDPE colored bottles
- #2 HDPE other containers
- All other RPPC bottles
- All other RPPC non-bottles

The estimated amounts of disposed dirty RPPCs were calculated using the same set of field procedures and the same formulas as for the remainder of the 1999 study. These protocols are documented in Appendix A. As in the 1995 study the dirty "field weights" also included the weight of contaminants such as food, moisture and other non-RPPC materials. To adjust for the additional weight of contaminants in the 1999 data, "clean weights" were calculated using contamination rates derived from the 1995 study. The contamination rates for each type of RPPC and each sector appear in Table 60.

Table 60: Field Weight to Clean Weight Conversion Factors for RPPCs

	Contamination Rates (percent of field weight that is contamination)		
	Commercial	**Residential**	**Self-Haul**
#1 PET Soda Bottles	4.63%	10.33%	6.12%
#1 PET Custom Bottles	12.51%	13.59%	14.16%
#1 PET Non-Bottle Rigids	11.76%	23.49%	13.36%
#2 HDPE Natural Bottles	18.03%	11.40%	13.52%
#2 HDPE Colored Bottles	17.09%	18.76%	21.90%
#2 HDPE Other Containers	26.84%	14.01%	20.77%
All Other RPPC Bottles	16.12%	16.20%	15.52%
All Other RPPC Non-Bottles	19.52%	23.67%	17.59%

Contamination rates were derived from the 1995 study of RPPC Recycling Rates in California, conducted by Cascadia Consulting Group for the American Plastics Council.

The contamination rates shown in Table 60 were calculated by comparing dirty "field weights" from the 1995 study to the 1995 "clean weights." First, the sample records from the 1995 study were grouped according to the sector of the waste stream represented (commercial, residential, or self-haul). Then the material categories examined in 1995 were grouped into eight categories that matched the set of RPPC materials considered in the current study. For each of the eight RPPC categories, the sum of all clean weights among the samples was subtracted from the sum of all dirty weights, and the contamination rate was calculated. This process was done separately for each RPPC material in each of the commercial, residential, and self-haul sets of data.

The derived contamination rates were used to reduce the field weights of RPPC materials that were recorded in the current study. The difference between 1999 field weights and the derived 1999 clean weights was assumed to be contamination and was added to the material category *All Non-RPPC Materials* which appears in Table 61 through Table 64. The 1995 contamination rates for self-haul RPPCs were applied to both residential self-haul and commercial self-haul records in the current study. Likewise, the 1995 contamination rates for residential RPPCs were applied to both single-family residential and multifamily residential records in the current study.

For a detailed description of the calculations used in the 1995 study to estimate "field" and dry or "clean weights" please see Appendix I. For a description of the statistical procedures used to estimate the percent composition of RPPCs in each sector, see Appendix A.

3.6.3 RESULTS

The objective of the RPPC portion of California's statewide waste characterization study was to determine the total amount of RPPCs disposed in the municipal solid waste stream. RPPC disposal data for the overall waste stream are presented below. Estimates of RPPC disposal for the commercial, residential, and self-haul sectors are found in Table 61 through Table 64.

OVERALL RPPC DISPOSAL

In 1999 an estimated 377,010 tons of RPPCs were disposed in California's municipal waste, representing an estimated 1.06% of the municipal waste stream.[5] This represents an increase of 0.35% over the 1995 estimate of 0.71%. The confidence interval for 1999 is +/- 0.07%. This means that we are 90% sure that the true mean or average of RPPCs in California solid waste is between 0.99% and 1.13%. This translates to an overall disposal estimate that ranges from 351,801 tons to 401,551 tons. Overall RPPC disposal estimates for each of the eight categories appear in Table 61.

[5] As with all tonnage figures reported in this study, RPPC tonnages were derived by applying 1999 waste composition findings to 1998 tonnages found in California's Disposal Reporting System.

Table 61: RPPC Composition of Overall Waste Stream

	Estimated Percent	+/-	Estimated Tons
#1 PET Soda Bottles	0.12%	0.02%	41,094
#1 PET Custom Bottles	0.24%	0.02%	85,002
#1 PET Non-Bottle Rigids	0.02%	0.01%	5,570
#2 HDPE Natural Bottles	0.25%	0.02%	90,208
#2 HDPE Colored Bottles	0.20%	0.02%	69,338
#2 HDPE Other Containers	0.13%	0.03%	45,991
All Other RPPC Bottles	0.03%	0.01%	11,905
All Other RPPC Non-Bottles	0.08%	0.03%	27,901
Subtotal	**1.06%**	**0.07%**	**377,010**
All Non-RPPC Materials	98.94%	0.07%	35,158,443
Total	**100.00%**		**35,535,453**

Confidence intervals calculated at the 90% confidence level. Percentages for materials may not total 100% due to rounding.

COMMERCIAL RPPC DISPOSAL

RPPCs comprised an estimated 0.92% of commercial sector waste. This is higher than the 1995 estimate of .71%. Data for individual categories of commercially disposed RPPCs appear in Table 62.

Table 62: RPPC Composition for Commercial Waste

	Estimated Percent	+/-	Estimated Tons
#1 PET Soda Bottles	0.12%	0.04%	20,430
#1 PET Custom Bottles	0.23%	0.05%	40,646
#1 PET Non-Bottle Rigids	0.00%	0.00%	670
#2 HDPE Natural Bottles	0.20%	0.03%	35,239
#2 HDPE Colored Bottles	0.16%	0.04%	27,969
#2 HDPE Other Containers	0.11%	0.05%	18,723
All Other RPPC Bottles	0.02%	0.01%	3,032
All Other RPPC Non-Bottles	0.07%	0.08%	12,312
Subtotal	**0.92%**	**0.13%**	**159,021**
All Non-RPPC Materials	99.08%	0.13%	17,199,338
Total	**100.00%**		**17,358,359**

Confidence intervals calculated at the 90% confidence level. Percentages for materials may not total 100% due to rounding.

RESIDENTIAL RPPC DISPOSAL

RPPCs accounted for an estimated 1.54% of residential sector waste, representing a substantial increase over the 1995 estimate of 1.05%. Detailed results of the 1999 residential RPPC sampling are found in Table 63.

Table 63: RPPC Composition in Residential Waste

	Estimated Percent	+/-	Estimated Tons
#1 PET Soda Bottles	0.15%	0.02%	19,806
#1 PET Custom Bottles	0.32%	0.04%	43,415
#1 PET Non-Bottle Rigids	0.04%	0.01%	4,867
#2 HDPE Natural Bottles	0.40%	0.04%	53,673
#2 HDPE Colored Bottles	0.30%	0.04%	40,326
#2 HDPE Other Containers	0.16%	0.05%	21,975
All Other RPPC Bottles	0.06%	0.01%	8,574
All Other RPPC Non-Bottles	0.11%	0.02%	15,388
Subtotal	**1.54%**	**0.12%**	**208,022**
All Non-RPPC Materials	98.46%	0.12%	13,317,482
Total	**100.00%**		**13,525,504**

Confidence intervals calculated at the 90% confidence level. Percentages for materials may not total 100% due to rounding.

SELF-HAUL RPPC DISPOSAL

An estimated 0.21% of self-haul waste was RPPCs. The 1999 estimate is slightly lower than the 1995 estimate of .27%. Detailed self-haul results are presented below in Table 64.

Table 64: RPPC Composition in Self-Haul Waste

	Estimated Percent	+/-	Estimated Tons
#1 PET Soda Bottles	0.02%	0.01%	858
#1 PET Custom Bottles	0.02%	0.01%	942
#1 PET Non-Bottle Rigids	0.00%	0.00%	33
#2 HDPE Natural Bottles	0.03%	0.02%	1,297
#2 HDPE Colored Bottles	0.02%	0.01%	1,042
#2 HDPE Other Containers	0.11%	0.07%	5,293
All Other RPPC Bottles	0.01%	0.00%	300
All Other RPPC Non-Bottles	0.00%	0.00%	201
Subtotal	**0.21%**	**0.07%**	**9,966**
All Non-RPPC Materials	99.79%	0.07%	4,641,625
Total	**100.00%**		**4,651,591**

Confidence intervals calculated at the 90% confidence level. Percentages for materials may not total 100% due to rounding.

APPENDIX A: DETAILED METHODOLOGY

A.1 INTRODUCTION

The California Integrated Waste Management Board (CIWMB) commissioned a Statewide Waste Characterization Study in order to obtain data to characterize wastes disposed in the residential, commercial, and self–haul waste streams. These waste streams were characterized through sampling of the waste delivered to disposal sites and waste collected directly from commercial and multifamily generators.

The Study provides detailed information on the composition of waste disposed in California during 1999. The design for the Study was prepared by a team of consultants led by the Cascadia Consulting Group, under the direction of CIWMB staff. In addition, an Advisory Group appointed by the CIWMB reviewed and approved the design.

This methodology describes the major elements of the Study – ranging from the initial selection of locations where sampling took place, to the sampling procedures, to the approach to analyzing the data.

A study like this is challenging because it seeks to apply pure statistical methods within the real-world limitations imposed by budgeting considerations and the day-to-day operations of solid waste transfer and disposal sites. This study sought to find the proper balance – a statistically valid analysis that was cost-effective and a process for gathering data that was not disruptive to facility operators or their customers.

A.2 SELECTION OF REGIONS, DISPOSAL SITES & WASTE SHEDS

The state was divided into regions to ensure that the diversity of geographic, climatic, demographic and economic conditions were appropriately represented in statewide composition estimates. Five geographic regions were delineated to adequately represent this diversity. The analyses that were conducted to define these regions are described below. To obtain a comparable level of data among these regions, five sampling sites were selected randomly from within each region. A total of 25 sites was the maximum number of sites that could be visited under the existing budget and schedule.

Data from the **single-family residential** sector (collected by professional haulers) and the **self-haul** sector (residential and commercial wastes not collected by professional haulers) were gathered at five disposal sites (landfills or transfer stations) in each region. For single family residential waste and self-hauled waste, an approximately equal number of samples was selected from each region, and weighted averages were used to prepare the statewide waste composition totals. The disposal sites were selected randomly within each region to ensure that the waste samples were representative of the region as a whole and to allow for statistical analysis of the data.

Each of the 25 sites selected represents a local "waste shed" where waste from different residential and commercial generators is channeled for disposal. Data from the **multifamily residential** sub-sector and the **commercial** sector were gathered from samples taken from generator sites within selected waste sheds.

For generator sampling, CIWMB staff designated two or three waste sheds in each region, and individual generators were randomly chosen from a list of businesses falling within approximately 20 miles of the selected sites (see Table 71 for a list of waste sheds).

Waste sampling occurred during two seasons to account for any seasonal variations in waste disposal patterns. The winter sampling occurred during February, March and April of 1999, and the summer sampling occurred during July, August, and September. Twelve sites were visited during the winter and thirteen during the summer for a total of 25 site visits.

The waste was sorted and characterized into the categories included on California's List of 57 Material Subtypes for Waste Sorting plus eight RPPC categories, as described in Appendix B. These categories were proposed by CIWMB staff and approved by the Advisory Group.

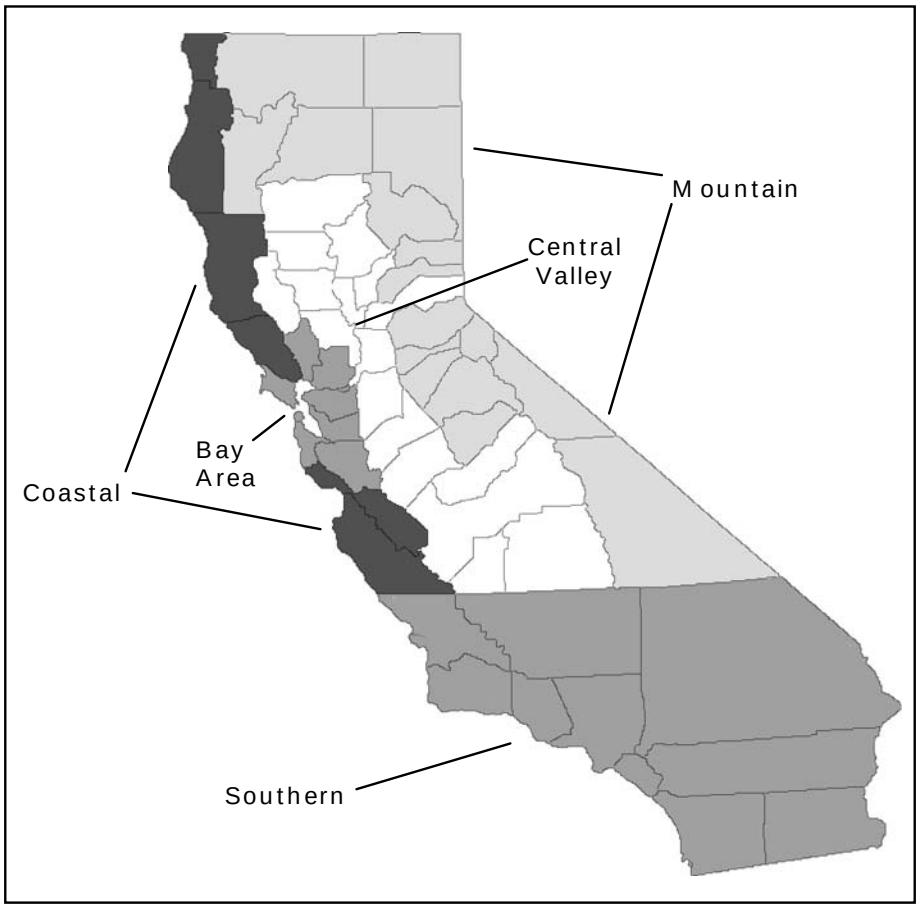
A.2.1 SELECTION OF REGIONS

This Study divided California into five regions to account for any demographic and/or geographic variation in waste composition. A random sampling methodology was used to select the sample sites within each region. The stratified sampling plan targeted an equal number of samples for each region, ensuring that the information collected would be comparable statewide and that it would represent the breadth of communities within the state.

Three steps were used to select the regions:

1. Identification of areas of the state with similar demographics and geographic features, and tentative assignment of counties to each region.
2. Review of data on all of the counties in the state to confirm the original assignment.
3. Review of the designation by the Advisory Group.

Figure 10: Regions Considered in the Study



The five regions are shown in Figure 10 and are characterized as follows:

Coastal – includes the counties on the coast that are not in either the Bay Area or Southern regions. The Coastal region is more populated than the rural Mountain region and has a large agricultural component similar to the Central Valley.

Bay Area – includes the counties in the San Francisco Bay Area, which are the more metropolitan counties with a strong industrial component in the economy.

Southern – includes counties that are strongly industrial with large populations and important agricultural influences.

Mountain – includes counties that are primarily rural, with strong agricultural economies, low population density, and a low industrial base.

Central Valley – includes counties between the Sierra Nevada mountains and the Coast Range that have a major agricultural base with important population centers and some manufacturing.

In general, regions were designated so that selected counties were contiguous.[6] The counties within each region are listed in Table 65.

Table 65: Counties in the Five Sampling Regions

Coastal	Bay Area	Southern	Mountain	Central Valley
Del Norte	Alameda	Imperial	Alpine	Butte
Humboldt	Contra Costa	Kern	Amador	Colusa
Mendocino	Marin	Los Angeles	Calaveras	Fresno
Monterey	Napa	Orange	El Dorado	Glenn
San Benito	San Francisco	Riverside	Inyo	Kings
Santa Cruz	San Mateo	San Bernardino	Lassen	Lake
Sonoma	Santa Clara	San Diego	Mariposa	Madera
	Solano	San Luis Obispo	Modoc	Merced
		Santa Barbara	Mono	Placer
		Ventura	Nevada	Sacramento
			Plumas	San Joaquin
			Shasta	Stanislaus
			Sierra	Sutter
			Siskiyou	Tehama
			Trinity	Tulare
			Tuolumne	Yolo
				Yuba

ASSIGNMENT OF COUNTIES TO REGIONS

Information for distinguishing among regions was drawn from data published in the California Department of Finance's *California County Profiles* and from data on population, employment, and taxable sales, which was made available by CIWMB staff. The primary factors used to distinguish among regions were:

- population of each county,
- population density within each county,
- level of civilian employment for each county,
- level of non-agricultural employment for each county (and conversely, level of agricultural employment),
- average per-capita income for each county.

The profile of each region according to these factors is shown in Table 66. When considered at the level of regions, there are clear differences for each factor.

[6] This approach results in designation of at least one county that is not similar to others in the region. Imperial County is in the southeastern end of the state and is primarily agricultural. Due to its geographic location, it was included in the Southern region, but it would have matched characteristics for the Central Valley region. Because Imperial County is not contiguous with the Central Valley region, it was grouped with other counties in the Southern region.

Table 66: Primary Factors for Selection of Sampling Regions

Factor	Measurement	Region				
		Coastal	Bay Area	Southern	Mountain	Central Valley
Counties' average **population**, as of 1/1/97	**Average**	**189,871**	**765,725**	**1,995,690**	**42,868**	**265,365**
	Low	28,250	120,800	140,500	1,180	18,300
	High	426,900	1,653,100	9,488,200	162,700	1,140,600
Counties' average **persons per acre**	**Average**	**0.24**	**4.62**	**1.15**	**0.04**	**0.28**
	Low	0.04	0.25	0.05	0.00	0.02
	High	0.86	26.03	5.26	0.14	1.85
Counties' average **civilian employment**	**Average**	**90,659**	**380,125**	**864,320**	**17,514**	**110,049**
	Low	9,230	54,300	40,700	450	7,170
	High	220,300	864,300	4,052,600	69,300	513,900
Ratio of counties' average **non-ag. employment** to statewide average non-ag. employment	**Average**	**51%**	**297%**	**585%**	**12%**	**71%**
	Low	10%	80%	30%	5%	5%
	High	120%	690%	2980%	40%	380%
Ratio of counties' average **per-capita income** to statewide average per-capita income	**Average**	**88%**	**132%**	**89%**	**79%**	**76%**
	Low	62%	91%	61%	64%	58%
	High	109%	180%	114%	96%	108%

In addition, consideration was given to the set of secondary factors shown in Table 67. These factors also indicate clear differences among the regions.

Table 67: Secondary Factors for Selection of Sampling Regions

Factor	Average Value for Counties in Each Region				
	Coastal	Bay Area	Southern	Mountain	Central Valley
Persons per household	2.7	2.7	3.0	2.4	2.8
Median years of school	13.3	14.2	13.3	13.1	12.9
Unemployment rate	8.8%	4.8%	9.3%	10.0%	12.3%
Value of manufacturing, % of state average	44%	400%	548%	31%	57%
Percent of area that is farm land	37.5%	45.9%	26.9%	17.1%	59.4%
Vehicle registrations per capita	0.54	0.61	0.53	0.62	0.5
County tax collections per capita	$174	$298	$130	$412	$145

The complete data set used is shown in Appendix J.

For a county that lies on the border between two neighboring regions, the following process was used to determine the county's assignment:

1. The county was initially assigned to one of the two neighboring regions, based on the consultants' best judgment.
2. If the county then was responsible for several of its region's high or low scores for any of the factors (described in Table 66, Table 67, and Appendix J), then the county may have been reassigned to another region if closer inspection of its characteristics indicated that it fit better in another region.

For example, Placer County was originally assigned to the Mountain region. However, Placer County has higher values than any other county in the Mountain region for population and manufacturing employment. Likewise, it has a lower value for percentage of farmland

than any other county in the Mountain region. Placer County was reassigned to the Central Valley region, where its scores are more consistent with those of other counties.

ADVISORY GROUP REVIEW

At its December 1, 1998 meeting, the Advisory Group reviewed the concept for the Sampling Plan, including the approach used to designate the counties in each region. The Advisory Group concurred in the assignment of counties for each region.

A.2.2 SELECTION OF SITES

ESTABLISHING THE UNIVERSE OF POSSIBLE SITES

The set of all sites to be considered for inclusion in the Study was derived from two sources. First, CIWMB staff provided a sorted list of transfer stations from the Solid Waste Information System (SWIS) database.[7] Second, CIWMB staff provided a list of landfills from a database used to track disposal for the Annual Reports required for AB 939 programs. This landfill database is updated more frequently than the SWIS database. From both the SWIS list and the landfill database, a new list of sites was developed to include only sites that handle more than 100 tons of waste per day. This minimum threshold of waste receipts was established to ensure that there would be enough vehicles from which to select samples.

The two databases were merged and sorted by SWIS number, which identifies each site uniquely and also indicates the county in which the site is located. A region number was added to each site entry, and the merged list was sorted by region number. The result was a list of potential sampling sites, including transfer stations, landfills and incinerators, sorted by region.

RANDOM SELECTION OF SITES

The purpose of the selection process was to randomly select five sites in each region. Each site was required to meet the minimum criteria for use as a sampling site. Each site meeting the criteria had an equal chance of being selected.

As the first step in this process, a random number was generated for each potential site, and the sites within each region were sorted according to the order of their random numbers. (This step is called a “random permutation” of the list for each region.)

Next, within each region, potential sites were eliminated from the list if they did not meet the minimum criteria required of sampling sites. The minimum criteria were that the site handles waste destined for final disposal (i.e. is not subject to any further processing or sorting), it had a viable way to obtain the weight of the loads brought in by drivers who were interviewed as part of the vehicle survey[8], and all three sectors use the facility. Table 68 shows the number of sites in each region that satisfied minimum criteria for selection. Ultimately, all but one site included in the final selection had scales. Also, a few sites were

[7] The complete SWIS list encompasses all disposal facilities, including some facilities that are not desired for the Study, such as closed disposal sites, composting sites, tire disposal sites, and others.

[8] A strong preference was placed on the ability to weigh every load. If this was not feasible, it was necessary to ensure there was a good method to estimate volumes and convert these volumes to weights. All sites except one had scales; however some sites did not use their scales to weigh small loads. For these loads, a volume to weight conversion was used.

used that processed or sorted materials for recovery, but measures were taken so that samples were either collected or sorted after the selected loads had gone through the process. This way, only materials destined for disposal were characterized.

Table 68: Suitable Sampling Sites in Each Region

Region	Number of Sites
Coastal	17
Bay Area	35
Southern	107
Mountain	6
Central Valley	48

The sites meeting the minimum criteria were ordered according to their random number, and the five sites from each region that occurred earliest in the list were selected as candidates for disposal site sampling. The initial candidates were contacted as described in the next section. In cases where a site was found to be unsuitable or unavailable, the next was chosen from the randomized list of acceptable sites, again in the order of the random number assigned.

In the Bay Area region, the process of selecting the sites was repeated due to concern that too many of the originally randomly selected sites were located in Alameda County. (All five randomly selected sites were in Alameda County.) A new random list of sites was prepared, and a new set of sites was selected.

CONTACTING THE SITES

The top five sites in each region were contacted to determine their suitability and their willingness to participate in the Study. The list of questions asked of the operator at each site is presented in Appendix K. The sites that were selected for sampling are listed in Table 69.

Table 69: Selected Sampling Sites

	SWIS Number	TPD*	Type
Coastal Region			
Monterey Regional Waste Management District/Marina Landfill	27-AA-0010	688	Landfill
John Smith Road Class III Landfill	35-AA-0001	244	Landfill
Buena Vista Drive Sanitary Landfill	44-AA-0004	421	Landfill
Central Landfill	49-AA-0001	1,410	Landfill
Johnson Canyon Landfill	27-AA-0005	122	Landfill
Bay Area Region			
Portrero Hills Landfill	48-AA-0075	618	Landfill
South Bayside Transfer Station	41-AA-0016	3,000	Trans. Stn.
Davis St. Transfer Station/Resource Recovery Complex	01-AA-0007	624	Trans. Stn.
Ox Mountain Landfill	41-AA-0002	2,623	Landfill
Berkeley Solid Waste Transfer Station	01-AC-0029	560	Trans. Stn.
Southern Region			
Universal Refuse Removal Recycling & Transfer Station	37-AA-0929	219	Trans. Stn.
Victorville Refuse Disposal Site	36-AA-0045	552	Landfill
Falcon Refuse Center	19-AR-0302	3,500	Trans. Stn.
Bradley Landfill West and West Extension	19-AR-0008	5,578	Landfill
Sunset Environmental Trans. Stn. & Resource Recovery Facility	30-AB-0336	1,700	Trans. Stn.
Mountain Region			
West Central Landfill	45-AA-0043	357	Landfill
South Tahoe Refuse	09-AA-0002	370	Trans. Stn.
Western Amador Recycling Facility	03-AA-0008	152	Trans. Stn.
City Of Redding Transfer Station/MRF	45-AA-0059	400	Trans. Stn.
McCourtney Road Large Volume Transfer Station	29-AA-0010	180	Trans. Stn.
Central Valley Region			
Billy Wright Disposal Site	24-AA-0002	123	Landfill
American Avenue Disposal Site	10-AA-0009	1,834	Landfill
Fairmead Solid Waste Disposal Site	20-AA-0002	266	Landfill
Yolo County Central Landfill	57-AA-0001	636	Landfill
Auburn Placer Disposal Transfer Station	31-AA-0601	244	Trans. Stn.

* Tons per day

SCHEDULING THE SITES

After confirming the sampling sites, another randomization process was used to determine whether sampling at each site would occur during the winter or summer. First, random numbers were assigned to each of the 25 selected sampling sites, and the list was sorted according to the random numbers. Then, the odd numbered sites (1st, 3rd, 5th, etc.) were assigned to be sampled during the summer, and the even numbered (2nd, 4th, 6th, etc.) sites were assigned to the winter season.

Table 70 indicates the numbers and types of sites in each region that were scheduled for sampling during each season.

Table 70: Sorting Site Characteristics

	Number Sampled		Type of Facility	
Region	**Winter**	**Summer**	**Landfill**	**Transfer Station**
Coastal	2	3	5	0
Bay Area	2	3	3	2
Southern	3	2	2	3
Mountain	3	2	1	4
Central Valley	2	3	4	1
Total	12	13	15	10

Once sites were assigned to seasons, one site in each region in each season was designated for generator sampling. In the Southern and Bay Area regions, an extra site was chosen where generator sampling would occur in both seasons, in order to expand the sampling areas in these larger regions.

Table 71 shows the selected disposal sites and their scheduled sampling periods, along with the city and county in which each site is located and an indication of whether each site was selected to be a generator sampling site.

Table 71: Sorting Sites, Seasons, and Locations

	Disposal Site Sampling Season	Facility Type	Generator Waste Shed	City	County
Coastal Region					
Monterey Regional Waste Mgmt. District/Marina Landfill	Winter	Landfill		Marina	Monterey
John Smith Road Class III Landfill	Summer	Landfill		Hollister	San Benito
Buena Vista Drive Sanitary Landfill	Summer	Landfill		Watsonville	Santa Cruz
Central Landfill	Winter	Landfill	Yes	Petaluma	Sonoma
Johnson Canyon Landfill	Summer	Landfill	Yes	Gonzales	Monterey
Bay Area Region					
Potrero Hills Landfill	Summer	Landfill		Suisun City	Solano
South Bayside Transfer Station	Winter	Trans. Stn.	Yes	San Carlos	San Mateo
Davis St. Transfer Station/Resource Recovery Complex	Summer	Trans. Stn.	Yes	San Leandro	Alameda
Kirby Canyon Landfill	N/A*	Landfill	Yes (both seasons)	Ellroy	Santa Clara
Ox Mountain Landfill	Winter	Landfill		Half Moon Bay	San Mateo
Berkeley Solid Waste Transfer Station	Summer	Trans. Stn.		Berkeley	Alameda
Southern Region					
Universal Refuse Removal Recycling & Transfer Station	Summer	Trans. Stn.		El Cajon	San Diego
Victorville Refuse Disposal Site	Winter	Landfill	Yes	Victorville	San Bernardino
Falcon Refuse Center	Summer	Trans. Stn.		Los Angeles	Los Angeles
Bradley Landfill West and West Extension	Winter	Landfill	Yes (both seasons)	Los Angeles	Los Angeles
Southeast Resource Recovery Facility	N/A*	Incinerator	Yes	Long Beach	Los Angeles
Sunset Environmental Trans. Stn. & Resource Recovery Fac.	Winter	Trans. Stn.		Torrence	Los Angeles
Mountain Region					
West Central Landfill	Winter	Landfill		Redding	Shasta
South Tahoe Refuse	Summer	Trans. Stn.	Yes	South Tahoe	El Dorado
Western Amador Recycling Facility	Summer	Trans. Stn.		Ione	Amador
City Of Redding Transfer Station/MRF	Winter	Trans. Stn.	Yes	Redding	Shasta
McCourtney Road Large Volume Transfer Station	Winter	Trans. Stn.		Nevada City	Nevada
Central Valley Region					
Billy Wright Disposal Site	Summer	Landfill	Yes	Los Banos	Merced
American Avenue Disposal Site	Summer	Landfill		Tranquility	Fresno
Fairmead Solid Waste Disposal Site	Winter	Landfill		Chowchilla	Madera
Yolo County Central Landfill	Summer	Landfill		Davis	Yolo
Auburn Placer Disposal Transfer Station	Winter	Trans. Stn.	Yes	Auburn	Placer

* These facilities were originally selected for both disposal site and generator sampling, but it was later determined that they would not be suitable for disposal site sampling due to logistical or other reasons. The original generator sampling areas associated with these facilities were used.

A site coordinator was assigned to each site. The site coordinator (including individuals from CIWMB, Cascadia, Sheri Eiker-Wiles Associates, and Pacific Waste Consulting Group) contacted the site to confirm that the site met the criteria for the study, was agreeable to participating in the study, and to make arrangements for the logistics of the waste sampling. The information collected from the sites included hours of operation, typical vehicle counts, tonnages by sector, nature of operations, and any recycling or processing on site. A summary sheet was prepared for each site. (A sample of the questionnaire is included in Appendix K.)

The exact day on which a specific site was sampled was based on a number of factors: site preferences, types of loads received on given days of the week, and efficiencies for the sorting crew. The owner of Sky Valley Associates, the sorting crew used for this study,

proposed a schedule based on parameters stated in the site summary. This proposed schedule was reviewed by the site coordinators and the project manager. Any needed adjustments to the schedule were made, and then the site coordinator contacted the site to confirm the date of the sampling and to finalize the arrangements.

A.2.3 COMMUNICATIONS PLAN

Communication with the site operators is one of the key elements of a successful sampling program. After the selection of sampling sites was finalized and approved, the following information was provided to site operators:

- a letter confirming the topics discussed during the interview at which the site operator agreed to participate
- a letter advising the site operator of when the sampling would occur and whether the site would used for sorting generator samples
- a fax or e-mail to the site operator one week before the sampling, reminding of the arrival date and support that would be needed on the day(s) of the sampling event
- a reminder phone call one day before the sampling event

Haulers serving the areas that had been designated for generator sampling were notified of the study and informed that the sampling crew would be collecting waste samples from some of their customers.

A.3 DISCUSSION OF NUMBERS OF SAMPLES

The study targeted 1,200 commercial generator samples, which corresponded to an allocation of approximately 40 to 50 samples per industry group. (See section A.4 for a detailed discussion of the allocation of samples among industry groups.) Slightly more than 1,200 commercial samples were collected, and the allocation of actual commercial samples (see Table 74 and Table 75) is in close correspondence with the planned allocation (see Table 73). Differences between the planned and actual number of commercial samples in a specific industry group typically were due to waste that was inaccessible or to scheduling conflicts in obtaining samples. For a few businesses, the industry group designation was changed after the sample had been obtained, based on additional information the consultants learned about the business. A total of 1,207 samples were actually obtained, as reflected in Table 72.

A total of 150 samples of single-family residential waste was targeted — 30 in each of the five regions. This is consistent with the California Uniform Waste Disposal Characterization Method. The 30 samples targeted in each region were distributed equally among five different sites in the region. Thus, six samples were targeted at each of 25 different sites throughout the state. A total of 148 samples were obtained, as shown in Table 72.

A total of 250 samples of self-haul waste was targeted, with two-thirds of the samples taken from commercial self-haul waste and the remaining one-third from residential self-haul

waste.[9] Samples were collected at five sites in each region for a total of 25 sites. Approximately ten samples were taken at each site. As shown in Table 72, a total of 247 self-haul samples was achieved.

In some instances, too few residential or self-haul samples were obtained at specific disposal sites. This was usually the result of too few vehicles coming to the site on the day of sampling. On one occasion, enough vehicles arrived, but one of the residential packer trucks subsequently malfunctioned, making the waste inaccessible. Whenever possible, the sampling crew obtained additional samples at subsequent sites to make up for losses along the way.

A total of 80 multifamily samples was targeted and obtained, as shown in Table 72. The study design planned to divide the samples among regions based on the numbers of multifamily residences in each region. However this design was somewhat modified. The strict allocation method would have allocated 53 samples to Southern California, and only 1 or 2 samples to the Mountain and Coastal Regions. Instead, slightly more than half of the samples (44 samples) were allocated to the Southern region of the state. Forty samples is the minimum number of samples required by the California Uniform Waste Disposal Characterization Method to characterize the waste disposed by a multifamily-residence population. The remainder of the samples were divided among the other four regions based on the number of multifamily residences in each region. However, each generator waste shed was assigned a minimum of one sample to provide adequate geographic distribution. This required a small adjustment to the allocation.

Table 72 summarizes the numbers of samples obtained in each sector and subsector. Additionally, Appendix G presents the waste shed or disposal site location of all samples obtained in each sector and subsector.

Table 72: Numbers of Samples Collected from Each Sector

Sector	Number of Samples Targeted	Number of Samples Collected
Commercial	1,200	1,207
Residential	230	228
Single-Family Residential	*150*	*148*
Multifamily Residential	*80*	*80*
Self-Haul	250	247
Commercial Self-Haul	*167*	*162*
Residential Self-Haul	*83*	*85*
Total	**1,680**	**1,682**

[9] For purposes of this study, commercial self-haul loads were those hauled by a commercial enterprise (e.g. contractor, landscaper, etc.) even if the source of the waste was a residential dwelling. Residential self-haul loads were those loads transported by a resident from their home to the disposal site. You had this in a previous version but I didn't find it anywhere in this version.

A.4 GENERATOR SELECTION AND CAPTURE PROCEDURES

A.4.1 COMMERCIAL GENERATOR SAMPLES

The objectives of this task were 1) to estimate the composition of commercially collected waste that is disposed by commercial, industrial, and institutional generators in California and 2) to develop composition profiles for 26 types of generators, or industry groups.

ALLOCATION OF COMMERCIAL GENERATOR SAMPLES

The study called for a total of 1200 commercial generator samples. The first step in allocating these samples was to select the waste sheds where commercial waste samples would be collected. From the list of randomly selected disposal sites in each region (see Table 69), CIWMB staff randomly selected two to three disposal sites in each region, for a total of twelve sites throughout the state. Using Geographic Information System (GIS) mapping, CIWMB staff selected zip code areas as the boundaries around these disposal sites that roughly corresponded to a 20 mile radius around the site. Businesses located within these "waste sheds" were eligible for generator sampling.

Industry groups were designated based on the CIWMB's standard industry groupings by Standard Industrial Classification (SIC) code (see Appendix E). Then the CIWMB allocated the number of samples to be collected from each industry group during each season according to the following process.

First, the number of samples to be collected throughout the state in each industry group were determined. Employment data for 1998 and previously determined business disposal rates (tons disposed per employee per year) were used to estimate total statewide disposal for each industry group, and the groups were ranked by disposal tonnage. A minimum of 40 samples was desired in each of the top 25 groups (groups A through Y in Table 73), each of which contribute at least 1% to the state's waste stream and in total account for an estimated 95% of the statewide waste disposed. To improve data for the industry groups that contribute the most waste, the minimum number of samples was increased to 50 for each of the top 10 groups. The remaining 13 groups, which together account for less than 5% of the waste, were lumped together and 60 samples (5% of the total number of samples) were assigned to this group as a whole.

Employment for each industry group in each region was used to distribute samples among the regions. For example, the Bay Area region accounts for 26% of statewide employment in Group A, therefore 26% of the samples for this group were allocated to that region. In the less populated regions, some of the groups account for much less than 1% of employment and would need less than one sample. However, to ensure that all of the top groups were represented in all regions, samples were assigned so that each region had at least 2 samples (one per season) in each of the top 25 industry groups. The sixty samples assigned to the lumped group were distributed so that these smaller industry groups were sampled in regions where they had significant employment.

Once the number of samples in each group in each region was determined, half the samples were assigned to each season. Where odd numbers of samples were assigned, the season to receive the extra sample was chosen randomly. For the lumped group, all seasonal assignments were done randomly. Table 73 shows the overall sampling plan, and Table 74 and Table 75 show the distribution of actual samples collected by season.

Table 73: Targeted Distribution of Commercial Samples, Based on Regional Employment

Group	Description of Businesses	Minimum No. of Samples	Coastal	Bay Area	Southern	Mountain	Central	Total Targeted
A	Finance / Insurance / Real Estate / Legal	50	2	13	29	2	5	51
B	Retail Trade-Restaurants	50	2	11	30	2	6	51
C	Retail Trade-Other	50	2	14	28	2	5	51
D	Services-Other Misc.	50	2	11	29	2	6	50
E	Wholesale Trade-Nondurable Goods	50	4	8	29	2	10	53
F	Retail Trade-Auto. Dealers & Service Stns.	50	2	9	31	2	7	51
G	Services-Other Professional	50	2	13	28	2	6	51
H	Retail Trade-Food Store	50	3	10	29	2	7	51
I	Construction	50	2	12	27	2	7	50
J	Services-Medical / Health	50	2	11	28	2	8	51
K	Manufacturing-Printing / Publishing	40	2	10	25	2	3	42
L	Services-Business Services	40	2	12	23	2	4	43
M	Services-Education	40	2	8	23	2	7	42
N	Public Administration	40	2	8	23	2	6	41
O	Services-Hotels / Lodging	40	2	9	23	3	3	40
P	Trucking and Warehousing	40	2	8	22	2	8	42
Q	Wholesale Trade-Durable Goods	40	2	10	25	2	4	43
R	Manufacturing-Other	40	2	6	30	2	4	44
S	Transportation-Other	40	2	10	24	2	4	42
T	Manufacturing-Electronic Equipment	40	2	17	20	2	2	43
U	Manufacturing-Food / Kindred	40	3	6	14	2	16	41
V	Manufacturing-Lumber and Wood Products	40	7	3	14	5	11	40
W	Manufacturing-Transportation Equipment	40	2	6	32	2	2	44
X	Retail Trade-Building Material and Garden	40	2	8	21	2	7	40
Y	Manufacturing-Industrial Machinery	40	2	16	20	2	3	43
Z	Agriculture / Fisheries	60 *	1	1	1	1	1	5
AA	Manufacturing-Instruments / Related		1	1	1	1	1	5
AB	Communications		1	1	1	1	1	5
AC	Manufacturing-Primary / Fabric. Metal		1	1	1	0	1	4
AD	Manufacturing-Apparel / Textile		0	1	1	0	1	3
AE	Manufacturing-Furniture / Fixtures		0	1	1	0	1	3
AF	Services-Motion Pictures		1	1	1	0	1	4
AG	Manufacturing-Chemical / Allied		0	1	1	0	1	3
AH	Retail Trade-General Merch. Stores		1	1	1	1	1	5
AI	Mining		1	1	1	1	1	5
AJ	Transportation-Air		0	1	1	0	1	3
AK	Utilities		1	1	1	1	1	5
AL	Manufacturing-Paper / Allied		1	1	1	1	1	5
AM	Forestry		1	1	1	1	1	5
	TOTALS		**69**	**263**	**641**	**62**	**165**	**1200**

* For groups Z through AM, a total of 60 samples was planned. Composition estimates were calculated for the aggregated groups Z through AM. Together, these groups are believed to generate less than 5% of the commercial waste disposed in California.

Within each industry group in each waste shed, samples were distributed so that the majority of the samples were drawn from businesses who contribute large amounts of waste. This was accomplished using the 80/20 rule as a guide. This rule states that generally, 80% of the waste disposed by a group came from the largest businesses which make up about 20% of the group, and 20% of the waste came from the remaining 80% of the (smaller) businesses. The procedure is described in detail below.

RANDOM SELECTION OF BUSINESS SITES

Specific businesses were selected randomly using NameFinders, a research organization that uses Dun and Bradstreet business data. For a region containing only one waste shed where generator sampling occurs, the process was as follows:

1. The business sites belonging to each industry grouping were segregated according to the range of numbers of employees at each site. A cut-off point was determined, going from larger business sites to smaller ones, such that business sites above the cut-off point represent approximately 80% of the total employment for all business sites of the industry grouping within the waste shed. The set of business sites that have more employees on site and that represent approximately 80% of the total employment was designated as "Tier 1" businesses. The set of smaller businesses was designated as "Tier 2."
2. Eighty percent of the required number of business sites for the SIC grouping were drawn randomly from the Tier 1 set, and 20% were drawn randomly from the Tier 2 set.[10]
3. Specific information about each business site was placed in a database and forwarded to SEWA and CIWMB staff, who contacted the businesses and determined if the business site met the criteria for sampling.

For a region containing two sampled waste sheds, NameFinders calculated the ratio of employment in each industry group that fell within one waste shed verses the employment that fell within the other waste shed. The ratio was used to determine how many business sites of each SIC grouping were required from each waste shed.

For example, if the waste shed surrounding the Bradley landfill contained x employees in the "Retail Trade – Other" category, and the region surrounding the Victorville landfill contained y employees in the same category, then $\frac{x}{x+y}$ percent of the required businesses was targeted from the Bradley waste shed, and $\frac{y}{x+y}$ percent was targeted from the Victorville waste shed. For each waste shed, the above numbered steps 1 through 3 were followed.

Since 1,200 business sites were required for the Study, Cascadia obtained information for approximately 10,000 candidate business sites chosen randomly as described above. Extra business names were obtained to account for ones on the list from NameFinders which were no longer in existence, had recently moved, that could not be reached by phone, or were eliminated through the screening process described below. Each candidate site received a letter from the CIWMB explaining that they had been selected for generator sampling.

[10] In order to ensure that there was a large enough pool of candidate business sites to draw from, information on approximately 10,000 businesses was obtained NameFinders, using Dun and Bradstreet data on individual businesses. Specific arrangements were made with approximately 2,700 businesses, or 2.25 times the number of required sites indicated in Table 73.

FINAL SCREENING OF BUSINESS SITES

CIWMB staff and SEWA divided the list of candidate sites and contacted the sites to determine:

- the number and size of dumpsters at the site,
- the frequency of pick-up,
- the type of service,
- the physical address, and
- the procedure for accessing the dumpsters.

These contacts proceeded until the required number of participating business sites were secured for each SIC grouping in each waste shed.

During the contact process, a business site was screened out of the study if it met any of the following conditions:

- It shared dumpster space with other businesses belonging to different SIC groupings or with any residences.
- It shared dumpster space with other businesses belonging to the same SIC grouping and it was impossible to obtain an estimate of the volume of waste generated in a given time frame by the selected business.
- Its dumpsters were not accessible to the sampling crew.
- It refused to permit sampling of its waste.
- SEWA or CIWMB staff were unable to obtain the required information on dumpster size, location, time and frequency of pick-up, or dumpster access procedures. However, this information was generally available from waste haulers.

If a business site was screened out, the next randomly selected business in that category was contacted, until the proper number of generators was identified for each industry group.

Table 74: Commercial Samples Collected by Region, Winter Season

			Number of Businesses Sampled in Each Region					
Group	**Description of Businesses**	**2-Digit SIC Codes Included**	**Coastal**	**Bay Area**	**Southern**	**Mountain**	**Central**	**Totals**
A	Finance / Insurance / Real Estate / Legal	60, 61, 62, 63, 64, 65, 67, 81	1	5	9		1	**16**
B	Retail Trade - Restaurants	58	1	4	16	1	4	**26**
C	Retail Trade - Other	56, 57, 59	1	7	13	1	1	**23**
D	Service - Other Misc.	72, 75, 76, 79, 83, 84	1	3	16	1	4	**25**
E	Wholesale Trade - Nondurable Goods	51	2	3	13	1	4	**23**
F	Retail Trade - Automotive Dealers & Service Stations	55	1	5	17	1	3	**27**
G	Services - Other Professional	86, 87, 89		6	15		1	**22**
H	Retail Trade - Food Stores	54	2	4	14		3	**23**
I	Construction	15, 16, 17	1	4	12		1	**18**
J	Services - Medical / Health	80	1	4	12	1	2	**20**
K	Manufacturing - Printing / Publishing	27	1	5	13	1	1	**21**
L	Services - Business Services	73	1	5	11			**17**
M	Services - Education	82	1	3	10	1	1	**16**
N	Public Administration	43, 91, 92, 93, 94, 95, 96, 97	3	4	11	1	3	**22**
O	Services - Hotels / Lodging	70	1	8	11	2	2	**24**
P	Trucking and Warehousing	42	1	6	11	1	2	**21**
Q	Wholesale Trade - Durable Goods	50	1	5	9	1	2	**18**
R	Manufacturing - Other	21, 29, 30, 31, 32, 39	1	3	16	1	1	**22**
S	Transportation - Other	40, 41, 44, 46, 47	1	6	5	1	1	**14**
T	Manufacturing - Electronic Equipment	36	1	7	10		1	**19**
U	Manufacturing - Food / Kindred	20	2	5	4	1	3	**15**
V	Manufacturing - Lumber and Wood Products	24	3	1	6	2	4	**16**
W	Manufacturing - Transportation Equipment	37	1	4	15	1		**21**
X	Retail Trade - Building Material and Garden	52	1	4	10	1	4	**20**
Y	Manufacturing - Industrial Machinery	35	1	7	7		3	**18**
Z	Agriculture / Fisheries	01, 02, 07, 09	1		1		1	**3**
AA	Manufacturing - Instruments / Related	38	1		1		1	**3**
AB	Communications	48		1		1		**2**
AC	Manufacturing - Primary / Fabricated Metal	33, 34		1				**1**
AD	Manufacturing - Apparel / Textiles	22, 23					1	**1**
AE	Manufacturing - Furniture / Fixtures	25		1				**1**
AF	Services - Motion Pictures	78						**0**
AG	Manufacturing - Chemical / Allied	28		1				**1**
AH	Retail Trade - General Merchandise Stores	53	1		1		2	**4**
AI	Mining	10, 12, 13, 14	1		1		1	**3**
AJ	Transportation - Air	45		2				**2**
AK	Utilities	49	1				1	**2**
AL	Manufacturing - Paper / Allied	26	1					**1**
AM	Forestry	08				1		**1**
	Totals		**37**	**124**	**290**	**22**	**59**	**532**

Table 75: Commercial Samples Collected by Region, Summer Season

			Number of Businesses Sampled in Each Region					
Group	**Description of Businesses**	**2-Digit SIC Codes Included**	**Coastal**	**Bay Area**	**Southern**	**Mountain**	**Central**	**Totals**
A	Finance / Insurance / Real Estate / Legal	60, 61, 62, 63, 64, 65, 67, 81	1	6	18	2	5	**32**
B	Retail Trade - Restaurants	58	1	7	14	1	2	**25**
C	Retail Trade - Other	56, 57, 59	1	7	15	1	4	**28**
D	Service - Other Misc.	72, 75, 76, 79, 83, 84	1	8	13	1	2	**25**
E	Wholesale Trade - Nondurable Goods	51	3	5	15	3	4	**30**
F	Retail Trade - Automotive Dealers & Service Stations	55	1	4	14	3	4	**26**
G	Services - Other Professional	86, 87, 89	3	5	12	2	5	**27**
H	Retail Trade - Food Stores	54	1	5	16	2	5	**29**
I	Construction	15, 16, 17	2	5	12	2	6	**27**
J	Services - Medical / Health	80	1	6	15	1	7	**30**
K	Manufacturing - Printing / Publishing	27	2	5	13	2	3	**25**
L	Services - Business Services	73		7	13	2	4	**26**
M	Services - Education	82	1	4	14	1	6	**26**
N	Public Administration	43, 91, 92, 93, 94, 95, 96, 97	1	4	12	1	3	**21**
O	Services - Hotels / Lodging	70	1	1	12	1	2	**17**
P	Trucking and Warehousing	42		1	11	2	7	**21**
Q	Wholesale Trade - Durable Goods	50	1	4	16	1	2	**24**
R	Manufacturing - Other	21, 29, 30, 31, 32, 39	1	2	15	1	4	**23**
S	Transportation - Other	40, 41, 44, 46, 47	2	5	16	1	3	**27**
T	Manufacturing - Electronic Equipment	36	2	12	9		2	**25**
U	Manufacturing - Food / Kindred	20	1	2	10	1	12	**26**
V	Manufacturing - Lumber and Wood Products	24	3	4	9	1	7	**24**
W	Manufacturing - Transportation Equipment	37	2	3	17		3	**25**
X	Retail Trade - Building Material and Garden	52	1	5	11	1	3	**21**
Y	Manufacturing - Industrial Machinery	35	2	13	13		2	**30**
Z	Agriculture / Fisheries	01, 02, 07, 09		1		1		**2**
AA	Manufacturing - Instruments / Related	38		3				**3**
AB	Communications	48		2			1	**3**
AC	Manufacturing - Primary / Fabricated Metal	33, 34	1		1		1	**3**
AD	Manufacturing - Apparel / Textiles	22, 23		1	1			**2**
AE	Manufacturing - Furniture / Fixtures	25			1		1	**2**
AF	Services - Motion Pictures	78			1		2	**3**
AG	Manufacturing - Chemical / Allied	28		1	1		1	**3**
AH	Retail Trade - General Merchandise Stores	53		1		1		**2**
AI	Mining	10, 12, 13, 14		1				**1**
AJ	Transportation - Air	45			1		1	**2**
AK	Utilities	49		1	1	1		**3**
AL	Manufacturing - Paper / Allied	26		3			1	**4**
AM	Forestry	08		1	1			**2**
	Totals		**36**	**145**	**343**	**36**	**115**	**675**

Contingency business sites were also obtained for use in sampling in case the Sky Valley Associates (SVA) crew was unable to access the dumpsters of a normal candidate business site in the field. Since it was impossible to determine ahead of time whether a contingency business site would stand in for a Tier 1 or Tier 2 business, contingency business sites were drawn from the Tier 1 set.

SEWA and CIWMB staff provided the final list of business sites to SVA along with maps showing how to get to each business site. SVA had copies of the letters that were sent to each business to show to any employee who questioned their activities. If the business denied permission to enter the property, or if the dumpsters were locked or inaccessible, SVA proceeded to the next site without a sample. SVA attempted to replace any missed samples with a sample from a contingency business site.

OBTAINING COMMERCIAL GENERATOR SAMPLES

Samples were removed from dumpsters so that a vertical cross section "slice" was taken that included waste from the top to the bottom of the bin. The minimum sample size targeted was, in order of priority, either 125 pounds, 1.5 cubic yards, or all of the waste in the bin if less than either of these amounts was present. If there were multiple bins at a site, SVA pulled a sub-sample from each bin. A limited number of very large businesses were selected that had diverse waste streams generated at the sampling site. CIWMB staff determined, with the help of the site contact, what the main waste streams were and the best way to obtain one or more representative samples. Dumpsters were sampled so that each significant waste stream was represented by a sample, and an estimate of the amount of each sampled waste stream was made. Data from these "multi-bin" samples was combined to get the overall composition for the business site.

SVA confirmed the number and size of waste containers at the business site. SVA also estimated the volume of waste in each container. As SVA pulled each sample from the containers, they attempted to maintain the relative density of the material as the sample was captured (e.g. they would not place heavy waste from the bottom of the container on the top of a sample). The sample volume was then measured (width, height and length).

The collected waste was segregated, labeled, and transported to the disposal site where waste sorting operations were occurring. This waste was sorted by hand into 57 waste categories and then sorted again into 8 RPPC categories. The component weights were entered into a computerized database or recorded on field sheets for later entry.

Following the completion of each season of commercial generator sampling, subcontractor Veterans Assistance Network (VAN) contacted each of the sampled business sites to verify its SIC classification, and the number of employees working at the site.

A.4.2 MULTIFAMILY RESIDENTIAL SAMPLES

The objective of this task was to estimate the composition of commercially collected waste that is disposed by multifamily residential generators (apartment complexes) in California.

ALLOCATION OF MULTIFAMILY RESIDENTIAL SAMPLES

Samples of multifamily waste were gathered at randomly selected multifamily complexes in the state. A total of 80 multifamily samples were targeted. The California Uniform Waste Disposal Characterization Method calls for a minimum of 40 samples. In this study, slightly

more than half of the multifamily samples (44 samples) were drawn from the Southern California region, where over fifty percent of the state's multifamily population resides. The other 36 were split among the remaining four regions based on the number of multifamily units in each region, with a minimum of two samples taken from each region (at least one per waste shed). The waste sheds used for multifamily sampling coincided with the waste sheds used for commercial generator sampling.

RANDOM SELECTION OF MULTIFAMILY SITES

Sheri Eiker-Wiles Associates (SEWA) randomly selected specific multifamily complexes. One complete list of apartments was assembled for each waste shed. The samples from the Bradley and Southeast Resource Recovery Facility waste sheds in Los Angeles County were compiled from the complete multi-family unit list from the County of Los Angeles. From that source, only those multi-family units with five or more dwellings and which matched the zip codes established for each waste shed were included in the random sort. The lists from the other sampling areas from around the state were amassed through the GTE yellow page listings under "apartments." Condominiums were not excluded from the lists, but the study kept no record of which complexes were condominiums and which were apartment buildings. Once each list was compiled, SEWA randomly sorted them and began calling to gather the basic information. When the call was made to the owner or the manager, the number of units was confirmed, and only those with five or more units were included in the sampling. The information obtained included the number and size of dumpsters at the site and the frequency of pick-up, as well as specific instructions for accessing the dumpsters. If the property manager or owner could not provide this information, SEWA tried to gather it from waste haulers.

Multifamily complexes whose waste was not accessible (e.g., in a locked area) were removed from the list. Multifamily complexes with fewer than five apartment units also were removed from the list. If a complex was removed, the next randomly selected complex in that category was selected.

If requested, SEWA would send complexes a formal letter from the CIWMB explaining the study, what was requested of the complex, and that a contractor would visit their site to gather a sample of their waste. If a complex refused permission when contacted, the next randomly selected complex in that category was contacted.

Based on the results of this work, SEWA prepared a list of 80 eligible multifamily units, plus a twenty-five percent contingency in each region. The contingency sites were only used if the field crew found that a complex on the selected list had bins that were locked or otherwise inaccessible, or if access was refused at the site. The final list of complexes, along with a map indicating the exact location and directions, was provided to Sky Valley Associates (SVA), the field crew responsible for waste sampling. A follow-up survey by Veterans Assistance Network (VAN) confirmed the number of units in the complex and the average vacancy rate.

OBTAINING MULTIFAMILY RESIDENTIAL SAMPLES

SVA visited the complexes on the list provided by SEWA and randomly collected a "slice" of waste from a bin or dumpster. Samples contained a vertical cross section of waste from the top to the bottom of the bin. SVA took either a 125 pound sample, a sample volume of 1.5 cubic yards, or all the waste that was at the site, if less than either of these amounts was present. This is consistent with the California Uniform Waste Disposal Characterization

Method. However, because many complexes had less waste than the desired weight or volume minimums on the day of sampling, SEWA and SVA worked to gather additional samples at the end of study to supplement the data.

SVA had copies of the letters sent to each complex to show anyone who questioned their activities. If the complex denied permission to enter the property, or if the dumpsters were locked or inaccessible, SVA proceeded to the next site without a sample. SVA attempted to replace any missed samples with a sample from the contingency list.

The waste was segregated and labeled, and transported to the disposal site where waste sampling was occurring. The waste was sorted by hand into 57 waste categories and then sorted again into 8 RPPC categories. The weights were entered into a computerized database or on field sheets.

A.4.3 VOLUME AND DENSITY MEASUREMENTS FOR GENERATOR SAMPLES

At each generator site that was visited, the collection crew noted the total cubic yardage of bin space that they observed at the site. This number was recorded as the Field Measurement of Dumpster Space, and it was used later in calculations that projected the amount of waste disposed by each generator annually. The volume of dumpsters was recorded in the field using units of cubic yards, based on actual measurements of the dimensions of dumpsters. Field records of compactor space were based on visual estimates.

Follow-up phone calls to generators sometimes provided more information about dumpster space. If a more accurate number was later obtained for a generator site, then a Revised Measurement of Dumpster Space was recorded by Cascadia staff and was used in the calculations. For example, a business manager sometimes told us of dumpsters located elsewhere on the property that were not observed by the sampling crew. Similar measurements were recorded for the volume of all trash compactors at each site, and information about compactors was also verified with follow-up phone calls.

The actual volume of waste contained in dumpsters on sampling day was measured with a tape measure. Volume was calculated based on the product of dumpster length, dumpster width, and the height of the waste inside the dumpster. The height measurement reflected the distance between the bottom of the inside of the dumpster and the highest point in the mound of waste inside. Later, the ratio of waste volume to dumpster space was converted into a number representing the “fullness” of the dumpsters at each business. (See section A.10 for a description of how the fullness number was used in calculating the annual disposal of waste by each business.)

The density of the waste was calculated based on the ratio between the weight of the sample and the volume of the sample. The sample weight was determined by adding up the weights of all the sorted components of the sample. The sample volume was determined by measuring the dimensions of the sample as it lay on a tarp at the generator site, immediately following extraction of the sample from the dumpster. An attempt was made to maintain the relative density of the sample, as described in section A.4.3 above. For an individual generator site,

$$\text{sample density} = \frac{\text{sample weight}}{\text{sample volume}}.$$

A.5 DISPOSAL SITE SAMPLE SELECTION

A.5.1 SINGLE-FAMILY RESIDENTIAL WASTE

Single-family loads were systematically selected to ensure unbiased and reliable waste composition estimates. Systematic selection consists of taking every n^{th} vehicle after a random start time. To calculate truckload sampling frequency by sector and vehicle type, a sampling interval (n) was established for each. Prior to conducting waste sampling at a disposal site, the site coordinator ascertained the average number of municipal or commercial hauler vehicles delivering residential waste on a given day. This number was divided by the number of samples needed at each site. This determined the sampling interval. For example, if n = 20, the 20^{th}, 40^{th}, etc. truck was selected for sampling. On the day of the sampling, vehicle surveyors assisted the sampling crew by flagging every n^{th} truck and the driver was directed to dump the load in a designated area.

A.5.2 RESIDENTIAL SELF-HAUL AND COMMERCIAL SELF-HAUL WASTE

Prior to conducting waste sampling at a disposal site, Cascadia ascertained the average number of self-haulers delivering waste on a given day. Cascadia divided this number by the required 10 samples per site to determine the "every n^{th}" vehicles that were to be selected.

Of the 250 samples, one-third were targeted from residential sources and two-thirds from commercial sources. When selecting self-haul vehicles at the disposal site, following the "every n^{th} vehicle" strategy, the first two selected loads were from commercial vehicles, and the next one was from a residential vehicle. Then two more commercial loads were sampled, followed by another residential load, and so forth. If the "n^{th}" self-haul vehicle selected for sampling was of the wrong sub-sector, then the next or "$n+1^{th}$" self-haul vehicle was selected for sampling.

On the day of the sampling, the person conducting vehicle surveys asked every self-haul vehicle if they were disposing residential or commercial waste. Every pre-selected commercial self-haul vehicle and every pre-selected residential self-haul vehicle was flagged. The waste was handled in accordance with the field procedures described in Section A.6.

A.6 SAMPLE SORTING AND DATA RECORDING

A.6.1 WASTE SORTING PROCEDURES

This section summarizes the general field procedures that were used at transfer stations and disposal sites. However, the specific protocols and procedures varied among sites so that the waste sampling and vehicle surveying were compatible with the operations of the site, and did not cause undue disruptions.

DIVERTING SELECTED VEHICLES

When a selected residential or self-haul load was identified at the scalehouse (see sections on Sample Selection for single-family waste and self-haul waste), scalehouse personnel flagged the vehicle with a pair of sample identification sheets. The vehicle was then directed to the sorting area, and the surveyor interviewed the driver to determine the following information:

1) sector: single family residential, residential self-haul, or commercial self-haul
2) for self-haul, the type of activity that generated the waste:
    - residential
    - construction and demolition
    - roofing
    - landscaping
    - commercial/industrial/institutional/other
3) vehicle type

EXTRACTING SAMPLES FROM LOADS

Sample loads from residential haulers were dumped in an elongated pile. From each sample load, one sorting sample was selected using an imaginary 16-cell grid superimposed over the dumped material. The Field Manager identified the randomly selected cell to be extracted. Then, with the assistance of the landfill's loader operator, approximately 200 pounds of waste was removed by machine from the designated cell and placed on a tarp. If a loader was not available, samples were removed from the pile by hand.

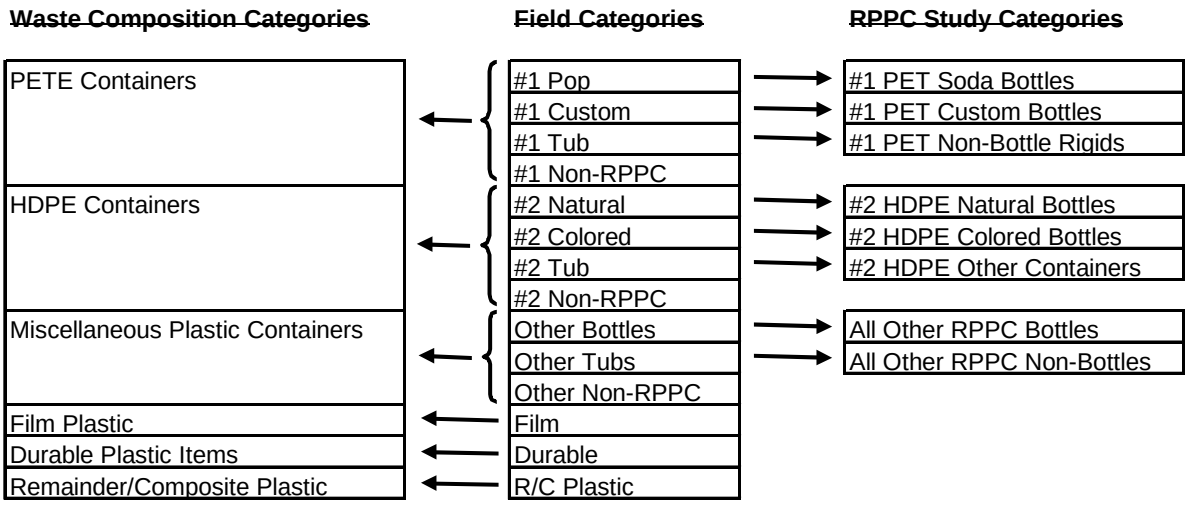
SORTING SAMPLES

Once the sample was placed on a tarp, the material was sorted by hand into the prescribed component categories. Plastic laundry baskets were used to contain the separated components. The sorting crew members typically specialize in groups of materials, such as papers or plastics, and sort from the baskets containing their specialty.

The Field Manager monitored the homogeneity of the component baskets as they accumulated, rejecting materials that were improperly classified. Open laundry baskets allowed the Field Manager to see the material at all times. The Field Manager also verified the purity of each component as it was weighed, before recording the weight into the database or on field sheets. The materials were sorted to the greatest reasonable level of detail by hand, until no more than a small amount of homogeneous fine material ("mixed residue") remained. The overall goal was to sort each sample directly into component categories in order to reduce the amount of indistinguishable fines or miscellaneous categories.

Plastics were sorted into 14 categories, which were folded into the six plastic categories required for the waste composition study and the eight plastic categories required for the RPPC study. The translation of the field categories to the waste composition and RPPC categories is diagrammed in Figure 11 below.

Figure 11: Translation of Field Sorting Categories to Study Categories of Plastics



After the plastics data were gathered, the weights were adjusted for contamination, based on the data from the 1995 decontamination study. (See Appendix I).

RECORDING SAMPLE DATA

The Field Manager recorded composition weights as well as the information obtained from the driver interview in the field using either a hand-held computer or field sheets. The database and corresponding data-entry forms were developed prior to the start of sampling to ensure accuracy, consistency among forms, and efficient recording of data. To ensure additional accuracy, the electronic data-entry forms included validation rules to prevent out-of-range values. (For example, the database will not allow “pick-up truck” to be entered as the vehicle type for a sample from a commercially hauled load).

A.6.2 HEALTH AND SAFETY PROTECTION

The sampling crew has an established, on-going safety and training program. Before sampling began at each site the crew first identified and discussed all of the unique hazards, emergency procedures, and operational restrictions that might be present. The contractor has written safety procedures and conduct guidelines, including a Bloodborne Pathogen Exposure Control Plan. These procedures are updated whenever new safety information, products or regulations appear.

In addition to continued training and practice, the sampling crew used its own high-quality safety equipment, field gear, and scales.

A.7 VEHICLE SURVEY

The objective of the vehicle surveys was to estimate the portion of California's waste contributed by each of the residential, commercial, and self-haul sectors. The surveys provided an estimate of the fraction of the overall waste stream contributed by each of the residential, self-haul, and commercial sectors and subsectors.

The vehicle surveys occurred at 24 of the 25 randomly selected sampling sites (See Table 71). The surveys were conducted with the drivers of all vehicles bringing waste to the sites during an eight-hour period.[11] A total of 3,648 surveys were completed. Appendix H presents the number of surveys conducted at each disposal site.

A.7.1 SURVEY APPROACH

The surveys were conducted at each sampling site on the same day disposal site sampling occurred. The surveyor was generally on site for an eight-hour period. At sites where there was heavy vehicle traffic, two or more surveyors were used.

The surveyor conducted a brief interview with the driver of each vehicle entering the site. The surveyor recorded the following data for each vehicle:

- information to enable identification of the weight of loads that did not have a tare weight on file at the scalehouse
- the weight of the contents as recorded in the scalehouse[12]
- the type of vehicle

The data gathered during the interview varied depending on whether the load was self-hauled or delivered by a public or private waste collection organization.

If the vehicle was from a company that collects waste, the driver was asked the following questions:

- Is the waste from a single–family dwelling, multi–family dwelling, or commercial source?
- If not all from one source, what is the percentage in the load from each?

If the vehicle was driven by a self-haul customer, the following question was asked:

- Is the source of waste residential, construction and demolition, roofing, landscaping, or other (i.e., general industrial and commercial)?

A copy of the form that was used to collect the data is included in Appendix D.

The surveyors received training in use of the survey form and the survey was tested at a transfer station before the first survey period.

---

[11] In rare cases, it was necessary to skip some vehicles to maintain safe and efficient traffic flows.

[12] If the operators of a site typically recorded the volume of a load rather than its actual weight, the volume-to-weight conversion used by the gate attendant at that site was used to convert volume to weight. The weight recorded for the load was the same weight as recorded by the gate attendant.

Data taken on the survey forms was checked for accuracy in the field. The surveyor checked the forms to ensure that all appropriate information had been gathered. The survey supervisor checked the surveys after they were returned to the office to confirm that all the required data was properly entered. Survey entries with errors or that were incomplete were not used.

Following each survey period (winter and summer), Veterans Assistance Network entered the vehicle survey data into a Microsoft Access database. Following data entry, Cascadia compared entries with the written field record, and any data entry errors were addressed. Two separate checks occurred. First, at various points during data entry, Cascadia randomly checked more than ten percent of the field records to ensure quality of data entry was sufficient. (The first time this was completed, errors were discovered and VAN was required to re-do the data entry. Subsequent random checks found the data entry to be precise). Second, upon completion of data entry, Cascadia checked every tonnage entry to ensure that the quantity data was accurately entered. During all of these checks, if data entry errors or omissions could not be resolved, the entry was deleted.

A.8 BASE POPULATION AND DISPOSAL DATA

A.8.1 ANNUAL TONNAGE ESTIMATES FOR EACH REGION AND STATEWIDE

The projections of statewide waste tonnage by sector and subsector relied on applying the vehicle survey results to the reported total amount of waste disposed in each region of the state in 1998. The tonnage in each sector and subsector was then added from the regional level to produce a figure for the state level. The total amount of waste disposed in each region is shown in Table 76. (See section A.10 for a detailed description of the calculation methods.)

Table 76: Total Waste Disposal (Tons) in Each County and Region, 1998

Coastal		Bay Area		Southern		Mountain		Central	
Del Norte	19,012	Alameda	2,256,929	Imperial	159,419	Alpine	0	Butte	169,280
Humboldt	84,197	Contra Costa	601,562	Kern	666,609	Amador	11,653	Colusa	0
Mendocino	52,053	Marin	312,801	Los Angeles	10,081,953	Calaveras	27,641	Fresno	709,713
Monterey	480,631	Napa	37,710	Orange	4,670,966	El Dorado	255	Glenn	20,894
San Benito	82,624	San Francisco	0	Riverside	1,615,275	Inyo	14,771	Kings	103,518
Santa Cruz	236,363	San Mateo	953,530	San Bernardino	1,278,510	Lassen	14,070	Lake	50,163
Sonoma	455,433	Santa Clara	1,637,992	San Diego	2,653,604	Mariposa	11,519	Madera	85,821
		Solano	612,073	San Luis Obispo	229,197	Modoc	0	Merced	208,485
				Santa Barbara	438,328	Mono	28,058	Placer	175,086
				Ventura	920,992	Nevada	0	Sacramento	1,115,822
						Plumas	1,644	San Joaquin	1,126,064
						Shasta	173,274	Stanislaus	182,838
						Sierra	2,525	Sutter	0
						Siskiyou	17,328	Tehama	42,892
						Trinity	4,315	Tulare	313,125
						Tuolumne	0	Yolo	210,029
								Yuba	176,907
Totals:	1,410,313		6,412,597		22,714,853		307,053		4,690,637

Total Statewide: 35,535,453 tons

Source: CIWMB Disposal Reporting System. Counties showing 0 tons disposed do not have local disposal facilities and send waste to other counties.

A.8.2 NUMBER OF APARTMENTS IN EACH REGION AND STATEWIDE

Estimates of the composition of multifamily sector waste at the state level relied on information about the number of apartment units in each region. (See section A.10 for a detailed description of the calculation methods.) The numbers of apartment units in each region are presented in Table 77.

Table 77: Numbers of Multifamily Units by County and Region, 1998

Coastal		Bay Area		Southern		Mountain		Central	
Del Norte	519	Alameda	145,549	Imperial	6,296	Alpine	328	Butte	10,508
Humboldt	4,718	Contra Costa	62,200	Kern	23,894	Amador	680	Colusa	473
Mendocino	2,808	Marin	22,021	Los Angeles	1,122,604	Calaveras	552	Fresno	49,402
Monterey	24,286	Napa	5,715	Orange	246,570	El Dorado	5,734	Glenn	790
San Benito	906	San Francisco	150,620	Riverside	79,165	Inyo	464	Kings	3,926
Santa Cruz	12,478	San Mateo	69,278	San Bernardino	82,637	Lassen	761	Lake	1,115
Sonoma	21,945	Santa Clara	141,193	San Diego	297,373	Mariposa	305	Madera	3,033
		Solano	19,698	San Luis Obispo	10,880	Modoc	207	Merced	7,178
				Santa Barbara	30,196	Mono	3,386	Placer	9,508
				Ventura	38,297	Nevada	2,475	Sacramento	97,223
						Plumas	597	San Joaquin	28,402
						Shasta	5,609	Stanislaus	21,945
						Sierra	105	Sutter	4,088
						Siskiyou	1,499	Tehama	1,601
						Trinity	259	Tulare	8,894
						Tuolumne	1,412	Yolo	14,462
								Yuba	2,613
Totals:	67,660		616,274		1,937,912		24,373		265,161

Total Statewide: 2,911,380 units

Information was taken from California Department of Finance data on counties, 1998.

A.9 QUALITY CONTROL PROCEDURES

Verification procedures were built into the processes for gathering and recording data during each segment of the study. These processes were discussed with each team member responsible for collecting or entering data, to ensure that data were managed consistently throughout the Study.

A.9.1 IDENTIFICATION OF COMMERCIAL AND MULTI-FAMILY GENERATORS

Initially, each set of candidate business sites obtained from NameFinders was screened to ensure that the set was drawn from the correct geographical area and included businesses in the correct SIC groups. Information about the business sites was then placed in a different database for each waste shed and e-mailed to the individual responsible for contacting businesses in that waste shed. As the calls proceeded, more information about each business was entered into the databases.

Following completion of calls, the set of confirmed businesses and multifamily complexes was reviewed by Cascadia staff to ensure that all necessary information had been collected to permit ready access to the waste for sampling and to permit extrapolation of quantities of waste disposed across entire SIC groups. If all the required information was not present for a business, the business record was returned to the caller for completion. If all information was present, the business record was placed in a separate "generator" database built to house information about businesses and multifamily complexes that were actually sampled. A parallel set of data was placed in the generator database for multifamily generators that were participating in the Study. (See Appendix D for a snapshot of the types of information contained in the generator recruitment database.)

At regular intervals, summaries of business site and multifamily site records were e-mailed to SVA for inclusion in the generator sampling schedule. Reports from SVA about any sites that were not actually sampled were recorded, and the corresponding site records in the database were marked as having not been sampled.

Following the completion of each season of generator sampling, subcontractor VAN contacted the sampled business sites to determine exact employment on site and to verify SIC classification. This information was entered by VAN into the generator database.

A.9.2 VEHICLE SURVEYS

Surveys of the drivers of individual vehicles at disposal sites were recorded on separate lines on a survey form (see Appendix D). In addition to vehicle-specific information, the surveyor recorded his/her name, the location, and the date on which each page of the form was completed. Pacific Waste Consulting Group reviewed the vehicle surveys to ensure consistent and correct recording of vehicle information and to incorporate volume-to-weight conversion factors when necessary for sites that did not weigh some vehicles.

Following the completion of each season's vehicle surveys, subcontractor VAN entered the information from the survey forms into a database. After the data entry was completed, Cascadia compared entries with the written field record, and any data entry errors were addressed. Two separate checks occurred. First, at various points during data entry, Cascadia randomly checked more than ten percent of the field records to ensure that the quality of data entry was sufficient. (The first time this was completed, errors were discovered and VAN was required to re-do the data entry. Subsequent random checks found the data entry to be precise). Second, upon completion of data entry, Cascadia checked every tonnage entry to ensure that the quantity data was accurately entered. During all of these checks, if data entry errors or omissions could not be resolved, the entry was deleted.

A.9.3 WASTE SAMPLING

For generator and disposal samples alike, information on the composition of each sample was entered into the field composition database. During the winter sampling period, subcontractor Sky Valley Associates recorded material weights from each sample on a hand-held computer. Each entry was stated by the person weighing the material and then was restated by the person recording the weights. On occasion, material weights were recorded on paper forms in the field. These records were subsequently entered into the project database, with one person reading the numbers aloud and another person typing them. In such cases, each entry was then verified again after the entire set of sample

records had been completed. Information accumulated by the sampling crew was e-mailed to Cascadia on a regular basis and was transferred to a master composition database. (See Appendix D for a snapshot of the information contained in the field composition database.)

During the summer sampling period, subcontractor VAN entered the composition data from paper field records, and each entry was verified by Cascadia staff.

A.10 DESCRIPTION OF STATISTICAL PROCEDURES USED

Data gathered from three sources (vehicle surveys, disposal site sampling, and generator sampling) were combined to yield estimates of percentages and tonnages of materials in California's waste stream. This section describes the methodology used to obtain each estimate and its associated variability.

The general calculation strategy involved two common themes: (1) the use of ratio estimators to determine the composition percentages of the waste stream; and (2) aggregation of sample data from the sampling unit to region and to the statewide level. A ratio estimator involves the ratio of two quantities, both of which are random variables. For most of this study, the basic ratio estimator was derived as the ratio of the weight of material in a given sample over the total weight of the sample. While the aggregation up to the state level varied by sector, the general procedure involved creating a new ratio estimator by weighting across ratios from a lower level. The details for each sector are given in the subsections that follow.

Statistical analyses were run under either Windows 98 or Windows NT using programs written in S-PLUS 4.5 Professional.

A.10.1 VEHICLE SURVEYS

Vehicle survey data were used to estimate the percentage of state waste disposed by commercial, residential and self-haul sectors. Data from a total of 24 sites across five regions[13] were aggregated to obtain individual tonnage estimates for overall commercial, commercial self-haul (including the sectors roofing, landscaping, construction and demolition, and other), residential self-haul, single-family residential, and multi-family residential sectors.

ESTIMATING PERCENTAGES

The following steps were used to estimate the statewide percentages for each sector.

1. Calculate the sum of the net weights of all vehicles surveyed at a given site, a given region, and a given sector. Repeat this for each site/region/sector combination, resulting in 24 sums per sector.

$$N_{ijk} = \sum_{R_i} \sum_{S_j} \sum_{Sec_k} w_{ijk}$$

[13] Vehicle surveys were conducted at five sites in each of four regions of the state and at four sites in the Southern region, for a total of 24 sites.

where R_i = region i, for i = 1,...,5;
S_j = site j, for j = 1,...,5;
Sec_k = sector k, for k = 1,...,8 for each of the eight sectors; and,
w_{ijk} = weight of load in region i, site j, sector k.

2. Calculate the sum of the net weights of all surveyed loads at a given site and a given region. Repeat this for each site/region combination, resulting in 24 sums.

$$D_{ij} = \sum_{R_i} \sum_{S_i} w_{ij}$$

where R_i = region i, for i = 1,...,5;
S_j = site j, for j = 1,...,5; and,
w_{ij} = total weight of all loads in region i, site j.

3. Calculate weighted region estimates by sector from the sums in 1 and 2 above.

$$RVS_{ik} = \frac{\sum_{j=1}^{5} a_{ij} \times N_{ijk}}{\sum_{j=1}^{5} a_{ij} \times D_{ij}}$$

where a_{ij} = annual tons for region i, site j.

4. Calculate weighted statewide estimates by sector from region estimates in 3 above.

$$SVS_k = \frac{\sum_{i-1}^{5} a_i \times RN_{ik}}{\sum_{i=1}^{5} a_i \times RD_i}$$

where a_i = annual tons for region i (including all sites, sampled or not);
$RN_{ik} = \sum_{j=1}^{5} a_{ij} \times N_{ijk}$, the numerator in step 3 above; and,
$RD_i = \sum_{j=1}^{5} a_{ij} \times D_{ij}$, the denominator in step 3 above.

The following example vehicle survey data is for 2 regions, 3 disposal sites per region.

SampleID	SectorID	SiteID	Tons	Region
8	1	12	8.81	1
83	1	12	9.38	1
85	1	14	12.36	1
245	1	14	9.78	1
246	1	15	6.21	1
612	1	15	2.47	1
620	1	15	6.41	1
1039	1	16	3.44	2
1040	1	16	7.76	2
1045	1	16	1.52	2
1597	1	19	9.40	2
1604	1	19	0.10	2
1611	1	19	0.07	2
1390	1	20	7.88	2
1391	1	20	3.30	2
1392	1	20	7.10	2
1399	1	20	1.72	2

Example annual tons data, by disposal sites, within region.

Region	SiteID	Annual Tons
1	12	458712
1	14	407706
1	15	59622
2	16	51626
2	19	87794
2	20	45256

Example annual tons data by region (including disposal sites not sampled).

Region	Annual Tons
1	6412597
2	4690637

1. Calculate the sum of the weights of all samples from a given disposal sites and a given region. Since there are two regions, with three sites per region, this will yield six separate sums:

$N_{1,12} = 8.81 + 9.38 = 18.19$ $N_{1,14} = 12.36 + 9.78 = 22.14$ $N_{1,15} = 6.21 + 2.47 + 6.41 = 15.09$

$N_{2,16} = 3.44 + 7.76 + 1.52 = 12.72$ $N_{2,19} = 9.40 + .10 + .07 = 9.57$

$N_{2,20} = 7.88 + 3.30 + 7.10 = 18.28$

2. Calculate the sum of the weights of all surveyed loads from a given site and a given region. In this case we would need the data for all other sectors. These values represent the total weight of all surveyed loads for the given site and region. For simplicity, assume the following surveyed load weights for each site:

$D_{1,12} = 50.70 \quad D_{1,14} = 56.90 \quad D_{1,15} = 72.40$
$D_{2,16} = 30.25 \quad D_{2,19} = 47.29 \quad D_{2,20} = 52.35$

3. Calculate weighted region estimates from the sums in steps 1 and 2 above.

$$RE_1 = \frac{(458712 \times 18.19) + (407706 \times 22.14) + (59622 \times 15.09)}{(458712 \times 50.70) + (407706 \times 56.90) + (59622 \times 72.40)} = \frac{18,270,278}{50,771,803}$$

$$RE_2 = \frac{(51626 \times 12.72) + (87794 \times 9.57) + (45256 \times 18.28)}{(51626 \times 30.25) + (87794 \times 47.29) + (45256 \times 52.35)} = \frac{2,324,206}{8,082,616}$$

4. Calculate weighted statewide estimates from region estimates in 3 above.

$$SC = \frac{(6,412,597 \times 18,270,278) + (4,690,637 \times 2,324,206)}{(6,412,597 \times 50,771,803) + (4,690,637 \times 8,082,616)} = \frac{1.28 \times 10^{14}}{3.63 \times 10^{14}} = 0.35$$

Thus, the statewide commercial sector accounts for 35% of the total waste stream.

EXTRAPOLATING TO TONNAGES

Annual tonnages for the various sectors of the vehicle survey were obtained by multiplying the individual sector statewide estimates by the statewide annual tonnage value; i.e. $TVS_k = SVS_k \times 35,535,453$. The statewide annual tonnage is assumed to be a constant and was based on 1998 figures from California's Disposal Reporting System.

A.10.2 CALCULATING COMPOSITION PERCENTAGES FROM SAMPLES

The calculation of composition percentages involved using data from generator sampling and disposal site sampling, combined with vehicle survey results. The methods varied somewhat by sector. Specific calculations, by sector, are outlined in the following sections.

COMMERCIAL WASTE

Data obtained from generator sampling were used to estimate the statewide waste stream composition for the commercial sector. Commercial compositions were estimated for 26 industry groups, as well as for the overall commercial sector.

INDUSTRY GROUP COMPOSITIONS

The following steps were used to estimate the commercial compositions for each industry group.

1. Aggregate compositions by industry group and region.

$$IC_{ijk} = \frac{\sum_{R_i}\sum_{I_j}\sum_{M_k} w_{ijk}}{\sum_{R_i}\sum_{I_j} w_{ij}}$$

where R_i = region i, for $i = 1,\ldots,5$;
I_j = industry group j, for $j = 1,\ldots,26$;
M_k = material type k, for $k = 1,\ldots,57$;
w_{ijk} = weight of sample for region i, industry group j, material type k; and,
w_{ij} = total weight of all samples in region i, industry group j.

2. Calculate weighted statewide estimates for each material type within each industry group by aggregating over regions.

$$IC_{jk} = \frac{\sum_{i=1}^{5} a_{ij} \times N_{ijk}}{\sum_{i=1}^{5} a_{ij} \times D_{ik}}$$

where a_{ij} = employment for region i, industry group j;
$N_{ijk} = \sum_{R_i}\sum_{I_j}\sum_{M_k} w_{ijk}$, the numerator in step 1 above; and,
$D_{ik} = \sum_{R_i}\sum_{I_j} w_{ij}$, the denominator in step 1 above.

OVERALL STATE COMMERCIAL COMPOSITION

The proportion for each material in the overall statewide commercial waste stream was calculated by aggregating individual industry group compositions.

$$COM_k = \frac{\sum_{j=1}^{26} a_j \times N_{jk}}{\sum_{j=1}^{26} a_j \times D_k}$$

where a_j = statewide employment for industry group j;
$N_{jk} = \sum_{i=1}^{5} a_{ij} \times N_{ijk}$, the numerator in step 2 above; and,
$D_k = \sum_{i=1}^{5} a_{ij} \times D_{ik}$, the denominator in step 2 above.

EXTRAPOLATING TO TONNAGES

Material tonnages for the overall commercial waste stream were obtained by multiplying the individual material type proportions by the commercial tonnage value resulting from the vehicle survey analysis; i.e. the tonnage for material type k in the entire commercial sector was calculated as $TC_k = COM_k \times 17,358,359$.

Material tonnages within each industry group were derived as follows. First, a figure was calculated for the estimated Tons Per Employee Per Year (TPEPY) for each industry group. (See Section A.10.3 for a description of TPEPY.) Second, the TPEPY figure for an industry group was multiplied by the number of employees statewide in that industry group to produce an estimate of the tons of waste disposed by the industry group. The total tons of waste disposed by all industry groups was constrained to equal 17,358,359 tons, which was the figure determined by the vehicle surveys. Finally, the tons of each material disposed by an individual industry group were calculated by multiplying the individual material type proportions by the tonnage for the relevant industry group.

RESIDENTIAL WASTE

Estimates for the residential sector were derived from a combination of data from generator and disposal site sampling. Data from disposal site sampling were used to estimate the composition for the single-family sector, while data from generator sampling were used to estimate the multi-family sector.

SINGLE-FAMILY

The following steps were used to estimate the single-family residential composition.

1. Calculate the sum of the weight of samples across all sites from a given region, for a given material type.

$$N_{ik} = \sum_{R_i} \sum_{M_k} \sum_{j=1}^{5} w_{ijk}$$

where R_i = region i, for $i = 1,...,5$;
M_k = material type k, for $k = 1,...,57$;
j = sites within region i; and,
w_{ijk} = weight of sample in region i, site j, material type k.

2. Calculate the sum of the total weights of all samples from a given region.

$$D_i = \sum_{R_i} \sum_{j=1}^{5} w_{ij}$$

where R_i = region i, for $i = 1,...,5$;
j =sites within region i; and,
w_{ij} = total weight of all samples in region i, site j.

3. Calculate weighted statewide estimates using sums in 1 and 2 above.

$$SSF_k = \frac{\sum_{i=1}^{5} a_i \times N_{ik}}{\sum_{i=1}^{5} a_i \times D_i}$$

where a_i = estimated annual tons for the single-family sector, region i. This weight was estimated using regional sector estimates from the vehicle survey results.

4. Extrapolate tonnages. Single-family residential tonnages were obtained by multiplying the individual material type proportions by the single-family residential tonnage value resulting from the vehicle survey analysis; i.e. $TSF_k = SSF_k \times 9{,}955{,}739$.

MULTI-FAMILY

The following steps were used to estimate the multi-family residential composition:

1. Calculate the sum of the weight of samples from a given region, for a given material type.

$$N_{ik} = \sum_{R_i} \sum_{M_k} w_{ik}$$

where R_i = region i, for $i = 1,...,5$;
M_k = material type k, for $k = 1,...,57$; and,
w_{ik} = weight of an individual sample in region i, for material type k.

2. Calculate the sum of the total weights of all samples from a given region.

$$D_i = \sum_{R_i} w_i$$

where R_i = region i, for $i = 1,...,5$; and,
w_i = total weight of all samples in region i.

3. Calculate weighted statewide estimates using sums in 1 and 2 above.

$$SMF_k = \frac{\sum_{i=1}^{5} a_i \times N_{ik}}{\sum_{i=1}^{5} a_i \times D_i}$$

where a_i = number of apartments in region i.

4. Extrapolate tonnages. Multifamily residential tonnages were obtained by multiplying the individual material type proportions by the multifamily residential tonnage value resulting from the vehicle survey analysis; i.e. $TMF_k = SMF_k \times 3{,}569{,}888$.

OVERALL RESIDENTIAL

The overall statewide residential composition was estimated as weighted average of the single-family and multi-family estimates. The weights were based on the proportions of waste generated by single-family and multi-family sectors, as determined from the vehicle survey analysis; i.e. the overall residential proportion of waste for a given material type k was calculated as $RES_k = (.736 \times SSF_k) + (.264 \times SMF_k)$. Overall residential tonnages were obtained by multiplying the individual material type proportions by the residential tonnage value resulting from the vehicle survey analysis; i.e. $TR_k = RES_k \times 13{,}525{,}504$.

SELF-HAUL WASTE

Data obtained from disposal site sampling were used to estimate the statewide waste stream composition for the self-haul sector. The computations for the commercial and residential subsectors mirror those for the single-family residential subsector described in the previous section. The only difference in the computations was in the weights a_i. For self-haul estimates, a_i represents estimated annual tons for the commercial (or residential) subsector, for region i. These weights were estimated using regional sector estimates from the vehicle survey results.

OVERALL SELF-HAUL

The following steps were used to estimate the overall self-haul composition:

1. Calculate the sum of the weight of samples across all sites from a given region, for a given material type, for both the commercial and residential subsectors.

$$N_{ikl} = \sum_{S_l} \sum_{R_i} \sum_{M_k} \sum_{j=1}^{5} w_{ijkl}$$

where S_l = subsector l, for $l = 1$ (commercial) and 2 (residential);
R_i = region i, for $i = 1,...,5$;
M_k = material type k, for $k = 1,...,57$;
j = sites within region i; and,
w_{ijkl} = weight of sample in region i, site j, material type k, subsector l.

2. Calculate the sum of the total weights of all samples from a given region.

$$D_{il} = \sum_{S_l} \sum_{R_i} \sum_{j=1}^{5} w_{ijl}$$

where S_l = subsector l, for $l = 1$ (commercial) and 2 (residential);
R_i = region i, for $i = 1,...,5$;
j =sites within region i; and,

w_{ijl} = total weight of all samples in region i, site j, subsector \.

3. Calculate weighted regional self-haul estimates using sums in 1 and 2 above.

$$RSH_{ik} = \frac{(a_{i1} \times N_{ik1}) + (a_{i2} \times N_{ik2})}{(a_{i1} \times D_{i1}) + (a_{i2} \times D_{i2})}$$

where a_{i1} and a_{i2} = regional estimated annual tons for the commercial and residential subsectors, respectively. These weights were estimated using regional sector estimates from the vehicle survey results.

4. Calculate weighted statewide estimates using the regional estimates in 3 above.

$$SSH_k = \frac{\sum_{i=1}^{5} a_i \times N_{ik}}{\sum_{i=1}^{5} a_i \times D_i}$$

where a_i = estimated annual tons for region i, based on vehicle survey results;
$N_{ik} = (a_{i1} \times N_{ik1}) + (a_{i2} \times N_{ik2})$, the numerator in step 3 above; and,
$D_i = (a_{i1} \times D_{i1}) + (a_{i2} \times D_{i2})$, the denominator in step 3 above.

Overall self-haul tonnages were obtained by multiplying the individual material type proportions by the self-haul tonnage value resulting from the vehicle survey analysis; i.e. $TSH_k = SSH_k \times 4,651,591$.

OVERALL STATEWIDE COMPOSITION

The overall statewide waste stream composition was calculated as a weighted average of the average commercial, residential and self-haul estimates. The weights were based on the proportions of waste generated by the commercial, residential and self-haul sectors, as determined from the vehicle survey analysis; i.e. the overall statewide proportion of waste for a given material type k was calculated as

$$OCOMP_k = (.488 \times COM_k) + (.381 \times RES_k) + (.131 \times SSH_k).$$

Overall statewide tonnages were obtained by multiplying the individual material type proportions by the annual statewide tonnage value; $TCOMP_k = OCOMP_k \times 35,535,453$.

A.10.3 CALCULATING TONS PER EMPLOYEE PER YEAR (TPEPY)

An estimate of tons per employee per year was calculated statewide for the commercial sector by industry groups. The calculations were as follows:

1. Calculate an average sample density for each industry group. Only samples that (a) weighed more than 50 pounds and that (b) were obtained on the day of or day before trash collection and/or the bin was full, were used in this estimation.

$$Den_k = \frac{\sum_j W_{jk}}{\sum_j V_{jk}}$$

where k = industry group, $k = 1,...,26$;
j = site whose number varied by industry group;
W_{jk} = weight of sample for industry group k, at site j; and,
V_{jk} = volume of sample for industry group k, at site j.

An overall statewide average density was calculated as a weighted sum of the average densities for each industry group:

$$Den = \sum_{k=1}^{26} a_k \times Den_k$$

where a_k = the proportion of statewide employment for industry group k; and,
Den_k = the average volume per employee per year for industry group k.

2. Assign a density to each sample. If the sample met the inclusion criteria in step 1, then the density was the sample density, W_j / V_j; otherwise, assign the average density, Den_k for the appropriate industry group k.

3. Assign a bin fullness to each sample, where bin fullness is defined as observed trash volume divided by observed dumpster volume. If the sample met the inclusion criteria in step 1 and there was data for observed trash volume and observed dumpster volume, then the observed bin fullness was used as the value for bin fullness. Otherwise, assign the average bin fullness for the appropriate industry group. Average bin fullness was calculated as:

$$BF_k = \frac{\sum_j \frac{TV_{jk}}{DV_{jk}}}{n_k}$$

where j = site whose number varied by industry group;
TV_{jk} = observed trash volume for industry group k, at site j;
DV_{jk} = observed dumpster volume for industry group k, at site j; and,
n_k = the number of qualified sites in industry group k.

4. Estimate tons per site per year (TPSPY) for each commercial site.

$$TPSPY_j = \frac{\left(\left(Den_j \times BC_j \times BF_j\right) + \left(Den_j \times CC_j \times 4\right)\right) \times AP_j}{2000}$$

where Den_j = sample density;

BC_j = site bin capacity;

BF_j = site bin fullness;

CC_j = site compactor capacity;

AP_j =annual site pickups.

As with the density and bin fullness calculations in steps 2 and 3, respectively, an average TPSPY for the given industry group was assigned to sites that did not have sufficient data to estimate a site specific TPSPY.

5. Within each region, an average TPEPY was calculated for each of the industry groups. The average TPEPY was calculated as a ratio estimator.

$$TPEPY_{ik} = \frac{\sum_j TPSPY_{ijk}}{\sum_j Emp_{ijk}}$$

where $TPSPY_{ijk}$ = tons per site per year at site j for industry group k, within region i;

and,

Emp_{ijk} = number of employees at site j for industry group k, within region i.

6. Calculate weighted statewide estimates, by industry group, using the regional estimates in 5 above.

$$TPEPY_k = \frac{\sum_{i=1}^{5}(a_{ik} \times \sum_j TPSPY_{ijk})}{\sum_{i=1}^{5}(a_{ik} \times \sum_j Emp_{ijk})}$$

where a_{ik} = number of employees in region i, for industry group k;

$TPSPY_{ijk}$ = tons per site per year at site j for industry group k, within region i;

and,

Emp_{ijk} = number of employees at site j for industry group k, within region i.

An overall statewide tons per employee per year was calculated as a weighted sum of the tons for each industry group:

$$TPEPY = \sum_{k=1}^{26} a_k \times TPEPY_k$$

where a_k = the proportion of statewide employment for industry group k ; and,
$TPEPY_k$ = the average volume per employee per year for industry group k .

TPEPY estimates were scaled up to produce tonnage estimates consistent with the amount of commercial waste estimated using the vehicle surveys. The TPEPY estimates for each industry group, as calculated above, were multiplied by the number of employees in each industry group to produce a tonnage figure. The tonnage figures were then summed across all industry groups, resulting in a number, 14,593,656, which was less than the 17,358,359 commercial tons that were projected by the vehicle survey analysis. The TPEPY figure for each industry group was then inflated by a factor of 1.189, which is the ratio $\frac{14,593,656}{17,358,359}$.

A.10.4 CALCULATING AVERAGE VOLUME PER EMPLOYEE PER YEAR

The average volume per employee per year was calculated for each industry group as follows.

$$YPEPY_k = \frac{TPEPY_k \times 2000}{Den_k}$$

where $TPEPY_k$ = tons per employee per year for industry group k , calculated as described in step 6, section A.10.3;
2000 = conversion factor from tons to pounds; and,
Den_k = average density for industry group k , calculated as described in step 1, section A.10.3.

An overall statewide average volume per employee per year was calculated as a weighted sum of the volumes for each industry group:

$$YPEPY = \sum_{k=1}^{26} a_k \times YPEPY_k$$

where a_k = the proportion of statewide employment for industry group k ; and,
$YPEPY_k$ = the average volume per employee per year for industry group k .

A.10.5 VARIANCE CALCULATIONS

Due to the complexity of the sampling design and the need to aggregate up over several levels of ratio estimators, several different approaches were used in calculating the standard errors of the various estimates. Bootstrap resampling was most commonly used, although in a few situations, this method was not employed. The particular methods and when they were applied, are described in the following sections.

BOOTSTRAP RESAMPLING

Bootstrap resampling was the preferred method for standard error calculations, and was used whenever possible. Specifically, bootstrapping was applied to the vehicle survey results, the waste stream composition results (including RPPC) for the commercial by industry group, overall commercial, self-haul, single-family and multi-family sectors, and the

TPEPY estimates. Bootstrapping was not used for the overall statewide composition, the residential composition (single-family and multi-family combined), the residential RPPC composition and the overall RPPC composition. Theoretically, resampling methods could have been applied to all the estimates, however, there were computational constraints in terms of computing resources to make it an efficient method to apply at all levels of aggregation.

When used for a given statistic, 1000 replicate estimates were calculated, yielding a bootstrap distribution from which the standard errors were derived. Depending on the statistic of interest, the data were resampled with replacement by region, by region and industry group, or by region and sector.

BIAS-CORRECTED (BCa) INTERVALS

Ninety percent confidence intervals were calculated for the bootstrap distributions using bias-corrected and adjusted percentiles. The bias-corrected (BCa) method transforms the .5 and .95 probability values to determine which percentiles of the empirical bootstrap distribution most accurately estimate the percentiles of interest. The BCa confidence limits are reported as the lower and upper bounds of the estimates.

To be consistent with other reports of this type, "+/-" values, based on the 90% confidence intervals, were presented with the results. These values were calculated as:

$$\max(Est - CI_L, CI_U - Est)$$

where max = maximum;
Est = estimated statistic;
CI_L = lower bootstrap BCa confidence bound; and,
CI_U = upper bootstrap BCa confidence bound.

Given that most of the bootstrapped confidence intervals were not symmetric, due to the skewness in the resulting bootstrap distributions, the reported "+/-" value will tend to inflate the confidence interval on one side (usually the lower bound in these analyses).

VARIANCE OF SUMS

In order to calculate estimates for overall statewide compositions and overall residential compositions, including RPPC estimates, results from multiple survey methods were averaged together as weighted sums. In all cases, the weights were based on the proportion of the waste stream represented by each sector. The proportions were taken from the vehicle survey results. For the purpose of standard error calculations, the individual components were assumed to be independent and the proportions (weights) were treated as constants. The basic formulation was as follows:

$$Var(c_1A + c_2B + ...) = c_1^2 Var(A) + c_2^2 Var(B) + ...$$

The decision to treat the proportions as constants was based on the belief that the vehicle survey results provided reliable estimates of the contribution of each sector to the overall waste generated in the state. The numbers from the vehicle survey were used to scale-up the TPEPY estimates and to generate tonnage estimates. While there is some uncertainty associated with the proportion estimates, the impact on standard error estimates of the

weighted averages are likely to be minimal. The proportions are constrained to sum to one, and thus if one goes up, one or more others must go down. Unless the individual standard errors associated with each component are highly variable, the incorporation of the uncertainty in the proportions would likely cancel one another and thus be negligible in an overall standard error estimation.

LARGE-SAMPLE CONFIDENCE INTERVALS BASED ON NORMAL THEORY

Confidence intervals for the residential sector (single-family plus multi-family) and the overall statewide compositions were obtained employing normal theory. The general calculation is:

$$CI_{90\%,k} = t_{.1(2),\infty}\sqrt{Var_k}$$

where $t_{.1(2),\infty}$ = 2-sided t-test statistic with .05 in each tail, for ∞ degrees of freedom (i.e. assume a normal distribution);

Var_k = variance of a given estimate, for industry group k, for which a confidence interval is being calculated.

A.10.6 RPPC STUDY

Prior to calculating the RPPC percent composition figures, the RPPC values within each sample were adjusted to reflect the "clean" weight of the actual plastic, as opposed to the "dirty" weight of plastic contaminated by food and other materials. Contamination rates from the 1995 study of RPPC quantities in California's waste stream were applied individually to the recorded RPPC weights within each sample. Specific decontamination factors were used for each RPPC material type and for each major sector of the waste stream (commercial, residential, and self-haul). (See Section 3.6.2 of the Final Report.)

For each sample, the difference between the measured "dirty" weight of each RPPC material and the calculated "clean" weight was considered to be contamination. The weight of the contamination was added to the weight of all non-RPPC materials in the sample to produce a category that represented everything that was not an RPPC.

From this point on, the percent and tons of RPPCs in each waste sector were calculated in a method identical to that described for the regular waste composition calculations described in the sections above. Percent and tonnage estimates were derived for each of eight categories of RPPC, as well as for a ninth category that represented all non-RPPC materials plus contamination.

APPENDIX B: LIST AND DEFINITIONS OF MATERIAL TYPES

The list and definitions of the Standard Material Categories were drawn from the California Integrated Waste Management Board's Uniform Waste Disposal Characterization Method.

B.1 LIST OF STANDARD MATERIAL CATEGORIES

The list below shows a hierarchy of material classes and subclasses. As part of the Statewide Waste Characterization Study, solid waste was sorted into the 57 specific material categories shown in bold type, and composition percentages were calculated for those material categories.

Paper
- Uncoated Corrugated Cardboard and Paper Bags
  - 1 **Uncoated Corrugated Cardboard**
  - 2 **Paper Bags**
- 3 **Newspaper**
- Office Paper
  - 4 **White Ledger**
  - 5 **Colored Ledger**
  - 6 **Computer Paper**
  - 7 **Other Office Paper**
- Miscellaneous Paper
  - 8 **Magazines and Catalogs**
  - 9 **Phone Books and Directories**
  - 10 **Other Miscellaneous Paper**
- 11 **Remainder/Composite Paper**

Glass
- 12 **Clear Glass Bottles and Containers**
- Colored Glass Bottles and Containers
  - 13 **Green Glass Bottles and Containers**
  - 14 **Brown Glass Bottles and Containers**
  - 15 **Other Colored Glass Bottles and Containers**
- 16 **Flat Glass**
- 17 **Remainder/Composite Glass**

Metal
- Ferrous Metals
  - 18 **Tin/Steel Cans**
  - 19 **Major Appliances**
  - 20 **Other Ferrous**
- Non-Ferrous Metals
  - 21 **Aluminum Cans**
  - 22 **Other Non-Ferrous**
- 23 **Remainder/Composite Metal**

- Plastic
  - Plastic Containers
    - HDPE Containers
    - PETE Containers
    - Miscellaneous Plastic Containers
  - Film Plastic
  - Durable Plastic Items
  - Remainder/Composite Plastic
- Other Organic
  - Food
  - Landscape and Agricultural
    - Leaves and Grass
    - Prunings and Trimmings
    - Branches and Stumps
    - Agricultural Crop Residues
  - Miscellaneous Organic
    - Manures
    - Textiles
  - Remainder/Composite Organic
- Construction and Demolition
  - Concrete
  - Asphalt Paving
  - Asphalt Roofing
  - Lumber
  - Gypsum Board
  - Rock, Soil and Fines
  - Remainder/Composite Construction and Demolition
- Household Hazardous Waste
  - Paint
  - Vehicle and Equipment Fluids
  - Used Oil
  - Batteries
  - Remainder/Composite Household Hazardous
- Special Waste
  - Ash
  - Sewage Solids
  - Industrial Sludge
  - Treated Medical Waste
  - Bulky Items
  - Tires
  - Remainder/Composite Special Waste
- Mixed Residue

B.2 DEFINITIONS OF STANDARD MATERIAL CATEGORIES

PAPER

"Uncoated Corrugated Cardboard and Paper Bags" includes the two subtypes described below. The subtypes are "uncoated corrugated cardboard" and "paper bags".

(1) **Uncoated Corrugated Cardboard** usually has three layers. The center wavy layer is sandwiched between the two outer layers. It does not have any wax coating on the inside or outside.

Examples: This subtype includes entire cardboard containers, such as shipping and moving boxes, computer packaging cartons, and sheets and pieces of boxes and cartons. This subtype does not include chipboard.

(2) **Paper Bags** means bags and sheets made from kraft paper.

Examples: This subtype includes paper grocery bags, fast food bags, department store bags, and heavyweight sheets of kraft packing paper.

(3) **Newspaper** means paper used in newspapers. This type does not include any subtypes.

Examples: This type includes newspaper and glossy inserts, and all items made from newsprint, such as free advertising guides, election guides, and tax instruction booklets.

"Office Paper" includes the four subtypes described below. The subtypes are "white ledger", "colored ledger", "computer paper", and "other office paper".

(4) **White Ledger** means uncolored bond, rag, or stationary grade paper. It may have colored ink on it. When the paper is torn, the fibers are white.

Examples: This subtype includes white photocopy, white laser print, and letter paper.

(5) **Colored Ledger** means colored bond, rag, or stationery grade paper. When the paper is torn, the fibers are colored throughout.

Examples: This subtype includes colored photocopy and letter paper. This subtype does not include fluorescent dyed paper or deep-tone dyed paper such as goldenrod colored paper.

(6) **Computer Paper** means paper used for computer printouts. This subtype usually has a strip of formfeed holes along two edges. If there are no holes, then the edges show tear marks. This subtype can be white or striped.

Examples: This subtype includes computer paper and printouts from continuous feed printers. This subtype does not include "white ledger" used in laser or impact printers, nor computer paper containing groundwood.

(7) **Other Office Paper** means other kinds of paper used in offices.

Examples: This subtype includes manila folders, manila envelopes, index cards, white envelopes, white window envelopes, notebook paper, and carbonless forms. This subtype does not include "white ledger", "colored ledger" or "computer paper".

"Miscellaneous Paper" includes the three subtypes described below. The subtypes are "magazines and catalogs", "phone books and directories", and "other miscellaneous paper".

(8) **Magazines and Catalogs** means items made of glossy coated paper. This paper is usually slick, smooth to the touch, and reflects light.

Examples: This subtype includes glossy magazines, catalogs, brochures and pamphlets.

(9) **Phone Books and Directories** means thin paper between coated covers. These items are bound along the spine with glue.

Examples: This subtype includes whole or damaged telephone books, "yellow pages", real estate listings, and some non-glossy mail order catalogs.

(10) **Other Miscellaneous Paper** means items made mostly of paper that do not fit into any of the above subtypes. Paper may be combined with minor amounts of other materials such as wax or glues. This subtype includes items made of chipboard, groundwood paper, and deep-toned or fluorescent dyed paper.

Examples: This subtype includes cereal and cracker boxes, unused paper plates and cups, goldenrod colored paper, hardcover and softcover books, school construction paper, butcher paper, and unopened junk mail.

(11) **Remainder/Composite Paper** means items made mostly of paper but combined with large amounts of other materials such as wax, plastic, glues, foil, food, and moisture.

Examples: This type includes waxed corrugated cardboard, aseptic packages, wax coated milk cartons, waxed paper, tissue, paper towels, blueprints, sepia, onion skin, fast food wrappers, carbon paper, self adhesive notes, and photographs.

GLASS

(12) **Clear Glass Bottles and Containers** means clear glass beverage and food containers with or without a CRV label.

Examples: This type includes whole or broken clear soda and beer bottles, fruit juice bottles, peanut butter jars, and mayonnaise jars.

"Colored Glass Bottles and Containers" includes food and beverage containers three subtypes described below. The subtypes are "green glass bottles and containers", "brown glass bottles", and "other colored containers".

(13) **Green Glass Bottles and Containers** means green-colored glass containers with or without a CRV label.

Examples: This subtype includes whole or broken green soda and beer bottles, and whole or broken green wine bottles.

(14) **Brown Glass Bottles and Containers** means brown-colored glass containers with or without a CRV label.

Examples: This subtype includes whole or broken brown soda and beer bottles, and whole or broken brown wine bottles.

(15) **Other Colored Glass Bottles and Containers** means colored glass containers and bottles other than green or brown with or without a CRV label.

Examples: This subtype includes whole or broken blue or other colored bottles and containers.

(16) **Flat Glass** means clear or tinted glass that is flat. This type does not include any subtypes.

Examples: This type includes glass window panes, doors, and table tops, flat automotive window glass (side windows), safety glass, and architectural glass. This subtype does not include windshields, laminated glass, or any curved glass.

(17) **Remainder/Composite Glass** means glass that cannot be put in any other type or subtype. It includes items made mostly of glass but combined with other materials. This type does not include any subtypes.

Examples: This type includes Pyrex, Corningware, crystal and other glass tableware, mirrors, auto windshields, and light bulbs.

METAL

The type "ferrous metals" includes three subtypes described below. The subtypes are "tin/steel cans", "major appliances", and "other ferrous".

(18) **Tin/Steel Cans** means rigid containers made mainly of steel. These items will stick to a magnet and may be tin-coated. This subtype is used to store food, beverages, paint, and a variety of other household and consumer products.

Examples: This subtype includes canned food and beverage containers, empty metal paint cans, empty spray paint and other aerosol containers, and bimetal containers with steel sides and aluminum ends.

(19) **Major Appliances** means discarded major appliances of any color. These items are often enamel-coated.

Examples: This subtype includes washing machines, clothes dryers, hot water heaters, stoves, and refrigerators. This subtype does not include electronics, such as televisions and stereos.

(20) **Other Ferrous** means any iron or steel that is magnetic or any stainless steel item. This subtype does not include "tin/steel cans".

Examples: This subtype includes structural steel beams, metal clothes hangers, metal pipes, stainless steel cookware, security bars, and scrap ferrous items.

"Non-Ferrous Metals" includes the two subtypes described below. The subtypes are "Aluminum Cans" and "Other Non-Ferrous".

(21) **Aluminum Cans** means any food or beverage container made mainly of aluminum.

Examples: This subtype includes aluminum soda or beer cans, and some pet food cans. This subtype does not include bimetal containers with steel sides and aluminum ends.

(22) **Other Non-Ferrous** means any metal item, other than aluminum cans, that is not stainless steel and that is not magnetic. These items may be made of aluminum, copper, brass, bronze, lead, zinc, or other metals.

Examples: This subtype includes aluminum window frames, aluminum siding, copper wire, shell casings, brass pipe, and aluminum foil.

(23) **Remainder/Composite Metal** means metal that cannot be put in any other type or subtype. This type includes items made mostly of metal but combined with other materials and items made of both ferrous metals and non-ferrous metal combined. This type does not include any subtypes.

Examples: This type includes brown goods (electronics and other small appliances), computers, televisions, radios, and electronic parts.

PLASTIC

"Plastic Containers" includes the three subtypes described below. The subtypes are "HDPE Containers" "PETE Containers", and "Other Plastic Containers".

(24) **HDPE Containers** means natural and colored HDPE containers. This plastic is usually either cloudy white, allowing light to pass through it (natural) or a solid color, preventing light from passing through it (colored). When marked for identification, it bears the number "2" in the triangular recycling symbol.

Examples: This subtype includes milk jugs, water jugs, detergent bottles, some hair-care bottles, empty motor oil, empty antifreeze, and other empty vehicle and equipment fluid containers.

(25) **PETE Containers** means clear or colored PETE containers. When marked for identification, it bears the number "1" in the center of the triangular recycling symbol and may also bear the letters "PETE" or "PET". The color is usually transparent green or clear. A PETE container usually has a small dot left from the manufacturing process, not a seam. It does not turn white when bent.

Examples: This subtype includes soft drink and water bottles, some liquor bottles, cooking oil containers, and aspirin bottles.

(26) **Miscellaneous Plastic Containers** means plastic containers made of types of plastic other than HDPE or PETE. Items may be made of PVC, PP, or PS. When marked for identification, these items may bear the number "3", "4", "5", "6", or "7" in the triangular recycling symbol.

Examples: This subtype includes food containers such as bottles for salad dressings and vegetable oils, flexible and brittle yogurt cups, syrup bottles, margarine tubs, microwave food trays, clamshell-shaped fast food or muffin containers, and foam egg cartons. This subtype also includes some shampoo containers and vitamin bottles.

(27) **Film Plastic** means flexible plastic sheeting. It is made from a variety of plastic resins including HDPE and LDPE. It can be easily contoured around an object by hand pressure. This type does not include any subtypes.

Examples: This type includes plastic garbage bags, food bags, dry cleaning bags, grocery store bags, packaging wrap, and food wrap. This type does not include rigid bubble packaging.

(28) **Durable Plastic Items** means plastic objects other than containers and film plastic. This type also includes plastic objects other than containers or film that bear the numbers "1" through "7" in the triangular recycling symbol. These items are usually made to last for more than one use.

Examples: This type includes plastic outdoor furniture, plastic toys and sporting goods, and plastic housewares, such as mop buckets, dishes, cups, and cutlery. This type also includes building materials such as house siding, window sashes and frames, housings for electronics such as computers, televisions and stereos, and plastic pipes and fittings.

(29) **Remainder and Composite Plastic** means plastic that cannot be put in any other type or subtype. This type includes items made mostly of plastic but combined with other materials. This type does not include any subtypes.

Examples: This type includes auto parts made of plastic attached to metal, plastic bubble packaging, drinking straws, foam drinking cups, produce trays, foam packing blocks, packing peanuts, foam plates and bowls, plastic strapping, plastic lids, and new plastic laminate (e.g., Formica), vinyl, and linoleum.

OTHER ORGANIC

(30) **Food** means food material resulting from the processing, storage, preparation, cooking, handling or consumption of food. This type includes material from industrial, commercial or residential sources. This type does not include any subtypes.

Examples: This type includes discarded meat scraps, dairy products, egg shells, fruit or vegetable peels, and other food items from homes, stores, and restaurants. This type includes grape pomace and other processed residues or material from canneries, wineries, or other industrial sources.

"Landscape and Agricultural" includes the four subtypes described below. The subtypes are "Leaves and Grass", "Prunings and Trimmings", "Branches and Stumps", and "Agricultural Crop Residues".

(31) **Leaves and Grass** means plant material, except woody material, from any public or private landscapes.

Examples: This subtype includes leaves, grass clippings, and plants. This subtype does not include woody material or material from agricultural sources.

(32) **Prunings and Trimmings** means woody plant material up to 4 inches in diameter from any public or private landscape.

Examples: This subtype includes prunings, shrubs, and small branches with branch diameters that do not exceed 4 inches. This subtype does not include stumps, tree trunks, or branches exceeding 4 inches in diameter. This subtype does not include material from agricultural sources.

(33) **Branches and Stumps** means woody plant material, branches and stumps that exceed 4 inches in diameter from any public or private landscape.

(34) **Agricultural Crop Residues** means plant material from agricultural sources.

Examples: This subtype includes orchard and vineyard prunings, vegetable by-products from farming, residual fruits, vegetables, and other crop remains after usable crop is harvested. This subtype does not include processed residues from canneries, wineries, or other industrial sources.

"Miscellaneous Organic" includes two subtypes described below. The subtypes are "Manures" and "Textiles".

(35) **Manures** means manure and soiled bedding materials from domestic, farm, or ranch animals.

Examples: This subtype includes manure and soiled bedding from animal production operations, race-tracks, riding stables, animal hospitals, and other sources.

(36) **Textiles** means items made of thread, yarn, fabric, or cloth.

Examples: This subtype includes clothes, fabric trimmings, draperies, and all natural and synthetic cloth fibers. This subtype does not include cloth covered furniture, mattresses, leather shoes, leather bags, or leather belts.

(37) **Remainder/Composite Organic** means organic material that cannot be put in any other type or subtype. This type includes items made mostly of organic materials but combined with other materials. This type does not include any subtypes.

Examples: This type includes leather items, carpets, cork, hemp rope, garden hoses, rubber items, hair, carpet padding, cigarette butts, disposable diapers, feminine hygiene products, and animal feces.

CONSTRUCTION AND DEMOLITION

(38) **Concrete** means a hard material made from sand, gravel, aggregate, cement mix and water.

Examples: This subtype includes pieces of building foundations, concrete paving, and cinder blocks.

(39) **Asphalt Paving** means a black or brown, tar-like material mixed with aggregate used as a paving material.

(40) **Asphalt Roofing** means composite shingles and other roofing material made with asphalt.

Examples: This type includes asphalt shingles and attached roofing tar and tar paper.

(41) **Lumber** means processed wood for building, manufacturing, landscaping, packaging, and processed wood from demolition. This type does not include any subtypes.

Examples: This type includes dimensional lumber, lumber cutoffs, engineered wood such as plywood and particleboard, wood scraps, pallets, wood fencing, wood shake roofing, and wood siding.

(42) **Gypsum Board** means interior wall covering made of a sheet of gypsum sandwiched between paper layers.

Examples: This subtype includes used or unused, broken or whole sheets of sheetrock, drywall, gypsum board, plasterboard, gypboard, gyproc, and wallboard.

(43) **Rock, Soil and Fines** means rock pieces of any size and soil, dirt, and other matter.

Examples: This subtype includes rock, stones, and sand, clay, soil and other fines. This subtype also includes non-hazardous contaminated soil.

(44) **Remainder/Composite Construction and Demolition** means construction and demolition material that cannot be put in any other type or subtype. This type may include items from different categories combined, which would be very hard to separate. This type does not include any subtypes.

Examples: This type includes brick, ceramics, tiles, toilets, sinks, and fiberglass insulation. This type may also include demolition debris that is a mixture of items such as plate glass, wood, tiles, gypsum board, and aluminum scrap.

HOUSEHOLD HAZARDOUS WASTE

(45) **Paint** means containers with paint in them. This type does not include any subtypes.

Examples: This type includes latex paint, oil based paint, and tubes of pigment or fine art paint. This type does not include dried paint, empty paint cans, or empty aerosol containers.

46) **Vehicle and Equipment Fluids** means containers with fluids used in vehicles or engines, except used oil. This type does not include any subtypes.

Examples: This type includes used antifreeze and brake fluid. This type does not include empty vehicle and equipment fluid containers.

(47) **Used Oil** means the same as defined in Health and Safety Code section 25250.1(a). This type does not include any subtypes.

Examples: This type includes spent lubricating oil such as crankcase and transmission oil, gear oil, and hydraulic oil.

(48) **Batteries** means any type of battery including both drycell and lead acid. This type does not include any subtypes.

Examples: This type includes car, flashlight, small appliance, watch and hearing aid batteries.

(49) **Remainder/Composite Household Hazardous** means household hazardous material that cannot be put in the "Paint", "Automotive Fluids", "Used Oil", or "Batteries" subtypes. This type also includes household hazardous material that is mixed. This type does not include any subtypes.

Examples: This type includes household hazardous waste which if improperly put in the solid waste stream may present handling problems or other hazards.

SPECIAL WASTE

(50) **Ash** means a residue from the combustion of any solid or liquid material. This type does not include any subtypes.

Examples: This type includes ash from fireplaces, incinerators, biomass facilities, waste-to-energy facilities, and barbecues. This subtype also includes ash and burned debris from structure fires.

(51) **Sewage Solids** means residual solids and semi-solids from the treatment of domestic waste water or sewage. This type does not include any subtypes.

Examples: This type includes biosolids, sludge, grit, screenings, and septage. This subtype does not include sewage or waste water discharged from the sewage treatment process.

(52) **Industrial Sludge** means sludge from factories, manufacturing facilities, and refineries. This type does not include any subtypes.

Examples: This type includes paper pulp sludge, and water treatment filter cake sludge.

(53) **Treated Medical Waste** has the same meaning as treated medical waste in Section 25023.5 of the Health and Safety Code. This type does not include any subtypes.

(54) **Bulky Items** means large hard to handle items that are not defined separately, including furniture, mattresses, and other large items. This type does not include any subtypes.

Examples: This type includes all sizes and types of furniture, mattresses, box springs, and base components.

(55) **Tires** means vehicle tires. This type does not include any subtypes.

Examples: This type includes tires from trucks, automobiles, motorcycles, heavy equipment, and bicycles.

(56) **Remainder/Composite Special Waste** means special waste that cannot be put in any other type.

Examples: This type includes asbestos-containing materials, such as certain types of pipe insulation and floor tiles, auto fluff, auto-bodies, trucks, trailers, truck cabs, and artificial fireplace logs.

MIXED RESIDUE

(57) **Mixed Residue** means material that cannot be put in any other type or subtype in the other categories. This category includes mixed residue that cannot be further sorted. This category does not include any types or subtypes.

Examples: This type includes residual material from a materials recovery facility or other sorting process that cannot be put in any of the previous remainder/composite types.

B.3 LIST AND EXAMPLES OF RPPCS

In addition to classifying all materials according to the 57 material categories, the contractor classified RPPCs (Rigid Plastic Packaging Containers) from each sample into the eight categories listed below.

	RPPC Material	Description and Examples
1	#1 PET Soda Bottles	PET bottles containing carbonated beverages such as soda pop, some sports drinks, or sparkling waters.
2	#1 PET Custom Bottles	PET bottles containing anything that is not a carbonated beverage. Examples include cooking oil bottles, shampoo bottles, and some liquor bottles.
3	#1 PET Non-Bottle Rigids	PET packages that are recloseable, such as packages containing small toys or hardware items.
4	#2 HDPE Natural Bottles	Primarily milk jugs and some juice bottles.
5	#2 HDPE Colored Bottles	Any HDPE bottle that is not clear/translucent. Examples include some orange juice bottles, many laundry detergent bottles, and some shampoo bottles.
6	#2 HDPE Other Containers	Examples include paint buckets, some margarine containers, some food jars, and some yogurt containers.
7	All Other RPPC Bottles	All plastic bottles that are not PET or HDPE. Examples include some sports drink bottles, many shampoo bottles, and some detergent bottles.
8	All Other RPPC Non-Bottles	Includes containers for some prepared foods, such as chip dip. Also includes some yogurt and margarine containers, as well as polystyrene egg cartons.

A container must meet all of the following criteria to be considered an RPPC.

- It is made entirely of plastic, except that lids, caps, or labels may be made of some other material.
- It is capable of maintaining its shape while holding a product.
- It is capable of multiple re-closure, with an attached or unattached lid or cap.
- Contains at least eight fluid ounces but no more than five gallons, or the equivalent volumes.
- It is normally used to store a product for seven days or longer (i.e., from the time the containers are filled).
- It is a packaging container in which a product is sold, offered for sale or distributed in California.

APPENDIX C: CIWMB STANDARD METHOD

C.1 DRAFT REGULATIONS GOVERNING DISPOSAL CHARACTERIZATION STUDIES

CALIFORNIA INTEGRATED WASTE MANAGEMENT BOARD
PRELIMINARY DRAFT REGULATIONS – NOVEMBER 13, 1996
DISPOSAL CHARACTERIZATION STUDIES

<Note: The following proposed text would add Article 6.0 to Title 14, California Code of Regulations, Division 7, Chapter 9.>

California Code of Regulations, Title 14, Division 7, Chapter 9

ARTICLE 6.0 DISPOSAL CHARACTERIZATION STUDIES

Section	DETAILED ANALYSIS
18726.0	Requirements for Conducting Disposal Characterization Studies
18726.1	General Information for Disposal Characterization Studies
18726.2	Determining Objectives and Scope of the Disposal Characterization Study
18726.3	Determining Data Collection Approach And Study Design
18726.10	Using Default Data for Disposal Characterization Studies
18726.20	Using Existing Data for Disposal Characterization Studies
18726.30	General Requirements for Conducting Landfill Sampling or Generator Sampling
18726.32	Health and Safety for Landfill Sampling or Generator Sampling
18726.34	Using Standard Sampling Protocols for Landfill Sampling or Generator Sampling
18726.40	Specific Requirements for Conducting Landfill Sampling
18726.45	Data Analysis for Landfill Sampling
18726.50	Specific Requirements for Conducting Generator Sampling
18726.52	Sample Selection for Generator Sampling
18726.54	Data Analysis for Generator Sampling
18726.60	Use of Alternatives to the Minimum Requirements for Landfill and Generator Sampling
18726.70	Combining Data Collection Approaches
18726.90	Reporting Requirements

ARTICLE 6.0 DISPOSAL CHARACTERIZATION STUDIES

Section 18726.0 Requirements for Conducting Disposal Characterization Studies

(a) Disposal Characterization Studies (DC studies) are generally conducted to collect information on the types and amounts of materials in the disposed waste stream. This information can be used to plan programs to divert solid waste from disposal. A jurisdiction shall conduct a DC study when:

(1) The Board has given the jurisdiction specific direction to conduct a DC Study, pursuant to Section 41770(b) of the Public Resources Code, because the jurisdiction has not met the 25% or 50% disposal reduction goal stated in Section 41780 of the Public Resources Code, or an alternative goal as approved by the Board;

(2) The jurisdiction will be revising its SRRE pursuant to Section 18788 of this Chapter and intends to include new disposal characterization information in the revision.

(b) The Uniform Waste Disposal Characterization Method, as specified in these regulations, shall be used by jurisdictions when conducting DC Studies. A DC Study shall constitute the Waste Characterization Component of a revised SRRE required by Sections 41030, 41032, 41330, and 41332 of the Public Resources Code.

(c) Jurisdictions conducting studies for purposes other than meeting the requirements of Section 18726.0(a) may use a method other than the Uniform Waste Disposal Characterization Method and need not include the resulting information in a revised SRRE. The information may be submitted as an appendix to the Waste Characterization Component, or in another Component of a revised SRRE.

NOTE: Authority: Section 40502 of the Public Resources Code.
Reference: Sections 41770, 41030, 41032, 41033, 41330, 41332, and 41333 of the Public Resources Code.

Section 18726.1 General Information for Disposal Characterization Studies

(a) A DC Study included in a revised SRRE is different from a Solid Waste Generation Study (SWGS) required to be included in an initial SRRE. Requirements for a SWGS are included in Article 5.0 of this Chapter, commencing with Section 18722.0.

(b) DC studies shall include the following five steps:

(1) select a characterization approach as specified in Sections 18726.2 and 18726.3 of this Article;

(2) collect data that is statistically representative of the jurisdiction as specified in Sections 18726.10, 18726.20, 18726.40 and 18726.50 of this Article;

(3) when sampling studies are conducted, use standard field protocols pursuant to Sections 18726.30 and 18726.34 of this Article;

(4) when sampling studies are conducted, use minimum health and safety standards pursuant to Section 18726.32 of this Article;

(5) when sampling studies are conducted, use standard data analysis methods pursuant to Sections 18726.45 and 18726.54 of this Article.

(c) Definitions which apply to this entire Chapter can be found in Article 3.0 of this Chapter (commencing with Section 18720.0). Definitions which apply specifically to DC Studies can be found in Section 18720.9 of Article 3.0 of this Chapter.

(d) Jurisdictions shall use the standard material type definitions found in Article 4.0 of this Chapter, commencing with Section 18721.0, when collecting information on their waste stream for a DC study.

(e) Reporting requirements for DC studies are found in Section 18726.90 of this Article.

(f) Jurisdictions may work together to conduct a DC study. The DC study shall characterize solid waste disposed from the participating jurisdictions. Waste characterization data shall be collected for each individual jurisdiction. Each participating jurisdiction shall individually follow the requirements of Sections 18726.2, 18726.3, and 18726.90 of this Article, and shall collect data that is statistically representative of the individual jurisdiction.

(g) Regional agencies, approved by the Board pursuant to Section 40975 of the Public Resources Code, may conduct a DC study to characterize waste from within the regional agency. The data collected must be statistically representative of the regional agency. Data for each member jurisdiction does not need to be reported by the regional agency. A city, county, or city and county, which has become a member of a regional agency, may prepare and submit to the Board an individual DC study, separate from that of the regional agency of which it is a member.

NOTE: Authority: Section 40502 of the Public Resources Code.
Reference: Sections 41770, 41030, 41032, 41033, 41330, 41332, and 41333 of the Public Resources Code.

Section 18726.2 Determining Objectives and Scope of the Disposal Characterization Study

(a) To determine the objectives of the DC study, jurisdictions shall consider the following factors.

(1) Any conditions set by the Board if required to conduct a DC Study because diversion goals have not been met.

(2) New or updated information the jurisdiction intends to include in a revised SRRE, excluding revisions to base-year quantity data as described in an

Annual Report prepared pursuant to Article 9.0 of this Chapter commencing with Section 18794.0.

(3) Intended use of waste characterization data, such as planning diversion programs, facility design, monitoring diversion program success, determining changes in waste stream characteristics, or other uses. The jurisdiction shall consider the data uses as related to program planning to meet disposal reduction goals.

(4) Any other factors the jurisdiction deems important.

(b) To determine the scope of the DC study, jurisdictions shall consider the following factors.

(1) Resources available for collecting waste characterization data, such as funding, staff time and expertise, or other resources. The tables in Sections 18726.40 and 18726.50 may be used to evaluate resource needs for DC sampling studies.

(2) Degree of accuracy and reliability of the data needed to satisfy the intended uses. Some data uses may require greater accuracy than can be achieved by use of the minimum standards described in these regulations.

(3) Whether information on material types shall be collected at the type or subtype level using the Material Type Definitions pursuant to Article 4.0 of this Chapter commencing with Section 18721.0.

(4) The extent of the data collection (i.e., comprehensive v. targeted studies) needed to satisfy the intended uses, and the sector(s), subpopulation(s), or other portion(s) of the waste stream to be included in the DC study such as the residential sector waste stream or the waste stream from a specific business grouping (subpopulation).

(5) Seasonal factors that affect the waste stream being characterized, such as those specified in Section 18726.45(c) of this Article.

(6) Special or unique waste streams that may need to be considered, such as self-haul, construction and demolition waste, biosolids, or disaster-related waste.

(7) Any other factors the jurisdiction deems important.

(c) The factors listed in this Section shall be used by the jurisdiction to determine the data collection approach as described in Section 18726.2 of this Article.

NOTE: Authority: Section 40502 of the Public Resources Code.
Reference: Sections 41770, 41030, 41032, 41033, 41330, 41332, and 41333 of the Public Resources Code.

Section 18726.3 Determining Data Collection Approach and DC Study Design

(a) The jurisdiction shall select one or more characterization approach(es) (i.e., how data will be collected) from the following:

(1) Use of default data from the CIWMB Waste Characterization Database. Jurisdictions may use default waste characterization data provided by the Board from the CIWMB Waste Characterization Database to collect information on their waste streams for diversion program planning. The requirements for using default data are found in Section 18726.10 of this Article.

(2) Use of existing data. Jurisdictions may use past studies conducted on their waste streams, or studies conducted by other jurisdictions, to collect information for diversion program planning. Jurisdictions may combine information from more than one existing study. The requirements for using existing data are found in Section 18726.20 of this Article.

(3) Landfill sampling or disposal facility sampling. Portions of waste (samples) are taken from trucks delivering waste to a facility such as a landfill, transfer station, or transformation facility. This approach is generally used to collect data at the sector level, such as for the residential sector or non-residential sector of a jurisdiction. The requirements for conducting landfill sampling studies are found in Sections 18726.30, 18726.32, 18726.34, 18726.40, and 18726.45 of this Article.

(4) Waste generator sampling. Portions of waste (samples) are collected directly from generators (such as individual residences or businesses) before the waste has been mixed with waste from other generators. This usually means samples are taken from individual bins before the waste is picked up by a collection vehicle. Waste characterization data can then be traced to a specific type of generator. Waste generator sampling is generally used to collect data for specific generators or groups of generators, such as similar types of businesses or residences. The requirements for conducting generator sampling studies are found in Sections 18726.30, 18726.32, 18726.34, 18726.50, 18726.52, and 18726.54 of this Article.

(5) Combination of approaches described in this Section, where appropriate. The requirements for combining approaches are found in Section 18726.70 of this Article.

(b) For a targeted waste type, such as household hazardous waste, or a targeted group of waste generators, jurisdictions may use a mass balance or materials flow data collection approach. This approach shall only be used if the jurisdiction determines it is the best way to collect the specific data needed. With a mass balance method, information on a jurisdiction's waste stream is developed by using data on quantities of commodities sold in the jurisdiction's marketplace. This data is used to estimate

solid wastes disposed as a result of the sale of these commodities. The jurisdiction shall, in the Waste Characterization Component of the SRRE, explain why this approach was chosen, and describe how the mass balance DC study was designed and conducted.

(c) If the factors listed in Section 18726.2 indicate one particular approach described in this section to be most appropriate, but the jurisdiction prefers to use another approach described in this section, it shall explain in the Waste Characterization Component of the SRRE how the preferred approach still meets the needs of the data collection effort and/or any specific direction given by the Board.

NOTE: Authority: Section 40502 of the Public Resources Code.
Reference: Sections 41770, 41030, 41032, 41033, 41330, 41332, and 41333 of the Public Resources Code.

Section 18726.10 Using Default Data For Disposal Characterization Studies

(a) The Board's default data incorporated into the CIWMB Waste Characterization Database includes the following information:

(1) disposal compositions for the business subpopulations listed in Appendix 3, which is hereby incorporated by Reference. These are based on statewide average data from generator-based waste characterization studies;

(2) statewide average disposal correlative factors for the subpopulations listed in Appendix 3, which relate the tons of waste disposed per employee per year;

(3) the numbers and types of businesses in each jurisdiction, and the number of employees in each subpopulation listed in Appendix 3 in the jurisdiction, based on a commercially-available business information database;

(4) composition of the disposed residential waste stream, based on a statewide average composition;

(5) a statewide average disposal correlative factor for the residential waste stream relating tons disposed per resident.

(b) The jurisdiction shall evaluate whether default data provided by the Board will adequately meet the objectives and scope of the DC study, as determined in Section 18726.2 of this Article.

(c) The jurisdiction shall evaluate whether the default data is applicable to local conditions such as local diversion programs, climate, economic factors, demographic factors, and other local factors which the jurisdiction determines to be important. The jurisdiction shall consider the following characteristics of the default data in the evaluation:

(1) Default data represents the average of data from all samples characterized in each subpopulation and made available to the Board. The CIWMB Waste Characterization Database makes information from many studies readily available for use by jurisdictions by providing this average data. Composition and disposal correlative factor data is based on samples and other information collected from the disposed waste streams of individual businesses and residences in some jurisdictions in California. Default data reflects the waste patterns and diversion programs existing in those jurisdictions. Jurisdictions using default data shall consider local waste patterns, diversion programs, and other circumstances that may differ from average conditions and may affect applicability of default data for the purposes of the study.

(2) Waste patterns within a subpopulation in a particular jurisdiction may vary from the average, due to the different sizes and types of businesses included in the local subpopulation.

(3) The numbers and types of businesses in a jurisdiction may change rapidly and this may not be accurately reflected in default data.

(d) DC studies using default data will be considered statistically representative if the jurisdiction demonstrates that default data meets the objectives and scope of the DC study, and is applicable to local conditions according to the evaluation required by this Section. If the evaluation shows that the addition of local data is needed to increase the applicability of default data to local conditions, and local data is available, the default data may be modified to include data on local conditions.

(e) The jurisdiction shall briefly explain, in its Waste Characterization Component of a revised SRRE, the applicability of default data to the local conditions, how it was evaluated, and how it was used to meet the scope and purpose of the DC study. If default data was modified to better reflect local conditions, this shall also be described in the Waste Characterization Component.

NOTE: Authority: Section 40502 of the Public Resources Code.
Reference: Sections 41770, 41030, 41032, 41033, 41330, 41332, and 41333 of the Public Resources Code.

Section 18726.20 Using Existing Data for Disposal Characterization Studies

(a) A jurisdiction may use past studies conducted on its waste stream, or studies conducted on the waste streams of other jurisdictions, to collect information for a DC study. A jurisdiction may combine information from more than one existing study.

(b) The existing data used shall not be more than 5 years old.

(c) The jurisdiction shall evaluate whether the existing data is compatible with the objectives and scope of the DC study as determined by Section 18726.2 of this

Article, and is specific and accurate enough to accomplish the purpose of the new DC study.

(d) When using existing data from another jurisdiction, the jurisdiction shall show that the other jurisdiction is comparable because of similarities between the sources of disposal.

(1) When using residential data from a comparable jurisdiction, the jurisdiction shall compare characteristics of the residential sector that affect the subtypes and amounts of solid waste disposed. Examples of characteristics that may affect the subtypes and amounts of residential solid waste include: population, population density, income, lot size, percent of single family homes v. multi-family, amount of rural area v. urban area, education level, amount of mandatory collection of waste v. self-haul, type of disposal collection, disposal fees (variable can rates, self-haul fees), availability and convenience of diversion programs, or climate.

(2) When using non-residential data from a comparable jurisdiction, the jurisdiction shall compare characteristics of the non-residential sector that affect the subtypes and amounts of solid waste disposed. Examples of characteristics that may affect the subtypes and amounts of non-residential solid waste include: numbers and types of commercial and industrial businesses, relative proportions of business types, sizes of businesses, number of employees at different businesses, building density, taxable sales, types of products sold, amount of rural area v. urban area, amount of mandatory collection of waste v. self-haul, type of disposal collection, disposal fees (variable can rates, self-haul fees), availability and convenience of diversion programs, or climate.

(3) The jurisdiction shall describe the characteristics that are similar, and the characteristics that are different, between the two jurisdictions that affect the subtypes and amounts of solid waste disposed for each source characterized. This information shall be included in the Waste Characterization Component of a revised SRRE, and shall include relevant numerical information that is commonly available.

(e) The existing data used must be statistically representative of the jurisdiction. DC studies based on use of existing data will be considered to meet this if one of the following conditions is met:

(1) The existing data comes from studies which meet the criteria specified in Sections 18726.40 and 18726.50 of this Article, and the data comes from the jurisdiction itself or from a comparable jurisdiction.

(2) The existing data meets the requirements of this Article.

(3) Other data which does not meet the criteria of this Section may be acceptable if the jurisdiction can show that it is statistically representative based on other

criteria, and approved by Board staff prior to use, on a case-by-case basis, as specified in Section 18726.52(f) of this Article.

(4) Jurisdictions may conduct limited sampling to supplement existing data, or combine data sets, in order to develop a data set that is statistically representative of the jurisdiction.

(f) Waste characterization field studies may have been conducted for the purpose of revising a SRRE prior to Board approval of the Uniform Waste Disposal Characterization Method. These studies may not meet all the requirements for statistical representativeness specified in Sections 18726.40 and 18726.50 of this Article. Jurisdictions may receive approval to use data from these studies, on a case-by-case basis as described in Section 18726.52(f) of this Article, if the jurisdiction demonstrates that the existing study adequately meets its needs for diversion program planning and evaluation.

(g) The jurisdiction shall, in the Waste Characterization Component of a revised SRRE, identify the source of existing data used, briefly describe how the data was collected or include the study itself, explain how the data is statistically representative of the jurisdiction, and explain how it meets the objectives and scope of the new DC study, as was identified according to Section 18726.2 of this Article.

NOTE: Authority: Section 40502 of the Public Resources Code.
Reference: Sections 41770, 41030, 41032, 41033, 41330, 41332, and 41333 of the Public Resources Code.

Section 18726.30 General Requirements for Conducting Landfill Sampling or Generator Sampling

DC sampling studies may be conducted using landfill sampling or generator sampling, or a combination of both. Health and safety protocol and field protocol requirements are the same for both types of DC studies, as described in Sections 18726.32 and 18726.34 of this Article. Requirements for sample selection, number of samples, sample weights, addressing seasonality, and data analysis are different for landfill and generator sampling, as described in Sections 18726.40 through 18726.54 of this Article.

NOTE: Authority: Section 40502 of the Public Resources Code.
Reference: Sections 41770, 41030, 41032, 41033, 41330, 41332, and 41333 of the Public Resources Code.

Section 18726.32 Health and Safety for Landfill Sampling or Generator Sampling

(a) Before conducting landfill or generator sampling, the local waste characterization project manager shall assess the health and safety issues associated with each individual sort and establish the appropriate training, procedures, and safeguards. Health and safety measures may include development of local protocols, training and supervision of sorters, designation of an on-site Safety Officer, or other measures.

(b) The jurisdiction shall consider the "Health and Safety Plan for Waste Characterization Studies" included in Appendix 1, which is incorporated by Reference, to help identify and evaluate risks. Every waste characterization study is different, and this Plan cannot identify every possible risk.

(c) The jurisdiction shall briefly list in the Waste Characterization Component of the SRRE the health and safety measures used for the DC sampling study.

NOTE: Authority: Section 40502 of the Public Resources Code.
Reference: Sections 41770, 41030, 41032, 41033, 41330, 41332, and 41333 of the Public Resources Code.

Section 18726.34 Using Standard Sampling Protocols for Landfill Sampling or Generator Sampling

(a) Physical or visual sample sorting procedures may be used. Jurisdictions shall consider the "Physical and Visual Solid Waste Sorting Procedures" included in Appendix 2, which is incorporated by Reference, as a guideline for sorting. Once the sample has been identified, the entire sample should be placed on a clean surface and sorted, either all at once or in stages. Materials should be assigned to waste types or subtypes. The weight or volume of each type or subtype shall be measured for each sample, and from this the percentage of each material type shall be determined for each sample.

(1) Since visual sorting may be prone to more errors of estimation than physical sorting, quality control measures shall be used to increase accuracy. The jurisdiction shall concisely describe in the Waste Characterization Component of a revised SRRE the quality control measures that were used. Examples of such measures are:

(A) At least 2 people estimate the composition of a sample, and the average value of each material type is used;

(B) Periodically perform both a visual and physical sort on the same sample, for example every fifth sample. Perform the physical sort after the visual sort, and continually adjust estimation procedures to improve accuracy.

(C) Weighing specific items in the sample when it is difficult to estimate the item's volume (for example, a broken chair).

(b) The sample shall be sorted into standard material types or subtypes, according to the definitions in Article 4.0 of this Chapter, commencing with Section 18721.0. At a minimum, data shall be collected at the standard material type level. If more detailed data is collected for submission to the Board, the subtype definitions in Article 4.0 of this Chapter, commencing with Section 18721.0 shall be used in place of the material type(s) definitions. The jurisdiction may design other subtypes according to the protocols described in Article 4.0 of this Chapter. The subtype level may be used

for some categories and the type level for other categories, according to the data needs of the jurisdiction.

(c) When sorting materials, sometimes it is unclear which type or subtype materials should be assigned to, due to contamination or other reasons. If the data from the study will be used to plan diversion programs which involve separating or reducing materials at the source, this general rule shall be used: Items that have the potential to be diverted through waste prevention or source-separated diversion programs shall be classified into higher value material types, and items that have little potential for diversion programs shall be classified in lower value material types.

NOTE: Authority: Section 40502 of the Public Resources Code.
Reference: Sections 41770, 41030, 41032, 41033, 41330, 41332, and 41333 of the Public Resources Code.

Section 18726.40 Specific Requirements for Conducting Landfill Sampling

(a) As required by Public Resources Code Sections 41032 and 41332, for the data collected from landfill sampling to be statistically representative of the solid waste disposed by the jurisdiction and to reflect seasonal variation, samples shall be selected according to Table 1. Jurisdictions may collect more samples over more seasons than specified by these minimum requirements.

Table 1. Sample Numbers and Weights for Landfill Sampling.

Type of Disposal Characterization Study	Minimum Number of Samples per Year	Minimum Sample Weight
Landfill Sampling - Residential Sector	30, distributed over a minimum of 2 seasons	200 pounds
Landfill Sampling - Non-Residential Sector	40, distributed over a minimum of 2 seasons	200 pounds

(b) To address seasonal variations that may occur during the calendar year, jurisdictions shall assess cyclical patterns of local climate, demography, commerce, or other local factors which may affect the composition of the waste stream. Sampling shall occur during a minimum of two seasons, with the number of samples split between the sampling periods, so as to gather the most representative data for the jurisdiction.

(c) Vehicles from which samples are taken shall be chosen randomly. The sampled portion of the vehicle load shall also be chosen randomly by the grid method or by the cone and quarter method as described in the *ASTM Standard Test Method for Determination of the Composition of Unprocessed Municipal Solid Waste*, published September 1992, which is incorporated by Reference. The jurisdiction shall verify that the vehicle sampled carries waste from the jurisdiction and sector being characterized.

(d) Only one sample shall be taken from each truck. More than one sample may be taken from one truck only if the jurisdiction notifies Board staff of the sampling plan

prior to the study, and demonstrates that the data collected will be statistically representative, and:

(1) the number of truckloads available for sampling in one season is less than 20; or

(2) the jurisdiction's study design shows that more than one sample per truck is desirable to achieve the study purpose.

NOTE: Authority: Section 40502 of the Public Resources Code.
Reference: Sections 41770, 41030, 41032, 41033, 41330, 41332, and 41333 of the Public Resources Code.

Section 18726.45 Data Analysis for Landfill Sampling

For randomly selected samples from a sector taken at a landfill or other disposal facility, the average composition shall be determined. This is done by summing the percentage of the material type in each sample and dividing by the number of samples. The calculation is performed for each material type or subtype characterized. The average percentage of material type, confidence interval at a 90% confidence level, and the standard deviation shall be calculated for each material type. To calculate estimated tonnages of each material type disposed by the sector, the average material type percentage is multiplied by the total tonnage disposed by the sector.

NOTE: Authority: Section 40502 of the Public Resources Code.
Reference: Sections 41770, 41030, 41032, 41033, 41330, 41332, and 41333 of the Public Resources Code.

Section 18726.50 Specific Requirements for Conducting Generator Sampling

(a) For generator sampling, generators shall be made in to groups of similar businesses or residences. These groups are called subpopulations. An example of a business subpopulation is “retail trade food stores” and an example of a residential subpopulation is “apartment buildings.” Appendix 3 lists business subpopulations that may be used for generator DC studies in the non-residential sector. Generator sampling may be used to characterize entire sectors as well as subpopulations.

(b) As required by Public Resources Code Sections 41032 and 41332, for the data collected to be statistically representative of the solid waste disposed by the jurisdiction and to reflect seasonal variation, samples shall be selected according to Table 2. Jurisdictions may collect more samples over more seasons than specified by these minimum requirements.

Table 2. Sample Numbers and Weights for Generator Sampling.

Type of Disposal Characterization Study	Minimum Number of Samples Per Year	Minimum Sample Weight
Generator Sampling - Residential Sector	40, distributed over a minimum of 2 seasons	125 lb. or 1.5 CY* or Whole Sample
Generator Sampling - Non-Residential Sector-level Study	50, distributed suitably to reflect seasons	125 lb. or 1.5 CY or Whole Sample
Generator Sampling - Subpopulation Level with Similar Businesses in Subpopulation	25, distributed suitably to reflect seasons	125 lb. or 1.5 CY or Whole Sample
Generator Sampling - Subpopulation Level with Different Business in Subpopulation	40, distributed suitably to reflect seasons	125 lb. or 1.5 CY or Whole Sample

* CY = cubic yards

(c) When the types of businesses grouped together in a subpopulation are different from each other, more samples should be taken to adequately characterize the variability. Generally, subpopulation numbers 1, 2, 3, 4, 11, 15, 16, 17, 22, 23, 24, 30, and 37 in Appendix 3 are subpopulations with different businesses included in the grouping. Jurisdictions shall evaluate the generators in their jurisdiction which are included in their target subpopulation to determine if they are different enough to require more sampling.

(d) To address seasonal variations that may occur during the calendar year, jurisdictions shall assess cyclical patterns of local climate, demography, trade, or commerce, or other local factors which may affect the composition of the waste stream being sampled. Sampling should be timed to gather the most representative data for the jurisdiction or the most important data to achieve the purposes of the DC study. For residential generator DC studies, sampling shall occur during a minimum of two seasons, and the number of samples shall be split between the sampling periods.

NOTE: Authority: Section 40502 of the Public Resources Code.
Reference: Sections 41770, 41030, 41032, 41033, 41330, 41332, and 41333 of the Public Resources Code.

Section 18726.52 Sample Selection for Generator Sampling

(a) For generator DC studies, individual businesses or residences shall be selected for sampling. The sector or subpopulation being sampled shall be subdivided ("stratified") into sampling groups ("strata") and individual generators shall be chosen from each group. Strata shall be based on criteria affecting waste patterns such as size of business (based on number of employees) or type of residence (multifamily or single family). The number of samples shall be allocated to each strata according to its proportion of the waste stream.

(b) For residential generator sampling studies which include the entire residential sector, the jurisdiction shall stratify residential generators into single-family residences and multi-family residences. Samples shall be allocated to each strata proportionate to the amount of waste disposed by the strata.

(c) For non-residential generator sampling studies, jurisdictions may use the method for grouping generators which is most appropriate for the intended use of the waste characterization data. The recommended method of stratification and sample allocation is the "80/20 rule." This approach is based on the assumption that 80% of the waste comes from 20% of the businesses (the largest businesses in the group). When using this rule, the sector or subpopulation shall be stratified by size so that the larger businesses that make up 20% of the group are separated from the other 80% of the businesses. The total number of generators to be sampled shall be allocated so that 80% of the samples are randomly assigned to businesses in the large generator group, and the remaining 20% of the samples are randomly assigned to the remaining businesses (which generate 20% of the waste).

(1) When randomly selecting businesses in a strata, the businesses shall be weighted so that larger businesses have a greater chance of being sampled, proportionate to the size of the business.

(d) In addition to composition data collected by sorting waste samples, the jurisdiction shall collect information on generators and strata characterized. This data is needed to extrapolate sample data as specified in Section 18726.54. This information consists of the following:

(1) An estimate of the total annual amount of waste disposed by each generator sampled. Estimates may be obtained from the generator, from the hauler which serves the generator, or the estimate may be made based on the size of waste container used by the generator and the frequency of collection of waste from the container.

(2) Number of employees or residents at each generator site sampled.

(3) Total number of employees or residents in each strata sampled.

(4) Total number of employees or residents in the subpopulation or sector being characterized.

(e) When only a portion of the waste in a generator's garbage bin is needed to meet minimum sample weight or volume, that portion shall be chosen randomly and the bin shall be divided vertically rather than horizontally. For example, waste shall be removed from the right half or left half of the garbage bin rather than the top half or bottom half. This procedure ensures that sample selection addresses settling of heavy objects that may be missed when waste is only removed from the top portion of a bin.

(f) If for a particular targeted study, or in a particular jurisdiction, stratification of generators is not possible or desirable for the study purposes, another sampling design may be used only if approved by Board staff prior to the beginning of the study. A description of the alternative method shall be submitted to the Board for review and approval. Within 10 working days from receipt of this material, Board staff shall inform the applicant if the application is deficient, and what specific additional information is required. Board staff shall approve or disapprove of the alternative

method within 30 days from the date the jurisdiction submits sufficient information. The jurisdiction may appeal Board staff's disapproval of the alternative method to the Board. The alternative plan and Board approval shall be included in the Waste Characterization Component of the revised SRRE.

NOTE: Authority: Section 40502 of the Public Resources Code.
Reference: Sections 41770, 41030, 41032, 41033, 41330, 41332, and 41333 of the Public Resources Code.

Section 18726.54 Data Analysis for Generator Sampling

(a) The extrapolation formulas below shall be used for generator studies for the non-residential sector, to address the variability between businesses. These formulas use the information described in Section 18726.52(d). The purpose of data extrapolation is to use information from individual samples to estimate the overall composition of the waste stream that was sampled. Jurisdictions may calculate the formulas by hand, use a self-developed electronic spreadsheet, or use an electronic spreadsheet provided by the Board. The statistical method used is called "a ratio estimator using stratification with probability proportionate to size."

(1) $$\text{Material compostion \% for subpopulation} = \frac{\sum_j \frac{1}{n_j}\left(\sum_i \frac{e_j}{e_{ij}} t_{ij} p_{ij}\right)}{\sum_j \frac{1}{n_j}\left(\sum_i \frac{e_j}{e_{ij}} t_{ij}\right)}$$

(2) $$\text{Tonnage extrapolation for subpopulation} = \frac{\sum_j \frac{1}{n_j}\left(\sum_i \frac{e_j}{e_{ij}} t_{ij}\right)}{\sum_j \frac{1}{n_j}\left(\sum_i \frac{e_j}{e_{ij}} e_{ij}\right)} \times E$$

Where p_{ij} = composition percent of target material for i^{th} generator in the j^{th} stratum
t_{ij} = tonnage at i^{th} generator in the j^{th} stratum
n_j = number of samples in the j^{th} stratum
e_{ij} = employees or residents at i^{th} generator in the j^{th} stratum
e_j = employees or residents of the j^{th} stratum of the subpopulation
E = estimate of employees or residents in the subpopulation

(b) The jurisdiction may use another data analysis procedure if it demonstrates that it is a more appropriate method for analyzing the specific data collected, and if approved by Board staff on a case-by-case basis, as described in Section 18726.52(f) of this Article.

(c) To improve accuracy, the variability between businesses sampled shall be taken into account in the extrapolation. This is done by weighting the sample data from individual businesses so that the composition data from the larger companies is given more weight. This will result in a composition that better reflects the whole group of businesses. The general extrapolation approach is as follows:

(1) First an individual "disposal correlative factor" of tons disposed per employee per year is calculated, for each business sampled. A disposal correlative factor relates the amount of waste disposed to the number of employees at the business. When the businesses have been grouped into strata, as described in Section 18726.52 of this Article, an average disposal correlative factor for each stratum can be developed. This takes the variability due to business size into account. The overall disposal correlative factor for the subpopulation is the weighted average of the strata disposal correlative factors.

(2) Data from each stratum is used to develop the overall composition for the subpopulation. It is more accurate to give the composition of a larger stratum more weight than a smaller one, rather than simply averaging the two compositions. This is done by weighting the composition of each stratum by the number of employees in that stratum. This addresses the variability in a subpopulation due to strata being different sizes. For example, the composition of one stratum with 9,000 employees is given more weight than the composition of a second stratum which has only 1,000 employees.

(d) If the jurisdiction cannot obtain all the data required for the formulas, the formulas may be modified to use the data that is available. The general approach of weighting individual sample data shall be followed in the modified formula.

(e) For residential generator sampling studies, the average composition of each subpopulation shall be determined according to the procedure in Section 18726.45 of this Article. To determine the composition of the residential sector, the weighted average composition of the subpopulations shall be used.

(f) If generator sampling is used to determine an overall composition for the non-residential sector, the composition of each subpopulation in the sector shall be weighted according to the tonnage contributed by the subpopulation to the sector's overall tonnage amount.

(g) If generator sampling data is used to determine the tonnage disposed by a sector, the accuracy of the sector tonnage amount may be checked against information from the disposal reporting system. Information from the disposal reporting may be used to adjust data from the DC study to improve accuracy.

(h) If generators were not stratified, and were randomly chosen, average compositions shall be determined as in Section 18726.45.

NOTE: Authority: Section 40502 of the Public Resources Code.
Reference: Sections 41770, 41030, 41032, 41033, 41330, 41332, and 41333 of the Public Resources Code.

Section 18726.60 Use of Alternatives to the Minimum Requirements for Landfill and Generator Sampling

(a) A jurisdiction may conduct sampling in only one season if it meets all of the following requirements:

(1) it has determined that sampling during only one period during the year will provide data that is statistically representative and reflects seasonal variation in the waste stream being characterized;

(2) it receives approval from Board staff for the alternative sampling plan prior to the beginning of the DC study, as described in Section 18726.52(f) of this Article; and

(3) the DC study characterizes the minimum number of samples as specified in Sections 18726.40 and 18726.50 of this Article.

(b) A jurisdiction may use minimum sample numbers lower than those specified in Sections 18726.40(a) and 18726.50(b) of this Article if it meets one of the following two requirements, and it receives approval by Board staff for the alternative sampling plan prior to the beginning of the DC study, as described in Section 18726.52(f) of this Article.

(1) it demonstrates that the proposed alternative sampling plan will provide data that is statistically representative for the purpose of the DC study (for example, a DC study focused on 20 specific businesses);

(2) it demonstrates only limited sampling is possible due to financial or other resource constraints.

NOTE: Authority: Section 40502 of the Public Resources Code.
Reference: Sections 41770, 41030, 41032, 41033, 41330, 41332, and 41333 of the Public Resources Code.

Section 18726.70 Combining Data Collection Approaches

DC studies conducted using a combination of data collection approaches will be considered statistically representative if data collected from each approach is shown to be statistically representative according to the above requirements.

NOTE: Authority: Section 40502 of the Public Resources Code.
Reference: Sections 41770, 41030, 41032, 41033, 41330, 41332, and 41333 of the Public Resources Code.

Section 18726.90 Reporting Requirements

(a) Jurisdictions shall report information on how the DC study was designed and conducted, and information on the results of the study, as specified in this Article. Any conditions set by the Board for DC studies shall be included. The results of consideration of the factors listed in Section 18726.2 and how determination of the data collection approach shall be discussed in the Waste Characterization Component of the revised SRRE.

(b) The following information shall be reported for sampling studies:

(1) number of samples in each sector or subpopulation sampled
(2) stratification procedure, if one was used
(3) timing of sampling, number of samples in each season, and how seasons were identified
(4) sample selection procedure
(5) whether samples were physically or visually sorted
(6) sample weights or volumes (may be reported as range)
(7) conversion factors used to convert volume to weight
(8) composition of each sector, subpopulation, or group characterized, including percent composition of each material type, confidence interval for each material type at the 90% confidence level, and estimated tonnage or cubic yards of each material type. The minimum level of reporting shall be the sector level.
(9) For non-residential generator sampling, the number of strata used, number of samples taken in each strata, and average disposal correlative factor for each strata shall also be reported.

(c) Table 3 is an example of how data may be reported to the Board for sampling studies.

Table 3. Example Format for Data Reporting.

Residential Sector Waste Composition			
Material Type	Average Composition (%)	± Confidence Interval at 90% Confidence Level	Estimated Tonnage for Waste Stream
Paper	31	5	310
Glass	12	4	120
Metal	7	3	70
Plastic	8	2	80
Other Organic	34	6	340
Construct./Demo.	6	3	60
Household Hazard.	1	1	10
Special Waste	1	1	10
Seasons Identified, Timing of Sampling: 2, Winter & Summer	Number of Samples per Season: 15	Total Number of Samples: 30	Estimated total tonnage of Residential Waste Stream: 1,000 tons

(d) For studies conducted using default data or existing data, the composition percentage of each material type or subtype and estimated tonnage shall be reported. The minimum level of reporting shall be the sector level.

(e) The following information shall also be included in the Waste Characterization Component of a revised SRRE:

(1) Any Board-approved revision to base year generation, disposal, or diversion amounts

(2) Residential and non-residential percentage of the waste stream, and amount of waste disposed by the jurisdiction, as reported in the most current Annual Report

(3) Revised or updated solid waste projections which list the total tonnages of disposal, diversion, and generation, and the percentage of solid waste diverted, for at least 10 years following the year the revised SRRE is submitted to the Board. Projections shall be developed according to Section 18722.10 of Article 5.0 of this Chapter, except that projections may be developed starting with the year the revised SRRE is submitted to the Board rather than the base year.

(f) If discrepancies are found between disposal reporting information collected according to Article 9.0 of this Chapter and data collected for a DC study, these discrepancies shall be discussed in the Waste Characterization Component of the revised SRRE.

NOTE: Authority: Section 40502 of the Public Resources Code.
Reference: Sections 41770, 41030, 41032, 41033, 41330, 41332, and 41333 of the Public Resources Code.

DRAFT HEALTH AND SAFETY PROTOCOL

Original: Yes
Replaces: None
Date: April 7, 1995

ARTICLE 6.0 DISPOSAL CHARACTERIZATION STUDIES

Health and Safety Guidelines for Waste Characterization Studies

1. **Introduction:**

The purpose of this document is to provide safety guidelines for performing visual and/or physical characterizations of non-hazardous solid waste from various selected garbage dumpsters, transfer stations, and sanitary landfills.

2. **Table of Contents:**

1.0 Introduction
2.0 Table of Contents
3.0 Specific procedure
- 3.01 List of Potential Hazards
- 3.02 Recommended Personal Safety/Protective Equipment
- 3.03 Responsible Personnel
- 3.04 General Safety Procedures
- 3.05 Site Control in Work Zones
- 3.06 Site Resources and personnel
- 3.07 Site Maps
- 3.08 Agreement to Comply with the Health and Safety Plan

3. **Specific Procedure:**

3.01 List of potential hazards

The following section lists some possible hazards that may occur during a visual and a physical sort of solid waste.

a. Physical hazards:

Cuts and punctures from handling hazardous materials: hypodermic needles, broken glass, razor blades, aerosol cans, chemicals, biohazards, bottles of unknown/unlabeled substances, plastic bottles containing used syringes, and other hazardous materials
Back injury
Slipping and falling
Heat stress and fatigue

Traffic or heavy equipment movement
Noise exposure from operation of heavy equipment
Animal and/or insect bites

b. Airborne contaminants:

Dust from solid waste

c. Chemical hazards:

Liquid spills from containers
Household and hazardous chemicals

d. Biological hazards:

Household hazardous wastes
Medical wastes and sharps
Bloody rags or objects
Hypodermic needles

3.02 Recommended personal safety/protective equipment

The following section lists some of the personal safety/protective equipment recommended for a visual and physical sort of solid waste.

a. Body protection:

Tyvek or equivalent, disposable coveralls
Chemical resistant coveralls, if appropriate
Hard bottomed, non-slip, steel toe boots
A supply of outer rubber (cut and puncture resistant) gloves
Chemical goggles or safety glasses with splash shields
Dust masks
A supply of inner (latex) gloves
Snake guards, if appropriate
Insect repellent
Dog repellent

b. Hearing protection (if site has equipment or activities that generate loud noises):

Ear plugs
Ear muffs

c. Other safety equipment:

Supportive back belt for heavy lifting

Industrial first aid kit
Field blanket
Eye wash kit
Moist, disposable towelettes (e.g., baby wipes)
Six foot pole
Small fire extinguisher
Portable telephone
High visibility traffic cones and tapes
Site specific safety plan
Liquids to replenish fluids (water and cups for dehydration)

3.03 Responsible personnel

The following section lists some of the duties and responsibilities of personnel who are supervising and conducting a visual/physical sort of solid waste.

a. Supervising, Project Manager's duties and responsibilities:

Delegate health and safety responsibilities to the Site Safety Officer, ensure that proper procedures are implemented by qualified personnel in a safe manner, make available proper personal protective equipment, adequate time, and budget.

Ensure that all field personnel have read, understood, and signed the master copy of this document.

Check that all the site personnel have received, and documented training on waste characterization methods, recognizing hazardous wastes, potential risks from handling hazardous materials, managing site traffic, controlling dust/airborne contaminants, and back injury prevention.

b. Site Safety Officer's (can be the same person as above) duties and responsibilities:

Has the duty and authority to stop unsafe operations, supervise CPR, and decide when to summon emergency services.

Ensure that the guidelines, rules, and procedures in this document are followed for all site work.

Be familiar with local emergency services, and maintain a list of emergency phone numbers. Provide a map with the quickest route to a medical facility.

Conduct daily tailgate health and safety meetings before each shift, and a daily summary meeting at the end of each shift to

discuss the day's safety issues, possible solutions, and notify personnel of all changes associated with health, safety, and protocol.

Maintain and inspect personal protective equipment. Ensure proper use of personal protective equipment by all employees.

Monitor on site hazards and the early health warning signs (e.g., heat stress/stroke, dehydration, or fatigue) of site personnel. It is recommended that on hot days, outdoor sampling should be done during the early hours.

Has completed appropriate health and safety training. (Recommended: 40-hour Hazardous Waste Operation & Emergency response, CCR, T8, Section 5192-OSHA).

3.04 General safety procedures

The following section lists some of the general safety procedures recommended for a visual/physical sort of solid waste.

a. All waste sorting personnel should: be in good physical condition, have had a recent medical exam, maintain a current tetanus booster and Hepatitis B shot, not be sensitive to odors and dust, and be able to read warning signs/labels on waste containers.

b. There will be absolutely no eating, smoking or drinking during sorting activities. Food and liquids are to be away from the sorting area. Plenty of fluids (e.g., water, sports drinks, etc.) and single use, disposable cups must be available at all times. Hands and faces should be washed before eating or drinking. Consume drinks and rest frequently during hot days.

c. The "line of sight buddy system" must always be maintained at the sorting site. The "line of sight buddy system" is as follows: sorters are grouped into pairs and each member is to periodically assess the physical condition of his/her "buddy".

d. Always wear the following before beginning the sorting procedure: both pairs of gloves (outer rubber and inner latex), chemical goggles or safety glasses with splash shields, a dust mask, and disposable Tyvek overalls. Use safety boots especially when getting into bins.

e. Make noise when approaching the actual waste site to allow any wildlife/pest animals to flee. Look for snakes and poisonous spiders around and inside a dumpster/bin by probing with a long stick.

f. Do not attempt to identify unknown chemical substances present in the waste stream: vials of chemicals, unlabeled pesticide/herbicide containers, and substances (e.g., chemicals, or needles) in unlabeled plastic/glass bottles/jugs.

g. Household hazardous wastes are those wastes resulting from products purchased by the public for household use which because of their quantity, concentration, physical, or infectious, characteristics, may pose a substantial known or potential hazard to human or environmental health when improperly disposed. Empty containers of household hazardous wastes are generally not considered to be a hazardous waste. If hazardous wastes are detected, the Site Safety Officer will be notified.

h. Hazardous materials and hazardous wastes should not be present in non-residential sources of municipal solid waste. If hazardous wastes are present in the municipal waste stream, from a commercial or industrial source, the material is not a household hazardous waste, it is a hazardous waste and the Site Safety Officer must be notified.

i. Biohazardous wastes are generally disposed of in red, plastic bags. Treated biohazardous wastes (by incineration, autoclave, chemical sterilization, etc.), are also usually in red bags. If biohazardous wastes are detected, the sort will be halted (the bag will not be removed from the dumpster/bin) and the Site Safety Officer must be notified.

j. A potential hazard that can arise in waste sampling is the presence of biohazardous wastes that are not in red bags, referred to as "fugitive regulated wastes". Sorters must be on alert for the indicators of fugitive biohazardous wastes: hypodermic needles, needle covers, medical tubing, articles contaminated with red (blood) colored substances, and medical device packaging. If fugitive biohazardous wastes are detected, the sort will be halted and the Site Safety Officer notified.

k. When sorting glass, remove the large pieces first, then remove the clear glass. Never use your hands to dig down through the waste. Use a rake or small shovel to pull/push the material to the side and continue sorting.

l. At the end of each shift, remove all disposable clothing into a plastic trash bag, and place the bag into a solid waste receptacle. All sorters must shower at the end of each shift.

3.05 Site control in work zones

The following section lists site control recommendations for a visual/physical sort of solid waste.

a. Traffic cones or high visibility warning tape will be placed around the active sorting area.

b. Each work crew will keep a site specific safety plan on site at all times.

3.06 Site resources and personnel

The following section lists available site contacts and resources for a visual/physical sort of solid waste.

a. On-site contact:

Main point of contact: _____

Telephone number: _____

Facility manager: _____

Telephone number: _____

b. Site resources locations

Toilet facilities: _____

_____

Drinking water: _____

_____

Telephone: _____

_____

c. Medical information:

Local emergency medical facility: _____

Fire Dept. phone number: _____

Police Dept. phone number: _____

Local ambulance phone number: _____

3.07 Site maps

See attachments for a site map that shows the location of local medical facilities.

3.08 Agreement to comply with the health and safety plan

I _____ have read and understand
print name
the health and safety plan and will follow the procedures and protocols detailed in the plan for waste characterization at all designated sites.

DRAFT PHYSICAL AND VISUAL SORTING PROTOCOL Original: Yes
Replaces: None
Date: April 7, 1995

ARTICLE 6.0 DISPOSAL CHARACTERIZATION STUDIES

Physical and Visual Solid Waste Sorting Procedures

1. **Introduction:**

The purpose of this document is to provide guidelines for performing visual and/or physical sorts of non-hazardous solid waste from selected garbage dumpsters, transfer stations, and sanitary landfills.

2. **Table of Contents:**

1.0 Introduction
2.0 Table of Contents
3.0 Specific procedure
- 3.01 Recommended Personal Safety/Protective Equipment
- 3.02 Recommended Sorting Equipment
- 3.03 General Sorting Protocol
- 3.04 Physical, Non-hazardous Solid Waste Characterization
- 3.05 Visual, Non-hazardous Solid Waste Characterization

3. **Specific Procedure:**

3.01 Recommended personal safety/protective equipment

Please see The Health and Safety Plan for Waste Characterization Studies document, page 2, section 3.02.

3.02 Recommended sorting equipment

a. Knife with a fixed blade.
b. Small bins or buckets (5 gal and/or larger) for weighing sorted materials.
c. Sorting table.
d. A scale that is accurate to one-tenth of a pound. Depending upon the waste stream, a larger capacity scale may be useful.
e. Tongs.
f. Permanent markers.
g. Clipboard and data sheets.
h. Large magnets.
i. Calculator.

j. Trash bags.
k. Step ladder.
l. A long stick, approximately 6' in length.
m. Rake with a long handle.
n. Rake with a short handle.
o. Shovel with a long handle.
p. Broom
q. Camera & film
r. Duct tape
s. Plastic sheeting (minimum of 10 mm thick)

3.03 General sorting protocol

a. If physical sampling is to be performed at the business site of a generator, try to minimize interference with normal operations.

b. Place traffic cones or high visibility warning tape around the active sorting area.

c. Make noise when approaching the actual waste site to allow any insects/pest animals to flee. Look for snakes, bees, wasps, and poisonous spiders around and inside a dumpster/bin by probing with a long stick.

d. Always wear the following before beginning the sorting procedure: both pairs of gloves (outer rubber and inner latex), chemical goggles or safety glasses with splash shields, a dust mask, and disposable Tyvek overalls.

e. There will be absolutely no eating, smoking or drinking during sorting activities in the sorting area. Plenty of fluids (e.g., water, sports drinks, etc.) must be available away from the sorting area. Hands and faces should be washed before eating or drinking. Frequent rest, drink and food breaks should be given during hot days.

f. Do not attempt to identify unknown chemical substances present in the waste stream: vials of chemicals, unlabeled pesticide/herbicide containers, and substances (e.g., chemicals, or needles) in unlabeled plastic/glass bottles/jugs.

3.04 Physical, non-hazardous solid waste characterization

a. The "line of sight buddy system" must always be maintained at the sorting site. The "line of sight buddy system" is as follows: sorters are grouped into pairs and each member is to periodically assess the physical condition of his/her "buddy".

b. Set up the sorting table. It is recommended that the labeled buckets be placed around the table so that the buckets that will receive the most material are nearest to the table. To reduce reaching distances, all buckets within a broad material category (i.e. paper) should be positioned close together.

c. Place plastic sheeting or tarp over the surface where the solid waste is to be sorted. Tape the edges of the cover down with duct tape or weight it down. The cover will protect the surface from stains.

d. When removing only part of the contents of a dumpster/bin, use a shovel (and a ladder, if needed) to remove the sample all the way to the bottom to insure that smaller, more dense elements are included. Remove subsamples of approximately 50 pounds (estimate: normally 100 pounds per cubic yard) from a preselected dumpster/bin onto the table until an appropriate sample weight has been sorted. If there is not enough material in a dumpster/bin, sort the entire contents. It is recommended that sampling occur when the dumpsters/bins are at their fullest, right before pick up.

e. Tear open garbage bags (not red bags) with rakes or other equipment and visually inspect for potential hazards. If hazardous or biohazardous wastes are detected, the sort will be halted and the Site Safety Officer must be notified.

f. Begin the sort by removing and characterizing the largest, bulkiest elements. Sort the remaining items into the categories and material types shown on the sample sheet. If a bucket becomes full, the full bucket is weighed, the data recorded on the data sheet, and the bucket is emptied and reused. Weigh and record the total mass (contents + bucket) on the data sheet. Record the type of bucket used so that later, the mass of the buckets can be subtracted from the total weight.

g. When sorting glass, remove and sort the larger pieces that are on top first. Never use your hands to dig down through the waste. Use a rake or small shovel to pull/push the material to the side and continue sorting.

h. When a sorter has a question regarding the material category or type into which an element should be placed, the Crew Leader will be consulted. For composites or multi material items, the predominate material type (as measured by weight) determines which material type it belongs.

i. Return all sorted materials to their dumpster/bin.

j. At the end of each shift, remove all disposable clothing into a plastic trash bag, and place the bag into a solid waste receptacle. Reusable equipment cleaned and sanitized after use. All sorters must shower at the end of each shift.

3.05 Visual, non-hazardous solid waste characterization

a. For the following wastes; a visual (not a physical sort) is appropriate: wastes that contain large quantities of bulky or heavy items (e.g., concrete demolition material), consist of materials too small to be sorted (e.g., ash), consist of materials that may be too dangerous to sort (e.g., chemical or biohazards), or are of primarily one type of material.

b. Photographs can be taken to document waste types or, used when other constraints (such as odor or business hours) sharply limit field sampling time. A 35mm camera using either fine-grained, professional color print film (e.g., Royal Gold); professional grade Kodachrome slide film or; an equivalent film type will be sufficient. Prints should be a minimum of 8" by 10". Photographs or slides should be taken from as close to a vertical position as possible above the spread-out sample. Mark out a rectangle on the image in which the waste types are to be identified. Some have found that subdividing the rectangle helps with keeping track of the sample areas and in identifying components.

c. For "in bin" visual characterizations, solid waste in dumpsters/bins can be visually inspected by personnel standing outside the dumpster/bin on a step ladder. Do not remove bags/material from the dumpster or bin. Use a rake or other equipment to break open bags and expose materials for visual characterization.

d. A recommended minimum of 2 persons shall conduct each sort, one person to characterize the solid waste, the other to record data. Independent observations and estimates of the volumes of the various waste materials should be attempted.

e. The average of the volume estimates should be used along with a density conversion table to convert the volume data to weight percentage. The sum of the average volumes should total 100% so, some adjustment in the 100% volume may be necessary. For materials with no published density conversion data, a sample can be weighed and volume measured to develop a conversion factor. Refer to section 4.04 above for physical sort guidelines.

f. Unidentifiable materials can be put into the "miscellaneous/unsorted" category. The rules for composites and multi-material waste characterization should be followed. For composites or multi-material

items, the predominate material type as measured by weight determines which material type it gets classified as. When a sorter has a question regarding the material category or type into which an item should be placed, the Crew Leader should be consulted.

g. For visual characterizations that are removed from the bin, ensure that smaller, denser items are included in the sort by sampling all the way to the bottom of the dumpster/bin. Do not sort only the top layers and consider the sampling procedure completed.

h. A load that is to be visually characterized should be spread into a thin layer (approx. 6-8 inches) so that nothing is covered by other objects. Periodically rake through the layer to determine if there are hidden waste types. If the lower layers are significantly different, remix them.

APPENDIX D: FORMS USED IN THE STUDY

FORM USED FOR VEHICLE SURVEYS

Date _____ **Page** _____ **of** _____

Survey Site _____ **Survey Site** _____ **Surveyor**

Minimum weight at this site _____ **Checked by**

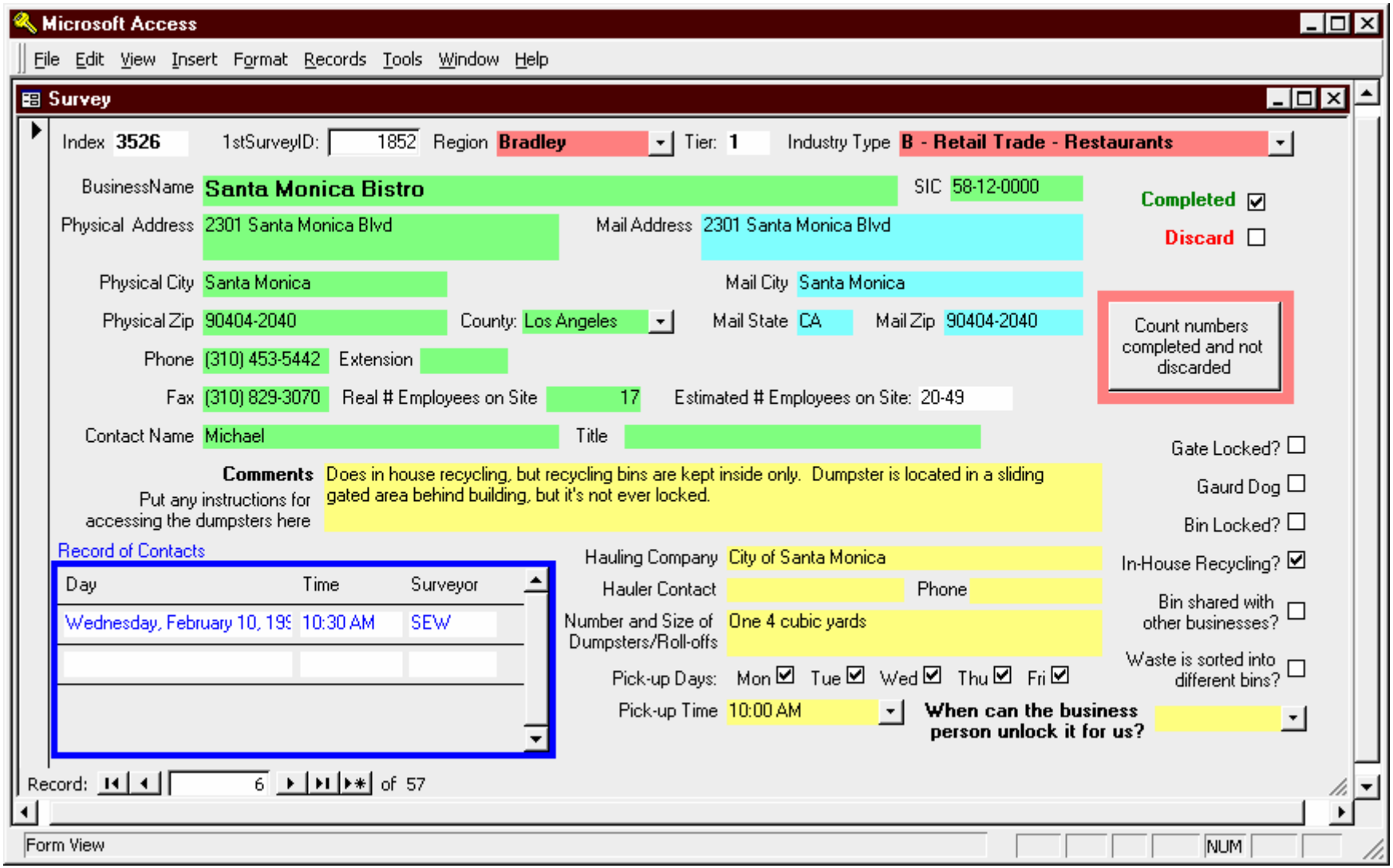
Data Entry #1 _____

Data Entry #2

	As All Vehicles Approach						*For Self-Haul Loads Only*	*Surveyor's NOTES*
	Vehicle License or ID Number	Substream	For mixed MF and SF res & com (X)			Net Weight of Load	Activity that Generated Self-Haul Waste	
		SH self-haul SF single family residential MF multi-family residential C commercial *If "mixed", then fill out percentages.*	Ask driver to estimate % of load that is SF, MF and Com that is SF, MF and Com Must total 100%			Indicate whether units are tons, pounds, or cubic yards	RSF residential single family RMF residential multi-family C&D construction & demolition RF roofing L landscaping O other commercial, industrial or institutional	
			% SF	% MF	% Com	*(circle units)*		
1		SH SF MF C				tons lbs yds	RSF RMF C&D RF L O	
2		SH SF MF C				tons lbs yds	RSF RMF C&D RF L O	
3		SH SF MF C				tons lbs yds	RSF RMF C&D RF L O	
4		SH SF MF C				tons lbs yds	RSF RMF C&D RF L O	
5		SH SF MF C				tons lbs yds	RSF RMF C&D RF L O	
6		SH SF MF C				tons lbs yds	RSF RMF C&D RF L O	
7		SH SF MF C				tons lbs yds	RSF RMF C&D RF L O	
8		SH SF MF C				tons lbs yds	RSF RMF C&D RF L O	
9		SH SF MF C				tons lbs yds	RSF RMF C&D RF L O	
10		SH SF MF C				tons lbs yds	RSF RMF C&D RF L O	
11		SH SF MF C				tons lbs yds	RSF RMF C&D RF L O	
12		SH SF MF C				tons lbs yds	RSF RMF C&D RF L O	
13		SH SF MF C				tons lbs yds	RSF RMF C&D RF L O	
14		SH SF MF C				tons lbs yds	RSF RMF C&D RF L O	
15		SH SF MF C				tons lbs yds	RSF RMF C&D RF L O	

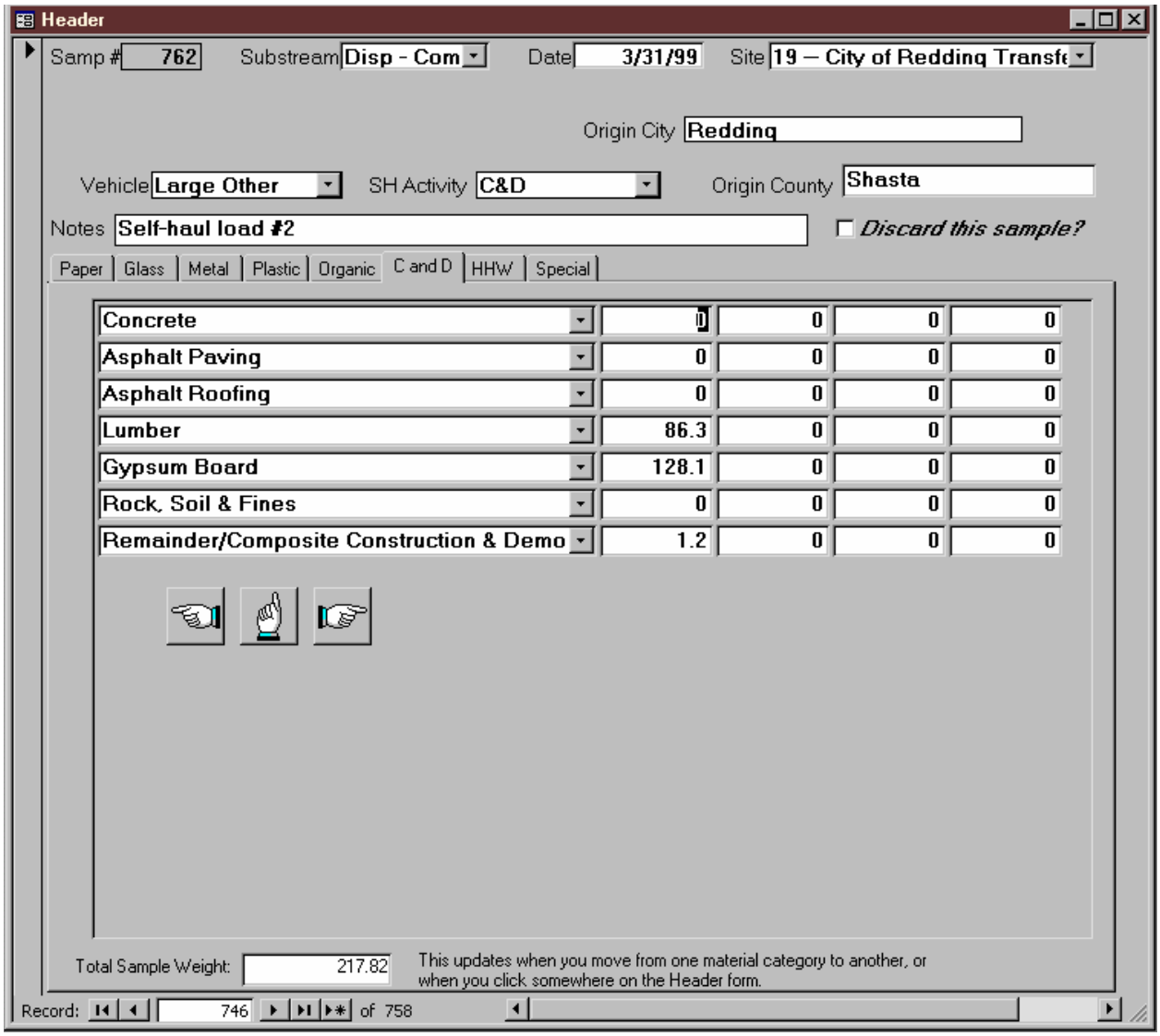
1. Make entries neatly in pen.
2. Enter the information at the top of each page. Enter total # of pages on each page at the end of the day.
3. Enter the vehicle license or ID number, if you need it to get vehicle net weights. It is not needed otherwise for the survey.
4. In the Substream column, circle either SH or one/more of the other three. If you circle SH, go to Self-haul Load Only.
5. If you do not circle SH, circle some combination of SF, MF, or C. Ask the driver what categories of waste are in the vehicle.
6. If you circle more than one of the SF, MF or C entries, be sure to ask the driver for the % of each.
7. Enter the weight. If the operator measures self-haul loads by volume, record the volume and indicate that the unit is "yds".
8. If the load is self-haul, circle only one of the entries in the For Self-Haul Only column. If you circle O, write a note saying what type of business the load is from.
9. If you make an error on an entry, draw a line through the entire entry and start over on a new line.

SNAPSHOT OF GENERATOR RECRUITMENT DATABASE

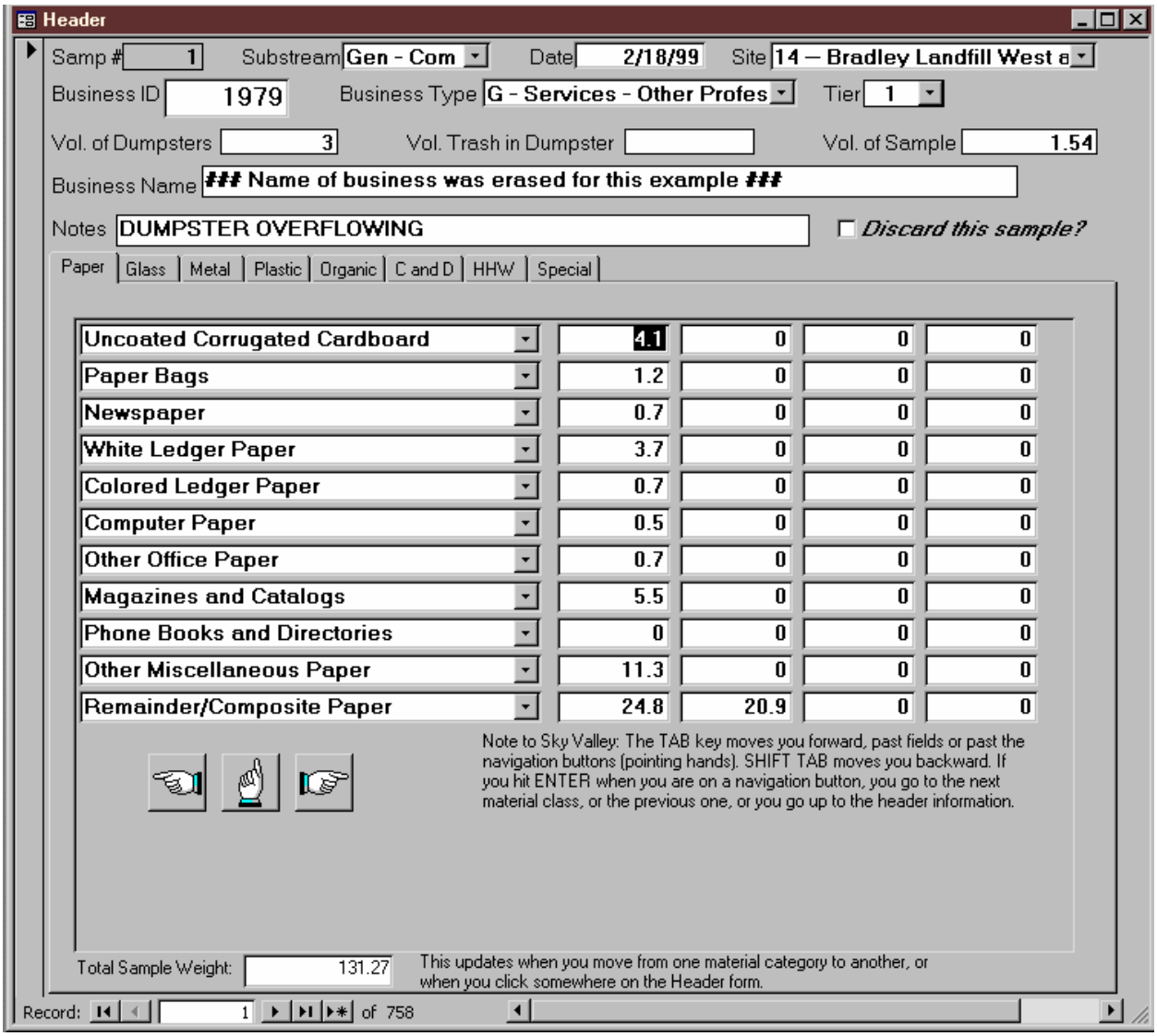


SNAPSHOTS OF DATABASE FOR ENTRY OF COMPONENT WEIGHTS IN THE FIELD

ENTRY FOR DISPOSAL SITE SAMPLE



ENTRY FOR GENERATOR SAMPLE



APPENDIX E: DEFINITIONS OF BUSINESS GROUPS

Table 78: Description of Industry Groups Designated in the Study

Assigned Code	Description of Group	SIC Codes Included	SIC Code Designations
A	Finance / Insurance / Real Estate / Legal	60	Depository institutions
		61	Nondepository credit institutions
		62	Security, commodity brokers, and services
		63	Insurance carriers
		64	Insurance agents, brokers, and service
		65	Real estate
		67	Holding and other investment offices
		81	Legal services
B	Retail Trade - Restaurants	58	Eating and drinking places
C	Retail Trade - Other	56	Apparel and accessory stores
		57	Furniture, home furnishings and equipment stores
		59	Miscellaneous retail
D	Services - Other Misc.	72	Personal services
		75	Automotive repair, services, and parking
		76	Miscellaneous repair services
		79	Amusement and recreational services
		83	Social services
		84	Museums, art galleries, botanical & zoological garden
E	Wholesale Trade - Nondurable Goods	51	Wholesale trade--nondurable goods
F	Retail Trade - Automotive Dealers & Service Stations	55	Automotive dealers and gasoline service stations
G	Services - Other Professional	86	Membership organizations
		87	Engineering and management services
		89	Miscellaneous services
H	Retail Trade - Food Store	54	Food stores

Assigned Code	Description of Group	SIC Codes Included	SIC Code Designations
I	Construction	15	General building contractors
		16	Heavy construction contractors
		17	Special trade contractors
J	Services - Medical / Health	80	Health services
K	Manufacturing - Printing / Publishing	27	Printing and publishing
L	Services - Business Services	73	Business services
M	Services - Education	82	Educational services
N	Public Administration	43	U.S. Postal Service
		91	Executive, legislative, and general government
		92	Justice, public order, and safety
		93	Finance, taxation, and monetary policy
		94	Administration of human resources
		95	Environmental quality and housing
		96	Administration of economic programs
		97	National security and international affairs
O	Services - Hotels / Lodging	70	Hotels, rooming houses, camps, and other lodging places
P	Trucking & Warehousing	42	Motor freight transportation and warehousing
Q	Wholesale Trade - Durable Goods	50	Wholesale trade--durable goods
R	Manufacturing - Other	21	Tobacco manufactures
		29	Petroleum and coal products
		30	Rubber and miscellaneous plastics products
		31	Leather and leather products
		32	Stone, clay, glass, and concrete products
		39	Miscellaneous manufacturing industries
S	Transportation - Other	40	Railroad operation
		41	Local and interurban passenger transit
		44	Water transportation
		46	Pipelines, except natural gas
		47	Transportation services

Assigned Code	Description of Group	SIC Codes Included	SIC Code Designations
T	Manufacturing - Electronic Equipment	36	Electrical and electronic equipment
U	Manufacturing - Food / Kindred	20	Food and kindred products
V	Manufacturing - Lumber & Wood Products	24	Lumber and wood products
W	Manufacturing - Transportation Equipment	37	Transportation equipment
X	Retail Trade - Building Material & Garden	52	Building materials, hardware, garden supply, & mobile
Y	Manufacturing - Industrial / Machinery	35	Industrial machinery and equipment
Z	Agriculture / Fisheries	01	Agricultural production- crops
		02	Agricultural production- livestock
		07	Agricultural services
		09	Fishing, hunting, and trapping
AA	Manufacturing - Instruments / Related	38	Instruments and related products
AB	Communications	48	Communications
AC	Manufacturing - Primary / Fabricated Metal	33	Primary metal industries
		34	Fabricated metal products
AD	Manufacturing - Apparel / Textile	22	Textile mill products
		23	Apparel and other textile products
AE	Manufacturing - Furniture / Fixtures	25	Furniture and fixtures
AF	Services - Motion Pictures	78	Motion pictures
AG	Manufacturing - Chemical / Allied	28	Chemicals and allied products
AH	Retail Trade - General Merchandise Store	53	General merchandise stores
AI	Mining	10	Metal mining
		12	Coal mining
		13	Oil and gas extraction
		14	Nonmetallic minerals, except fuels
AJ	Transportation - Air	45	Transportation by air
AK	Utilities	49	Electric, gas, and sanitary services
AL	Manufacturing - Paper / Allied	26	Paper and allied products
AM	Forestry	08	Forestry

APPENDIX F: DISTRIBUTION OF EMPLOYMENT BY BUSINESS GROUP AND REGION

Table 79: Numbers of Employees by Industry Group in Each Region

	Region					
Industry Group	Coastal	Bay Area	Southern	Mountain	Central	**Totals**
A - Finance / Insurance / Real Estate / Legal	42,004	310,193	711,016	16,421	128,730	**1,208,364**
B - Retail Trade - Restaurants	38,299	179,248	510,685	18,292	106,972	**853,496**
C - Retail Trade - Other	33,797	231,180	469,780	14,346	86,925	**836,028**
D - Services - Other Misc.	51,940	235,230	620,366	24,845	137,652	**1,070,033**
E - Wholesale Trade - Nondurable Goods	29,635	64,555	234,844	3,720	78,163	**410,917**
F - Retail Trade - Automotive Dealers & Service Stations	10,909	48,995	172,776	7,061	40,804	**280,545**
G - Services - Other Professional	26,574	177,787	371,562	12,793	74,658	**663,374**
H - Retail Trade - Food Store	18,290	71,019	204,221	9,386	48,581	**351,497**
I - Construction	21,286	112,779	249,629	13,048	61,726	**458,468**
J - Services - Medical / Health	49,319	305,611	764,759	25,185	205,000	**1,349,874**
K - Manufacturing - Printing / Publishing	5,557	54,610	130,115	2,634	18,229	**211,145**
L - Services - Business Services	18,583	185,019	343,841	6,240	57,399	**611,082**
M - Services - Education	40,259	173,851	534,793	20,349	150,371	**919,623**
N - Public Administration	24,871	133,872	375,728	20,500	104,954	**659,925**
O - Services - Hotels / Lodging	13,285	45,106	128,983	18,440	17,389	**223,203**
P - Trucking & Warehousing	5,179	25,284	72,257	2,356	26,271	**131,347**
Q - Wholesale Trade - Durable Goods	16,018	151,178	387,437	5,953	56,539	**617,125**
R - Manufacturing - Other	3,696	23,270	124,081	1,143	15,546	**167,736**
S - Transportation - Other	4,474	39,688	97,504	3,606	15,874	**161,146**
T - Manufacturing - Electronic Equipment	5,016	114,637	134,671	775	11,298	**266,397**
U - Manufacturing - Food / Kindred	12,545	24,009	53,734	832	61,680	**152,800**
V - Manufacturing - Lumber & Wood Products	6,152	2,268	11,975	4,459	9,485	**34,339**
W - Manufacturing - Transportation Equipment	969	21,928	111,446	222	3,399	**137,964**
X - Retail Trade - Building Material & Garden	7,375	26,331	72,132	4,357	24,052	**134,247**
Y - Manufacturing - Industrial / Machinery	5,874	89,741	108,937	1,195	15,929	**221,676**
Z - AM Lumped Group	35,268	244,220	777,818	17,397	146,297	**1,221,000**
Totals	**527,174**	**3,091,609**	**7,775,090**	**255,555**	**1,703,923**	**13,353,351**

Data was obtained from Dun and Bradstreet in October 1999.

Table 80: Numbers of Businesses by Industry Group in Each Region

	Region					
Industry Group	Coastal	Bay Area	Southern	Mountain	Central	**Totals**
A - Finance / Insurance / Real Estate / Legal	7,113	40,426	96,931	3,837	21,031	**169,338**
B - Retail Trade - Restaurants	2,865	13,693	35,253	1,698	7,612	**61,121**
C - Retail Trade - Other	6,679	27,295	78,326	3,573	13,889	**129,762**
D - Services - Other Misc.	9,587	38,836	100,856	5,293	23,341	**177,913**
E - Wholesale Trade - Nondurable Goods	1,625	4,678	16,333	578	3,252	**26,466**
F - Retail Trade - Automotive Dealers & Service Stations	1,309	4,411	16,160	812	4,169	**26,861**
G - Services - Other Professional	4,972	23,006	50,383	2,605	12,117	**93,083**
H - Retail Trade - Food Store	1,451	5,840	16,463	853	4,249	**28,856**
I - Construction	4,320	13,481	35,932	3,452	9,486	**66,671**
J - Services - Medical / Health	5,221	25,204	63,321	2,414	13,454	**109,614**
K - Manufacturing - Printing / Publishing	621	3,734	9,474	297	1,374	**15,500**
L - Services - Business Services	3,118	17,158	39,460	1,644	7,019	**68,399**
M - Services - Education	1,173	4,709	11,771	812	3,404	**21,869**
N - Public Administration	1,826	4,237	10,214	2,060	4,650	**22,987**
O - Services - Hotels / Lodging	1,004	1,496	4,716	1,120	1,100	**9,436**
P - Trucking & Warehousing	576	1,873	5,495	445	1,960	**10,349**
Q - Wholesale Trade - Durable Goods	1,910	12,789	37,554	1,079	6,054	**59,386**
R - Manufacturing - Other	353	1,604	5,777	196	845	**8,775**
S - Transportation - Other	566	3,778	9,008	381	1,352	**15,085**
T - Manufacturing - Electronic Equipment	101	1,563	2,598	38	177	**4,477**
U - Manufacturing - Food / Kindred	399	717	985	89	504	**2,694**
V - Manufacturing - Lumber & Wood Products	180	166	493	201	229	**1,269**
W - Manufacturing - Transportation Equipment	54	184	1,073	26	137	**1,474**
X - Retail Trade - Building Material & Garden	922	2,319	7,084	675	2,191	**13,191**
Y - Manufacturing - Industrial / Machinery	241	2,150	6,270	181	716	**9,558**
Z - AM Lumped Group	2,719	9,377	33,489	1,677	7,359	**54,621**
Totals	**60,905**	**264,724**	**695,419**	**36,036**	**151,671**	**1,208,755**

Data was obtained from Dun and Bradstreet in October 1999.

APPENDIX G: NUMBERS OF SAMPLES BY SECTOR, SITE, REGION, AND SEASON

DISPOSAL SITE SAMPLES

Disposal-site sampling included samples from the single-family residential, commercial self-haul, and residential self-haul sectors. The tables below present the numbers of disposal site samples that were captured and sorted in each region, during each season, and at each site. (Please refer to Table 71 for the proper name and location of each disposal site listed below.)

Region	**Coastal**					
Season	Winter		Summer			Totals
Disposal Site	Monterey Regional	Central Landfill	Buena Vista	John Smith	Johnson Canyon	
Single-Family Residential	6	6	5	6	6	**29**
Commercial Self-Haul	10	7	7	6	6	**36**
Residential Self-Haul	0	3	3	4	4	**14**
Totals	**16**	**16**	**15**	**16**	**16**	**79**

Region	**Bay Area**					
Season	Winter		Summer			Totals
Disposal Site	South Bayside	Ox Mountain	Davis Street	Potrero Hills	Berkeley T.S.	
Single-Family Residential	6	5	6	6	7	**30**
Commercial Self-Haul	7	9	6	7	7	**36**
Residential Self-Haul	3	1	4	3	2	**13**
Totals	**16**	**15**	**16**	**16**	**16**	**79**

Region	**Southern**					
Season	Winter			Summer		Totals
Disposal Site	Bradley Landfill	Sunset Environmental	Victorville Refuse	Universal Refuse	Falcon Refuse	
Single-Family Residential	6	4	6	5	6	**27**
Commercial Self-Haul	9	4	6	4	8	**31**
Residential Self-Haul	3	4	4	5	3	**19**
Totals	**18**	**12**	**16**	**14**	**17**	**77**

Region	Mountain					
Season	Winter			Summer		Totals
Disposal Site	City of Redding	West Central L.F.	McCourtney Road	South Tahoe Refuse	Western Amador	
Single-Family Residential	6	6	6	6	6	**30**
Commercial Self-Haul	8	3	4	7	5	**27**
Residential Self-Haul	4	5	4	2	3	**18**
Totals	**18**	**14**	**14**	**15**	**14**	**75**

Region	Central					
Season	Winter		Summer			Totals
Disposal Site	Fairmead	Auburn Placer	Yolo County	Billy Wright	American Avenue	
Single-Family Residential	6	6	6	6	8	**32**
Commercial Self-Haul	3	9	6	9	5	**32**
Residential Self-Haul	5	3	5	3	5	**21**
Totals	**14**	**18**	**17**	**18**	**18**	**85**

GENERATOR SAMPLES

Generator sampling included samples from the commercial and multifamily residential sectors. The tables below present the numbers of generator samples that were captured and sorted in each region, during each season, and in each waste shed. (Please refer to Table 71 for the location of each waste shed listed below.)

Region	Coastal		
Season	Winter	Summer	Totals
Waste Shed	Central Landfill	Johnson Canyon	
Commercial	37	36	**73**
Multi-Family Residential	1	2	**3**
Totals	**38**	**38**	**76**

Region	Bay Area				
Season	Winter		Summer		Totals
Waste Shed	South Bayside	Kirby Canyon	Davis Street	Kirby Canyon	
Commercial	72	52	67	78	**269**
Multi-Family Residential	3	5	13	3	**24**
Totals	**75**	**57**	**80**	**81**	**293**

Region	Southern				
Season	Winter		Summer		Totals
Waste Shed	Bradley Landfill	Victorville Refuse	Bradley Landfill	S.E. Resource Recovery	
Commercial	266	24	172	171	**633**
Multi-Family Residential	21	1	18	4	**44**
Totals	**287**	**25**	**190**	**175**	**677**

Region	Mountain		
Season	Winter	Summer	Totals
Waste Shed	City of Redding	South Tahoe Refuse	
Commercial	22	36	**58**
Multi-Family Residential	1	1	**2**
Totals	**23**	**37**	**60**

Region	Central		
Season	Winter	Summer	Totals
Waste Shed	Auburn Placer	Billy Wright	
Commercial	59	115	**174**
Multi-Family Residential	4	3	**7**
Totals	**63**	**118**	**181**

APPENDIX H: NUMBERS OF VEHICLES SURVEYED BY SITE, REGION, AND SEASON

Region	**Coastal**					
Season	Winter		Summer			Total
Disposal Site	Monterey Regional	Central Landfill	Buena Vista	John Smith	Johnson Canyon	
Number of Vehicle Surveys	110	152	163	94	24	**543**

Region	**Bay Area**					
Season	Winter		Summer			Total
Disposal Site	South Bayside	Ox Mountain	Davis Street	Potrero Hills	Berkeley T.S.	
Number of Vehicle Surveys	196	128	606	107	132	**1,169**

Region	**Southern**					
Season	Winter			Summer		Total
Disposal Site	Bradley Landfill	Sunset Environmental	Victorville Refuse	Universal Refuse	Falcon Refuse	
Number of Vehicle Surveys	519	160	134	16 *	84	**913**

Region	**Mountain**					
Season	Winter			Summer		Total
Disposal Site	City of Redding	West Central L.F.	McCourtney Road	South Tahoe Refuse	Western Amador	
Number of Vehicle Surveys	125	52	194	64	52	**487**

Region	**Central**					
Season	Winter		Summer			Total
Disposal Site	Fairmead	Auburn Placer	Yolo County	Billy Wright	American Avenue	
Number of Vehicle Surveys	91	107	137	43	174	**552**

* The 16 vehicle survey results obtained from Universal Refuse Removal Recycling and Transfer Station were not included in the vehicle survey analysis, because it was determined that the day of surveying did not adequately represent all of the sectors contributing waste to the site.

APPENDIX I: PAPER ON CALCULATING RPPC CONTAMINATION RATES

Estimating the Percent of RPPCs in the Waste Stream

Report to Cascadia Consulting Group
June 7, 1996

Ashley Steel
Paul Sampson
Department of Statistics
University of Washington

Problem Overview

The goal of these calculations is to produce an estimator of the percent weight of Rigid Plastic Packaging Containers (RPPCs) discarded in California's landfills and to calculate the variance associated with that estimator. This estimator will eventually be used to calculate the percent of RPPCs that are recycled in California. The percent of RPPCs recycled in California, and the variance of that estimate, will be important tools for assessing how well the legally mandated recycling rate is being met.

The abbreviations and subscripts used in the calculation formulas are summarized in the next section of this report along with an outline of the overall strategy for condensing the information into one estimator. Details are provided for each calculation to be carried out. The method explains not only how to calculate the estimator but also how to calculate the variance of the estimator at each step.

Data were gathered at 11 waste management centers in August and September of 1995 and at 13 waste management sites in January and February of 1996. These 24 sites were chosen from a list of all landfill and transfer stations in the State of California which met certain minimum requirements; the site must accept all three types of municipal solid waste and it must process a minimum of 100 tons of waste per day. As certain types of waste management facilities were excluded from the selection process, some systematic estimation biases may exist. Although the list of potential waste management sites was randomly ordered, there may also be some selection bias among those sites which agreed to participate in the study. Both types of potential bias and methods for addressing them are discussed in the final section of this report.

Calculation Strategy

The following discussion outlines the steps for going from the data on each component of plastic and its dry versus field weight for three different substreams and 24 different sites, to a final estimate of the overall percent RPPCs going into California's landfills. The numbers in the discussion refer to the numerical calculations described below each section. The terminology to be used in this discussion and the abbreviations for the calculations are summarized in Table 1.

Table 1: Summary of Terms and Abbreviations

Term	Abbreviation	Description
Waste	W	The weight of the waste, including both RPPCs and all other materials.
Component	C (c = 1 to 19)	The weight of each of the 19 types of RPPC (i.e., PET soda bottles, PS foam).
Field Weight	F	Weight, as measured at the site.
Dry Weight	D	Weight after being washed and dried.
Substream	(b = 1 to 3)	Each of three types of municipal solid waste: residential, commercial, self-haul.
Site	(t = 1 to 24)	Each of the 24 transfer stations and landfills.
Sample	(i = 1 to n)	For each site and substream, 6 or 7 samples were taken, where n = number of samples at a particular cell of interest (for example, self-haul at site #6).
Dry Weight Sub-Sample	(j = 1 to m)	For each site and substream, j denotes the number of field samples for which dry weights were calculated.

Note: While substream and site are sampling strata, components are not. Therefore, the subscripts for components, c, will be separated from those of the sampling strata, b, t, and the samples themselves, i, j.

Quick Summary of the Steps

I) Calculate the ratio of the average field weight to the average total waste weight for each component, in each substream, at each site.

II) Calculate the ratio of the average dry weight to the average field weight for each component in each substream at each site.

III) Multiply the ratio of field weight to total waste weight by the ratio of dry weight to field weight for each component in each substream at each site.

$$\frac{\text{field weight (component)}}{\text{total weight of waste}} \times \frac{\text{dry weight (component)}}{\text{field weight (component)}} = \frac{\text{dry weight (component)}}{\text{total weight of waste}}$$

IV) Sum the dry weight to total waste weight for all the components within each substream and site. This will give you a ratio of the dry weight for all components to total waste weight for each substream, at each site.

V) Average the ratios of dry weight of all components to total waste weight within each substream across all 24 sites.

VI) Take a weighted, by percent of waste in each substream, average of the ratio of the average dry weight of all components to the average total waste weight across all three substreams. This produces one number which is the estimator of the ratio of the dry weight of RPPCs to the total waste weight for all components and across all sites and substreams.

Calculations

I) Calculate the ratio of the average field weight to the average total waste weight for each component, in each substream, at each site.

The first step is to calculate the ratio $A_{c,bt}$ of the RPPC weight over the weight of total waste for each component, in each substream, for each site (**1**). Each of these ratios must be calculated separately so that component-specific adjustments can be made to account for field versus dry weight. Because both the numerator and the denominator of this term are random variables, the approximate variance must be computed using the formula from Cochran (p. 33, 1977) (**2**). For ease of calculation, in steps (**2**), (**4**), and (**10**), it is probably best to calculate the quantities such as $\sum_i (C_{c,bti} W_{bti})$ and $\sum_i \left(W_{bti}{}^2\right)$ before you begin the rest of the calculations.

(**1**) $$A_{c,bt} = \overline{C_{c,bt}} \,/\, \overline{W_{bt}}$$

where $\overline{C_{c,bt}}$ denotes the average weight of a particular component over all the samples in a particular substream, *b*, and at a particular site, *t*, and $\overline{W_{bt}}$ denotes the average weight of the total sample of waste over all the samples in that substream, *b*, and site, *t*. For example, the average, $\overline{C_{c,bt}}$, is calculated as $\overline{C_{c,bt}} = \frac{1}{n}\sum_i C_{c,bti}$.

(**2**) $$\mathrm{Var}(A_{c,bt}) \approx \left(\frac{\sqrt{n}}{\sum_i W_{bti}} \sqrt{\frac{\sum_i \left(C_{c,bti}{}^2\right) - \left(2A_{c,bt}\sum_i \left(C_{c,bti} W_{bti}\right)\right) + \left(A_{c,bt}{}^2 \sum_i \left(W_{bti}{}^2\right)\right)}{n-1}} \right)^2$$

where *n* is the number of samples in the particular substream and at the particular site for which the statistic is being calculated.

At this point, you should have $A_{c,bt}$ and the variance of $A_{c,bt}$ for all 19 components, at all three substreams and all 24 sites. Therefore, you should have 1,368 values of $A_{c,bt}$ and a separate variance for each.

II) Calculate the ratio of the average dry weight to the average field weight for each component in each substream at each site.

Next, the ratio of the dry weight over the field weight, $E_{c,bt}$, must be computed for each component, each substream, and each site (**3**). Again, this is the ratio of two random variables, and the variance can be computed as in Cochran (**4**).

(**3**) $$E_{c,bt} = \overline{D_{c,bt}} / \overline{F_{c,bt}}$$

where $\overline{D_{c,bt}}$ denotes the average of all *m* dry weights for a particular substream, *b*, and a particular site *t*, and where $\overline{F_{c,bt}}$ denotes the average field weight of the *m* samples for which dry weights are available, at each substream, *b*, and site, *t*.

(**4**) $$\mathrm{Var}(E_{c,bt}) \approx \left(\frac{\sqrt{m}}{\sum_j F_{c,btj}} \sqrt{\frac{\sum_j \left(D_{c,btj}{}^2\right) - \left(2E_{c,bt}\sum_j \left(D_{c,btj}F_{c,btj}\right)\right) + \left(E_{c,bt}{}^2 \sum_j \left(F_{c,btj}{}^2\right)\right)}{m-1}} \right)^2$$

where *m* denotes the number of samples for which dry weights are available in substream *b*, and at site *t*.

At this point, you should have one field weight to wet weight ratio, $E_{c,bt}$, for each component, *c*, at each substream, *b*, for each site, *t*, and a separate variance for each $E_{c,bt}$.

III) Multiply the ratio of field weight to total waste weight by the ratio of dry weight to field weight for each component in each substream, at each site.

The next step is to multiply these two ratio estimators together (**5**) and compute the variance of this product (**6**). The formulas used in calculating the variance of the product of two independent variables are derived from those in Arnold (1990). In essence, we are making the following calculation for each component, in each substream, and at each site:

$$\frac{\text{field weight (component)}}{\text{total weight of waste}} \times \frac{\text{dry weight (component)}}{\text{field weight (component)}} = \frac{\text{dry weight (component)}}{\text{total weight of waste}}.$$

(**5**) $$G_{c,bt} = A_{c,bt} E_{c,bt}$$

(**6**) $$\mathrm{Var}\left(G_{c,bt}\right)=\left(\mathrm{Var}\left(A_{c,bt}\right)+{A_{c,bt}}^2\right)\left(\mathrm{Var}\left(E_{c,bt}\right)+{E_{c,bt}}^2\right)-\left(A_{c,bt}E_{c,bt}\right)^2$$

IV) Sum the dry weight to total waste weight for all the components within each substream and site.

Now that we have an estimate of the ratio of the dry weight of each component to total waste, in each substream, at each site ($G_{c,bt}$), we can sum $G_{c,bt}$ over all the components and get an estimate of the ratio of total RPPC dry weight to the weight of total waste (H_{bt}) in each substream and at each site (**7**). Assuming that within each site and each substream, the estimates of the ratio of the dry component weight to the weight of the total waste are independent, the variance of this estimate is the sum of the variances for the individual components (**8**).

(**7**) $$H_{bt}=\sum_c G_{c,bt}$$

(**8**) $$\mathrm{Var}(H_{bt})=\sum_c \mathrm{Var}(G_{c,bt})$$

(V) Average the ratios of dry weight of all components to total waste weight within each substream, across all 24 sites.

Next, we pool the estimates of the percent RPPCs in each substream across all 24 sites to get one estimate of the ratio (N_b) of the weight of RPPCs to the weight of total waste for each substream (**9**). The variance of this estimator, if it is going to be used as an estimate of the substream-specific percentages of RPPCs in all 153 potential sampling sites, must describe both between-site variability and within-site variability. As well, it must include a finite sampling correction (**10**) (Cochran 1977, Sections 10.2-10.4). In this step, we are assuming that the site-specific estimates of the ratios of RPPCs to total waste in each substream are independent. For further refinements of the variance calculation, please see the attached memo from Paul Sampson to Leina Johansson, May 3, 1996.

(**9**) $$N_b=\frac{\sum_t H_{bt}}{24}$$

(**10**) $$\mathrm{Var}(N_b)=\left(\frac{1-\left(\frac{24}{153}\right)}{24}\right)\left(\left(\frac{1}{24-1}\right)\sum_t (H_{bt}-N_b)^2\right)+\left(\frac{\left(\frac{24}{153}\right)}{24^2}\right)\sum_t \mathrm{Var}(H_{bt})$$

Note: The first term of Equation (**10**) represents the site-to-site variability, and the second term represents the within-site variability.

(VI) Take a weighted, by percent waste in each substream, average of the ratio of the average dry weight of all components to the average total waste weight across all three substreams.

The final step is to take a weighted average of the ratio of RPPCs to total weight across the three substreams (**13**). The variance of this final estimator (*O*) is the sum of the variance of each of the three estimators times the proportion of waste in that substream squared (**14**).

(**13**) $$O = \sum_{b} (\text{prop}_b \times N_b)$$

(**14**) $$\text{Var}(O) = \sum_{b} [(\text{prop}_b)^2 \times \text{Var}(N_b)]$$

where prop_b are the proportions of total waste in each of the three substreams. The variance calculation assumes that the estimates for each substream are independent. Although this assumption may be violated because we have constrained the sum of the three proportions to equal 1, we don't expect that the estimates would be strongly correlated. If the variances of the estimates within each substream were correlated, one would expect a negative correlation, and so the calculation in step (**14**) can be considered conservative.

One should note that for small sample sizes, the distribution of ratio estimators is often asymmetric. Therefore, confidence intervals for ratio estimators based on small sample sizes, for example the ratios of each RPPC component to the total weight in a given substream at a given site, should be calculated using the alternate method proposed in Cochran, p. 156. Because the final estimator here is based on sums of ratio estimators, we can use the central limit theorem and assume that our final distribution is asymptotically normal and standard confidence intervals can be computed.

Sampling Bias

The two types of potential bias in this sampling design, as described briefly in the introduction, are systematic bias from excluding certain types of waste management facilities from the analysis and selection bias caused by the difficulties in finding site managers who were willing to participate in the study.

The best way to assess how much bias might exist is to gather some simple information about the waste management sites which did not participate in the study. Using this information, it would be possible to design some sensitivity analyses which placed boundaries around the final estimator, describing the worst-case scenarios. For example, if 10% of the facilities which were not sampled were small specialty facilities which handled a large percentage of RPPCs, one could calculate a final estimator based on a weighted sum of 0.90 multiplied by *Q* or *Z*, the final estimate of RPPCs per total weight of waste in the sites which were sampled and 0.10 times some multiple, for example two or three, of the final estimate. The estimator from these calculations could be presented as an estimate of the final percent of RPPCs in the worst-case situation where the small, unobservable facilities see, for example, two or three times the RPPCs of the Larger, observable facilities.

References

Arnold, S. F. 1990. Mathematical Statistics. Prentice-Hall, Inc.: New Jersey.

Cochran, W. C. 1977. Sampling Techniques. John Wiley and Sons: New York.

Zar, J. H. 1984. Biostatistical Analysis. Prentice-Hall, Inc.: New Jersey.

APPENDIX J: COUNTY DEMOGRAPHIC DATA USED IN SELECTION OF REGIONS

County	Employment	Taxable Sales	*Region Number*	Land Area (Acres)	Area % of CA	Population	Persons/ Acre	Pop per Household	Median Yrs School
Alameda	650,800	17,087,375	*2*	472,000	0.473%	1,375,900	2.915	2.710	13.9
Alpine	450	18,861	*4*	472,740	0.474%	1,180	0.002	2.427	13.8
Amador	12,490	254,562	*4*	379,240	0.380%	33,750	0.089	2.392	12.9
Butte	75,500	1,598,552	*5*	1,049,340	1.051%	199,100	0.190	2.427	13.2
Calaveras	12,830	176,520	*4*	652,920	0.654%	36,500	0.056	2.450	13.0
Colusa	7,170	185,498	*5*	736,500	0.738%	18,300	0.025	2.876	12.5
Contra Costa	435,500	8,575,704	*2*	460,980	0.462%	879,200	1.907	2.668	14.3
Del Norte	9,230	145,303	*1*	645,050	0.646%	28,250	0.044	2.626	12.7
El Dorado	69,300	979,382	*4*	1,095,350	1.097%	142,200	0.130	2.624	13.6
Fresno	326,300	6,552,968	*5*	3,816,450	3.823%	776,200	0.203	3.039	12.7
Glenn	9,790	186,650	*5*	841,530	0.843%	26,800	0.032	2.788	12.6
Humboldt	56,300	1,079,084	*1*	2,286,590	2.291%	126,600	0.055	2.434	13.3
Imperial	40,700	1,012,588	*3*	2,672,030	2.677%	140,500	0.053	3.390	12.2
Inyo	6,740	217,442	*4*	6,522,930	6.535%	18,350	0.003	2.272	12.8
Kern	243,500	5,291,665	*3*	5,210,630	5.220%	628,200	0.121	2.919	12.7
Kings	37,690	753,226	*5*	889,270	0.891%	118,200	0.133	3.232	12.5
Lake	21,100	317,533	*5*	805,420	0.807%	54,800	0.068	2.340	12.7
Lassen	10,540	200,359	*4*	2,916,790	2.922%	34,450	0.012	2.738	12.9
Los Angeles	4,052,600	82,620,919	*3*	2,598,380	2.603%	9,488,200	3.652	3.038	13.0
Madera	44,240	709,293	*5*	1,368,590	1.371%	111,600	0.082	2.972	12.5
Marin	126,000	2,902,225	*2*	332,660	0.333%	242,200	0.728	2.411	15.4
Mariposa	6,860	122,048	*4*	928,780	0.930%	16,000	0.017	2.368	13.0
Mendocino	39,180	733,126	*1*	2,245,940	2.250%	85,900	0.038	2.534	13.0
Merced	69,500	1,239,209	*5*	1,234,490	1.237%	201,000	0.163	3.150	12.6
Modoc	3,720	60,059	*4*	2,524,390	2.529%	10,150	0.004	2.408	12.7
Mono	5,490	136,774	*4*	1,948,470	1.952%	10,400	0.005	2.430	13.9
Monterey	159,500	3,437,830	*1*	2,126,040	2.130%	371,500	0.175	3.088	13.2
Napa	54,300	1,227,540	*2*	482,470	0.483%	120,800	0.250	2.592	13.6
Nevada	37,970	705,378	*4*	612,900	0.614%	86,600	0.141	2.431	13.8
Orange	1,288,700	32,533,206	*3*	505,400	0.506%	2,659,300	5.262	2.967	14.0
Placer	98,400	2,783,550	*5*	898,820	0.900%	209,700	0.233	2.606	13.8
Plumas	8,860	147,239	*4*	1,634,540	1.637%	20,350	0.012	2.208	13.0
Riverside	567,400	11,138,861	*3*	4,613,220	4.621%	1,380,000	0.299	2.947	12.9
Sacramento	513,900	11,980,275	*5*	618,040	0.619%	1,140,600	1.846	2.598	13.7
San Benito	21,500	328,365	*1*	889,050	0.891%	44,350	0.050	3.161	12.7
San Bernardino	645,100	13,126,523	*3*	12,839,540	12.862%	1,587,400	0.124	3.066	12.9
San Diego	1,170,700	25,138,565	*3*	2,690,870	2.696%	2,724,400	1.012	2.777	13.8
San Francisco	384,100	10,392,212	*2*	29,890	0.030%	778,100	26.032	2.441	14.2
San Joaquin	213,800	4,422,080	*5*	895,640	0.897%	535,400	0.598	2.990	12.7
San Luis Obispo	97,900	1,997,905	*3*	2,114,880	2.119%	234,100	0.111	2.530	13.7
San Mateo	364,500	9,775,981	*2*	287,430	0.288%	701,100	2.439	2.774	14.2
Santa Barbara	181,800	3,544,310	*3*	1,752,620	1.756%	398,000	0.227	2.829	13.8
Santa Clara	864,300	25,260,854	*2*	826,380	0.828%	1,653,100	2.000	2.970	14.3
Santa Cruz	128,600	2,087,730	*1*	285,310	0.286%	245,600	0.861	2.740	14.2
Shasta	65,200	1,571,041	*4*	2,422,820	2.427%	162,700	0.067	2.483	13.0
Sierra	1,560	23,301	*4*	610,200	0.611%	3,360	0.006	2.379	12.9
Siskiyou	16,300	319,793	*4*	4,023,850	4.031%	44,400	0.011	2.338	12.9
Solano	161,500	3,029,077	*2*	530,030	0.531%	375,400	0.708	2.930	13.5
Sonoma	220,300	4,569,715	*1*	1,008,770	1.011%	426,900	0.423	2.561	13.9
Stanislaus	169,000	3,772,868	*5*	956,520	0.958%	419,500	0.439	2.958	12.7
Sutter	28,900	689,714	*5*	385,720	0.386%	74,700	0.194	2.695	12.9
Tehama	20,840	391,669	*5*	1,888,670	1.892%	54,800	0.029	2.513	12.7
Trinity	4,500	2,556,821	*4*	2,034,470	2.038%	13,400	0.007	2.394	12.8
Tulare	135,100	371,102	*5*	3,087,570	3.093%	355,500	0.115	3.177	12.4
Tuolumne	17,410	58,249	*4*	1,430,820	1.433%	52,100	0.036	2.396	12.9
Ventura	354,800	6,544,583	*3*	1,181,410	1.184%	716,800	0.607	3.038	13.6
Yolo	81,400	1,685,983	*5*	647,960	0.649%	154,500	0.238	2.646	13.8
Yuba	18,200	326,204	*5*	403,490	0.404%	60,500	0.150	2.756	12.7
Entire State	**13,240,050**	**319,095,449**		**99,822,800**	**100.0%**	**32,609,000**	**0.33**	**2.882**	**13.4**

County	Civ Labor Force	Unemploy Rate	Non-Ag Emp % of CA	Per capita income	Income % of CA	Manuf % of CA	No. of Farms	Farm % of Land	Vehicles Reg pre cap	Pub Rev per Capita
Alameda	684,800	5.0	4.84	$27,071	112.4	5.19	482	60.7	0.57	$113
Alpine	500	9.7	0.05	$22,105	91.8	0.05	*Note 1*	*Note 1*	0.74	$1,632
Amador	13,370	6.6	0.10	$18,761	77.9	0.05	367	62.3	0.64	$263
Butte	82,900	9	0.50	$18,040	74.9	0.20	1,944	43.1	0.52	$108
Calaveras	14,130	9.2	0.10	$17,973	74.6	2.30	438	37.7	0.70	$196
Colusa	8,860	19.1	0.05	$19,799	82.2	*Note 1*	836	61.1	0.51	$284
Contra Costa	458,100	4.9	2.30	$31,246	129.7	1.90	675	35.4	0.62	$121
Del Norte	10,270	10.2	0.10	$14,935	62.0	0.05	86	2.0	0.47	$148
El Dorado	73,900	6.3	0.30	$23,161	96.1	0.10	690	9.3	0.61	$214
Fresno	375,000	13	1.90	$18,329	76.1	1.20	7,021	46.5	0.45	$89
Glenn	11,510	14.9	0.05	$15,866	65.9	0.05	1,187	56.3	0.48	$115
Humboldt	60,900	7.5	0.40	$18,917	78.5	0.40	874	26.1	0.54	$154
Imperial	57,700	29.4	0.30	$14,790	61.4	0.10	657	19.9	0.51	$105
Inyo	7,360	8.4	0.10	$20,645	85.7	*Note 1*	79	0.1	0.64	$544
Kern	279,000	12.7	1.40	$17,625	73.2	0.70	1,995	54.5	0.44	$190
Kings	43,300	12.9	0.20	$13,982	58.0	0.20	1,092	87.2	0.39	$134
Lake	23,820	11.4	0.10	$19,060	79.1	*Note 1*	815	20.4	0.66	$187
Lassen	11,800	10.6	0.10	$16,058	66.7	0.05	312	16.7	0.43	$127
Los Angeles	4,415,500	8.2	29.80	$23,501	97.6	31.50	1,446	7.1	0.52	$137
Madera	51,530	14.1	0.20	$15,842	65.8	0.20	1,709	54.8	0.45	$152
Marin	130,400	3.4	0.80	$43,318	179.8	0.20	260	50.8	0.71	$234
Mariposa	7,520	8.8	0.05	$18,255	75.8	*Note 1*	256	22.2	0.66	$573
Mendocino	42,780	8.4	0.20	$19,673	81.7	0.20	1,088	32.3	0.57	$265
Merced	82,900	16.2	0.40	$15,653	65.0	0.30	2,879	79.2	0.44	$114
Modoc	4,220	11.8	0.05	$15,519	64.4	*Note 1*	466	27.2	0.47	$272
Mono	6,140	10.5	0.05	$20,084	83.4	*Note 1*	73	5.3	0.64	$698
Monterey	179,300	11	0.90	$25,270	104.9	0.50	1,245	64.6	0.52	$147
Napa	57,800	6	1.10	$27,881	115.7	0.40	1,227	48.8	0.60	$226
Nevada	40,730	6.8	0.20	$20,917	86.8	0.10	415	11.8	0.63	$161
Orange	1,343,900	4.1	9.30	$27,420	113.8	10.70	379	12.0	0.59	$48
Placer	104,100	5.4	0.60	$25,933	107.7	0.60	1,125	15.3	0.64	$243
Plumas	10,050	11.9	0.10	$19,844	82.4	0.05	125	7.3	0.68	$352
Riverside	618,000	8.2	2.70	$19,632	81.5	1.70	3,511	9.2	0.48	$121
Sacramento	546,900	6	3.80	$23,038	95.6	1.30	1,427	61.3	0.54	$196
San Benito	24,400	11.9	0.10	$18,266	75.8	0.10	611	67.5	0.50	$147
San Bernardino	695,100	7.2	3.60	$17,848	74.1	2.40	1,653	10.0	0.48	$75
San Diego	1,236,300	5.3	7.80	$23,263	96.6	4.40	6,565	19.2	0.55	$96
San Francisco	403,000	4.7	4.20	$36,061	149.7	2.10	*Note 1*	*Note 1*	0.44	$1,300
San Joaquin	240,800	11.2	1.30	$18,874	78.3	1.50	4,097	87.5	0.47	$141
San Luis Obispo	103,600	5.5	0.60	$20,490	85.1	0.20	1,880	62.6	0.59	$237
San Mateo	377,200	3.4	2.50	$35,802	148.6	2.40	302	20.0	0.75	$163
Santa Barbara	192,700	5.7	1.10	$25,860	107.3	0.90	1,613	47.8	0.54	$178
Santa Clara	896,600	3.6	6.90	$31,487	130.7	19.10	1,057	41.5	0.63	$127
Santa Cruz	140,200	8.3	0.70	$26,202	108.8	0.90	771	18.5	0.57	$184
Shasta	72,300	9.9	0.40	$19,558	81.2	0.20	844	16.0	0.54	$108
Sierra	1,750	10.9	0.05	$19,176	79.6	*Note 1*	53	9.1	0.63	$728
Siskiyou	18,820	13.4	0.10	$17,853	74.1	0.10	689	16.1	0.61	$165
Solano	174,700	7.6	1.10	$21,873	90.8	0.70	850	64.2	0.53	$97
Sonoma	230,400	4.4	1.20	$25,888	107.5	0.90	2,737	51.3	0.61	$175
Stanislaus	196,600	14	1.00	$18,122	75.2	1.70	4,354	79.4	0.49	$94
Sutter	34,300	15.7	0.30	$19,767	82.1	0.10	1,362	82.5	0.52	$133
Tehama	23,260	10.4	0.10	$15,154	62.9	0.10	1,381	53.8	0.47	$146
Trinity	5,250	14.2	0.05	$15,877	65.9	*Note 1*	113	5.7	0.60	$288
Tulare	160,600	15.9	0.70	$16,144	67.0	0.60	5,469	43.9	0.42	$135
Tuolumne	19,390	10.2	0.10	$18,214	75.6	0.10	249	9.6	0.63	$270
Ventura	381,800	7.1	1.90	$24,736	102.7	2.20	2,195	27.1	0.59	$118
Yolo	86,900	6.3	0.60	$22,093	91.7	0.40	912	80.1	0.51	$77
Yuba	21,100	13.9	0.30	$14,532	60.3	0.05	719	58.2	0.47	$119
Entire State	**15,596,100**	**7.2**		**$24,090**			**77,657**	**29.0**	**0.55**	**$124**

Note 1: These entries had no value shown in the original data, indicating that they were zero.

APPENDIX K: QUESTIONS USED TO DETERMINE SUITABILITY OF SORTING SITES

1. GENERAL INFORMATION TO PROVIDE TO SITE

   - Thank you for agreeing to help out with the statewide study.
   - We'll be conducting the study in July and August.
   - We will need 6 samples from residential packer trucks (pure residential loads as much as possible) and 10 samples from self-haul loads. Samples will be collected all on one day and most likely sorted that same day – in unusual circumstances, we may need to finish sorting on a second day.
   - For generator sites, we will also be collecting samples directly from businesses in the area and bringing them to your site for sorting and disposal. This sampling will require an additional 3 to 10 days at your site.
   - We will also be conducting a gate survey to determine the percentage of waste at your facility from residential, commercial, and self-haul sources. This survey will be done for 1 day – the same day we collect the residential and self-haul samples.

2. CONTACT INFORMATION

Name of site		Date	
Physical Address			
City		Zip	
Site Owner/ Operator			
Person approving use of the site		Email	
Address			
City		Zip	
Phone		Fax	
Site Manager		Email	
Address			
City		Zip	
Phone		Fax	
Person with data about the site		Email	
Address			
City		Zip	
Phone		Fax	

Who should the sampling crew and gate surveyor contact when they come on-site?

Will they be available in July/August?

Yes No

If they are on vacation or not there, who do we see?

_____

3. SITE TRAFFIC INFORMATION

Does the site receive:

A) Residential packer loads?

Yes No

Do you know if there are pure residential loads coming in?

Yes No Don't Know

Do they come in any particular day or time?

B) Commercial packer loads?

C) Self-haul loads? Both from residential sources and non-residential sources (like landscaping, construction)?

Do they come in any particular day or time?

Facility's hours of operation:

M _____
T _____
W _____
Th _____
F _____
Sat _____
Sun_____

Do you close early if you have reached your allowed daily tonnage amount?

Yes No

Does this happen very often?

Yes No

Are there site conditions we need to be aware of such as high winds, snakes or other animals, other special circumstances?

What are your peak traffic times for:

Residential packers_____

Commercial packers_____

Self-haul residential_____

Self-haul commercial_____

Would it be possible for the sorting crew to be there when the site is closed, for example after hours or on weekends if needed?

Yes No

How many scales do you have?

Do different types of trucks go to different scales (i.e., all self-haul going to one scale?)

How is traffic handled at the gate? (in relation to how we can select vehicle loads for sorting)

Is any recycling or recovery done at the site?

If yes, what materials?

And how is it done?

How are loads directed to recycling areas/how are recyclers handled?

The purpose of the study is to characterize disposed wastes only. If materials are recovered, we need to sample what is left. What is the best way to do this at your site?

We need to know how many loads of different types of waste you receive. Can you give this to me now, or should I fax you a short form to fill out?

Number of Loads

Day of Week	Single Fam. Res.	Comm. Packer	Comm. Roll-off	Transfer Truck	Self Haul Pickup or Smaller	Self-Haul Bigger Than Pickup
Sunday						
Monday						
Tuesday						
Wednesday						
Thursday						
Friday						
Saturday						

Any waste streams/types the facility does not accept that we need to sample?

Are there size restrictions on loads?

_____

4. SAMPLING RESIDENTIAL AND SELF-HAUL LOADS AT YOUR SITE

Crews have hardhats, orange vests, coveralls, boots, gloves. Any other safety equipment or special procedures you want them to use?

We need an area for the sorting crew to work, for the entire time we will be at the site. It needs to meet the following criteria (check box if yes/okay):

- Size of about 2 parking spaces
- It should be convenient to the disposal point, but not interfere with your operations. Or, samples from the loads need to be moved to the sorting area.
- We also need a space near the pit or disposal face for residuals after sorting is complete. We will dispose of the residue from the sorting where you request at the landfill face or in the transfer station pit.
- Is it possible to get a sheltered site, or to allow the crew to set up a shelter (like a canopy)?
- Is it okay to have the crew there on weekend days?

Can you provide a loader and operator in the tipping area to pull samples from the selected loads?

Yes No

We need access to the load for enough time to collect the sample. The sort crew will designate where to collect the sample in the pile and guide the operator to drop the sample. We expect that it will take from two to five minutes to obtain a sample. Is this okay?

Yes No

If no loader available, can we manually collect the samples from the pile, which will take a little longer?

Yes No

Loads will be randomly chosen throughout the day for sampling (6 residential packers, 10 self-haulers). Vehicles will be selected at the gate for sampling, and we will need a net weight of these vehicles. Vehicle selection will involve marking down the number of the selected vehicles as they pass through the gate and giving a card to selected vehicles. The vehicle will be directed to dump the load in an area where the sample can be pulled.

Is a person available at the gatehouse to help select vehicles for the 1 day?

Yes No

5. ADDITIONAL INFO FOR GENERATOR SAMPLING SITES

We will also be collecting samples directly from businesses in the area. The sampling crew will be collecting the samples and delivering them to the site for the sorting crew to sort. Between approximately 30 and 100 samples of about 125 lb each will be brought to your site to be sorted and ultimately disposed. Therefore we will need to be at your site an additional 3 to 10 days. Samples will be the same type of waste accepted by your facility, but may come from areas not normally disposing at your facility (i.e., from counties or cities not normally in your area). Is this okay?

Yes No

Do special arrangements need to be made?

Do we need to contact local haulers about this?

Generator samples may need to be stored overnight – collected one day, sorted the next. Need space and need to meet permit conditions. Is this okay?

Yes No

---

6. GATE SURVEY INFO

On the one day that we are taking samples of waste from vehicles entering your site, we will also be surveying all vehicles entering the site during an 8 hour survey period. We will need net weights of all vehicles surveyed and vehicles chosen for sampling. Will be doing a short interview of drivers of all vehicles, commercial haulers and self-haulers, to determine whether load is residential, commercial, or from one of 5 self-haul categories. Depending on how busy your site is, we will use one or two surveyors. The surveyors will bypass vehicles if they are impeding the flow of traffic into the site.

Can you provide vehicle counts during the survey period?

What safety equipment is needed by gate surveyor?

What types of vehicles are not weighed?

Are they charged a minimum fee?
Yes No

How is tonnage estimated for these loads?

Are there any potential problems with recording the weights of all vehicles that enter the site for the survey?

7. FINAL LOGISTICS

Can you please send me

- Written directions to the site(such as used for directing tour groups)
- Plan of area where we could sample (taken from permit)

Please remember to notify gate personnel.

Any other special circumstances we need to be aware of?

Anything you need from us?

Your main contact will be me – *give your name and phone number*. The contact for the field crew is Brad Anderson of Sky Valley Associates.

CIWMB will be sending you a confirmation letter. We will also cc your LEA in that letter and notify the Board's Permitting and Enforcement staff, just so they are aware that you are cooperating with the Board's project.

As we get closer to the study period, we'll arrange specific days for the crew to be at your site. We will send you a reminder letter 2 weeks before we will be at your site, and remind you again a few days before the crew will be there.

The CIWMB may wish to set up site visits during sorting for Board staff to observe field work for the project. Is this okay?

Yes No

We will let you know ahead of time about this.

Do you mind if we put info on the Board's LEA web site that you are participating in the study?

Yes No

We may need to contact you again for more detailed info for gate survey – person contacting you will be _____ from Cascadia.

Do you have any other questions?

Thank you for your time today, and thank you for helping us out with this important study.

APPENDIX L: DATA ELEMENTS OF THE STUDY

This section lists the pieces of information collected during the course of the study. Each datum was used either in planning the waste sampling process or in conducting the analysis.

Vehicle surveys

Date of survey

Location (site) of survey

Minimum weight at that site

Surveyor name

Page number + line number to uniquely identify each record

Vehicle license number or vehicle ID

Substream (SH, SF res, MF res, Com, or mixed res & com)

- If mixed res & com, then ask driver to estimate percentage of each to total 100%
- If SH, then determine activity that generated the waste: SF residential, MF residential, C&D, roofing, landscaping, or commercial/industrial/institutional/other

Net weight of load, specifying units as tons, pounds, or cubic yards

Misc. field notes

Composition database, containing records from disposal site samples and generator samples

- Date of sampling
- Site
- Sample number (unique for each sample)
- Substream:
  - Residential
    - Single-Family
    - Multi-Family
  - Commercial
  - Self-Haul
    - Residential
    - Commercial/industrial/institutional/other
    - Roofing
    - Landscaping
    - C&D
- Business name (generator only)
- Business/Multi-family ID number (generator only)
- Business SIC grouping (generator only)
- Business Tier grouping (generator only)
- Business number of employees on site
- Total volume of dumpsters (generator only)
- How full are dumpsters when sampled? (generator only)
- Weight of one cubic yard of waste (generator only)
- Weight of each material or RPPC
- City or district where load originated (res & SH only)
- Vehicle type (res & SH only)
- Vehicle license number (res & SH only)

Information for Vehicle Selection

Number of single-family residential packers at site per day

Number of commercial-hauling vehicles at site per day

- packers
- roll-offs

Number of self-haul vehicles at site per day (not broken down by size)