Contractor's Report to the Board

Statewide Waste Characterization Study

December 2004

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Zero Waste—You Make It Happen!

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Acknowledgments

This study would not have been possible without the cooperation and assistance of solid waste management companies, solid waste facilities, waste haulers, and apartment managers and owners throughout the State of California who generously agreed to participate in this effort.

Executive Summary

Introduction and Objectives

In 2003 and 2004, the California Integrated Waste Management Board (CIWMB) conducted a statewide study with the objective of obtaining information on the types and amounts of materials disposed at solid waste facilities throughout the state. In many ways, this study followed the standards and protocols established for the 1999 Statewide Waste Characterization Study. As with the 1999 study, the present study derives quantity and composition estimates for the commercial, residential, and self-hauled waste streams throughout California.

However, the present study departs significantly from the 1999 study in its use of samples obtained from vehicles at disposal facilities to characterize commercial waste, instead of samples obtained at actual commercial sites. The present study also examines additional material types and includes additional analysis of the disposal rates of rigid plastic packaging containers (RPPC) and California redemption value (CRV) containers at a level of detail beyond what was done in the 1999 study.[1]

Study Methodology

Waste sampling occurred using a stratified random sampling methodology in which waste was sampled from numerous subgroups (strata) to develop a waste composition profile for each stratum. The strata were then "added together" 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 included the geographical region, the waste sector (residential, commercial or self-hauled), and the waste subsector (single-family residential, multifamily residential, residential self-hauled, and commercial self-hauled).

The state was divided into five regions that were selected because of similarities in demographic, climate, geographic, and economic characteristics. Data regarding waste composition was gathered from 550 waste samples sorted at 22 disposal facilities (landfills and transfer stations) in five regions during four seasons. Whenever possible, a randomized process was used to select participating disposal facilities, vehicles carrying waste, multifamily dwellings, and waste samples to include in the study. Approximately equal numbers of waste samples belonging to each waste sector were obtained from each region of the state.

The waste from samples was sorted into 98 material types that can be fit to California's Standard List of Material Subtypes for Waste Sorting as well as RPPC types and CRV types that have been defined by CIWMB staff and described in Appendix B: List and Definitions of Material Types. All material types were chosen and defined such that they can be fit to the material types used during California's 1999 Statewide Waste Characterization Study. New for this study were separate types for four categories of electronic waste, expanded plastic film types, and carpeting. Also, for the first time, the CIWMB included a contamination study for selected material types.

In addition, surveys of vehicle drivers at the entrances to participating disposal facilities produced data that was used to estimate the portion of California's waste that corresponds to each of the waste sectors and subsectors. Generally, the surveys were conducted on the same days that waste sampling occurred. All vehicles bringing waste to the site during a pre-determined ten-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 4,693 surveys were completed.

[1] The 1999 study is available at www.ciwmb.ca.gov/WasteChar/Study1999/

Results

The data gathered during the sampling efforts was compiled, 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-hauled sectors.
- Disposed waste composition and tonnage of the single-family residential and multifamily residential subsectors.
- Disposed waste composition and tonnage of the commercial self-hauled and residential self-hauled subsectors.
- Disposed waste tonnage for four waste-generating activities that comprise commercial self-hauled waste.
- Disposed waste composition and tonnage for RPPCs and CRV containers statewide.

The findings show that, statewide, the commercial sector comprises 47 percent of the waste stream, the residential sector (single-family plus multifamily) represents 31.6 percent, and the self-hauled sector is responsible for the remaining 21.3 percent. The data also shows that approximately 350,770 tons of RPPCs were disposed statewide in 2003, equating to 0.87 percent of the overall waste stream.

Table ES-1 depicts the estimated contribution to the overall waste stream of each sector. Figure ES-A through Figure ES-D display the breakdown of the waste stream by nine material classes of material, for the overall waste stream and each of the three waste sectors that were studied. Table ES-2 presents the ten most prevalent material types in the overall disposed waste stream. Finally, Table ES-3 provides a detailed breakdown of the composition of the overall waste stream by material type.

A note on data for the *construction & demolition* material class: the data in this category reflects the total amounts of these **material types** in the overall disposed waste stream, regardless of the activity generating the material. For example, the *lumber* material type would include wood scraps from a home craft project that were disposed in a residential garbage can. Another example would be a pallet that a business disposed in its dumpster. These materials were not generated by construction and demolition **activities**, but they fall under the *lumber* material type in the *construction & demolition* material class.

Also, construction and demolition activities generate other materials in addition to the ones listed under the *construction & demolition* material class, such as *cardboard*, *ferrous metal*, and *plastic film*. These materials were counted under the *paper*, *metal*, and *plastic* material classes, even though they were generated by construction and demolition activities. In sum, the amounts of materials listed in the *construction & demolition* material class cannot be used as an estimate of the total amount of construction and demolition waste disposed in California. A future study, to be conducted in 2005, will focus on characterizing and quantifying construction and demolition waste as a separate waste stream.

Table ES-1: Estimated Contribution of Each Sector to California's Overall Disposed Waste Stream, 2003

	Est. Percentage of Disposed Waste Stream	Est. Tons Disposed Statewide
Commercial	47.0%	18,924,058
Residential	31.6%	12,721,055
Single-family residential	23.4%	*9,403,504*
Multifamily residential	*8.2%*	*3,317,551*
Self-hauled	21.3%	8,590,215
Commercial self-hauled	17.3%	*6,963,322*
Residential self-hauled	*4.0%*	*1,626,894*
Totals	**100.0%**	**40,235,328**

Numbers may not total exactly due to rounding. Source: Individual facility records and 2003 vehicle survey findings applied to CIWMB Disposal Reporting System 2003 tonnage figures.

Figure ES-A: Material Classes in California's Overall Disposed Waste Stream, 2003

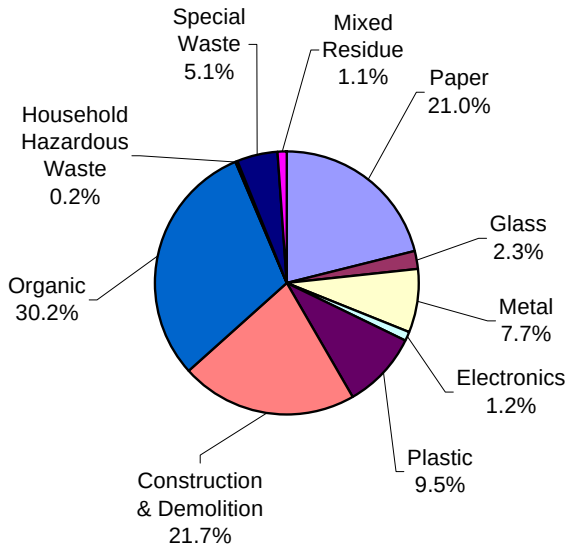


Figure ES-B: Material Classes in the Commercial Disposed Waste Stream, 2003

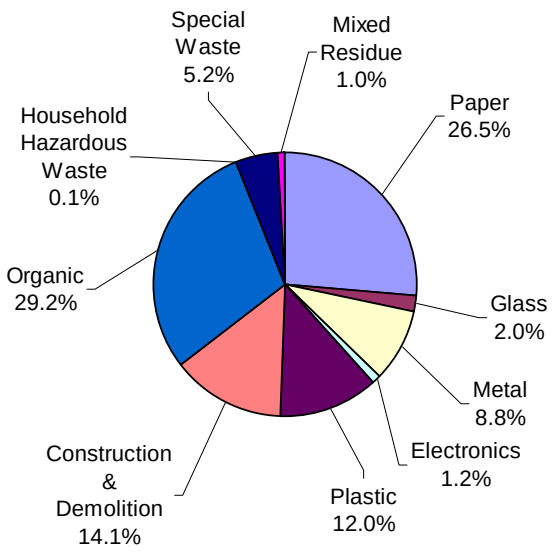


Figure ES-C: Material Classes in the Residential Disposed Waste Stream, 2003

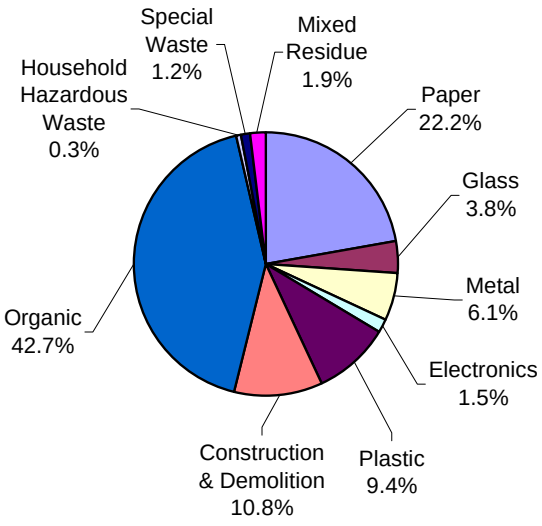
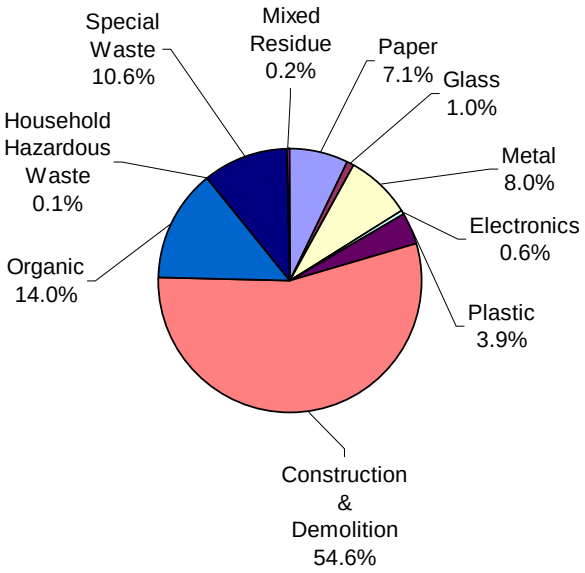


Figure ES-D: Material Classes in the Self-Hauled Disposed Waste Stream, 2003



Numbers may not total exactly due to rounding.

Table ES-2: Ten Most Prevalent Material Types in California's Overall Disposed Waste System, 2003

Material Type	Est. Pct.	Est. Tons	Cumulative Pct.
Food	14.6%	5,854,352	14.6%
Lumber	9.6%	3,881,214	24.2%
Uncoated Corrugated Cardboard	5.7%	2,312,147	29.9%
Remainder/Composite Paper	5.7%	2,274,433	35.6%
Remainder/Composite Organics	4.4%	1,752,803	40.0%
Leaves and Grass	4.2%	1,696,022	44.2%
Remainder/Composite Construction and Demolition	3.6%	1,452,009	47.8%
Other Miscellaneous Paper	3.5%	1,400,526	51.3%
Bulky Items	3.4%	1,348,224	54.6%
Remainder/Composite Metal	2.5%	1,018,242	57.1%

Any differences between *cumulative percent* figures and the sum of *estimated percent* figures are due to rounding. *Note: *Remainder/composite paper* includes such items as waxed corrugated cardboard, aseptic packages, paper towels, and photographs. Examples of *remainder/composite organics* include leather items, cork, garden hoses, carpet padding, and diapers. The material type *remainder/composite construction and demolition* includes such items as tiles, toilets, and fiberglass insulation. *Remainder/composite metal* includes such items as small non-electronic appliances, motors, and insulated wire.

Table ES-3: Composition of California's Overall Disposed Waste Stream by Material Type, 2003

	Est. Pct.	+ / -	Est. Tons
Paper	**21.0%**		**8,445,989**
Uncoated Corrugated Cardboard	5.7%	1.2%	2,312,147
Paper Bags	1.0%	0.5%	386,097
Newspaper	2.2%	0.4%	887,091
White Ledger	1.1%	0.3%	447,516
Colored Ledger	0.1%	0.0%	20,583
Computer Paper	0.1%	0.0%	20,845
Other Office Paper	0.7%	0.2%	296,203
Magazines and Catalogs	0.8%	0.2%	311,143
Phone Books and Directories	0.2%	0.1%	89,403
Other Miscellaneous Paper	3.5%	0.6%	1,400,526
Remainder/Composite Paper	5.7%	0.7%	2,274,433
Glass	**2.3%**		**934,926**
Clear Glass Bottles and Containers	0.9%	0.1%	356,467
Green Glass Bottles and Containers	0.4%	0.1%	180,570
Brown Glass Bottles and Containers	0.3%	0.0%	104,568
Other Colored Glass Bottles and Containers	0.0%	0.0%	3,106
Flat Glass	0.4%	0.4%	151,344
Remainder/Composite Glass	0.3%	0.1%	138,870
Metal	**7.7%**		**3,115,357**
Tin/Steel Cans	0.8%	0.2%	323,540
Major Appliances	1.5%	2.1%	616,663
Used Oil Filters	0.0%	0.0%	1,376
Other Ferrous	2.4%	0.5%	969,676
Aluminum Cans	0.2%	0.0%	74,851
Other Non-Ferrous	0.3%	0.1%	111,008
Remainder/Composite Metal	2.5%	0.6%	1,018,242
Electronics	**1.2%**		**481,353**
Brown Goods	0.1%	0.0%	41,394
Computer-related Electronics	0.3%	0.2%	119,917
Other Small Consumer Electronics	0.2%	0.1%	93,273
Television and Other Items with CRTs	0.6%	0.5%	226,769
Plastic	**9.5%**		**3,809,699**
PETE Containers	0.5%	0.1%	216,134
HDPE Containers	0.5%	0.1%	189,549
Miscellaneous Plastic Containers	0.5%	0.1%	206,470
Plastic Trash Bags	1.0%	0.2%	390,460
Plastic Grocery and Other Merchandise Bags	0.4%	0.0%	147,038
Non-Bag Commercial and Industrial Packaging Film	0.7%	0.3%	290,331
Film Products	0.2%	0.2%	93,073
Other Film	2.1%	0.6%	826,757
Durable Plastic Items	1.4%	0.2%	561,543
Remainder/Composite Plastic	2.2%	0.3%	888,343

	Est. Pct.	+ / -	Est. Tons
Organic	**30.2%**		**12,166,452**
Food	14.6%	2.6%	5,854,352
Leaves and Grass	4.2%	1.0%	1,696,022
Prunings and Trimmings	2.3%	0.6%	920,356
Branches and Stumps	0.3%	0.2%	119,754
Agricultural Crop Residues	0.0%	0.0%	0
Manures	0.1%	0.0%	36,506
Textiles	2.4%	1.3%	947,789
Carpet	2.1%	0.7%	838,869
Remainder/Composite Organics	4.4%	0.8%	1,752,803
Construction & Demolition	**21.7%**		**8,732,074**
Concrete	2.4%	0.9%	966,607
Asphalt Paving	0.0%	0.0%	10,414
Asphalt Roofing	1.9%	1.0%	767,981
Lumber	9.6%	1.4%	3,881,214
Gypsum Board	1.7%	0.8%	676,430
Rock, Soil, and Fines	2.4%	1.0%	977,419
Remainder/Composite Construction and Demolition	3.6%	0.8%	1,452,009
Household Hazardous Waste	**0.2%**		**73,599**
Paint	0.0%	0.0%	19,203
Vehicle and Equipment Fluids	0.0%	0.0%	1,000
Used Oil	0.0%	0.0%	548
Batteries	0.1%	0.0%	34,021
Remainder/Composite Household Hazardous	0.0%	0.0%	18,827
Special Waste	**5.1%**		**2,038,431**
Ash	0.1%	0.1%	60,160
Sewage Solids	0.0%	0.0%	0
Industrial Sludge	0.0%	0.0%	0
Treated Medical Waste	0.0%	0.0%	15,367
Bulky Items	3.4%	1.2%	1,348,224
Tires	0.3%	0.2%	126,633
Remainder/Composite Special Waste	1.2%	1.6%	488,047
Mixed Residue	**1.1%**	0.3%	**437,448**
Totals	**100.0%**		**40,235,328**
Sample count:	**550**		

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

Introduction and Overview

In 2003, the California Integrated Waste Management Board (CIWMB) commissioned a second Statewide Waste Disposal Characterization Study in order to obtain data to characterize the residential, commercial, and self-hauled waste streams. As with the previous study, conducted in 1999, the present study gathered information on the types and amounts of materials disposed in these waste streams through sampling of the waste delivered to disposal sites and waste collected directly from apartment buildings and complexes.

However, the present study departs significantly from the 1999 study in its use of samples obtained from vehicles at disposal facilities to characterize commercial waste, instead of samples obtained at actual commercial sites. The present study also examines additional material types and includes additional analysis of the disposal rates of rigid plastic packaging containers (RPPC) and California Redemption Value (CRV) containers at a level of detail beyond what was done in the 1999 study. Sampling was conducted in four seasons rather than two, as was done in 1999. This study did not gather information on materials diverted through source reduction, recycling, or composting.

Objectives of the Study

The primary objectives of this project were to quantify and characterize the residential, commercial, and self-hauled sectors of the disposed waste stream in 2003. Part of this effort involved quantifying and characterizing important subsectors of the disposed waste stream including single-family residential and multifamily residential waste, commercial self-hauled and residential self-hauled waste, and self-hauled waste generated by several common commercial activities. Secondary objectives of the project were to estimate the amounts of RPPCs and CRV containers, film plastics, and oil-contaminated materials disposed in California in 2003, as well as to gather data on contamination rates for RPPCs and CRV containers.

Waste Sectors

Waste was characterized for three sectors, four subsectors, and four activities shown in Table 1.

Table 1: Overview of Waste Disposal Sectors and Subsectors

Sector	Subsector	Activity	Description
Commercial waste			**Waste disposed by businesses, industries (factories, farms, etc.), institutions, and governments (schools, highways, parks, etc.) that is collected and transported by contracted and franchised haulers**
Residential Waste			**Waste disposed by households that is collected and transported by contracted and franchised haulers**
	Single-family residential waste		Waste that is collected from either single-family residences or buildings that include no more than four living units
	Multifamily residential waste		Waste that is collected from multi-unit buildings with greater than four living units
Self-hauled waste			**Waste hauled by individuals, businesses, or government agencies that haul their own garbage; includes waste delivered by anyone other than a contracted or franchised hauler**
	Commercial self-hauled waste		Waste that is hauled to a disposal site by a commercial enterprise (e.g., landscaper, contractor, etc.) even if waste is from residential dwellings
		Construction, demolition, and remodeling waste	*Waste generated during the construction, remodeling, or demolition of buildings by construction professionals*
		Landscaping waste	*Waste generated as part of landscaping and other yard care activities by landscaping professionals*
		Roofing waste	*Waste generated during the installation or replacement of roofs, including tear-off, by roofing professionals*
		Other commercial and industrial self-hauled waste	*All waste generated at businesses or institutions and hauled by these businesses that is not construction/remodeling/ demolition, landscaping, or roofing waste*
	Self-hauled residential waste		Waste that is hauled to a disposal site by a resident from his/her home

In this study, waste from the commercial sector, the self-hauled sector, and the single-family residential subsector was sampled at disposal facilities (transfer stations and landfills). Samples were obtained from randomly selected loads of each type of waste as they arrived at the facilities.

The multifamily residential waste subsector was characterized by obtaining waste samples at the point of generation; that is, at individual randomly-selected apartment buildings and complexes in the vicinity of the disposal facilities where other sampling/sorting activities were taking place. All waste sectors and subsectors were quantified through the use of vehicle surveys administered at the participating disposal facilities.

Dividing the State into Regions

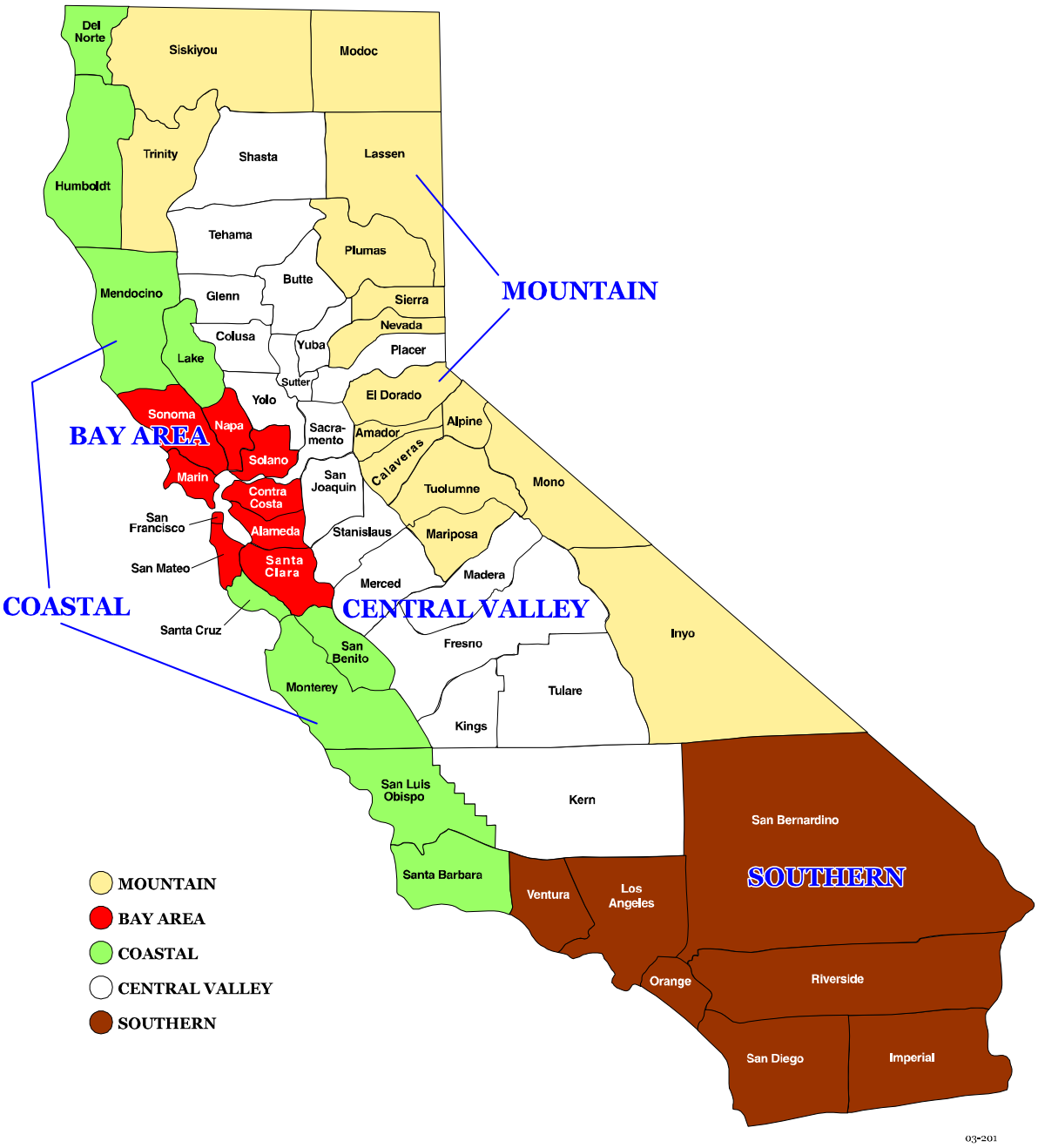
This study divides California into five regions, because clear differences in demographic and geographic characteristics of certain areas of the state are expected to correlate with different compositions of the waste stream. The five regions are shown in the map in Figure A on the following page.

In general, the regions can be 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 more metropolitan and have strong industrial components in the economy.
- **Southern**—includes counties that are strongly industrial with large populations and some 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.

The specific assignment of counties to regions is shown in Table A-1 in Appendix A: Detailed Methodology.

Figure A: Regions Considered in the Study



Selection and Scheduling of Sites

Disposal facilities throughout each region of the state were randomly selected for inclusion in the study based on 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 handle waste destined for final disposal (that is, the waste is not subject to any further processing or sorting), that it was possible to obtain credible tonnage data from all three waste sectors (that is, commercial, residential and self-hauled), and that it was possible to perform waste sampling and sorting there. In addition, in all regions except the Mountain Region, facilities had to accept an average of at least 100 tons of disposed waste per day to participate in the study.

Four facilities in each region were selected to participate in the study, for a total of 20 facilities. In each season, two facilities per region were visited. Generally, two facilities were visited in summer and winter, and the other two in autumn and spring. During the course of the study, two original facilities had to be replaced due to logistical difficulties, so a total of 22 facilities were used. See Table A-2 for a listing of all facilities.

A period of ten weekdays was scheduled for sampling and sorting activities during each season of the study. Following is a list of the sampling/sorting dates:

- Summer: July 9–22, 2003
- Autumn: October 6–17, 2003
- Winter: January 12–23, 2004
- Spring: April 1–9 and April 13–16, 2004

Appendix A: Detailed Methodology contains a thorough description of the selection and screening procedures, as well as a complete accounting of the numbers of waste samples and RPPC/CRV decontamination samples.

Capture and Sorting of Waste Samples

Samples of disposed waste from the single-family residential, commercial, commercial self-hauled, and residential self-hauled sectors were gathered at selected disposal facilities (landfills or transfer stations) in each region. For multifamily residences, waste samples were collected directly from apartment buildings and complexes rather than at disposal facilities. This allowed for more detailed analysis of the multifamily waste stream. Samples associated with each waste sector and subsector were apportioned to participating disposal facilities in a way that ensured representation by each region of the state during each of the four seasons of the study. Table 2 shows the number of samples that were collected for each sector.

Table 2: Numbers of Waste Samples Characterized, by Sector and Subsector

Sector	Number of Samples
Commercial	200
Residential	150
Single-family residential	*110*
Multifamily residential	*40*
Self-hauled	200
Commercial self-hauled	*133*
Residential self-hauled	*67*
Total	**550**

Please see Table A-3 in Appendix A: Detailed Methodology for a detailed account of planned and actual waste samples and Table A-5 for the distribution of samples among facilities. Generally, samples were distributed evenly among seasons and regions.

In addition to standard waste characterization, approximately one-third of the waste samples belonging to each waste sector and subsector were scheduled to have their component RPPCs and CRV containers saved, decontaminated, and re-weighed in their clean form. The numbers of RPPC/CRV samples are presented in Table 3, below, and are presented in greater detail in Appendix A: Detailed Methodology.

Table 3: Numbers of RPPC/CRV Samples Analyzed for Contamination, by Sector and Subsector

Sector	Number of Samples
Commercial	42
Residential	41
Single-family residential	*30*
Multifamily residential	*11*
Self-hauled	40
Commercial self-hauled	*27*
Residential self-hauled	*13*
Total	**123**

Waste Types

Waste samples were sorted and characterized according to 98 material types for waste sorting, as described in Appendix B: List and Definitions of Material Types. The 98 **material types** are organized into ten **broad material classes**—*paper, glass, metal, electronics, plastic, organic waste*, *construction & demolition waste, household hazardous waste*, *special waste*, and *mixed residue*. The material types are organized into broad material classes as follows:

- 11 types of paper.
- 14 types of glass.
- 11 types of metals.
- 4 types of electronics.
- 29 types of plastic.
- 9 types of organic waste.

- 7 types of construction and demolition waste.
- 5 types of household hazardous waste.
- 7 types of special waste.
- 1 category of mixed residues that were too small to sort.

The categorization included 17 types of RPPCs, 10 types of plastic CRV containers, 8 types of glass CRV containers, and 4 types of CRV metal containers.

New material classifications for this study included carpeting, five types of film, and four types of electronic waste, as well as RPPCs and CRV types. All new types were designed to be folded into the standard list so that findings could be compared to those of the 1999 study.

Vehicle Surveys

At each disposal facility that participated in the study, a survey was administered to the drivers of vehicles carrying waste to the facility on the day(s) the data collection crew was present. The objective of the survey was to determine how many tons of disposed waste on the given day were associated with each of the waste sectors, subsectors, and activities addressed in this study. This information, in conjunction with daily transaction reports and annual tonnage reports from facilities, was used to determine the relative proportions associated with each waste sector at the facility level, the regional level, and the statewide level. Vehicle surveys were conducted during eight days in each of the five regions of the state, for a total of 40 survey days and 4,693 vehicles surveyed.

Results

Interpreting the Results

How Data Is Presented

For the overall waste composition, and for each waste sector and subsector, data is presented in three ways:

- First, a summary of waste composition by broad material class is presented in a pie chart.
- Next, the ten most prevalent material types, by weight, are shown in a table.
- Third, a detailed table lists all the full composition and quantity results for the 67 material types, excluding RPPCs and CRVs, defined for the 2003 study. Data for RPPCs and CRVs is presented separately in the section Special Studies of RPPCs, CRVs, and Oil Containers. Please refer to Appendix B: List and Definitions of Material Types and Figure A-c and Figure A-d in Appendix A: Detailed Methodology for tables and descriptions of the material types and classes.

Means and Error Ranges

The data from the sorting process was treated with a statistical procedure that provided two kinds of information for each of the material types:

- The percent-by-weight estimated composition of waste represented by the samples examined in this study.
- The degree of precision of our composition estimates.

All estimates of precision were calculated at the 90 percent confidence level. The equations used in these calculations appear in the section Description of Calculations and Statistical Procedures Used in Appendix A: Detailed Methodology.

The example below illustrates how the results can be interpreted. The example indicates that the best estimate of the amount of *leaves and grass* present in the universe of waste sampled is 5.2 percent. The figure 1.2 percent reflects the precision of the estimate. When calculations are performed at the 90 percent confidence level, we are 90 percent certain that the mean estimate for *leaves and grass* is between 5.2 percent + 1.2 percent and 5.2 percent - 1.2 percent. In other words, we are 90 percent certain that the mean lies between 6.4 percent and 4 percent.

Waste Material	Est. Pct.	+ / -
Leaves and grass	5.2%	1.2%

Rounding

When interpreting the results presented in the tables and figures in this report, it is important to consider the **effect of rounding**.

To keep the waste composition tables and figures readable, estimated tonnages are rounded to the nearest ton, and estimated percentages are rounded to the nearest tenth of a percent. Due to this rounding, the **tonnages** presented in the report, when added together, may not exactly match the subtotals and totals shown. Similarly, the **percentages**, when added together, may not exactly

match the subtotals or totals shown. Also, percentages less than 0.05 percent are shown as 0.0 percent.

Statewide Tonnages by Sector

Vehicle Survey

Daily transaction reports from each facility were used to establish the proportion of waste transported by contracted and franchised haulers (single-family, commercial, and multifamily), and waste hauled by others (commercial and residential self-hauled). Then, the results of the vehicle surveys were used to determine how much waste to assign to each specific waste sector. Thus, vehicle surveys determined how to assign tonnage to single-family versus commercial waste versus multifamily waste. Likewise, the surveys distinguished residential self-hauled waste from commercial self-hauled waste, and commercial self-haul activities.

Vehicle surveys were conducted at all 22 disposal facilities where disposal site waste samples were collected, and in all but one case, they were conducted on the same days as the collection of disposal site samples.

The surveys were administered to the drivers of each vehicle entering the facility through the gate at which the surveyor was posted. If the facility had multiple gates, then the surveyor rotated among the gates at regular intervals of approximately one hour. Additional information on weekend disposal patterns was gathered from the facility to supplement survey data for weekdays and adjust data to better reflect overall disposal at the facility.

The ultimate product of the survey data and weekend data was an estimate of the fraction of the overall waste stream contributed by each of the waste sectors, subsectors, and activities at each participating facility. Appendix A: Detailed Methodology describes how this information was then used to estimate the relative magnitude of each part of the disposed waste stream on a regional basis and statewide. A copy of the form that was used to collect the data is included in Appendix C.

Table 4: Vehicle Survey Responses, by Region and Season

	Coastal	Bay Area	Southern	Mountain	Central	Totals
Summer 2003	201	371	203	389	209	**1,373**
Autumn 2003	185	255	396	81	157	**1,074**
Winter 2004	187	233	211	346	181	**1,158**
Spring 2004	254	219	408	77	130	**1,088**
Totals	**827**	**1078**	**1218**	**893**	**677**	**4,693**

Statewide Percentages and Tonnages by Sector

Table 5 shows the estimated contributions of each sector of the waste stream.

Table 5: Statewide Tonnage and Percentage of Disposed Waste Stream by Sector, 2003

	Est. Percentage of Disposed Waste Stream	Est. Tons Disposed Statewide
Commercial	47.0%	18,924,058
Residential	31.6%	12,721,055
Single-family residential	23.4%	*9,403,504*
Multifamily residential	*8.2%*	*3,317,551*
Self-hauled	21.3%	8,590,215
Commercial self-hauled	17.3%	*6,963,322*
Residential self-hauled	*4.0%*	*1,626,894*
Totals	**100.0%**	**40,235,328**

Numbers may not total exactly due to rounding.

Commercial waste and residential waste include all waste collected and transported to disposal sites by contracted and franchised waste haulers. Self-hauled waste includes both commercial and residential wastes that are hauled by anyone other than a contracted or franchised hauler (for example, an individual homeowner, a construction company, a landscaper, etc). For purposes of this study, commercial self-hauled loads were those hauled by a commercial enterprise (for example, contractor, landscaper, etc.) even if the source of the waste was a residential dwelling. Residential self-hauled loads were those loads transported by a resident from their home to the disposal site.

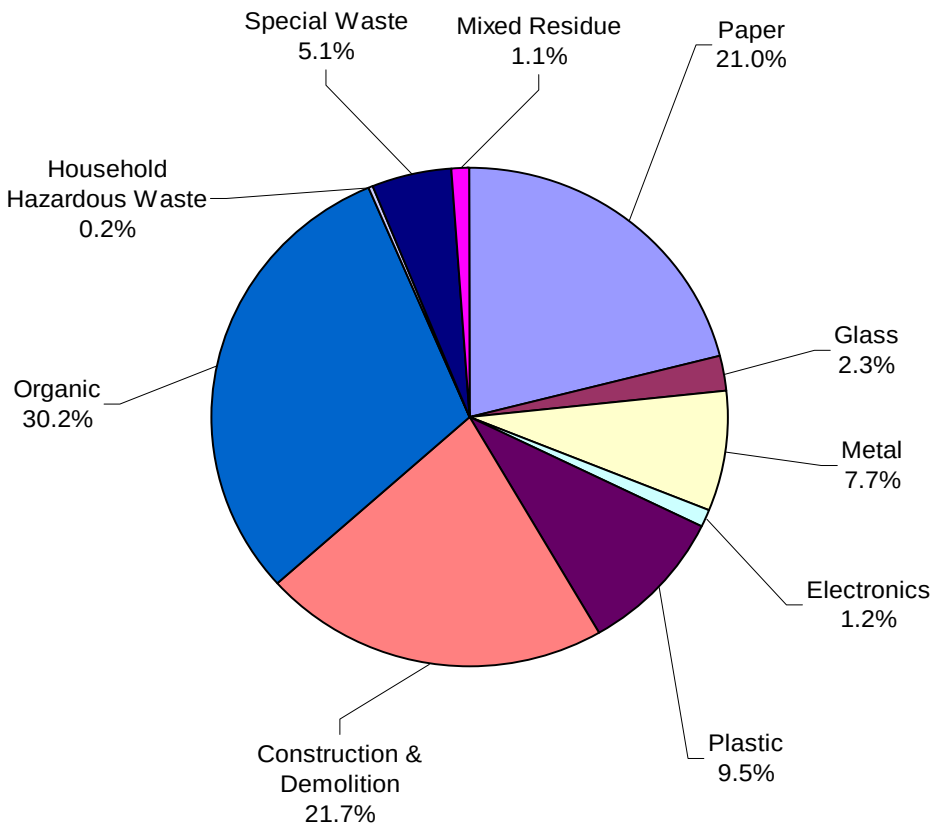
Single-family and multifamily residential waste together accounts for 31.6 percent of the state's waste stream, while 68.4 percent comes from all other sources. Overall, the per-capita disposal rate for the state was approximately 1.11 tons per person per year in 2003. The per-capita disposal rate for residential waste (single-family and multifamily) was approximately 0.35 tons per person per year. The average per unit disposal rate for the multifamily subsector is 0.99 tons per unit per year.

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 estimates by broad material class for the overall waste stream are illustrated in Figure B. The largest material class in the overall waste stream was *organic waste*, which accounted for about 30 percent of the waste stream, by weight, followed by *construction & demolition waste* (21.7 percent) and *paper* (21.0 percent). (See Appendix B: List and Definitions of Material Types for a description of the material types included in each material class.)

Figure B: Overview of California's Overall Disposed Waste Stream, 2003



Numbers may not total exactly due to rounding.

Note on data for the *construction & demolition* material class: the data in this category reflects the total amounts of these **material types** in the overall disposed waste stream, regardless of the activity generating the material. For example, the *lumber* material type would include wood scraps from a home craft project that were disposed in a residential garbage can. Another example would be a pallet that a business disposed in its dumpster. These materials were not generated by construction and demolition **activities**, but they fall under the *lumber* material type in the *construction & demolition* material class.

Also, construction and demolition activities generate other materials in addition to the ones listed under the *construction & demolition* material class, such as *cardboard*, *ferrous metal*, and *plastic film*. These materials were counted under the *paper*, *metal*, and *plastic* material classes, even though they were generated by construction and demolition activities.

In sum, the amounts of materials listed in the *construction & demolition* material class cannot be used as an estimate of the total amount of construction and demolition waste disposed in California. A future study, to be conducted in 2005, will focus on characterizing and quantifying construction and demolition waste as a separate waste stream.

Of the top ten most prevalent material types in the overall waste stream, as shown in Table 6, the material types *lumber*, *uncoated corrugated cardboard*, and *other miscellaneous paper* are typically recyclable and, together, account for about 19 percent of the waste stream. Additionally, *food* and *leaves and grass* are compostable material types and account for close to 19 percent of the waste stream, by weight. Together, the top ten material types compose approximately 57 percent of overall waste.

Table 6: Ten Most Prevalent Material Types in California's Overall Disposed Waste System, 2003

Material Type	Est. Pct.	Est. Tons	Cumulative Pct.
Food	14.6%	5,854,352	14.6%
Lumber	9.6%	3,881,214	24.2%
Uncoated Corrugated Cardboard	5.7%	2,312,147	29.9%
Remainder/Composite Paper	5.7%	2,274,433	35.6%
Remainder/Composite Organics	4.4%	1,752,803	40.0%
Leaves and Grass	4.2%	1,696,022	44.2%
Remainder/Composite Construction and Demolition	3.6%	1,452,009	47.8%
Other Miscellaneous Paper	3.5%	1,400,526	51.3%
Bulky Items	3.4%	1,348,224	54.6%
Remainder/Composite Metal	2.5%	1,018,242	57.1%

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

The composition percentages by weight for each material type in California's overall waste stream are listed in Table 7.

Table 7: Composition of California's Overall Disposed Waste Stream, 2003

	Est. Pct.	+ / -	Est. Tons
Paper	**21.0%**		**8,445,989**
Uncoated Corrugated Cardboard	5.7%	1.2%	2,312,147
Paper Bags	1.0%	0.5%	386,097
Newspaper	2.2%	0.4%	887,091
White Ledger	1.1%	0.3%	447,516
Colored Ledger	0.1%	0.0%	20,583
Computer Paper	0.1%	0.0%	20,845
Other Office Paper	0.7%	0.2%	296,203
Magazines and Catalogs	0.8%	0.2%	311,143
Phone Books and Directories	0.2%	0.1%	89,403
Other Miscellaneous Paper	3.5%	0.6%	1,400,526
Remainder/Composite Paper	5.7%	0.7%	2,274,433
Glass	**2.3%**		**934,926**
Clear Glass Bottles and Containers	0.9%	0.1%	356,467
Green Glass Bottles and Containers	0.4%	0.1%	180,570
Brown Glass Bottles and Containers	0.3%	0.0%	104,568
Other Colored Glass Bottles and Containers	0.0%	0.0%	3,106
Flat Glass	0.4%	0.4%	151,344
Remainder/Composite Glass	0.3%	0.1%	138,870
Metal	**7.7%**		**3,115,357**
Tin/Steel Cans	0.8%	0.2%	323,540
Major Appliances	1.5%	2.1%	616,663
Used Oil Filters	0.0%	0.0%	1,376
Other Ferrous	2.4%	0.5%	969,676
Aluminum Cans	0.2%	0.0%	74,851
Other Non-Ferrous	0.3%	0.1%	111,008
Remainder/Composite Metal	2.5%	0.6%	1,018,242
Electronics	**1.2%**		**481,353**
Brown Goods	0.1%	0.0%	41,394
Computer-related Electronics	0.3%	0.2%	119,917
Other Small Consumer Electronics	0.2%	0.1%	93,273
Television and Other Items with CRTs	0.6%	0.5%	226,769
Plastic	**9.5%**		**3,809,699**
PETE Containers	0.5%	0.1%	216,134
HDPE Containers	0.5%	0.1%	189,549
Miscellaneous Plastic Containers	0.5%	0.1%	206,470
Plastic Trash Bags	1.0%	0.2%	390,460
Plastic Grocery and Other Merchandise Bags	0.4%	0.0%	147,038
Non-Bag Commercial and Industrial Packaging Film	0.7%	0.3%	290,331
Film Products	0.2%	0.2%	93,073
Other Film	2.1%	0.6%	826,757
Durable Plastic Items	1.4%	0.2%	561,543
Remainder/Composite Plastic	2.2%	0.3%	888,343

	Est. Pct.	+ / -	Est. Tons
Organic	**30.2%**		**12,166,452**
Food	14.6%	2.6%	5,854,352
Leaves and Grass	4.2%	1.0%	1,696,022
Prunings and Trimmings	2.3%	0.6%	920,356
Branches and Stumps	0.3%	0.2%	119,754
Agricultural Crop Residues	0.0%	0.0%	0
Manures	0.1%	0.0%	36,506
Textiles	2.4%	1.3%	947,789
Carpet	2.1%	0.7%	838,869
Remainder/Composite Organics	4.4%	0.8%	1,752,803
Construction & Demolition	**21.7%**		**8,732,074**
Concrete	2.4%	0.9%	966,607
Asphalt Paving	0.0%	0.0%	10,414
Asphalt Roofing	1.9%	1.0%	767,981
Lumber	9.6%	1.4%	3,881,214
Gypsum Board	1.7%	0.8%	676,430
Rock, Soil, and Fines	2.4%	1.0%	977,419
Remainder/Composite Construction and Demolition	3.6%	0.8%	1,452,009
Household Hazardous Waste	**0.2%**		**73,599**
Paint	0.0%	0.0%	19,203
Vehicle and Equipment Fluids	0.0%	0.0%	1,000
Used Oil	0.0%	0.0%	548
Batteries	0.1%	0.0%	34,021
Remainder/Composite Household Hazardous	0.0%	0.0%	18,827
Special Waste	**5.1%**		**2,038,431**
Ash	0.1%	0.1%	60,160
Sewage Solids	0.0%	0.0%	0
Industrial Sludge	0.0%	0.0%	0
Treated Medical Waste	0.0%	0.0%	15,367
Bulky Items	3.4%	1.2%	1,348,224
Tires	0.3%	0.2%	126,633
Remainder/Composite Special Waste	1.2%	1.6%	488,047
Mixed Residue	**1.1%**	0.3%	**437,448**
Totals	**100.0%**		**40,235,328**
Sample count:	**550**		

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

Commercial Waste

The objective of this portion of the study was to characterize California's disposed waste from commercial and industrial sources. Commercial waste is defined as waste disposed by businesses, industries, and public organizations that is collected and transported by contracted and franchised waste haulers. As shown in Table 5, the commercial sector accounts for approximately 47 percent of California's municipal solid waste stream.

Description of Samples

Samples of commercial waste were obtained from randomly selected vehicles at the landfills and transfer stations employed in this study. Composition percents and estimated tons for each material were derived by combining data at the regional level, with weighting proportionate to the estimated amount of commercial waste disposed in each region, as revealed by the vehicle surveys. (Please see Appendix A: Detailed Methodology for a description of the methods used in selecting, sorting, and analyzing samples.)

Table 8 presents the numbers of samples that were obtained in each region and each season for commercial waste. In total, 200 samples of commercial waste were analyzed.

Table 8: Overall Commercial Samples Obtained, by Region and Season

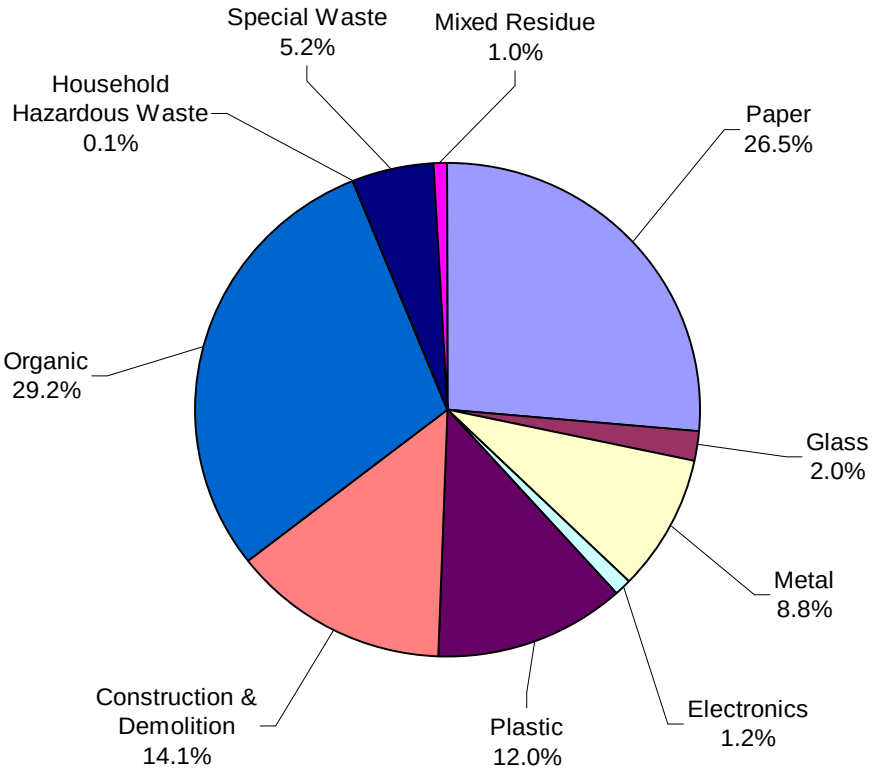
	Coastal	Bay Area	Southern	Mountain	Central	Totals
Summer 2003	10	10	9	8	7	**44**
Autumn 2003	10	10	11	11	13	**55**
Winter 2004	10	10	10	11	10	**51**
Spring 2004	8	12	10	10	10	**50**
Totals	**38**	**42**	**40**	**40**	**40**	**200**

See Table A-2 for the names and locations of the disposal facilities that were visited.

Overall Commercial Waste Composition

Composition results by broad material class for commercial waste are illustrated in Figure C and described in detail in Table 10. The largest broad material classes of the commercial waste stream are *organic* and *paper*, which account for about 29 percent and 27 percent of the total, respectively. (See Appendix B: List and Definitions of Material Types for a description of the material types included in each material class.)

Figure C: Overview of Commercial Disposed Waste, 2003



Numbers may not total exactly due to rounding.

Table 9 presents the ten most prevalent material types, which account for approximately 61 percent of commercial waste. Typically recyclable material types, including *uncoated corrugated cardboard*, *lumber*, *other miscellaneous paper*, and *major appliances*, make up approximately 23 percent of the commercial waste stream. *Food*, which accounts for an additional 19 percent of the waste stream, is compostable.

Table 9: Ten Most Prevalent Material Types in Commercial Disposed Waste, 2003

Material Type	Est. Pct.	Est. Tons	Cumulative Pct.
Food	18.8%	3,565,086	18.8%
Uncoated Corrugated Cardboard	8.3%	1,565,842	27.1%
Lumber	7.9%	1,498,863	35.0%
Remainder/Composite Paper	7.0%	1,319,968	42.0%
Other Miscellaneous Paper	4.3%	822,247	46.4%
Remainder/Composite Organics	3.3%	618,265	49.6%
Other Film	3.2%	611,527	52.9%
Major Appliances	2.8%	534,565	55.7%
Remainder/Composite Plastic	2.7%	511,069	58.4%
Remainder/Composite Special Waste	2.5%	478,141	60.9%

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

Table 10 presents detailed composition results for the commercial waste stream.

Table 10: Composition of Commercial Disposed Waste, 2003

	Est. Pct.	+ / -	Est. Tons
Paper	**26.5%**		**5,010,261**
Uncoated Corrugated Cardboard	8.3%	2.3%	1,565,842
Paper Bags	1.5%	1.0%	281,423
Newspaper	2.1%	0.7%	401,257
White Ledger	1.2%	0.5%	234,511
Colored Ledger	0.1%	0.0%	11,616
Computer Paper	0.1%	0.1%	17,679
Other Office Paper	1.0%	0.4%	187,577
Magazines and Catalogs	0.7%	0.3%	138,555
Phone Books and Directories	0.2%	0.1%	29,586
Other Miscellaneous Paper	4.3%	1.2%	822,247
Remainder/Composite Paper	7.0%	1.5%	1,319,968
Glass	**2.0%**		**370,098**
Clear Glass Bottles and Containers	0.6%	0.2%	117,439
Green Glass Bottles and Containers	0.3%	0.2%	57,410
Brown Glass Bottles and Containers	0.1%	0.0%	10,684
Other Colored Glass Bottles and Containers	0.0%	0.0%	67
Flat Glass	0.7%	0.9%	137,827
Remainder/Composite Glass	0.2%	0.2%	46,671
Metal	**8.8%**		**1,656,648**
Tin/Steel Cans	0.9%	0.3%	169,014
Major Appliances	2.8%	4.5%	534,565
Used Oil Filters	0.0%	0.0%	0
Other Ferrous	2.4%	0.8%	452,411
Aluminum Cans	0.1%	0.0%	24,993
Other Non-Ferrous	0.3%	0.2%	63,525
Remainder/Composite Metal	2.2%	1.0%	412,140
Electronics	**1.2%**		**236,190**
Brown Goods	0.0%	0.0%	6,344
Computer-related Electronics	0.3%	0.3%	62,884
Other Small Consumer Electronics	0.2%	0.2%	38,039
Television and Other Items with CRTs	0.7%	0.9%	128,923
Plastic	**12.0%**		**2,272,432**
PETE Containers	0.5%	0.1%	96,945
HDPE Containers	0.4%	0.1%	78,641
Miscellaneous Plastic Containers	0.6%	0.3%	117,921
Plastic Trash Bags	1.4%	0.4%	269,352
Plastic Grocery and Other Merchandise Bags	0.2%	0.1%	38,930
Non-Bag Commercial and Industrial Packaging Film	1.0%	0.5%	188,833
Film Products	0.4%	0.4%	72,077
Other Film	3.2%	1.4%	611,527
Durable Plastic Items	1.5%	0.5%	287,135
Remainder/Composite Plastic	2.7%	0.7%	511,069

	Est. Pct.	+ / -	Est. Tons
Organic	**29.2%**		**5,531,661**
Food	18.8%	5.4%	3,565,086
Leaves and Grass	2.4%	1.3%	456,781
Prunings and Trimmings	0.7%	0.3%	139,999
Branches and Stumps	0.2%	0.3%	35,316
Agricultural Crop Residues	0.0%	0.0%	0
Manures	0.0%	0.0%	973
Textiles	2.3%	2.5%	433,989
Carpet	1.5%	0.9%	281,252
Remainder/Composite Organics	3.3%	1.4%	618,265
Construction & Demolition	**14.1%**		**2,670,504**
Concrete	1.8%	1.0%	344,379
Asphalt Paving	0.0%	0.0%	7,030
Asphalt Roofing	0.8%	0.9%	153,859
Lumber	7.9%	1.8%	1,498,863
Gypsum Board	0.4%	0.3%	70,779
Rock, Soil, and Fines	1.1%	0.9%	209,758
Remainder/Composite Construction and Demolition	2.0%	0.7%	385,835
Household Hazardous Waste	**0.1%**		**21,000**
Paint	0.0%	0.0%	7,052
Vehicle and Equipment Fluids	0.0%	0.0%	0
Used Oil	0.0%	0.0%	0
Batteries	0.0%	0.0%	8,040
Remainder/Composite Household Hazardous	0.0%	0.0%	5,908
Special Waste	**5.2%**		**975,182**
Ash	0.1%	0.2%	25,894
Sewage Solids	0.0%	0.0%	0
Industrial Sludge	0.0%	0.0%	0
Treated Medical Waste	0.1%	0.1%	14,926
Bulky Items	1.8%	1.2%	348,301
Tires	0.6%	0.4%	107,920
Remainder/Composite Special Waste	2.5%	3.5%	478,141
Mixed Residue	**1.0%**	0.5%	**180,083**
Totals	**100.0%**		**18,924,058**
Sample count:	**200**		

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

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 contracted and franchised 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 5, the residential sector accounts for approximately 31.6 percent of California's municipal solid waste stream. The single-family residential subsector accounts for approximately 23.4 percent, and the multifamily residential subsector accounts for approximately 8.2 percent.

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).

Description of Samples

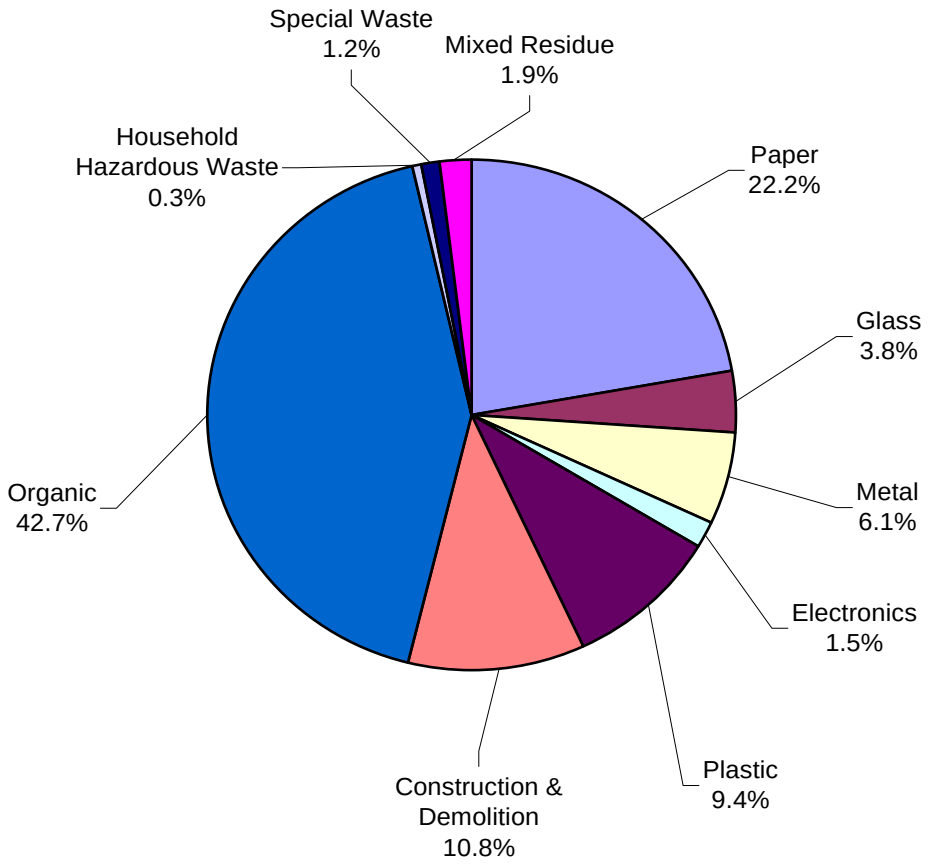
Samples of single-family residential waste were obtained from randomly selected vehicles at the landfills and transfer stations that participated in this study. Samples of multifamily residential waste were collected at multifamily complexes that were selected randomly from the regions surrounding the participating solid waste facilities. Composition percents and estimated tons for each material type 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: Detailed Methodology for a description of the methods used in selecting, sorting, and analyzing samples.)

Table 13 and Table 17 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, 150 samples of residential waste were analyzed (110 single-family and 40 multifamily).

Overall Residential Waste Composition

Composition results by broad material class for residential disposed waste are illustrated in Figure D and described in detail in Table 12. A large portion—an estimated 43 percent—of the residential waste stream was composed of *organic* material. (See Appendix B: List and Definitions of Material Types for a description of material types included in each material class.)

Figure D: Overview of Overall Residential Disposed Waste, 2003



Numbers may not total exactly due to rounding.

The top ten most prominent material types, shown in Table 11, include the compostable material types *food*, *leaves and grass*, and *prunings and trimmings.* Additionally, typically recyclable material types listed are *lumber* (4.2 percent), *other miscellaneous paper* (3.9 percent), *newspaper* (3.7 percent), and *uncoated corrugated cardboard* (3.6 percent). (See Appendix B: List and Definitions of Material Types for a description of the material types included in each material class.)

Table 11: Ten Most Prevalent Material Types in Overall Residential Disposed Waste, 2003

Material Type	Est. Pct.	Est. Tons	Cumulative Pct.
Food	17.3%	2,199,406	17.3%
Leaves and Grass	7.8%	996,295	25.1%
Remainder/Composite Organics	7.0%	892,219	32.1%
Remainder/Composite Paper	6.7%	854,422	38.9%
Prunings and Trimmings	5.3%	673,405	44.1%
Lumber	4.2%	532,179	48.3%
Other Miscellaneous Paper	3.9%	495,245	52.2%
Newspaper	3.7%	464,919	55.9%
Uncoated Corrugated Cardboard	3.6%	459,622	59.5%
Textiles	3.5%	446,522	63.0%

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

Table 12 presents the composition percentages, by weight, for each material type in the overall residential sector.

Table 12: Composition of Overall Residential Disposed Waste, 2003

	Est. Pct.	+ / -	Est. Tons
Paper	**22.2%**		**2,825,640**
Uncoated Corrugated Cardboard	3.6%	0.7%	459,622
Paper Bags	0.7%	0.1%	95,320
Newspaper	3.7%	0.5%	464,919
White Ledger	1.2%	0.3%	158,781
Colored Ledger	0.1%	0.0%	7,595
Computer Paper	0.0%	0.0%	2,457
Other Office Paper	0.7%	0.1%	84,767
Magazines and Catalogs	1.2%	0.2%	151,465
Phone Books and Directories	0.4%	0.2%	51,047
Other Miscellaneous Paper	3.9%	0.4%	495,245
Remainder/Composite Paper	6.7%	0.6%	854,422
Glass	**3.8%**		**478,692**
Clear Glass Bottles and Containers	1.6%	0.3%	208,314
Green Glass Bottles and Containers	0.9%	0.2%	116,732
Brown Glass Bottles and Containers	0.7%	0.1%	91,309
Other Colored Glass Bottles and Containers	0.0%	0.0%	1,766
Flat Glass	0.1%	0.1%	10,243
Remainder/Composite Glass	0.4%	0.1%	50,328
Metal	**6.1%**		**770,009**
Tin/Steel Cans	1.0%	0.1%	130,196
Major Appliances	0.0%	0.0%	0
Used Oil Filters	0.0%	0.0%	1,376
Other Ferrous Metal	1.6%	0.4%	203,679
Aluminum Cans	0.4%	0.1%	47,280
Other Non-Ferrous Metal	0.2%	0.0%	28,127
Remainder/Composite Metal	2.8%	0.9%	359,351
Electronics	**1.5%**		**195,171**
Brown Goods	0.2%	0.1%	27,019
Computer-related Electronics	0.3%	0.5%	43,640
Other Small Consumer Electronics	0.2%	0.3%	26,834
Television and Other Items with CRTs	0.8%	1.1%	97,678
Plastic	**9.4%**		**1,201,588**
PETE Containers	0.9%	0.1%	110,004
HDPE Containers	0.8%	0.1%	104,480
Miscellaneous Plastic Containers	0.7%	0.1%	85,276
Plastic Trash Bags	0.9%	0.1%	112,668
Plastic Grocery and Other Merchandise Bags	0.8%	0.1%	104,895
Non-Bag Commercial and Industrial Packaging Film	0.0%	0.0%	2,684
Film Products	0.1%	0.1%	16,420
Other Film	1.6%	0.2%	199,769
Durable Plastic Items	1.3%	0.2%	166,402
Remainder/Composite Plastic	2.4%	0.3%	298,992

	Est. Pct.	+ / -	Est. Tons
Organic	**42.7%**		**5,433,236**
Food	17.3%	1.4%	2,199,406
Leaves and Grass	7.8%	1.9%	996,295
Prunings and Trimmings	5.3%	1.6%	673,405
Branches and Stumps	0.1%	0.1%	16,428
Agricultural Crop Residues	0.0%	0.0%	0
Manures	0.3%	0.1%	35,534
Textiles	3.5%	1.3%	446,522
Carpet	1.4%	0.8%	173,427
Remainder/Composite Organics	7.0%	0.8%	892,219
Construction & Demolition	**10.8%**		**1,374,362**
Concrete	0.7%	0.9%	92,642
Asphalt Paving	0.0%	0.0%	0
Asphalt Roofing	0.1%	0.0%	7,305
Lumber	4.2%	1.3%	532,179
Gypsum Board	1.2%	0.8%	153,826
Rock, Soil, and Fines	2.7%	1.5%	338,515
Remainder/Composite Construction and Demolition	2.0%	0.8%	249,895
Household Hazardous Waste	**0.3%**		**43,975**
Paint	0.1%	0.1%	10,856
Vehicle and Equipment Fluids	0.0%	0.0%	0
Used Oil	0.0%	0.0%	466
Batteries	0.2%	0.1%	23,684
Remainder/Composite Household Hazardous	0.1%	0.0%	8,968
Special Waste	**1.2%**		**156,330**
Ash	0.1%	0.1%	8,463
Sewage Solids	0.0%	0.0%	0
Industrial Sludge	0.0%	0.0%	0
Treated Medical Waste	0.0%	0.0%	441
Bulky Items	1.0%	0.9%	122,730
Tires	0.1%	0.1%	16,125
Remainder/Composite Special Waste	0.1%	0.0%	8,570
Mixed Residue	**1.9%**	0.4%	**242,051**
Totals	**100.0%**		**12,721,055**
Sample count:	**150**		

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

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 subsector 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 22 samples were obtained from each of the five regions of the state. (See Appendix A: Detailed Methodology for a description of the methods used in selecting, sorting, and analyzing samples.)

Table 13 presents the numbers of samples that were obtained in each region and each season. For the whole state, 110 samples of single-family residential were sorted.

Table 13: Single-Family Residential Samples Obtained, by Region and Season

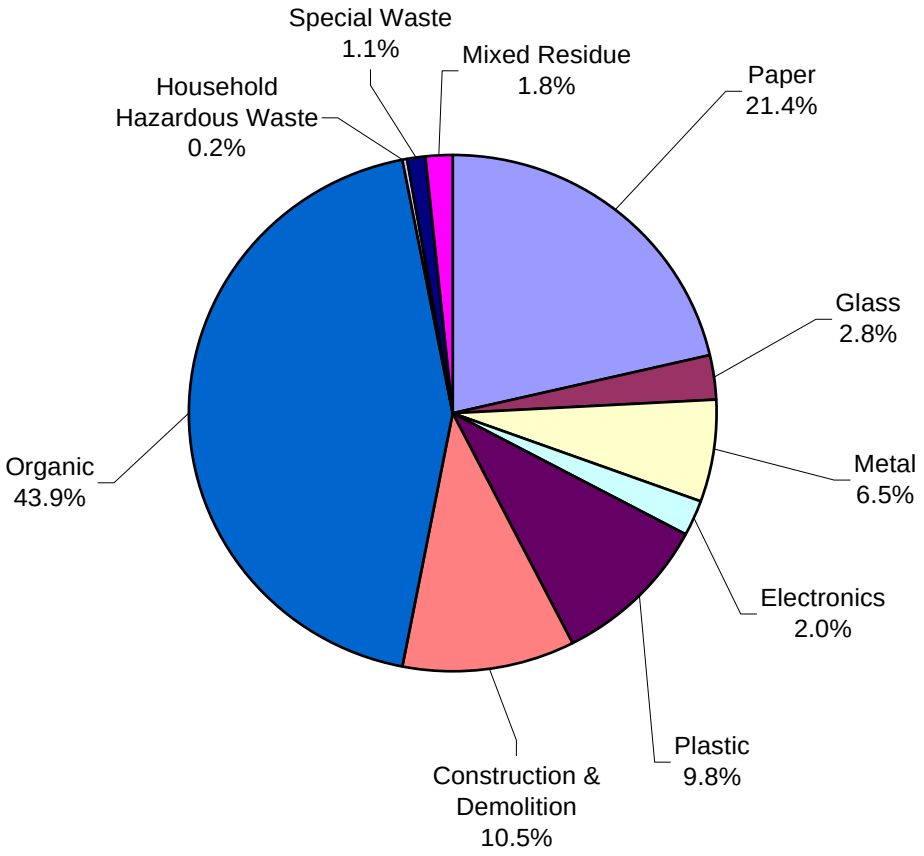
	Coastal	Bay Area	Southern	Mountain	Central	Totals
Summer 2003	5	6	6	5	6	**28**
Autumn 2003	6	6	5	5	5	**27**
Winter 2004	6	5	6	6	6	**29**
Spring 2004	5	5	5	6	5	**26**
Totals	**22**	**22**	**22**	**22**	**22**	**110**

See Table A-2 for the names and locations of the disposal facilities that were visited.

Single-family Residential Waste Composition

Composition results by broad material class for single-family residential waste are illustrated in Figure E and described in detail in Table 16. The largest broad material class in the single-family residential waste stream is the class *organic*, which makes up an estimated 44 percent of the total, by weight. *Paper*, the next largest broad material class, accounted for about 21 percent of the waste. (See Appendix B: List and Definitions of Material Types for a description of the material types included in each material class.)

Figure E: Overview of Single-Family Residential Disposed Waste, 2003



Numbers may not total exactly due to rounding.

As shown in Table 14, the compostable material types *food*, *leaves and grass*, and *prunings and trimmings* together make up approximately 31 percent of the single-family residential waste stream. Prevalent material types that are typically recyclable include *other miscellaneous paper*, *lumber*, and *uncoated corrugated cardboard*. (See Appendix B: List and Definitions of Material Types for a description of material types included in each material class.)

Table 14: Ten Most Prevalent Material Types in Single-Family Residential Disposed Waste, 2003

Material Type	Est. Pct.	Est. Tons	Cumulative Pct.
Food	16.7%	1,571,798	16.7%
Leaves and Grass	9.4%	885,995	26.1%
Remainder/Composite Organics	7.2%	673,917	33.3%
Remainder/Composite Paper	6.8%	640,114	40.1%
Prunings and Trimmings	5.1%	481,751	45.2%
Other Miscellaneous Paper	4.1%	386,864	49.3%
Lumber	3.9%	366,957	53.3%
Textiles	3.8%	354,676	57.0%
Rock, Soil, and Fines	3.6%	336,371	60.6%
Uncoated Corrugated Cardboard	3.5%	332,741	64.1%

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, Table 15 shows the relative presence of leaves versus grass in the sampled waste for each season of the study. These should be considered rough estimates, and no statistical treatment was applied to the breakdown of Leaves and Grass into its two components.

Table 15: Prevalence of Leaves vs. Grass in Single-Family Disposed Waste, by Season

Season	Leaves	Grass	Totals
Summer 2003	62%	38%	**100%**
Autumn 2003	87%	13%	**100%**
Winter 2004	48%	52%	**100%**
Spring 2004	60%	40%	**100%**

Table 16 presents the detailed composition results for the single-family residential subsector.

Table 16: Composition of Single-Family Residential Disposed Waste, 2003

	Est. Pct.	+ / -	Est. Tons
Paper	**21.4%**		**2,009,837**
Uncoated Corrugated Cardboard	3.5%	0.8%	332,741
Paper Bags	0.7%	0.2%	68,649
Newspaper	3.3%	0.7%	305,842
White Ledger	0.7%	0.2%	66,523
Colored Ledger	0.1%	0.0%	4,965
Computer Paper	0.0%	0.0%	2,296
Other Office Paper	0.7%	0.1%	65,706
Magazines and Catalogs	1.1%	0.2%	100,196
Phone Books and Directories	0.4%	0.2%	35,940
Other Miscellaneous Paper	4.1%	0.5%	386,864
Remainder/Composite Paper	6.8%	0.7%	640,114
Glass	**2.8%**		**262,194**
Clear Glass Bottles and Containers	1.3%	0.3%	120,644
Green Glass Bottles and Containers	0.6%	0.2%	54,305
Brown Glass Bottles and Containers	0.5%	0.1%	45,689
Other Colored Glass Bottles and Containers	0.0%	0.0%	1,534
Flat Glass	0.1%	0.1%	9,612
Remainder/Composite Glass	0.3%	0.1%	30,411
Metal	**6.5%**		**608,582**
Tin/Steel Cans	1.0%	0.1%	98,416
Major Appliances	0.0%	0.0%	0
Used Oil Filters	0.0%	0.0%	1,376
Other Ferrous	1.9%	0.6%	179,212
Aluminum Cans	0.3%	0.1%	29,868
Other Non-Ferrous	0.3%	0.1%	25,690
Remainder/Composite Metal	2.9%	1.2%	274,020
Electronics	**2.0%**		**191,348**
Brown Goods	0.3%	0.2%	26,511
Computer-related Electronics	0.4%	0.6%	41,145
Other Small Consumer Electronics	0.3%	0.4%	26,034
Television and Other Items with CRTs	1.0%	1.5%	97,658
Plastic	**9.8%**		**920,623**
PETE Containers	0.8%	0.1%	72,861
HDPE Containers	0.7%	0.1%	66,170
Miscellaneous Plastic Containers	0.7%	0.1%	65,143
Plastic Trash Bags	0.9%	0.1%	80,808
Plastic Grocery and Other Merchandise Bags	0.9%	0.1%	81,309
Non-Bag Commercial and Industrial Packaging Film	0.0%	0.0%	2,408
Film Products	0.2%	0.1%	16,415
Other Film	1.7%	0.2%	164,475
Durable Plastic Items	1.3%	0.3%	126,312
Remainder/Composite Plastic	2.6%	0.4%	244,724

	Est. Pct.	+ / -	Est. Tons
Organic	**43.9%**		**4,130,370**
Food	16.7%	1.7%	1,571,798
Leaves and Grass	9.4%	2.5%	885,995
Prunings and Trimmings	5.1%	2.0%	481,751
Branches and Stumps	0.1%	0.1%	8,703
Agricultural Crop Residues	0.0%	0.0%	0
Manures	0.0%	0.0%	2,253
Textiles	3.8%	1.8%	354,676
Carpet	1.6%	1.1%	151,276
Remainder/Composite Organics	7.2%	1.1%	673,917
Construction & Demolition	**10.5%**		**992,024**
Concrete	0.4%	0.3%	33,676
Asphalt Paving	0.0%	0.0%	0
Asphalt Roofing	0.1%	0.0%	5,388
Lumber	3.9%	1.7%	366,957
Gypsum Board	1.2%	0.8%	109,226
Rock, Soil, and Fines	3.6%	2.0%	336,371
Remainder/Composite Construction and Demolition	1.5%	0.9%	140,406
Household Hazardous Waste	**0.2%**		**22,750**
Paint	0.1%	0.1%	8,748
Vehicle and Equipment Fluids	0.0%	0.0%	0
Used Oil	0.0%	0.0%	466
Batteries	0.1%	0.1%	10,861
Remainder/Composite Household Hazardous	0.0%	0.0%	2,676
Special Waste	**1.1%**		**98,975**
Ash	0.1%	0.1%	8,459
Sewage Solids	0.0%	0.0%	0
Industrial Sludge	0.0%	0.0%	0
Treated Medical Waste	0.0%	0.0%	373
Bulky Items	0.7%	0.5%	66,546
Tires	0.2%	0.2%	15,620
Remainder/Composite Special Waste	0.1%	0.1%	7,977
Mixed Residue	**1.8%**	0.5%	**166,801**
Totals	**100.0%**		**9,403,504**
Sample count:	**110**		

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

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 subsector 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 the regions surrounding the disposal facilities that participated in the study. (See Table A-2 for a list of participating facilities.) Forty samples of multifamily waste were apportioned to the five regions of the state.

Table 17 presents the numbers of samples that were obtained in each region and each season.

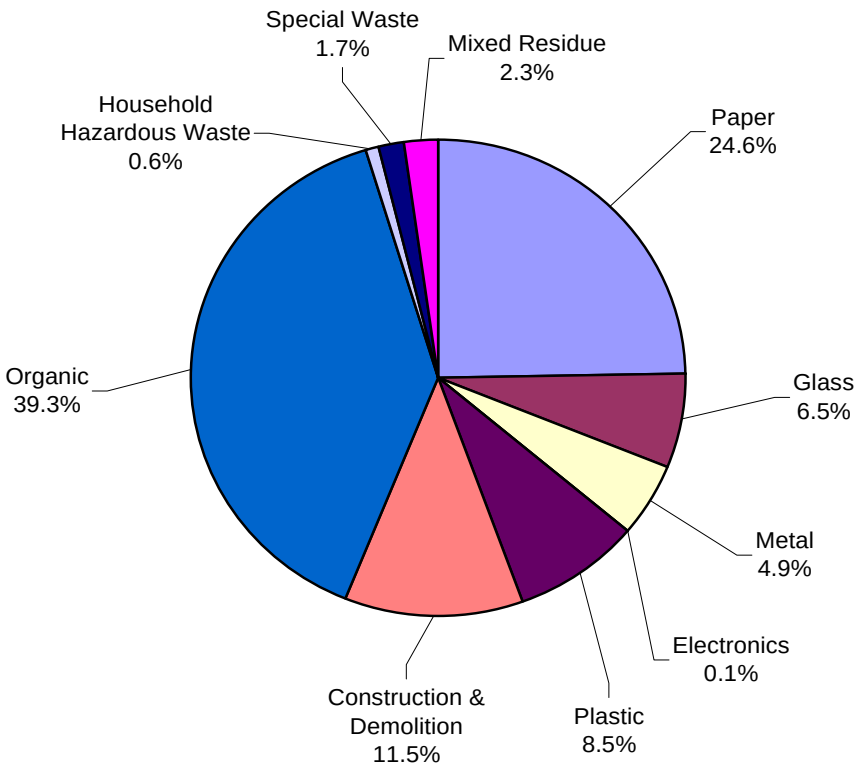
Table 17: Multifamily Residential Samples Obtained, by Region and Season

Season	Coastal	Bay Area	Southern	Mountain	Central	Totals
Summer 2003	2	2	2	2	2	**10**
Autumn 2003	2	2	2	2	2	**10**
Winter 2004	2	2	2	2	2	**10**
Spring 2004	2	2	2	2	2	**10**
Totals	**8**	**8**	**8**	**8**	**8**	**40**

Multifamily Residential Waste Composition

Composition results by broad material class for multifamily residential waste are illustrated in Figure F and described in detail in Table 19. As shown in Figure F, the largest broad material class is *organic*, which accounts for about 39 percent, followed by *paper*, which makes up about one quarter of the multifamily residential waste stream, by weight. (See Appendix B: List and Definitions of Material Types for a description of the material types included in each material class.)

Figure F: Overview of Multifamily Residential Disposed Waste, 2003



Numbers may not total exactly due to rounding.

As shown in Table 18, *food*, *prunings and trimmings*, and *leaves and grass* are prevalent compostable material types that, together, make up about 28 percent of this subsector's waste. Prevalent material types that are typically recyclable, including *lumber*, *newspaper*, and *uncoated corrugated cardboard*, and *other miscellaneous paper*, account for about 17 percent of the total. (See Appendix B: List and Definitions of Material Types for definitions of the material types included in each material class.)

Table 18: Ten Most Prevalent Material Types in Multifamily Residential Disposed Waste, 2003

Material Type	Est. Pct.	Est. Tons	Cumulative Pct.
Food	18.9%	627,608	18.9%
Remainder/Composite Organics	6.6%	218,302	25.5%
Remainder/Composite Paper	6.5%	214,308	32.0%
Prunings and Trimmings	5.8%	191,654	37.7%
Lumber	5.0%	165,222	42.7%
Newspaper	4.8%	159,077	47.5%
Uncoated Corrugated Cardboard	3.8%	126,881	51.3%
Leaves and Grass	3.3%	110,300	54.7%
Remainder/Composite Construction and Demolition	3.3%	109,488	58.0%
Other Miscellaneous Paper	3.3%	108,381	61.2%

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

Table 19 presents the detailed composition results for the multifamily residential subsector.

Table 19: Composition of Multifamily Residential Disposed Waste, 2003

	Est. Pct.	+ / -	Est. Tons
Paper	**24.6%**		**815,803**
Uncoated Corrugated Cardboard	3.8%	1.1%	126,881
Paper Bags	0.8%	0.2%	26,671
Newspaper	4.8%	0.5%	159,077
White Ledger	2.8%	0.8%	92,258
Colored Ledger	0.1%	0.0%	2,629
Computer Paper	0.0%	0.0%	162
Other Office Paper	0.6%	0.1%	19,061
Magazines and Catalogs	1.5%	0.5%	51,269
Phone Books and Directories	0.5%	0.5%	15,107
Other Miscellaneous Paper	3.3%	0.2%	108,381
Remainder/Composite Paper	6.5%	0.9%	214,308
Glass	**6.5%**		**216,498**
Clear Glass Bottles and Containers	2.6%	0.7%	87,670
Green Glass Bottles and Containers	1.9%	0.5%	62,427
Brown Glass Bottles and Containers	1.4%	0.4%	45,620
Other Colored Glass Bottles and Containers	0.0%	0.0%	232
Flat Glass	0.0%	0.0%	631
Remainder/Composite Glass	0.6%	0.2%	19,918
Metal	**4.9%**		**161,427**
Tin/Steel Cans	1.0%	0.2%	31,779
Major Appliances	0.0%	0.0%	0
Used Oil Filters	0.0%	0.0%	0
Other Ferrous Metal	0.7%	0.4%	24,467
Aluminum Cans	0.5%	0.1%	17,413
Other Non-Ferrous Metal	0.1%	0.0%	2,437
Remainder/Composite Metal	2.6%	0.8%	85,331
Electronics	**0.1%**		**3,824**
Brown Goods	0.0%	0.0%	508
Computer-related Electronics	0.1%	0.1%	2,495
Other Small Consumer Electronics	0.0%	0.0%	800
Television and Other Items with CRTs	0.0%	0.0%	20
Plastic	**8.5%**		**280,965**
PETE Containers	1.1%	0.3%	37,144
HDPE Containers	1.2%	0.2%	38,310
Miscellaneous Plastic Containers	0.6%	0.1%	20,133
Plastic Trash Bags	1.0%	0.2%	31,859
Plastic Grocery and Other Merchandise Bags	0.7%	0.1%	23,586
Non-Bag Com. and Indus. Packaging Film	0.0%	0.0%	275
Film Products	0.0%	0.0%	5
Other Film	1.1%	0.2%	35,294
Durable Plastic Items	1.2%	0.2%	40,090
Remainder/Composite Plastic	1.6%	0.1%	54,268

	Est. Pct.	+ / -	Est. Tons
Organic	**39.3%**		**1,302,866**
Food	18.9%	2.0%	627,608
Leaves and Grass	3.3%	1.4%	110,300
Prunings and Trimmings	5.8%	2.6%	191,654
Branches and Stumps	0.2%	0.2%	7,725
Agricultural Crop Residues	0.0%	0.0%	0
Manures	1.0%	0.4%	33,280
Textiles	2.8%	0.8%	91,845
Carpet	0.7%	0.7%	22,151
Remainder/Composite Organics	6.6%	0.7%	218,302
Construction & Demolition	**11.5%**		**382,338**
Concrete	1.8%	3.3%	58,966
Asphalt Paving	0.0%	0.0%	0
Asphalt Roofing	0.1%	0.1%	1,917
Lumber	5.0%	1.3%	165,222
Gypsum Board	1.3%	1.8%	44,600
Rock, Soil, and Fines	0.1%	0.1%	2,144
Remainder/Composite Construction and Demolition	3.3%	1.4%	109,488
Household Hazardous Waste	**0.6%**		**21,224**
Paint	0.1%	0.1%	2,108
Vehicle and Equipment Fluids	0.0%	0.0%	0
Used Oil	0.0%	0.0%	0
Batteries	0.4%	0.2%	12,824
Remainder/Composite Household Hazardous	0.2%	0.1%	6,293
Special Waste	**1.7%**		**57,354**
Ash	0.0%	0.0%	4
Sewage Solids	0.0%	0.0%	0
Industrial Sludge	0.0%	0.0%	0
Treated Medical Waste	0.0%	0.0%	68
Bulky Items	1.7%	2.9%	56,184
Tires	0.0%	0.0%	505
Remainder/Composite Special Waste	0.0%	0.0%	593
Mixed Residue	**2.3%**	0.9%	**75,251**
Totals	**100.0%**		**3,317,551**
Sample count:	**40**		

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

Self-Hauled Waste

The objective of this portion of the study was to characterize California's self-hauled waste stream at the state level. Self-hauled waste is waste that is transported to the disposal site by someone other than a contracted or franchised hauler. This section presents composition findings for the statewide self-hauled sector as a whole, as well as findings for commercial self-hauled waste and residential self-hauled waste.

As shown in Table 5, the self-hauled waste sector accounts for approximately 21.3 percent of California's municipal solid waste stream. The commercial self-hauled and residential self-hauled subsectors make up approximately 17.3 percent and 4 percent, respectively.

As part of the vehicle survey, drivers of vehicles carrying commercial self-hauled waste to disposal facilities were asked to classify the activity that generated the waste. Based on their responses, we estimated that commercial self-hauled waste from construction, demolition, and remodeling activities represents 5 percent of the overall waste stream. Similarly, waste from roofing and waste from landscaping represent about 1.3 percent and 1.9 percent of the overall waste stream, respectively. Other miscellaneous commercial activities generate commercial self-hauled waste that represents approximately 9.1 percent of the overall waste stream. These results are shown in Table 24.

Description of Samples

Samples of self-hauled waste were obtained from randomly selected vehicles at the landfills and transfer stations employed in this study. Approximately 40 samples were obtained from each of the five regions of the state. One-third of the samples were from residential sources, and two-thirds from commercial self-hauled sources. Overall self-hauled composition results are based on an average of the two subsectors, weighted at the regional level. (See Appendix A: Detailed Methodology for a description of the methods used in selecting, sorting, and analyzing samples.)

Table 20 presents the numbers of samples that were obtained in each region and each season. For the whole state, 200 samples of self-hauled waste were sorted.

Table 20: Self-Hauled Samples Obtained by Region and Season

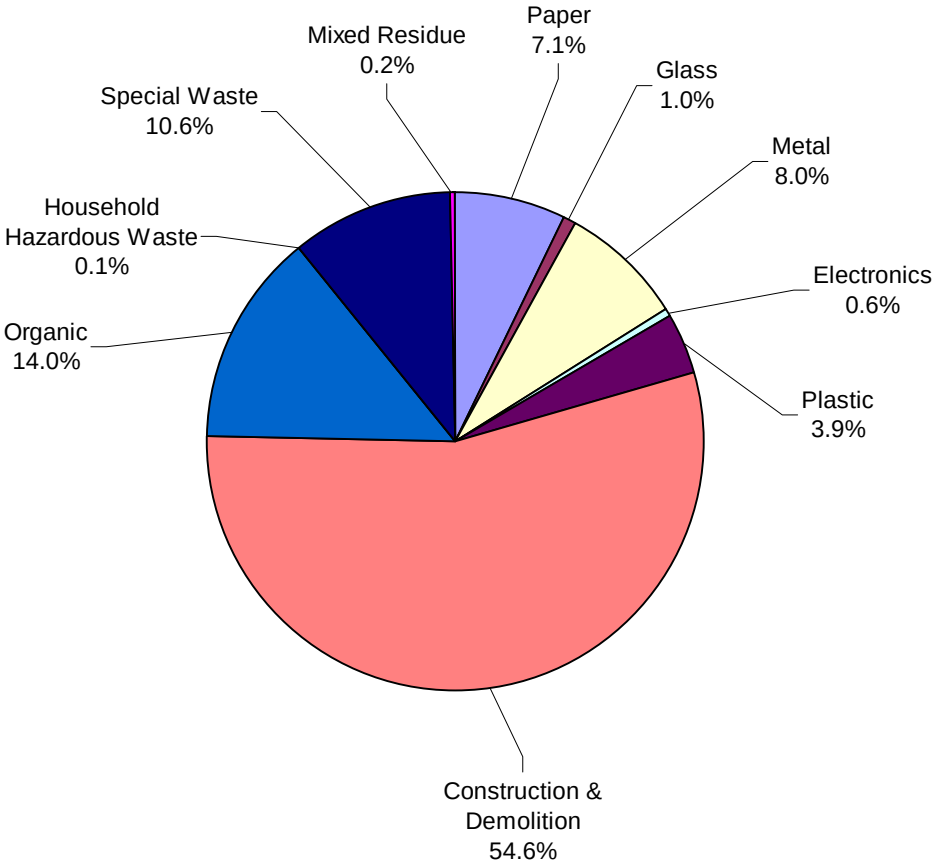
Season	Coastal	Bay Area	Southern	Mountain	Central	Totals
Summer 2003	10	10	10	11	11	**52**
Autumn 2003	10	10	10	10	9	**49**
Winter 2004	10	10	10	10	10	**50**
Spring 2004	9	11	10	9	10	**49**
Totals	**39**	**41**	**40**	**40**	**40**	**200**

See Table A-2 for the names and locations of the disposal facilities that were visited.

Overall Self-Hauled Waste Composition

Composition results by broad material class for self-hauled waste are illustrated in Figure G and described in detail in Table 23. More than half of the overall self-hauled waste stream—approximately 55 percent—was comprised of the broad material class *construction & demolition*. (See Appendix B: List and Definitions of Material Types for a description of the material types included in each material class.)

Figure G: Overview of Overall Self-Hauled Disposed Waste, 2003



Numbers may not total exactly due to rounding.

Of the most prevalent material types shown in Table 21, *lumber* is the largest recyclable material, accounting for an estimated 22 percent of the overall self-hauled waste stream. Other readily recyclable material types include *asphalt roofing*, *concrete*, *gypsum board*, *other ferrous metal*, and *uncoated corrugated cardboard*. (See Appendix B: List and Definitions of Material Types for a description of the material types included in each material class.)

Table 21: Ten Most Prevalent Material Types in Overall Self-Hauled Disposed Waste, 2003

Material Type	Est. Pct.	Est. Tons	Cumulative Pct.
Lumber	21.5%	1,850,171	21.5%
Bulky Items	10.2%	877,193	31.7%
Remainder/Composite Construction and Demolition	9.5%	816,279	41.3%
Asphalt Roofing	7.1%	606,817	48.3%
Concrete	6.2%	529,586	54.5%
Gypsum Board	5.3%	451,825	59.7%
Rock, Soil, and Fines	5.0%	429,146	64.7%
Carpet	4.5%	384,190	69.2%
Other Ferrous Metal	3.7%	313,585	72.9%
Uncoated Corrugated Cardboard	3.3%	286,683	76.2%

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-hauled sector. Table 22 presents the relative proportions of leaves versus grass during each season of the study, for self-hauled waste. These should be considered rough estimates, and no statistical treatment was applied to the breakdown of *Leaves and Grass* into its two components.

Table 22: Prevalence of Leaves vs. Grass in Self-Hauled Disposed Waste, by Season

Season	Leaves	Grass	Totals
Summer 2003	37%	63%	**100%**
Autumn 2003	100%	0%	**100%**
Winter 2004	98%	2%	**100%**
Spring 2004	53%	47%	**100%**

Table 23 presents the detailed composition results for the overall self-hauled sector.

Table 23: Composition of Overall Self-Hauled Disposed Waste, 2003

	Est. Pct.	+ / -	Est. Tons
Paper	**7.1%**		**610,088**
Uncoated Corrugated Cardboard	3.3%	1.2%	286,683
Paper Bags	0.1%	0.0%	9,353
Newspaper	0.2%	0.1%	20,915
White Ledger	0.6%	0.8%	54,224
Colored Ledger	0.0%	0.0%	1,373
Computer Paper	0.0%	0.0%	709
Other Office Paper	0.3%	0.2%	23,860
Magazines and Catalogs	0.2%	0.2%	21,123
Phone Books and Directories	0.1%	0.1%	8,771
Other Miscellaneous Paper	1.0%	0.4%	83,035
Remainder/Composite Paper	1.2%	0.5%	100,043
Glass	**1.0%**		**86,136**
Clear Glass Bottles and Containers	0.4%	0.2%	30,713
Green Glass Bottles and Containers	0.1%	0.1%	6,428
Brown Glass Bottles and Containers	0.0%	0.0%	2,576
Other Colored Glass Bottles and Containers	0.0%	0.0%	1,273
Flat Glass	0.0%	0.0%	3,275
Remainder/Composite Glass	0.5%	0.5%	41,871
Metal	**8.0%**		**688,699**
Tin/Steel Cans	0.3%	0.3%	24,331
Major Appliances	1.0%	0.8%	82,098
Used Oil Filters	0.0%	0.0%	0
Other Ferrous	3.7%	1.6%	313,585
Aluminum Cans	0.0%	0.0%	2,578
Other Non-Ferrous	0.2%	0.1%	19,357
Remainder/Composite Metal	2.9%	1.0%	246,751
Electronics	**0.6%**		**49,992**
Brown Goods	0.1%	0.1%	8,031
Computer-related Electronics	0.2%	0.2%	13,393
Other Small Consumer Electronics	0.3%	0.2%	28,400
Television and Other Items with CRTs	0.0%	0.0%	168
Plastic	**3.9%**		**335,679**
PETE Containers	0.1%	0.1%	9,185
HDPE Containers	0.1%	0.0%	6,428
Miscellaneous Plastic Containers	0.0%	0.0%	3,273
Plastic Trash Bags	0.1%	0.1%	8,440
Plastic Grocery and Other Merchandise Bags	0.0%	0.0%	3,213
Non-Bag Commercial and Industrial Packaging Film	1.2%	1.2%	98,813
Film Products	0.1%	0.0%	4,576
Other Film	0.2%	0.1%	15,461
Durable Plastic Items	1.3%	0.5%	108,007
Remainder/Composite Plastic	0.9%	0.3%	78,282

	Est. Pct.	+ / -	Est. Tons
Organic	**14.0%**		**1,201,555**
Food	1.0%	0.8%	89,860
Leaves and Grass	2.8%	2.6%	242,946
Prunings and Trimmings	1.2%	0.7%	106,952
Branches and Stumps	0.8%	0.8%	68,009
Agricultural Crop Residues	0.0%	0.0%	0
Manures	0.0%	0.0%	0
Textiles	0.8%	0.4%	67,278
Carpet	4.5%	2.5%	384,190
Remainder/Composite Organics	2.8%	1.6%	242,319
Construction & Demolition	**54.6%**		**4,687,209**
Concrete	6.2%	3.2%	529,586
Asphalt Paving	0.0%	0.1%	3,384
Asphalt Roofing	7.1%	4.3%	606,817
Lumber	21.5%	4.6%	1,850,171
Gypsum Board	5.3%	3.5%	451,825
Rock, Soil, and Fines	5.0%	3.7%	429,146
Remainder/Composite Construction and Demolition	9.5%	3.4%	816,279
Household Hazardous Waste	**0.1%**		**8,625**
Paint	0.0%	0.0%	1,294
Vehicle and Equipment Fluids	0.0%	0.0%	1,000
Used Oil	0.0%	0.0%	82
Batteries	0.0%	0.0%	2,298
Remainder/Composite Household Hazardous	0.0%	0.0%	3,951
Special Waste	**10.6%**		**906,920**
Ash	0.3%	0.4%	25,802
Sewage Solids	0.0%	0.0%	0
Industrial Sludge	0.0%	0.0%	0
Treated Medical Waste	0.0%	0.0%	0
Bulky Items	10.2%	4.7%	877,193
Tires	0.0%	0.0%	2,589
Remainder/Composite Special Waste	0.0%	0.0%	1,336
Mixed Residue	**0.2%**	0.2%	**15,314**
Totals	**100.0%**		**8,590,215**
Sample count:	**200**		

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

Commercial Self-Hauled Waste

The objective of this portion of the study was to characterize California's commercial self-hauled 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.

Commercial Self-Hauled Activities

Drivers bringing commercial self-hauled waste were asked to describe the activity that generated the waste. The possible responses were: construction/demolition/remodeling, roofing, landscaping, and other commercial or industrial activities. Table 24 shows the estimated amount of disposed material corresponding to each activity statewide.

Table 24: Contribution of Specific Activities to Commercial Self-Hauled Waste, 2003

Activity	Est. Percentage of Disposed Waste Stream	Est. Tons Disposed Statewide
Construction & Demolition	5.0%	1,998,776
Roofing	1.3%	519,165
Landscaping	1.9%	768,133
Other Commercial	9.1%	3,677,248
Totals	**17.3%**	**6,963,322**

Numbers may not total exactly due to rounding.

Description of Samples

Samples of commercial self-hauled waste were obtained from randomly selected vehicles at the landfills and transfer stations that participated in this study. Approximately 26 samples were obtained from each of the five regions of the state. (See Appendix A: Detailed Methodology for a description of the methods used in selecting, sorting, and analyzing samples.)

Table 25 presents the numbers of samples that were obtained in each region and each season. For the whole state, 133 samples of commercial self-hauled waste were sorted.

Table 25: Commercial Self-Hauled Samples Obtained, by Region and Season

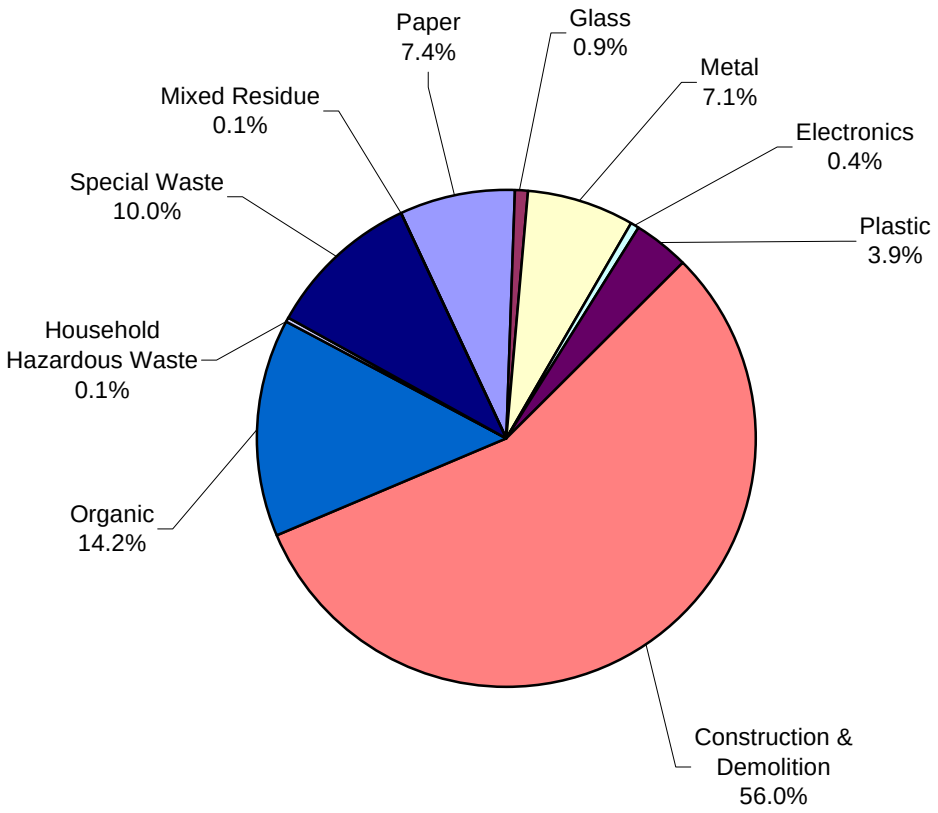
	Coastal	Bay Area	Southern	Mountain	Central	Totals
Summer 2003	7	6	6	7	7	**33**
Autumn 2003	6	7	7	7	6	**33**
Winter 2004	6	7	7	7	6	**33**
Spring 2004	6	8	7	6	7	**34**
Totals	**25**	**28**	**27**	**27**	**26**	**133**

See Table A-2 for the names and locations of the disposal facilities that were visited.

Commercial Self-Hauled Waste Composition

Composition results by broad material class for commercial self-hauled waste are illustrated in Figure H and described in detail in Table 27. An estimated 56 percent of the commercial self-hauled waste stream is comprised of the material class *construction & demolition*. (See Appendix B: List and Definitions of Material Types for a description of the material types included in each material class.)

Figure H: Overview of Commercial Self-Hauled Disposed Waste, 2003



Numbers may not total exactly due to rounding.

Table 26 shows the most prevalent material types of the commercial self-hauled waste stream. Of the material types listed, *lumber*, *asphalt roofing*, *concrete*, *gypsum board*, *uncoated corrugated cardboard*, and *other ferrous metal* are readily recyclable and, together, account for about 48 percent of this waste, by weight. (See Appendix B: List and Definitions of Material Types for a description of the material types included in each material class.)

Table 26: Ten Most Prevalent Material Types in Commercial Self-Hauled Disposed Waste, 2003

Material Type	Est. Pct.	Est. Tons	Cumulative Pct.
Lumber	20.0%	1,392,558	20.0%
Bulky Items	9.7%	672,586	29.7%
Remainder/Composite Construction and Demolition	8.8%	609,667	38.4%
Asphalt Roofing	8.5%	593,004	46.9%
Concrete	6.7%	464,315	53.6%
Rock, Soil, and Fines	6.1%	421,547	59.7%
Gypsum Board	5.9%	413,052	65.6%
Carpet	4.7%	328,122	70.3%
Uncoated Corrugated Cardboard	3.7%	254,376	73.9%
Other Ferrous Metal	3.5%	242,933	77.4%

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

Table 27 presents the detailed composition results for the commercial self-hauled subsector.

Table 27: Composition of Commercial Self-Hauled Disposed Waste, 2003

	Est. Pct.	+ / -	Est. Tons
Paper	**7.4%**		**514,428**
Uncoated Corrugated Cardboard	3.7%	1.5%	254,376
Paper Bags	0.1%	0.1%	8,181
Newspaper	0.2%	0.2%	14,638
White Ledger	0.8%	1.0%	53,186
Colored Ledger	0.0%	0.0%	1,270
Computer Paper	0.0%	0.0%	704
Other Office Paper	0.3%	0.2%	22,905
Magazines and Catalogs	0.1%	0.1%	7,373
Phone Books and Directories	0.1%	0.1%	6,404
Other Miscellaneous Paper	0.9%	0.4%	59,530
Remainder/Composite Paper	1.2%	0.6%	85,861
Glass	**0.9%**		**60,301**
Clear Glass Bottles and Containers	0.2%	0.1%	12,973
Green Glass Bottles and Containers	0.1%	0.1%	5,487
Brown Glass Bottles and Containers	0.0%	0.0%	2,241
Other Colored Glass Bottles and Containers	0.0%	0.0%	1,000
Flat Glass	0.0%	0.0%	2,367
Remainder/Composite Glass	0.5%	0.6%	36,233
Metal	**7.1%**		**492,195**
Tin/Steel Cans	0.3%	0.3%	18,991
Major Appliances	0.0%	0.0%	0
Used Oil Filters	0.0%	0.0%	0
Other Ferrous	3.5%	1.9%	242,933
Aluminum Cans	0.0%	0.0%	1,877
Other Non-Ferrous	0.2%	0.1%	10,995
Remainder/Composite Metal	3.1%	1.3%	217,400
Electronics	**0.4%**		**26,491**
Brown Goods	0.1%	0.1%	4,954
Computer-related Electronics	0.1%	0.1%	6,055
Other Small Consumer Electronics	0.2%	0.2%	15,314
Television and Other Items with CRTs	0.0%	0.0%	168
Plastic	**3.9%**		**269,307**
PETE Containers	0.1%	0.1%	7,168
HDPE Containers	0.1%	0.0%	4,274
Miscellaneous Plastic Containers	0.0%	0.0%	2,422
Plastic Trash Bags	0.1%	0.1%	7,034
Plastic Grocery and Other Merchandise Bags	0.0%	0.0%	2,114
Non-Bag Commercial and Industrial Packaging Film	1.4%	1.5%	98,494
Film Products	0.0%	0.0%	2,687
Other Film	0.2%	0.1%	11,778
Durable Plastic Items	1.1%	0.5%	78,345
Remainder/Composite Plastic	0.8%	0.3%	54,989

	Est. Pct.	+ / -	Est. Tons
Organic	**14.2%**		**991,819**
Food	1.1%	1.0%	75,686
Leaves and Grass	2.9%	3.1%	199,745
Prunings and Trimmings	1.2%	0.8%	85,531
Branches and Stumps	0.8%	1.0%	54,223
Agricultural Crop Residues	0.0%	0.0%	0
Manures	0.0%	0.0%	0
Textiles	0.7%	0.4%	46,579
Carpet	4.7%	3.1%	328,122
Remainder/Composite Organics	2.9%	1.9%	201,933
Construction & Demolition	**56.0%**		**3,897,492**
Concrete	6.7%	3.9%	464,315
Asphalt Paving	0.0%	0.1%	3,348
Asphalt Roofing	8.5%	5.3%	593,004
Lumber	20.0%	5.4%	1,392,558
Gypsum Board	5.9%	4.3%	413,052
Rock, Soil, and Fines	6.1%	4.6%	421,547
Remainder/Composite Construction and Demolition	8.8%	4.0%	609,667
Household Hazardous Waste	**0.1%**		**7,138**
Paint	0.0%	0.0%	1,157
Vehicle and Equipment Fluids	0.0%	0.0%	915
Used Oil	0.0%	0.0%	0
Batteries	0.0%	0.0%	1,776
Remainder/Composite Household Hazardous	0.0%	0.1%	3,290
Special Waste	**10.0%**		**696,851**
Ash	0.3%	0.5%	22,108
Sewage Solids	0.0%	0.0%	0
Industrial Sludge	0.0%	0.0%	0
Treated Medical Waste	0.0%	0.0%	0
Bulky Items	9.7%	5.6%	672,586
Tires	0.0%	0.0%	1,766
Remainder/Composite Special Waste	0.0%	0.0%	391
Mixed Residue	**0.1%**	0.2%	**7,299**
Totals	**100.0%**		**6,963,322**
Sample count:	**133**		

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

Residential Self-Hauled Waste

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

Description of Samples

Samples of residential self-hauled waste were obtained from randomly selected vehicles at the landfills and transfer stations employed in this study. Approximately 14 samples were obtained from each of the five regions of the state. (See Appendix A: Detailed Methodology for a description of the methods used in selecting, sorting, and analyzing samples.)

Table 28 presents the numbers of samples that were obtained in each region and each season. For the whole state, 67 samples of residential self-hauled waste were sorted.

Table 28: Residential Self-Hauled Samples Obtained, by Region and Season

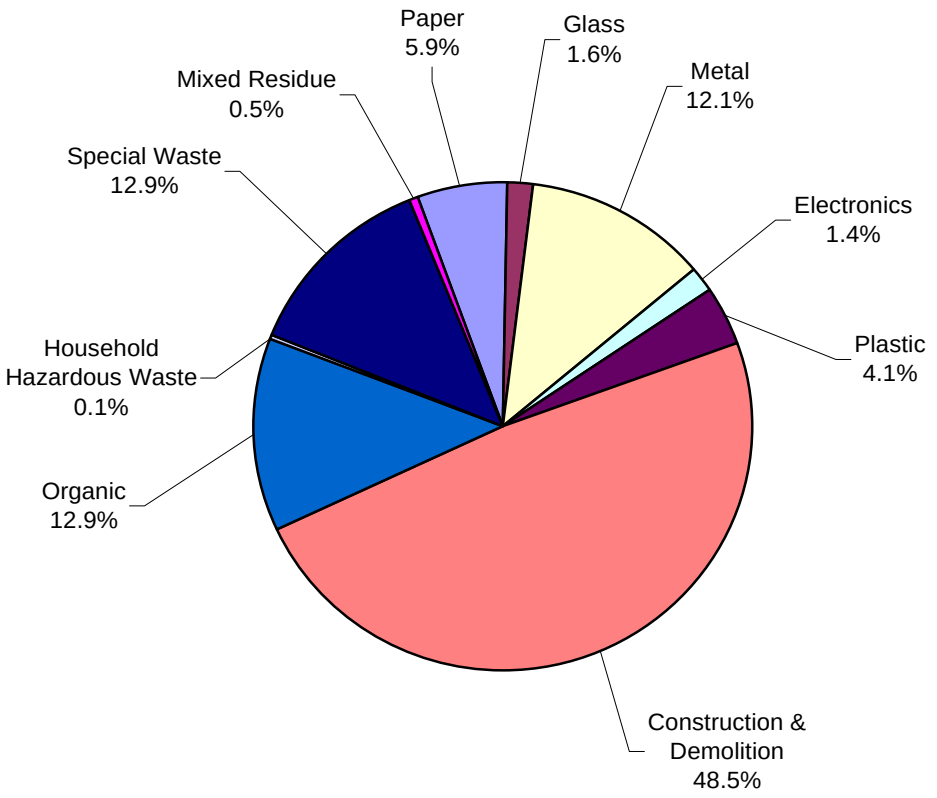
	Coastal	Bay Area	Southern	Mountain	Central	Totals
Summer 2003	3	4	4	4	4	**19**
Autumn 2003	4	3	3	3	3	**16**
Winter 2004	4	3	3	3	4	**17**
Spring 2004	3	3	3	3	3	**15**
Totals	**14**	**13**	**13**	**13**	**14**	**67**

See Table A-2 for the names and locations of the disposal facilities that were visited.

Residential Self-Hauled Waste Composition

Composition results by broad material class for residential self-hauled waste are illustrated in Figure I and described in detail in Table 30. Nearly half of the residential self-hauled waste is comprised of *construction & demolition* material types. (See Appendix B: List and Definitions of Material Types for a list of material types by class and for definitions of the material types included in each material class.)

Figure I: Overview of Residential Self-Hauled Disposed Waste, 2003



Numbers may not total exactly due to rounding.

Table 29 lists the ten most prevalent material types for the residential self-hauled waste stream. Of these material types, *lumber*, *major appliances*, *concrete*, *other ferrous metal*, and *gypsum board* are all typically recyclable and, together, make up about 44 percent of the waste from the residential self-hauled waste stream. Compostable material types include *leaves and grass*, which account for nearly 3 percent of the total, by weight.

Table 29: Ten Most Prevalent Material Types in Residential Self-Hauled Disposed Waste, 2003

Material Type	Est. Pct.	Est. Tons	Cumulative Pct.
Lumber	28.1%	457,613	28.1%
Remainder/Composite Construction and Demolition	12.7%	206,612	40.8%
Bulky Items	12.6%	204,607	53.4%
Major Appliances	5.0%	82,098	58.5%
Other Ferrous Metal	4.3%	70,652	62.8%
Concrete	4.0%	65,271	66.8%
Carpet	3.4%	56,069	70.3%
Leaves and Grass	2.7%	43,201	72.9%
Remainder/Composite Organics	2.5%	40,386	75.4%
Gypsum Board	2.4%	38,773	77.8%

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

Table 30 presents the detailed composition results for the residential self-hauled subsector.

Table 30: Composition of Residential Self-Hauled Disposed Waste, 2003

	Est. Pct.	+ / -	Est. Tons
Paper	**5.9%**		**95,659**
Uncoated Corrugated Cardboard	2.0%	1.0%	32,307
Paper Bags	0.1%	0.0%	1,173
Newspaper	0.4%	0.2%	6,277
White Ledger	0.1%	0.0%	1,039
Colored Ledger	0.0%	0.0%	102
Computer Paper	0.0%	0.0%	4
Other Office Paper	0.1%	0.0%	955
Magazines and Catalogs	0.8%	1.0%	13,750
Phone Books and Directories	0.1%	0.1%	2,366
Other Miscellaneous Paper	1.4%	1.2%	23,504
Remainder/Composite Paper	0.9%	0.6%	14,181
Glass	**1.6%**		**25,835**
Clear Glass Bottles and Containers	1.1%	0.9%	17,740
Green Glass Bottles and Containers	0.1%	0.0%	941
Brown Glass Bottles and Containers	0.0%	0.0%	335
Other Colored Glass Bottles and Containers	0.0%	0.0%	272
Flat Glass	0.1%	0.1%	907
Remainder/Composite Glass	0.3%	0.3%	5,639
Metal	**12.1%**		**196,504**
Tin/Steel Cans	0.3%	0.2%	5,340
Major Appliances	5.0%	4.4%	82,098
Used Oil Filters	0.0%	0.0%	0
Other Ferrous	4.3%	1.8%	70,652
Aluminum Cans	0.0%	0.0%	701
Other Non-Ferrous	0.5%	0.4%	8,362
Remainder/Composite Metal	1.8%	0.8%	29,351
Electronics	**1.4%**		**23,501**
Brown Goods	0.2%	0.2%	3,076
Computer-related Electronics	0.5%	0.5%	7,338
Other Small Consumer Electronics	0.8%	0.8%	13,086
Television and Other Items with CRTs	0.0%	0.0%	0
Plastic	**4.1%**		**66,372**
PETE Containers	0.1%	0.1%	2,016
HDPE Containers	0.1%	0.1%	2,155
Miscellaneous Plastic Containers	0.1%	0.0%	852
Plastic Trash Bags	0.1%	0.1%	1,405
Plastic Grocery and Other Merchandise Bags	0.1%	0.0%	1,099
Non-Bag Commercial and Industrial Packaging Film	0.0%	0.0%	319
Film Products	0.1%	0.2%	1,889
Other Film	0.2%	0.1%	3,683
Durable Plastic Items	1.8%	0.8%	29,662
Remainder/Composite Plastic	1.4%	0.8%	23,293

	Est. Pct.	+ / -	Est. Tons
Organic	**12.9%**		**209,737**
Food	0.9%	0.5%	14,174
Leaves and Grass	2.7%	2.6%	43,201
Prunings and Trimmings	1.3%	1.7%	21,420
Branches and Stumps	0.8%	1.2%	13,786
Agricultural Crop Residues	0.0%	0.0%	0
Manures	0.0%	0.0%	0
Textiles	1.3%	0.9%	20,700
Carpet	3.4%	2.5%	56,069
Remainder/Composite Organics	2.5%	1.2%	40,386
Construction & Demolition	**48.5%**		**789,716**
Concrete	4.0%	2.5%	65,271
Asphalt Paving	0.0%	0.0%	36
Asphalt Roofing	0.8%	0.9%	13,812
Lumber	28.1%	7.4%	457,613
Gypsum Board	2.4%	1.5%	38,773
Rock, Soil, and Fines	0.5%	0.4%	7,599
Remainder/Composite Construction and Demolition	12.7%	5.8%	206,612
Household Hazardous Waste	**0.1%**		**1,486**
Paint	0.0%	0.0%	138
Vehicle and Equipment Fluids	0.0%	0.0%	84
Used Oil	0.0%	0.0%	82
Batteries	0.0%	0.0%	521
Remainder/Composite Household Hazardous	0.0%	0.1%	661
Special Waste	**12.9%**		**210,069**
Ash	0.2%	0.4%	3,694
Sewage Solids	0.0%	0.0%	0
Industrial Sludge	0.0%	0.0%	0
Treated Medical Waste	0.0%	0.0%	0
Bulky Items	12.6%	5.7%	204,607
Tires	0.1%	0.1%	823
Remainder/Composite Special Waste	0.1%	0.1%	945
Mixed Residue	**0.5%**	0.6%	**8,014**
Totals	**100.0%**		**1,626,894**
Sample count:	**67**		

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

Special Studies of RPPCs, CRVs, and Oil Containers

Introduction and Background

California law stipulates specific recycling requirements for RPPCs. Estimates of the disposed amounts of these materials are used in order to evaluate whether the requirements are being met. Therefore, these containers were sorted separately. (See the 1999 statewide study for more details on the RPPC requirements.)

In addition, the California Department of Conservation, Division of Recycling (DOR) administers California's beverage container recycling program (California's "Bottle Bill"). These containers are assigned a California Redemption Value (CRV). DOR contributed a portion of the funding for this study to sort CRV containers separately as well as to perform a contamination study for these containers.

Because of the specific data needed for RPPCs and CRVs, and the overlap between some of the material types in each realm, the standard list of material types was further subdivided. (See Figure A-c and Figure A-d in Appendix A: Detailed Methodology for the schematic layout of types sorted.)

Finally, because plastic, aluminum, and bimetal containers are light in weight, when they become contaminated by food or other wastes their weight and proportion in the waste stream may be skewed. Therefore a contamination study was conducted for these RPPC and CRV materials to more accurately determine their proportion in the waste stream.

The contamination study involved isolating RPPCs and CRVs from selected waste samples, removing liquid contents, and taking the remaining materials to a laboratory for cleaning and re-weighing. At the lab, any attached materials, including lids, were removed in the cleaning process.

Methodology

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

1. RPPC PET Bottles.
2. RPPC PET Other Containers.
3. RPPC HDPE Natural Bottles.
4. RPPC HDPE Colored Bottles.
5. RPPC HDPE Other Containers.
6. RPPC #3–7 Bottles.
7. RPPC #3–7 Clamshell Containers.
8. RPPC #3–7 Other Containers.
9. RPPC HDPE Buckets.

The types of CRV are:

1. CRV PET Containers—Small.
2. CRV PET Containers—Large.
3. CRV HDPE Containers—Small.
4. CRV HDPE Containers—Large.
5. CRV #3–7 Containers.
6. CRV Aluminum Containers.
7. CRV Bimetal Containers.
8. CRV Glass.

CRV types #5–7 above were sorted into large and small categories, but so few of the large containers were found that the size categories for these three types were combined for analysis and reporting.

Please see Figure A-c and Figure A-d for an explanation of the individual material types that belong to each RPPC and CRV category and the overlap between RPPC and CRV types.

The estimated amounts of disposed "dirty" RPPCs and CRVs were calculated using the same set of field procedures and the same formulas as for the remainder of the 2003 study. These protocols are documented in Appendix A: Detailed Methodology. In addition, an average "contamination rate" was calculated for selected types of RPPCs and CRVs, by sector. In each case, the contamination rate was combined with the estimate for the amount disposed, to produce an estimate of the amount of the pure form of the RPPC or CRV material that is disposed. (Refer to Sorting Waste Samples and Recording Composition Data in Appendix A: Detailed Methodology for a discussion of which material types were included in the decontamination study.)

When oil was present in the sample, the crew estimated and recorded the volume of oil in the sample, the contamination level (low, medium, or high), and the size of containers believed to have contained oil. A very small percentage of samples, less than 1 percent, were found to be contaminated with a low level of oil. Given that only a small number of samples were contaminated, no statistical analyses are provided.

Results for RPPCs and CRVs

The objective of the RPPC and CRV portion of this study was to determine the total amount of RPPCs and CRVs disposed in the municipal solid waste stream. RPPC and CRV disposal data are presented below. For both RPPCs and CRVs, estimates of disposal for the commercial, residential, and self-haul sectors are found in this section.

CONTAMINATION RATES

The contamination rates for each type of RPPC and each sector appear in Table 31. The contamination rates for each type of CRV likewise appear in Table 32.

Table 31: Contamination Rates for RPPCs, 2003

	Contamination Rates (percent of field weight that is contamination)		
RPPC Material	**Commercial**	**Residential**	**Self-Haul**
RPPC PET Bottles	20.2%	24.4%	18.2%
RPPC PET Other Containers	29.5%	27.6%	31.2%
RPPC HDPE Natural Bottles	24.5%	17.8%	12.6%
RPPC HDPE Colored Bottles	25.1%	31.5%	38.1%
RPPC HDPE Other Containers	46.1%	20.9%	45.8%
RPPC #3–7 Bottles	32.8%	44.8%	24.4%
RPPC #3–7 Clamshell Containers	43.8%	34.4%	35.9%
RPPC #3–7 Other Containers	49.7%	34.0%	23.0%
RPPC HDPE Buckets	18.6%	8.7%	41.8%

Table 32: Contamination Rates for CRVs, 2003

	Contamination Rates (percent of field weight that is contamination)		
CRV Material	**Commercial**	**Residential**	**Self-Haul**
CRV PET Containers—Small	20.4%	24.2%	15.0%
CRV PET Containers—Large	11.4%	17.4%	24.7%
CRV HDPE Containers—Small	31.1%	16.3%	44.6%
CRV HDPE Containers—Large	85.6%	28.1%	77.6%
CRV #3–7 Containers	N/A	77.3%	13.2%
CRV Aluminum Containers	12.6%	16.3%	6.4%
CRV Bimetal Containers	37.5%	45.7%	3.7%

QUANTITIES OF RPPCS AND CRVS DISPOSED

Based on the contamination rates, "clean" disposal quantities for RPPC and CRV material types were calculated and are presented in this section (Table 33 through Table 40). Glass CRV material types were not included in the decontamination study. However, the estimates of disposed quantities, based on the dirty "field weights," are presented for these materials with other CRV materials in this section.

Overall RPPC and CRV Disposal

In 2003 an estimated 350,770 tons of RPPCs and 469,156 tons of CRVs were disposed in California's municipal waste. This corresponds to 0.87 percent and 1.17 percent of the overall

waste stream, respectively. The estimated disposed quantities of RPPCs generally, and of each type, are shown in Table 33. Table 34: CRV Composition of Overall Disposed Waste Stream shows similar estimates for CRVs overall and by type.

Table 33: RPPC Composition of Overall Disposed Waste Stream, 2003

RPPC Material	Est. Pct.	+/-	Est. Tons
RPPC PET Bottles	0.29%	0.05%	115,859
RPPC PET Other Containers	0.05%	0.03%	21,509
RPPC HDPE Natural Bottles	0.12%	0.02%	49,200
RPPC HDPE Colored Bottles	0.12%	0.03%	46,913
RPPC HDPE Other Containers	0.02%	0.02%	6,968
RPPC #3–7 Bottles	0.02%	0.01%	6,180
RPPC #3–7 Clamshell Containers	0.06%	0.02%	24,621
RPPC #3–7 Other Containers	0.05%	0.01%	22,081
RPPC HDPE Buckets	0.14%	0.12%	57,439
Total	**0.87%**		**350,770**

Confidence intervals calculated at the 90 percent confidence level.
Percentages for material types may not total exactly due to rounding.

Table 34: CRV Composition of Overall Disposed Waste Stream, 2003

CRV Material	Est. Pct.	+/-	Est. Tons
CRV PET Containers—Small	0.14%	0.03%	56,629
CRV PET Containers—Large	0.10%	0.02%	38,502
CRV HDPE Containers—Small	0.01%	0.00%	3,498
CRV HDPE Containers—Large	0.05%	0.01%	21,653
CRV #3–7 Containers	0.01%	0.00%	3,858
CRV Aluminum Containers	0.13%	0.03%	50,956
CRV Bimetal Containers	0.01%	N/A	3,865
CRV Clear Glass Small	0.37%	0.11%	150,579
CRV Clear Glass Large	0.04%	0.02%	17,753
CRV Green Glass Small	0.08%	0.02%	30,729
CRV Green Glass Large	0.02%	0.01%	6,453
CRV Brown Glass Small	0.19%	0.05%	75,970
CRV Brown Glass Large	0.02%	0.01%	7,725
CRV Other Colored Glass Small	0.00%	0.00%	986
CRV Other Colored Glass Large	0.00%	0.00%	0
Total	**1.17%**		**469,156**

Confidence intervals calculated at the 90 percent confidence level. Percentages for material types may not total exactly due to rounding.

Commercial RPPC and CRV Disposal

In 2003 an estimated 136,578 tons of RPPCs and 146,522 tons of CRVs were disposed by the commercial sector. The estimated disposed quantities of RPPCs generally, and of each type, are shown in Table 35.

Table 36 shows similar estimates for CRVs overall and by type.

Table 35: RPPC Composition of the Commercial Disposed Waste Stream, 2003

RPPC Material	Est. Pct.	+/-	Est. Tons
RPPC PET Bottles	0.23%	0.08%	43,760
RPPC PET Other Containers	0.06%	0.06%	10,663
RPPC HDPE Natural Bottles	0.08%	0.03%	15,788
RPPC HDPE Colored Bottles	0.07%	0.04%	12,651
RPPC HDPE Other Containers	0.01%	0.04%	1,866
RPPC #3–7 Bottles	0.01%	0.01%	1,719
RPPC #3–7 Clamshell Containers	0.06%	0.04%	11,727
RPPC #3–7 Other Containers	0.03%	0.01%	5,966
RPPC HDPE Buckets	0.17%	0.25%	32,439
Total	**0.72%**		**136,578**

Confidence intervals calculated at the 90 percent confidence level.
Percentages for material types may not total exactly due to rounding.

Table 36: CRV Composition of the Commercial Disposed Waste Stream, 2003

CRV Material	Est. Pct.	+/-	Est. Tons
CRV PET Containers—Small	0.14%	0.05%	26,615
CRV PET Containers—Large	0.07%	0.03%	13,631
CRV HDPE Containers—Small	0.01%	0.01%	1,583
CRV HDPE Containers—Large	0.02%	0.02%	4,119
CRV #3–7 Containers	N/A	N/A	N/A
CRV Aluminum Containers	0.09%	0.04%	17,310
CRV Bimetal Containers	0.01%	N/A	2,090
CRV Clear Glass Small	0.31%	0.18%	58,052
CRV Clear Glass Large	0.03%	0.04%	5,685
CRV Green Glass Small	0.05%	0.03%	8,767
CRV Green Glass Large	0.00%	0.00%	32
CRV Brown Glass Small	0.04%	0.02%	8,001
CRV Brown Glass Large	0.00%	0.00%	568
CRV Other Colored Glass Small	0.00%	0.00%	67
CRV Other Colored Glass Large	0.00%	0.00%	0
Total	**0.77%**		**146,522**

Confidence intervals calculated at the 90 percent confidence level. Percentages for material types may not total exactly due to rounding.

Residential RPPC and CRV Disposal

In 2003 an estimated 184,165 tons of RPPCs and 293,961 tons of CRVs were disposed by the residential sector. The estimated disposed quantities of RPPCs generally, and of each type, are shown in Table 37. Table 38 shows similar estimates for CRVs overall and by type.

Table 37: RPPC Composition of the Residential Disposed Waste Stream, 2003

RPPC Material	Est. Pct.	+/-	Est. Tons
RPPC PET Bottles	0.51%	0.07%	65,483
RPPC PET Other Containers	0.08%	0.02%	10,243
RPPC HDPE Natural Bottles	0.25%	0.05%	31,635
RPPC HDPE Colored Bottles	0.25%	0.05%	31,764
RPPC HDPE Other Containers	0.04%	0.03%	4,909
RPPC #3–7 Bottles	0.03%	0.03%	4,022
RPPC #3–7 Clamshell Containers	0.10%	0.02%	12,453
RPPC #3–7 Other Containers	0.12%	0.02%	15,055
RPPC HDPE Buckets	0.07%	0.06%	8,602
Total	**1.45%**		**184,165**

Confidence intervals calculated at the 90 percent confidence level.
Percentages for material types may not total exactly due to rounding.

Table 38: CRV Composition of the Residential Disposed Waste Stream, 2003

CRV Material	Est. Pct.	+/-	Est. Tons
CRV PET Containers—Small	0.21%	0.04%	26,097
CRV PET Containers—Large	0.18%	0.04%	23,377
CRV HDPE Containers—Small	0.01%	0.01%	1,468
CRV HDPE Containers—Large	0.13%	0.02%	16,660
CRV #3–7 Containers	0.01%	0.01%	1,161
CRV Aluminum Containers	0.25%	0.05%	31,246
CRV Bimetal Containers	0.01%	N/A	1,671
CRV Clear Glass Small	0.65%	0.20%	82,075
CRV Clear Glass Large	0.08%	0.04%	10,273
CRV Green Glass Small	0.17%	0.06%	21,167
CRV Green Glass Large	0.04%	0.03%	5,436
CRV Brown Glass Small	0.52%	0.16%	65,550
CRV Brown Glass Large	0.06%	0.03%	7,059
CRV Other Colored Glass Small	0.01%	0.01%	719
CRV Other Colored Glass Large	0.00%	0.00%	0
Total	**2.31%**		**293,961**

Confidence intervals calculated at the 90 percent confidence level. Percentages for material types may not total exactly due to rounding.

Self-Hauled RPPC and CRV Disposal

In 2003 an estimated 30,027 tons of RPPCs and 26,848 tons of CRVs were disposed in California's self-hauled waste. The estimated disposed quantities of RPPCs generally, and of each type, are shown in Table 39. Table 40 shows similar estimates for CRVs overall and by type.

Table 39: RPPC Composition of the Self-Hauled Disposed Waste Stream, 2003

RPPC Material	Est. Pct.	+/-	Est. Tons
RPPC PET Bottles	0.08%	0.05%	6,616
RPPC PET Other Containers	0.01%	0.01%	603
RPPC HDPE Natural Bottles	0.02%	0.01%	1,778
RPPC HDPE Colored Bottles	0.03%	0.02%	2,498
RPPC HDPE Other Containers	0.00%	0.00%	194
RPPC #3–7 Bottles	0.01%	0.01%	440
RPPC #3–7 Clamshell Containers	0.01%	0.00%	441
RPPC #3–7 Other Containers	0.01%	0.01%	1,060
RPPC HDPE Buckets	0.19%	0.02%	16,397
Total	**0.35%**		**30,027**

Confidence intervals calculated at the 90 percent confidence level. Percentages for material types may not total exactly due to rounding.

Table 40: CRV Composition of the Self-Hauled Disposed Waste Stream, 2003

CRV Material	Est. Pct.	+/-	Est. Tons
CRV PET Containers—Small	0.05%	0.04%	3,917
CRV PET Containers—Large	0.02%	0.01%	1,494
CRV HDPE Containers—Small	0.01%	0.00%	448
CRV HDPE Containers—Large	0.01%	0.01%	873
CRV #3–7 Containers	0.01%	N/A	872
CRV Aluminum Containers	0.03%	0.02%	2,399
CRV Bimetal Containers	0.00%	N/A	104
CRV Clear Glass Small	0.12%	0.08%	10,451
CRV Clear Glass Large	0.02%	0.03%	1,796
CRV Green Glass Small	0.01%	0.01%	794
CRV Green Glass Large	0.01%	0.02%	984
CRV Brown Glass Small	0.03%	0.02%	2,418
CRV Brown Glass Large	0.00%	0.00%	97
CRV Other Colored Glass Small	0.00%	0.00%	199
CRV Other Colored Glass Large	0.00%	0.00%	0
Total	**0.31%**		**26,848**

Confidence intervals calculated at the 90 percent confidence level. Percentages for material types may not total exactly due to rounding.

Appendix A: Detailed Methodology

Introduction

The California Integrated Waste Management Board (CIWMB) commissioned a Statewide Waste Characterization Study in order to obtain data to characterize and quantify municipal solid waste disposed throughout the State of California. Waste from commercial, single-family residential, multifamily residential, commercial self-hauled, and residential self-hauled sources was characterized through sampling of the waste delivered to disposal sites, sampling of waste collected directly from multifamily locations, and surveys of vehicles delivering waste to participating solid waste facilities. This project represents the second comprehensive statewide waste characterization and quantification study, following one completed by the CIWMB in 1999.

This appendix describes the major elements in the methodology of the study, ranging from the initial selection of locations where sampling and surveys took place, to the sampling and surveying procedures, to the approach to analyzing the data.

This type of study 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.

Selection of Regions, Disposal Facilities, and Multifamily Sites

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. To obtain a comparable level of data among these regions, disposal facilities were selected randomly from within each region as the locations for data collection and waste sampling to occur.

Data from the single-family residential, commercial, commercial self-hauled, and residential self-hauled waste sectors was gathered at disposal facilities in each region. Data from the multifamily residential waste sector was collected at randomly-selected apartment buildings or complexes in the vicinity of each participating disposal facility. For each waste sector, approximately equal numbers of samples were obtained from each region and during each season. 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.

Waste sampling and the quantification of waste through vehicle surveys occurred during four seasons to account for any seasonal variations in waste disposal patterns. A period of ten weekdays was scheduled for sampling and sorting activities during each season of the study. The sampling/sorting dates were:

- Summer: July 9–22, 2003
- Autumn: October 6–17, 2003
- Winter: January 12–23, 2004
- Spring: April 1–9 and April 13–16, 2004

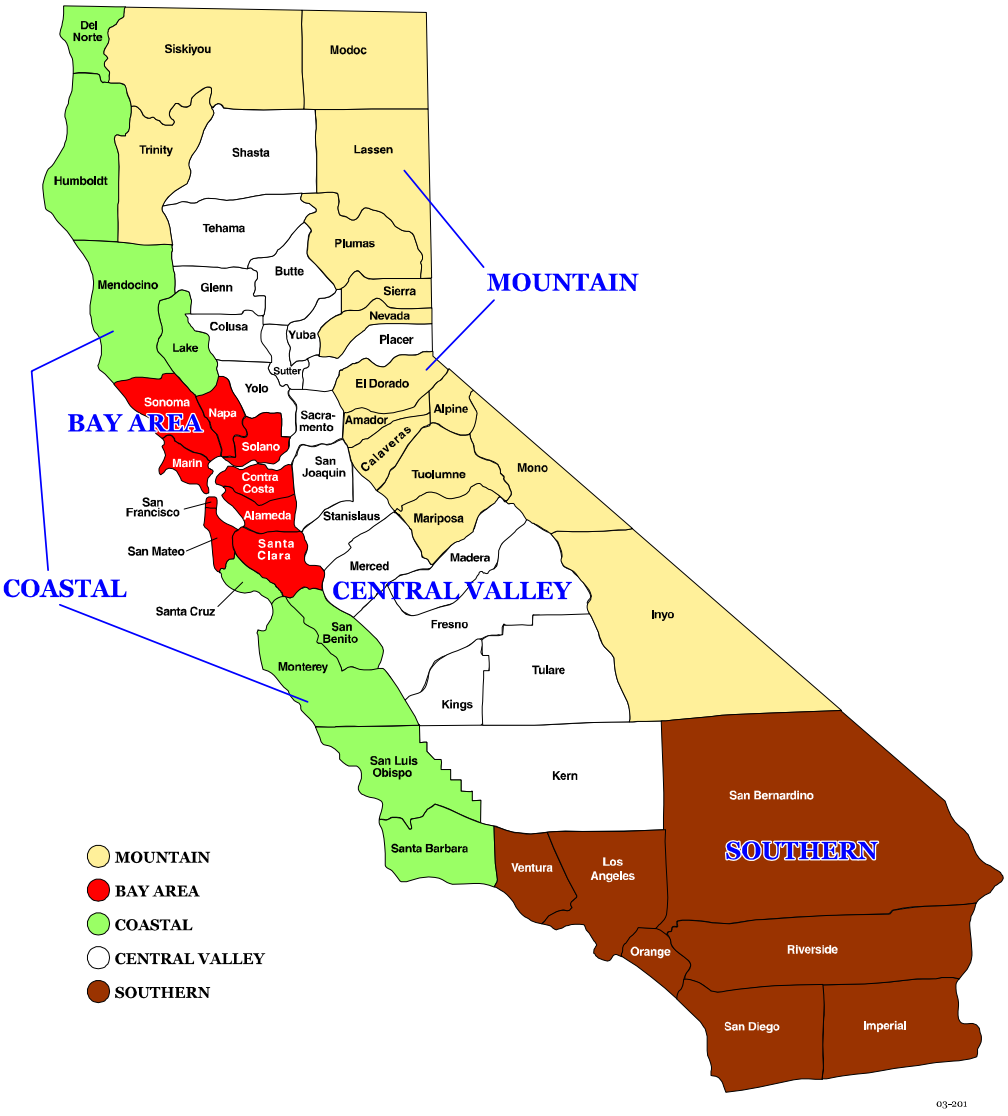
Selection of Regions

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 facilities

at which data was collected within each region. The stratified sampling plan initially targeted an equal number of samples for each region in order to ensure that the information collected would be comparable statewide and that it would represent the breadth of communities within the state. The regions are shown graphically in Figure A-a, below, and the counties that made up each region are cited in Table A-1.

For more background on how the regions were defined, see Appendix A of the 1999 statewide study (available at www.ciwmb.ca.gov/Publications/default.asp?pubid=824). Some of the regions in this study were modified slightly from the 1999 study.

Figure A-a: Regions Considered in the Study



The five regions are shown in Figure A-a 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.

Table A-1: Counties in the Five Sampling Regions

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

Selection of Sites

RANDOM SELECTION OF SITES

Disposal facilities (landfills and transfer stations) for the 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 handle waste destined for final disposal (that is, the waste is not subject to any further processing or sorting), that it was possible to obtain credible tonnage data from all three waste sectors (that is, commercial, residential, and self-hauled), and that it was possible to perform waste sampling and sorting there.

Disposal facilities were selected using the steps described below.

- Assembly of list—CIWMB staff assembled a complete list of disposal facilities in the state that were believed to handle 100 tons or more of waste per day (considering only waste that had not already passed through a waste transfer station). Facilities on the list were grouped according to which of the five regions they lie in.

- The list of facilities within each region was placed in random order, using a random number generator. Then, ten candidate facilities were selected from each region, starting with the first facility appearing on the random-ordered list, for a total of 50 candidate facilities.
- The facilities were then contacted, in the order they appeared on the list, to request that they participate in the study and to screen them for eligibility. The goal was to recruit four facilities in each region, with the expectation that each facility would be visited twice during periods approximately six months apart.
- When the facilities were contacted by telephone, three screening criteria were applied: (1) the facility had to receive an average of at least 100 tons of directly-hauled waste per operating day, (2) an adequate number of vehicles from all waste streams had to be available daily to be sampled, and (3) management had to be willing to accommodate the expected waste sampling and sorting activities.
- When the management of selected facilities agreed to participate, their facilities were assigned to either a spring-autumn or a summer-winter sampling schedule, depending on their position among recruited facilities on the randomized list. The first recruited facility in each region was assigned to the summer/winter sampling schedule. The next one was assigned to the fall/spring sampling schedule, and so forth.
- If a recruited facility was later rejected, the next facility in the randomly sorted list for that region was contacted.

During the recruitment process, a number of facilities were rejected because a significant amount of the waste coming in was being processed for recovery, whether the facility was officially named as a materials recovery facility (MRF) or not. This occurred more frequently in this study than in the 1999 statewide study. Also, in the Mountain region, which is very rural, it was difficult finding appropriate sampling sites because many facilities are small and didn't receive many loads from one or more of the desired sectors on any given day. In some cases special arrangements had to be made to collect samples from all sectors.

During the course of the study, two of the original facilities had to be replaced due to logistical difficulties, so a total of 22 facilities were used. See Table A-2 for a list of all participating facilities.

RECRUITING AND SCHEDULING THE SITES

The questionnaire that was used during a telephone interview with personnel at each selected disposal facility is presented in Appendix C. In addition to obtaining contact information for the staff who were able to assist in making arrangements for data collection at each facility, the questionnaire asked for:

- Details on how incoming waste loads are classified according to sector.
- The facility's days and hours of operation.
- The vehicle traffic expected for each sector on each day of the week, and the estimated peak time of day for each type of load.
- Specific information about numbers and types of vehicles arriving on weekend days.
- How many scalehouses exist at the facility, and how vehicles are directed to the scalehouses. (For example, do commercial haulers use a separate gate than self-haulers or cash customers?)

- What recycling or recovery operations exist at the facility, and how the study team may obtain samples of waste after any recycling or recovery operations have already been applied to the waste.
- Any rules that may be used for recording the net weight of vehicles and for recording alternate minimum weights for small vehicles.
- Unusual conditions (for example, weather, anomalies in traffic patterns, etc.) that might affect data collection.

While administering the questionnaire, the study team explained the data collection crew's needs for space, their need for the assistance of a loader and operator, and the need for access to restrooms and shelter at the facility.

Table A-2: Participating Disposal Facilities

Region	County	Facility	City	Seasons	Dates
Bay Area	Alameda	Davis Street Transfer Station	San Leandro	Summer/Winter	7/17/03 and 1/21/04
	Santa Clara	Guadalupe Sanitary Landfill	San Jose	Summer/Winter	7/16/03 and 1/20/04
	Alameda	Tri Cities Disposal Facility	Fremont	Fall/Spring	10/13/03 and 4/8/04
	Sonoma	Sonoma Transfer Station	Sonoma	Fall/Spring	10/14/03 and 4/7/04
Coastal	Monterey	Crazy Horse Sanitary Landfill	Salinas	Summer/Winter	7/14/03 and 1/16/04
	Monterey	Madison Lane Transfer Station	Salinas	Summer/Winter	7/15/03 and 1/19/04
	Mendocino	Willits Solid Waste Transfer Station	Willits	Fall/Spring	10/15/03 and 4/6/04
	Humboldt	Hawthorne Street Transfer Station	Eureka	Fall/Spring	10/16/03 and 4/5/04
Mountain	Calaveras	Rock Creek Landfill	Milton	Summer/Winter	7/21/03 and 1/22/04
	Nevada	McCourtney Road Large Volume T.S.	Grass Valley	Summer/Winter	7/22/03 and 1/23/04
	Mono	Benton Crossing Sanitary Landfill	Whitmore Hot Springs	Fall/Spring	10/9/03 and 4/1/04
	Lassen	Bass Hill Landfill	Susanville	Fall/Spring	10/17/03 and 4/2/04
Southern	Los Angeles	American Waste Transfer Station	Gardena	Summer	7/9/03
	San Bernardino	Barstow Landfill	Barstow	Summer/Winter	7/10/03 and 1/13/04
	San Bernardino	West Valley MRF & Transfer Station	Fontana	Winter	1/12/04
	San Diego	Miramar Landfill	San Diego	Fall/Spring	10/6/03 and 4/13/04
	Orange	Prima Deshecha Sanitary Landfill	San Juan Capistrano	Fall/Spring	10/7/03 and 4/14/04
Valley	Stanislaus	Fink Road Landfill	Crows Landing	Summer	7/18/03
	Tulare	Visalia Disposal Site	Visalia	Summer/Winter	7/11/03 and 1/15/04
	Stanislaus	Turlock Transfer	Turlock	Fall/Spring	10/10/03 and 4/9/04
	Fresno	American Avenue Landfill	Kerman	Fall	10/8/03
	Tulare	Teapot Dome Disposal Site	Porterville	Winter/Spring	1/14/04 and 4/15/04

Numbers of Samples

The State of California's *Draft Regulations Governing Disposal Characterization Studies* guides the determination of the number of samples to sort from each waste sector in each region of the State. Thirty residential samples and 40 commercial samples were planned from each region.[2] Because self-hauled waste is highly variable in composition (as is commercial waste), 40 samples of self-hauled waste were planned from each region as well. During the entire study, a total of 550 samples were planned, of which 150 were residential samples, 200 were commercial samples, and 200 were self-hauled samples. The planned and actual numbers of samples characterized for the study are shown in Table A-3.

[2] At the regional level, these numbers of samples are consistent with sample numbers recommended in Section 18726.50 of the Draft Regulations Governing Disposal Characterization Studies.

Table A-3: Planned vs. Actual Numbers of Waste Samples

Sector	Planned Number of Samples	Actual Number of Samples
Commercial	200	200
Residential	150	150
Single-family residential	*110*	*110*
Multifamily residential	*40*	*40*
Self-Hauled	200	200
Commercial self-hauled	*133*	*132*
Residential self-hauled	*67*	*68*
Total	**550**	**550**

Table A-5 presents a detailed account of the waste samples that were characterized at each facility, in each region, and in each season.

In addition to standard waste characterization, approximately one-third of the waste samples belonging to each waste sector and subsector were scheduled to have their component RPPCs and CRV containers saved, decontaminated, and re-weighed in their clean form. The numbers of planned and actual RPPC/CRV samples are presented in Table A-4, below, and a detailed account of the sources of RPPC/CRV samples is presented in Table A-6. (The section entitled "Special Studies of RPPCs, CRVs, and Oil Containers" presents a thorough explanation of the purpose of RPPC/CRV samples and the process for decontaminating and analyzing them.)

Table A-4: Planned vs. Actual Numbers of RPPC/CRV Decontamination Samples

Sector	Planned Number of Samples	Actual Number of Samples
Commercial	40	42
Residential	40	41
Single-family residential	*29*	*30*
Multifamily residential	*11*	*11*
Self-Hauled	40	40
Commercial self-hauled	*27*	*27*
Residential self-hauled	*13*	*13*
Total	**120**	**123**

Table A-5: Waste Samples Characterized During the Study

*Note: Bass Hill Landfill was visited a third time in order to sample residential samples missed on a previous sampling day.

			Summer 2003					Fall 2003					Winter 2004					Spring 2004					Totals
Region	Facility	Dates	SF Res	MF Res	Com	SH Com	SH Res	SF Res	MF Res	Com	SH Com	SH Res	SF Res	MF Res	Com	SH Com	SH Res	SF Res	MF Res	Com	SH Com	SH Res	
Bay Area	Davis Street Transfer Station	Jul. 17, 2003																					
	San Leandro, Alameda County	Jan. 21, 2004	3	1	5	3	2						3	1	5	4	1						28
	Guadalupe Sanitary Landfill	Jul. 16, 2003																					
	San Jose, Santa Clara County	Jan. 20, 2004	3	1	5	3	2						2	1	5	3	2						27
	Sonoma Transfer Station	Oct. 14, 2003																					
	Sonoma, Sonoma County	Apr. 7, 2004						3	1	5	4	1						3	1	5	4	2	29
	Tri-Cities Disposal Facility	Oct. 13, 2003																					
	Fremont, Alameda County	Apr. 8, 2004						3	1	5	3	2						2	1	7	4	1	29
Coastal	Crazy Horse Sanitary Landfill	Jul. 14, 2003																					
	Salinas, Monterey County	Jan. 16, 2004	2	1	5	3	2						3	1	5	3	2						27
	Hawthorne Street Transfer Station	Oct. 16, 2003																					
	Eureka, Humboldt County	Apr. 5, 2004						3	1	5	3	2						3	1	5	3	2	28
	Madison Lane Transfer Station	Jul. 15, 2003																					
	Salinas, Monterey County	Jan. 19, 2004	3	1	5	4	1						3	1	5	3	2						28
	Willitts Transfer Station	Oct. 15, 2003																					
	Willitts, Mendocino County	Apr. 6, 2004						3	1	5	3	2						2	1	3	3	1	24
		Oct. 17, 2003																					
Mountain	Bass Hill Landfill*	Apr. 2, 2004																					
	Susanville, Lassen County	Apr. 16, 2004						3	1	6	4	1						5	1	5	3	2	31
	Benton Crossing Landfill	Oct. 9, 2003																					
	Whitmore Hot Springs, Mono County	Apr. 1, 2004						2	1	5	3	2						1	1	5	3	1	24
	McCourtney Road Large Volume T.S.	Jul. 22, 2003																					
	Grass Valley, Nevada County	Jan. 23, 2004	2	1	5	3	2						3	1	6	4	1						28
	Rock Creek Landfill	Jul. 21, 2003																					
	Milton, Calaveras County	Jan. 22, 2004	3	1	3	4	2						3	1	5	3	2						27
Southern	American Waste Transfer Station	Jul. 9, 2003																					
	Gardena, Los Angeles County		3	1	5	3	2																14
	Barstow Landfill	Jul. 10, 2003																					
	Barstow, San Bernardino County	Jan. 13, 2004	3	1	4	3	2						3	1	5	4	1						27
	Miramar Landfill	Oct. 6, 2003																					
	San Diego, San Diego County	Apr. 13, 2004						2	1	6	3	2						3	1	5	3	2	28
	Prima Deshecha Sanitary Landfill	Oct. 7, 2003																					
	San Juan Capistrano, County of Orange	Apr. 14, 2004						3	1	5	4	1						2	1	5	4	1	27
	West Valley MRF and Transfer Station	Jan. 12, 2004																					
	Fontana, San Bernardino County												3	1	5	3	2						14
Valley	American Avenue Landfill	Oct. 8, 2003																					
	Kerman, Fresno County							2	1	6	3	2											14
	Fink Road Landfill	Jul. 18, 2003																					
	Crows Landing, Stanislaus County		3	1	2	3	3																12
	Turlock Transfer Station	Oct. 10, 2003																					
	Turlock, Stanislaus County	Apr. 9, 2004						3	1	7	3	1						2	1	5	4	1	28
	Teapot Dome Disposal Site	Jan. 14, 2004																					
	Porterville, Tulare County	Apr. 15, 2004												1	6	4	2	3	1	5	3	2	27
	Visalia Disposal Site	Jul. 11, 2003																					
	Visalia, Tulare County	Jan. 15, 2004	3	1	5	4	1						6	1	4	2	2						29
Totals			**28**	**10**	**44**	**33**	**19**	**27**	**10**	**55**	**33**	**16**	**29**	**10**	**51**	**33**	**17**	**26**	**10**	**50**	**34**	**15**	**550**

Table A-6: RPPC/CRV Decontamination Samples Analyzed During the Study

*Note: Bass Hill Landfill was visited a third time in order to sample residential samples missed on a previous sampling day.

			Summer 2003					Fall 2003					Winter 2004					Spring 2004					Totals
Region	Facility	Dates	SF Res	MF Res	Com	SH Com	SH Res	SF Res	MF Res	Com	SH Com	SH Res	SF Res	MF Res	Com	SH Com	SH Res	SF Res	MF Res	Com	SH Com	SH Res	
Bay Area	Davis Street Transfer Station	Jul. 17, 2003																					
	San Leandro, Alameda County	Jan. 21, 2004	1		1		1						1		1	1							6
	Guadalupe Sanitary Landfill	Jul. 16, 2003																					
	San Jose, Santa Clara County	Jan. 20, 2004	1		1	1							1		1	1							6
	Sonoma Transfer Station	Oct. 14, 2003																					
	Sonoma, Sonoma County	Apr. 7, 2004						1		1								1		1	1		5
	Tri-Cities Disposal Facility	Oct. 13, 2003																					
	Fremont, Alameda County	Apr. 8, 2004						1		1		1						1	1	1	1		7
Coastal	Crazy Horse Sanitary Landfill	Jul. 14, 2003																					
	Salinas, Monterey County	Jan. 16, 2004		1	1	1							1		1		2						7
	Hawthorne Street Transfer Station	Oct. 16, 2003																					
	Eureka, Humboldt County	Apr. 5, 2004						1		1		1						1		1	1		6
	Madison Lane Transfer Station	Jul. 15, 2003																					
	Salinas, Monterey County	Jan. 19, 2004	1		1								1		1	1							5
	Willitts Transfer Station	Oct. 15, 2003																					
	Willitts, Mendocino County	Apr. 6, 2004							1	1	2							1		1	1		7
		Oct. 17, 2003																					
Mountain	Bass Hill Landfill	Apr. 2, 2004																					
	Susanville, Lassen County	Apr. 16, 2004						1		1	1							1		1	1		6
	Benton Crossing Landfill	Oct. 9, 2003																					
	Whitmore Hot Springs, Mono County	Apr. 1, 2004						1		1		1							1	1	2		7
	McCourtney Road Large Volume T.S.	Jul. 22, 2003																					
	Grass Valley, Nevada County	Jan. 23, 2004	1		1								1		1		1						5
	Rock Creek Landfill	Jul. 21, 2003																					
	Milton, Calaveras County	Jan. 22, 2004	1		1	1	1							1	1	1							7
Southern	American Waste Transfer Station	Jul. 9, 2003																					
	Gardena, Los Angeles County		1		1																		2
	Barstow Landfill	Jul. 10, 2003																					
	Barstow, San Bernardino County	Jan. 13, 2004		1	1	1	1						1		1								6
	Miramar Landfill	Oct. 6, 2003																					
	San Diego, San Diego County	Apr. 13, 2004							1	1	1							1		1	1	1	7
	Prima Deshecha Sanitary Landfill	Oct. 7, 2003																					
	San Juan Capistrano, County of Orange	Apr. 14, 2004						1		1								1		2	2		7
	West Valley MRF and Transfer Station	Jan. 12, 2004																					
	Fontana, San Bernardino County													1	1		1						3
Valley	American Avenue Landfill	Oct. 8, 2003																					
	Kerman, Fresno County								1	1	2												4
	Fink Road Landfill	Jul. 18, 2003																					
	Crows Landing, Stanislaus County		1		1		1																3
	Teapot Dome Disposal Site	Jan. 14, 2004																					
	Porterville, Tulare County	Apr. 15, 2004												1	1	2		1		1			6
	Turlock Transfer Station	Oct. 10, 2003																					
	Turlock, Stanislaus County	Apr. 9, 2004						1		1		1						1		2			6
	Visalia Disposal Site	Jul. 11, 2003																					
	Visalia, Tulare County	Jan. 15, 2004		1	1	1							1		1								5
Totals			**7**	**3**	**10**	**5**	**4**	**7**	**3**	**10**	**6**	**4**	**7**	**3**	**10**	**6**	**4**	**9**	**2**	**12**	**10**	**1**	**123**

Obtaining and Sorting Waste Samples

Sampling at Disposal Facilities

Upon arriving at the site, the team reviewed the sampling plan and sorting requirements with each disposal site's operational staff. They verified the information collected during the telephone interview, including the most suitable area for sorting and the availability of equipment for selecting samples and transporting them to the sorting area.

DIVERTING SELECTED LOADS

A systematic selection procedure was used to identify the vehicles that provided waste samples at Municipal Solid Waste (MSW) facilities. To calculate vehicle sampling frequency for each waste sector, we established a sampling interval for each. Sampling intervals were determined by dividing the total number of loads for each sector arriving at the facility each day—estimated from disposal site interviews—by the number of samples needed each day. The resulting number was the sampling frequency and determined whether, for example, every third vehicle, every sixth vehicle, or every twentieth vehicle is selected for sampling. This strategy was termed "selecting every n^{th} vehicle" within a waste sector. Please see Appendix C for an example of a *vehicle selection form* that specifies the intervals chosen for a particular day of sampling.

Every time one of the designated n^{th} vehicles in each waste sector arrived, the gate surveyor recorded on a *sample placard* information obtained from the driver about the load, including the name of the hauler, the jurisdiction the waste was from, the route number (when available), and the time of arrival at the facility. The surveyor placed the sample placard on the vehicle's windshield or dashboard to identify it as a vehicle intended for sampling and directed the driver to the sampling area. Please see Appendix C for an example of a *sample placard*.

When the sampling crew intercepted the vehicle, the field crew supervisor recorded the information from the sample placard onto the *sample sorting & characterization form*. The field crew supervisor also noted any unusual circumstances associated with the load or the sample.

OBTAINING WASTE SAMPLES; ADEQUATE SAMPLE WEIGHTS

Each load selected for sampling was tipped into an elongated pile on the ground or the floor of the disposal facility. The field crew supervisor then oversaw the following steps to obtain the sample.

1. **Visually dividing each sample load into 16 cells.** An imaginary 16-cell grid[3] was superimposed on the tipped load, as depicted in Figure A-b.

2. **Instructing the loader operator to capture waste from a randomly selected cell in the grid**. The desired cell number corresponding to each sample was pre-selected at random and recorded on the *sample placards* that were provided to the sampling crew. (Please see Appendix C for an example of a *sample placard*.) The field crew supervisor directed the loader operator to the randomly selected cell in the grid to obtain the waste sample.

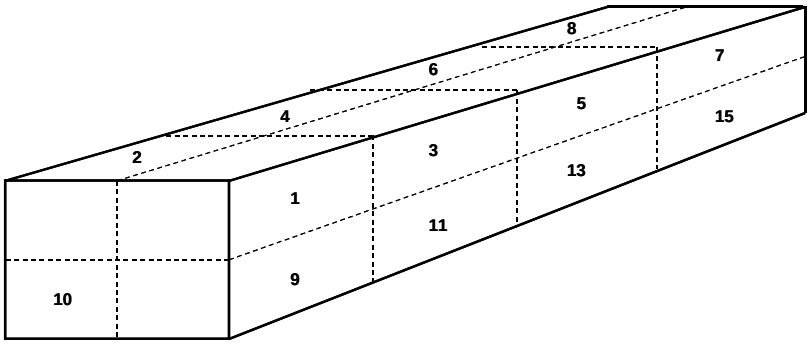
3. **Select a sample estimated to weigh at least 200 pounds from the pile.** Material from the identified cell was placed onto a tarpaulin for sorting. In most cases, a

[3] The number of cells in this grid was adjusted downward for small loads. For example, a small load could be divided into 8 cells instead of 16 to ensure that a sufficient amount of waste (at least 200 pounds per cell) was captured for sampling.

loader was available to transport the material, but at some facilities samples were removed from the pile by hand. Prior to sorting each sample, a crew member took a digital photograph of the sample with the sample placard and identification number visible in the picture. These pictures were later incorporated into the sampling results database.

The specifications for selecting self-hauled samples were slightly different, because self-hauled loads vary greatly in size. A sample of at least 200 pounds was taken only if the entire load weighed at least 250 pounds. For loads weighing between 175 and 250 pounds, the entire load was sorted as a sample. In the cases when a load weighed less than 175 pounds, additional loads from the same waste subsector (commercial self-hauled or residential self-hauled) were collected until the total weight exceeded 200 pounds. The combined small vehicle loads were then sorted as one sample.

Figure A-b: The 16-Cell Grid as Applied to a Tipped Load



Sampling at Multifamily Sites

SELECTING AND VISITING MULTIFAMILY SITES

Prior to each sampling season, CIWMB staff identified apartment buildings and complexes for inclusion in the study and contacted the management of those buildings to gather information and confirm the suitability of the sites. Selected multifamily sites generally were within 15 miles of the corresponding disposal facility where waste sampling and sorting took place. A multifamily site is defined as a building consisting of five or more dwelling units. Two multifamily sites—one primary and one backup—were identified for each sampling day. For each day, sampling arrangements were made with both the primary and backup site, although only one site was ultimately chosen to provide the day's sample of multifamily waste.

As part of the follow-up interview process, the study team contacted the management at each multifamily site to determine the exact location of each waste container that was to be included in sampling and waste generation measurements. The study team confirmed that access to each waste container was possible early on the morning of sampling or, in some cases, the night before the scheduled sampling day. A specific procedure for accessing the waste was developed for each site.

For sites where the waste containers are not normally accessible during early morning hours (for example, they are in a locked area), the study team made arrangements to ensure that the sampling crew would be granted access without delay. If a multifamily site could not provide the required information and guarantee that the waste containers would be accessible to the data collection crew at the time indicated, then the site was dropped from inclusion in the study. The

study team also obtained the number of existing and occupied dwelling units in each selected multifamily site.

At each site, the volume of waste in each waste container was measured using a tape measure along each dimension, and the dimensions were recorded on a *multifamily site visit form* created specifically for that multifamily site. (Please see Appendix C: Forms Used in the Study for an example of a *multifamily site visit form*.) Later, the waste disposal rate for each multifamily site was calculated based on the total volume of accumulated waste that was measured, divided by the time elapsed since the most recent waste pickup.

OBTAINING WASTE SAMPLES AT MULTIFAMILY SITES

All the waste disposal bins at the site were inspected to determine whether any substantial and obvious differences existed among waste in the bins. In most cases, the waste sample was obtained from a single bin, chosen at random from among those present at the site. If clear differences were apparent in the waste from bin to bin, then subsamples from two bins were taken to ensure a representative sample. However, the waste in *all* waste containers associated with the building was measured in order to calculate a waste disposal rate.

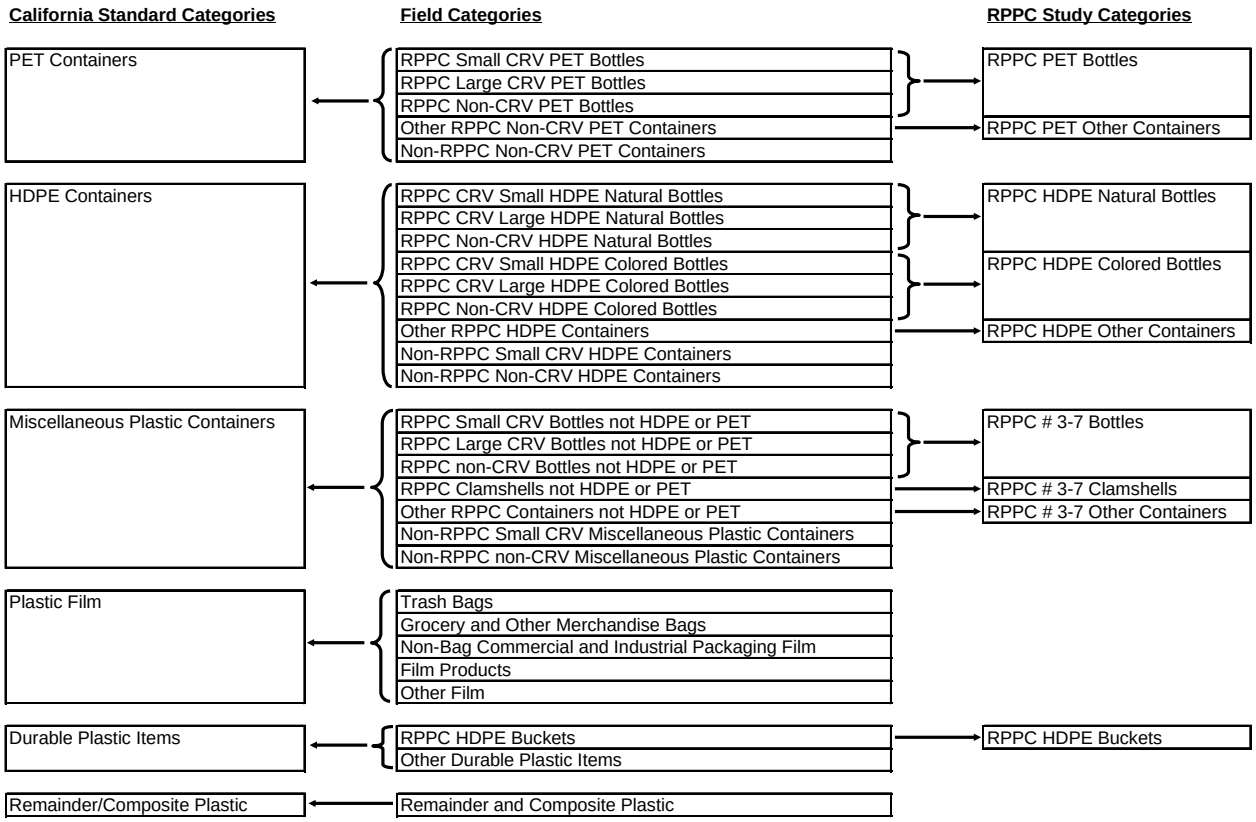
Each waste sample was extracted from the bin by pulling out a vertical cross-section of waste estimated to weigh at least 200 pounds. The sample was placed in large wheeled containers ("toters"), and its volume was measured for later calculation of the density of multifamily waste. In most cases, enough waste was extracted from the bins to fill three 96-gallon toters exactly, thus providing a sample with total volume of 288 gallons, or approximately 1.5 cubic yards. The sample was transported to the disposal site scheduled for that day, where samples of waste from other sectors were being obtained and sorted. Multifamily waste samples were sorted according to the same protocol that was used for other waste sectors.

Sorting Waste Samples and Recording Composition Data

After the sample was acquired and placed on a tarp, the material was sorted by hand into the prescribed component types. The material types are defined in Appendix B: List and Definitions of Material Types. Plastic laundry baskets were used to contain the separated components. Four crew members sorted the contents of each sample and placed each material type in the appropriate basket, while the field crew supervisor monitored the consistency and accuracy of each crew member's work. Each crew member typically specializes in groups of material types, such as papers or plastics.

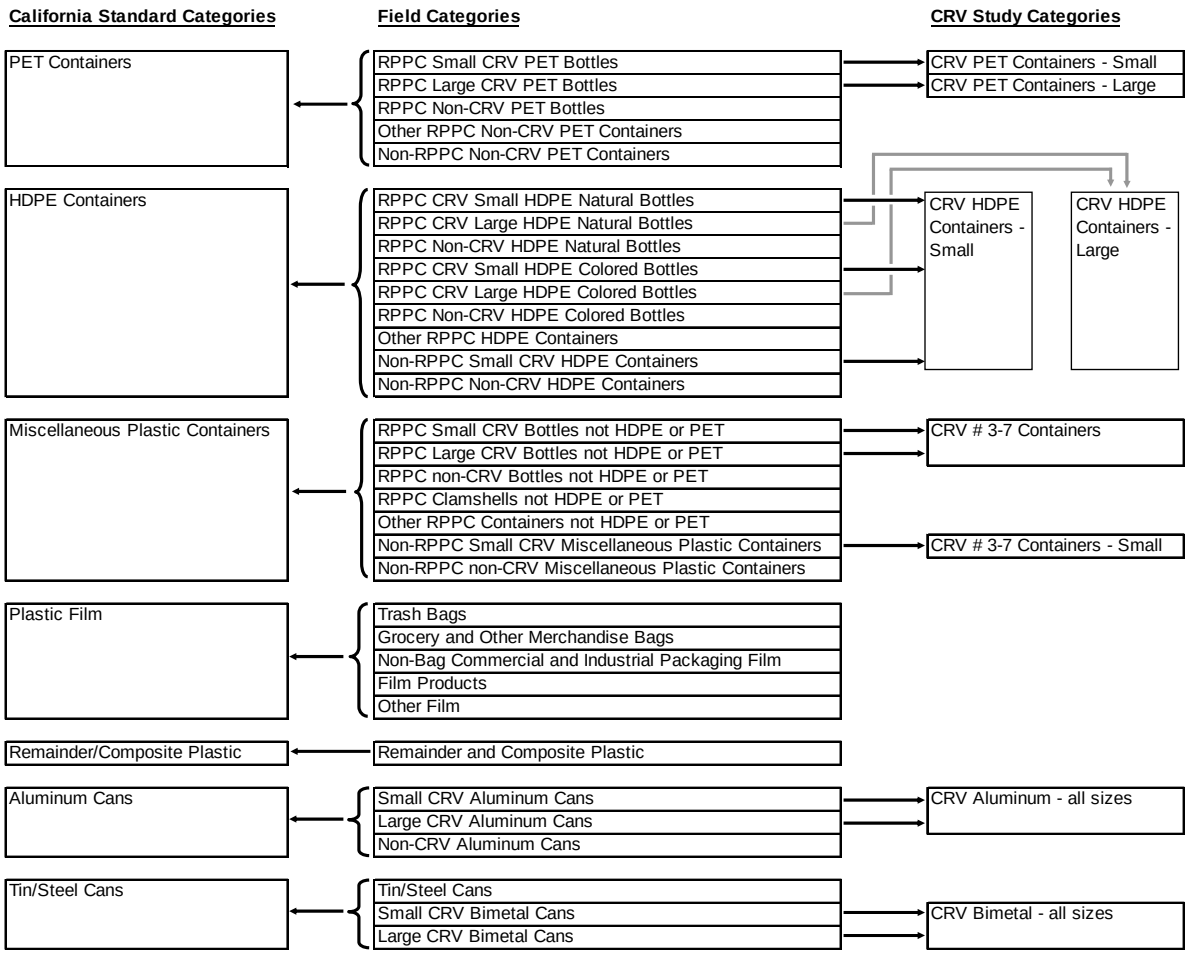
Plastics and metal cans were sorted into 40 "field types," which were later translated into the three types of plastic containers and two types of metal cans that appear in the standard material list, as well as the nine plastic types required for the RPPC study and the five plastic types and two metal-can types required for the CRV study. Although CRV aluminum and bimetal cans were sorted by size in the field, very few of the large size were found. Also, very few CRV # 3–7 containers were found overall. Therefore the size types were combined for data analysis and reporting. The translation of the field types to the waste composition and RPPC types and CRV types is depicted in the following figures.

Figure A-c: Translation of Field Sorting Types to Study Types of RPPCs



Note: Not all of the possible permutations of RPPC/CRV container combinations were needed for the study. For example, there are no known CRV PET bottles under 8 ounces (that is, CRV but not RPPC.)

Figure A-d: Translation of Field Sorting Types to Study Types of CRV Containers



Note: Not all of the possible permutations of RPPC/CRV container combinations were needed for the study. For example, there are no known CRV PET bottles under 8 ounces (that is, CRV but not RPPC.)

The material types into which the samples were sorted also included 12 types of glass containers, of which there were eight types of CRV glass containers. CRV glass containers were not subjected to the same decontamination process as aluminum and plastic CRV containers, because it is assumed that any contamination on them is negligible compared to the weight of the glass itself. All material weights recorded at this stage of the process reflected the "in-the-field" or "contaminated" state of the material types.

For each sample, the field crew supervisor estimated the percentage of leaves and the percentage of grass, by weight, in the "leaves and grass" material category. The field crew supervisor also noted certain information about oil that may have been present in the sample. If there was evidence that containers captured in the sample contained a significant amount of oil after disposal, then those containers were counted, and the field crew supervisor estimated their volume. Information recorded on the sampling data form included:

- Whether containers in the sample probably contained oil (yes or no).
- Size of containers that were believed to have contained oil.

- Level of oil contamination of sample (high, medium, or low).
- Estimated volume of oil contamination (if possible to estimate).

The field crew supervisor monitored the homogeneity of the material that the sorting crew placed into the assigned component baskets, and directed the re-sorting of material types if they were improperly classified. Open laundry baskets allowed the supervisor to see the material at all times.

The supervisor also verified the purity of each component as it was weighed, before recording the weight into the *sample sorting and characterization form*. (Please see Appendix C for an example of a *sample sorting and characterization form.*) The material types 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. During sorting, the goal was to sort each sample directly into material types in order to minimize the amount of indistinguishable fines or miscellaneous types.

The baskets holding each material category were weighed (accounting for each basket empty weight) on a set of scales that was calibrated to accuracy within one-tenth of a pound. The field crew supervisor recorded composition weights, and the information obtained from the driver on the *sample sorting and characterization form*.

The data from each season's waste sorts were sent to Cascadia's office for data entry. A database was developed using Microsoft Access prior to the start of sampling. The database permitted entry of the characteristics of the waste load associated with each sample, as well as the weights of the material components in each sample. Material component weights were entered twice, independently, for each sample, and the entered weights were compared to verify that the first entry matched the second entry. In this way, the weight data from each entered record was verified.

Vehicle Survey

In order to quantify the waste associated with each sector and subsector, surveys were conducted at the entrance of each participating facility. The surveys were administered to the drivers of each vehicle entering the facility through the gate at which the surveyor was posted. If the facility had multiple gates, then the surveyor rotated among the gates at regular intervals of approximately an hour. Additional information on weekend disposal patterns was gathered from the facility to supplement survey data for weekdays and adjust data to better reflect overall disposal at the facility.

The ultimate product of the survey data and weekend data was an estimate of the fraction of the overall waste stream contributed by each of the waste sectors, subsectors, and activities at each participating facility. The "Quantifying Disposed Waste" section of Appendix A: Detailed Methodology describes how this information was then used to estimate the relative magnitude of each part of the disposed waste stream on a regional basis and statewide.

On survey days, the surveyor arrived at the site at the scheduled start time, which was scheduled to permit full coverage throughout the day of times of greatest traffic at the facility. The surveyor introduced himself/herself to the scalehouse staff and verified the procedure for administering the survey that day by confirming several key details:

- The procedure for obtaining vehicle net weights.

- Any rules the facility used for assigning a minimum net weight to certain types of vehicles, such as those carrying residential self-hauled loads.
- Any rules governing the assignment of *net volume* estimates instead of net weights.

At the chosen start-time, the surveyor positioned himself/herself at the designated entrance to the facility and proceeded to interview the driver of each passing vehicle. The information gathered through the interview included the following:

- The sector, subsector, and/or activity to which the waste belonged.
- For loads that were composed of waste from more than one sector, the estimated proportions of the sectors represented in the load.

An example *vehicle survey form* that was used to collect the data is included in Appendix C: Forms Used in the Study.

At most of the facilities, it was possible for the surveyor to obtain net weights for vehicles by observing the weighing process at the scalehouse and recording the weight at the same moment the vehicle drove across the scales. In some cases, the surveyor coordinated with scalehouse personnel periodically throughout the day to obtain weight tickets (transaction receipts) corresponding to every load of waste brought to the facility.

In all cases, the surveyor recorded the type of waste and net weight, net volume, or default assigned weight for every vehicle encountered that was carrying disposed waste that did not come from another solid waste facility. The survey did not record loads of non-disposed waste, material to be recycled or recovered, alternative daily cover, or material brought from transfer stations or other solid waste facilities.

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 data collection season, the data on the survey forms was entered into a Microsoft Access database. Following data entry, the entries were compared with the written field records, and any data entry errors were addressed. Two separate checks occurred. During all of these checks, if data entry errors or omissions could not be resolved, the entry was deleted. First, the field weights from sorting each sample were entered twice into a customized database that compared the two sets of entries and flagged any that did not match. Second, each database record was reviewed and compared against the original field form.

Description of Calculations and Statistical Procedures Used

Data from vehicle surveys, facility tonnage reports, and the sorting of waste samples was analyzed to yield estimates of percentages and tonnages of material types in California's waste stream. This section describes the methodology used to obtain each estimate and its associated confidence interval (error range).

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 regional level to the statewide level. A ratio estimator involves the ratio of two quantities, both of which are random variables. For most of the steps in the analysis, 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. The general procedure involved creating a new ratio estimator by weighting

across ratios from a lower level. For example, statewide ratio estimators were created by weighting of the region-level ratio estimators.

Quantifying Disposed Waste

Disposed waste from each sector was quantified through the use of vehicle surveys and tonnage reports at the disposal facilities that participated in this study. The calculation method is described below.

Step 1: Aggregating Survey Records to Produce Findings at the Facility Level. For a given facility on a given day, each vehicle that was included in the gatehouse survey had its net weight of waste assigned to one or more of the established waste sectors, in accordance with the response of the driver. Thus, the tonnage from each vehicle was assigned or apportioned to one or more of the commercial, single-family residential, multifamily residential, commercial self-hauled, or residential self-hauled sectors.

If the period during which the vehicle survey was conducted at the facility was believed to be representative of the day's overall influx of waste, then the tonnages revealed by the survey were used in a straightforward manner to calculate the relative proportions of the waste stream associated with each sector, subsector, and activity.

Actual transaction records from the facility were utilized to supplement survey data in two ways. First, if there was a period of time during the day when incoming vehicle traffic was noticeably different and was not covered by the survey, then facility transaction records for the additional period were incorporated into the calculation of each type of waste.

For example, if there was a period early in the morning, not covered by the surveyor, when franchised haulers were allowed to bring commercial or residential waste to the facility, then that waste was accounted for and assigned to the proper waste sectors after examination of transaction records and discussions with the facility managers and/or the haulers. Second, if transaction records were available for the survey day(s) so that it was possible to dedicate tonnage to franchised hauler and self-hauled vehicles, these estimates were used first. Survey data was then applied to designate tonnage to the sectors and activity types.

The projection of waste tonnage for a weekday, based on the vehicle survey and supplementary information, was "scaled up" by a factor of five to produce an estimate of tonnages for each type of waste for all weekdays during a given week. Then, records from the facility were examined to develop estimates of the amounts of each type of waste that arrived on the weekend following the sampling/survey day.

The weekend estimates were added to the weekday estimates to produce a composite set of estimates of the amount of waste from each sector, subsector, and activity arriving at the disposal facility over a representative seven-day period. If the facility was visited twice during the study, then the results from both visits were averaged to produce an estimate of the waste assigned to each sector for an arbitrary seven-day period.

When each facility's reported tonnage figures for disposed waste were obtained for the calendar year 2003, the relative proportions described above were applied to the reported figures to produce estimates of the tons of disposed waste associated with each sector, subsector, and activity at the facility in question.

Example of Estimating Sector Proportions at the Facility Level

For example, imagine that Facility A was visited in both the summer and winter seasons. The following scenario describes how the percentages of waste for each subsector were calculated for this facility.

First, daily transaction reports from the facility for the two weekdays the study crew was present were examined to determine the tons associated with the combination of waste sectors that included *commercial*, *single-family residential,* and *multifamily* waste, and also for the combination of waste sectors that included *commercial self-hauled* and *residential self-hauled* waste. A hypothetical accounting of tonnages from two daily transaction reports is shown below.

	Commercial	Single-family Residential	Multifamily Residential	Commercial Self-hauled	Residential Self-hauled	Total
Tonnage from summer day transaction report	94			19		113
Tonnage from winter day transaction report	91			16		107
Tonnage for two weekdays	185			35		220

Next, the projection for two weekdays was "scaled up" by a factor of 2.5 to reflect the expected tons over five weekdays, as shown below.

	Commercial	Single-family Residential	Multifamily Residential	Commercial Self-hauled	Residential Self-hauled	Total
Tonnage for two weekdays	185			35		220
Tonnage for five weekdays	463			88		551

Next, transaction records for the weekends that followed the visits by the study crew were examined to determine average weekend tonnage.

	Commercial	Single-family Residential	Multifamily Residential	Commercial Self-hauled	Residential Self-hauled	Total
Tonnage for first weekend	36			16		52
Tonnage for second weekend	40			18		58
Average tonnage for a weekend	38			17		55

Then, separately from examining the facility's transaction records, the results of the vehicle survey were examined. In this hypothetical case, the vehicle survey was conducted for nine hours on each of two days at the facility, and the facility was open to the public for 12 hours on each day. Tonnages for each sector were calculated by adding together the survey records. Then, the tonnages were scaled up by a factor of 1.333, to reflect 12 hours instead of 9 hours from each survey day.

	Commercial	Single-family Residential	Multifamily Residential	Commercial Self-hauled	Residential Self-hauled	Total
Tonnage from first survey day, 9 hours	95	70	15	20	10	210
Tonnage from second survey day, 9 hours	105	60	20	25	5	215
Tonnage from both survey days, 9 hours	200	130	35	45	15	425
Projected tonnage from both survey days, 12 hours	267	173	47	60	20	567

To the projected tonnage from the hours on each of the two survey days when the facility was open to the public, we added any known additional tons that were brought in by franchised haulers early in the morning, before the facility was open to the public. The projected tonnages by sector for "two complete survey days" were used to calculate the relative percents associated with each waste subsector within the combined groups of (1) commercial, single-family, and multifamily, and (2) commercial self-hauled and residential self-haul. These steps are shown below.

	Commercial	Single-family Residential	Multifamily Residential	Commercial Self-hauled	Residential Self-hauled	Total
Projected tonnage from both survey days, 12 hours	267	173	47	60	20	567
Additional tons in early morning	10	8	2	0	0	20
Projected tonnage for two complete days	277	181	49	60	20	587
Relative percent within group of sectors	54.6%	35.7%	9.7%	75%	25%	
Totals of relative percents	100%			100%		

The percents for each waste subsector were applied to the projected tonnage for five weekdays, to develop estimated tonnages for each waste subsector, as shown below.

	Commercial	Single-family Residential	Multifamily Residential	Commercial Self-hauled	Residential Self-hauled	Total
Tonnage for five weekdays, from transaction reports	463			88		551
Relative percents, from surveys	54.6%	35.7%	9.7%	75%	25%	
Estimated tons for each subsector over five weekdays	253	165	45	66	22	551

Similarly, the percents for each waste subsector predicted by the vehicle survey were applied to the projected tonnage for weekends, as shown below. In most cases, no single-family residential waste arrived on weekends, so the known tonnage of commercially-hauled waste was distributed proportionally between the commercial and multifamily subsectors in the same ratio that was calculated for other days of the week.

	Commercial	Single-family Residential	Multifamily Residential	Commercial Self-hauled	Residential Self-hauled	Total
Tonnage for a typical weekend, from transaction reports	38			17		55
Relative percents, from surveys	85.0%	0.0%	15.0%	75.0%	25.0%	
Estimated tons for each subsector on a weekend	32	0	6	13	4	55

Finally, the estimates for five weekdays were combined with the estimates for a weekend to produce week-long estimates of the tonnage associated with each waste subsector. This is shown below.

	Commercial	Single-family Residential	Multifamily Residential	Commercial Self-hauled	Residential Self-hauled	Total
Estimated tons over five weekdays	253	165	45	66	22	551
Estimated tons on a weekend	32	0	6	13	4	55
Total estimated tons for each subsector	285	165	51	79	26	606

Step 2: Aggregating Tonnage from Facilities to Produce Findings at the Regional Level. Tonnage estimates for each type of waste were combined for participating facilities within each region, using a weighted averaging method. The tonnage estimates for each type of waste at all participating facilities within a region were aggregated, and relative proportions were calculated for each sector, subsector, and activity. The aggregated proportions for each sector, subsector, and activity were then applied to the total 2003 disposal figure for the region, as drawn from the Disposal Reporting System.

For example, hypothetical annual tonnages by subsector for facilities visited in a region are shown in the table below.

	Commercial	Single-family Residential	Multifamily Residential	Commercial Self-hauled	Residential Self-hauled	Total
Facility A	255,500	184,000	26,000	24,500	10,000	500,000
Facility B	150,000	80,000	10,000	30,000	5,000	275,000
Total (tons)	405,500	264,000	36,000	54,500	15,000	775,000
% of Total	52.4%	34.1%	4.6%	7.0%	1.9%	100%

Self-hauled commercial waste was further allocated to the activities construction & demolition, landscaping, roofing, and other. The tonnage from the self-hauled commercial waste is assigned to the activities using survey data as in the table below.

	Construction & Demolition	Roofing	Landscaping	Other Commercial	Total Commercial Self-hauled
Facility A (tons)	7,350	7,350	1,225	8,575	24,500
Facility B (tons)	12,000	10,500	3,000	4,500	30,000
Totals of both facilities	19,350	17,850	4,225	13,075	54,500
% of total	35.4%	32.8%	7.8%	24.0%	100%

Using an annual tonnage for this region of 2,345,678 tons, we can assign tonnages to subsectors and activities according to the percentages from the survey data.

Region 1	Commercial	Single-family Residential	Multifamily Residential	Commercial Self-hauled	Residential Self-hauled	Total
Percents	52.4%	34.1%	4.6%	7.0%	1.9%	100%
Tons	1,229,136	799,876	107,901	164,197	44,568	2,345,678

	Construction & Demolition	Roofing	Landscaping	Other Commercial
Percents	35.4%	32.8%	7.8%	24.0%
Tons	58,126	53,857	12,807	39,407

Step 3: Aggregating Regional Findings to Produce Sector Tonnage Estimates Statewide. The relative proportions of disposed waste corresponding to each sector were combined among regions using a weighted aggregation method. The weightings associated with each region were proportional to the total disposed tonnage for the region for calendar year 2003. This step resulted in a final set of proportions reflecting the relative disposal of waste corresponding to each waste sector statewide. The proportions were then multiplied by the total 2003 statewide disposal figure to produce the statewide tonnage estimate associated with each sector.

The 2003 figures for disposed tonnage associated with each region, as drawn from the Disposal Reporting System, are shown in Table A-7.

Table A-7: Total Waste Disposal (Tons) in Each County and Region, 2003

Coastal		Bay Area		Southern		Mountain		Central	
Del Norte	20,322	Alameda	2,000,026	Imperial	230,311	Alpine	0	Butte	180,769
Humboldt	58	Contra Costa	1,097,985	Los Angeles	9,632,493	Amador	26,288	Colusa	512
Lake	45,816	Marin	358,978	Orange	5,017,173	Calaveras	44,330	Fresno	598,575
Mendocino	0	Napa	46,998	Riverside	3,387,589	El Dorado	1,397	Glenn	21,828
Monterey	445,280	San Francisco	0	San Bernardino	1,628,610	Inyo	14,930	Kern	769,453
San Benito	54,758	San Mateo	789,082	San Diego	3,861,249	Lassen	24,001	Kings	723,470
San Luis Obispo	302,646	Santa Clara	1,268,865	Ventura	1,107,155	Mariposa	10,321	Madera	113,319
Santa Barbara	414,864	Solano	850,919			Modoc	0	Merced	254,047
Santa Cruz	230,694	Sonoma	486,120			Mono	30,234	Placer	250,451
						Nevada	0	Sacramento	869,556
						Plumas	445	San Joaquin	1,612, 170
						Sierra	2,808	Shasta	259,566
						Siskiyou	13,003	Stanislaus	402,563
						Trinity	0	Sutter	0
						Tuolumne	0	Tehama	51,450
								Tulare	249,987
								Yolo	191,879
								Yuba	239,985
Totals:	1,514,438		6,898,973		24,864,580		167,757		6,789,580
	4%		17%		62%		0.4%		17%

Total Statewide: 40,235,328 tons

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

Estimating Waste Composition

Waste composition estimates were calculated using one of two methods, the choice of which depended on the way composition data was collected. When waste samples were selected from vehicles that were chosen through a randomized process as they arrived at disposal facilities, it was appropriate to treat each sample as being equivalent to its peers within the same sampling stratum. Our statistical method for estimating the composition of single-family residential, commercial, and self-hauled waste relied on a method that gave equal weighting or "importance" to each sample within a given stratum. Confidence intervals (error ranges) were calculated based on assumptions of normality in the composition estimates.

On the other hand, when waste samples were collected at the sites where the waste was generated (for example, collected at individual apartment buildings), it became necessary to introduce a means of accounting for the relative magnitude of each generator site in the estimation process. The statistical method in this case used the estimated amount of waste generated at each site as a weighting factor to assign relative "importance" to that site in the composition calculations.

In the descriptions of calculation methods, the following variables are used frequently.

1. i denotes an individual sample
2. j denotes the material type
3. c_j is the weight of the material type j in a sample
4. w is the weight of an entire sample
5. r_j is the composition estimate for material j (r stands for *ratio*)
6. a denotes a region of the state (a stands for *area*)
7. s denotes a particular sector or subsector of the waste stream
8. n denotes the number of samples in the particular group that is being analyzed at that step

ESTIMATING COMPOSITION BASED ON SAMPLES FROM VEHICLES

The following method was used to estimate the composition of waste belonging to the single-family residential, commercial, commercial self-hauled, and residential self-hauled sectors.

For a given stratum (that is, for the samples belonging to the same waste sector within the same region), the composition estimate denoted by r_j represents the ratio of the components' weight to the total weight of all the samples in the stratum. It was derived by summing each component's weight across all of the selected samples belonging to a given stratum and dividing by the sum of the total weight of waste for all of the samples in that stratum, as shown in the following equation:

$$r_j = \frac{\sum_i c_{ij}}{\sum_i w_i} \quad (1)$$

where:

c = weight of particular component

w = sum of all component weights

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

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

For example, the following simplified scenario involves three samples. For the purposes of this example, only the weights of the component *carpet* are shown.

	Sample 1	Sample 2	Sample 3
Weight (*c*) of carpet	5	3	4
Total Sample Weight (*w*)	80	70	90

$$r_{Carpet} = \sum \frac{5+3+4}{80+70+90} = 0.05$$

To find the composition estimate for the component *carpet*, the weights for that material are added for all selected samples and divided by the total sample weights of those samples. The resulting composition is 0.05, or 5 percent. In other words, 5 percent of the sampled material, by weight, is *carpet*. This finding is then projected onto the stratum being examined in this step of the analysis.

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

$$\mathrm{Var}(r_j) \approx \left(\frac{1}{n}\right)\left(\frac{1}{\overline{w}^2}\right)\left(\frac{\sum_i \left(c_{ij} - r_j w_i\right)^2}{n-1}\right) \tag{2}$$

where:

$$\overline{w} = \frac{\sum_i w_i}{n} \tag{3}$$

(For more information regarding Equation 2, please refer to *Sampling Techniques, 3rd Edition* by William G. Cochran [John Wiley & Sons, Inc., 1977].)

Second, precision levels at the 90 percent confidence level were calculated for a component's mean as follows:

$$r_j \pm \left(z\sqrt{\mathrm{Var}(r_j)}\right) \tag{4}$$

where z = the value of the z-statistic (1.645) corresponding to a 90 percent confidence level

Composition results for strata were then combined, using a weighted averaging method, to estimate the composition of larger portions of the waste stream. The relative tonnages associated with each stratum served as the weighting factors. The calculation was performed as follows:

$$O_j = \left(p_1 * r_{j1}\right) + \left(p_2 * r_{j2}\right) + \left(p_3 * r_{j3}\right) + \ldots \tag{5}$$

where:

p = the proportion of tonnage contributed by the noted waste stratum (that is, the weighting factor)

r = ratio of component weight to total waste weight in the noted waste stratum (that is, the composition percent for the given material component)

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

For example, the above equation is illustrated here using three waste strata.

	Stratum 1	Stratum 2	Stratum 3
Ratio (r) of carpet	5%	10%	10%
Tonnage	25,000	100,000	50,000
Proportion of tonnage (p)	14.3%	57.1%	28.6%

To estimate the portion of larger portions of the waste stream, the composition results for the three strata are combined as follows.

$$O_{Carpet} = (0.143 * 0.05) + (0.571 * 0.10) + (0.286 * 0.10) = 0.092 = 9.2\%$$

Therefore, 9.2 percent of this examined portion of the waste stream is *carpet*.

The variance of the weighted average was calculated as follows:

$$\mathrm{Var}(O_j) = \left(p_1^2\ \mathrm{Var}(r_{j1})\right) + \left(p_2^2\ \mathrm{Var}(r_{j2})\right) + \left(p_3^2\ \mathrm{Var}(r_{j3})\right) + \ldots \quad (6)$$

ESTIMATING COMPOSITION BASED ON SAMPLES FROM MULTIFAMILY SITES

The following method was used to estimate the composition of waste belonging to the multifamily residential sector. This method assigned a weighting or "importance" to each generator sample, proportionate to the amount of waste that was believed to be disposed by the multifamily site that corresponded to the sample.

For a given region, a, the composition estimate denoted by r_j represents the ratio of the components' weight to the total weight of all the samples in the stratum. It was derived through the following steps:

$$r_{aj} = \frac{\sum_i q_{ai} c_{aij}}{\sum_i q_{ai} w_{ai}} \quad (7)$$

where:

a denotes the particular region

j denotes the material type

i denotes each individual sample

q_i = the annual disposed tonnage estimated for the multifamily site that produced sample i

c_{ij} = the weight of material component j in sample i

w_i = the sum of all component weights in sample i

For example, the following scenario illustrates the above equation using three hypothetical samples, taken from three separate multifamily sites in the Central region.

	Sample 1 of Multifamily Site 1	Sample 2 of Multifamily Site 2	Sample 3 of Multifamily Site 3
Weight (c) of carpet (j)	5	10	7
Total Sample Weight (w)	100	95	90

	Multifamily Site 1	Multifamily Site 2	Multifamily Site 3
Annual Disposed Tonnage (q)	25	130	125

$$r_{Central,Carpet} = \frac{(25*5)+(130*10)+(125*7)}{(25*100)+(130*95)+(125*90)} = 0.08$$

The variance of the estimate at the regional level was calculated:

$$\mathrm{Var}(r_{aj}) \approx \left(\frac{\sqrt{n}}{\sum_i q_{ai} w_{ai}} \sqrt{\frac{\sum_i \left((q_{ai} c_{aij})^2 \right) - \left(2 r_{aj} \sum_i \left((q_{ai})^2 c_{aij} w_{ai} \right) \right) + \left((r_{aj})^2 \sum_i \left((q_{ai} w_{ai})^2 \right) \right)}{n-1}} \right)^2 \quad (8)$$

where n is the number of multifamily samples in region a.

For more information regarding Equation 8, please refer to *Sampling Techniques, 3rd Edition* by William G. Cochran (John Wiley & Sons, Inc., 1977).

Composition estimates for each region were then combined through a weighted averaging process to form composition estimates at the state level, similar to the method described for the other waste sectors.

$$r_j = \sum_{a=1}^{5} p_a r_{aj} \quad (9)$$

where p_a = the proportion of statewide multifamily disposed tons associated with region a.

The variance of the estimate at the statewide level was calculated:

$$\mathrm{Var}(r_j) = \sum_{a=1}^{5} \left(p_a^2 \ \mathrm{Var}\left(r_{aj} \right) \right) \tag{10}$$

Although the notation appears to be different, this formula is essentially the same as the formula used to calculate variance for combined strata for the other waste sectors.

ESTIMATING COMPOSITION OF ENTIRE STATEWIDE DISPOSED WASTE STREAM

Composition results for all waste sectors were combined, using a weighted averaging method, to estimate the composition of the entire statewide disposed waste stream. The relative tonnages associated with each sector served as the weighting factors. The calculation was performed as follows:

$$O_j = \left(p_1 * r_{j1} \right) + \left(p_2 * r_{j2} \right) + \left(p_3 * r_{j3} \right) + \ldots \tag{11}$$

where:

p = the proportion of tonnage contributed by the noted waste sector (that is, the weighting factor)

r = ratio of component weight to total waste weight in the noted waste sector (that is, the composition percent for the given material component)

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

The following scenario illustrates the above equation. This example involves the component *carpet* in three waste sectors.

	Waste Sector 1	Waste Sector 2	Waste Sector 3
Ratio of carpet (r)	0.05	0.10	0.15
Proportion of Tonnage (p)	0.50	0.25	0.25

$$O_{Carpet} = (0.50 * 0.05) + (0.25 * 0.10) + (0.25 * 0.15) = 0.0875$$

So, it is estimated that 0.0875 or 8.75% of the entire waste stream is composed of *carpet*.

The variance of the weighted average was calculated as follows:

$$\mathrm{Var}(O_j) = \left(p_1^2 \ \mathrm{Var}(r_{j1}) \right) + \left(p_2^2 \ \mathrm{Var}(r_{j2}) \right) + \left(p_3^2 \ \mathrm{Var}(r_{j3}) \right) + \ldots \tag{12}$$

ESTIMATING THE AMOUNTS OF AND CONTAMINATION RATES OF DISPOSED RPPCS AND CRV CONTAINERS

The estimates of statewide disposal of rigid plastic packaging containers (RPPCs) and of California Redemption Value (CRV) containers were done in essentially the same way. The calculation method is described here for RPPCs, although it was applied to the data for CRV containers as well.

Step 1: determined the average percent of the sample weight that corresponded to each RPPC material. This step was identical to calculation steps described earlier in this appendix, for estimating the percent of other material types in waste samples. For each material, the ratio of field weight to total sample weight was calculated as shown below. This was done for each material type for each individual waste sector within each individual region of the state.

$$A_{jas} = \frac{\sum_i c_{ijas}}{\sum_i w_{ias}} \tag{13}$$

The variance of the ratio estimator was estimated as:

$$\mathrm{Var}(A_{jas}) \approx \left(\frac{\sqrt{n_{as}}}{\sum_i w_{ias}} \sqrt{\frac{\sum_i \left(c_{ijas}^2\right) - 2A_{jas}\sum_i \left(c_{ijas} w_{jas}\right) + A_{jas}^2 \sum_i \left(w_{jas}^2\right)}{n_{as} - 1}} \right)^2 \tag{14}$$

where:

n is the number of RPPC/CRV samples obtained and sorted in the field, within the stratum being examined

a denotes the particular region

s denotes the particular waste sector

j denotes the material type

i denotes each individual sample

c_{ij} = the weight of material component j in sample i

w_i = the sum of all component weights in sample i

Step 2a: Using a subset of samples chosen for decontamination (see Table A-6), determined the average ratio of clean (decontaminated) weights to field weights for each material. As with the previous step, this was done for each material type for each individual waste sector within each individual region of the state.

$$E_{jas} = \frac{\sum_i d_{ijas}}{\sum_i f_{ijas}} \tag{15}$$

where:

m is the number of RPPC/CRV samples that were decontaminated within the stratum being examined

a denotes the particular region

s denotes the particular waste sector

j denotes the material type

i denotes each individual sample

d_{ij} = the weight of decontaminated component j in sample i

f_{ij} = the field weight (prior to decontamination) of component j in sample i

For example, the following scenario involves three samples from the waste sector commercial, in the region Central, for the material *RPPC HDPE Buckets.* The samples below were randomly selected to be included in the RPPC decontamination study. These selected samples each included the material *RPPC HDPE Buckets*. They could have also contained other RPPC material types, although those are not shown here.

These samples were sorted and weighed in the field as were all samples. The RPPC material types, though, from these samples were bagged and transported to the lab where they were cleaned, dried, and re-weighed. The field weights and cleaned, or decontaminated, weights are shown in the table below:

	RPPC Sample 1	RPPC Sample 2	RPPC Sample 3
RPPC HDPE Buckets—field weight (*f*)	6.0	10.0	6.5
RPPC HDPE Buckets—clean weight (*d*)	5.0	7.5	5.5

$$E_{RPPC\_HDPE\_Buckets,Central,Commercial} = \frac{5.0+7.5+5.5}{6.0+10.0+6.5} = 0.8$$

As calculated above, the average ratio of clean weight to field weight for *RPPC HDPE Buckets* would be 0.8.

The variance of the ratio estimator was estimated as:

$$\mathrm{Var}(E_{jas}) \approx \left(\frac{\sqrt{m_{jas}}}{\sum_i f_{ijas}} \sqrt{\frac{\sum_i \left(d_{ijas}^2\right) - 2E_{jas}\sum_i \left(d_{ijas} f_{ijas}\right) + E_{jas}^2 \sum_i \left(f_{ijas}^2\right)}{m_{jas}-1}} \right)^2 \quad (16)$$

Equation 16 is essentially the same as Equation 2, although it is expressed in a different algebraic form.

Step 2b: Determined the average ratio of clean (decontaminated) weights to field weights for each material at the statewide level, for each waste sector.

$$E_{js} = \sum_a p_{as} E_{jas} \quad (17)$$

$$\mathrm{Var}(E_{js}) = \sum_a \left(p_{as}^2 \ \mathrm{Var}(E_{jas})\right) \quad (18)$$

where p_{as} is the relative portion of disposed tonnage associated with waste sector *s* in region *a* in 2003.

Step 2c: Determined the average ratio of clean (decontaminated) weights to field weights for each individual material at the statewide level, across all waste sectors.

$$E_j = \sum_s p_s E_{js} \tag{19}$$

$$\text{Var}(E_j) = \sum_s \left(p_s^2 \ \text{Var}(E_{js}) \right) \tag{20}$$

where p_s is the relative portion of disposed tonnage associated with waste sector *s* in 2003.

Step 2d: produced the contamination rates that were reported for each RPPC type.

$$\text{Contamination Rate}_j = \left(1 - E_j\right) \pm z\sqrt{\text{Var}(E_j)} \tag{21}$$

where *z* is the *z*-statistic, 1.645

Step 3: applied the decontamination ratio found in Step 2a to the field percent found in Step 1. This resulted in an estimate of the amount of each pure RPPC material (not including any contamination) in the waste associated with a given waste sector and region.

$$G_{jas} = A_{jas} E_{jas} \tag{22}$$

For example, a scenario to illustrate the above equation involves the sector *commercial*, the region *Central*, and the material *RPPC HDPE Buckets*. Here, we assume a field percent of 3 percent. In other words, for the commercial sector in the Central region, 3 percent of the waste is estimated to be *RPPC HDPE Buckets*.

	Field Percent Calculated in Step 1	Decontamination Ratio Calculated in Step 2a
RPPC HDPE Buckets	0.03	0.8

$$G_{RPPC\_HDPE\_Buckets,Central,Commercial} = 0.03 * 0.8 = 0.024$$

Applying the decontamination ratio to the field percent of 3 percent results in an uncontaminated percent of 2.4 percent. Using this method to account for contamination, we can estimate a new composition percent for this material: 2.4 percent of the Commercial substream in the Central Region is composed of *RPPC HDPE Buckets*.

The variance of the estimate was calculated:

$$\text{Var}(G_{jas}) = \left(\text{Var}(A_{jas}) + A_{jas}^2\right)\left(\text{Var}(E_{jas}) + E_{jas}^2\right) - \left(A_{jas} E_{jas}\right)^2 \tag{23}$$

(For more information regarding Equation 23, please refer to *Sampling Techniques, 3rd Edition* by William G. Cochran [John Wiley & Sons, Inc., 1977].)

Step 4: Estimated the average amount of each pure RPPC material (not including any contamination) in the waste associated with a given waste sector (across all regions combined).

$$H_{js} = \sum_{a=1}^{5} p_{as} G_{jas} \tag{24}$$

$$\text{Var}(H_{js}) = \sum_{a=1}^{5} \left(p_{as}^2 \ \text{Var}(G_{jas}) \right) \tag{25}$$

where p_a is the portion of waste tons in waste sector s associated with region a.

The quantity of RPPCs by type disposed in each waste sector was reported as:

$$\text{Quantity}_{js} = q_s H_{js} \ \pm q_s z \sqrt{\text{Var}(H_{js})} \tag{26}$$

where:

q_s is the estimated statewide disposal tonnage associated with waste sector s

z is the z-statistic, 1.645

Step 5: estimated the average amount of a given RPPC material (not including any contamination) in the waste from all waste sectors combined.

$$K_j = \sum_{s} p_s H_{js} \tag{27}$$

$$\text{Var}(K_j) = \sum_{s} \left(p_s^2 \ \text{Var}(H_{js}) \right) \tag{28}$$

where p_s is the portion of waste tons statewide associated with waste sector s.

The quantity of RPPCs by type disposed statewide (across all waste sectors combined) was reported as:

$$\text{Quantity}_{\text{j}} = qK_j \ \pm qz \sqrt{\text{Var}(K_j)} \tag{29}$$

where:

q is the estimated statewide disposal tonnage for all waste sectors combined

z is the z-statistic, 1.645

For more information on calculating RPPC contamination rates, please see Appendix I of the 1999 Statewide Study.

Disposal Rates Applied to Population Estimates

All population and housing unit data was collected from the California Department of Finance Financial & Economic Data estimates as of January 2004.

Disposal Rate per Capita

Residential disposal was the combined tonnage of both single-family and multifamily waste streams. The residential disposal rate was calculated by dividing the residential waste disposal estimate by the population.

The statewide overall disposal rate estimate was calculated by dividing the total disposed tonnage in the State by the total population.

Disposal Rate per Multifamily Unit

Complexes with five or more units were considered multifamily for the purposes of this study. A percent of vacancies was subtracted from the total number to obtain an occupancy rate. Also included in the number of multifamily units is the number of mobile home units. Disposal rate per multifamily unit was calculated by dividing the statewide disposed tonnage estimate for the multifamily sector by the number of multifamily units.

Appendix B: List and Definitions of Material Types

Introduction

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

The material list used for the 1999 study contained 57 standard types. For this study, new types were added for electronic waste, film plastic, and carpeting, as well as specialized RPPC and CRV types described below. Definitions and descriptions of RPPCs and CRVs are included in this appendix in the section titled "Definitions of RPPCs and CRV Containers." The resulting list includes 98 types as described in the section titled "Expanded List of Material Types." These material types on the expanded list are defined in the section "Definitions of Material Types."

This new list of material types including specialized subdivisions were designed to be "folded up" into a condensed list used for presenting results in this study that includes 67 types. The condensed version is shown below followed by the complete list.

Condensed List of Material Types

The list below was used to track composition data throughout this report. It is a condensed version of the 98 material types (shown in bold type) that were used for sorting.

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

Metal
- Ferrous Metals
  18. **Tin/Steel Cans**
  19. **Major Appliances**
  20. **Used Oil Filters***
  21. **Other Ferrous**

Non-Ferrous Metals

22 **Aluminum Cans**

23 **Other Non-Ferrous**

24 **Remainder/Composite Metal**

*__NOTE__: This type was previously classified under “Other Ferrous.”

Electronics*

25 **Brown Goods**

26 **Computer-related Electronics**

27 **Other Small Consumer Electronics**

28 **Television and Other Items with CRTs**

***NOTE**: These types were previously classified under “Remainder/Composite Metal.”

Plastic

29 **PET Containers**

30 **HDPE Containers**

31 **Miscellaneous Plastic Containers**

Film Plastic*

32 **Trash Bags**

33 **Grocery and Other Merchandise Bags**

34 **Non-Bag Commercial and Industrial Packaging Film**

35 **Film Products**

36 **Other Film**

37 **Durable Plastic Items**

38 **Remainder/Composite Plastic**

***NOTE**: These types were previously classified under the more general type “Film Plastic.”

Other Organic Materials

39 **Food**

Landscape and Agricultural

40 **Leaves and Grass**

41 **Prunings and Trimmings**

42 **Branches and Stumps**

43 **Agricultural Crop Residues**

Miscellaneous Organic

44 **Manures**

45 **Textiles**

46 **Carpet***

47 **Remainder/Composite Organic**

***NOTE**: Previously classified under “Remainder/Composite Organic.”

Construction & Demolition

48 **Concrete**

49 **Asphalt Paving**

50 **Asphalt Roofing**

51 **Lumber**

52 **Gypsum Board**

53 **Rock, Soil and Fines**

54 **Remainder/Composite Construction & Demolition**

Household Hazardous Waste

55 **Paint**
56 **Vehicle and Equipment Fluids**
57 **Used Oil**
58 **Batteries**
59 **Remainder/Composite Household Hazardous**

Special Waste

60 **Ash**
61 **Sewage Solids**
62 **Industrial Sludge**
63 **Treated Medical Waste**
64 **Bulky Items**
65 **Tires**
66 **Remainder/Composite Special Waste**

67 **Mixed Residue**

Expanded List of Material Types

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 98 specific material types shown in bold type, and composition percentages were calculated for those material types.

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

Clear Glass Bottles and Containers

12 **Clear Glass Small CRV**
13 **Clear Glass Large CRV**
14 **Clear Glass Non-CRV**

Green Glass Bottles and Containers

15 **Green Glass Small CRV**
16 **Green Glass Large CRV**
17 **Green Glass Non-CRV**

Brown Glass Bottles and Containers

Brown Glass Small CRV

Brown Glass Large CRV

Brown Glass Non-CRV

Other Colored Glass Bottles and Containers

Other Colored Glass Small CRV

Other Colored Glass Large CRV

Other Colored Glass Non-CRV

Flat Glass

Remainder/Composite Glass

Metal

Ferrous Metals

Tin/Steel Cans

Small CRV Bimetal Cans

Large CRV Bimetal Cans

Major Appliances

Used Oil Filters*

Other Ferrous

Non-Ferrous Metals

Small CRV Aluminum Cans

Large CRV Aluminum Cans

Non-CRV Aluminum Cans

Other Non-Ferrous

Remainder/Composite Metal

***NOTE**: This type was previously classified under "Other Ferrous."

Electronics*

Brown Goods

Computer-Related Electronics

Other Small Consumer Electronics

Television and Other Items with CRTs

***NOTE**: These types were previously classified under "Remainder/Composite Metal."

Plastic

PET Containers

RPPC Small CRV PET Bottles

RPPC Large CRV PET Bottles

RPPC Non-CRV PET Bottles

Other RPPC PET Containers

Non-RPPC Non-CRV PET Containers

HDPE Containers

RPPC CRV Small HDPE Natural Bottles

RPPC CRV Large HDPE Natural Bottles

RPPC Non-CRV HDPE Natural Bottles

RPPC CRV Small HDPE Colored Bottles

RPPC CRV Large HDPE Colored Bottles

RPPC Non-CRV HDPE Colored Bottles

Other RPPC HDPE Containers

Non-RPPC Small CRV HDPE Containers

54 **Non-RPPC Non-CRV HDPE Containers**

Miscellaneous Plastic Containers

55 **RPPC Small CRV Bottles not HDPE or PET**

56 **RPPC Large CRV Bottles not HDPE or PET**

57 **RPPC Non-CRV Bottles not HDPE or PET**

58 **RPPC Clamshells not HDPE or PET**

59 **Other RPPC Containers not HDPE or PET**

60 **Non-RPPC Small CRV Miscellaneous Plastic Containers**

61 **Non-RPPC Non-CRV Miscellaneous Plastic Containers**

Film Plastic*

62 **Trash Bags**

63 **Grocery and Other Merchandise Bags**

64 **Non-Bag Commercial and Industrial Packaging Film**

65 **Film Products**

66 **Other Film**

Durable Plastic Items

67 **RPPC HDPE Buckets**

68 **Other Durable Plastic Items**

69 **Remainder/Composite Plastic**

***NOTE**: These types were previously classified under the more general type "Film Plastic."

Other Organic Materials

70 **Food**

Landscape and Agricultural

71 **Leaves and Grass**

72 **Prunings and Trimmings**

73 **Branches and Stumps**

74 **Agricultural Crop Residues**

Miscellaneous Organic

75 **Manures**

76 **Textiles**

77 **Carpet***

78 **Remainder/Composite Organic**

***NOTE**: Previously classified under "Remainder/Composite Organic."

Construction & Demolition

79 **Concrete**

80 **Asphalt Paving**

81 **Asphalt Roofing**

82 **Lumber**

83 **Gypsum Board**

84 **Rock, Soil and Fines**

85 **Remainder/Composite Construction & Demolition**

Household Hazardous Waste

86 **Paint**

87 **Vehicle and Equipment Fluids**

88 **Used Oil**

89 **Batteries**

90 **Remainder/Composite Household Hazardous**

Special Waste

91 **Ash**

92 **Sewage Solids**

93 **Industrial Sludge**

94 **Treated Medical Waste**

95 **Bulky Items**

96 **Tires**

97 **Remainder/Composite Special Waste**

98 **Mixed Residue**

Definitions of Material Types

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

2. **Paper Bags** means bags and sheets made from Kraft paper. Examples include paper grocery bags, fast food bags, department store bags, and heavyweight sheets of Kraft packing paper.

3. **Newspaper** means paper used in newspapers. Examples include newspaper and glossy inserts, and all items made from newsprint, such as free advertising guides, election guides, plain news packing paper, stapled college schedules of classes, 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 include 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 include 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 form feed holes along two edges. If there are no holes, then the edges show tear marks. This subtype can be white or striped. Examples include 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 include manila folders, manila envelopes, index cards, white envelopes, white window envelopes, white or

colored notebook paper, carbonless forms, and junk mail. 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 include 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 include 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 include cereal and cracker boxes, unused paper plates and cups, goldenrod colored paper, school construction paper/butcher paper, milk cartons, ice cream cartons and other frozen food boxes, unopened junk mail, colored envelopes for greeting cards, pulp paper egg cartons, unused pulp paper plant pots, and hardcover and softcover books.

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 include waxed corrugated cardboard, aseptic packages, waxed paper, tissue, paper towels, blueprints, sepia, onion skin, fast food wrappers, carbon paper, self-adhesive notes, and photographs.

GLASS

"Clear Glass Bottles and Containers" means clear glass beverage and food containers with or without a CRV label.

12. **Clear Glass Small CRV Bottles and Containers** means clear glass containers that meet the criteria for CRV containers designed to contain less than 24 ounces of material. Examples include whole or broken clear soda bottles and fruit juice bottles, and whole or broken clear wine cooler bottles.

13. **Clear Glass Large CRV Bottles and Containers** means clear glass containers that meet the criteria for CRV containers designed to contain 24 ounces or more of material.

14. **Clear Glass Non-CRV Bottles and Containers** means clear glass containers that do not meet the criteria for CRV containers. Examples include clear wine bottles, mayonnaise jars, and jam jars.

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

15. **Green Glass Small CRV Bottles and Containers** means green-colored glass containers that meet the criteria for CRV containers designed to contain less than 24 ounces of material. Examples include whole or broken green soda and beer bottles.

16. **Green Glass Large CRV Bottles and Containers** means green-colored glass containers that meet the criteria for CRV containers designed to contain 24 ounces or more of material.

17. **Green Glass Non-CRV Bottles and Containers** means green-colored glass containers that do not meet the criteria for CRV containers. Examples include green wine bottles.

18. **Brown Glass Small CRV Bottles and Containers** means brown-colored glass containers that meet the criteria for CRV containers designed to contain less than 24 ounces of material. Examples include whole or broken brown soda and beer bottles.

19. **Brown Glass Large CRV Bottles and Containers** means brown-colored glass containers that meet the criteria for CRV containers designed to contain 24 ounces or more of material.

20. **Brown Glass Non-CRV Bottles and Containers** means brown-colored glass containers that do not meet the criteria for CRV containers. Examples include brown wine bottles.

21. **Other Colored Glass Small CRV Bottles and Containers** means colored glass containers bottles and containers other than green or brown that meet the criteria for CRV containers designed to contain less than 24 ounces of material. Examples include whole or broken soda bottles.

22. **Other Colored Glass Large CRV Bottles and Containers** means colored glass bottles and containers other than green or brown that meet the criteria for CRV containers designed to contain 24 ounces or more of material.

23. **Other Colored Glass Non-CRV Bottles and Containers** means colored glass bottles and containers other than green or brown that do not meet the criteria for CRV containers.

24. **Flat Glass** means clear or tinted glass that is flat. Examples include glass windowpanes, doors, and tabletops, flat automotive window glass (side windows), safety glass, and architectural glass. This type does not include windshields, laminated glass, or any curved glass.

25. **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. Examples include Pyrex, Corningware, crystal and other glass tableware, mirrors, non-fluorescent light bulbs, and auto windshields.

METAL

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

26. **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 include canned food and beverage containers, empty metal paint cans, empty spray paint and other aerosol containers, and non-CRV bimetal containers with steel sides and aluminum ends.

27. **Small CRV Bimetal Cans** means rigid container that have steel sides and aluminum ends and that meet the CRV criteria for containers designed to hold less than 24 ounces of material. These cans are often used to store beverages.

28. **Large CRV Bimetal Cans** means rigid containers that have steel sides and aluminum ends and that meet the CRV criteria for containers designed to hold 24 ounces or more of material.

29. **Major Appliances** means discarded major appliances of any color. These items are often enamel-coated. Examples include washing machines, clothes dryers, hot water heaters, stoves, and refrigerators. This subtype does not include electronics, such as televisions and stereos.

30. **Used Oil Filters** means metal oil filters used in motor vehicles and other engines, which contain a residue of used oil. **NOTE**: This type was previously classified under "Other Ferrous."

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

32. **Small CRV Aluminum Cans** means any food or beverage container that is made mainly of aluminum and that meets the CRV criteria for containers designed to hold less than 24 ounces of material. Examples include most aluminum soda or beer cans. This subtype does not include bimetal containers with steel sides and aluminum ends.

33. **Large CRV Aluminum Cans** means any food or beverage container that is made mainly of aluminum and that meets the CRV criteria for containers designed to hold 24 ounces or more of material.

34. **Non-CRV Aluminum Cans** means any food or beverage container that is made mainly of aluminum and that does not meet the CRV criteria. Examples include some cat food and meat cans.

35. **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 include aluminum window frames, aluminum siding, copper wire, shell casings, brass pipe, and aluminum foil.

36. **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. Examples include small non-electronic appliances such as toasters and hair dryers, motors, insulated wire, and finished products that contain a mixture of metals, or metals and other materials, whose weight is derived significantly from the metal portion of its construction.

ELECTRONICS

"Electronics" includes four subtypes described below. The subtypes are "Brown Goods," "Computer-related Electronics," "Other Small Consumer Electronics," and "Televisions and Other Items with CRTs." **NOTE**: These types were previously classified under "Remainder/Composite Metal."

37. **Brown Goods** means generally larger, non-portable electronic goods that have some circuitry. Examples include microwaves, stereos, VCRs, DVD players, radios, audio/visual equipment, and non-CRT televisions (such as LCD televisions).

38. **Computer-related Electronics** means electronics with large circuitry that is computer-related**.** Examples include processors, mice, keyboards, laptops, disk drives, printers, modems, and fax machines.

39. **Other Small Consumer Electronics** means portable non-computer-related electronics with large circuitry. Examples include personal digital assistants (PDAs), cell phones, phone systems, phone answering machines, computer games and other electronic toys, portable CD players, camcorders, and digital cameras.

40. **Televisions and Other Items with CRTs**. Examples include televisions, computer monitors, and other items containing a cathode ray tube (CRT).

PLASTIC

NOTE: Many of the plastic types have been designed to collect information on Rigid Plastic Packaging Containers (RPPCs), a category that is subject to specific regulation. Please see the subsequent section for definitions and examples of RPPCs.

"PET Containers" means clear or colored PET 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 PET container usually has a small dot left from the manufacturing process, not a seam. It does not turn white when bent. This includes subtypes 41–45 below.

41. **RPPC Small CRV PET Bottles** means clear or colored PET bottles designed to contain less than 24 ounces of material and meet the RPPC and CRV criteria.

42. **RPPC Large CRV PET Bottles** means clear or colored PET bottles designed to contain 24 ounces or more of material and meet the RPPC and CRV criteria.

43. **RPPC Non-CRV PET Bottles** means clear or colored PET bottles that meet the RPPC criteria but do not meet the CRV criteria.

44. **Other RPPC PET Containers** means non-bottle PET containers that meet the RPPC criteria. Includes clamshell containers.

45. **Non-RPPC Non-CRV PET Containers** means PET bottles and containers that do not meet the criteria for being either CRVs or RPPCs.

"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 and may also bear the letters "HDPE." This includes types 46–54 below.

46. **RPPC CRV Small HDPE Natural Bottles** means clear/translucent HDPE bottles designed to contain less than 24 ounces of material and meet the RPPC and CRV criteria.

47. **RPPC CRV Large HDPE Natural Bottles** means clear/translucent HDPE bottles designed to contain 24 ounces or more of material and meet the RPPC and CRV criteria.

48. **RPPC Non-CRV HDPE Natural Bottles** means clear/translucent HDPE bottles that meet the RPPC criteria but do not meet the CRV criteria.

49. **RPPC CRV Small HDPE Colored Bottles** means colored, non-translucent HDPE bottles designed to contain less than 24 ounces of material and meet the RPPC and CRV criteria.

50. **RPPC CRV Large HDPE Colored Bottles** means colored, non-translucent HDPE bottles designed to contain 24 ounces or more of material and meet the RPPC and CRV criteria.

51. **RPPC Non-CRV HDPE Colored Bottles** means colored, non-translucent HDPE bottles that meet the RPPC criteria but do not meet the CRV criteria.

52. **Other RPPC HDPE Containers** means non-bottle HDPE containers that meet the RPPC criteria.

53. **Non-RPPC Small CRV HDPE Containers** means HDPE bottles and containers that do not meet the RPPC criteria but that meet the criteria for CRV containers designed to contain less than 24 ounces of material.

54. **Non-RPPC Non-CRV HDPE Containers** means HDPE bottles and containers that do not meet the criteria for being either CRVs or RPPCs.

"Miscellaneous Plastic Containers" means plastic containers made of types of plastic other than HDPE or PET. 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. This subtype also includes unmarked plastic containers. This includes types 55–61 below.

55. **RPPC Small CRV Bottles not HDPE or PET** means bottles made of types of plastic other than HDPE or PET (that is, made of types #3–7, or unmarked) that meet the RPPC criteria and that meet the CRV criteria for plastic items that contain less than 24 ounces of material.

56. **RPPC Large CRV Bottles not HDPE or PET** means bottles made of types of plastic other than HDPE or PET (that is, made of types #3–7, or unmarked) that meet the RPPC criteria and that meet the CRV criteria for plastic items that contain 24 ounces or more of material.

57. **RPPC non-CRV Bottles not HDPE or PET** means bottles made of types of plastic other than HDPE or PET (that is, made of types #3–7, or unmarked) that meet the RPPC criteria but do not meet the CRV criteria.

58. **RPPC Clamshells not HDPE or PET** means clamshell packaging that meets the RPPC criteria, made out of plastic types #3-7 or unmarked. This category includes polystyrene egg cartons.

59. **Other RPPC Containers not HDPE or PET** means other plastic containers of types #3-7, or unmarked, that meet the RPPC criteria.

60. **Non-RPPC Small CRV Miscellaneous Plastic Containers** means other containers made of types #3-7 that do not meet the RPPC criteria but do meet the CRV criteria for plastic items that contain less than 24 ounces of material.

61. **Non-RPPC non-CRV Miscellaneous Plastic Containers** means other containers made of types #3-7 that do not meet the RPPC criteria or the CRV criteria. This includes single-serving drink cups from take-away food stores and restaurants.

"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 includes types 62–66 below. **NOTE**: These types were previously classified under the more general type "Film Plastic."

62. **Trash Bags** means plastic bags sold for use as trash bags, for both residential and commercial use. Does not include other plastic bags like shopping bags that might have been used to contain trash.

63. **Grocery and Other Merchandise Bags** means plastic shopping bags used to contain merchandise to transport from the place of purchase, given out by the store with the purchase. Includes dry-cleaning plastic bags intended for one-time use.

64. **Non-Bag Commercial and Industrial Packaging Film** means film plastic used for large-scale packaging or transport packaging. Examples include shrink-wrap, mattress bags, furniture wrap, and film bubble wrap.

65. **Film Products** means plastic film used for purposes other than packaging. Examples include agricultural film (films used in various farming and growing applications, such as silage greenhouse films, mulch films, and wrap for hay bales), plastic sheeting used as drop cloths, and building wrap.

66. **Other Film** means all other plastic film that does not fit into any other type. Examples include other types of plastic bags (sandwich bags, zipper-recloseable bags, newspaper bags, produce bags, frozen vegetable bags, bread bags), food wrappers such as candy-bar wrappers, mailing pouches, bank bags, X-ray film, metallized film (wine containers and balloons), and plastic food wrap.

"Durable Plastic Items" means plastic objects other than disposable package items. These items are usually made to last for a few months up to many years. These include the plastics used in construction, communication, electrical and electronics, furniture, transportation, and recreation industries. This includes types 67–68 below.

67. **RPPC HDPE Buckets** means colored and natural buckets and pails made of HDPE and designed to hold 5 gallons or less of material. This category includes buckets regardless of whether they are attached to metal handles. Examples include large paint buckets and commercial buckets used to contain food for commercial use (restaurants, etc.). These objects are packages containing material for sale, and are not sold as buckets themselves (such as mop buckets).

68. **Other Durable Plastic Items** means all other plastic objects other than containers, film plastic, or HDPE buckets. Examples include mop buckets, plastic outdoor furniture, plastic toys, CD's, plastic stay straps, and sporting goods, and plastic house wares such as 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), fan blades, impact-resistance cases (for example, tool boxes, first aid boxes, tackle boxes, sewing kits, etc.), and plastic pipes and fittings.

69. **Remainder/Composite Plastic** means plastic that cannot be put in any other type or subtype. They are usually recognized by their optical opacity. This type includes items made mostly of plastic but combined with other materials. Examples include auto parts made of plastic attached to metal, plastic drinking straws, foam drinking cups, produce trays, foam meat and pastry trays, foam packing blocks, packing peanuts, foam plates and bowls, plastic strapping, plastic lids, some kitchen ware, toys, new plastic laminate (for example, Formica), vinyl, linoleum, plastic lumber, insulating foams, imitation ceramics, handles and knobs, plastic string (such as is used for hay bales), and plastic rigid bubble/foil packaging (as for medications).

ORGANIC

70. **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. Examples include 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."

71. **Leaves and Grass** means plant material, except woody material, from any public or private landscapes. Examples include leaves, grass clippings, sea weed, and plants. This subtype does not include woody material or material from agricultural sources.

72. **Prunings and Trimmings** means woody plant material up to 4 inches in diameter from any public or private landscape. Examples include 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.

73. **Branches and Stumps** means woody plant material, branches, and stumps that exceed four inches in diameter from any public or private landscape.

74. **Agricultural Crop Residues** means plant material from agricultural sources. Examples include 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 three subtypes described below. The subtypes are "Manures," "Textiles," and "Carpet."

75. **Manures** means manure and soiled bedding materials from domestic, farm, or ranch animals. Examples include manure and soiled bedding from animal production operations, racetracks, riding stables, animal hospitals, and other sources.

76. **Textiles** means items made of thread, yarn, fabric, or cloth. Examples include 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.

77. **Carpet** means flooring applications consisting of various natural or synthetic fibers bonded to some type of backing material. Does not include carpet padding. *NOTE: Previously classified under "Remainder/Composite Organic."

78. **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. Examples include leather items, cork, hemp rope, garden hoses, rubber items, hair, carpet padding, cigarette butts, diapers, feminine hygiene products, wood products (popsicle sticks and toothpicks), sawdust, and animal feces.

CONSTRUCTION & DEMOLITION

79. **Concrete** means a hard material made from sand, gravel, aggregate, cement mix, and water. Examples include pieces of building foundations, concrete paving, and cinder blocks.

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

81. **Asphalt Roofing** means composite shingles and other roofing material made with asphalt. Examples include asphalt shingles and attached roofing tar and tar paper.

82. **Lumber** means processed wood for building, manufacturing, landscaping, packaging, and processed wood from demolition. Examples include dimensional lumber, lumber cutoffs, engineered wood such as plywood and particleboard, wood scraps, pallets, wood fencing, wood shake roofing, and wood siding.

83. **Gypsum Board** means interior wall covering made of a sheet of gypsum sandwiched between paper layers. Examples include used or unused, broken or whole sheets of sheetrock, drywall, gypsum board, plasterboard, gypboard, gyproc, and wallboard.

84. **Rock, Soil and Fines** means rock pieces of any size and soil, dirt, and other matter. Examples include rock, stones, and sand, clay, soil, and other fines. This type also includes non-hazardous contaminated soil.

85. **Remainder/Composite Construction & Demolition** means construction and demolition material that cannot be put in any other type or subtype. This type may include items from different types combined, which would be very hard to separate. Examples include brick, ceramics, tiles, toilets, sinks, dried paint not attached to other materials, 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

86. **Paint** means containers with paint in them. Examples include 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.

87. **Vehicle and Equipment Fluids** means containers with fluids used in vehicles or engines, except used oil. Examples include used antifreeze and brake fluid. This type does not include empty vehicle and equipment fluid containers.

88. **Used Oil** means the same as defined in Health and Safety Code section 25250.1(a). Examples include spent lubricating oil such as crankcase and transmission oil, gear oil, and hydraulic oil.

89. **Batteries** means any type of battery including both dry cell and lead acid. Examples include car, flashlight, small appliance, watch, and hearing aid batteries.

90. **Remainder/Composite Household Hazardous** means household hazardous material that cannot be put in any other type or subtype. This type also includes household hazardous material that is mixed. Examples include household hazardous waste which if improperly put in the solid waste stream may present handling problems or other hazards, such as pesticides, caustic cleaners, and fluorescent light bulbs.

SPECIAL WASTE

91. **Ash** means a residue from the combustion of any solid or liquid material. Examples include ash from structure fires, fireplaces, incinerators, biomass facilities, waste-to-energy facilities, and barbecues.

92. **Sewage Solids** means residual solids and semi-solids from the treatment of domestic waste water or sewage. Examples include biosolids, sludge, grit, screenings, and septage. This

category does not include sewage or waste water discharged from the sewage treatment process.

93. **Industrial Sludge** means sludge from factories, manufacturing facilities, and refineries. Examples include paper pulp sludge, and water treatment filter cake sludge.

94. **Treated Medical Waste** means medical waste that has been processed in order to change its physical, chemical, or biological character or composition, or to remove or reduce its harmful properties or characteristics, as defined in section 25123.5 of the California Health and Safety Code.

95. **Bulky Items** means large hard-to-handle items that are not defined separately, including furniture, mattresses, and other large items. Examples include all sizes and types of furniture, mattresses, box springs, and base components.

96. **Tires** means vehicle tires. Examples include tires from trucks, automobiles, motorcycles, heavy equipment, and bicycles.

97. **Remainder/Composite Special Waste** means special waste that cannot be put in any other type. Examples include asbestos-containing materials, such as certain types of pipe insulation and floor tiles, auto fluff, auto-bodies, trucks, trailers, truck cabs, untreated medical waste/pills/hypodermic needles, and artificial fireplace logs.

MIXED RESIDUE

98. **Mixed Residue** means material that cannot be put in any other type or subtype in the other types. This category includes mixed residue that cannot be further sorted. Examples include clumping kitty litter and residual material from a materials recovery facility or other sorting process that cannot be put in any of the previous remainder/composite types.

Definitions of RPPCs and CRV Containers

In coordination with classifying all materials according to the 98 material types, certain plastic materials were classified as RPPC (Rigid Plastic Packaging Containers) from each sample into the nine types listed below.

Table B-1: Definitions of RPPC and CRV Containers

	RPPC Material	Description and Examples
1	RPPC PET (#1) Bottles	PET bottles containing beverages or other liquids. Examples include bottles for soda pop, some sports drinks, sparkling waters, cooking oil, shampoo, and some liquors.
2	RPPC PET (#1) Other Containers	PET containers and packages, other than bottles, that are recloseable. Examples include packages containing small toys or hardware items.
3	RPPC HDPE (#2) Natural Bottles	Primarily milk jugs and some juice bottles.
4	RPPC HDPE (#2) Colored Bottles	Any HDPE bottle that is not clear/translucent. Examples include some orange juice bottles, many laundry detergent bottles, and some shampoo bottles.
5	RPPC HDPE (#2) Other Containers	Examples include some margarine containers, some food jars, and some yogurt containers.
6	RPPC #3–#7 Bottles	All plastic bottles that are not PET or HDPE. Examples include some sports drink bottles, many shampoo bottles, and some detergent bottles.
7	RPPC #3–#7 Clamshells	Food clamshell containers such as those often used by restaurants, delicatessens and fast food restaurants; and non-food clamshells used for packaging such as for hardware, electronics, automotive parts, sports gear, safety equipment, and personal care products.
8	RPPC #3–#7 Other Containers	Includes containers for some prepared foods, such as chip dip. Also includes some yogurt and margarine containers.
9	RPPC HDPE (#2) Buckets	HDPE buckets, often used as containers for paint and other household chemicals and building materials. These buckets are sometimes used for shipment of bulk foods.

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 has an attached or unattached lid or cap.
- Contains at least 8 fluid ounces but no more than 5 gallons, or the equivalent volumes.

Also, certain glass, plastic, and metal containers were classified as CRV (California Redemption Value) containers. CRV containers were defined for sorting as beverage containers that display the CRV notification. Generally, CRV containers include carbonated soft drinks, beer, bottled water, and juice and sports drinks. For more details, see the Department of Conservation, Division of Recycling websites at www.bottlesandcans.com/what_main.html and www.consrv.ca.gov/dor/crcp/recyclers/Images/Act-2004.pdf.

A list of CRV material types and their intersection with the list of material types that were sorted for the study appears in Figure A-d, in the section titled “Quantifying Disposed Waste” of Appendix A: Detailed Methodology.

Appendix C: Forms Used in the Study

Examples of the field forms used in the study appear in this appendix in the following order:

Vehicle Selection Form

Sample Placard

Sample Sorting & Characterization Form

Vehicle Survey Form

Multifamily Site Recruitment Form

Multifamily Site Visit Form

Disposal Facility Recruitment Form

Snapshot of Waste Composition Data Entry Database

Snapshot of Vehicle Survey Data Entry Database

Vehicle Selection Form (front)

CIWMB Waste Characterization Study
Vehicle Selection Form

Site: Benton Crossing Landfill

Date: Thursday, April 1

Goal: 14 Samples Total

Each number represents an expected vehicle based on the available data.

Cross off one number for each category of vehicle entering the landfill.

When you reach the number circled, ask this vehicle to go to the sorting area.

FRANCHISED RESIDENTIAL: (SF 1-3) NEED 3 TOTAL

**Must be at least 80% single-family residential waste.*

(1) (2) (3) **This load should be on the ground when you arrive in the morning.

(expect 0)

FRANCHISED COMMERCIAL PACKER: (Com 1-5) NEED 5 TOTAL

**Must be at least 80% commercial waste.*

(1) (2) (3) (4) (5) 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

(expect 7)

SELF HAULED RESIDENTIAL: (SHR 1-2) NEED 2 TOTAL

1 (2) 3 (4) 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

(expect 4)

SELF HAULED COMMERCIAL: (SHC 1-3) NEED 3 TOTAL

(1) 2 3 (4) 5 6 (7) 8 9 10 11 12 13 14 15 16 17 18 19 20

(expect 8)

Multi-family Generator Sample (MF-1) NEED 1 TOTAL

(1)

Vehicle Selection Form (back)

Record information for selected samples here as well as on sampling placards. Cross out sample id's not used.

Sample ID	*Hauler*	*Route #*	*Jurisdiction*	*Time of arrival*
SF 1				
SF 2				
SF 3				
COM 1				
COM 2				
COM 3				
COM 4				
COM 5				
COM 6				
COM 7				

SHR 1	CONSTRUCTION	LANDSCAPING	ROOFING	OTHER
SHR 2	CONSTRUCTION	LANDSCAPING	ROOFING	OTHER
SHR 3	CONSTRUCTION	LANDSCAPING	ROOFING	OTHER

SHC 1	CONSTRUCTION	LANDSCAPING	ROOFING	OTHER
SHC 2	CONSTRUCTION	LANDSCAPING	ROOFING	OTHER
SHC 3	CONSTRUCTION	LANDSCAPING	ROOFING	OTHER
SHC 4	CONSTRUCTION	LANDSCAPING	ROOFING	OTHER
SHC 5	CONSTRUCTION	LANDSCAPING	ROOFING	OTHER

Sample Placard

Cell Number 13

BENTON X-ING

COM1

1-Apr

RES and COM LOADS ONLY

Hauler _____

Route # _____

Jurisdiction _____

Time of arrival

□ RPPC

□ Photo

Sample Sorting & Characterization Form (front)

METALS

Small CRV Aluminum			
Large CRV Aluminum			
Non-CRV Aluminum			
Other Non-Ferrous			
Tin/Steel Cans			
Small CRV Bimetal			
Large CRV Bimetal			
Major Appliances			
Used Oil Filters			
Other Ferrous			
R/C Metal			

GLASS

CLEAR - Small CRV			
CLEAR - Large CRV			
CLEAR - Non-CRV			
GREEN - Small CRV			
GREEN - Large CRV			
GREEN - Non-CRV			
BROWN - Small CRV			
BROWN - Large CRV			
BROWN - Non-CRV			
OTHER - Small CRV			
OTHER - Large CRV			
OTHER - Non-CRV			
Flat Glass			
R/C Glass			

PAPER

Cardboard			
Paper Bags			
Newspaper			
White Ledger			
Colored Ledger			
Computer Paper			
Other Office Paper			
Magazine/Catalog			
Phone Book/Directory			
Other Misc. Paper			
R/C Paper			

ELECTRONICS

Brown Goods			
Computer-related			
Other Small Consumer			
TV & Other CRTs			

SPECIAL WASTE

Ash			
Sewage Solids			
Industrial Sludge			
Treated Medical Waste			
Bulky Items			
Tires			
R/C Special Waste			
Mixed Residue			

RPPC

HOUSEHOLD HAZARDOUS WASTE

Paint		
Vehicle & Equip. Fluids		
Used Oil		
Batteries		
R/C Household Hazardous		

USED OIL

Sample Contained Oil? YES NO

Level of Contamination: HIGH MEDIUM LOW

Estimated Volume Spilled:

SECTOR: (circle)	**SH ACTIVITY: (circle)**
SF - Single Family	CD - Const/Demo
MF - Multi-Family	LS - Landscaping
COM - Commercial	RF - Roofing
SHR - Self-Haul Residential	O - Other
SHC - Self-Haul Commerical	

Hauling Company

Route #

Jurisdiction

Approx. time of arrival

Sample ID	**Date**

Sample Sorting & Characterization Form (back)

PLASTICS

#1 RPPC Bottles - Small CRV			
#1 RPPC Bottles - Large CRV			
#1 RPPC Bottles - Non-CRV			
#1 RPPC - Other			
#1 Non RPPC - Non-CRV			
#2 Nat RPPC Bottles - Small CRV			
#2 Nat RPPC Bottles - Large CRV			
#2 Nat RPPC Bottles - Non-CRV			
#2 Col RPPC Bottles - Small CRV			
#2 Col RPPC Bottles - Large CRV			
#2 Col RPPC Bottles - Non-CRV			
#2 Bucket RPPC			
#2 - Other RPPC			
#2 Non-RPPC - Small CRV			
#2 Non-RPPC - Non-CRV			

#3-7 RPPC Bottles - Small CRV			
#3-7 RPPC Bottles - Large CRV			
#3-7 RPPC Bottles - Non-CRV			
#3-7 RPPC Clamshell			
#3-7 RRPC Other			
#3-7 Non-RPPC - Small CRV			
#3-7 Non RPPC - Non-CRV			
Trash Bags			
Grocery Bags			
Non-bag Com/Ind Film			Is the film product mostly agricultural film? **Yes** **No**
Film Products			
Other Film			
Durable Plastic Products			
R/C Plastic			

RPPC

NOTES:

ORGANICS

Food			
(%) Leaves & Grass			
Prunings/Trimmings			
Branches/Stumps			
Agricultural Crop Residues			
Manures			
Textiles			
Carpet			
R/C Organics			

CONSTRUCTION & DEMOLITION

Concrete			
Asphalt Paving			
Asphalt Roofing			
Lumber			
Gypsum Board			
Rock/Soil/Fines			
R/C Demo			

Vehicle Survey Form (front)

Date ____/____/____ **Page** _____ **of** _____
Survey Site _____ **Surveyor** _____ **This sheet started at** _____**am pm**
Minimum weight at this site _____ **Checked by** _____

	All Vehicles Sector					***For Self-Haul Only*** Activity that Generated Self-Haul Waste	***All Vehicles*** Net Weight of Load	***Surveyor's NOTES*** If needed for net weights, record license/ticket #s here.
	SF single-family residential MF multifamily residential COM commercial CSH commercial self-haul RSH residential self-haul *If 100%, just check box. If "mixed", then fill out percentages (must total 100%).*					CD Construction & Demolition L Landscaping RF Roofing O Other self-haul	Circle units if they aren't all the same. Default units *(circle one)* **tons lbs yds**	
	% SF	%MF	%COM	%CSH	%RSH			
1						CD L RF O	tons lbs yds	
2						CD L RF O	tons lbs yds	
3						CD L RF O	tons lbs yds	
4						CD L RF O	tons lbs yds	
5						CD L RF O	tons lbs yds	
6						CD L RF O	tons lbs yds	
7						CD L RF O	tons lbs yds	
8						CD L RF O	tons lbs yds	
9						CD L RF O	tons lbs yds	
10						CD L RF O	tons lbs yds	
11						CD L RF O	tons lbs yds	
12						CD L RF O	tons lbs yds	
13						CD L RF O	tons lbs yds	
14						CD L RF O	tons lbs yds	
15						CD L RF O	tons lbs yds	
16						CD L RF O	tons lbs yds	
17						CD L RF O	tons lbs yds	
18						CD L RF O	tons lbs yds	
19						CD L RF O	tons lbs yds	
20						CD L RF O	tons lbs yds	

Vehicle Survey Form (back)

GENERAL INSTRUCTIONS

Make entries neatly in pen.
Enter the information at the top of each page. Enter total # of pages on each page at the end of the day.
Enter the net weight of the load. If the operator measures self-haul loads by volume, record the volume and indicate that the unit is "yds".
If the load is self-haul, circle only one of the activities in the For Self-Haul Only column.
If you make an error on an entry, draw a line through the entire entry and start over on a new line.

STEP-BY-STEP INSTRUCTIONS

CHECK IN WITH GATEHOUSE STAFF

Confirm the method for getting net weights.

WHEN A VEHICLE ARRIVES, STOP THE VEHICLE, THEN BEGIN QUESTIONS:

ALL DRIVERS:

Introduction: "Hello, the California Integrated Waste Management Board is conducting a survey today."
Ask the driver what **sector** generated the load

If you circle more than one sector, be sure to ask the driver for the estimated % of each.

Commercially collected residential: Single-family (SF)	Waste that is collected by a commercial hauler from single-family residences
Commercially collected residential: Multifamily (MF)	Waste that is collected by a commercial hauler from multi-unit structures with greater than 4 units
Commercially collected commercial (COM)	Waste disposed by businesses, industries (factories, farms, etc.), and governments (schools, highways, parks, etc.) that is collected and transported by professional waste haulers
Self-hauled residential (RSH)	Waste hauled to a disposal site by a resident from their home
Self-hauled commercial (CSH)	Waste hauled to a disposal site by commercial enterprise (e.g. landscaper, contractor, etc.), even if source of waste was from residential

SELF-HAUL DRIVERS ONLY:

If it is a self-haul load, ask the driver what **activity** generated the waste.

ROOFING (RF)	Waste generated by professionals who install or replace roofs
LANDSCAPING (L)	Waste generated by professionals who landscape or do other yard care activities
CONSTRUCTION & DEMOLITION (C&D)	Waste generated by professionals who construct or demolish buildings
Other (O)	Waste not included in above categories.

RECORD NET WEIGHTS

Multifamily Site Recruitment Form (front)

Multifamily Recruitment Info Sheet

Use as Primary ☐ **Use as B/U** ☐

Complex Name:	
Complex Address:	
Complex City:	
Complex Phone:	

Sort Site ☐ **Sort Date** ☐

Season ☐ **Sort Day of Wk** ☐

1. Willing to participate?

☐ **YES** – go to Step 2. ☐ **NO** – go to next site

2. Non-resident use of dumpsters?

☐ **YES** – go to next site ☐ **NO** – go to Step 3.

3. Do P/U days and times fit schedule?

☐ **YES** – fill in below ☐ **NO** – go to next site

P/U Day ☐ **P/U Time** ☐

4. Contact Information

Name of Contact	
Title	
Phone	
After-hours phone	
Email	
Fax	

Multifamily Site Recruitment Form (back)

5. Are dumpsters accessible during non-business hours?

☐ **YES** – go to Step 7. ☐ **NO** – go to Step 6

6. How can collection crew gain access?

7. Hauler information.

Name: **Phone:** (

8. Do you have recycling services for residents?

☐ **YES** – go to Step 9. ☐ **NO** – go to Step 10.

9. What items recycled?

Paper		
Plastic		
Glass		
Cans		

10. Advised of Contractor followup?

☐ **YES** ☐ **NO**

11. Hauler confirms P/U days and times?

☐ **YES** – go to Step 13 ☐ **NO** – go to Step 12

12. Do actual P/U days /times fit schedule?

☐ **YES** – fill in below ☐ **NO** – go to next site

P/U Day **P/U Time**

13. Complete top of form.

NOTE:

Multifamily Site Visit Form (front)

Site Name:

☒Use as PRIMARY ☐Use as BACKUP

Sort Site
Sort day

Address of complex

Best time to sample

Contact person
Title
Phone
Office Hours
After-hours phone
Fax

Normal Pick-up Day & Time

General description of waste containers

Detailed Instructions

Multifamily Site Visit Form (back)

Sampling Toter Data	First Toter	Second Toter	Third Toter	Fourth Toter
	_____ in. Ht. of Trash ☐ Full	_____ in. Ht. of Trash ☐ Full	_____ in. Ht. of Trash ☐ Full	_____ in. Ht. of Trash ☐ Full

Refuse Bin Data

CONTAINER #1

Depth	Width	Ht. Of Trash
_____ in.	_____ in.	_____ in.

CONTAINER #2

Depth	Width	Ht. Of Trash
_____ in.	_____ in.	_____ in.

CONTAINER #3

Depth	Width	Ht. Of Trash
_____ in.	_____ in.	_____ in.

CONTAINER #4

Depth	Width	Ht. Of Trash
_____ in.	_____ in.	_____ in.

CONTAINER #5

Depth	Width	Ht. Of Trash
_____ in.	_____ in.	_____ in.

Disposal Facility Recruitment Form (Page 1)

1. SCHEDULE

Range of dates for sampling and surveying: ☐ July 9-20, 2003 and January 12-23, 2004
☐ October 6-17, 2003 and April 5-17, 2004

Dates that definitely will not work:

Can we have access to a loader? Would it be available throughout the day?

2. TONNAGE & VEHICLE QUANTITIES

Does the facility have a MRF? What % of loads are MRF'ed?

How many total tons does the facility receive daily? _____

How many tons from transfer vehicles? _____ biosolids? _____

How many vehicles enter on a weekday, on average?

	Weekday	Saturday	Sunday
Transfer trucks			
Res-packers			
Haulers with business waste (packers, roll-offs, or compactors carrying commercial, industrial, government, military, or multifamily waste)			
Self-haul vehicles			
Total Vehicle Count			

Peak times of day on a weekday?
For transfer trucks:
For haulers with residential waste:
For haulers with business/c&d waste:
For self-haul vehicles, including contractors and landscapers:

**Can we have one weekday's transaction records?

3. CONTACT INFORMATION

Physical address:
City, Zip:

Site owner/operator:

Person approving use of the site:
Mailing address:

City, Zip:
Phone:

Person with data about the site:
Phone:
Email:
Fax:

On-site manager or supervisor (primary contact for logistics):
Phone:
Email:
Will this person be available on the indicated dates?

Contact person for crew when they arrive the morning of sampling:
Phone:

Backup contact:
Phone:

Scalehouse contact:
Phone:

Correspondence should be sent to:

4. SITE TRAFFIC INFORMATION

Facility's hours of operation:

M _____
T _____
W _____
Th _____
F _____
Sat _____
Sun_____

Do you accept vehicles before opening the gate to the public?
If so, what hours do vehicles start arriving?

(Fax or e-mail the definitions of waste sectors to the data contact person at the facility.)

5. Site Information

Do you close early if you have reached your allowed daily tonnage amount? Yes

Estimate how many times per month this happens. _____/month

Are there site conditions we need to be aware of such as high winds, snakes or other animals, other special circumstances?

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?

How many gatehouses does your facility have? _____
How many scales? _____

Do different types of vehicles go to different gatehouses – i.e., all self-haul going to one scale? If yes, please explain.

6. Net Weight Procedures

Do all vehicles get weighed? If not, which vehicles don't get weighed?

Drivers of loads will be surveyed at the entrance throughout the day. The survey is very brief, involving just a few questions. We also will need to learn the net weight of each vehicle that we survey. We may give the driver of each vehicle a numbered card to hand to your gatehouse staff when the driver leaves the facility. Can your gatehouse staff write the net weight of each vehicle on each card?

7. MATERIAL HANDLING

Other than MRFing, what materials are recovered at this site? How and when are vehicles diverted so that recovered materials can be separated from disposed waste?

Material	How and when diverted

The purpose of the study is to take samples of disposed wastes only. How can we sample from vehicles after they have had materials recovered?

8. SAMPLING AND SORTING PROCEDURES

We need an area for the sorting crew to work, for the entire time we will be at the site. It should be about the size of two truck bays. Can the site accommodate this? Where do you think that will be?

Crews have hardhats, orange vests, coveralls, boots, and gloves. Are there any other safety equipment or special procedures you want them to use?

We need access to the load for enough time to collect the sample. After a load is tipped on the ground, the sorting crew will designate which part of the load should be picked up by the loader and moved to the sorting area. We expect that it will take from two to five minutes to obtain a sample. Is this okay?

9. ADDITIONAL INFORMATION

What hauling companies do you work with primarily? Who should we contact to notify them about the study that will take place on the two days at your facility?

Company:
Contact person:
Phone:
Mailing address:

In order to communicate with all drivers, we will develop translation cards that show the survey questions in several languages. What are the most common languages used by the drivers of vehicles that arrive at your facility?

___ English ___Spanish

10. FINAL LOGISTICS

Can you please send me a plan or map of area where we could sample (taken from permit)

Please remember to notify gate personnel.

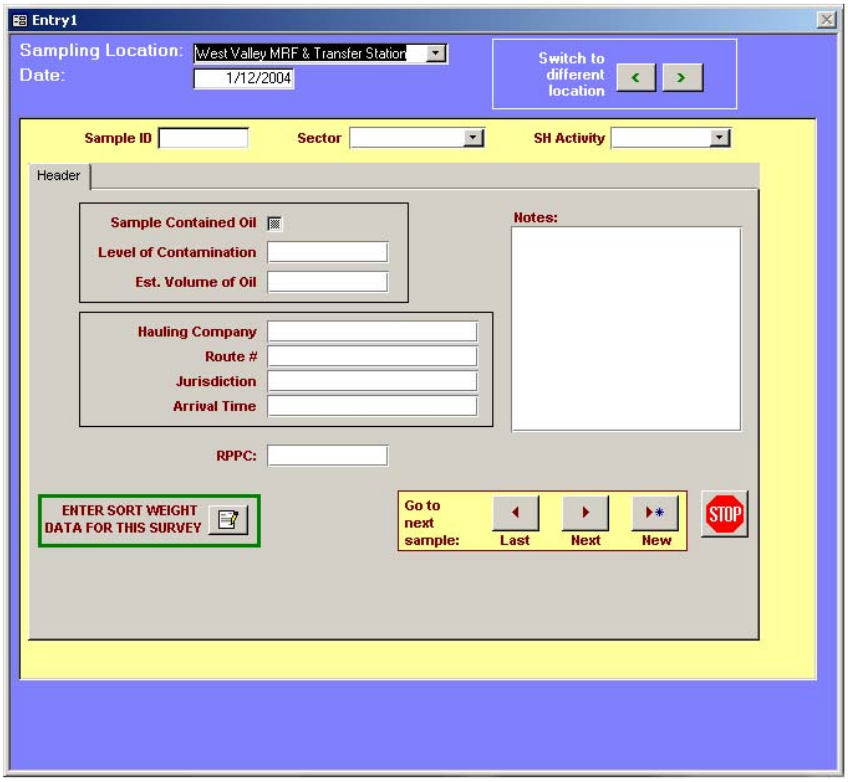
Any other special circumstances we need to be aware of?

The CIWMB may wish to set up site visits during sorting for Board staff to observe fieldwork for the project. Is this okay?

We are interested in whether much used oil is still being disposed in landfills. Do you find many loads contaminated with used oil? What percent of loads?

We will send you a copy of our insurance policy. Is there anything else you need from us?

Snapshot of Waste Composition Data Entry Database



Snapshot of Vehicle Survey Data Entry Database