

# ***Contractor's Report to the Board***

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## ***Executive Summary***

# ***Statewide Waste Characterization Study***

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***Produced under contract by:***

***Cascadia Consulting Group, Inc.***



*The complete study can be found on the Board's website at  
<http://www.ciwmb.ca.gov/Publications/default.asp?pubid=1097>*

# Executive Summary

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## ***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<sup>1</sup>.

## ***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.

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<sup>1</sup> The 1999 study is available at <http://www.ciwmb.ca.gov/Publications/default.asp?pubid=824>.

## 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.

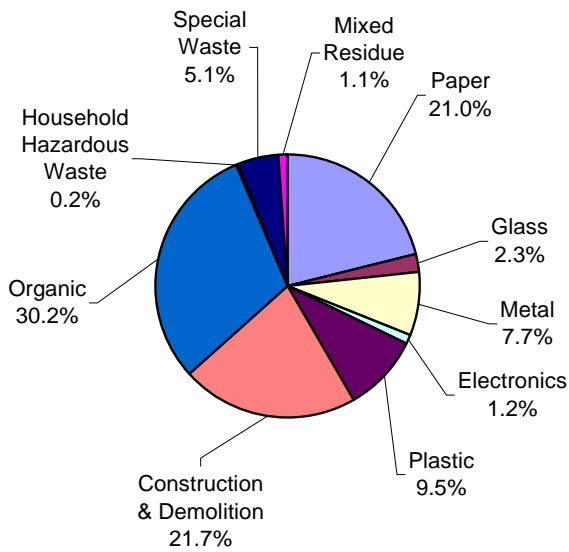
Also, construction and demolition activities generate other materials in addition to the ones listed under the *construction & demolition* material class, such as *cardboard*, *ferrous metal*, and *plastic film*. These materials were counted under the *paper*, *metal*, and *plastic* material classes,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

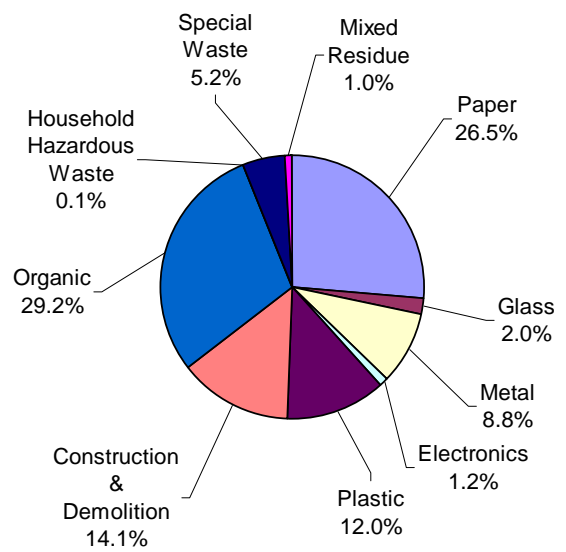
	<b>Est. Percentage of Disposed Waste Stream</b>	<b>Est. Tons Disposed Statewide</b>
Commercial	47.0%	18,924,058
Residential	31.6%	12,721,055
<i>Single-family residential</i>	23.4%	9,403,504
<i>Multifamily residential</i>	8.2%	3,317,551
Self-hauled	21.3%	8,590,215
<i>Commercial self-hauled</i>	17.3%	6,963,322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

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.

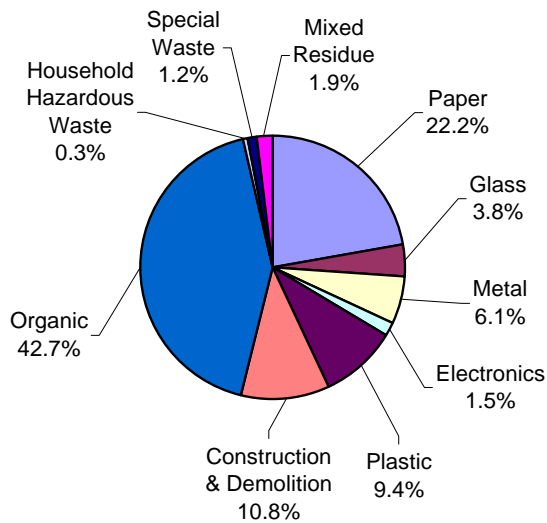
**Figure ES-A: Material Classes in California's Overall Disposed Waste Stream, 2003**



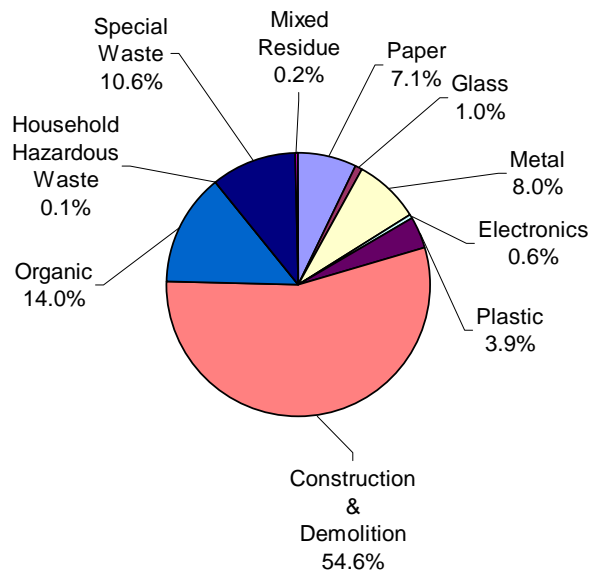
**Figure ES-B: Material Classes in the Commercial Disposed Waste Stream, 2003**



**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**

<b>Material Type</b>	<b>Est. Pct.</b>	<b>Est. Tons</b>	<b>Cumulative Pct.</b>
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		Est. Pct.	+ / -	Est. Tons
<b>Paper</b>	<b>21.0%</b>		<b>8,445,989</b>	<b>Organic</b>	<b>30.2%</b>		<b>12,166,452</b>
Uncoated Corrugated Cardboard	5.7%	1.2%	2,312,147	Food	14.6%	2.6%	5,854,352
Paper Bags	1.0%	0.5%	386,097	Leaves and Grass	4.2%	1.0%	1,696,022
Newspaper	2.2%	0.4%	887,091	Prunings and Trimmings	2.3%	0.6%	920,356
White Ledger	1.1%	0.3%	447,516	Branches and Stumps	0.3%	0.2%	119,754
Colored Ledger	0.1%	0.0%	20,583	Agricultural Crop Residues	0.0%	0.0%	0
Computer Paper	0.1%	0.0%	20,845	Manures	0.1%	0.0%	36,506
Other Office Paper	0.7%	0.2%	296,203	Textiles	2.4%	1.3%	947,789
Magazines and Catalogs	0.8%	0.2%	311,143	Carpet	2.1%	0.7%	838,869
Phone Books and Directories	0.2%	0.1%	89,403	Remainder/Composite Organics	4.4%	0.8%	1,752,803
Other Miscellaneous Paper	3.5%	0.6%	1,400,526				
Remainder/Composite Paper	5.7%	0.7%	2,274,433	<b>Construction &amp; Demolition</b>	<b>21.7%</b>		<b>8,732,074</b>
<b>Glass</b>	<b>2.3%</b>		<b>934,926</b>	Concrete	2.4%	0.9%	966,607
Clear Glass Bottles and Containers	0.9%	0.1%	356,467	Asphalt Paving	0.0%	0.0%	10,414
Green Glass Bottles and Containers	0.4%	0.1%	180,570	Asphalt Roofing	1.9%	1.0%	767,981
Brown Glass Bottles and Containers	0.3%	0.0%	104,568	Lumber	9.6%	1.4%	3,881,214
Other Colored Glass Bottles and Containers	0.0%	0.0%	3,106	Gypsum Board	1.7%	0.8%	676,430
Flat Glass	0.4%	0.4%	151,344	Rock, Soil, and Fines	2.4%	1.0%	977,419
Remainder/Composite Glass	0.3%	0.1%	138,870	Remainder/Composite Construction and Demolition	3.6%	0.8%	1,452,009
<b>Metal</b>	<b>7.7%</b>		<b>3,115,357</b>	<b>Household Hazardous Waste</b>	<b>0.2%</b>		<b>73,599</b>
Tin/Steel Cans	0.8%	0.2%	323,540	Paint	0.0%	0.0%	19,203
Major Appliances	1.5%	2.1%	616,663	Vehicle and Equipment Fluids	0.0%	0.0%	1,000
Used Oil Filters	0.0%	0.0%	1,376	Used Oil	0.0%	0.0%	548
Other Ferrous	2.4%	0.5%	969,676	Batteries	0.1%	0.0%	34,021
Aluminum Cans	0.2%	0.0%	74,851	Remainder/Composite Household Hazardous	0.0%	0.0%	18,827
Other Non-Ferrous	0.3%	0.1%	111,008				
Remainder/Composite Metal	2.5%	0.6%	1,018,242	<b>Special Waste</b>	<b>5.1%</b>		<b>2,038,431</b>
<b>Electronics</b>	<b>1.2%</b>		<b>481,353</b>	Ash	0.1%	0.1%	60,160
Brown Goods	0.1%	0.0%	41,394	Sewage Solids	0.0%	0.0%	0
Computer-related Electronics	0.3%	0.2%	119,917	Industrial Sludge	0.0%	0.0%	0
Other Small Consumer Electronics	0.2%	0.1%	93,273	Treated Medical Waste	0.0%	0.0%	15,367
Television and Other Items with CRTs	0.6%	0.5%	226,769	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
<b>Plastic</b>	<b>9.5%</b>		<b>3,809,699</b>	<b>Mixed Residue</b>	<b>1.1%</b>	0.3%	<b>437,448</b>
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	<b>Totals</b>	<b>100.0%</b>		<b>40,235,328</b>
Remainder/Composite Plastic	2.2%	0.3%	888,343	<b>Sample count:</b>	<b>550</b>		

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