

WASTE CHARACTERIZATION STUDY

Prepared for:
City and County of San Francisco
Department of the Environment

August 2005



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225 Bush Street
Suite 1700
San Francisco, CA 94104
415.896.5900
www.esassoc.com

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PREFACE

This study is one part of a waste characterization project performed for the San Francisco Department of the Environment by the following team of consultants:

- Environmental Science Associates, which provided project management, methodology development, visual waste characterization, and report preparation and production.
- CalRecovery, Inc., which provided methodology development, research, sample analysis, and report preparation for the Toxicity Profile portion of this project.
- Sage Environmental, which provided methodology development.
- Cascadia Consulting Group, which provided methodology and database development, data analysis, and report preparation, as well as hand sorting of waste samples through their subcontractor Sky Valley Associates.
- Matthew J. Southworth, who provided tonnage stream data and sample planning.
- Eagle Eye Editing, which provided data entry, report preparation, and editing services.

The purpose of this project was to identify the major constituents in the San Francisco municipal solid waste stream. The study methods were designed to enable City staff to prioritize future efforts to divert wastes from disposal through the development of new waste reduction and recycling options for San Francisco businesses and residents. Samples from loads of solid waste from refuse collection route trucks, individual businesses, City departments, and private citizens were manually sorted or visually examined to compile profiles of waste stream constituents. This study provides the findings from these waste characterization efforts. A companion study focuses on the toxicity of materials that were found during sampling.

The study effort has been assisted at every step by the management and workers at the local affiliates of Norcal Waste Systems, Inc., and by staff in the Department of the Environment, the Department of Public Works, and the Recreation and Park Department. The management staff at Hillside Landfill in Colma was also very helpful in arranging for visual characterization of waste samples. The assistance of these companies, agencies, and individuals is gratefully acknowledged.

EXECUTIVE SUMMARY

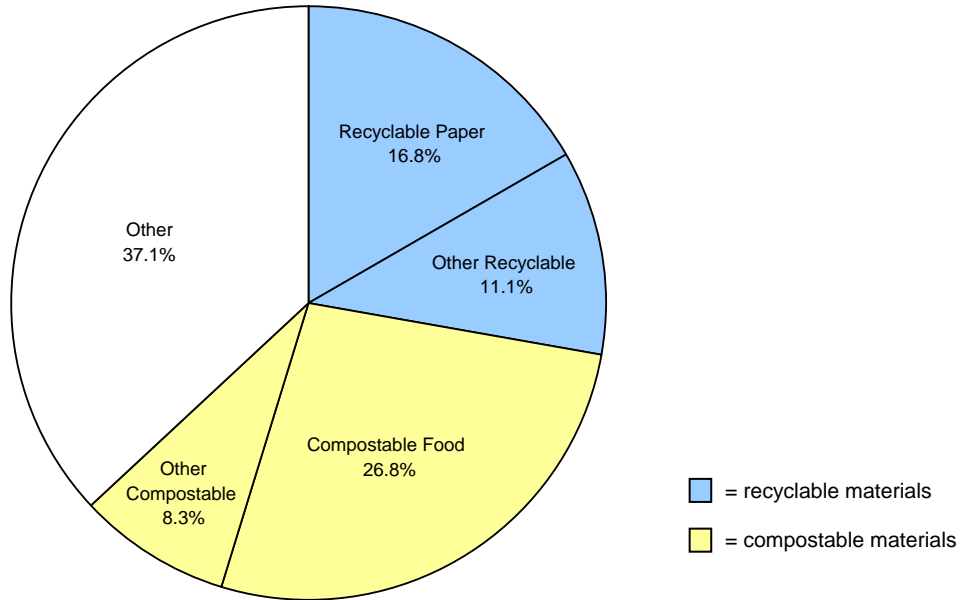
The City and County of San Francisco Department of the Environment (SFE) is responsible for the City's role in recycling and waste reduction programs throughout San Francisco. The SFE is working to meet the City goals of 75 percent landfill diversion by 2010 and zero waste by 2020. To support this work, the SFE commissioned this study to characterize and quantify the municipal solid waste (MSW) sent to landfill from San Francisco. This report presents the results of this study, which was conducted between autumn 2004 and spring 2005.

Norcal Waste Systems, Inc. operates much of the solid waste infrastructure in San Francisco. This includes the San Francisco Recycling and Disposal (SFR&D) Transfer Station, the adjacent Integrated Material Recovery Facility (iMRF), Recycle Central at Pier 96, and the following collection companies: Sunset Scavenger Company and Golden Gate Disposal and Recycling. Disposed wastes from these facilities are landfilled, and most other MSW originating in San Francisco is taken to Hillside Landfill in Colma and Ox Mountain Landfill in Half Moon Bay. MSW delivered to Norcal's facilities from various San Francisco sources was quantified based on records provided by Norcal; this MSW was characterized through hand-sorting and visual analysis of the disposed waste samples. The data from waste samples were subjected to statistical analysis to produce a waste composition profile for each *sector* of the city's disposed waste stream. Individual sectors were then combined in the analysis to produce composition profiles for larger portions of the disposed waste stream.

The finding of substantial quantities of readily recyclable materials, in the range of 30 to 50 percent, was consistent for most of the waste stream sectors and subsectors that were examined in this study. The SFE can promote significant progress toward the 75-percent-reduction and zero-waste goals by working to increase the use of existing options for recycling and waste reduction.

Figure 1 summarizes the composition for the disposed waste stream in its entirety. Table 1 shows the "top 10" most prevalent categories of wastes in the entire system.

Figure 1: Summary of the Composition of Waste Disposed through Norcal



**TABLE 1
TOP 10 MATERIALS IN SAN FRANCISCO WASTE DISPOSED THROUGH NORCAL**

Material	Percent	Cumulative Percent
Food	26.8%	
Mixed Low-Grade Paper	7.2%	34.1%
Compostable/Soiled Paper	5.5%	39.5%
Other Film	4.5%	44.0%
Newspaper	3.7%	47.8%
Asphaltic Roofing	3.6%	51.4%
Textiles	3.4%	54.8%
Plain OCC/Kraft Paper	3.2%	58.1%
Hazardous Waste	2.9%	61.0%
Composite/Other Products	2.8%	63.8%

SECTION I

Introduction and Background

The City and County of San Francisco Department of the Environment (SFE) initiated a study to determine the quantities and composition of municipal solid waste (MSW) sent from within the city to landfills for disposal. The general purpose of the study was to profile the types and amounts of materials in disposed MSW. The findings of the study are expected to provide a basis for measuring the effectiveness of existing diversion programs, determining what materials continue to be landfilled, and developing new programs for waste reduction and material recovery.

To meet the City's objectives, the study team characterized 757 samples of MSW, 197 of which were characterized by hand-sorting and 560 of which were characterized visually. Data collection through the hand-sorting of samples occurred in September 2004 and February 2005, and visual characterization of samples was done at various times between October 2004 and June 2005.

The focus of the study included the majority of MSW generated within city boundaries and disposed through Norcal. This report presents findings for the entire portion of the waste stream disposed through Norcal, as well as for key sectors of that waste stream. Composition findings are organized by waste sector and subsector, as indicated by the bulleted descriptions below.

Citywide Aggregation of Findings at the Highest Level Possible

- **Findings for waste from within the city and disposed through Norcal.** This category includes the following waste sectors, which are described in more detail below: waste from Fantastic 3 sources, residuals from the Pier 96 facility, other waste collected commercially outside the Fantastic 3 program, self-hauled waste, and residuals from the Integrated Material Recovery Facility (iMRF). It also includes items disposed through the Bulky Items Collection program, although the waste from that program was not characterized directly as part of this study. Findings aggregated at this level do not include characterization data from the Hillside Landfill, although composition findings specific to the landfill are reported separately in Appendix A.

Findings Based on Hand-Sorted Samples

- **Combined Fantastic 3 programs (includes rear-loader service)**
 - Single-family residential Fantastic 3
 - Multifamily residential Fantastic 3
 - Commercial, government, and institutional Fantastic 3

- **Residual waste from the Pier 96 facility**
 - Recovery operations addressing Fantastic 3 waste
 - Recovery operations addressing other waste

Findings Based on a Combination of Hand-Sorted and Visually Characterized Samples

- **Waste collected commercially outside the Fantastic 3 program**
 - **Commercially collected multifamily residential waste.** This category includes waste collected from multifamily residences through the use of packer trucks, as well as waste from multifamily residences that is delivered to the transfer station in rolloff containers. The samples of multifamily waste were characterized through hand sorting.
 - **Commercially collected waste from commercial, government, and institutional (CGI) sources.** This category includes waste collected from CGI sources through the use of packer trucks, as well as waste from CGI sources that is delivered to the transfer station in open rolloff containers or compactors. Twenty-four samples from packers and 19 samples from compactors were characterized through hand sorting, while six samples from open rolloff containers were characterized visually.
 - **Waste from home cleanout operations.** This includes waste from home cleanout events that is delivered to the transfer station in open rolloff containers. All six samples of this type of waste were characterized visually.

Findings Based on Visual Characterization of Samples

- **Self-hauled waste.** This category includes waste from Department of Public Works (DPW) sources (described in more detail below), commercial businesses that hold waste disposal accounts with Norcal, packers from the Recreation and Park Department, and other city self-hauled waste. Specific sub-sectors that are examined in detail are described immediately below. This sector does not include wastes brought to the Transfer Station by the general public, because those wastes are sorted in the public disposal area, after which all residues are sorted in the iMRF.
 - **Self-hauled waste from businesses**
 - **Self-hauled waste from the DPW.** This category includes waste from city litter cans, street sweepings, litter patrol and broom support, DPW packer trucks, and other DPW waste not classified elsewhere.
- **Findings for specific industry groups and City operations.** These findings were based on visual characterization of samples (containers or vehicles full of waste) from targeted members of particular industry groups and City operations. These findings are considered to “stand alone” for each group, and the data from these samples were not combined with data from other parts of the study.
- **Residuals from the iMRF.** These residuals were visually characterized, but it was necessary to use a different method from the load-by-load techniques used for other samples. These residues were produced continuously but were not directly accessible; they could only be observed as they traveled to the transfer station pit on the residue discharge conveyor. This

required unique sampling and data recording strategies, which are described in more detail in Appendix C.

- **Findings for Hillside Landfill.** These findings were based on visual characterization of loads arriving at the landfill. These findings are considered to “stand alone,” and the data from these samples were not combined with data from other parts of the study.
- **Findings for Ox Mountain Landfill.** These findings were based on quantity data from the Disposal Reporting System maintained by the California Integrated Waste Management Board, and on descriptions of waste sources and composition provided by management of Ox Mountain Landfill. These findings are also considered to “stand alone.”

The appendices to this report provide additional details about several aspects of the study:

- Detailed data, in a series of tables
- The names and definitions of the material categories used for the study
- The waste sampling methodology: how vehicles were selected, wastes were extracted, and materials were sorted and weighed
- Waste composition calculations, expressed as formulas
- Samples of field forms

A. Summary of Data Collection and Analysis Activities

The composition of disposed MSW can be determined through examination only after resource recovery steps have been taken. Therefore, waste samples were obtained for hand-sorting and visual characterization after the waste had been subjected to recovery processes, including source separation of recyclables, “pick lines,” and processing by the material recovery facility. In this study, the characterization of waste samples occurred at the following locations:

- The Transfer Station operated by San Francisco Recycling and Disposal (SFR&D)
- The iMRF, adjacent to the Transfer Station
- Other receiving areas at the SRF&D site
- The Hillside Landfill, in Colma

B. Developing the Sampling Plan

For the purposes of this study, the entire disposed waste stream was divided into several identified waste sectors, which were further divided into subsectors. For subsectors that were expected to consist of relatively smaller or more diverse pieces of material, a hand-sorting characterization plan was prepared. For subsectors of the waste stream that were expected to consist of relatively larger, less diverse pieces of material (such as waste from construction and demolition projects), a visual characterization plan was developed. Visual characterization was also used to compile data about wastes from certain types of City operations and commercial establishments, as identified by SFE staff.

Table 2 shows the waste sectors that were addressed during the study, as well as the characterization approach and the number of waste samples that were characterized for each

sector. Appendix C provides more detailed information about the approach used for specific subsectors of the waste stream.

**TABLE 2
NUMBER OF SAMPLES CHARACTERIZED FROM EACH WASTE SECTOR**

Waste Sector	Characterization Method	Numbers of Samples
Fantastic 3 Program	Hand-sort	115
Pier 96	Hand-sort	18
Commercially Collected Waste	Hand-sort and visual	76
Self-Hauled Waste	Visual	27
iMRF	Visual	55
Specific Types of Businesses and Institutions	Visual	147
Hillside Landfill	Visual	321

It is important to understand the sizes of the various subsectors and sectors, in addition to their composition, for several reasons:

- When planning new waste diversion programs, their potential benefit can be estimated in terms of the tonnage of waste that they will divert.
- If questions about the marketing of diverted materials arise, such questions need to be addressed using estimates of diverted tonnages.
- Data from subsectors should be aggregated to the sector level using a weighted-average technique, in proportion to the tonnages of each subsector. In the same way, data for the entire waste stream or a group of sectors can be compiled from lower-level data.

For this study, the sizes of waste flows are expressed in tons per year, using local data provided by Norcal and other data from the Disposal Reporting System maintained by the California Integrated Waste Management Board. Table 3 shows those tonnages, applied to the subsectors and sectors defined above.

The annual tonnages provided by Norcal are from the period July 2003–June 2004, the most recent rate year that was completed prior to the start of this study. The annual tonnages from the Disposal Reporting System are from calendar year 2003, the most recent year with data available at the time of report preparation.

The volumes of several of these streams are likely to change substantially in future years. For example, the throughput of the iMRF and Pier 96 operations is increasing, as Norcal works to divert more waste using existing facilities. Also, both the population and the level of business

**TABLE 3
WASTE FLOWS FOR SECTORS AND SUBSECTORS**

Sector or Subsector	Tons/Year	Source of Tonnage Data
<i>Fantastic 3 + Rear-Loader Service</i>		
Single-family	129,630	Norcal; (Fan3 + rear-loader tons) x customer volume fraction
Multifamily	48,082	Norcal; (Fan3 + rear-loader tons) x customer volume fraction
Commercial, governmental, institutional	59,609	Norcal; (Fan3 + rear-loader tons) x customer volume fraction
<i>Pier 96 Residuals</i>		
Residue from Fantastic 3 material processing	15,934	Norcal
Residue from other material processing	3,513	Norcal
<i>Commercially Collected</i>		
Commercially collected multifamily		
Packer trucks	7,599	Norcal; prorated from all commercial packer truck tonnage based on volumes of customer types
Rolloff trucks	6,530	Norcal; prorated from all commercial compactor truck tonnage based on volumes of customer types
Commercially collected CGI		
Packer trucks	69,765	Norcal
Rolloff trucks (compactor)	59,947	Norcal; all compactors – multifamily portion
Rolloff trucks (loose)	14,338	Norcal; open rolloff tonnage x 1/3
Home cleanout	14,338	Norcal; open rolloff tonnage x 1/3
<i>Bulky Item Collection</i>	2,032	Norcal
<i>Self-Hauled</i>		
Large dumping vehicles		
Commercial self-haul with accounts	16,832	Norcal
Packers from Recreation and Park Department	2,000	Estimated from typical daily volume at Transfer Station
Other City self-hauled waste	2,000	Estimated from general observation at Transfer Station
Department of Public Works		
City litter cans	17,500	Norcal; allowance in agreement with City for DPW tonnage
Street sweepings	12,893	Norcal; data on DPW loads
Litter patrol and broom support	5,526	Norcal; data on DPW loads
DPW packer trucks	3,684	Norcal; data on DPW loads
Wastewater treatment plant screenings	921	Norcal; data on DPW loads
Other DPW materials	5,523	Norcal; data on DPW loads
<i>iMRF</i>		
Residue from iMRF operations	17,468	Norcal
Subtotal	515,664	
Waste not handled by Norcal		
Hillside Landfill	32,145	Disposal Reporting System (CIWMB)
Ox Mountain Landfill	75,490	Disposal Reporting System (CIWMB)
Other Landfills (estimated)	41,850	Disposal Reporting System (CIWMB)
Subtotal	149,485	
Total	665,149	
CIWMB = California Integrated Waste Management Board		

activity in San Francisco appear to have grown in 2004 and 2005, so these tonnages are likely to increase, offsetting some of the gains in diversion from iMRF and Pier 96 operations. Those who use the results of this study should take tonnage changes and newer diversion programs into consideration.

For various reasons, several of the smaller subsectors were not characterized. Those streams, their approximate sizes (from Norcal, rate year 2003/2004), and related information are provided in Table 4.

**TABLE 4
SUBSECTORS NOT CHARACTERIZED**

Stream	Tons/Year	Notes
Residue from sorting of public self-haul	35,244	This residue is now processed through the iMRF.
City litter cans	17,500	Surrogate: litter patrol and broom support
Open rolloff loads from C&D sources	14,338	Tonnage for 2003/2004 is estimated as one-third of all open-top rolloffs. This material is now processed through the iMRF.
Bulky item collection	2,032	Surrogate: DPW packer trucks
Other City department self-haul (Port, Housing Authority, School District, etc.)	2,000	Surrogate: Self-hauled waste from businesses

Obtaining and Characterizing Samples

Hand-Sorted Samples

Prior to each sampling date in September 2004 and February 2005, a list was developed of all vehicles of the targeted waste sectors that were expected to arrive at the SFR&D Transfer Station on a given date. As each pre-identified vehicle entered the solid waste facility, the sampling crew supervisor verified information with the driver about the waste collected, and the load was tipped onto the floor of the facility. A staff member at the facility then used a front loader to scoop a sample of the waste, usually weighing between 200 and 300 pounds, and place it on a tarpaulin for sorting.

The sorting work area is shown on the front cover of this report. The data collection crew sorted each sample into 63 material categories. For each sample, the weight of each material was recorded on a form and later transferred to a database. Samples were tracked using a numbering system that indicated the associated waste sectors and collection routes.

Visually Characterized Samples

In order to characterize waste from City operations and institutions, specific loads were intercepted as they arrived at the disposal facility. The waste from specified types of businesses

was characterized not by targeting specific loads, but by examining loads from those sectors as they arrived at the disposal facilities on the days when data collection was occurring.

The visual observations were performed by the same observer, who has extensive experience with the visual characterization of wastes. Each selected load was tipped onto the floor of the facility, and the composition was estimated in terms of the percent of the load’s volume that was perceived to correspond to each of the material categories used in the study. (Volume percentages were converted to weight figures during the later analysis phase of the study.) If the load included opaque trash bags containing waste, a selection of bags from every portion of the load was opened, and the contents examined.

After the initial examination of the load to estimate material volumes as percentages, the observer would sum those percentages. If the result was not 100 percent, the observer would examine the load more closely and use a separate column on the data sheet to enter adjustments. When possible, loads were photographed to provide an objective record of the contents.

Analysis and Reporting

Data from the characterization of samples were entered into a customized database and reviewed for accuracy. At the conclusion of the study, waste composition estimates were calculated for specific subsectors.

Composition estimates for the primary waste sectors addressed in the study were then developed by aggregating the data from subsectors using a weighted average procedure based on the annual tonnage in each subsector. Finally, a composition estimate for waste disposed through Norcal was developed by aggregating data from the relevant waste sectors.

Subclass	Wta	Wtb	Wtc	Wtd
Newspaper	4.00	0.00	0.00	0.00
Plain OCC/Kraft	6.60	0.00	0.00	0.00
Waxed OCC/Kraft	0.00	0.00	0.00	0.00
Mixed Low Grade	20.80	0.00	0.00	0.00
Phone Books	0.00	0.00	0.00	0.00
Office Paper	4.30	0.00	0.00	0.00
Computer Paper	0.00	0.00	0.00	0.00
Milk/Juice/Polycoat	0.00	0.00	0.00	0.00
Frozen Food Polycoats	0.40	0.00	0.00	0.00
Compostable Soiled	16.30	4.20	0.00	0.00
Paper/Other Materials	2.00	0.00	0.00	0.00
Other Paper	0.01	0.00	0.00	0.00

SECTION II

Characterization Findings

This section presents a summary of the composition of each waste sector and subsector considered in this study. When sufficient data are available, findings highlight the amounts of readily recyclable and compostable materials present. Pie charts are used to indicate the portion of waste from each sector or subsector that corresponds to recyclable paper, other recyclable materials, food, and other compostable materials. In addition, a table lists the 10 most prevalent materials in each sector or subsector. In the pie charts and “top 10” tables, recyclable materials are indicated with blue shading, while compostable materials, including food, are indicated with yellow shading.

For the purposes of this report, recyclable and compostable paper, compostable organics, plastic, and glass are defined as materials that are accepted by the Fantastic 3 Program, and recyclable metals and construction and demolition (C&D) wastes are those that are known to be commonly recycled in San Francisco.

Recyclable paper types include:

- Newspaper
- Plain OCC/Kraft paper
- Waxed OCC/Kraft paper
- High-grade paper
- Mixed low-grade paper

Other recyclable materials include:

- PET bottles
- HDPE natural bottles
- HDPE colored bottles
- Other plastic bottles
- No. 2, 4, and 5 tubs, cups, and lids
- Glass beverage bottles
- Container glass
- Aluminum cans
- Aluminum foil/containers
- Other aluminum
- Other nonferrous items
- Tin/steel cans
- Empty paint and aerosol cans
- Other ferrous items
- Clean wood
- Pallets and crates
- Clean gypsum
- Rock/concrete/bricks

Compostable materials include:

- Food
- Polycoated paper
- Compostable/soiled paper
- Grass
- Prunings
- Stumps and logs

Detailed information about the composition of waste from each sector and subsector can be found in Appendix A, including the percentages of each material and the computed margin of error (shown in the “+/-” column) for each percentage. High margins of error occur when the concentration of a material varies greatly from sample to sample, or when the number of samples is relatively small.

Those who use this report should note the following:

- Measurements of hazardous waste include the weights of the containers holding those wastes.
- The “hazardous waste” category includes painted, varnished, or glued wood products.
- Unless otherwise noted, percentages are based on weight rather than volume.

A. San Francisco Waste Disposed through Norcal

As shown the Figure 2, readily recyclable and compostable materials make up nearly 63 percent of San Francisco waste disposed through Norcal. The largest single component of the waste stream is food, accounting for approximately 27 percent of the total by weight.

Figure 2: Recoverability of San Francisco Waste Disposed through Norcal

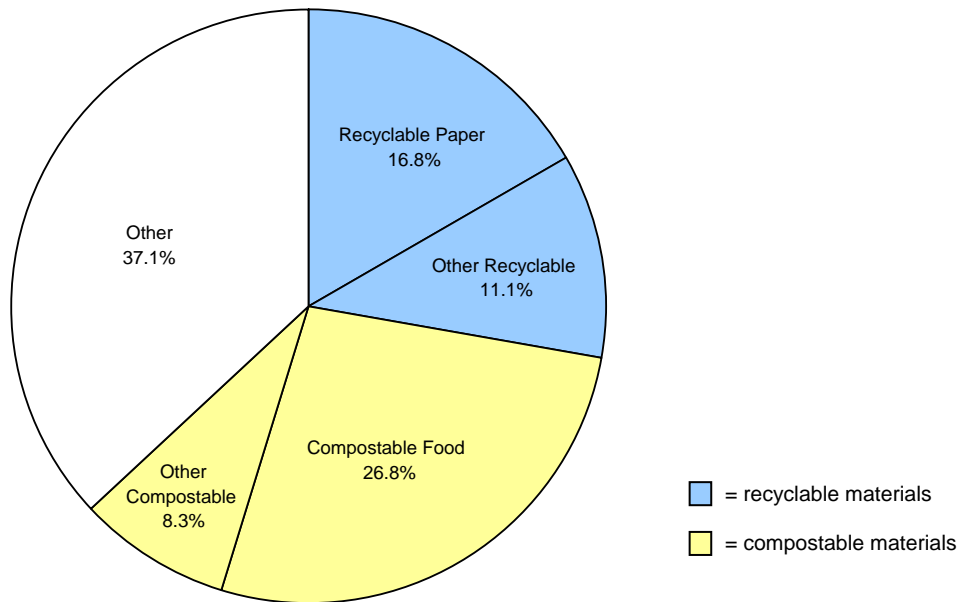


Table 3 shows the 10 most prevalent materials in the overall Norcal waste stream, by weight, along with the cumulative percentages found by adding together the materials in order of prevalence. Notably, food and compostable paper are among the top three materials, and three

types of recyclable paper are among the top eight materials. Papers suitable for recycling or composting constitute more than 23 percent of this waste stream.

Although nonpaper recyclables constitute approximately 11 percent of this waste stream, no single type of recyclable material other than paper is present in sufficient amounts to show up as one of the “top 10” materials.

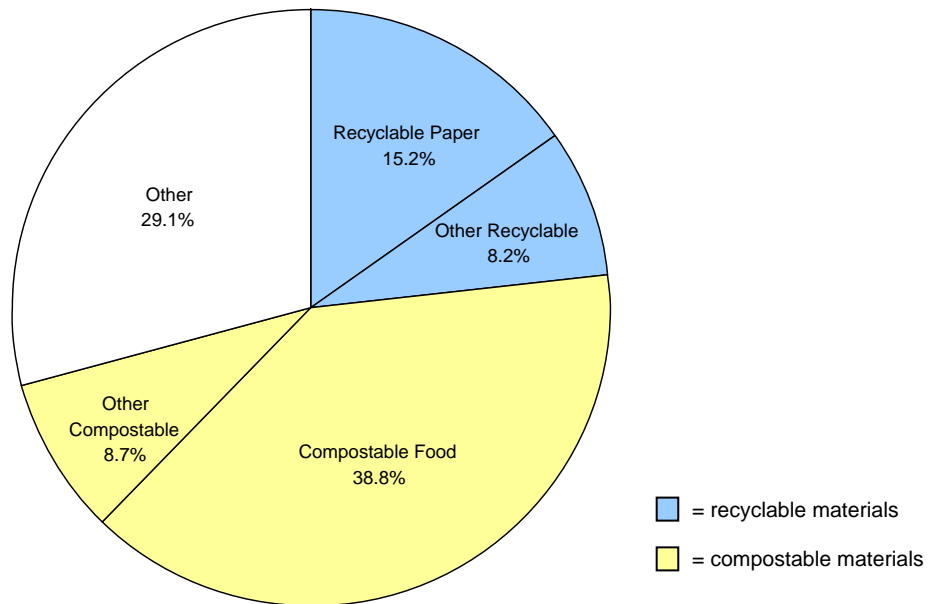
**TABLE 5
TOP 10 MATERIALS IN SAN FRANCISCO WASTE DISPOSED THROUGH NORCAL**

Material	Percent	Cumulative Percent
Food	26.8%	
Mixed Low-Grade Paper	7.2%	34.1%
Compostable/Soiled Paper	5.5%	39.5%
Other Film	4.5%	44.0%
Newspaper	3.7%	47.8%
Asphaltic Roofing	3.6%	51.4%
Textiles	3.4%	54.8%
Plain OCC/Kraft Paper	3.2%	58.1%
Hazardous Waste	2.9%	61.0%
Composite/Other Products	2.8%	63.8%

B. Waste Disposed through the Fantastic 3 Program

Figure 3 and Table 6 present composition findings for the waste sectors corresponding to the combined set of Fantastic 3 programs, including waste from the single-family, multifamily, and commercial subsectors. A clearer understanding of the individual subsectors can be gained by examining the tables on the following pages and comparing composition findings for each Fantastic 3 subsector to the findings for similar waste collected by other means. Some comparisons are noted in the pages that follow.

Figure 3: Recoverability of Waste Disposed through Fantastic 3 Program



**TABLE 6
TOP 10 MATERIALS IN WASTE DISPOSED THROUGH FANTASTIC 3 PROGRAM**

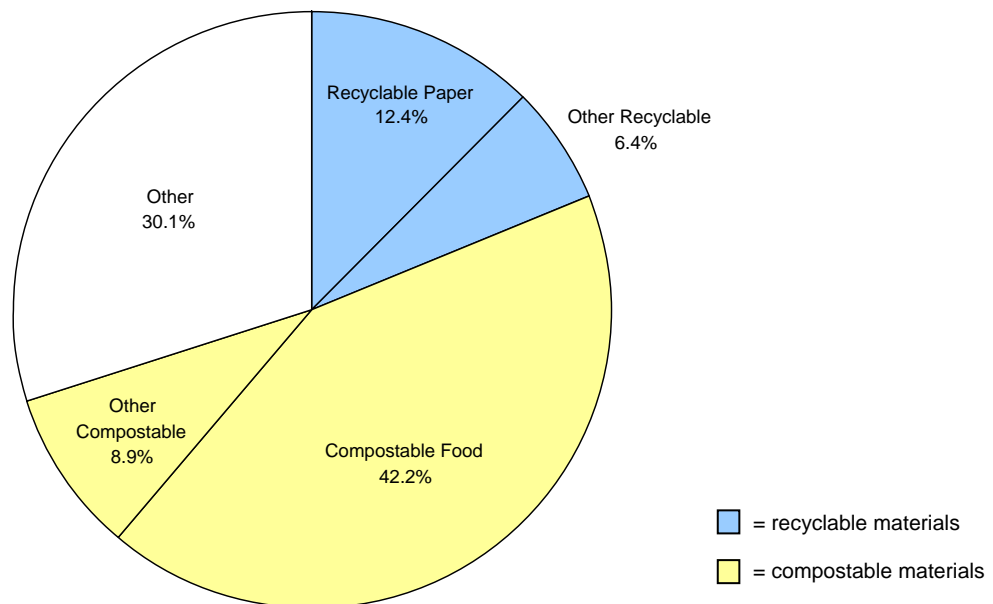
Material	Percent	Cumulative Percent
Food	38.8%	
Mixed Low-Grade Paper	6.7%	45.5%
Compostable/Soiled Paper	6.2%	51.6%
Other Film	5.1%	56.8%
Newspaper	3.8%	60.6%
Disposable Diapers	3.6%	64.1%
Textiles	3.4%	67.6%
Animal By-products	2.7%	70.3%
Plain OCC/Kraft Paper	2.7%	73.0%
Beverage Bottles	2.0%	75.0%

Waste Disposed through Fantastic 3 Single-Family Residential Program

Waste collected through the Fantastic 3 program from single-family residential sources includes a substantially greater amount of food than waste collected through the Fantastic 3 program from multifamily sources. On the other hand, Fantastic 3 single-family waste includes markedly less recyclable paper and other recyclable materials than are collected from multifamily sources.

The total amount of readily recoverable material in the Fantastic 3 single-family waste stream is approximately 70 percent, which is comparable to the percentage for readily recoverable material found in the Fantastic 3 multifamily waste stream.

Figure 4: Recoverability of Waste Disposed through Fantastic 3 Single-Family Residential Program



As shown in Table 7, food and compostable paper are the two most prevalent materials in single-family waste collected through the Fantastic 3 program. Recyclable types of paper together account for three of the top 10 materials in this waste subsector.

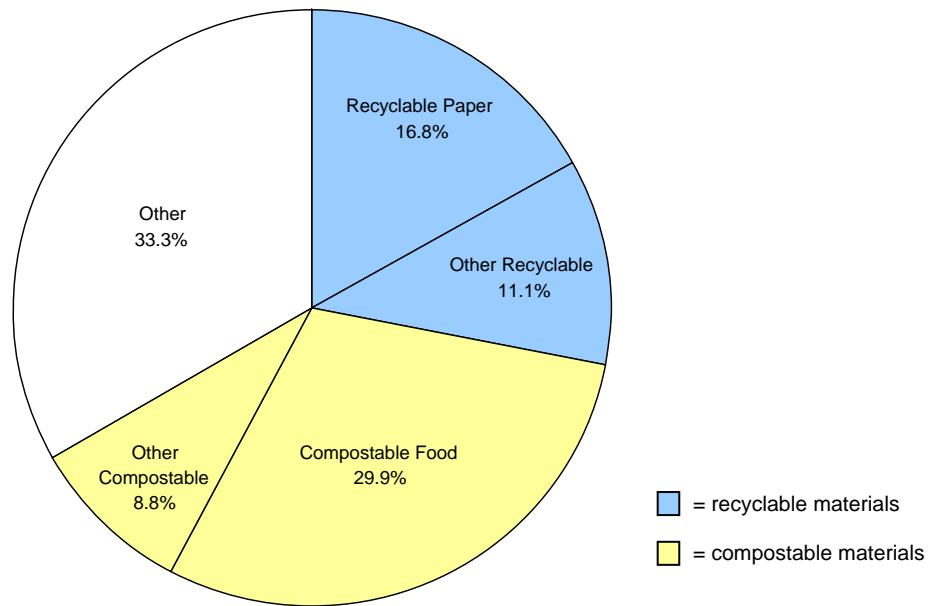
**TABLE 7
TOP 10 MATERIALS IN WASTE DISPOSED THROUGH FANTASTIC 3
SINGLE-FAMILY RESIDENTIAL PROGRAM**

Material	Percent	Cumulative Percent
Food	42.2%	
Compostable/Soiled Paper	6.4%	48.6%
Mixed Low-Grade Paper	6.0%	54.6%
Other Film	5.2%	59.8%
Disposable Diapers	4.6%	64.5%
Animal By-products	3.8%	68.2%
Textiles	3.2%	71.5%
Newspaper	3.0%	74.5%
Plain OCC/Kraft Paper	2.0%	76.5%
Hazardous Waste	1.9%	78.4%

Waste Disposed through Fantastic 3 Multifamily Residential Program

The amounts of recyclable paper and other readily recyclable materials (16.8 percent and 11.1 percent, respectively) found in multifamily waste collected through the Fantastic 3 program are similar to the amounts found in multifamily waste collected by commercial haulers outside the Fantastic 3 program. The amounts of food and other compostable materials are slightly greater in Fantastic 3 multifamily waste than in other multifamily waste.

Figure 5: Recoverability of Waste Disposed through Fantastic 3 Multifamily Residential Program



As indicated in Table 8, recyclable paper types make up three of the top 10 materials in this waste subsector. Glass beverage bottles constitute an unexpectedly large portion of the waste from Fantastic 3 multifamily customers. Food and compostable paper represent two of the top three materials.

**TABLE 8
TOP 10 MATERIALS IN WASTE DISPOSED THROUGH FANTASTIC 3
MULTIFAMILY RESIDENTIAL PROGRAM**

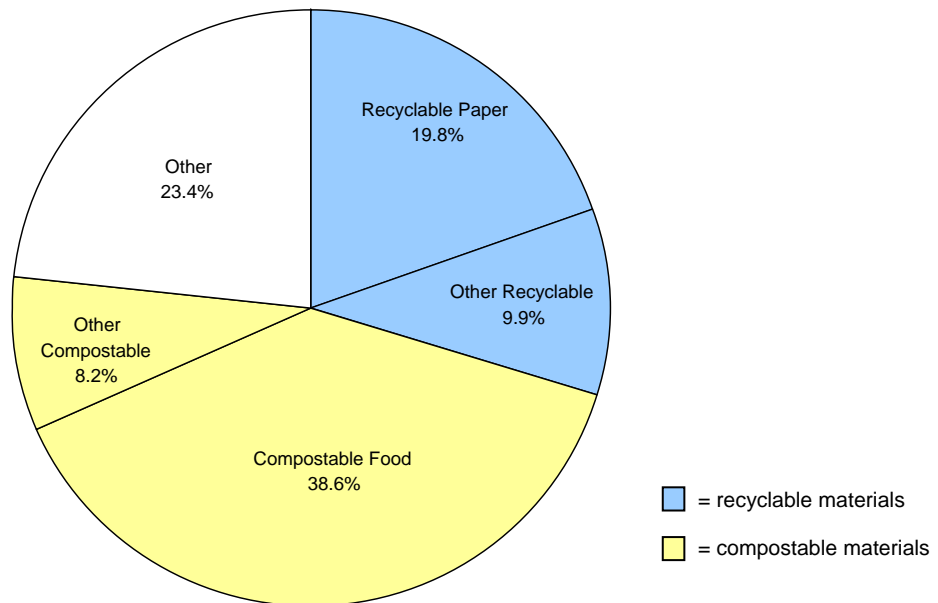
Material	Percent	Cumulative Percent
Food	29.9%	
Mixed Low-Grade Paper	7.4%	37.3%
Compostable/Soiled Paper	6.1%	43.4%
Textiles	5.1%	48.6%
Newspaper	5.0%	53.6%
Other Film	4.7%	58.3%
Beverage Bottles	3.6%	61.9%
Animal By-products	2.7%	64.6%
Plain OCC/Kraft Paper	2.6%	67.1%
Rock/Concrete/Bricks	2.6%	69.7%

Waste Disposed through Fantastic 3 CGI Program

CGI waste collected through the Fantastic 3 program contains approximately the same amount of recyclable paper as is found in CGI waste collected commercially outside the Fantastic 3 program. However, Fantastic 3 CGI waste contains a relatively smaller percentage of other recyclable materials than corresponding non-Fantastic 3 CGI waste.

Fantastic 3 CGI waste contains a great deal more food than other CGI waste collected commercially.

Figure 6: Recoverability of Waste Disposed through Fantastic 3 CGI Program



As shown in Table 9, the most prevalent materials in the waste from CGI participants in the Fantastic 3 program are food, mixed low-grade paper, and compostable paper. Recyclable grades of paper make up four of the top 10 materials for this waste subsector. Recyclable ferrous metal items and glass beverage bottles both appear among the top 10 materials.

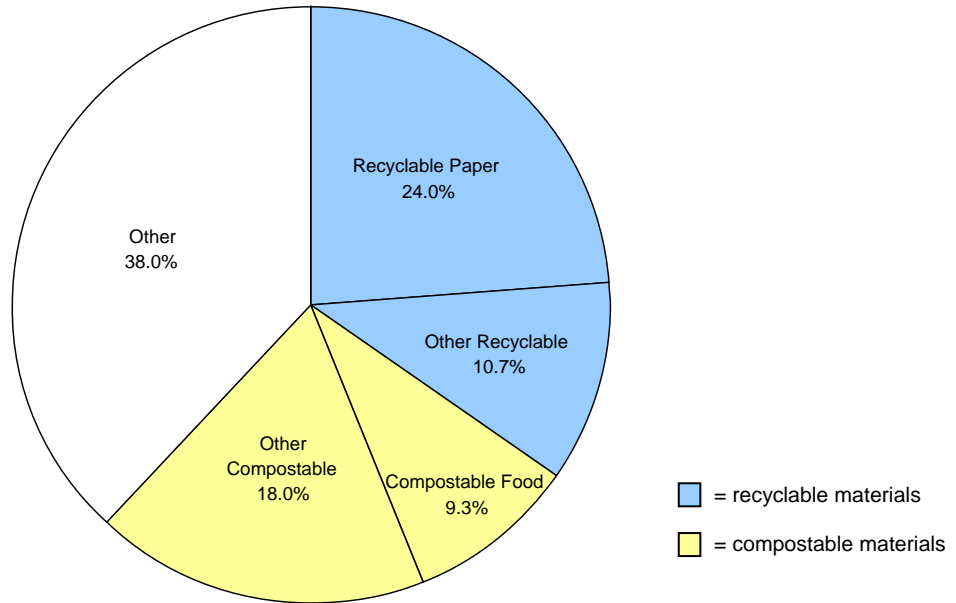
TABLE 9
TOP 10 MATERIALS IN WASTE DISPOSED THROUGH FANTASTIC 3 CGI PROGRAM

Material	Percent	Cumulative Percent
Food	38.6%	
Mixed Low-Grade Paper	7.5%	46.1%
Compostable/Soiled Paper	5.6%	51.7%
Other Film	5.4%	57.1%
Newspaper	4.4%	61.6%
Plain OCC/Kraft Paper	4.4%	65.9%
Other Ferrous	3.0%	68.9%
High-Grade Paper	2.5%	71.5%
Beverage Bottles	2.4%	73.9%
Textiles	2.4%	76.3%

C. Waste from the Pier 96 Material Recovery Facility

Figure 7 depicts the residual wastes from the Pier 96 facility, including residuals from operations that process material collected through the Fantastic 3 program as well as operations that process other material. A more detailed examination of the residuals from the two types of operations is presented on the following pages.

Figure 7: Recoverability of Waste from the Pier 96 Material Recovery Facility



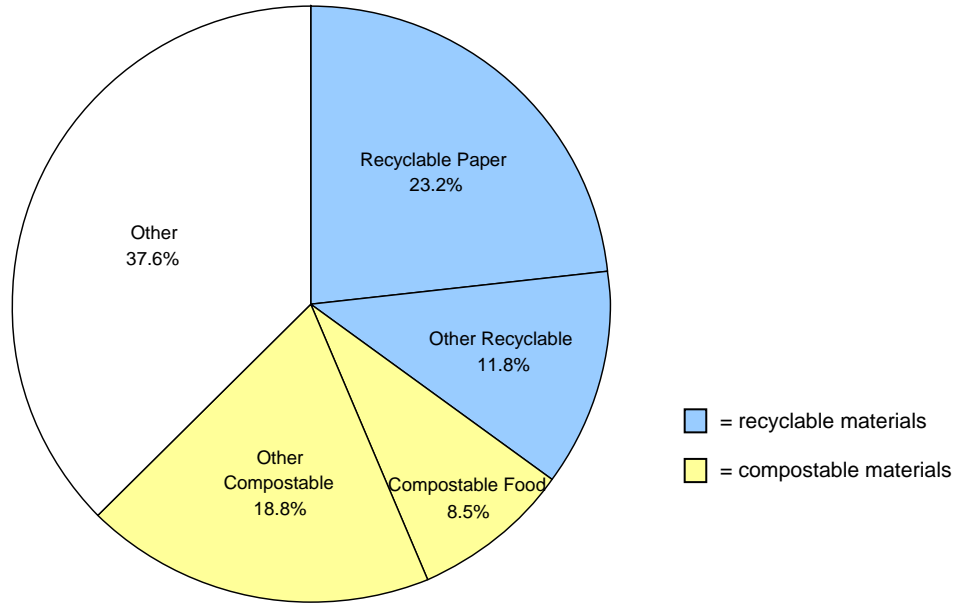
**TABLE 10
TOP 10 MATERIALS IN WASTE FROM THE PIER 96 MATERIAL RECOVERY FACILITY**

Material	Percent	Cumulative Percent
Compostable/Soiled Paper	16.5%	
Mixed Low-Grade Paper	12.2%	28.7%
Food	9.3%	38.0%
Other Film	8.2%	46.2%
Newspaper	6.4%	52.6%
Textiles	6.4%	59.0%
High-Grade Paper	3.1%	62.1%
Disposable Diapers	2.5%	64.6%
Plain OCC/Kraft Paper	2.3%	66.9%
Sand/Soil/Dirt/Grit/Fines	2.2%	69.1%

Waste from Pier 96 Fantastic 3 Operations

Clearly, food and compostable paper represent a major portion of residuals from recovery operations that process Fantastic 3 material. Recyclable paper types, ferrous metal, and potentially recyclable categories of plastic also are present in notable amounts. However, the characterization process did not evaluate individual items found in samples, such as toys or other miscellaneous plastic products, for their suitability for recycling.

Figure 8: Recoverability of Waste from Pier 96 Fantastic 3 Operations



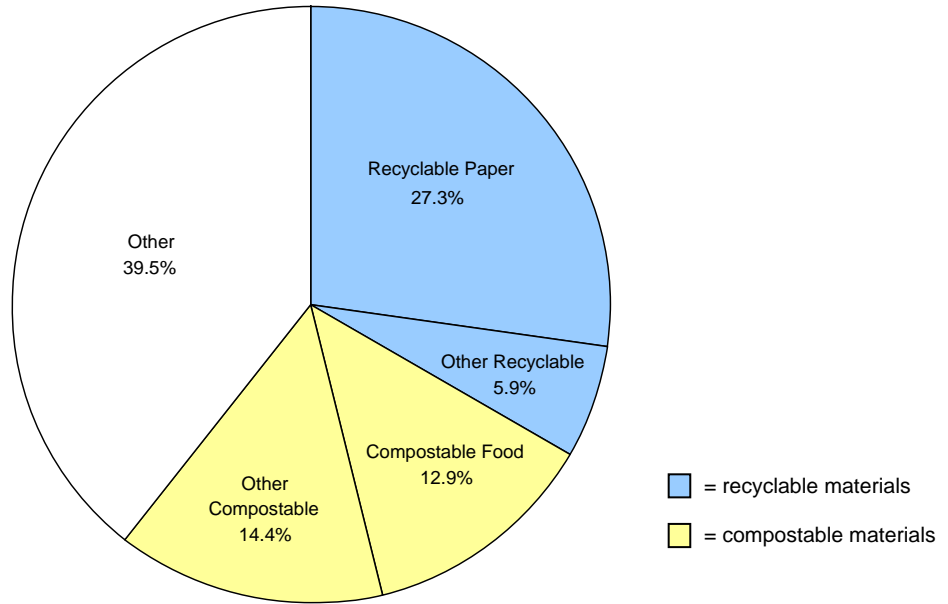
**TABLE 11
TOP 10 MATERIALS IN WASTE FROM PIER 96 FANTASTIC 3 OPERATIONS**

Material	Percent	Cumulative Percent
Compostable/Soiled Paper	17.7%	
Mixed Low-Grade Paper	12.5%	30.2%
Food	8.5%	38.7%
Other Film	7.5%	46.2%
Textiles	7.3%	53.6%
Newspaper	6.6%	60.2%
Disposable Diapers	2.9%	63.1%
Other Ferrous	2.3%	65.4%
Plastic Products	2.3%	67.7%
Other Rigid Packaging	2.3%	70.0%

Waste from Other Pier 96 Operations

Food and compostable paper are present in significant amounts in this residual stream. Recyclable paper types make up a notable percentage of the residuals. Potentially recyclable categories of plastic also are present, but in smaller amounts than seen in residuals from Fantastic 3 material sent through the Pier 96 facility. The characterization process did not evaluate individual items found in samples, such as articles of clothing, for their suitability for recycling.

Figure 9: Recoverability of Waste from Other Pier 96 Operations



**TABLE 12
TOP 10 MATERIALS IN WASTE FROM OTHER PIER 96 OPERATIONS**

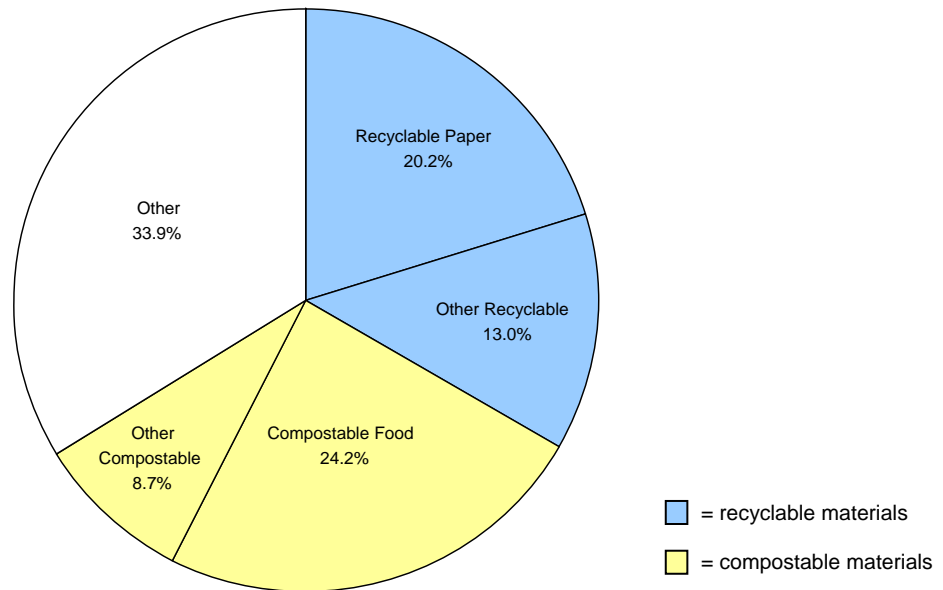
Material	Percent	Cumulative Percent
Food	12.9%	
Sand/Soil/Dirt/Grit/Fines	11.5%	24.4%
Compostable/Soiled Paper	11.4%	35.8%
Other Film	11.4%	47.2%
Mixed Low-Grade Paper	10.5%	57.7%
High-Grade Paper	7.9%	65.6%
Newspaper	5.6%	71.3%
Plain OCC/Kraft Paper	3.3%	74.6%
Composite/Other Products	2.2%	76.8%
Textiles	2.0%	78.8%

D. Other Commercially Collected Waste

The waste sector “other commercially collected waste” refers to the waste collected from businesses, government, institutions, or multifamily sources by companies that are primarily in the business of waste hauling or waste management. This category also includes waste hauled in rolloff containers from residences by commercial haulers following home cleanout activities.

Figure 10 and Table 13 present findings for the entire sector. This waste sector includes roughly the same percentage of nonfood compostable materials as that collected through the Fantastic 3 program, but relatively less food. However, this sector includes a higher percentage of recyclable materials than the Fantastic 3 sector.

Figure 10: Recoverability of Other Commercially Collected Waste



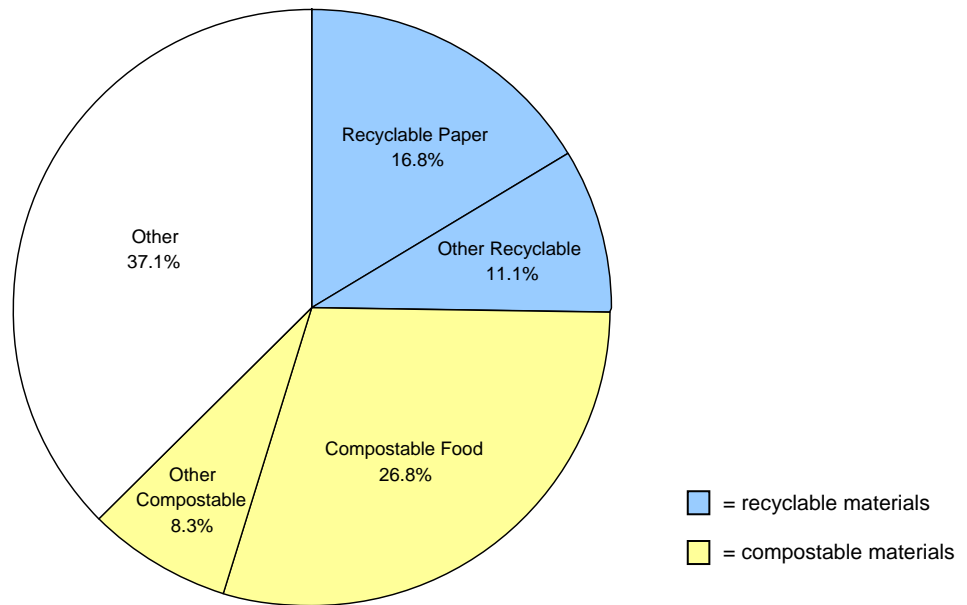
**TABLE 13
TOP 10 MATERIALS IN OTHER COMMERCIALY COLLECTED WASTE**

Material	Percent	Cumulative Percent
Food	24.2%	
Mixed Low-Grade Paper	7.6%	31.8%
Compostable/Soiled Paper	5.6%	37.4%
Other Film	5.0%	42.3%
Plain OCC/Kraft Paper	4.5%	46.9%
Newspaper	4.0%	50.9%
Sand/Soil/Dirt/Grit/Fines	3.8%	54.7%
Hazardous Waste	3.5%	58.2%
Plate Glass	2.7%	61.0%
Textiles	2.6%	63.5%

Commercially Collected Multifamily Residential Waste

Based on the sampling results, the percentages of recyclable paper and other readily recyclable materials found in commercially collected multifamily waste are similar to those found in Fantastic 3 waste, regardless of whether the waste was collected from participants in the Fantastic 3 program or not. The amounts of food and other compostable materials are slightly lower in non-Fantastic 3 multifamily waste than in Fantastic 3 multifamily waste.

Figure 11: Recoverability of Commercially Collected Multifamily Residential Waste



As shown in Table 14, food and compostable paper represent two of the 10 most prevalent materials in multifamily waste collected outside the Fantastic 3 program. Likewise, recyclable grades of paper count for two of the materials in the top 10. The presence of hazardous waste as one of the top 10 materials in this waste subsector should be noted and examined in more detail, using data from the toxicity profile that was conducted during the study period.

TABLE 14
TOP 10 MATERIALS IN COMMERCIALY COLLECTED MULTIFAMILY RESIDENTIAL WASTE

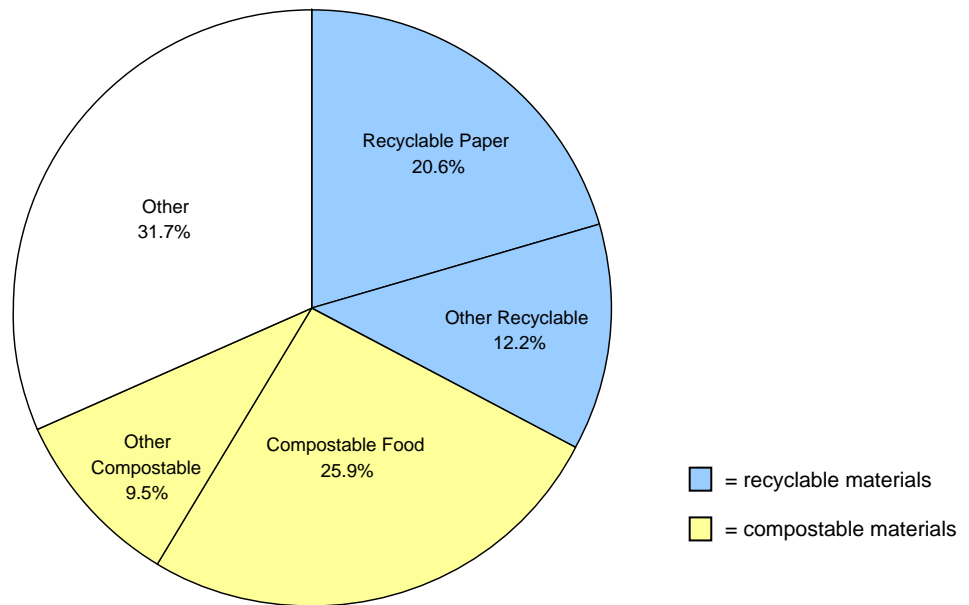
Material	Percent	Cumulative Percent
Food	29.4%	
Mixed Low-Grade Paper	8.7%	38.1%
Textiles	6.6%	44.7%
Hazardous Waste	5.3%	49.9%
Compostable/Soiled Paper	4.5%	54.4%
Other Film	3.6%	58.0%
Composite/Other Metals	3.6%	61.6%
Animal By-products	3.4%	65.0%
Newspaper	3.1%	68.2%
Composite/Other Wood	3.0%	71.2%

Commercially Collected CGI Waste

CGI Waste collected commercially outside the Fantastic 3 program contains approximately the same amount of recyclable paper as is found in CGI waste collected through the Fantastic 3 program. However, non-Fantastic 3 CGI waste contains a greater percentage of other recyclable materials than corresponding Fantastic 3 CGI waste.

Commercially collected CGI waste collected outside the Fantastic 3 program contains substantially less food than Fantastic 3 CGI waste.

Figure 12: Recoverability of Commercially Collected CGI Waste



As with other categories of waste, food and compostable paper represent two of the largest portions of the commercially collected non-Fantastic 3 CGI waste stream. Recyclable types of paper make up three of the top 10 materials.

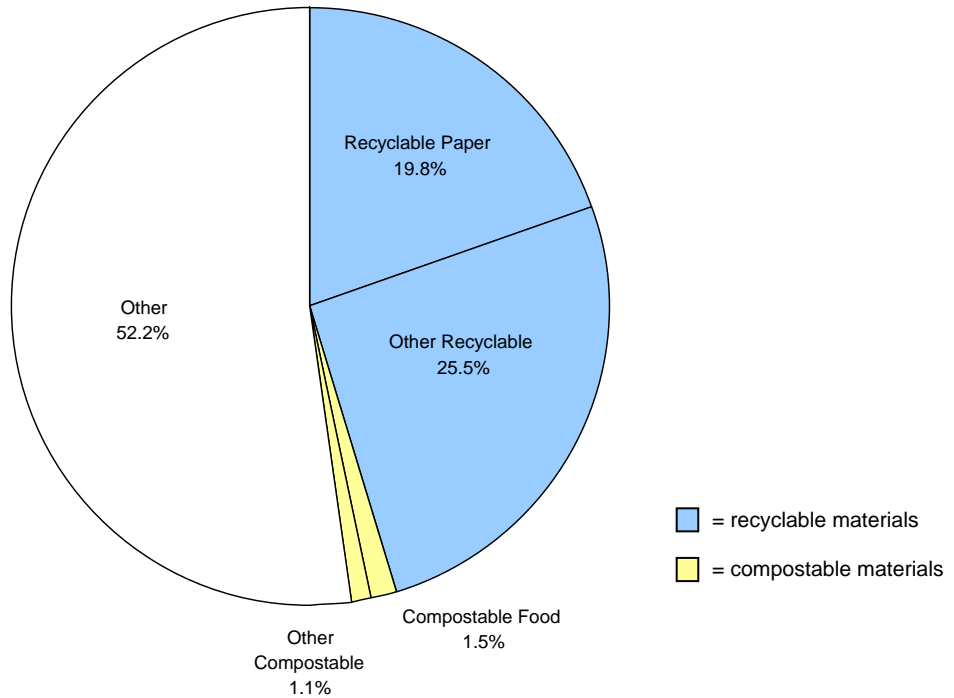
**TABLE 15
TOP 10 MATERIALS IN COMMERCIALY COLLECTED CGI WASTE**

Material	Percent	Cumulative Percent
Food	25.9%	
Mixed Low-Grade Paper	7.4%	33.3%
Compostable/Soiled Paper	6.3%	39.6%
Other Film	5.6%	45.1%
Plain OCC/Kraft Paper	4.4%	49.6%
Newspaper	4.1%	53.7%
Plate Glass	3.3%	57.0%
Sand/Soil/Dirt/Grit/Fines	2.8%	59.7%
Rock/Concrete/Bricks	2.8%	62.5%
Textiles	2.4%	64.8%

Commercially Collected Home Cleanout Waste

Waste from home cleanout operations represents a rich source of recyclable materials, especially recyclable paper types, that could be easily targeted. Several types of recyclable paper appear to be highly prevalent, as well as recyclable ferrous metal items and recyclable wood in the form of pallets and crates. However, it is important to note that these conclusions are based on the visual characterization of only six container loads of waste.

Figure 13: Recoverability of Commercially Collected Home Cleanout Waste



**TABLE 16
TOP 10 MATERIALS IN COMMERCIALY COLLECTED HOME CLEANOUT WASTE**

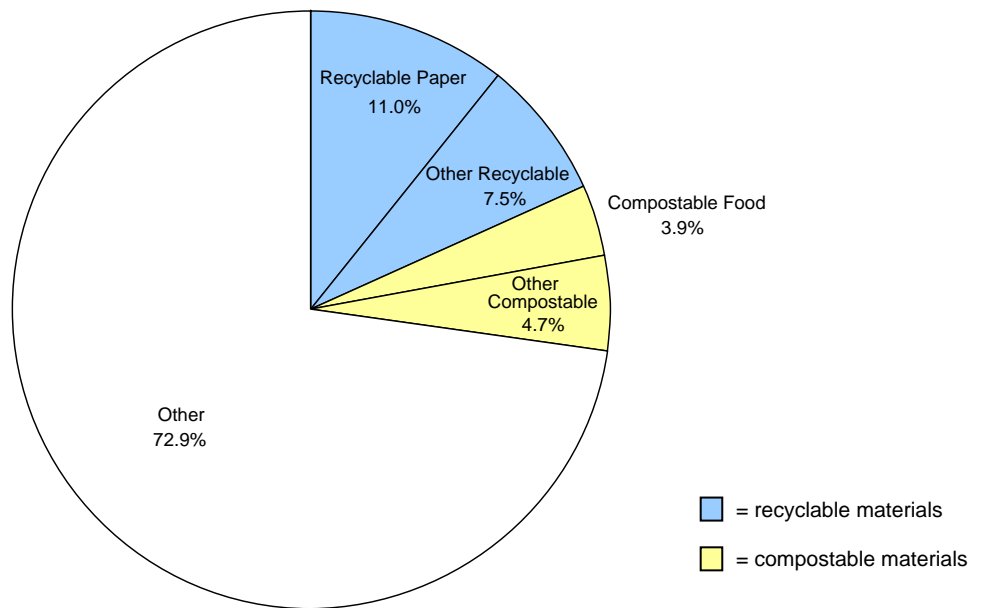
Material	Percent	Cumulative Percent
Sand/Soil/Dirt/Grit/Fines	18.0%	
Hazardous Waste	14.7%	32.7%
Other Ferrous	14.7%	47.4%
Mixed Low-Grade Paper	8.4%	55.8%
Plain OCC/Kraft Paper	7.4%	63.2%
Furniture	5.4%	68.6%
Pallets/Crates	5.3%	74.0%
Newspaper	3.9%	77.9%
Carpet/Upholstery	3.0%	80.9%
Plastic Products	2.9%	83.8%

E. Self-Hauled Waste

The entire self-hauled waste sector was characterized by examining large waste loads from businesses that have individual accounts with Norcal, waste from the Recreation and Park Department packer trucks, and waste from the Department of Public Works. Data from each subsector were combined using a weighted averaging technique to produce the findings shown in Figure 14 and Table 17.

More insight may be gained by examining the composition profiles that appear on the following pages for self-hauled CGI waste and for self-hauled Department of Public Works waste.

Figure 14: Recoverability of Self-Hauled Waste



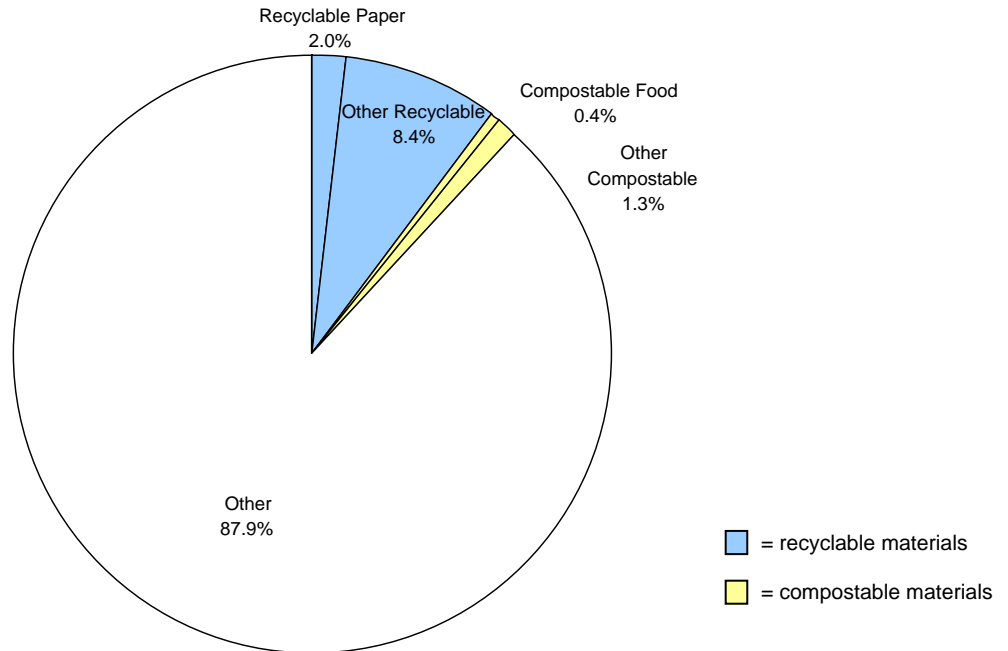
**TABLE 17
TOP 10 MATERIALS IN SELF-HAULED WASTE**

Material	Percent	Cumulative Percent
Asphaltic Roofing	26.4%	
Composite/Other Products	21.1%	47.5%
Textiles	5.7%	53.3%
Hazardous Waste	4.8%	58.1%
Mixed Low-Grade Paper	4.5%	62.6%
Food	3.9%	66.5%
Sand/Soil/Dirt/Grit/Fines	3.8%	70.3%
Other Ferrous	3.6%	73.9%
Newspaper	3.0%	76.9%
Prunings	2.6%	79.6%

Self-Hauled Waste from Businesses

Based on the examination of nine loads of waste from commercial account holders, recyclable paper and compostable materials represent a very small fraction of waste from this subsector. Recyclable materials other than paper are present in relatively small amounts compared to other waste subsectors considered in this study. By far the largest portion of this waste subsector is asphaltic roofing.

Figure 15: Recoverability of Self-Hauled Waste from Businesses



**TABLE 18
TOP 10 MATERIALS IN SELF-HAULED WASTE FROM BUSINESSES**

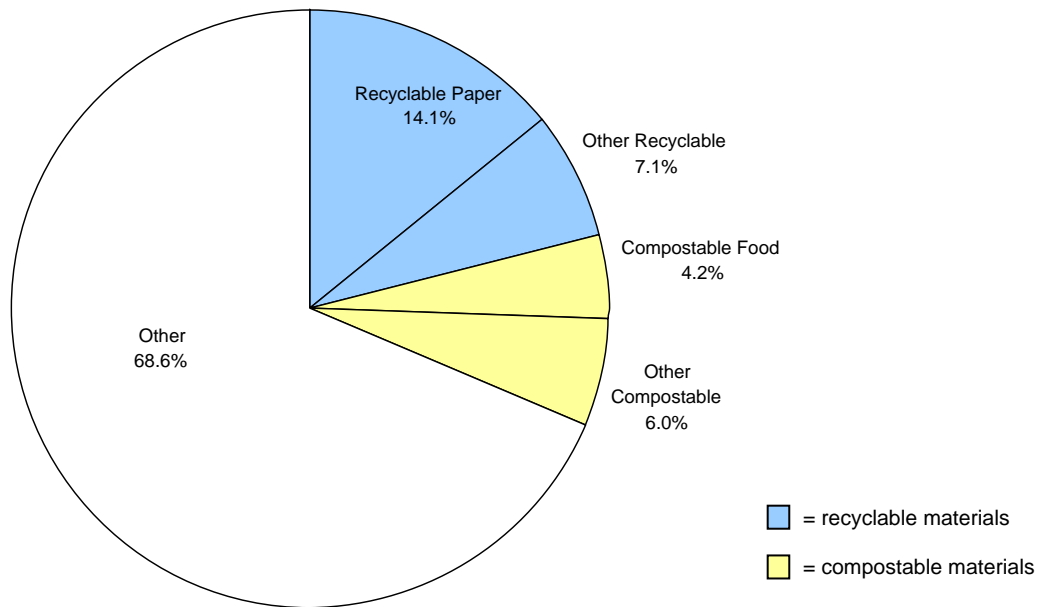
Material	Percent	Cumulative Percent
Asphaltic Roofing	72.2%	
Sand/Soil/Dirt/Grit/Fines	8.3%	80.5%
Clean Wood	3.6%	84.1%
Composite/Other Construction Debris	2.9%	87.0%
Rock/Concrete/Bricks	2.8%	89.9%
Composite/Other Plastics	2.3%	92.1%
Other Ferrous	1.8%	93.9%
Prunings	1.0%	95.0%
Waxed OCC/Kraft Paper	0.9%	95.9%
Composite/Other Metals	0.6%	96.5%

Self-Hauled Waste from the Department of Public Works

Waste from the Department of Public Works was characterized by examining waste from packer trucks and from litter patrol and broom support operations.

In order to produce the findings shown in Figure 16 and Table 19, waste from other sources was also counted in the weighted average composition calculation. Waste from streetside litter baskets was considered to have a composition similar to that of waste from litter patrol and broom support operations. For the purpose of producing this aggregated composition profile, waste from street sweeping vehicles and screenings from wastewater treatment plants were counted as being equivalent to the material category “composite/other products.”

Figure 16: Recoverability of Self-Hauled Waste from the Department of Public Works



As can be seen in the figure and table, significant amounts of recyclable and compostable material remain in the overall Department of Public Works self-hauled waste stream.

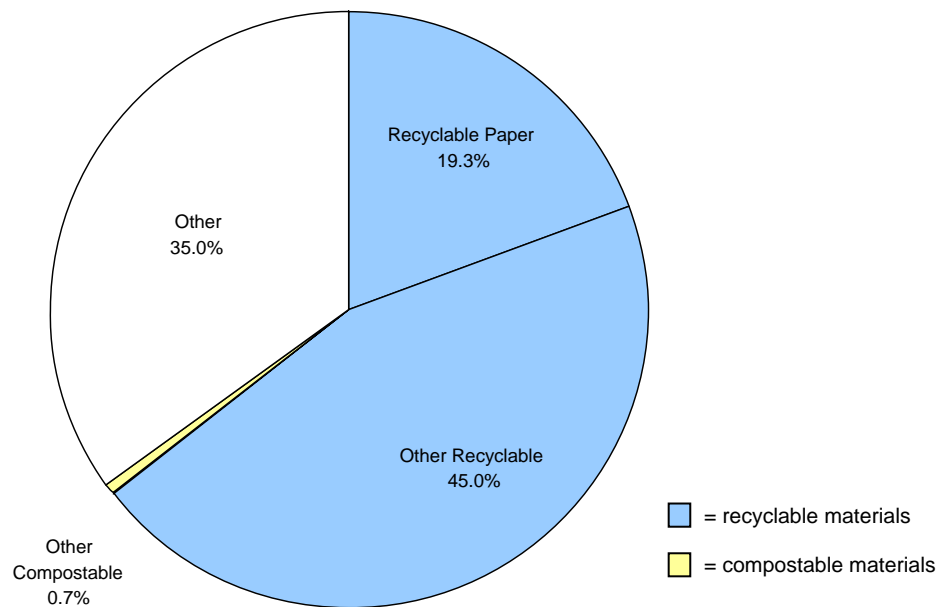
TABLE 19
TOP 10 MATERIALS IN SELF-HAULED WASTE FROM THE DEPARTMENT OF PUBLIC WORKS

Material	Percent	Cumulative Percent
Composite/Other Products	30.5%	
Asphaltic Roofing	8.7%	39.1%
Textiles	8.2%	47.4%
Hazardous Waste	6.8%	54.2%
Mixed Low-Grade Paper	5.8%	59.9%
Other Ferrous	4.5%	64.4%
Food	4.2%	68.6%
Newspaper	4.0%	72.6%
Prunings	3.4%	76.0%
Plain OCC/Kraft Paper	3.4%	79.4%

F. Waste from the iMRF

The compostable fraction of waste disposed from the iMRF as residue is very small. However, large portions of the waste consist of recyclable low-grade paper and other recyclable materials. The two largest construction/demolition material types present in this waste stream are “rock/concrete/bricks” and “clean wood.” In addition, almost 2 percent of this waste stream consists of potentially recyclable OCC/Kraft paper.

Figure 17: Recoverability of Waste from the iMRF



**TABLE 20
TOP 10 MATERIALS IN WASTE FROM THE iMRF**

Material	Percent	Cumulative Percent
Rock/Concrete/Bricks	30.1%	
Mixed Low-Grade Paper	17.0%	47.1%
Clean Wood	14.0%	61.0%
Carpet/Upholstery	8.2%	69.2%
Painted Gypsum	6.0%	75.3%
Hazardous Waste	5.1%	80.4%
Asphaltic Roofing	4.8%	85.1%
Composite/Other Construction Debris	3.1%	88.2%
Other Film	3.0%	91.2%
Composite/Other Metals	2.4%	93.6%

G. San Francisco Waste Disposed at Hillside Landfill

The single largest material component of this waste sector, rock/concrete/bricks, is also the single greatest recyclable component. Clean gypsum is also present in significant amounts. Recyclable paper types and compostable debris other than food are present in small but significant amounts.

Figure 18: Recoverability of San Francisco Waste Disposed at Hillside Landfill

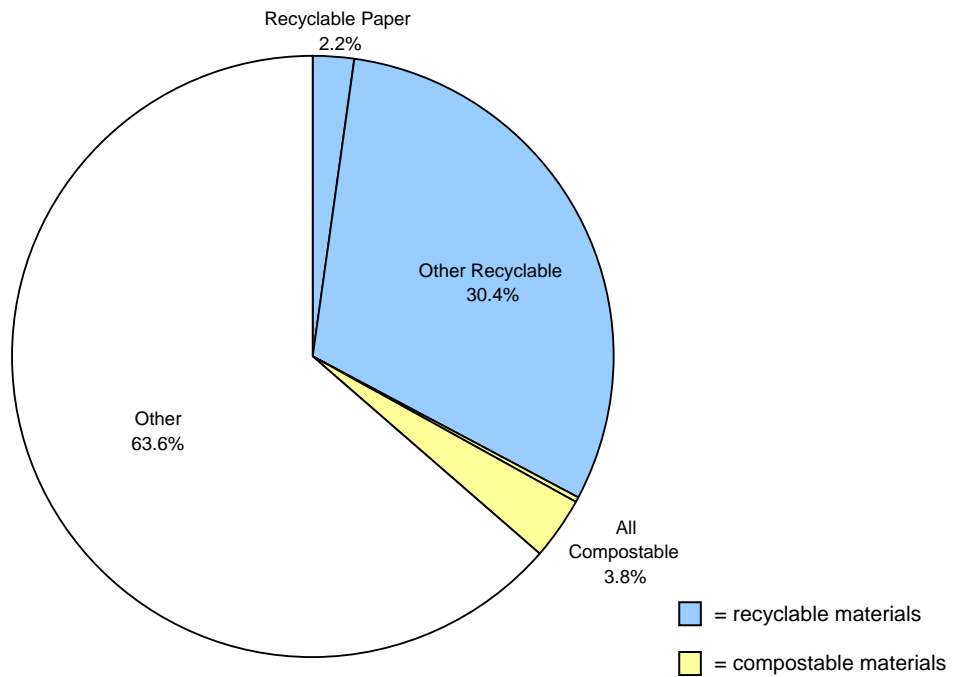


TABLE 21
TOP 10 MATERIALS IN SAN FRANCISCO WASTE DISPOSED AT HILLSIDE LANDFILL

Material	Percent	Cumulative Percent
Rock/Concrete Bricks	25.0%	
Sand/Soil/Dirt/Grit/Fines	20.0%	45.0%
Ceramics	7.5%	52.5%
Painted Gypsum	6.6%	59.1%
Hazardous Waste	5.7%	64.9%
Clean Gypsum	3.6%	68.5%
Asphaltic Roofing	3.6%	72.1%
Appliances	3.4%	75.5%
Furniture	3.3%	78.8%
Composite/Other Construction Debris	2.5%	81.3%

H. Waste from Specific Business Groups

Overview

In discussion with SFE staff, the following business-sector waste streams were targeted for visual characterization:

- Large hotels (served by compactors, hauled by rolloff trucks)
- Small hotels (served by refuse and recycling vehicles collecting from carts, bags, and bins)
- Restaurants (generally with cart/bag/bin service)
- Large retail stores and malls (compactor service)
- Large office buildings with ground-floor retail (compactor service)
- Large office buildings with no retail (compactor service)

In addition, SFE staff requested visual characterization of wastes from a number of specific City operations, including hospitals, the Jail, Municipal Railway yards, etc. These operations were generally served by compactors or open rolloff containers.

The goal was to provide a total of 150 visual characterizations, spread evenly across these sources. In the City operations stream, operations were targeted based on known opportunities for diversion and high disposed tonnage. For the large hotel stream, an effort was made to avoid hotels involved in labor disputes. It was determined that high worker turnover could reduce the effectiveness of the recycling programs at these hotels, thereby resulting in nonrepresentative samples. For the large hotel and the other streams, loads were chosen day by day based on their availability for sampling.

In addition, the materials disposed at the Hillside Landfill in Colma by self-haulers from San Francisco were also characterized visually. Self-hauled wastes disposed at the SFR&D Transfer Station were not characterized visually because these wastes are processed for recycling in a variety of ways.

Large Hotels

A total of 21 large hotel samples were taken by visual characterization. Two samples were deleted after the decision was made to exclude large hotels that were involved in labor disputes. It was determined that high worker turnover could reduce the effectiveness of the recycling programs at these hotels, thereby resulting in nonrepresentative samples. As a result, the total number of analyzed samples, across both seasons, was 19. In many cases, individual hotels were characterized in fall 2004 and again in spring 2005. Because no seasonally driven variation was apparent, the samples were treated as a single group.

The market niche for an individual hotel was usually apparent from its waste stream. Hotels used largely by business people had wastes that included newspapers, courier packets, legal briefs, marketing data, etc. The wastes from hotels used by vacationers exhibited shopping bags and boxes, beverage containers, and takeout food containers. A few high-end hotels apparently provide spa services that disposed of slippers, pillows, and cosmetic product containers. Other hotel services that caused variations in wastes included restaurants, catering, convention space, and retail. A few hotels appeared to have active bars, based on the substantial number of glass beverage bottles concentrated in pockets within their waste loads. The Cathedral Hill Hotel and the “W” Hotel were notable in this regard.

On average, these materials had the highest estimated weights:

Food	44%
Low-grade paper (news & mixed)	27%
Compostable/soiled paper	5%
High-grade paper	5%
Glass bottles and containers	4%

For most of these materials, concentrations varied considerably from one hotel to another, a reflection of the market niche and the varying services present at each hotel. However, the variation may also reflect the presence of recycling programs at certain hotels.

Other materials present in smaller but noticeable quantities were corrugated cardboard (apparently from embedded retailers) and textiles (discarded clothing and spa-wear).

Small Hotels

For this study, small hotels were defined as those hotels and motels that are too small to have compactor service. In recent years, most small hotels have been converted from bin service to cart service for compatibility with Norcal’s refuse collection system. Hence, the targeted small hotels were limited to those with cart service in order to facilitate sample collection.

The original goal number of samples from this sector was 22. The ideal approach for sample collection and analysis would have been for Norcal to collect 22 separate samples from a representative subset of all small hotels and bring each sample to the transfer station for analysis. However, this method of sample collection was error-prone, and the cost to Norcal would have been very high. Instead, the following approach was used. Norcal staff examined its collection routes in areas known to have high concentrations of small hotels and identified several clusters of small hotels that had collection on the same day. In discussion with study team staff, clusters were identified that would focus on three distinct types of small hotels: small luxury hotels near theaters and Union Square shops, larger family and group-oriented hotels and motels on or near the Van Ness and Lombard Street corridor, and hotels for low-income residents. One cluster of each type was chosen for collection and sampling. Each cluster had six to 10 hotels that were expected to set out refuse on the same route and at the same time.

Subsampling within each cluster was done after the cluster load was delivered to the transfer station. Each load, typically 4 to 8 cubic yards in volume, was separated into four piles, and each pile was considered a sample. To the extent possible, waste from each hotel was placed in one pile only. For the visual characterization, all bags were opened and the materials examined.

Using this method, with three clusters collected each season, a total of 24 samples were analyzed. On average, these materials had the highest estimated weights:

Low-grade paper (news & mixed)	36%
Food	24%
Compostable/soiled paper	7%
Glass bottles and containers	6%
Rigid plastic containers	4%
High-grade paper	4%
Textiles	4%

The concentration of food was noticeably lower than in large hotels, primarily because small hotels are much less likely to have an onsite restaurant. (Takeout food containers and associated plastic bags were readily apparent in most of these samples.) Most of the textiles appeared to be clothing discarded in the low-income cluster. Concentrations of paper and containers varied considerably from sample to sample. Some visitor-oriented small hotels apparently had bars, in-room mini-bars, or gatherings of guests that produced substantial amounts of beer, wine, and liquor bottles.

Restaurants

Because there are more than 3,000 restaurants in San Francisco, this business sector was evaluated as a distinct stream. Most restaurants produce far less than the volume of waste that would make compactor service economical. Consequently, the restaurants had to be sampled in a manner similar to that for the small hotels (i.e., by defining clusters and separating cluster loads into samples at the transfer station).

The three restaurant clusters were chosen from three demographically distinct parts of the city:

- The West Portal neighborhood shopping district, which serves residents in the area west of Twin Peaks.
- Clement Street near 25th Avenue, which serves residents in the Richmond District.
- Bush Street at Kearny Street, where the Financial District abuts Chinatown, and restaurants largely serve a mix of business and tourist customers.

Cluster loads were brought to the transfer station and separated into samples in the same manner as described above for small hotels. In addition, one restaurant that shared compactor service with office space was analyzed separately. (This compactor was sampled two times in all; one sample was placed in the “office with retail” category, and one in the “restaurant” category.)

Using this method, with three clusters collected each season and one compactor, a total of 25 samples were analyzed. On average, these materials had the highest estimated weights:

Food	85%
Compostable/soiled paper	4%
Low-grade paper (news & mixed)	3%
Glass bottles and containers	1%
Rigid plastic containers	1%
Cardboard	1%

The data were reasonably consistent among samples, indicating that most restaurants generate an amount of food waste that far outweighs the remaining materials. The relatively low amount of cardboard indicates (and visual observations confirm) that most restaurants discard very little cardboard; it appears that they are finding ways to recycle it.

It was also apparent from the visual observations that the refuse from many small restaurants includes residential wastes. However, it was not possible to determine from the samples whether these were wastes from the same building or from other sources.

Large Retail Stores and Malls

These sources included retailers that occupy all, or nearly all, of a building, as well as shopping mall areas such as Stonestown and San Francisco Centre. Two entertainment complexes with substantial shopping areas (Metreon and Kabuki) and one cinema (1000 Van Ness) were also included. To assure a focus on the largest retailers, only those with rolloff compactor service were targeted, and grocery stores were excluded.

Twenty-four samples were taken by observing the contents of rolloff containers serving these retail sources. Because there were a limited number of retailers with rolloff service, many were sampled once each season (twice in all).

On average, these materials had the highest estimated weights:

Food	42%
Low-grade paper (news & mixed)	16%
Plastic products	7%
Cardboard	6%
Compostable/soiled paper	5%

The high quantities of food reflect the large amounts of food discarded from malls with food service. Of the 24 samples, seven had less than 20 percent food and 10 had more than 60 percent.

Several retail sources had loads consisting of a few very specific types of waste. The most striking examples were the loads from 22 Fourth Street, which were composed almost entirely of plastic coat hangers and plastic film.

Most retailers produced relatively little cardboard, but a few had substantial amounts. Twenty of the 24 samples were less than 10 percent cardboard by weight (with six of those having 1 percent or less), but four samples had more than 10 percent cardboard. The sources for these four samples included at least one retailer reputed to have a strong recycling program. This points up the need for close internal supervision to assure that employees recycle cardboard, if discarding it into a compactor is an alternative.

Large Office Buildings with Ground-Floor Retail

Samples were drawn from high-rise office buildings that have retail outlets at street level and are served by compactors. An initial list of high-rise buildings was taken from the website maintained by Emporis, a company that indexes high-rise structures around the world as a resource for real estate professionals and the general public. The list was reviewed by staff at Golden Gate Disposal and subdivided into lists of office buildings with and without ground-floor retail. Golden Gate Disposal staff also identified the buildings whose discards are taken to Pier 96; those buildings were not included in this study.

The resulting list was surprisingly small, with only 10 buildings eligible for sampling. Since the goal had been to obtain 20 to 22 samples during this study, many of the eligible buildings were sampled twice. A non-high-rise office building with a substantial restaurant attached (Il Fornaio, at 1265 Battery Street) was included once in this sample. Within the logistical constraints of the study, it was only possible to obtain 14 samples from this sector.

The dominant group of buildings in this sector was Embarcadero Center, Buildings 1 through 4. These buildings have restaurants among their retail mix. Several of the other buildings in this sector also have food service, either in restaurants or employee dining rooms. As a consequence, wastes from these buildings contain a substantial amount of food and food-service material, making them extremely difficult to process at the Pier 96 recycling facility. As a result, these wastes continue to be taken to the SFR&D Transfer Station for disposal.

On average, these materials had the highest estimated weights:

Food	45%
Low-grade paper (news & mixed)	17%
High-grade paper	9%
Compostable/soiled paper	6%
Cardboard	4%

The buildings with the most food waste typically had a kitchen or restaurant(s) on site. Although food was present at substantial levels (at least 30 percent) in most samples, cardboard was less consistent, and high-grade paper was very inconsistent. Four of the samples had less than 5 percent high-grade paper by weight, but three other samples had more than 15 percent high-grade paper.

The Ferry Building is a special case within this category. It has a number of food shops and other retailers on the ground floor, and various offices within the upper floors of the complex. Building management is actively involved in providing recycling services, and efforts are being made to increase those services. Nevertheless, the samples indicated a substantial amount of food waste (more than 50 percent by weight) and a noticeable amount of high-grade paper from the offices.

Large Office Buildings with No Retail

Samples were drawn from high-rise office buildings that do not have retail outlets and are served by compactors. The list of candidate buildings was developed from the website maintained by Emporis, as described in the previous section.

The resulting list had a total of 11 buildings eligible for sampling. One other newly reopened building was added in the spring 2005 session, and one compactor that was delivering to Pier 96 in fall 2004 returned to the SFR&D Transfer Station in spring 2005. Since the goal had been to obtain 20 to 22 samples during this study, many of the eligible buildings were sampled twice, and a few of the most frequently pulled compactors were sampled a third time. Within the logistical constraints of the study, 21 samples were obtained from this sector.

Several of the buildings in this group had employee dining areas with kitchens, and the wastes from most of the others included a significant amount of food, primarily employee meals from takeout food sources or from home. On average, these materials had the highest estimated weights:

Food	38%
Low-grade paper (news & mixed)	22%
High-grade paper	12%
Compostable/soiled paper	9%

In addition, the fraction of rigid plastic containers was a remarkably high 13 percent by volume. Due to the low density of these materials, the percentage by weight was only 2.9 percent on average; nonetheless, there is a noteworthy waste reduction opportunity for these materials. Most of the containers in this category were drinking-water bottles and other beverage bottles that appeared to have been supplied for use in meetings and at workstations. In a few samples, it

appeared that someone had collected these bottles with the intent of recycling them but had not been able to do so.

City Operations

City staff targeted a number of City operations for visual characterization. Emphasis was placed on the largest operations (i.e., those that produce the largest amounts of waste).

In the discussions of specific streams presented below, all percentages derived from the raw visual characterization data are by volume.

Housing Authority

The San Francisco Housing Authority operates several stakeside dump-bed trucks that pick up abandoned wastes from public housing projects. In the fall 2004 round of visual characterization, five of these loads were characterized.

There was a wide variety of material types in these loads, but four types of materials predominated:

Plain OCC/Kraft	19%
Prunings	14%
Furniture	11%
Low-grade paper	7%

Also, much of the material in these loads was household refuse in plastic trash bags.

These data were recorded at the SFR&D Transfer Station prior to salvage by workers. A portion of the OCC/Kraft, prunings, and furniture are diverted by SFR&D. Low-grade paper was thinly scattered throughout the loads, in trash bags and loose, and may not be economically feasible to divert after delivery by the San Francisco Housing Authority.

Broom Support and Litter Patrol Pickup Trucks

In conjunction with street-sweeping work, a fleet of pickup trucks operated by the Bureau of Street Environmental Services patrols city streets in advance of street sweeping machines to remove large objects that the sweeping machines cannot handle. These trucks also support work crews that clean heavily littered areas and collect abandoned wastes such as bags of trash, furniture, etc. In the fall 2004 round of visual characterization, 10 of these loads were characterized.

There was a wide variety of material types in these loads, but three types of materials predominated:

Prunings	16%
Textiles	15%
Plain OCC/Kraft	13%

In general, the high average values for these materials reflect very high amounts in a few loads. For example, two loads had OCC/Kraft concentrations of 55 and 49 percent, respectively. In most other loads there was very little cardboard.

These data were recorded at SFR&D prior to salvage by workers. Some materials in these loads are diverted by SFR&D.

DPW Packer Trucks

The Department of Public Works operates several packer trucks that collect abandoned wastes and perform related community services, such as collecting weeds and trash cleaned from community gardens. These trucks also serve as “mother ships” for the broom support and littler patrol pickup trucks, which can bring wastes to a nearby packer rather than make the longer trip to the SFR&D Transfer Station. In the spring 2005 round of visual characterization, four of these loads were characterized.

In these loads, two types of materials were seen in substantial amounts:

Furniture	19%
Mattresses	14%

In general, the concentrations of these materials were similar in most loads. Typically, these loads are discharged directly into the transfer station pit, which prevents salvage or diversion of materials. Most of the furniture and some of the mattresses and box springs had been badly damaged by the packer truck during loading. However, many of these objects appeared to be unusable due to wear, staining, and other damage prior to collection.

Two of the four observed loads contained a noticeable amount of compostable prunings (between 10 and 20 percent), apparently collected from community gardens and median weeding projects.

Institutions

The term “institutions” is used here to mean publicly operated facilities that house and feed relatively large numbers of people. Several institutions managed by City departments generate substantial amounts of waste and were selected for observation during this study. For each institution, the contents of a specific compactor were observed twice.

San Francisco General Hospital

The “Kitchen” compactor was observed in fall 2004 and spring 2005. The two loads differed significantly. The first had a substantial amount of medical waste that appeared to be from intensive care, emergency, and/or operating rooms. The second had a much greater fraction of material that appeared to be from food preparation and general patient care activities (gowns, gloves, and some dressing kits), but no “red bag” regulated infectious waste or other material that indicated intensive medical procedures.

The two loads had several materials in common: plastic film, rigid plastic containers (primarily beverage containers), cardboard boxes, and food waste. Each of these materials constituted less than 10 percent of the total, except for film, which was between 10 and 15 percent.

Laguna Honda Hospital

The “Housekeeping” compactor was observed in fall 2004 and spring 2005. The two loads differed somewhat. The first had more waste that appeared to be from patient care, and the second had more material that appeared to be from food preparation and general residential and administrative activities.

There were similar and potentially significant levels of several materials in the two loads. Average concentrations of these materials are listed below:

Rigid plastic containers	11%
Compostable/soiled paper	8%
Low-grade paper	7%
Food waste	7%

Both of the loads also contained a substantial fraction of disposable adult diapers and related products.

San Francisco Jails

The compactor from 850 Bryant Street was observed in fall 2004 and spring 2005. There was a higher proportion of food in the 2004 observation, but in most other respects the two loads were reasonably similar. The five most prevalent materials were:

Food	23%
Plastic films	14%
Low-grade paper	13%
Compostable/soiled paper	13%
Rigid plastic containers	9%

The rigid plastic containers and the paper products were largely single-serving food and beverage containers used by inmates. The Jails building uses a large number of heavy clear plastic bags to contain refuse, and these contributed to the high volume of plastic films. There were also noticeable quantities of reusable dairy crates as well as office paper and beverage bottles (apparently from the staff dining area).

Youth Guidance Center

This compactor was observed twice in spring 2005. In most respects, the two loads were reasonably similar. The most prevalent materials were:

Rigid plastic containers	22%
Compostable/soiled paper	20%
Low-grade paper	11%
Food	9%
Composite/other paper	9%
Plastic films	9%
Metal containers/foil	7%

The rigid plastic containers and the paper products were largely single-serving food and beverage containers used by residents. Dairy products, especially milk and yogurt, were the main sources. The metal containers/foil category was largely made up of institutional-size food cans (“No. 10 cans”). These occupied a great deal of volume because they had not been flattened. One load was nearly 10 percent prunings (ice plant and crabgrass), apparently from weed control efforts at the facility. These prunings were found in plastic trash bags.

Operations

The term “operations” is used here to mean facilities that are used to process materials, maintain equipment, or store and dispatch vehicles. The facilities targeted for this study were selected by City staff.

Muni Yards

Three facilities that clean, repair, and store vehicles used by the San Francisco Municipal Railway were targeted: the San Jose Avenue, Indiana Street, and Harrison Street facilities. One load from each facility’s compactor was characterized. Three materials were prevalent in all three loads:

Low-grade paper	31%
Plain OCC/Kraft	20%
Compostable/soiled paper	19%

The low-grade and compostable/soiled papers appeared to be largely from the cleanout of buses and light-rail vehicles. The cardboard was clearly from boxes of supplies used at the facilities.

There were numerous large objects such as tires and bus windowpanes in these loads. These would cause problems for a sorting system that uses conveyors, such as Recycle Central at Pier 96.

Water Department Corporation Yard

One sample was observed from the Water Department Corporation Yard at 1990 Newcomb Street. The facility is served by an open-top rolloff container that holds office wastes and materials brought to the yard from repair jobsites around the city. In general, this sample appeared to reflect a very low level of effort at waste diversion. The most prevalent materials were:

Low-grade paper	22%
Rigid plastic containers	10%
Plastic films	9%
Compostable/soiled paper	8%

There was also a noticeable amount of wood, some of it pressure-treated, as well as glass and metal beverage containers. It appeared that a portion of the waste was from residential sources. Also, a small volume (estimated at 1 percent) of the waste was oily metal chips that appeared to be from a machine shop; a big-screen television, with picture tube, was also in the observed load.

Wastewater Treatment Plant

The City operates three wastewater treatment facilities; the Southeast Water Pollution Control Plant is the largest, and its operational solid waste disposal needs are served by two open-top rolloff containers. The container from 1700 Jerrold Avenue was observed in fall 2004, and the container from 1701 Jerrold was observed in spring 2005.

The two loads were quite different. The load from 1700 contained a substantial amount of construction and demolition material, apparently from the remodeling of some space within the facility. The load from 1701 had numerous pallets and crates, some cardboard (much of it boxes that had contained labware), and a number of sacks that had a paper outer layer and a plastic lining. Both loads contained prunings, apparently from the facility grounds, and a noticeable amount of refuse that appeared to be from residential sources.

Fire Department

Several years ago, the SFE made a major effort to reduce wastes from fire stations and enable them to make full use of the Fantastic 3 program by setting out compostables, recyclable containers, and paper separately from refuse. To gain insight into how well the Department is using the program, refuse from five stations in various parts of the city was collected as a composite sample.

Visually, the most striking component of this sample was the large number of purple gloves used by EMT's and paramedics based at the fire stations. On a volume basis, the most prevalent material was compostable/soiled paper, at more than 30 percent. Most of this was paper towels. The gloves and other plastic items were the second-greatest constituent, at 16 percent, and rigid plastics—mainly beverage containers—were third, at 12 percent.

Food was only 5 percent, in spite of ample evidence that meals are prepared in the fire stations. Most of the small amount of recyclable paper appeared to originate from one station (720 Moscow Street), and there was virtually no cardboard in this sample. In summary, it appears that aside from beverage containers, most of the fire stations are actively recycling.

Recreation and Park Department

The Recreation and Park Department is the source of several distinct waste streams that may be reducible through very specific source separation and source reduction efforts. For this study, several loads and parts of loads from subsections of Recreation and Park's refuse collection routes were examined in spring 2005. Because each of these samples was unique, computing the average composition would not be meaningful. However, the following observations were made for specific samples:

- At Buena Vista Park (and possibly other parks), where vehicle access into the park is difficult, gardeners place grass and weeds in plastic "lawn and leaf" bags, which are collected as refuse.

- Illegal dumping, especially by small contractors and renovating homeowners, is an obvious problem. The examined loads were from Golden Gate Park and nearby large park areas (Great Highway, Lake Merced, etc.), and every load had ½ to 1 cubic yard of C&D or renovation waste, including carpet and padding, roofing material, etc. Recreation and Park staff voiced the observation that McLaren Park is much more heavily affected by these wastes.
- Illegal dumping of household waste also occurs. Recreation and Park staff indicated that such dumping is especially prevalent along Great Highway.
- In refuse from several locations, a substantial volume of beverage containers was found. Exact sources could not be determined, but likely sources appeared to be Buena Vista Park, Great Highway, and Lake Merced. The average concentration of beverage containers, across all Recreation and Park samples, was approximately 15 percent by volume. (The data indicate 20 percent, but this includes rigid plastics such as picnic plates.)
- Picnic wastes are a noticeable component, but across all of the observed samples, the average concentration of food wastes was approximately 5 percent by volume.

A load from the rolloff container that serves the Corporation Yard within Golden Gate Park was also examined. Compared to the other Recreation and Park Department samples, the Corporation Yard load contained a noticeable amount of corrugated cardboard as well as more animal wastes and prunings (primarily pulled weeds, but also trimmed branches).

APPENDIX A

Detailed Waste Characterization Tables

Recyclable materials are indicated in blue, and compostable materials are indicated in yellow. For the purposes of this report, recyclable paper, plastic, and glass are defined as materials that are accepted by the Fantastic 3 Program, and recyclable metals and C&D wastes are those that are known to be commonly recycled in San Francisco.

Table A-1: Characterization of San Francisco Waste Disposed through Norcal

Material	Est. Pct.	+ / -	Est. Tons	Material	Est. Pct.	+ / -	Est. Tons
Paper	24.3%		125,177	Organics	33.0%		170,305
Newspaper	3.7%	0.7%	19,287	Grass	0.2%	0.1%	871
Plain OCC/Kraft Paper	3.2%	0.4%	16,675	Prunings	1.7%	0.6%	8,997
Waxed OCC/Kraft Paper	0.9%	0.6%	4,458	Food	26.8%	1.9%	138,242
High-Grade Paper	1.7%	0.3%	8,660	Disposable Diapers	2.1%	0.4%	10,965
Mixed Low-Grade Paper	7.2%	0.7%	37,360	Animal By-products	1.4%	0.5%	7,378
Polycoated Paper	0.8%	0.1%	4,326	Composite/Other Organic	0.7%	0.5%	3,852
Compostable/Soiled Paper	5.5%	0.6%	28,312	Other Materials	9.5%		49,015
Composite/Other Paper	1.2%	0.2%	6,098	Tires	0.0%	0.0%	224
Plastic	10.5%		54,316	Rubber	0.3%	0.1%	1,570
PET Bottles	0.5%	0.1%	2,759	Textiles	3.4%	0.8%	17,753
HDPE Natural Bottles	0.2%	0.0%	989	Carpet/Upholstery	1.6%	0.5%	8,040
HDPE Colored Bottles	0.2%	0.0%	854	Apparel	0.4%	0.1%	2,120
Other Plastic Bottles	0.0%	0.0%	136	Furniture	0.6%	0.4%	3,138
#2, 4, & 5 Tubs, Cups, and Lids	0.4%	0.1%	1,860	Mattresses	0.1%	0.0%	506
#1, 3, 6, & 7 Tubs, Cups, and Lids	0.6%	0.1%	2,973	Appliances	0.2%	0.2%	1,188
Nonfood Expanded Polystyrene	0.2%	0.1%	1,221	Composite/Other Products	2.8%	0.1%	14,477
Other Food Service Plastics	0.7%	0.1%	3,761	CDL Wastes	12.2%		62,776
Other Rigid Packaging	0.7%	0.3%	3,667	Clean Wood	1.6%	0.5%	8,085
Clean Shopping/Dry Cleaner Bags	0.2%	0.0%	1,018	Pallets & Crates	0.6%	0.3%	2,882
Other Clean Polyethylene Film	0.5%	0.2%	2,762	Stumps & Logs	0.0%	0.0%	85
Other Film	4.5%	0.5%	23,156	Composite/Other Wood	0.6%	0.3%	3,314
Plastic Products	1.0%	0.2%	5,282	Clean Gypsum	0.3%	0.2%	1,359
Composite/Other Plastic	0.8%	0.2%	3,878	Painted Gypsum	0.2%	0.2%	1,120
Glass	3.3%		17,142	Fiberglass Insulation	0.0%	0.0%	64
Beverage Bottles	1.8%	0.3%	9,181	Rock/Concrete/Bricks	2.3%	1.0%	11,996
Container Glass	0.3%	0.1%	1,331	Asphaltic Roofing	3.6%	0.8%	18,585
Plate Glass	1.0%	1.0%	4,992	Ceramics	0.3%	0.2%	1,706
Composite/Other Glass	0.3%	0.2%	1,638	Sand/Soil/Dirt/Grit/Fines	2.1%	1.1%	10,974
Metals	4.2%		21,910	Composite/Other Construction Debris	0.5%	0.3%	2,608
Aluminum Cans	0.2%	0.0%	858	Hazardous Wastes	2.9%		15,022
Aluminum Foil/Containers	0.2%	0.0%	872	Hazardous Waste	2.9%	0.9%	15,022
Other Aluminum	0.1%	0.0%	266				
Other Nonferrous	0.1%	0.0%	345				
Tin/Steel Cans	0.6%	0.1%	3,121				
Empty Paint & Aerosol Cans	0.1%	0.0%	258				
Empty Propane and Other Tanks	0.0%	0.0%	8				
Other Ferrous	2.0%	0.7%	10,111				
Composite/Other Metals	1.2%	0.3%	6,070				
Total				Total	100.0%		515,664
Number of samples:	291						

Table A-2: Characterization of Waste Disposed through Fantastic 3 Program

Material	Est. Pct.	+ / -	Est. Tons	Material	Est. Pct.	+ / -	Est. Tons
Paper	23.4%		55,631	Organics	47.4%		112,604
Newspaper	3.8%	0.5%	9,011	Grass	0.1%	0.1%	340
Plain OCC/Kraft Paper	2.7%	0.4%	6,390	Prunings	1.5%	0.6%	3,636
Waxed OCC/Kraft Paper	0.3%	0.1%	786	Food	38.8%	2.7%	92,055
High-Grade Paper	1.7%	0.3%	4,005	Disposable Diapers	3.6%	0.8%	8,482
Mixed Low-Grade Paper	6.7%	0.6%	15,852	Animal By-products	2.7%	0.9%	6,521
Polycoated Paper	0.9%	0.1%	2,090	Composite/Other Organic	0.7%	0.2%	1,570
Compostable/Soiled Paper	6.2%	0.6%	14,627	Other Materials	5.7%		13,491
Composite/Other Paper	1.2%	0.2%	2,869	Tires	0.0%	0.0%	22
Plastic	11.6%		27,645	Rubber	0.3%	0.2%	666
PET Bottles	0.6%	0.1%	1,454	Textiles	3.4%	0.6%	8,107
HDPE Natural Bottles	0.2%	0.0%	538	Carpet/Upholstery	1.2%	0.6%	2,901
HDPE Colored Bottles	0.2%	0.0%	542	Apparel	0.7%	0.2%	1,571
Other Plastic Bottles	0.0%	0.0%	80	Furniture	0.0%	0.0%	0
#2, 4, & 5 Tubs, Cups, and Lids	0.4%	0.1%	1,009	Mattresses	0.0%	0.0%	0
#1, 3, 6, & 7 Tubs, Cups, and Lids	0.6%	0.1%	1,502	Appliances	0.1%	0.1%	224
Nonfood Expanded Polystyrene	0.2%	0.1%	565	Composite/Other Products	0.0%	0.0%	1
Other Food Service Plastics	0.9%	0.1%	2,107	CDL Wastes	3.5%		8,291
Other Rigid Packaging	0.5%	0.1%	1,262	Clean Wood	0.5%	0.3%	1,238
Clean Shopping/Dry Cleaner Bags	0.3%	0.1%	630	Pallets & Crates	0.0%	0.0%	44
Other Clean Polyethylene Film	0.5%	0.2%	1,144	Stumps & Logs	0.0%	0.0%	0
Other Film	5.1%	0.4%	12,212	Composite/Other Wood	0.7%	0.5%	1,642
Plastic Products	1.0%	0.3%	2,420	Clean Gypsum	0.3%	0.3%	810
Composite/Other Plastic	0.9%	0.2%	2,182	Painted Gypsum	0.0%	0.0%	2
Glass	2.7%		6,396	Fiberglass Insulation	0.0%	0.0%	18
Beverage Bottles	2.0%	0.3%	4,797	Rock/Concrete/Bricks	0.7%	0.8%	1,744
Container Glass	0.4%	0.1%	868	Asphaltic Roofing	0.0%	0.0%	65
Plate Glass	0.1%	0.1%	291	Ceramics	0.6%	0.4%	1,318
Composite/Other Glass	0.2%	0.1%	440	Sand/Soil/Dirt/Grit/Fines	0.5%	0.3%	1,106
Metals	3.7%		8,735	Composite/Other Construction Debris	0.1%	0.1%	304
Aluminum Cans	0.2%	0.0%	528	Hazardous Wastes	1.9%		4,528
Aluminum Foil/Containers	0.2%	0.0%	551	Hazardous Waste	1.9%	0.6%	4,528
Other Aluminum	0.1%	0.0%	140				
Other Nonferrous	0.1%	0.1%	148				
Tin/Steel Cans	0.7%	0.1%	1,747				
Empty Paint & Aerosol Cans	0.0%	0.0%	108				
Empty Propane and Other Tanks	0.0%	0.0%	8				
Other Ferrous	1.3%	0.9%	3,168				
Composite/Other Metals	1.0%	0.2%	2,337				
Number of samples:	115			Total	100.0%		237,321

Table A-3: Characterization of Waste Disposed through Fantastic 3 Single-Family Residential Program

Material	Est. Pct.	+ / -	Est. Tons	Material	Est. Pct.	+ / -	Est. Tons
Paper	20.6%		26,683	Organics	53.1%		68,801
Newspaper	3.0%	0.7%	3,952	Grass	0.2%	0.1%	214
Plain OCC/Kraft Paper	2.0%	0.5%	2,538	Prunings	1.6%	0.8%	2,082
Waxed OCC/Kraft Paper	0.1%	0.1%	92	Food	42.2%	3.6%	54,664
High-Grade Paper	1.3%	0.3%	1,726	Disposable Diapers	4.6%	1.3%	6,026
Mixed Low-Grade Paper	6.0%	0.9%	7,814	Animal By-products	3.8%	1.6%	4,893
Polycoated Paper	0.7%	0.1%	942	Composite/Other Organic	0.7%	0.3%	922
Compostable/Soiled Paper	6.4%	0.8%	8,323	Other Materials	5.6%		7,313
Composite/Other Paper	1.0%	0.2%	1,295	Tires	0.0%	0.0%	22
Plastic	11.3%		14,659	Rubber	0.2%	0.1%	261
PET Bottles	0.5%	0.1%	670	Textiles	3.2%	0.8%	4,199
HDPE Natural Bottles	0.2%	0.1%	212	Carpet/Upholstery	1.2%	0.8%	1,518
HDPE Colored Bottles	0.3%	0.1%	344	Apparel	0.9%	0.3%	1,106
Other Plastic Bottles	0.0%	0.0%	47	Furniture	0.0%	0.0%	0
#2, 4, & 5 Tubs, Cups, and Lids	0.4%	0.1%	565	Mattresses	0.0%	0.0%	0
#1, 3, 6, & 7 Tubs, Cups, and Lids	0.7%	0.2%	906	Appliances	0.2%	0.2%	209
Nonfood Expanded Polystyrene	0.2%	0.1%	257	Composite/Other Products	0.0%	0.0%	0
Other Food Service Plastics	0.9%	0.2%	1,151	CDL Wastes	2.5%		3,216
Other Rigid Packaging	0.6%	0.2%	789	Clean Wood	0.6%	0.4%	780
Clean Shopping/Dry Cleaner Bags	0.2%	0.1%	242	Pallets & Crates	0.0%	0.0%	0
Other Clean Polyethylene Film	0.2%	0.2%	316	Stumps & Logs	0.0%	0.0%	0
Other Film	5.2%	0.4%	6,739	Composite/Other Wood	0.4%	0.2%	543
Plastic Products	1.1%	0.5%	1,434	Clean Gypsum	0.5%	0.5%	696
Composite/Other Plastic	0.8%	0.2%	988	Painted Gypsum	0.0%	0.0%	2
Glass	1.9%		2,526	Fiberglass Insulation	0.0%	0.0%	18
Beverage Bottles	1.3%	0.3%	1,627	Rock/Concrete/Bricks	0.1%	0.1%	102
Container Glass	0.4%	0.1%	549	Asphaltic Roofing	0.0%	0.0%	0
Plate Glass	0.1%	0.1%	92	Ceramics	0.4%	0.2%	533
Composite/Other Glass	0.2%	0.1%	258	Sand/Soil/Dirt/Grit/Fines	0.2%	0.3%	309
Metals	3.1%		4,000	Composite/Other Construction Debris	0.2%	0.2%	233
Aluminum Cans	0.2%	0.0%	247	Hazardous Wastes	1.9%		2,432
Aluminum Foil/Containers	0.2%	0.1%	305	Hazardous Waste	1.9%	0.5%	2,432
Other Aluminum	0.0%	0.0%	20				
Other Nonferrous	0.1%	0.1%	128				
Tin/Steel Cans	0.7%	0.1%	876				
Empty Paint & Aerosol Cans	0.1%	0.0%	69				
Empty Propane and Other Tanks	0.0%	0.0%	0				
Other Ferrous	0.8%	0.3%	1,025				
Composite/Other Metals	1.0%	0.3%	1,331				
Number of samples:	40			Total	100.0%		129,630

Table A-4: Characterization of Waste Disposed through Fantastic 3 Multifamily Residential Program

Material	Est. Pct.	+ / -	Est. Tons	Material	Est. Pct.	+ / -	Est. Tons
Paper	25.1%		12,086	Organics	37.6%		18,064
Newspaper	5.0%	1.6%	2,421	Grass	0.3%	0.3%	123
Plain OCC/Kraft Paper	2.6%	0.6%	1,232	Prunings	1.4%	1.1%	694
Waxed OCC/Kraft Paper	0.3%	0.3%	131	Food	29.9%	6.3%	14,392
High-Grade Paper	1.6%	0.4%	762	Disposable Diapers	2.4%	1.2%	1,163
Mixed Low-Grade Paper	7.4%	1.3%	3,543	Animal By-products	2.7%	1.5%	1,281
Polycoated Paper	0.9%	0.2%	452	Composite/Other Organic	0.9%	0.7%	411
Compostable/Soiled Paper	6.1%	1.6%	2,954	Other Materials	8.4%		4,022
Composite/Other Paper	1.2%	0.3%	590	Tires	0.0%	0.0%	0
Plastic	11.6%		5,554	Rubber	0.6%	0.7%	292
PET Bottles	0.9%	0.2%	431	Textiles	5.1%	1.7%	2,472
HDPE Natural Bottles	0.2%	0.1%	118	Carpet/Upholstery	1.9%	2.0%	923
HDPE Colored Bottles	0.3%	0.1%	125	Apparel	0.7%	0.4%	335
Other Plastic Bottles	0.0%	0.0%	18	Furniture	0.0%	0.0%	0
#2, 4, & 5 Tubs, Cups, and Lids	0.3%	0.1%	162	Mattresses	0.0%	0.0%	0
#1, 3, 6, & 7 Tubs, Cups, and Lids	0.6%	0.2%	276	Appliances	0.0%	0.0%	0
Nonfood Expanded Polystyrene	0.4%	0.2%	194	Composite/Other Products	0.0%	0.0%	0
Other Food Service Plastics	0.8%	0.3%	396	CDL Wastes	7.2%		3,480
Other Rigid Packaging	0.5%	0.2%	239	Clean Wood	0.1%	0.1%	71
Clean Shopping/Dry Cleaner Bags	0.2%	0.1%	117	Pallets & Crates	0.0%	0.0%	0
Other Clean Polyethylene Film	0.5%	0.6%	242	Stumps & Logs	0.0%	0.0%	0
Other Film	4.7%	1.0%	2,265	Composite/Other Wood	1.9%	2.6%	904
Plastic Products	0.8%	0.4%	404	Clean Gypsum	0.2%	0.4%	114
Composite/Other Plastic	1.2%	0.8%	566	Painted Gypsum	0.0%	0.0%	0
Glass	4.3%		2,063	Fiberglass Insulation	0.0%	0.0%	0
Beverage Bottles	3.6%	0.9%	1,716	Rock/Concrete/Bricks	2.6%	3.7%	1,227
Container Glass	0.5%	0.2%	249	Asphaltic Roofing	0.0%	0.1%	20
Plate Glass	0.0%	0.0%	2	Ceramics	1.1%	1.7%	534
Composite/Other Glass	0.2%	0.2%	96	Sand/Soil/Dirt/Grit/Fines	1.2%	1.1%	567
Metals	3.4%		1,614	Composite/Other Construction Debris	0.1%	0.1%	43
Aluminum Cans	0.3%	0.1%	156	Hazardous Wastes	2.5%		1,199
Aluminum Foil/Containers	0.2%	0.1%	117	Hazardous Waste	2.5%	1.7%	1,199
Other Aluminum	0.1%	0.1%	56				
Other Nonferrous	0.0%	0.0%	2				
Tin/Steel Cans	0.8%	0.3%	390				
Empty Paint & Aerosol Cans	0.0%	0.0%	18				
Empty Propane and Other Tanks	0.0%	0.0%	0				
Other Ferrous	0.8%	0.7%	371				
Composite/Other Metals	1.1%	0.6%	505				
Number of samples:	21			Total	100.0%		48,082

Table A-5: Characterization of Waste Disposed through Fantastic 3 CGI Program

Material	Est. Pct.	+ / -	Est. Tons	Material	Est. Pct.	+ / -	Est. Tons
Paper	28.3%		16,861	Organics	43.2%		25,739
Newspaper	4.4%	0.7%	2,638	Grass	0.0%	0.0%	2
Plain OCC/Kraft Paper	4.4%	0.9%	2,620	Prunings	1.4%	1.2%	860
Waxed OCC/Kraft Paper	0.9%	0.4%	562	Food	38.6%	5.5%	22,999
High-Grade Paper	2.5%	1.0%	1,517	Disposable Diapers	2.2%	1.7%	1,294
Mixed Low-Grade Paper	7.5%	1.3%	4,495	Animal By-products	0.6%	0.4%	347
Polycoated Paper	1.2%	0.3%	695	Composite/Other Organic	0.4%	0.2%	238
Compostable/Soiled Paper	5.6%	0.8%	3,350	Other Materials	3.6%		2,156
Composite/Other Paper	1.7%	0.6%	984	Tires	0.0%	0.0%	0
Plastic	12.5%		7,433	Rubber	0.2%	0.1%	112
PET Bottles	0.6%	0.1%	353	Textiles	2.4%	1.0%	1,436
HDPE Natural Bottles	0.3%	0.1%	207	Carpet/Upholstery	0.8%	0.6%	461
HDPE Colored Bottles	0.1%	0.0%	72	Apparel	0.2%	0.1%	131
Other Plastic Bottles	0.0%	0.0%	15	Furniture	0.0%	0.0%	0
#2, 4, & 5 Tubs, Cups, and Lids	0.5%	0.2%	282	Mattresses	0.0%	0.0%	0
#1, 3, 6, & 7 Tubs, Cups, and Lids	0.5%	0.2%	320	Appliances	0.0%	0.0%	16
Nonfood Expanded Polystyrene	0.2%	0.1%	114	Composite/Other Products	0.0%	0.0%	1
Other Food Service Plastics	0.9%	0.2%	561	CDL Wastes	2.7%		1,595
Other Rigid Packaging	0.4%	0.1%	234	Clean Wood	0.6%	0.6%	387
Clean Shopping/Dry Cleaner Bags	0.5%	0.3%	271	Pallets & Crates	0.1%	0.1%	44
Other Clean Polyethylene Film	1.0%	0.7%	586	Stumps & Logs	0.0%	0.0%	0
Other Film	5.4%	1.0%	3,209	Composite/Other Wood	0.3%	0.2%	195
Plastic Products	1.0%	0.5%	581	Clean Gypsum	0.0%	0.0%	0
Composite/Other Plastic	1.1%	0.4%	628	Painted Gypsum	0.0%	0.0%	0
Glass	3.0%		1,807	Fiberglass Insulation	0.0%	0.0%	0
Beverage Bottles	2.4%	0.7%	1,454	Rock/Concrete/Bricks	0.7%	0.9%	415
Container Glass	0.1%	0.1%	69	Asphaltic Roofing	0.1%	0.1%	46
Plate Glass	0.3%	0.5%	197	Ceramics	0.4%	0.2%	251
Composite/Other Glass	0.1%	0.1%	87	Sand/Soil/Dirt/Grit/Fines	0.4%	0.3%	230
Metals	5.2%		3,121	Composite/Other Construction Debris	0.0%	0.1%	28
Aluminum Cans	0.2%	0.1%	124	Hazardous Wastes	1.5%		897
Aluminum Foil/Containers	0.2%	0.1%	129	Hazardous Waste	1.5%	1.3%	897
Other Aluminum	0.1%	0.1%	65				
Other Nonferrous	0.0%	0.0%	19				
Tin/Steel Cans	0.8%	0.3%	481				
Empty Paint & Aerosol Cans	0.0%	0.0%	22				
Empty Propane and Other Tanks	0.0%	0.0%	8				
Other Ferrous	3.0%	3.3%	1,773				
Composite/Other Metals	0.8%	0.4%	501				
Number of samples:	54			Total	100.0%		59,609

Table A-6: Characterization of Waste from the Pier 96 Material Recovery Facility

Material	Est. Pct.	+ / -	Est. Tons	Material	Est. Pct.	+ / -	Est. Tons
Paper	43.1%		8,381	Organics	12.9%		2,505
Newspaper	6.4%	2.2%	1,251	Grass	0.0%	0.0%	0
Plain OCC/Kraft Paper	2.3%	0.9%	446	Prunings	0.4%	0.2%	81
Waxed OCC/Kraft Paper	0.0%	0.0%	0	Food	9.3%	5.0%	1,812
High-Grade Paper	3.1%	1.3%	601	Disposable Diapers	2.5%	1.5%	479
Mixed Low-Grade Paper	12.2%	1.8%	2,366	Animal By-products	0.2%	0.3%	48
Polycoated Paper	1.1%	0.6%	206	Composite/Other Organic	0.4%	0.4%	85
Compostable/Soiled Paper	16.5%	9.7%	3,218	Other Materials	8.4%		1,631
Composite/Other Paper	1.5%	0.9%	293	Tires	0.0%	0.0%	0
Plastic	21.2%		4,116	Rubber	0.3%	0.3%	62
PET Bottles	0.8%	0.1%	149	Textiles	6.4%	2.3%	1,240
HDPE Natural Bottles	0.3%	0.1%	50	Carpet/Upholstery	0.7%	0.5%	144
HDPE Colored Bottles	0.2%	0.0%	34	Apparel	0.7%	1.0%	137
Other Plastic Bottles	0.1%	0.1%	18	Furniture	0.0%	0.0%	0
#2, 4, & 5 Tubs, Cups, and Lids	1.8%	1.2%	346	Mattresses	0.0%	0.0%	0
#1, 3, 6, & 7 Tubs, Cups, and Lids	1.1%	0.6%	223	Appliances	0.2%	0.4%	47
Nonfood Expanded Polystyrene	0.3%	0.1%	63	Composite/Other Products	0.0%	0.0%	0
Other Food Service Plastics	1.6%	1.2%	316	CDL Wastes	5.3%		1,026
Other Rigid Packaging	2.0%	1.2%	396	Clean Wood	0.1%	0.1%	25
Clean Shopping/Dry Cleaner Bags	0.7%	0.4%	135	Pallets & Crates	0.0%	0.0%	0
Other Clean Polyethylene Film	0.6%	0.3%	113	Stumps & Logs	0.0%	0.0%	0
Other Film	8.2%	1.0%	1,592	Composite/Other Wood	0.9%	0.3%	183
Plastic Products	2.2%	0.6%	430	Clean Gypsum	0.0%	0.0%	1
Composite/Other Plastic	1.3%	0.5%	249	Painted Gypsum	0.2%	0.4%	45
Glass	2.2%		426	Fiberglass Insulation	0.0%	0.0%	0
Beverage Bottles	2.0%	0.8%	380	Rock/Concrete/Bricks	0.9%	1.4%	166
Container Glass	0.1%	0.1%	13	Asphaltic Roofing	0.0%	0.0%	0
Plate Glass	0.0%	0.0%	0	Ceramics	0.0%	0.0%	5
Composite/Other Glass	0.2%	0.2%	33	Sand/Soil/Dirt/Grit/Fines	2.2%	1.6%	434
Metals	6.3%		1,225	Composite/Other Construction Debris	0.9%	1.5%	167
Aluminum Cans	0.3%	0.0%	61	Hazardous Wastes	0.7%		137
Aluminum Foil/Containers	0.3%	0.1%	56	Hazardous Waste	0.7%	0.8%	137
Other Aluminum	0.1%	0.1%	15				
Other Nonferrous	0.3%	0.4%	53				
Tin/Steel Cans	1.5%	1.1%	295				
Empty Paint & Aerosol Cans	0.1%	0.2%	28				
Empty Propane and Other Tanks	0.0%	0.0%	0				
Other Ferrous	2.0%	1.5%	397				
Composite/Other Metals	1.6%	0.4%	321				
Number of samples:	18			Total	100.0%		19,447

Table A-7: Characterization of Waste from Pier 96 Fantastic 3 Operations

Material	Est. Pct.	+ / -	Est. Tons	Material	Est. Pct.	+ / -	Est. Tons
Paper	43.2%		6,889	Organics	12.4%		1,975
Newspaper	6.6%	2.6%	1,052	Grass	0.0%	0.0%	0
Plain OCC/Kraft Paper	2.1%	1.1%	331	Prunings	0.2%	0.1%	30
Waxed OCC/Kraft Paper	0.0%	0.0%	0	Food	8.5%	6.0%	1,360
High-Grade Paper	2.0%	1.5%	323	Disposable Diapers	2.9%	1.8%	466
Mixed Low-Grade Paper	12.5%	2.0%	1,997	Animal By-products	0.3%	0.3%	47
Polycoated Paper	1.0%	0.7%	154	Composite/Other Organic	0.5%	0.5%	72
Compostable/Soiled Paper	17.7%	11.9%	2,816	Other Materials	9.7%		1,541
Composite/Other Paper	1.4%	1.1%	216	Tires	0.0%	0.0%	0
Plastic	21.4%		3,411	Rubber	0.3%	0.3%	50
PET Bottles	0.8%	0.1%	127	Textiles	7.3%	2.8%	1,169
HDPE Natural Bottles	0.3%	0.1%	42	Carpet/Upholstery	0.9%	0.6%	143
HDPE Colored Bottles	0.2%	0.0%	29	Apparel	0.8%	1.2%	132
Other Plastic Bottles	0.1%	0.1%	17	Furniture	0.0%	0.0%	0
#2, 4, & 5 Tubs, Cups, and Lids	2.1%	1.4%	330	Mattresses	0.0%	0.0%	0
#1, 3, 6, & 7 Tubs, Cups, and Lids	1.2%	0.7%	189	Appliances	0.3%	0.5%	47
Nonfood Expanded Polystyrene	0.3%	0.2%	50	Composite/Other Products	0.0%	0.0%	0
Other Food Service Plastics	1.7%	1.5%	268	CDL Wastes	3.3%		529
Other Rigid Packaging	2.3%	1.4%	362	Clean Wood	0.1%	0.1%	10
Clean Shopping/Dry Cleaner Bags	0.8%	0.5%	129	Pallets & Crates	0.0%	0.0%	0
Other Clean Polyethylene Film	0.7%	0.3%	107	Stumps & Logs	0.0%	0.0%	0
Other Film	7.5%	1.0%	1,191	Composite/Other Wood	1.0%	0.3%	166
Plastic Products	2.3%	0.7%	362	Clean Gypsum	0.0%	0.0%	0
Composite/Other Plastic	1.3%	0.6%	208	Painted Gypsum	0.0%	0.0%	0
Glass	2.3%		360	Fiberglass Insulation	0.0%	0.0%	0
Beverage Bottles	2.0%	1.0%	318	Rock/Concrete/Bricks	1.0%	1.7%	156
Container Glass	0.1%	0.1%	10	Asphaltic Roofing	0.0%	0.0%	0
Plate Glass	0.0%	0.0%	0	Ceramics	0.0%	0.0%	0
Composite/Other Glass	0.2%	0.3%	32	Sand/Soil/Dirt/Grit/Fines	0.2%	0.2%	30
Metals	7.0%		1,122	Composite/Other Construction Debris	1.0%	1.8%	166
Aluminum Cans	0.3%	0.0%	50	Hazardous Wastes	0.7%		108
Aluminum Foil/Containers	0.3%	0.1%	47	Hazardous Waste	0.7%	1.0%	108
Other Aluminum	0.1%	0.2%	15				
Other Nonferrous	0.3%	0.5%	52				
Tin/Steel Cans	1.7%	1.3%	278				
Empty Paint & Aerosol Cans	0.2%	0.3%	27				
Empty Propane and Other Tanks	0.0%	0.0%	0				
Other Ferrous	2.3%	1.8%	370				
Composite/Other Metals	1.8%	0.4%	283				
Number of samples:	4			Total	100.0%		15,934

Table A-8: Characterization of Waste from Other Pier 96 Operations

Material	Est. Pct.	+ / -	Est. Tons	Material	Est. Pct.	+ / -	Est. Tons
Paper	42.5%		1,491	Organics	15.1%		530
Newspaper	5.6%	1.7%	198	Grass	0.0%	0.0%	0
Plain OCC/Kraft Paper	3.3%	1.0%	115	Prunings	1.5%	1.1%	51
Waxed OCC/Kraft Paper	0.0%	0.0%	0	Food	12.9%	5.2%	452
High-Grade Paper	7.9%	2.7%	278	Disposable Diapers	0.4%	0.2%	13
Mixed Low-Grade Paper	10.5%	3.8%	368	Animal By-products	0.0%	0.0%	1
Polycoated Paper	1.5%	0.6%	53	Composite/Other Organic	0.4%	0.3%	13
Compostable/Soiled Paper	11.4%	2.8%	401	Other Materials	2.6%		91
Composite/Other Paper	2.2%	0.7%	77	Tires	0.0%	0.0%	0
Plastic	20.1%		705	Rubber	0.4%	0.2%	13
PET Bottles	0.6%	0.1%	22	Textiles	2.0%	1.1%	72
HDPE Natural Bottles	0.2%	0.1%	8	Carpet/Upholstery	0.0%	0.0%	1
HDPE Colored Bottles	0.2%	0.1%	5	Apparel	0.2%	0.2%	6
Other Plastic Bottles	0.0%	0.0%	1	Furniture	0.0%	0.0%	0
#2, 4, & 5 Tubs, Cups, and Lids	0.5%	0.2%	16	Mattresses	0.0%	0.0%	0
#1, 3, 6, & 7 Tubs, Cups, and Lids	1.0%	0.3%	35	Appliances	0.0%	0.0%	0
Nonfood Expanded Polystyrene	0.4%	0.2%	14	Composite/Other Products	0.0%	0.0%	0
Other Food Service Plastics	1.4%	0.7%	48	CDL Wastes	14.2%		498
Other Rigid Packaging	1.0%	0.4%	34	Clean Wood	0.4%	0.2%	14
Clean Shopping/Dry Cleaner Bags	0.2%	0.1%	6	Pallets & Crates	0.0%	0.0%	0
Other Clean Polyethylene Film	0.2%	0.1%	7	Stumps & Logs	0.0%	0.0%	0
Other Film	11.4%	3.3%	401	Composite/Other Wood	0.5%	0.3%	17
Plastic Products	1.9%	1.3%	67	Clean Gypsum	0.0%	0.0%	1
Composite/Other Plastic	1.2%	1.0%	41	Painted Gypsum	1.3%	2.1%	45
Glass	1.9%		66	Fiberglass Insulation	0.0%	0.0%	0
Beverage Bottles	1.8%	0.9%	62	Rock/Concrete/Bricks	0.3%	0.3%	10
Container Glass	0.1%	0.1%	3	Asphaltic Roofing	0.0%	0.0%	0
Plate Glass	0.0%	0.0%	0	Ceramics	0.2%	0.1%	5
Composite/Other Glass	0.0%	0.0%	1	Sand/Soil/Dirt/Grit/Fines	11.5%	8.6%	405
Metals	3.0%		104	Composite/Other Construction Debris	0.0%	0.0%	1
Aluminum Cans	0.3%	0.1%	11	Hazardous Wastes	0.8%		29
Aluminum Foil/Containers	0.2%	0.2%	8	Hazardous Waste	0.8%	0.5%	29
Other Aluminum	0.0%	0.0%	0				
Other Nonferrous	0.0%	0.1%	1				
Tin/Steel Cans	0.5%	0.1%	17				
Empty Paint & Aerosol Cans	0.0%	0.0%	1				
Empty Propane and Other Tanks	0.0%	0.0%	0				
Other Ferrous	0.8%	0.4%	28				
Composite/Other Metals	1.1%	0.5%	38				
Number of samples:	14			Total	100.0%		3,513

Table A-9: Characterization of Other Commercially Collected Waste

Material	Est. Pct.	+ / -	Est. Tons	Material	Est. Pct.	+ / -	Est. Tons
Paper	28.1%		48,521	Organics	29.2%		50,401
Newspaper	4.0%	1.7%	6,941	Grass	0.2%	0.3%	393
Plain OCC/Kraft Paper	4.5%	1.1%	7,837	Prunings	1.9%	1.1%	3,330
Waxed OCC/Kraft Paper	1.9%	1.8%	3,358	Food	24.2%	4.2%	41,748
High-Grade Paper	2.1%	0.8%	3,601	Disposable Diapers	1.2%	0.5%	2,004
Mixed Low-Grade Paper	7.6%	1.7%	13,037	Animal By-products	0.5%	0.5%	781
Polycoated Paper	0.9%	0.3%	1,597	Composite/Other Organic	1.2%	1.3%	2,144
Compostable/Soiled Paper	5.6%	1.3%	9,670	Other Materials	6.1%		10,463
Composite/Other Paper	1.4%	0.6%	2,482	Tires	0.0%	0.0%	12
Plastic	11.6%		19,950	Rubber	0.5%	0.3%	842
PET Bottles	0.6%	0.2%	1,101	Textiles	2.6%	1.1%	4,472
HDPE Natural Bottles	0.2%	0.1%	381	Carpet/Upholstery	1.6%	1.2%	2,841
HDPE Colored Bottles	0.2%	0.0%	269	Apparel	0.2%	0.2%	373
Other Plastic Bottles	0.0%	0.0%	36	Furniture	0.9%	0.9%	1,480
#2, 4, & 5 Tubs, Cups, and Lids	0.3%	0.1%	469	Mattresses	0.1%	0.1%	115
#1, 3, 6, & 7 Tubs, Cups, and Lids	0.7%	0.2%	1,200	Appliances	0.0%	0.1%	80
Nonfood Expanded Polystyrene	0.3%	0.1%	440	Composite/Other Products	0.1%	0.1%	249
Other Food Service Plastics	0.7%	0.2%	1,238	CDL Wastes	11.2%		19,397
Other Rigid Packaging	1.1%	0.8%	1,867	Clean Wood	1.8%	1.1%	3,149
Clean Shopping/Dry Cleaner Bags	0.1%	0.1%	214	Pallets & Crates	1.5%	1.0%	2,512
Other Clean Polyethylene Film	0.8%	0.5%	1,453	Stumps & Logs	0.0%	0.0%	0
Other Film	5.0%	1.2%	8,565	Composite/Other Wood	0.8%	0.7%	1,341
Plastic Products	1.1%	0.3%	1,917	Clean Gypsum	0.3%	0.4%	495
Composite/Other Plastic	0.5%	0.1%	802	Painted Gypsum	0.0%	0.0%	17
Glass	5.7%		9,895	Fiberglass Insulation	0.0%	0.0%	0
Beverage Bottles	2.1%	0.7%	3,693	Rock/Concrete/Bricks	2.4%	2.1%	4,130
Container Glass	0.2%	0.1%	337	Asphaltic Roofing	0.0%	0.0%	0
Plate Glass	2.7%	3.0%	4,700	Ceramics	0.2%	0.1%	344
Composite/Other Glass	0.7%	0.6%	1,165	Sand/Soil/Dirt/Grit/Fines	3.8%	3.1%	6,557
Metals	4.5%		7,783	Composite/Other Construction Debris	0.5%	0.3%	853
Aluminum Cans	0.2%	0.0%	261	Hazardous Wastes	3.5%		6,107
Aluminum Foil/Containers	0.1%	0.1%	251	Hazardous Waste	3.5%	2.1%	6,107
Other Aluminum	0.1%	0.1%	111				
Other Nonferrous	0.1%	0.1%	143				
Tin/Steel Cans	0.6%	0.2%	1,044				
Empty Paint & Aerosol Cans	0.1%	0.0%	114				
Empty Propane and Other Tanks	0.0%	0.0%	0				
Other Ferrous	2.3%	1.4%	4,013				
Composite/Other Metals	1.1%	0.4%	1,846				
Total	100.0%		172,517				
Number of samples:	76						

Table A-10: Characterization of Commercially Collected Multifamily Residential Waste

Material	Est. Pct.	+ / -	Est. Tons	Material	Est. Pct.	+ / -	Est. Tons
Paper	22.4%		3,164	Organics	38.3%		5,413
Newspaper	3.1%	1.0%	443	Grass	0.1%	0.1%	13
Plain OCC/Kraft Paper	2.7%	0.7%	377	Prunings	2.6%	2.0%	363
Waxed OCC/Kraft Paper	0.3%	0.3%	41	Food	29.4%	12.3%	4,152
High-Grade Paper	1.6%	0.6%	233	Disposable Diapers	2.3%	0.8%	326
Mixed Low-Grade Paper	8.7%	3.0%	1,225	Animal By-products	3.4%	4.8%	482
Polycoated Paper	0.6%	0.2%	84	Composite/Other Organic	0.5%	0.4%	77
Compostable/Soiled Paper	4.5%	2.0%	636	Other Materials	8.3%		1,175
Composite/Other Paper	0.9%	0.3%	125	Tires	0.0%	0.0%	0
Plastic	10.4%		1,463	Rubber	0.1%	0.1%	17
PET Bottles	0.6%	0.2%	90	Textiles	6.6%	4.1%	932
HDPE Natural Bottles	0.4%	0.1%	60	Carpet/Upholstery	0.2%	0.2%	26
HDPE Colored Bottles	0.3%	0.2%	38	Apparel	0.5%	0.3%	67
Other Plastic Bottles	0.0%	0.0%	7	Furniture	0.9%	1.5%	134
#2, 4, & 5 Tubs, Cups, and Lids	0.3%	0.1%	47	Mattresses	0.0%	0.0%	0
#1, 3, 6, & 7 Tubs, Cups, and Lids	0.7%	0.3%	97	Appliances	0.0%	0.0%	0
Nonfood Expanded Polystyrene	0.2%	0.2%	31	Composite/Other Products	0.0%	0.0%	0
Other Food Service Plastics	0.7%	0.3%	104	CDL Wastes	5.5%		778
Other Rigid Packaging	0.4%	0.2%	56	Clean Wood	1.4%	1.6%	197
Clean Shopping/Dry Cleaner Bags	0.2%	0.2%	26	Pallets & Crates	0.0%	0.0%	0
Other Clean Polyethylene Film	0.2%	0.2%	25	Stumps & Logs	0.0%	0.0%	0
Other Film	3.6%	0.9%	508	Composite/Other Wood	3.0%	2.3%	422
Plastic Products	2.2%	2.2%	311	Clean Gypsum	0.0%	0.0%	0
Composite/Other Plastic	0.4%	0.2%	63	Painted Gypsum	0.0%	0.0%	0
Glass	3.7%		525	Fiberglass Insulation	0.0%	0.0%	0
Beverage Bottles	2.5%	0.5%	350	Rock/Concrete/Bricks	0.0%	0.0%	0
Container Glass	0.8%	0.4%	116	Asphaltic Roofing	0.0%	0.0%	0
Plate Glass	0.0%	0.0%	2	Ceramics	0.2%	0.2%	30
Composite/Other Glass	0.4%	0.4%	56	Sand/Soil/Dirt/Grit/Fines	0.0%	0.0%	6
Metals	6.1%		864	Composite/Other Construction Debris	0.9%	1.1%	123
Aluminum Cans	0.3%	0.1%	47	Hazardous Wastes	5.3%		747
Aluminum Foil/Containers	0.2%	0.0%	24	Hazardous Waste	5.3%	5.2%	747
Other Aluminum	0.1%	0.1%	17				
Other Nonferrous	0.3%	0.4%	40				
Tin/Steel Cans	1.0%	0.4%	142				
Empty Paint & Aerosol Cans	0.0%	0.0%	3				
Empty Propane and Other Tanks	0.0%	0.0%	0				
Other Ferrous	0.6%	0.3%	84				
Composite/Other Metals	3.6%	3.0%	507				
Number of samples:	21			Total	100.0%		14,129

Table A-11: Characterization of Commercially Collected CGI Waste

Material	Est. Pct.	+ / -	Est. Tons	Material	Est. Pct.	+ / -	Est. Tons
Paper	29.4%		42,422	Organics	31.0%		44,671
Newspaper	4.1%	2.0%	5,933	Grass	0.2%	0.3%	289
Plain OCC/Kraft Paper	4.4%	1.2%	6,401	Prunings	2.1%	1.3%	2,959
Waxed OCC/Kraft Paper	2.3%	2.2%	3,317	Food	25.9%	4.8%	37,379
High-Grade Paper	2.3%	0.9%	3,368	Disposable Diapers	1.2%	0.6%	1,678
Mixed Low-Grade Paper	7.4%	1.9%	10,601	Animal By-products	0.2%	0.3%	299
Polycoated Paper	1.0%	0.3%	1,487	Composite/Other Organic	1.4%	1.6%	2,067
Compostable/Soiled Paper	6.3%	1.5%	9,007	Other Materials	5.4%		7,728
Composite/Other Paper	1.6%	0.7%	2,310	Tires	0.0%	0.0%	12
Plastic	12.4%		17,892	Rubber	0.6%	0.3%	825
PET Bottles	0.7%	0.3%	1,007	Textiles	2.4%	1.3%	3,424
HDPE Natural Bottles	0.2%	0.1%	318	Carpet/Upholstery	1.7%	1.4%	2,380
HDPE Colored Bottles	0.2%	0.1%	230	Apparel	0.2%	0.2%	299
Other Plastic Bottles	0.0%	0.0%	28	Furniture	0.4%	0.7%	567
#2, 4, & 5 Tubs, Cups, and Lids	0.3%	0.1%	417	Mattresses	0.0%	0.0%	24
#1, 3, 6, & 7 Tubs, Cups, and Lids	0.8%	0.2%	1,096	Appliances	0.0%	0.1%	44
Nonfood Expanded Polystyrene	0.3%	0.1%	398	Composite/Other Products	0.1%	0.1%	154
Other Food Service Plastics	0.8%	0.3%	1,131	CDL Wastes	10.0%		14,420
Other Rigid Packaging	1.3%	0.9%	1,807	Clean Wood	1.8%	1.3%	2,623
Clean Shopping/Dry Cleaner Bags	0.1%	0.1%	173	Pallets & Crates	1.2%	1.0%	1,750
Other Clean Polyethylene Film	1.0%	0.7%	1,427	Stumps & Logs	0.0%	0.0%	0
Other Film	5.6%	1.5%	8,025	Composite/Other Wood	0.6%	0.8%	919
Plastic Products	0.8%	0.3%	1,189	Clean Gypsum	0.3%	0.5%	495
Composite/Other Plastic	0.4%	0.1%	646	Painted Gypsum	0.0%	0.0%	17
Glass	6.4%		9,208	Fiberglass Insulation	0.0%	0.0%	0
Beverage Bottles	2.2%	0.8%	3,198	Rock/Concrete/Bricks	2.8%	2.6%	3,967
Container Glass	0.1%	0.1%	203	Asphaltic Roofing	0.0%	0.0%	0
Plate Glass	3.3%	3.6%	4,698	Ceramics	0.2%	0.1%	314
Composite/Other Glass	0.8%	0.7%	1,108	Sand/Soil/Dirt/Grit/Fines	2.8%	3.2%	3,968
Metals	3.1%		4,455	Composite/Other Construction Debris	0.3%	0.3%	367
Aluminum Cans	0.1%	0.0%	212	Hazardous Wastes	2.3%		3,254
Aluminum Foil/Containers	0.2%	0.1%	224	Hazardous Waste	2.3%	1.2%	3,254
Other Aluminum	0.0%	0.0%	9				
Other Nonferrous	0.1%	0.1%	91				
Tin/Steel Cans	0.6%	0.2%	889				
Empty Paint & Aerosol Cans	0.1%	0.0%	111				
Empty Propane and Other Tanks	0.0%	0.0%	0				
Other Ferrous	1.3%	0.8%	1,824				
Composite/Other Metals	0.8%	0.3%	1,094				
Number of samples:	49			Total	100.0%		144,050

Table A-12: Characterization of Commercially Collected Home Cleanout Waste

Material	Est. Pct.	+ / -	Est. Tons	Material	Est. Pct.	+ / -	Est. Tons
Paper	20.5%		2,934	Organics	2.2%		317
Newspaper	3.9%	2.8%	565	Grass	0.6%	1.0%	91
Plain OCC/Kraft Paper	7.4%	5.1%	1,058	Prunings	0.1%	0.1%	9
Waxed OCC/Kraft Paper	0.0%	0.0%	0	Food	1.5%	2.4%	217
High-Grade Paper	0.0%	0.0%	0	Disposable Diapers	0.0%	0.0%	0
Mixed Low-Grade Paper	8.4%	5.9%	1,211	Animal By-products	0.0%	0.0%	0
Polycoated Paper	0.2%	0.3%	26	Composite/Other Organic	0.0%	0.0%	0
Compostable/Soiled Paper	0.2%	0.3%	27				
Composite/Other Paper	0.3%	0.5%	47	Other Materials	10.9%		1,559
Plastic	4.2%		595	Tires	0.0%	0.0%	0
PET Bottles	0.0%	0.0%	4	Rubber	0.0%	0.0%	0
HDPE Natural Bottles	0.0%	0.0%	3	Textiles	0.8%	1.1%	116
HDPE Colored Bottles	0.0%	0.0%	1	Carpet/Upholstery	3.0%	3.4%	435
Other Plastic Bottles	0.0%	0.0%	0	Apparel	0.0%	0.1%	7
#2, 4, & 5 Tubs, Cups, and Lids	0.0%	0.0%	5	Furniture	5.4%	8.5%	779
#1, 3, 6, & 7 Tubs, Cups, and Lids	0.0%	0.0%	7	Mattresses	0.6%	1.1%	91
Nonfood Expanded Polystyrene	0.1%	0.1%	10	Appliances	0.3%	0.4%	36
Other Food Service Plastics	0.0%	0.0%	4	Composite/Other Products	0.7%	0.8%	95
Other Rigid Packaging	0.0%	0.0%	3	CDL Wastes	29.3%		4,199
Clean Shopping/Dry Cleaner Bags	0.1%	0.1%	14	Clean Wood	2.3%	1.9%	329
Other Clean Polyethylene Film	0.0%	0.0%	1	Pallets & Crates	5.3%	5.5%	761
Other Film	0.2%	0.2%	32	Stumps & Logs	0.0%	0.0%	0
Plastic Products	2.9%	1.9%	417	Composite/Other Wood	0.0%	0.0%	0
Composite/Other Plastic	0.7%	0.8%	94	Clean Gypsum	0.0%	0.0%	0
Glass	1.1%		163	Painted Gypsum	0.0%	0.0%	0
Beverage Bottles	1.0%	1.1%	145	Fiberglass Insulation	0.0%	0.0%	0
Container Glass	0.1%	0.1%	18	Rock/Concrete/Bricks	1.1%	2.0%	163
Plate Glass	0.0%	0.0%	0	Asphaltic Roofing	0.0%	0.0%	0
Composite/Other Glass	0.0%	0.0%	0	Ceramics	0.0%	0.0%	0
Metals	17.2%		2,465	Sand/Soil/Dirt/Grit/Fines	18.0%	17.2%	2,583
Aluminum Cans	0.0%	0.0%	2	Composite/Other Construction Debris	2.5%	2.2%	362
Aluminum Foil/Containers	0.0%	0.0%	3	Hazardous Wastes	14.7%		2,106
Other Aluminum	0.6%	1.0%	85	Hazardous Waste	14.7%	21.7%	2,106
Other Nonferrous	0.1%	0.2%	13				
Tin/Steel Cans	0.1%	0.1%	12				
Empty Paint & Aerosol Cans	0.0%	0.0%	0				
Empty Propane and Other Tanks	0.0%	0.0%	0				
Other Ferrous	14.7%	15.2%	2,104				
Composite/Other Metals	1.7%	2.7%	245				
Number of samples:	6			Total	100.0%		14,338

Table A-13: Characterization of Self-Hauled Waste

Material	Est. Pct.	+ / -	Est. Tons	Material	Est. Pct.	+ / -	Est. Tons
Paper	13.4%		8,941	Organics	6.9%		4,589
Newspaper	3.0%	1.6%	2,021	Grass	0.2%	0.3%	134
Plain OCC/Kraft Paper	2.5%	1.5%	1,684	Prunings	2.6%	2.7%	1,770
Waxed OCC/Kraft Paper	0.5%	0.7%	311	Food	3.9%	2.2%	2,603
High-Grade Paper	0.4%	0.5%	297	Disposable Diapers	0.0%	0.0%	0
Mixed Low-Grade Paper	4.5%	2.2%	3,011	Animal By-products	0.0%	0.1%	29
Polycoated Paper	0.6%	0.4%	425	Composite/Other Organic	0.1%	0.1%	52
Compostable/Soiled Paper	1.2%	0.6%	788				
Composite/Other Paper	0.6%	0.4%	403	Other Materials	31.5%		21,046
Plastic	2.8%		1,854	Tires	0.3%	0.3%	187
PET Bottles	0.1%	0.0%	54	Rubber	0.0%	0.0%	0
HDPE Natural Bottles	0.0%	0.0%	20	Textiles	5.7%	4.5%	3,843
HDPE Colored Bottles	0.0%	0.0%	9	Carpet/Upholstery	0.9%	0.5%	580
Other Plastic Bottles	0.0%	0.0%	2	Apparel	0.1%	0.0%	37
#2, 4, & 5 Tubs, Cups, and Lids	0.1%	0.0%	35	Furniture	2.0%	1.7%	1,347
#1, 3, 6, & 7 Tubs, Cups, and Lids	0.1%	0.0%	46	Mattresses	0.4%	0.2%	276
Nonfood Expanded Polystyrene	0.0%	0.0%	33	Appliances	1.0%	0.8%	666
Other Food Service Plastics	0.1%	0.1%	99	Composite/Other Products	21.1%	0.4%	14,110
Other Rigid Packaging	0.2%	0.1%	141	CDL Wastes	34.9%		23,336
Clean Shopping/Dry Cleaner Bags	0.1%	0.0%	36	Clean Wood	1.7%	1.6%	1,119
Other Clean Polyethylene Film	0.1%	0.1%	52	Pallets & Crates	0.5%	0.5%	314
Other Film	0.4%	0.2%	257	Stumps & Logs	0.1%	0.1%	55
Plastic Products	0.7%	0.3%	437	Composite/Other Wood	0.2%	0.3%	148
Composite/Other Plastic	0.9%	1.1%	634	Clean Gypsum	0.0%	0.0%	0
Glass	0.5%		322	Painted Gypsum	0.0%	0.0%	0
Beverage Bottles	0.5%	0.4%	306	Fiberglass Insulation	0.0%	0.0%	12
Container Glass	0.0%	0.0%	16	Rock/Concrete/Bricks	1.0%	1.8%	694
Plate Glass	0.0%	0.0%	0	Asphaltic Roofing	26.4%	6.3%	17,689
Composite/Other Glass	0.0%	0.0%	0	Ceramics	0.0%	0.0%	0
Metals	5.4%		3,578	Sand/Soil/Dirt/Grit/Fines	3.8%	1.8%	2,573
Aluminum Cans	0.0%	0.0%	8	Composite/Other Construction Debris	1.1%	1.6%	731
Aluminum Foil/Containers	0.0%	0.0%	14	Hazardous Wastes	4.8%		3,214
Other Aluminum	0.0%	0.0%	0	Hazardous Waste	4.8%	3.7%	3,214
Other Nonferrous	0.0%	0.0%	0				
Tin/Steel Cans	0.0%	0.0%	33				
Empty Paint & Aerosol Cans	0.0%	0.0%	3				
Empty Propane and Other Tanks	0.0%	0.0%	0				
Other Ferrous	3.6%	1.9%	2,388				
Composite/Other Metals	1.7%	1.6%	1,132				
Total	100.0%		66,879				
Number of samples:	27						

Table A-14: Characterization of Self-Hauled Waste from Businesses

Material	Est. Pct.	+ / -	Est. Tons	Material	Est. Pct.	+ / -	Est. Tons
Paper	2.4%		404	Organics	1.4%		242
Newspaper	0.2%	0.2%	31	Grass	0.0%	0.1%	5
Plain OCC/Kraft Paper	0.5%	0.6%	85	Prunings	1.0%	1.6%	173
Waxed OCC/Kraft Paper	0.9%	1.7%	149	Food	0.4%	0.7%	64
High-Grade Paper	0.0%	0.0%	0	Disposable Diapers	0.0%	0.0%	0
Mixed Low-Grade Paper	0.4%	0.5%	65	Animal By-products	0.0%	0.0%	0
Polycoated Paper	0.1%	0.2%	19	Composite/Other Organic	0.0%	0.0%	0
Compostable/Soiled Paper	0.1%	0.2%	20				
Composite/Other Paper	0.2%	0.4%	34	Other Materials	0.7%		123
Plastic	2.5%		427	Tires	0.0%	0.0%	0
PET Bottles	0.0%	0.0%	0	Rubber	0.0%	0.0%	0
HDPE Natural Bottles	0.0%	0.0%	0	Textiles	0.1%	0.1%	11
HDPE Colored Bottles	0.0%	0.0%	0	Carpet/Upholstery	0.1%	0.3%	24
Other Plastic Bottles	0.0%	0.0%	0	Apparel	0.0%	0.0%	1
#2, 4, & 5 Tubs, Cups, and Lids	0.0%	0.0%	1	Furniture	0.2%	0.2%	27
#1, 3, 6, & 7 Tubs, Cups, and Lids	0.0%	0.0%	1	Mattresses	0.0%	0.0%	0
Nonfood Expanded Polystyrene	0.1%	0.1%	10	Appliances	0.0%	0.0%	0
Other Food Service Plastics	0.0%	0.0%	0	Composite/Other Products	0.4%	0.7%	60
Other Rigid Packaging	0.0%	0.0%	0	CDL Wastes	90.1%		15,170
Clean Shopping/Dry Cleaner Bags	0.0%	0.1%	8	Clean Wood	3.6%	4.2%	598
Other Clean Polyethylene Film	0.0%	0.0%	0	Pallets & Crates	0.2%	0.3%	37
Other Film	0.1%	0.1%	18	Stumps & Logs	0.0%	0.0%	0
Plastic Products	0.0%	0.0%	3	Composite/Other Wood	0.0%	0.0%	0
Composite/Other Plastic	2.3%	2.9%	386	Clean Gypsum	0.0%	0.0%	0
Glass	0.0%		0	Painted Gypsum	0.0%	0.0%	0
Beverage Bottles	0.0%	0.0%	0	Fiberglass Insulation	0.0%	0.1%	8
Container Glass	0.0%	0.0%	0	Rock/Concrete/Bricks	2.8%	4.9%	480
Plate Glass	0.0%	0.0%	0	Asphaltic Roofing	72.2%	17.3%	12,158
Composite/Other Glass	0.0%	0.0%	0	Ceramics	0.0%	0.0%	0
Metals	2.4%		405	Sand/Soil/Dirt/Grit/Fines	8.3%	4.7%	1,399
Aluminum Cans	0.0%	0.0%	0	Composite/Other Construction Debris	2.9%	4.4%	490
Aluminum Foil/Containers	0.0%	0.0%	0	Hazardous Wastes	0.4%		62
Other Aluminum	0.0%	0.0%	0	Hazardous Waste	0.4%	0.5%	62
Other Nonferrous	0.0%	0.0%	0				
Tin/Steel Cans	0.0%	0.0%	0				
Empty Paint & Aerosol Cans	0.0%	0.0%	2				
Empty Propane and Other Tanks	0.0%	0.0%	0				
Other Ferrous	1.8%	2.5%	302				
Composite/Other Metals	0.6%	0.8%	101				
Number of samples:			9	Total	100.0%		16,832

Table A-15: Characterization of Self-Hauled Waste from the Department of Public Works

Material	Est. Pct.	+ / -	Est. Tons	Material	Est. Pct.	+ / -	Est. Tons
Paper	17.0%		7,807	Organics	7.9%		3,636
Newspaper	4.0%	2.3%	1,854	Grass	0.3%	0.4%	121
Plain OCC/Kraft Paper	3.4%	2.2%	1,557	Prunings	3.4%	3.9%	1,568
Waxed OCC/Kraft Paper	0.3%	0.4%	144	Food	4.2%	3.0%	1,947
High-Grade Paper	0.6%	0.8%	283	Disposable Diapers	0.0%	0.0%	0
Mixed Low-Grade Paper	5.8%	3.2%	2,653	Animal By-products	0.0%	0.0%	0
Polycoated Paper	0.8%	0.6%	376	Composite/Other Organic	0.0%	0.0%	0
Compostable/Soiled Paper	1.4%	0.8%	628	Other Materials	44.9%		20,655
Composite/Other Paper	0.7%	0.5%	313	Tires	0.4%	0.4%	187
Plastic	2.7%		1,255	Rubber	0.0%	0.0%	0
PET Bottles	0.1%	0.1%	44	Textiles	8.2%	6.5%	3,785
HDPE Natural Bottles	0.0%	0.0%	12	Carpet/Upholstery	0.9%	0.7%	429
HDPE Colored Bottles	0.0%	0.0%	7	Apparel	0.1%	0.1%	33
Other Plastic Bottles	0.0%	0.0%	1	Furniture	2.7%	2.4%	1,245
#2, 4, & 5 Tubs, Cups, and Lids	0.0%	0.0%	22	Mattresses	0.6%	0.3%	276
#1, 3, 6, & 7 Tubs, Cups, and Lids	0.1%	0.0%	28	Appliances	1.4%	1.2%	666
Nonfood Expanded Polystyrene	0.0%	0.0%	21	Composite/Other Products	30.5%	0.4%	14,035
Other Food Service Plastics	0.2%	0.1%	89	CDL Wastes	13.5%		6,238
Other Rigid Packaging	0.3%	0.2%	132	Clean Wood	1.0%	0.6%	439
Clean Shopping/Dry Cleaner Bags	0.0%	0.0%	18	Pallets & Crates	0.6%	0.8%	258
Other Clean Polyethylene Film	0.1%	0.1%	51	Stumps & Logs	0.1%	0.2%	55
Other Film	0.5%	0.3%	214	Composite/Other Wood	0.3%	0.5%	148
Plastic Products	0.9%	0.4%	429	Clean Gypsum	0.0%	0.0%	0
Composite/Other Plastic	0.4%	0.4%	186	Painted Gypsum	0.0%	0.0%	0
Glass	0.5%		246	Fiberglass Insulation	0.0%	0.0%	3
Beverage Bottles	0.5%	0.6%	239	Rock/Concrete/Bricks	0.3%	0.6%	157
Container Glass	0.0%	0.0%	8	Asphaltic Roofing	8.7%	2.1%	3,988
Plate Glass	0.0%	0.0%	0	Ceramics	0.0%	0.0%	0
Composite/Other Glass	0.0%	0.0%	0	Sand/Soil/Dirt/Grit/Fines	2.2%	0.8%	1,008
Metals	6.7%		3,075	Composite/Other Construction Debris	0.4%	0.5%	183
Aluminum Cans	0.0%	0.0%	7	Hazardous Wastes	6.8%		3,133
Aluminum Foil/Containers	0.0%	0.0%	12	Hazardous Waste	6.8%	5.3%	3,133
Other Aluminum	0.0%	0.0%	0				
Other Nonferrous	0.0%	0.0%	0				
Tin/Steel Cans	0.1%	0.0%	25				
Empty Paint & Aerosol Cans	0.0%	0.0%	1				
Empty Propane and Other Tanks	0.0%	0.0%	0				
Other Ferrous	4.5%	2.4%	2,050				
Composite/Other Metals	2.1%	2.3%	980				
Total	100.0%		46,047				
Number of samples:	14						

Table A-16: Characterization of Waste from the iMRF

Material	Est. Pct.	+ / -	Est. Tons	Material	Est. Pct.	+ / -	Est. Tons
Paper	19.5%		3,415	Organics	0.7%		125
Newspaper	0.0%	0.0%	2	Grass	0.0%	0.0%	0
Plain OCC/Kraft Paper	1.7%	1.0%	291	Prunings	0.7%	0.7%	125
Waxed OCC/Kraft Paper	0.0%	0.0%	0	Food	0.0%	0.0%	0
High-Grade Paper	0.7%	0.8%	124	Disposable Diapers	0.0%	0.0%	0
Mixed Low-Grade Paper	17.0%	8.1%	2,961	Animal By-products	0.0%	0.0%	0
Polycoated Paper	0.0%	0.0%	0	Composite/Other Organic	0.0%	0.0%	0
Compostable/Soiled Paper	0.0%	0.0%	0				
Composite/Other Paper	0.2%	0.3%	36	Other Materials	9.1%		1,595
Plastic	3.9%		678	Tires	0.0%	0.0%	0
PET Bottles	0.0%	0.0%	0	Rubber	0.0%	0.0%	0
HDPE Natural Bottles	0.0%	0.0%	0	Textiles	0.4%	0.2%	62
HDPE Colored Bottles	0.0%	0.0%	0	Carpet/Upholstery	8.2%	5.5%	1,434
Other Plastic Bottles	0.0%	0.0%	0	Apparel	0.0%	0.0%	0
#2, 4, & 5 Tubs, Cups, and Lids	0.0%	0.0%	0	Furniture	0.0%	0.0%	0
#1, 3, 6, & 7 Tubs, Cups, and Lids	0.0%	0.0%	0	Mattresses	0.0%	0.0%	0
Nonfood Expanded Polystyrene	0.7%	0.8%	120	Appliances	0.0%	0.0%	0
Other Food Service Plastics	0.0%	0.0%	0	Composite/Other Products	0.6%	0.8%	99
Other Rigid Packaging	0.0%	0.0%	0	CDL Wastes	58.7%		10,253
Clean Shopping/Dry Cleaner Bags	0.0%	0.0%	0	Clean Wood	14.0%	7.6%	2,440
Other Clean Polyethylene Film	0.0%	0.0%	0	Pallets & Crates	0.0%	0.0%	0
Other Film	3.0%	1.6%	521	Stumps & Logs	0.0%	0.0%	0
Plastic Products	0.2%	0.1%	29	Composite/Other Wood	0.0%	0.0%	0
Composite/Other Plastic	0.0%	0.0%	8	Clean Gypsum	0.3%	0.4%	53
Glass	0.5%		96	Painted Gypsum	6.0%	4.8%	1,055
Beverage Bottles	0.0%	0.0%	0	Fiberglass Insulation	0.2%	0.2%	34
Container Glass	0.5%	0.9%	96	Rock/Concrete/Bricks	30.1%	14.6%	5,261
Plate Glass	0.0%	0.0%	0	Asphaltic Roofing	4.8%	3.2%	831
Composite/Other Glass	0.0%	0.0%	0	Ceramics	0.2%	0.4%	38
Metals	2.4%		420	Sand/Soil/Dirt/Grit/Fines	0.0%	0.0%	0
Aluminum Cans	0.0%	0.0%	0	Composite/Other Construction Debris	3.1%	2.2%	541
Aluminum Foil/Containers	0.0%	0.0%	0	Hazardous Wastes	5.1%		886
Other Aluminum	0.0%	0.0%	0	Hazardous Waste	5.1%	5.3%	886
Other Nonferrous	0.0%	0.0%	0				
Tin/Steel Cans	0.0%	0.0%	0				
Empty Paint & Aerosol Cans	0.0%	0.0%	5				
Empty Propane and Other Tanks	0.0%	0.0%	0				
Other Ferrous	0.0%	0.0%	3				
Composite/Other Metals	2.4%	2.0%	413				
Number of samples:	55			Total	100.0%		17,468

Table A-17: Characterization of Waste Disposed at the Hillside Landfill

Material	Est. Pct.	+ / -	Est. Tons	Material	Est. Pct.	+ / -	Est. Tons
Paper	5.9%		1,910	Organics	2.2%		703
Newspaper	0.8%	0.3%	252	Grass	0.1%	0.1%	42
Plain OCC/Kraft Paper	0.1%	0.0%	44	Prunings	1.2%	0.5%	385
Waxed OCC/Kraft Paper	0.0%	0.0%	1	Food	0.3%	0.3%	87
High-Grade Paper	0.2%	0.2%	73	Disposable Diapers	0.0%	0.0%	0
Mixed Low-Grade Paper	1.1%	0.4%	348	Animal By-products	0.0%	0.0%	0
Polycoated Paper	2.1%	1.6%	664	Composite/Other Organic	0.6%	0.9%	189
Compostable/Soiled Paper	0.1%	0.1%	18				
Composite/Other Paper	1.6%	1.2%	511	Other Materials	9.1%		2,916
Plastic	1.2%		387	Tires	0.0%	0.0%	14
PET Bottles	0.0%	0.0%	2	Rubber	0.0%	0.0%	0
HDPE Natural Bottles	0.0%	0.0%	1	Textiles	1.3%	0.6%	415
HDPE Colored Bottles	0.0%	0.0%	0	Carpet/Upholstery	0.3%	0.1%	85
Other Plastic Bottles	0.0%	0.0%	0	Apparel	0.0%	0.0%	3
#2, 4, & 5 Tubs, Cups, and Lids	0.0%	0.0%	1	Furniture	3.3%	1.3%	1,069
#1, 3, 6, & 7 Tubs, Cups, and Lids	0.0%	0.0%	1	Mattresses	0.0%	0.0%	14
Nonfood Expanded Polystyrene	0.0%	0.0%	14	Appliances	3.4%	1.6%	1,088
Other Food Service Plastics	0.0%	0.0%	5	Composite/Other Products	0.7%	0.3%	228
Other Rigid Packaging	0.0%	0.0%	7	CDL Wastes	69.7%		22,401
Clean Shopping/Dry Cleaner Bags	0.0%	0.0%	3	Clean Wood	0.7%	0.2%	228
Other Clean Polyethylene Film	0.1%	0.0%	17	Pallets & Crates	0.0%	0.0%	6
Other Film	0.2%	0.1%	64	Stumps & Logs	0.0%	0.0%	2
Plastic Products	0.6%	0.2%	198	Composite/Other Wood	0.0%	0.0%	13
Composite/Other Plastic	0.2%	0.1%	75	Clean Gypsum	3.6%	2.0%	1,163
Glass	2.9%		933	Painted Gypsum	6.6%	2.2%	2,124
Beverage Bottles	0.0%	0.0%	12	Fiberglass Insulation	0.0%	0.0%	14
Container Glass	0.0%	0.0%	0	Rock/Concrete/Bricks	25.0%	6.0%	8,042
Plate Glass	1.3%	0.8%	422	Asphaltic Roofing	3.6%	2.7%	1,148
Composite/Other Glass	1.6%	0.8%	499	Ceramics	7.5%	2.4%	2,415
Metals	3.3%		1,050	Sand/Soil/Dirt/Grit/Fines	20.0%	4.3%	6,431
Aluminum Cans	0.0%	0.0%	0	Composite/Other Construction Debris	2.5%	1.0%	816
Aluminum Foil/Containers	0.0%	0.0%	0	Hazardous Wastes	5.7%		1,844
Other Aluminum	0.0%	0.0%	10	Hazardous Waste	5.7%	1.0%	1,844
Other Nonferrous	0.2%	0.1%	61				
Tin/Steel Cans	0.0%	0.0%	1				
Empty Paint & Aerosol Cans	0.1%	0.0%	19				
Empty Propane and Other Tanks	0.0%	0.0%	7				
Other Ferrous	0.7%	0.2%	230				
Composite/Other Metals	2.2%	0.8%	722				
Number of samples:	321			Total	100.0%		32,145

Table A-18: Characterization of San Francisco Waste Disposed through Norcal, Winter Season

Material	Est. Pct.	+ / -	Material	Est. Pct.	+ / -
Paper	23.2%		Organics	32.6%	
Newspaper	4.1%	1.1%	Grass	0.1%	0.1%
Plain OCC/Kraft Paper	3.3%	0.7%	Prunings	1.9%	0.8%
Waxed OCC/Kraft Paper	1.4%	1.2%	Food	26.9%	2.8%
High-Grade Paper	1.5%	0.3%	Disposable Diapers	2.0%	0.7%
Mixed Low-Grade Paper	6.7%	1.1%	Animal By-products	1.2%	0.4%
Polycoated Paper	0.8%	0.2%	Composite/Other Organic	0.5%	0.2%
Compostable/Soiled Paper	4.5%	1.0%	Other Materials	9.9%	
Composite/Other Paper	0.9%	0.2%	Tires	0.0%	0.0%
Plastic	10.0%		Rubber	0.2%	0.1%
PET Bottles	0.5%	0.1%	Textiles	3.3%	0.9%
HDPE Natural Bottles	0.2%	0.0%	Carpet/Upholstery	2.1%	0.7%
HDPE Colored Bottles	0.1%	0.0%	Apparel	0.5%	0.2%
Other Plastic Bottles	0.0%	0.0%	Furniture	0.6%	0.4%
#2, 4, & 5 Tubs, Cups, and Lids	0.3%	0.1%	Mattresses	0.1%	0.0%
#1, 3, 6, & 7 Tubs, Cups, and Lids	0.2%	0.1%	Appliances	0.3%	0.2%
Nonfood Expanded Polystyrene	0.3%	0.1%	Composite/Other Products	2.8%	0.1%
Other Food Service Plastics	1.1%	0.2%	CDL Wastes	14.3%	
Other Rigid Packaging	0.9%	0.9%	Clean Wood	2.1%	1.1%
Clean Shopping/Dry Cleaner Bags	0.2%	0.1%	Pallets & Crates	0.6%	0.4%
Other Clean Polyethylene Film	0.7%	0.3%	Stumps & Logs	0.0%	0.0%
Other Film	3.7%	0.5%	Composite/Other Wood	0.7%	0.5%
Plastic Products	1.2%	0.3%	Clean Gypsum	0.3%	0.3%
Composite/Other Plastic	0.7%	0.2%	Painted Gypsum	0.2%	0.2%
Glass	3.2%		Fiberglass Insulation	0.0%	0.0%
Beverage Bottles	1.7%	0.3%	Rock/Concrete/Bricks	3.2%	2.2%
Container Glass	0.2%	0.1%	Asphaltic Roofing	3.6%	0.8%
Plate Glass	1.0%	1.0%	Ceramics	0.5%	0.3%
Composite/Other Glass	0.3%	0.2%	Sand/Soil/Dirt/Grit/Fines	2.4%	1.3%
Metals	3.4%		Composite/Other Construction Debris	0.7%	0.4%
Aluminum Cans	0.1%	0.0%	Hazardous Wastes	3.4%	
Aluminum Foil/Containers	0.2%	0.1%	Hazardous Waste	3.4%	1.1%
Other Aluminum	0.0%	0.0%			
Other Nonferrous	0.1%	0.1%			
Tin/Steel Cans	0.5%	0.1%			
Empty Paint & Aerosol Cans	0.0%	0.0%			
Empty Propane and Other Tanks	0.0%	0.0%			
Other Ferrous	1.4%	0.5%			
Composite/Other Metals	1.0%	0.3%			
Number of samples:	200		Total	100.0%	

Table A-19: Characterization of San Francisco Waste Disposed through Norcal, Spring Season

Material	Est. Pct.	+ / -	Material	Est. Pct.	+ / -
Paper	24.9%		Organics	33.2%	
Newspaper	3.4%	0.5%	Grass	0.2%	0.2%
Plain OCC/Kraft Paper	3.1%	0.5%	Prunings	1.6%	0.6%
Waxed OCC/Kraft Paper	0.4%	0.2%	Food	26.7%	2.5%
High-Grade Paper	1.7%	0.4%	Disposable Diapers	2.3%	0.5%
Mixed Low-Grade Paper	7.8%	0.8%	Animal By-products	1.6%	0.8%
Polycoated Paper	0.8%	0.1%	Composite/Other Organic	0.8%	0.6%
Compostable/Soiled Paper	6.4%	0.7%			
Composite/Other Paper	1.4%	0.4%	Other Materials	9.1%	
Plastic	11.0%		Tires	0.0%	0.0%
PET Bottles	0.6%	0.1%	Rubber	0.3%	0.1%
HDPE Natural Bottles	0.2%	0.0%	Textiles	3.6%	0.8%
HDPE Colored Bottles	0.2%	0.0%	Carpet/Upholstery	1.1%	0.5%
Other Plastic Bottles	0.0%	0.0%	Apparel	0.3%	0.1%
#2, 4, & 5 Tubs, Cups, and Lids	0.4%	0.1%	Furniture	0.6%	0.4%
#1, 3, 6, & 7 Tubs, Cups, and Lids	0.9%	0.1%	Mattresses	0.1%	0.0%
Nonfood Expanded Polystyrene	0.2%	0.1%	Appliances	0.2%	0.1%
Other Food Service Plastics	0.4%	0.1%	Composite/Other Products	2.8%	0.1%
Other Rigid Packaging	0.7%	0.1%	CDL Wastes	10.6%	
Clean Shopping/Dry Cleaner Bags	0.2%	0.1%	Clean Wood	1.4%	0.5%
Other Clean Polyethylene Film	0.3%	0.3%	Pallets & Crates	0.5%	0.3%
Other Film	5.1%	0.6%	Stumps & Logs	0.0%	0.0%
Plastic Products	0.9%	0.2%	Composite/Other Wood	0.5%	0.3%
Composite/Other Plastic	0.8%	0.2%	Clean Gypsum	0.2%	0.2%
Glass	3.5%		Painted Gypsum	0.2%	0.2%
Beverage Bottles	1.9%	0.5%	Fiberglass Insulation	0.0%	0.0%
Container Glass	0.3%	0.1%	Rock/Concrete/Bricks	1.7%	0.8%
Plate Glass	0.9%	1.0%	Asphaltic Roofing	3.6%	0.8%
Composite/Other Glass	0.4%	0.2%	Ceramics	0.2%	0.1%
Metals	5.2%		Sand/Soil/Dirt/Grit/Fines	1.8%	1.0%
Aluminum Cans	0.2%	0.0%	Composite/Other Construction Debris	0.4%	0.2%
Aluminum Foil/Containers	0.2%	0.0%	Hazardous Wastes	2.5%	
Other Aluminum	0.1%	0.1%	Hazardous Waste	2.5%	0.9%
Other Nonferrous	0.1%	0.1%			
Tin/Steel Cans	0.7%	0.2%			
Empty Paint & Aerosol Cans	0.1%	0.0%			
Empty Propane and Other Tanks	0.0%	0.0%			
Other Ferrous	2.6%	1.2%			
Composite/Other Metals	1.3%	0.4%			
Number of samples:	189		Total	100.0%	

APPENDIX B

Material List and Definitions

Paper

1. **Newspaper:** Printed ground-wood newsprint. Advertising “slicks” (glossy paper), if found mixed with newspaper; otherwise, ad slicks are included with mixed low-grade paper.
2. **Plain OCC/Kraft Paper:** Unwaxed/uncoated corrugated container boxes and Kraft paper, including large brown or white paper checkout bags printed with the name of a supermarket.
3. **Waxed OCC/Kraft Paper:** Waxed/coated corrugated container boxes and Kraft paper, and brown paper bags.
4. **High-Grade Paper:** White and lightly colored bond, rag, or stationery-grade paper. This includes white or lightly colored sulfite/sulfate bond, copy papers, notebook paper, envelopes, continuous-feed sulfite/sulfate computer printouts, and forms of all types, excluding carbonless paper.
5. **Mixed Low-Grade Paper:** Mixed paper acceptable in San Francisco’s residential curbside program. This includes junk mail, magazines, colored papers, bleached Kraft, boxboard, mailing tubes, carbonless copy paper, ground-wood computer printouts, paperback books, and telephone directories. Includes large Kraft carryout bags and white shopping bags without a supermarket name, department stores, hardware stores, etc. with or without handles, paper fast-food packaging bags, paper lunch-size bags, etc.
6. **Polycoated Paper:** Bleached and unbleached paperboard coated with HDPE film. This includes polycoated milk, juice (including those with plastic spouts), and ice cream cartons, paper cups, takeout containers, and frozen/refrigerator packaging. Excludes juice concentrate cans.
7. **Compostable/Soiled Paper:** Paper towels, paper plates, waxed paper, tissues, and other papers that were soiled with food during use (e.g., pizza box inserts).
8. **Composite/Other Paper:** Predominantly paper with other materials attached (e.g., orange juice cans and spiral notebooks), and other difficult to recycle paper products such as carbon copy paper, hardcover books, photographs, and aseptic drink boxes.

Plastic

9. **PET Bottles:** Polyethylene terephthalate (No. 1) translucent bottles.
10. **HDPE Natural Bottles:** High-density translucent polyethylene (No. 2) milk, juice, beverage, oil, vinegar, and distilled water bottles with necks.

11. **HDPE Colored Bottles:** High-density colored polyethylene (No. 2) bottles. Liquid detergent bottles and some hair care bottles with necks.
12. **Other Plastic Bottles:** Plastic bottles not classified in the above-defined PET or HDPE categories; includes No. 3 through No. 7, unknown bottles, and other bottles with necks.
13. **No. 2, 4, and 5 Tubs, Cups, and Lids:** No. 2, 4, and 5 wide mouth cups and tubs, without a neck, and lids, such as for yogurt, cottage cheese, and margarine containers.
14. **No. 1, 3, 6, and 7 Tubs, Cups, and Lids:** No. 1, 3, 6, and 7 wide-mouth cups and tubs, without a neck, and lids, such as polystyrene (expanded and clear) drink cups, and food, cosmetic, cleaning, auto, and other products and packaging.
15. **Nonfood Expanded Polystyrene:** Nonfood packaging and finished products made of expanded polystyrene. Includes Styrofoam products such as packaging peanuts and blocks.
16. **Other Food Service Plastics:** Includes plastic food-related packaging and finished products not classified elsewhere that are made of polystyrene and other plastics. Includes items such as plates, bowls, clamshells, salad trays, microwave trays, cookie tray inserts, utensils, straws, stirrers, and condiment packaging.
17. **Other Rigid Packaging:** No. 1 through No. 7 and unmarked rigid plastic packaging and containers (excluding expanded polystyrene and food service plastics). Includes plastic toothpaste tubes and spools.
18. **Clean Shopping/Dry Cleaner Bags:** Includes grocery and other checkout bags without a supermarket or other type of store name printed on them. This category includes bags intended to contain produce, bread, merchandise, dry-cleaned clothing, and newspapers, but it does not include bags that were not contaminated with food, liquid, or grit during use.
19. **Other Clean Polyethylene Film:** Polyethylene film, plastic sheeting, and bags, other than those identified above, which were not contaminated with food, liquid, or grit during use.
20. **Other Film:** Film packaging other than checkout bags, and not defined above, or: was contaminated with food, liquid, or grit during use; is woven together (e.g., grain bags); contains multiple layers of film or other materials that have been fused together (e.g., potato chip bags). This category also includes photographic negatives, shower curtains, and used garbage bags. This category also includes supermarket and shopping bags that were contaminated with food, liquid, or grit during use.
21. **Plastic Products:** Other finished plastic products made entirely of plastic such as toys, toothbrushes, vinyl hose, and lawn furniture. Includes fiberglass resin products and materials.
22. **Composite/Other Plastic:** Items that are predominantly plastic with other materials attached such as disposable razors, pens, lighters, toys, and binders.

Glass

23. **Beverage Bottles:** Bottles of all colors including: soda, liquor, wine, juice, beer, mineral water, and sports drinks.

24. **Container Glass:** Glass jars and other containers of all colors holding solid and/or liquid materials such as condiments, jam, pickles, nondairy creamer, vinegar, extracts, and facial cream.
25. **Plate Glass:** Clear or tinted window, door, shelf, tabletop, flat auto, bus shelter, and other flat glass, including tempered.
26. **Composite/Other Glass:** Mirrors, glassware, crystal, Pyrex and CorningWare, and laminated or curved glass such as windshields.

Metal

27. **Aluminum Cans:** Aluminum beverage cans (UBC) and bi-metal cans made mostly of aluminum.
28. **Aluminum Foil/Containers:** Aluminum food containers, trays, pie tins, and foil.
29. **Other Aluminum:** Aluminum products and scraps such as window frames and cookware.
30. **Other Nonferrous:** Metals not derived from iron, to which a magnet will not adhere, and which are not significantly contaminated with other metals or materials.
31. **Tin/Steel Cans:** Tinned steel food, pet food, and other containers, including bi-metal cans mostly of steel.
32. **Empty Paint and Aerosol Cans:** Empty, metal paint and aerosol cans, including metal lids.
33. **Empty Propane and Other Tanks:** Metal tanks used for storage and distribution of propane and other compressed fuels.
34. **Other Ferrous:** Ferrous and alloyed ferrous scrap metals, to which a magnet adheres, and which are not significantly contaminated with other metals or materials.
35. **Composite/Other Metals:** Items that are predominantly metal such as motors, insulated wire, appliances, and other products or parts containing a mixture of metals, or metals and other materials.

Organic

36. **Grass:** Grass clippings only, not including sod or weeded plants.
37. **Prunings:** Leaves, weeds, brush, and cut prunings, 4 feet or less in length, from bushes, shrubs, and trees.
38. **Food:** Food wastes and scraps, including meat, bone, dairy, grains, rinds, tea bags, coffee grounds with filters, etc. Excludes the weight of food containers, except when container weight is not appreciable compared to the food inside. Compostable peanuts, food packaging with food scraps, and small wooden produce crates are also included in this category.

39. **Disposable Diapers:** Diapers made from a combination of fibers, synthetic and/or natural, and made for the purpose of single use. This includes disposable baby diapers and adult protective undergarments.
40. **Animal By-products:** Animal carcasses not resulting from food storage or preparation, animal wastes, and kitty litter.
41. **Composite/Other Organic:** Combustible materials including wax, bar soap, cigarette butts, feminine hygiene products, vacuum cleaner bag contents, leather, briquettes, and fireplace, burn barrel, and fire-pit ash, and other organic materials not classified elsewhere.

Other Products

42. **Tires:** Vehicle tires of all types. Inner tubes are put into the rubber category.
43. **Rubber:** Finished products and scrap materials made of natural and synthetic rubber, such as bath mats, inner tubes, rubber hoses, and foam rubber.
44. **Textiles:** Rag stock fabric materials and clothing including natural and synthetic textiles such as cotton, wool, silk, woven nylon, rayon, and polyester.
45. **Carpet/Upholstery:** General category of flooring applications and non-rag stock textiles consisting of various natural or synthetic fibers bonded to some type of backing material. Also includes non-rag stock grade textiles such as heavy linens and draperies.
46. **Apparel:** Shoes, tennis shoes, purses, and other composite accessories.
47. **Furniture:** Mixed-material furniture such as upholstered chairs. Furniture that is made purely of one material, such as plastic or metal, would be categorized according to that material (e.g., plastic products or other ferrous metal).
48. **Mattresses:** Mattresses and box springs.
49. **Appliances:** Nonhazardous, not predominantly metal electric appliances such as toasters, microwave ovens, power tools, curling irons, and light fixtures.
50. **Composite/Other Products:** Other multi-material assembled or composite household and other products.

Construction Debris

51. **Clean Wood:** Including milled lumber commonly used in construction for framing and related uses, including 2 x 4's and 2 x 6's, and sheets of plywood, strandboard, and particleboard.
52. **Pallets and Crates:** Clean wood pallets (whole and broken), crates, pieces of crates, and other packaging lumber and panel board. Small compostable wooden produce crates are put in the food category.
53. **Stumps and Logs:** Stumps or logs 4 feet or greater in length.

54. **Composite/Other Wood:** Predominantly wood and lumber products that are mixed with other materials in such a way that they cannot easily be separated. This includes wood with metal, gypsum, concrete, or other contaminants. Painted or chemically treated wood goes in the hazardous waste “treated wood” category.
55. **Clean Gypsum:** Calcium sulfate dehydrate sandwiched between heavy layers of Kraft-type paper. Also known as drywall. This category includes drywall that has not been painted or treated in other ways.
56. **Painted Gypsum:** Used or demolition gypsum wallboard that has been painted or treated.
57. **Fiberglass Insulation:** Fiberglass building and mechanical insulation, batt or rigid.
58. **Rock/Concrete/Bricks:** Rock gravel larger than 2" in diameter, Portland cement mixtures (set or unset), and fired-clay bricks.
59. **Asphaltic Roofing:** Asphalt shingles and tarpaper of built-up roofing.
60. **Ceramics:** Finished ceramic or porcelain products such as toilets, sinks, cups, and dishware.
61. **Sand/Soil/Dirt/Grit/Fines:** Contains mixed fines smaller than 2" in diameter, including floor sweepings from construction sites and other inorganic waste.
62. **Composite/Other Construction Debris:** Construction debris (other than predominantly wood) that cannot be classified elsewhere.

Hazardous Waste

63. **Hazardous Waste:** Latex paints, solvent-based adhesives/glues, water-based adhesives/glues, oil-based paint/solvent, caustic cleaners, pesticides/herbicides, dry-cell batteries, wet-cell batteries, gasoline/kerosene, motor oil/diesel oil, oil filters, asbestos, treated wood, explosives, medical wastes, other cleaners/chemicals, light bulbs, televisions, computer monitors, other computer equipment, other electronics, certain cosmetics, and other potentially harmful wastes. This category also includes plastic, paper, and glass containers that were used for the sale or distribution of products categorized as hazardous materials and that contained any noticeable amount of the hazardous product.

APPENDIX C

Waste Sampling Methodology

Overview

This appendix describes the methods used to characterize the municipal solid waste (MSW) that originates from within San Francisco and that is disposed through Norcal or disposed at the Hillside Landfill. The study employed the hand-sorting and visual characterization of waste samples to derive statistically valid estimates of the composition of MSW corresponding to specific waste sectors.

Allocation of Waste Samples

The study team identified the most important sources of waste (referred to as *sectors*) that together constitute the MSW originating within San Francisco. Sectors were further classified into *subsectors*, when appropriate.

It was determined that certain waste sectors would be best characterized using hand-sorting techniques. These waste sectors included residential waste, some commercial waste, and residue from the Pier 96 material recovery facility. Typically, waste from these sectors includes very diverse types of material in relatively small pieces, and it is therefore not well suited to visual characterization. Other waste sectors, including some waste in open rolloff containers, self-hauled waste, waste from certain City departments, and waste from the iMRF were assigned to be characterized through visual techniques.

An additional component of the project involved characterizing waste from selected representatives of certain business groups and institutions. Containers of waste from these generator groups were characterized visually.

The diagram on the following page presents the sectors and subsectors that together generate San Francisco's disposed MSW. The diagram indicates which parts of the waste stream were addressed in this study, and how each sector or subsector was characterized. In addition, the diagram presents an estimate of the annual tons of waste associated with each sector or subsector, based on 2004 data.

Waste Sector or Subsector	Characterization Method	Number of Samples	Estimated Annual Tons
Waste disposed through Norcal			
<i>Waste characterized in this study</i>			
<i>Sectors that were combined for the study's "overall Norcal" waste characterization</i>			
Fantastic 3 Program			
Single-family (SF)	Hand-sort	40	129,630
Multifamily (MF)	Hand-sort	21	48,082
Commercial, governmental, institutional (CGI)	Hand-sort	54	59,609
Pier 96			
Residuals from Fantastic 3 programs	Hand-sort	4	15,934
Residuals from other waste sources	Hand-sort	14	3,513
Commercially Collected Waste			
Multifamily (MF) waste			
MF waste collected in packer trucks	Hand-sort	17	7,599
MF waste in compactors	Hand-sort	4	6,530
Commercial, governmental, institutional (CGI)			
CGI waste collected in packer trucks	Hand-sort	24	69,765
CGI waste in compactors	Hand-sort	19	59,947
CGI waste in open rolloff containers	Visual	6	14,338
Home cleanout waste in open rolloff containers	Visual	6	14,338
Self-Hauled Waste			
Waste self-hauled by businesses with Norcal accounts	Visual	9	16,832
Waste in packers from Recreation & Park Department	Visual	4	2,000
Waste from Department of Public Works (DPW)			
Litter patrol and broom support	Visual	10	5,526
DPW packer trucks	Visual	4	3,684
City litter cans	Modeled ¹		17,500
Street sweepings	Modeled ²		12,893
Wastewater treatment plant screenings	Modeled ²		921
Other DPW materials	Modeled ³		5,523
Other City self-hauled waste	Modeled ³		2,000
Bulky item collection	Modeled ⁴		2,032
Residuals from the iMRF facility	Visual	55	17,468
<i>Business, institutional, and government groups that were analyzed separately</i>			
Large hotels	Visual	19	
Small hotels	Visual	24	
Restaurants	Visual	25	
Large retail stores and malls	Visual	24	
Large office buildings with ground-floor retail	Visual	14	
Large office buildings with no retail	Visual	21	
Housing Authority	Visual	5	
City Operations			
Muni Yards	Visual	3	
Water Department Corps yard	Visual	1	
Wastewater treatment plant refuse	Visual	2	
Fire Department	Visual	1	
Institutions			
San Francisco General Hospital	Visual	2	
Laguna Honda Hospital	Visual	2	
San Francisco Jails	Visual	2	
Youth Guidance Center	Visual	2	
<i>Waste not characterized in this study</i>			
Public self-hauled waste that goes to the iMRF			
Rolloff construction and demolition waste that goes to the iMRF			
Organics operations rejects			2,885
Pier 96 mixed paper line residuals			2,620
Direct haul operations rejects			342
Transfer station adjustments			-1,649
Waste not disposed through Norcal			
<i>Waste characterized in this study</i>			
Hillside Landfill	Visual	321	32,145
<i>Waste not characterized in this study</i>			
Ox Mountain Landfill			75,490
Other Landfills (estimated)			41,850

Notes:

- ¹ Waste from city streetside litter cans, which was not sampled, was assumed to have the same composition as waste disposed by litter patrol and broom support operations, which was sampled. This assumption was used to produce composition profiles for wastes disposed by the DPW and for wastes disposed through Norcal.
- ² Street sweepings and wastewater treatment plant screenings were not characterized, but were classified wholly as the material “composite/other products” for the purpose of calculating composition profiles for wastes disposed by the DPW and for wastes disposed through Norcal.
- ³ In order to produce composition profiles for wastes disposed by the DPW and for wastes disposed through Norcal, other DPW materials and other City self-hauled waste were assumed to have the same composition profile as self-hauled waste from businesses that have Norcal accounts.
- ⁴ Waste from bulky item collection operations was assumed to have the same composition profile as waste collected by DPW packer trucks. This assumption was used to produce a composition profile for wastes disposed through Norcal.

Calculation of Waste Sector Quantities

Field Data Collection Procedures

Different methods were employed to characterize waste samples, depending on whether the characterization was based on hand-sorting or on visual techniques. Both methods are described below.

Procedures for Hand-Sorting Waste Samples

Selection of Vehicles for Sampling

Based on the list of vehicles that were expected to arrive at the SFR&D Transfer Station each day from the relevant waste sectors, a daily vehicle selection list was developed for each day of the September and February sampling periods. An example of the selection list for Tuesday, February 22, 2005 is shown below. The supervisor of the sorting crew used the vehicle selection list to identify targeted vehicles and direct them to the sampling area.

In most cases, the vehicle selection list included more vehicles for each category than were required to meet sampling quotas. The supervisor of the sorting crew obtained samples from vehicles in a given category in roughly the order they arrived at the transfer station, until the required number of samples was met.

Figure C-1: Example of Vehicle Selection List

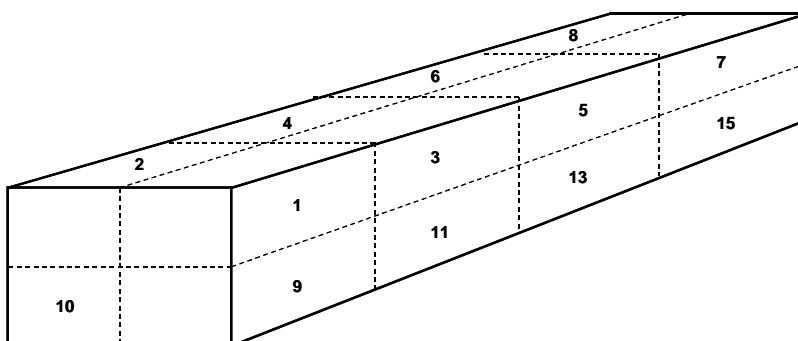
Expected loads for Tuesday, February 22

Number of samples to get	Check if sampled	Unique Number	Waste Sector	Route #	Hauler
4	<input type="checkbox"/>	105	Fan3 SF	25B	GG
	<input type="checkbox"/>	106	Fan3 SF	42	SS
	<input type="checkbox"/>	107	Fan3 SF	090	SS
	<input type="checkbox"/>	108	Fan3 SF	090	SS
	<input type="checkbox"/>	109	Fan3 SF	014	GG
	<input type="checkbox"/>	110	Fan3 SF	26A	GG
2	<input type="checkbox"/>	111	Fan3 MF	104	GG
	<input type="checkbox"/>	112	Fan3 MF	014	SS
	<input type="checkbox"/>	113	Fan3 MF	072	SS
	<input type="checkbox"/>	114	Fan3 MF	9B	GG
4	<input type="checkbox"/>	115	Fan3 Com	29	GG
	<input type="checkbox"/>	116	Fan3 Com	001	GG
	<input type="checkbox"/>	117	Fan3 Com	17C	SS
	<input type="checkbox"/>	118	Fan3 Com	029	SS
	<input type="checkbox"/>	119	Fan3 Com	039	SS
	<input type="checkbox"/>	120	Fan3 Com	035	GG
2	<input type="checkbox"/>	121	Other MF	069	GG
	<input type="checkbox"/>	122	Other MF	070	GG
	<input type="checkbox"/>	123	Other MF	083	SS
	<input type="checkbox"/>	124	Other MF	D1	SS
5	<input type="checkbox"/>	125	Other Com	F3	GG
	<input type="checkbox"/>	126	Other Com	D5	GG
	<input type="checkbox"/>	127	Other Com	F6	SS
	<input type="checkbox"/>	128	Other Com	D8	GG
	<input type="checkbox"/>	129	Other Com	22A	GG
	<input type="checkbox"/>	130	Other Com	040	GG
	<input type="checkbox"/>	131	Other Com	2AA	SS

Extraction of Waste Samples

When a vehicle was selected for sampling, the manager of the sorting crew directed the driver to tip the load in an elongated pile on the ground. At this point, the pile was divided into an imaginary 16-cell grid, as shown in the diagram below, and approximately 200 to 300 pounds of material from the predetermined randomly selected cell (as designated on the vehicle selection list) was extracted from the pile using a loader or similar piece of equipment. This material became the actual sample, and it was placed on a tarp and dragged to the sorting area.

Figure C-2: 16-Cell Grid



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

Sorting of Waste Samples

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

The manager of the sorting crew monitored the homogeneity of the component baskets as material accumulated. Open laundry baskets allowed the manager to see the material at all times. The manager also verified the purity of each component as it was weighed, before recording the weight on the sampling form. Please refer to Appendix E for a copy of the sampling form.

After all materials had been weighed and their weights recorded, the hazardous waste portion of each sample was placed in a box, along with a cardboard label designating the origin of the sample and the amount of hazardous waste material that was present. The hazardous waste material from each sample was then transferred to the CalRecovery team, which was conducting a parallel study of the hazardous components of San Francisco's waste stream. Please refer to Appendix E for a copy of the transfer label.

Procedures for Visual Characterization of Waste Samples

Appropriate Application of Visual Characterization Method

Visual characterization of wastes involves closely observing the wastes and making detailed, quantitative records of the materials present, without physically sorting or weighing the materials. It has several limitations: it is less precise than weighing, and it relies heavily on the observer's judgment and ability to see everything in the load being characterized. Also, converting visual characterization data from observed volumes to inferred weights involves assumptions about the densities of materials; and some of those materials can have densities that cover a very broad range. For example, the density of loose prunings (shrubs and limbs) can range from 30 to over 100 pounds per cubic yard, so the use of a single density assumption will introduce error into some calculations.

Visual characterization also has some advantages over "physical" (weigh and sort) characterization:

- In loads that contain large objects and large homogeneous lumps of material (such as yard waste), the concentrations of these materials may be better represented.
- It is less labor intensive, providing more information (albeit less precise information) for the same effort.
- There is no need for concern about the validity of a subsample, because the entire load is being considered.
- It can provide insight into the ways that wastes are generated and disposed at specific locations, indicating recycling and waste reduction programs that are best suited for the needs and behaviors present at that location.

Visual characterization is particularly well suited to assess large loads generated by specific types of large businesses. For example, in San Francisco, one of the largest business sectors is hotels, and large hotels typically have their wastes removed in compactors that contain up to a week's worth of material in a single load. Examining several of these loads can provide useful data on which materials are discarded by most hotels, and which materials might be concentrated in some hotels but not in others. Similar inferences can be developed for other large business sectors as well.

Visual Characterization Method

Regulations promulgated by the California Integrated Waste Management Board (CIWMB) describe a procedure for visual waste characterization that was the basis for the methods used in this project. The CIWMB methods were adapted in several ways to fit the needs of this project. The major difference is that the CIWMB method uses two observers who independently assess a load, then agree on its composition. For this project, that was impractical, because it requires a substantial amount of time to make and discuss observations. At the SFR&D Transfer Station, the arrival times of loads were not highly predictable, and the work area was limited. Loads had to be assessed and cleared away very quickly to avoid creating a backlog that would interfere with traffic in the station. Consequently, a single observer was used. When possible, loads were photographed to provide an objective record of the contents.

Consistent with the CIWMB regulations, data were recorded on a volume-fraction basis, rather than attempting to estimate weight fractions. For example, if a 20-cubic-yard load appeared to hold 5 cubic yards of food waste and 15 cubic yards of prunings, then it was recorded as 25 percent food waste and 75 percent prunings. The differing densities of materials were taken into account in subsequent calculations, not during the actual observations.

If the load contained opaque trash bags, many of them were opened and examined prior to recording volume estimates. Due to time constraints, in most cases it was not possible to open all opaque bags. The bags that were opened were chosen from all parts of the load, and at least 15 to 20 bags were opened, to provide a broad cross-section of the contents. Typically, this procedure enabled the observer to see some repetition in the bags' contents, from one part of the load to another, indicating that several days' worth of refuse was being examined. It also provided some confidence that all of the materials in the load were being seen.

When a load consisted of relatively few materials in large proportions, estimating volume fractions was relatively simple. The smaller components required more attention. Two tests were applied by the observer:

1. How many multiples of this volume would take up as much space as the entire load?
2. What is the volume of the whole load, and the volume of this component?

Answers to these questions were used to estimate volume fractions.

After an initial pass to estimate material volumes as percentages, the observer would sum those percentages. The result was usually less than 100 percent. To correct this discrepancy, the observer would examine the load more closely and use a separate column on the data sheet to enter adjustments to bring various components up (or rarely, down) until a total of 100 percent was reached. All visual observations were performed by the same observer, who has extensive experience with the visual characterization of wastes.

A sample data sheet appears in Appendix E.

APPENDIX D

Waste Composition Calculations

Basic Composition Calculations

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

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

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

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 includes two random variables (the component and total sample weights). The **variance of the ratio estimator** equation follows:

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

where:

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

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

$$r_j \pm \left(t \cdot \sqrt{\hat{V}_{r_j}}\right)$$

where:

t = the value of the t-statistic (1.645) corresponding to a 90% confidence level

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

Calculations to Aggregate Waste Sectors

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

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

where:

p	=	the proportion of tonnage contributed by the noted substream
w	=	the ratio of component weight to the total waste weight in the noted substream
for i	=	1 to m
where m	=	the number of components

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

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

APPENDIX E

Field Forms

Vehicle Selection Form

Expected loads for Tuesday, February 22

Number of samples to get	Check if sampled	Unique Number	Waste Sector	Route #	Hauler
4	<input type="checkbox"/>	105	Fan3 SF	25B	GG
	<input type="checkbox"/>	106	Fan3 SF	42	SS
	<input type="checkbox"/>	107	Fan3 SF	090	SS
	<input type="checkbox"/>	108	Fan3 SF	090	SS
	<input type="checkbox"/>	109	Fan3 SF	014	GG
	<input type="checkbox"/>	110	Fan3 SF	26A	GG
2	<input type="checkbox"/>	111	Fan3 MF	104	GG
	<input type="checkbox"/>	112	Fan3 MF	014	SS
	<input type="checkbox"/>	113	Fan3 MF	072	SS
	<input type="checkbox"/>	114	Fan3 MF	9B	GG
4	<input type="checkbox"/>	115	Fan3 Com	29	GG
	<input type="checkbox"/>	116	Fan3 Com	001	GG
	<input type="checkbox"/>	117	Fan3 Com	17C	SS
	<input type="checkbox"/>	118	Fan3 Com	029	SS
	<input type="checkbox"/>	119	Fan3 Com	039	SS
	<input type="checkbox"/>	120	Fan3 Com	035	GG
2	<input type="checkbox"/>	121	Other MF	069	GG
	<input type="checkbox"/>	122	Other MF	070	GG
	<input type="checkbox"/>	123	Other MF	083	SS
	<input type="checkbox"/>	124	Other MF	D1	SS
5	<input type="checkbox"/>	125	Other Com	F3	GG
	<input type="checkbox"/>	126	Other Com	D5	GG
	<input type="checkbox"/>	127	Other Com	F6	SS
	<input type="checkbox"/>	128	Other Com	D8	GG
	<input type="checkbox"/>	129	Other Com	22A	GG
	<input type="checkbox"/>	130	Other Com	040	GG
	<input type="checkbox"/>	131	Other Com	2AA	SS

Hand-Sort Characterization Form

PAPER

Newspaper			
Plain OCC/Kraft			
Waxed OCC/Kraft			
Kraft Supermarket Bags			
Other Paper Bags			
High Grade			
Mixed Low Grade			
Polycoated			
Compostable/Soiled			
Composite/Other Paper			

PLASTIC

PET Bottles			
HDPE Natural Bottles			
HDPE Colored Bottles			
Other Plastic Bottles			
#2, 4 & 5 Non-Takeout T/C/L			
#2, 4 & 5 Takeout T/C/L			
#1, 3, 6 & 7 Non-Takeout T/C/L			
#1, 3, 6 & 7 Takeout T/C/L			
Non-Food Expanded Poly			
Other Food Service Plastics			
Other Rigid Packaging			
Clean Market Bags			
Contaminated Market Bags			
Clean Non-market Bags			
Contaminated Non-market Bags			
Other Clean Polyethylene Film			
Other Film			
Plastic Products			
Composite/Other Plastic			

METAL

Aluminum Cans			
Aluminum Foil/Containers			
Other Aluminum			
Other Nonferrous			
Tin/Steel Cans			
Other Ferrous			
Empty Paint/Aerosol Cans			
Empty Propane/Other Tanks			
Composite/Other Metals			

GLASS

Beverage Bottles			
Container Glass			
Plate Glass			
Composite/Other Glass			

ORGANIC

Grass			
Prunings			
Food			
Disposable Diapers			
Animal By-products			
Composite/Other Organic			

OTHER PRODUCTS

Tires			
Rubber			
Textiles			
Carpet/Upholstery			
Apparel			
Furniture			
Mattresses			
Appliances			
Composite/Other Products			

CONSTRUCTION DEBRIS

Clean Wood			
Pallets & Crates			
Stumps & Logs			
Composite/Other Wood			
Clean Gypsum			
Painted Gypsum			
Fiberglass Insulation			
Rock/Concrete/Bricks			
Asphaltic Roofing			
Ceramics			
Sand/Soil/Dirt/Grit/Fines			
Composite/Other Const. Debris			

HAZARDOUS WASTES

--	--	--	--

Sample ID:

Route:

Sector:

Capture Date:

Sort Date:

Transfer Label for Hazardous Waste Portion of a Sample

Unique number: _____

Capture date: _____

Route # _____

Waste sector: _____

Total haz. weight: _____ lbs.

Sample Data Sheet

Date _____ Time _____ By _____

Box No. _____

Size _____ Percent Full _____

Truck No. _____ est adj

Visual Characterization Data Sheet

Source _____

Notes _____

Sample Stream & Number _____ est adj

F1	Paper	Plain OCC/kraft		
F2	Paper	Waxed OCC/kraft		
F3	Paper	HighGrade Paper		
F4	Paper	Low Grade Paper (news & mixed)		
F5	Paper	Compostable / Soiled Paper		
F9	Paper	Composite/Other paper		
P1	Plastic	Rigids		
P2	Plastic	EPS foam		
P3	Plastic	Films		
P4	Plastic	Products		
P5	Plastic	AutoProductEmpties		
P9	Plastic	Composite/Other Plastic		
G1	Glass	Container		
G2	Glass	Plate		
G9	Glass	Composite/Other Glass		
M1	Metal	Containers/Foil		
M2	Metal	Other NonFerrous		
M3	Metal	Paint/Aerosol Cans		
M4	Metal	Compressed Gas Tanks		
M5	Metal	Other Ferrous		
M9	Metal	Composite/Other Metals		
R1	Organic	Grass		
R2	Organic	Prunings		
R3	Organic	Food		
R4	Organic	Disposable Diapers		
R5	Organic	Animal ByProducts		
R9	Organic	Composite/Other Organic		
O1	OtherProducts	Tires		
O2	OtherProducts	Rubber		
O3	OtherProducts	Textiles		
O4	OtherProducts	Carpet/Upholstery		
O5	OtherProducts	Furniture		
O6	OtherProducts	Mattresses		
O7	OtherProducts	Appliances		
O9	OtherProducts	Composite/Other Products		

C01	Const Debris	Clean Wood		
C02	Const Debris	Pallets/Crates		
C03	Const Debris	Stumps/Logs		
C04	Const Debris	Composite/Other Wood		
C05	Const Debris	Clean Gypsum		
C06	Const Debris	Painted Gypsum		
C07	Const Debris	FG Insulation		
C08	Const Debris	Rock/Conc/Brick		
C09	Const Debris	Asphaltic Roofing		
C10	Const Debris	Ceramics		
C11	Const Debris	Sand/Soil/Dirt/Grit/Fines		
C19	Const Debris	Composite/Other Const Debris		
H01	HazWastes	Paints/Glues/Solvents		
H02	HazWastes	Cleaning Products		
H03	HazWastes	Pesticides/Wood Preserv		
H04	HazWastes	Dry Cells		
H05	HazWastes	Wet Cells		
H06	HazWastes	Gasoline/Kerosene		
H07	HazWastes	Vehicle Fluids & Oil Filters		
H08	HazWastes	ACM		
H09	HazWastes	Treated Wood		
H10	HazWastes	Explosives		
H11	HazWastes	Medical		
H12	HazWastes	Lights		
H13	HazWastes	Mercury-Containing		
H14	HazWastes	Compressed Gas		
H15	HazWastes	CRT Devices		
H16	HazWastes	UWED's		
H17	HazWastes	Strong Oxidizers		
H18	HazWastes	Strong Reducing Agents		
H19	HazWastes	Waxes		
H20	HazWastes	Acids		
H21	HazWastes	Bases		
H22	HazWastes	Inks/Dyes		
H29	HazWastes	Other Potentially Harmful		