

## Introduction and Overview

The City of Cupertino completed this single-family residential waste characterization as a pilot study in preparation for a potential project future focusing on the City's entire waste stream. The composition and quantity data in this report is intended to:

- Identify materials with potential diversion opportunities.
- Provide a baseline for evaluating the future success of diversion programs.
- Provide data useful in planning future programs to support the City's Zero Waste goals.

The consultant field team collected garbage, recycling, and organics samples on select routes from 50 single-family residences over the course of one week in July 2018. The team then transported the samples to the SMaRT station and hand-sorted the samples into 46 material types. In addition to collecting samples from 10 houses on each selected route, the field team also counted the total number of houses on each selected route with garbage, and/or recycling, and/or organics carts set-out for collection (because not everyone sets out their carts every week) to supplement the composition calculations. Compared to the traditional method of sampling from collections trucks at the transfer station, the sampling method used in this study combined with the additional set-out data allow for more detailed investigations of behavioral patterns among single-family generators.

## Material Types

Prior to beginning the field work, the project team worked with City of Cupertino staff to define the 46 material types used in the hand sorts. Defining the material types ahead of time assisted with consistent, accurate, and efficient sorting of each sample by the field crew. The 46 material types are grouped into eight material classes: Paper, Plastic, Glass, Metal, Organic, Hazardous, Construction and Demolition Debris, and Other Materials. See the Material Definitions section for a list of the material types and detailed definitions.

To identify additional diversion opportunities, the project team also organized the 46 material types according to their recoverability using four recoverability groups:

- **Recyclable**—Materials accepted in the current curbside recycling program. These materials are highlighted in blue throughout the tables and figures.
- **Compostable**—Materials accepted in the current curbside organics program. These materials are highlighted in green throughout the tables and figures.
- **Potentially Recyclable**—Materials that are recoverable via consumer take-back or drop-off programs or which could be diverted in a curbside program if they customer was

diligent about cleaning them. This includes the contaminated but otherwise recyclable items. These materials are highlighted in orange throughout the tables and figures.

- **Problem Materials**—Materials that are not currently readily recoverable due to a lack of markets, technologies, or programs. These materials are highlighted in grey throughout the tables and figures.

Each material type was assigned to one of these recoverability groups based on the recoverability group definitions listed above and with input from City staff. Material types are color coded in the results section to indicate where each material type was allocated, and Table 1 shows to which recoverability group each material types was assigned.

**Table 1. Recoverability Groups and Materials Types, 2018 Characterization Study**

Recyclable	Potentially Recyclable
Clean, Flattened, Uncoated Corrugated Cardboard	Contaminated Recyclable Paper
Clean, Unflattened, Uncoated Corrugated Cardboard	Paper Takeout Containers
Clean Recyclable Paper	Coated Paper Cups
Clean Coated Paper Products	Contaminated Recyclable Plastic
Gable Top Cartons Aseptics	Contaminated Recyclable Glass Bottles & Jars
Clean #1 PETE Plastic Packaging	Contaminated Recyclable Metal
Clean #2 HDPE Plastic Packaging	Electronics
Clean Other #3-7 Plastic Packaging	Batteries
Clean Recyclable Film Plastic	Construction & Demolition Debris
Plastic Takeout Containers	<b>Problem Materials</b>
Durable Plastic Products	Other Composite Paper
Clean Glass Bottles & Jars	Expanded #6 Products and Packaging
Clean Aluminum Cans & Foil	Flexible Plastic Pouches
Clean Other Recyclable Metal	Other Composite Film Plastics
<b>Compostable</b>	Compostable Plastic
Paper Tissues & Towels	Other Plastic
Other Compostable Paper	Other Composite Glass
Pizza Boxes	Other Metal
Plant Trimmings	Diapers
Edible Food Scraps	Animal Feces Litter
Inedible Food Scraps	Other Organic
Other Compostable Organics	Medicine
	Other Hazardous Waste
	Textiles & Leather
	Non-metal Appliances
	Other Materials

## Results

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

- The percent-by-weight estimated composition and
- The degree of precision of the composition estimates. All estimates of precision were calculated at the 90% confidence level.

The example below illustrates how the results can be interpreted. In this example, the best estimate of the amount of *edible food scraps* present in the universe of waste sampled is 22.7%. The figure 2.6% reflects the precision of the estimate. When calculations are performed at the 90% confidence level, we are 90% certain that the true amount of *edible food scraps* is between 22.7% plus 2.6% and 22.7% minus 2.6%. In other words, we are 90% certain that the mean lies between 20.1% and 25.3%.

### Error Range (+/-)

The error range is a measure of the spread of values in a collection of data. For instance, if the quantity of *edible food scraps* was found to be nearly the same in each of the 113 samples analyzed for this study, the result would be a very narrow error range. By contrast, if some samples were composed of 75% *edible food scraps* and others were 0% *edible food scraps*, the results would show a much broader error range.

Material Type	Est. Pct.	+ / -
Edible Food Scraps	22.7%	2.6%

## ROUNDING

To keep the composition tables and figures readable, estimated tonnages are rounded to the nearest ton, and estimated percentages are rounded to the nearest tenth of a percent (percentages less than 0.05% are shown as 0.0%). Due to this rounding, the tonnages presented in the report, when added together, may not exactly match the subtotals and totals shown. Similarly, the percentages, when added together, may not exactly match the subtotals or totals shown.

The composition data are presented in several ways:

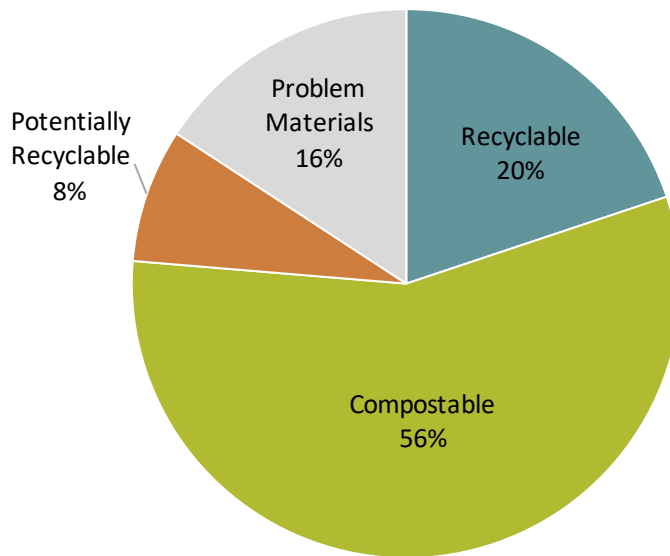
- An overview of composition by **recoverability group** is presented as a pie chart.
- The five most prevalent individual *material types*, by weight, are shown in a table.
- A detailed table lists the full composition and quantity results for the 46 *material types*.
- Summaries of residential behavior patterns regarding cart usage and contamination, and
- A summary of capture rates for key materials.

Sample data from two houses has been excluded as outliers from the composition analysis. One household that filled their recycling bin entirely with yard debris and one household that had more than 170 pounds of kitty litter in their trash. Consequently, though the field team collected samples from 50 houses, samples from only 48 houses are included in the analysis.

**FINDINGS**

Figure 1 below describes overall single-family generation (garbage, recycling, and organics combined) by recoverability class. This figure represents all the materials that the field team collected as samples from single-family residents for this study (materials from the garbage, recycling, and organics carts), combined in one figure. Of all the materials that single-family residents generate and place at the curb in garbage, recycling, or organics carts, approximately 56% (11,223 tons) are **Compostable**, and 20% (3,951 tons) are **Recyclable**. An additional 8% are **Potentially Recyclable**, mostly recyclable items that are too contaminated to recycle.

**Figure 1. Material Recoverability, Single-Family Generation (Recycling, Garbage, and Organics Combined)**



The bar chart in Figure 2 illustrates the recoverability of each stream. This figure is developed by multiplying the material composition (based on the sorted material) by the annual tons for each stream (provided by the City). The height of each bar in the figure illustrates the annual tonnage of each stream (garbage, recycle, organics) based on fiscal year 2017-18 tonnage information provided by the City of Cupertino. As shown, 57% of materials that single-family residents disposed in garbage carts could have been recovered via the curbside recycling and organics programs (primarily organics) had the material been placed in the correct cart. Contaminants account for approximately 28% of the recycling stream. Contaminated but otherwise recyclable materials (i.e. a piece of recyclable paper contaminated with food) comprise a considerable

portion of the contaminants. The single-family curbside organics carts contain approximately 5% contaminants.

**Figure 2. Single-Family Recoverability and Annual Tonnage by Stream**

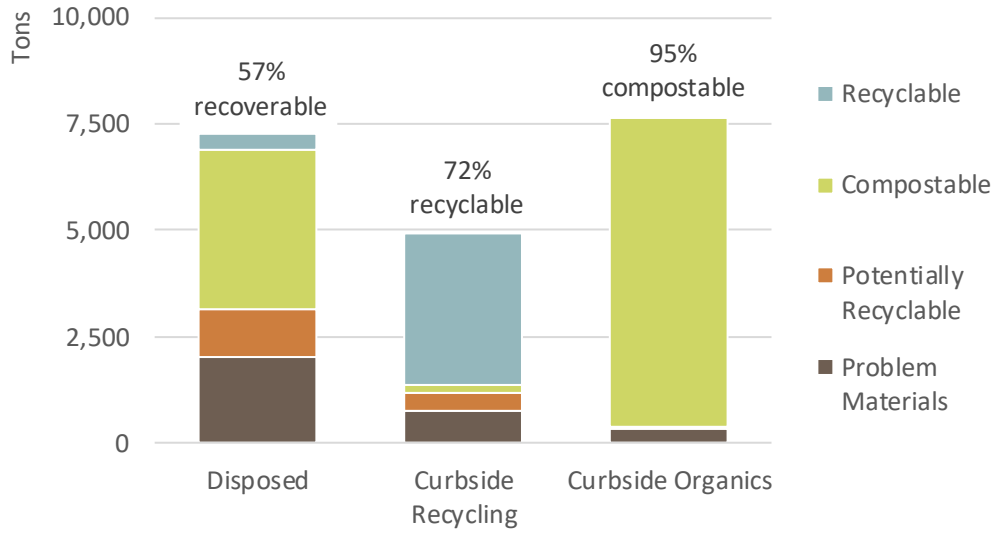
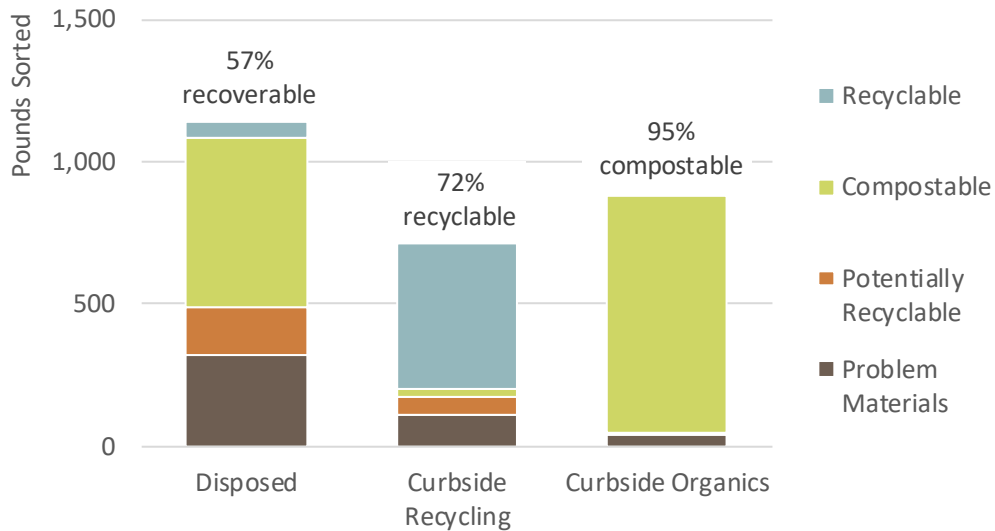


Figure 3 illustrates the same recoverability information as Figure 2 but the height of each column represents the pounds of material sorted from each stream instead of annual tons as in Figure 2.

**Figure 3. Single-Family Recoverability and Pounds Sorted by Stream**



Of the five most prevalent materials in the single-family garbage stream (Table 2), three materials are compostable: *edible food scraps* (31.0% and 2,251 tons), *inedible food scraps* (14.8% and 1,076 tons), and *paper tissues & towels* (5.2% and 374 tons). *Other materials* (9.1% and 660 tons) is also a significant portion of the single-family garbage stream.

**Table 2. Five Most Prevalent Materials, Single-Family Garbage**

Material	Est. Percent	Est. Tons
Edible Food Scraps	31.0%	2,251
Inedible Food Scraps	14.8%	1,076
Other Materials	9.1%	660
Paper Tissues & Towels	5.2%	374
Construction & Demolition Debris	5.1%	372
<b>Total</b>	<b>65.3%</b>	<b>4,733</b>

As shown in Table 3, four of the five most prevalent materials in the single-family recycling stream are recyclable. *Clean recyclable paper* (36.4%, 1,799 tons) is over three times more prevalent than the next most prevalent material in the stream (*Clean glass bottles & jars*, 10.6%, 525 tons). *Textiles & leather* is the most prevalent contaminant in the recycling cart (6.1%, 300 tons); more prevalent even than any of the contaminated but otherwise recyclable materials.

**Table 3. Five Most Prevalent Materials, Single-Family Recycling**

Material	Est. Percent	Est. Tons
Clean Recyclable Paper	36.4%	1,799
Clean Glass Bottles & Jars	10.6%	525
Clean, Flattened, Uncoated Corrugated Cardboard	8.5%	418
Textiles & Leather	6.1%	300
Clean, Unflattened, Uncoated Corrugated Cardboard	4.2%	208
<b>Total</b>	<b>65.7%</b>	<b>3,251</b>

*Plant trimmings* (82.0%, 6,295 tons) is by far the most prevalent material in the single-family organics stream. *Edible food scraps* (8.1%, 625 tons) and *inedible food scraps* (3.7%, 285 tons) are also prevalent. The five most prevalent materials accounted for 98% of the organics stream (see Table 4 for the complete list of the five most prevalent materials in the organics carts).

**Table 4. Five Most Prevalent Materials, Single-Family Organics**

Material	Est. Percent	Est. Tons
Plant Trimmings	82.0%	6,295
Edible Food Scraps	8.1%	625
Inedible Food Scraps	3.7%	285
Other Organic	2.3%	176
Other Materials	1.9%	148
<b>Total</b>	<b>98.0%</b>	<b>7,529</b>

## Detailed Composition

Table 5 (next page) presents the detailed garbage, recycling, organics, and overall generation composition by material type. Additionally, capture rates are listed for each material type. The capture rate for many of the common recyclable materials is over 90%. The capture rate is less than 25% for both *edible food scraps* and *inedible food scraps*.

## Composition Summary

The composition results indicate that Cupertino single-family residents currently fully participate in the curbside recycling program—90 percent of clean recyclable material generated by residents in the pilot group was placed in the recycling bin, and only 10% (360 tons) of clean, recyclable materials remain in the garbage. A 90% capture rate for recyclables is on par with the capture rate observed in other high-performing West Coast jurisdictions. Capturing the additional 360 tons would have a relatively small impact (an increase of approximately 2 percentage points) on Cupertino's overall diversion rate compared to the investment needed to divert this material.

The data indicate that the greatest opportunities for Cupertino is not for residents to recycle more—they're already recycling nearly as much as is possible—but to (1) increase the capture rate for compostables, specifically for food scraps and paper and to a lesser degree (2) keep recyclable material placed in the recycling cart free from contamination.

If Cupertino residents could increase their food waste capture rate to 90% (meaning that 90% of all food waste generated goes to the organics bin), they would divert an additional 2,800 tons of material, increasing the residential diversion rate by 14 percentage points (assuming no other change in current conditions). The study data indicate that only about one-third of households place any of their food scraps in the organics cart. Increasing participation in food scraps composting can boost the diversion rate at a relatively low cost compared to other diversion opportunities.

Regarding contaminated recyclables, our pilot data show that 350 tons of dirty but otherwise recyclable material are placed in the recycling bin. While this does not offer as large a diversion opportunity as food scraps, keeping materials placed in the recycling bin clean and free of contamination is particularly critical given current market conditions and lower acceptance limits for contamination from end markets. Residents are already putting this material in the recycling bin, they just need to clean it up.

# CITY OF CUPERTINO RESIDENTIAL WASTE PILOT STUDY

**Table 5. Detailed Composition, Single-Family Disposal, Recycling, Organics, and Overall Generation**

Material	Disposal			Recycling			Organics			Generation			Capture Rates	
	Est. Percent	+ / -	Est. Tons	Est. Percent	+ / -	Est. Tons	Est. Percent	+ / -	Est. Tons	Est. Percent	+ / -	Est. Tons	Recycling Bin	Compost Bin
<b>Paper</b>	<b>13.0%</b>		<b>939</b>	<b>60.2%</b>		<b>2,978</b>	<b>1.8%</b>		<b>136</b>	<b>20.4%</b>		<b>4,053</b>		
Clean, Flattened, Uncoated Corrugated Cardboard	0.1%	0.1%	4	8.5%	3.8%	418	0.0%	0.0%	0	2.1%	0.9%	423	99%	0%
Clean, Unflattened, Uncoated Corrugated Cardboard	0.0%	0.0%	1	4.2%	1.5%	208	0.2%	0.3%	14	1.1%	0.4%	224	93%	6%
Clean Recyclable Paper	1.8%	1.2%	130	36.4%	9.1%	1,799	0.0%	0.0%	0	9.7%	2.3%	1,929	93%	0%
Clean Coated Paper Products	0.0%	0.0%	1	0.0%	0.1%	2	0.0%	0.1%	3	0.0%	0.0%	6	40%	50%
Gable Top Cartons & Aseptics	0.2%	0.1%	14	0.9%	0.4%	45	0.0%	0.0%	0	0.3%	0.1%	59	76%	1%
Contaminated Recyclable Paper	3.5%	1.1%	255	4.1%	1.6%	202	0.4%	0.3%	33	2.5%	0.6%	490	41%	7%
Paper Tissues & Towels	5.2%	1.2%	374	0.7%	0.6%	34	0.9%	0.9%	70	2.4%	0.6%	478	7%	15%
Other Compostable Paper	0.7%	0.5%	54	0.4%	0.1%	21	0.1%	0.1%	4	0.4%	0.2%	79	27%	5%
Paper Takeout Containers	0.4%	0.2%	31	0.2%	0.1%	9	0.0%	0.0%	3	0.2%	0.1%	43	21%	7%
Coated Paper Cups	0.3%	0.1%	18	0.2%	0.1%	9	0.0%	0.0%	0	0.1%	0.0%	27	33%	0%
Pizza Boxes	0.0%	0.0%	1	0.5%	0.3%	26	0.0%	0.0%	0	0.1%	0.1%	26	98%	0%
Other Composite Paper	0.8%	0.4%	57	4.1%	2.9%	203	0.1%	0.1%	7	1.3%	0.7%	267	76%	3%
<b>Plastic</b>	<b>8.3%</b>		<b>606</b>	<b>14.2%</b>		<b>704</b>	<b>0.2%</b>		<b>15</b>	<b>6.7%</b>		<b>1,325</b>		
Clean #1 PETE Plastic Packaging	0.1%	0.1%	7	3.5%	0.8%	172	0.0%	0.0%	0	0.9%	0.2%	179	96%	0%
Clean #2 HDPE Plastic Packaging	0.1%	0.0%	5	1.3%	0.4%	63	0.0%	0.0%	0	0.3%	0.1%	68	93%	0%
Clean Other #3-7 Plastic Packaging	0.1%	0.0%	7	1.4%	0.8%	71	0.0%	0.0%	0	0.4%	0.2%	78	91%	1%
Clean Recyclable Film Plastic	0.8%	0.3%	56	2.0%	1.0%	97	0.0%	0.0%	3	0.8%	0.3%	156	62%	2%
Plastic Takeout Containers	0.4%	0.2%	30	0.3%	0.2%	17	0.0%	0.2%	0	0.2%	0.1%	47	36%	1%
Durable Plastic Products	0.7%	0.3%	50	1.5%	1.4%	74	0.1%	0.2%	9	0.7%	0.4%	133	56%	7%
Contaminated Recyclable Plastic	3.2%	0.8%	231	1.7%	0.7%	84	0.0%	0.0%	0	1.6%	0.3%	316	27%	0%
Expanded #6 Products and Packaging	0.4%	0.2%	30	0.3%	0.2%	13	0.0%	0.2%	0	0.2%	0.1%	43	30%	0%
Compostable Plastic	0.0%	0.0%	3	0.2%	0.2%	8	0.0%	0.0%	0	0.1%	0.1%	11	68%	4%
Flexible Plastic Pouches	0.0%	0.0%	2	0.0%	0.0%	1	0.0%	0.0%	0	0.0%	0.0%	3	47%	0%
Other Composite Film Plastics	0.3%	0.1%	25	0.2%	0.1%	12	0.0%	0.0%	0	0.2%	0.1%	37	33%	0%
Other Plastic	2.2%	0.5%	161	1.8%	1.3%	90	0.0%	0.0%	1	1.3%	0.4%	253	36%	0%
<b>Glass</b>	<b>1.4%</b>		<b>98</b>	<b>12.5%</b>		<b>618</b>	<b>0.0%</b>		<b>0</b>	<b>3.6%</b>		<b>716</b>		
Clean Glass Bottles & Jars	0.6%	0.4%	42	10.6%	3.7%	525	0.0%	0.0%	0	2.9%	0.9%	567	93%	0%
Contaminated Recyclable Glass Bottles & Jars	0.6%	0.6%	46	1.0%	0.8%	50	0.0%	0.0%	0	0.5%	0.3%	96	52%	0%
Other Composite Glass	0.1%	0.2%	10	0.9%	0.9%	43	0.0%	0.0%	0	0.3%	0.2%	53	82%	0%
<b>Metal</b>	<b>1.6%</b>		<b>118</b>	<b>2.3%</b>		<b>113</b>	<b>0.0%</b>		<b>0</b>	<b>1.2%</b>		<b>232</b>		
Clean Aluminum Cans & Foil	0.1%	0.1%	11	0.7%	0.3%	37	0.0%	0.0%	0	0.2%	0.1%	47	78%	0%
Clean Other Recyclable Metal	0.0%	0.0%	3	0.6%	0.2%	30	0.0%	0.0%	0	0.2%	0.1%	33	91%	0%
Contaminated Recyclable Metal	0.6%	0.2%	40	0.4%	0.3%	17	0.0%	0.0%	0	0.3%	0.1%	58	30%	0%
Other Metal	0.9%	0.5%	65	0.6%	0.8%	29	0.0%	0.0%	0	0.5%	0.3%	94	31%	0%
<b>Organics</b>	<b>56.6%</b>		<b>4,108</b>	<b>2.4%</b>		<b>118</b>	<b>96.1%</b>		<b>7,382</b>	<b>58.4%</b>		<b>11,608</b>		
Plant Trimmings	0.1%	0.1%	8	0.0%	0.0%	0	82.0%	8.2%	6,295	31.7%	3.1%	6,303	0%	100%
Edible Food Scraps	31.0%	11.0%	2,251	1.7%	1.3%	83	8.1%	6.4%	625	14.9%	4.7%	2,958	3%	21%
Inedible Food Scraps	14.8%	4.5%	1,076	0.3%	0.4%	14	3.7%	3.1%	285	6.9%	2.0%	1,376	1%	21%
Other Compostable Organics	0.0%	0.0%	0	0.0%	0.0%	0	0.0%	0.0%	1	0.0%	0.0%	2	0%	80%
Diapers	3.3%	2.2%	243	0.0%	0.1%	2	0.0%	0.0%	0	1.2%	0.8%	245	1%	0%
Animal Feces & Litter	4.5%	3.7%	329	0.0%	0.0%	0	0.0%	0.0%	0	1.7%	1.4%	329	0%	0%
Other Organic	2.8%	3.1%	201	0.4%	0.3%	18	2.3%	3.5%	176	2.0%	1.8%	395	5%	44%
<b>Hazardous Waste</b>	<b>2.1%</b>		<b>154</b>	<b>1.2%</b>		<b>61</b>	<b>0.0%</b>		<b>0</b>	<b>1.1%</b>		<b>215</b>		
Electronics	0.6%	0.6%	45	1.0%	0.6%	51	0.0%	0.0%	0	0.5%	0.3%	96	53%	0%
Batteries	1.0%	1.4%	69	0.0%	0.0%	2	0.0%	0.0%	0	0.4%	0.5%	72	3%	0%
Medicine	0.3%	0.5%	25	0.0%	0.0%	0	0.0%	0.0%	0	0.1%	0.2%	25	0%	0%
Other Hazardous Waste	0.2%	0.2%	15	0.2%	0.2%	8	0.0%	0.0%	0	0.1%	0.1%	23	36%	0%
<b>Other Materials</b>	<b>17.0%</b>		<b>1,230</b>	<b>7.2%</b>		<b>355</b>	<b>1.9%</b>		<b>148</b>	<b>8.7%</b>		<b>1,734</b>		
Textiles & Leather	2.7%	1.1%	198	6.1%	5.7%	300	0.0%	0.0%	0	2.5%	1.5%	499	60%	0%
Non-metal Appliances	0.0%	0.0%	0	0.0%	0.0%	0	0.0%	0.0%	0	0.0%	0.0%	0		
Construction & Demolition Debris	5.1%	7.2%	372	0.0%	0.0%	0	0.0%	0.0%	0	1.9%	2.6%	372	0%	0%
Other Materials	9.1%	4.4%	660	1.1%	0.6%	55	1.9%	3.1%	148	4.3%	2.0%	863	6%	17%
<b>Recyclable</b>	<b>5%</b>		<b>360</b>	<b>72%</b>		<b>3,560</b>	<b>0%</b>		<b>31</b>	<b>20%</b>		<b>3,951</b>	<b>90%</b>	<b>1%</b>
<b>Compostable</b>	<b>52%</b>		<b>3,763</b>	<b>4%</b>		<b>178</b>	<b>95%</b>		<b>7,281</b>	<b>56%</b>		<b>11,223</b>	<b>2%</b>	<b>65%</b>
<b>Potentially Recyclable</b>	<b>15%</b>		<b>1,108</b>	<b>9%</b>		<b>425</b>	<b>0%</b>		<b>36</b>	<b>8%</b>		<b>1,570</b>	<b>27%</b>	<b>2%</b>
<b>Problem Materials</b>	<b>28%</b>		<b>2,022</b>	<b>16%</b>		<b>785</b>	<b>4%</b>		<b>332</b>	<b>16%</b>		<b>3,139</b>	<b>25%</b>	<b>11%</b>
<b>Totals</b>	<b>100%</b>		<b>7,253</b>	<b>100%</b>		<b>4,948</b>	<b>100%</b>		<b>7,681</b>	<b>100%</b>		<b>19,882</b>		
<b>Sample Count</b>			<b>43</b>			<b>41</b>			<b>29</b>					

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



Each day the field team noted which carts were set out at each house on the selected routes. Figure 4 is based on the set-out data that the field team collected over the course of the study. Approximately 94% of households set out their garbage cart weekly, 87% set out their recycling cart, and 66% set out their organics cart.

**Figure 4. Weekly Set-Out Rates by Cart Type**

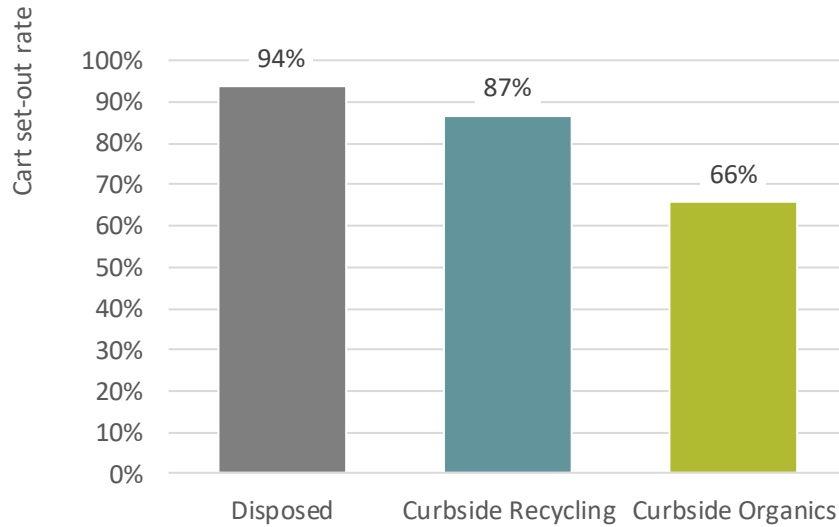


Figure 5 indicates that 69% of single-family households divert (place into the recycling cart) 80-100% of the recyclables that they generate. On the other end of the spectrum, 9% of households do not divert any of the recyclables that they generate.

**Figure 5. Single-Family Recycling Diversion Efficiency Behavior Patterns**

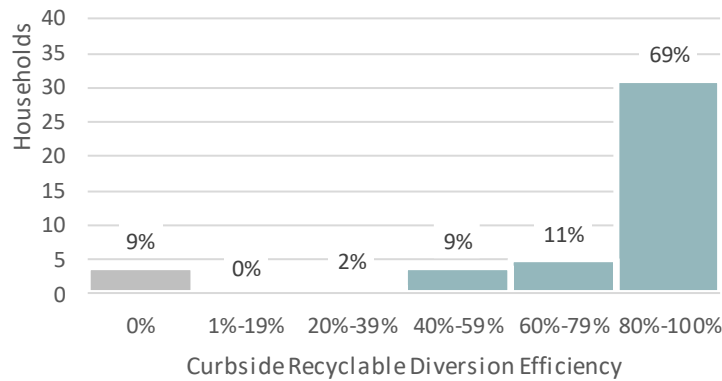
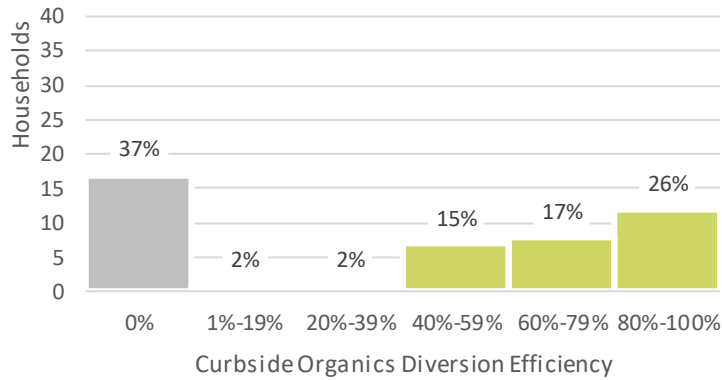


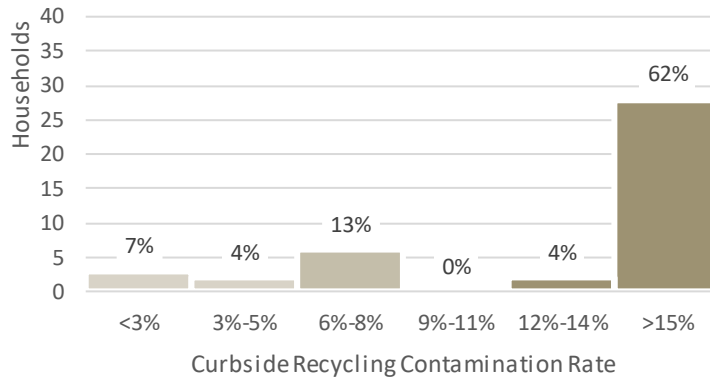
Figure 6 indicates that the range of composting behavior is broader than the range of recycling behaviors. As shown, 26% of single-family households divert 80-100% of the compostables that they generate, and 37% of households are not diverting compostables at all. 17% of households divert 60-79% of their compostables and an additional 15% divert 40-59% of their compostables.

**Figure 6. Single-Family Compost Diversion Efficiency Behavior Patterns**



A relatively high level of contamination (>15%) is prevalent among Cupertino households. As Figure 7 demonstrates, recycling carts at nearly two-thirds of households (62%) are more than 15% contaminants. Only 7% of single-family residents have a contamination rate less than a 3%. Contaminated but otherwise recyclable materials comprise a sizable fraction of the contaminants.

**Figure 7. Single-Family Recycling Contamination Rates Behavior Patterns**



As Figure 8 demonstrates, 11% of single-family residents have a contamination rate of greater than 5% in their organics cart, while nearly half (48%) have a contamination rate of less than 1%.

**Figure 8. Single-Family Organics Contamination Rates Behavior Patterns**

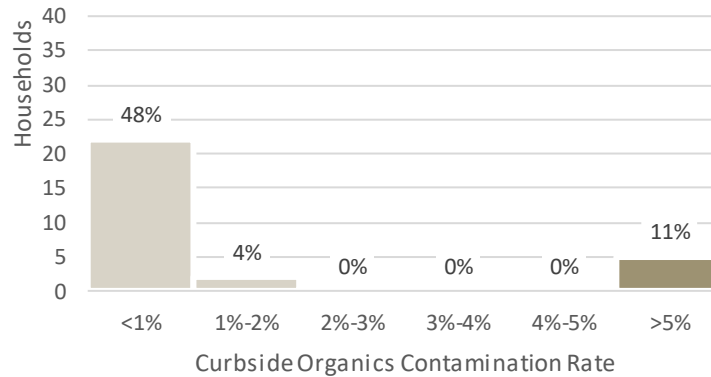
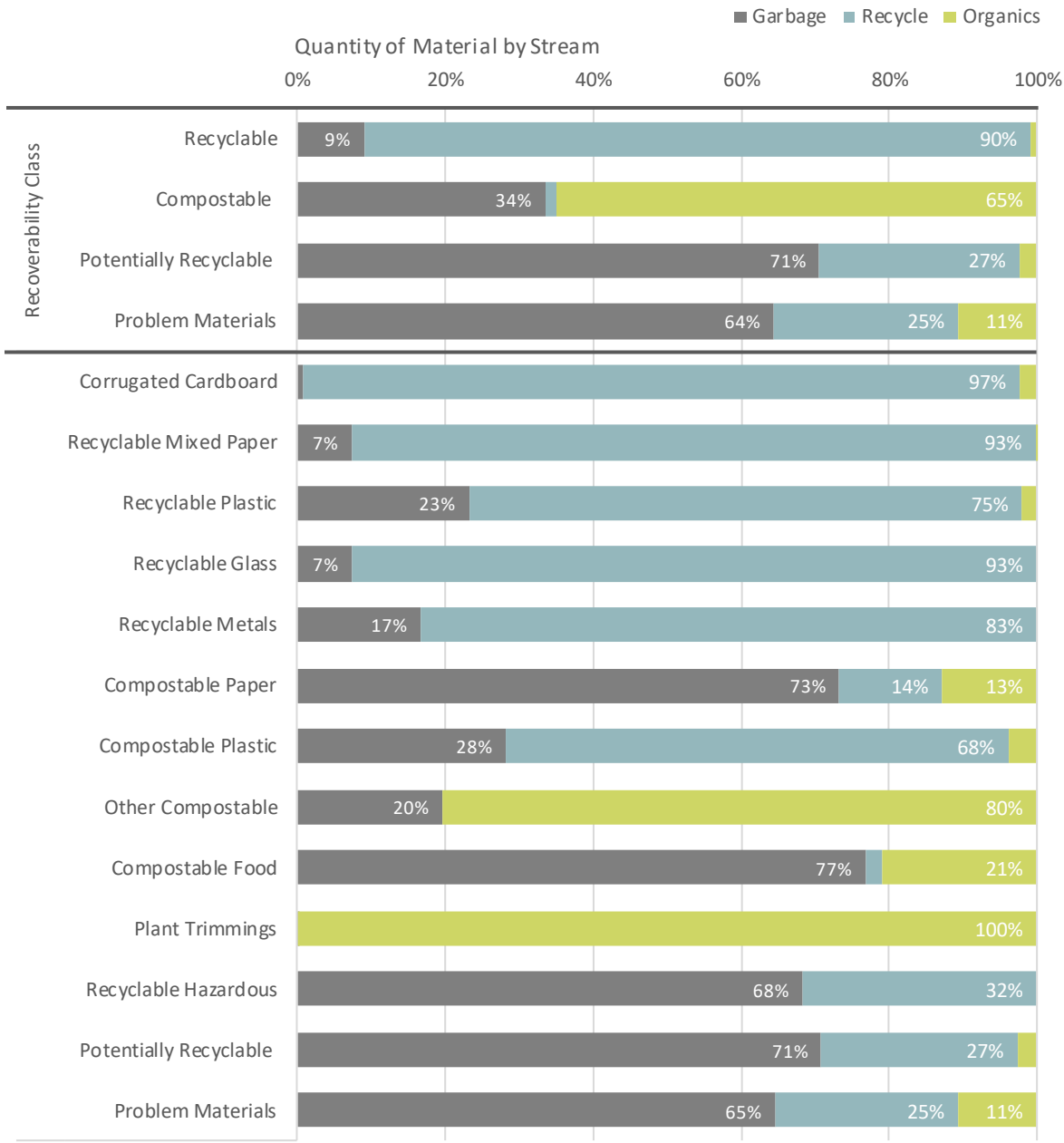


Figure 9 describes capture rates for aggregated key materials of interest. We have rolled many of the study’s material types into more broad material categories to demonstrate where there are general opportunities for improving materials capture. For example, *clean, flattened, uncoated corrugated cardboard* and *clean, unflattened, uncoated corrugated cardboard* are rolled into an aggregated material type called “corrugated cardboard.”

A capture rate indicates what proportion of each key material type households are placing in the correct container. For example, the capture rate for compostable paper (i.e., the pounds of compostable paper placed in the organics cart divided by the total pounds of compostable paper generated) indicates an opportunity for increased capture; only 13% of compostable paper is captured in the organics stream, 14% enters the recycling stream as contamination, and 73% is disposed as garbage. Material categories with high capture rates include corrugated cardboard (97% capture), recyclable mixed paper (93% capture), and recyclable glass (93% capture). Recyclable plastic (75% capture) has a relatively low capture rate. Plant trimmings has a capture rate of 100%, while compostable food presents a sizable opportunity with a capture rate of only 21%.

Figure 9. Aggregate Single-Family Capture Rates by Stream



## Material Definitions

### PAPER

1. **CLEAN, FLATTENED, UNCOATED CORRUGATED CARDBOARD:** Uncoated boxes, packaging, sheets, and other pieces with a corrugated layer sandwiched between two outer layers that has been flattened to reduce the volume. Examples include shipping boxes and some shoe boxes.
2. **CLEAN, UNFLATTENED, UNCOATED CORRUGATED CARDBOARD:** Uncoated boxes, packaging, sheets, and other pieces with a corrugated layer sandwiched between two outer layers that has **NOT** been flattened to reduce the volume. Examples include shipping boxes and some shoe boxes.
3. **CLEAN RECYCLABLE PAPER:** Paper and paper products recycled curbside, except corrugated cardboard. Includes newspaper, high grade white or colored ledger, paper bags, bond, rag, stationary, office, copy or printing paper, low grade mixed junk mail, envelopes (plastic windows ok), magazines, clay coated glossy catalogs, brochures and pamphlets, hardback and paperback books, spiral notebooks, manila folders, index cards, self-adhesive notes, phonebooks, bagged shredded paper, construction paper, kraft or bleached sheets, toilet paper tubes, non-corrugated box/liner/chip/paper board (e.g., cereal and tissue boxes, six pack holders), egg cartons, tissue wrapping paper, blueprints, and carbonless forms. Minor amounts of glue or other binding are okay.
4. **CLEAN COATED PAPER PRODUCTS:** Paper and paper products that are coated with polyethylene or other non-compostable layers inside and/or outside. Includes fast food wrappers, pizza box liners, butcher paper, and ice cream and other frozen/refrigerated food packaging. This does not include coated corrugated cardboard, items with a gable top, prepared food takeout containers, or paper cups.
5. **GABLE TOP CARTONS & ASEPTICS:** Containers that are poly or wax (not clay) coated inside and/or outside with a gable top such as milk and juice cartons (including those with plastic spouts). Does not include aseptic packaging. Multilayer composite cartons of bleached paper, poly film and foil, such as juice, milk, soup and tofu boxes.
6. **CONTAMINATED RECYCLABLE PAPER:** paper items normally accepted in the curbside recycling program that are too contaminated to be marketed. Examples include ledger paper soaked in coffee, cardboard covered in paint, excessively wet boxboard packaging, etc. Includes loose shredded paper.
7. **PAPER TISSUE & TOWELS:** Paper towels, napkins, tissues, toilet paper, and other short fiber, potentially soiled, paper that is not recyclable, but is compostable. Includes cotton balls, pads, and non-plastic swabs and wipes.
8. **OTHER COMPOSTABLE PAPER:** Uncoated paper not generally accepted in the recycling program that is not tissue & towels, and that can be composted. This includes some paper products with a compostable plastic liner. Examples include: some food-soiled paper plates, french fry containers, and coffee filters. Recyclable paper that was likely soiled in the collection cart should be included in the contaminated recyclable paper category.

9. **PAPER TAKEOUT CONTAINERS:** Rigid paper containers used for serving or transporting single-use, ready to eat, prepared foods from a food service point-of-sale. This material type includes containers that could have been avoided had a customer brought a re-usable food container to the point-of-sale. Example include boxes and clamshells for items from the “hot food” bar or salad bar at a grocery store or deli, “Chinese food” take out cartons, etc. This does not include paper cups or paper wraps (like for a hamburger, deli sandwich, or burrito). This does not include items in paper retail packaging like frozen foods, cereals.
10. **COATED PAPER CUPS:** Cups that are poly, compostable plastic, or wax coated inside and/or outside such as for coffee and other hot drinks or soda and other cold drinks.
11. **PIZZA BOXES:** Boxes used for take-out or delivery of prepared pizza. Includes both clean and soiled boxes.
12. **OTHER COMPOSITE PAPER:** Items predominantly paper, not elsewhere defined, but with one or more other material rendering them hard to recycle or compost, such as orange juice concentrate cans, carbon copy paper, foil laminated paper boxes and gum wrappers, packaging with large plastic windows (blister packs) or integrated foam, cylindrical coffee containers made of paperboard and metal with a plastic lid, and heavily plastic laminated or painted paper.

## PLASTIC

13. **CLEAN #1 PETE PLASTIC PACKAGING:** Polyethylene terephthalate (PET) bottles, jars, frozen food trays, retail packaging and other rigid items such as food and beverage containers. This includes clamshells that are not otherwise included in the plastic takeout containers material type, like berry clamshells and four pack muffin clamshells.
14. **CLEAN #2 HDPE PLASTIC PACKAGING:** High-density polyethylene (HDPE) bottles, jars, tubs, lids, and other rigid items such as distilled water, milk, juice, vinegar, yogurt, detergent and empty motor oil or antifreeze containers.
15. **CLEAN OTHER #3-7 PLASTIC PACKAGING:** Polyvinyl chloride (PVC), low-density polyethylene (LDPE), polypropylene (PP), non-expanded styrene (PS), other (#7, various resins) and unlabeled, unidentifiable bottles, jars, tubs, lids, and other rigid items such as some salad dressing, syrup and prescription bottles, CD cases, and auto parts. Items are typically constructed of a single plastic resin and smaller than a basketball.
16. **CLEAN RECYCLABLE FILM PLASTIC:** Single layer clear or colored film without an inner foil or metallic layer accepted in the Cupertino recycling carts. Includes, dry cleaner, newspaper, Ziploc, bread, cracker, tortilla chip, stretch, shrink and bubble wrap, plastic sheeting, frozen food, and clear or colored grocery, department store and other retail and food establishment merchandise and to go bags.
17. **PLASTIC TAKEOUT CONTAINERS:** Rigid plastic containers used for serving or transporting single-use, ready to eat, prepared foods from a food service point-of-sale. This material type includes containers that could have been avoided had a customer brought a re-usable food container to the point-of-sale. Example include boxes and clamshells for items from the “hot food” bar or salad bar at a grocery store or deli, “Chinese food” take out cartons, plastic tubs

and bowls from fast food restaurants, etc. This does include plastic to-go cups. This does not include items in plastic retail packaging like frozen foods, microwavable soups, etc.

18. **DURABLE PLASTIC PRODUCTS:** Large, rigid items made predominately from plastic (usually a single resin) and intended for multiple uses. Examples include clothes hangers, buckets, lawn furniture, plastic pipe, and some toys.
19. **CONTAMINATED RECYCLABLE PLASTIC:** plastic items normally accepted in the curbside recycling program that are too contaminated to be marketed. Examples include yogurt tubs containing yogurt residue or milk jugs containing milk.
20. **EXPANDED #6 PRODUCTS AND PACKAGING:** Styrofoam and other expanded polystyrene cups, plates, bowls, clamshells, packaging blocks and peanuts (except compostable ones), insulation, non-corrugated foamcore (Include sandwiched between two layers of paper or plastic) and other rigid items. Does not include food service items that would otherwise be included in the plastic takeout containers material type.
21. **COMPOSTABLE PLASTIC:** Polylactic acid (PLA) and other bags, cups, lids, plates, bowls, clamshells, trays, utensils, and other items labeled "compostable."
22. **FLEXIBLE PLASTIC POUCHES:** means plastic pouches made of thicker, multi-layer flexible material. May have a flat bottom so that package would stand up on its own, but not always. Material is thicker than potato chip bags and frozen vegetable bags. Includes plastic coffee bags like Starbucks and Peet's; Capri Sun pouches; baby food pouches – may have plastic screw top; soup pouches; salad dressing pouches; wine pouches; backpacking meals in pouches; soap refill pouches; laundry detergent pouches; and other similar items.

INCLUDED – THICKER, MULTI-LAYER PACKAGING	EXCLUDED – THINNER, SINGLE-LAYER PACKAGING
Plastic coffee bags (Starbucks and Peet's) Juice pouches (Capri Sun) Baby food pouches – may have plastic screw top Soup pouches Salad dressing pouches Wine pouches Backpacking meals in pouches Soap refill pouches Laundry detergent pouches Other similar items	Potato chip bags and similar Candy wrappers Tortilla bags Frozen food bags (vegetables, berries) Nut/snack bags Shrink plastic wrappers (Slim Jim and string cheese wrappers) Ziploc bags intended for home use Thin produce bags as used in grocery stores Newspaper bags Bread bags Small (2 inch) pouches for condiments (mustard, relish, etc.) Yogurt tubes (Gogurt) Mailing pouches, usually colored or white (not clear) (LL Bean, medication pouches) 100% Plastic mailing pouches with bubble wrap Other similar items





23. **OTHER COMPOSITE FILM PLASTICS:** Items made of multi-layer, multi-material films, typically with a metallic or foil layer. Examples include potato chip bags, candy bar wrappers, energy bar wrappers, and anti-static electronics wrappers.
24. **OTHER PLASTIC:** Items that are predominantly rigid plastic but have more than one type of plastic and/or other materials like metal or film plastics not described elsewhere. Includes toothbrushes, disposable razors, pens, some toys, lighters, vinyl binders, hoses, foil and plastic blister packs (such as for medications), and fiberglass products except insulation. Does not include appliances or electronics. Includes non-recyclable film like trash bags, condiment pouches, mailing pouches, shower curtain, woven polyethylene (e.g., grain bags, wipes, dryer sheets), and mylar balloons.



## GLASS

25. **CLEAN GLASS BOTTLES & JARS:** Any container grade glass bottles and jars for water, soda, juice, wine, beer, liquor, vinegar, condiments, pickles, body care, and other products.
26. **CONTAMINATED RECYCLABLE GLASS BOTTLES & JARS:** Glass items normally accepted in the curbside recycling program that are too contaminated to be marketed.
27. **OTHER COMPOSITE GLASS:** Items that are predominantly glass but have other materials like wire mesh or plastic lamination (curved auto windshields, bus shelter and other safety glass), silvering (mirrors), or other components (incandescent and halogen bulbs). Does not include mercury lamps, which go in the *mercury lamps* hazardous category. Items made only of clear or tinted glass that is not container glass. Includes drinking glasses, crystal, and laboratory ware, table tops, or blown glass. Includes tempered or toughened glass (such as flat side or rear window auto glass).

## METAL

28. **CLEAN ALUMINUM CANS & FOIL:** Aluminum cans and bi-metal cans made mostly of aluminum (for beverages, pet food, etc.), empty aluminum aerosol cans for hazardous products, all (empty or full) aluminum aerosol cans with non-toxic contents, and aluminum food containers, trays, pie tins and foil.
29. **CLEAN OTHER RECYCLABLE METAL:** Non-ferrous, ferrous, composite, etc. Any other metal not described above.
30. **CONTAMINATED RECYCLABLE METAL:** Metal items normally accepted in the curbside recycling program that are too contaminated to be marketed.
31. **OTHER METAL:** Other items predominately made of metal that are not accepted in the curbside recycling program. Examples include major appliances, window blinds, and car parts.

## ORGANIC

32. **PLANT TRIMMINGS:** Prunings and cuttings from bushes, shrubs and trees, and non-woody plant materials including grass clippings, sod, leaves, dead flowers, weeds, loose or rolled tobacco (without filters but including any rolling paper), cork, hemp rope and other plant material. Includes all plant types, and branches, trunks and stumps of any size.
33. **EDIBLE FOOD SCRAPS:** The components of food that, in a particular food supply chain, are intended to be consumed by humans. What is considered edible varies among users (e.g., chicken feet are consumed in some food supply chains but not others), changes over time, and is influenced by a range of variables. For the purposes of this study, edible food is food that any user (*not* all users) would eat. So, for example, although not all users would eat chicken feet, some users might, so we could consider chicken feet edible in this study.

34. **INEDIBLE FOOD SCRAPS:** The components of food not included in the edible food (skins, pits, bones, eggshells, coffee grounds, tea bags, etc.)
35. **OTHER COMPOSTABLE ORGANICS:** Includes bagasse foodware and disposable wood utensils, wood stirrers, toothpicks, wood popsicle sticks, candles, compostable packaging peanuts, hair, finger nails, etc.
36. **DIAPERS:** Diapers made from a combination of fibers, synthetic and/or natural, primarily for single use. Includes disposable baby diapers, adult protective undergarments, feminine hygiene products. Includes diaper and any contents, including human feces not in diapers, etc.
37. **ANIMAL FECES & LITTER:** Any non-human animal feces and litter such as cat feces and kitty litter, dog poop, bird droppings, and horse manure and soiled bedding. Includes soiled paper and other litter materials. Also includes animal carcasses not resulting from food storage or preparation.
38. **OTHER ORGANIC:** Predominantly organic items that are mixed with non-organic materials and cannot easily be separated for composting.

## HAZARDOUS WASTE

39. **ELECTRONICS:** All types of products which include one or more integrated circuits, circuit boards, or “chips” and/or have a visual display greater than (or equal to) four inches on the diagonal. Generally, includes anything that can be programmed. Includes televisions, computer monitors, CPUs and computer peripherals, fax machines, stereo equipment, VCRs, some games and toys. Does NOT include items powered by electricity (“plug or battery”) if electronic circuitry or a video display are not present, for example non-robotic vacuum cleaners. Note that there may be products intended for the same use of which some will be electronic waste and some will not – for example, coffeemakers (some just plug in and are switched on manually and some contain chips/boards because they have on/off/grind etc. features which can be programmed).
40. **BATTERIES:** All chemistries, including alkaline batteries, Ni-Cd, Ni-MH, Lithium, Lithium-ion, and small sealed lead acid (SSLA) batteries often used in battery backup units.
41. **MEDICINE:** All medicine intended for human or veterinary use, including prescription and non-prescription (over-the-counter) drugs as well as vitamins and nutritional products.
42. **OTHER HAZARDOUS WASTE:** Paint, mercury lamps, pesticides, cleaning products, motor oil, oil & fuel filters, medical waste, cold packs, and items and materials not fitting into any of the other hazardous categories, but which meet California’s hazardous waste characteristic descriptions for ignitability, corrosivity, reactivity, or toxicity. Includes lab chemicals, solvents (paint thinner, nail polish & nail polish remover), mercury thermometers & thermostats, adhesives, glues, fuel, non-empty and pressurized gas canisters and cylinders, antifreeze, asbestos containing material, ammunition, writing and printing ink, hair dye. Does NOT typically include cosmetics or personal care products. Includes empty containers which previously contained a hazardous material.

**OTHER MATERIALS**

43. **TEXTILES & LEATHER:** Items made of thread, yarn, fabric, or cloth from natural or synthetic materials such as cotton, wool, silk, nylon, rayon or polyester. Includes carpet, clothes, fabric trimmings, curtains, drapes, and linens. Also includes real and synthetic leather shoes, handbags, belts, scraps, pillows, and upholstery.
44. **NON-METAL APPLIANCES:** Multi-material electric analog (not digital, no chips) appliances, primarily plastic, such as old toasters, power tools, curling irons, light fixtures, clocks and dial telephones
45. **CONSTRUCTION AND DEMOLITION DEBRIS:** Includes clean, painted, treated wood; inerts; gypsum; roofing; C&D glass, and other construction & demolitions related items.
46. **OTHER MATERIALS:** All remaining, generally multi-material composite or indistinct items not elsewhere defined. Examples include items less than 2" in diameter on any side, whole filtered cigarettes and cigarette butts, dryer lint, tires, rubber, and personal care products (shampoo, cosmetics, soaps, toothpaste, etc.).