# Rhode Island Solid Waste Characterization Study

FINAL REPORT – December 31, 2015

Prepared for:

## Rhode Island Resource Recovery Corporation


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# Rhode Island Solid Waste Characterization Study

## Rhode Island Resource Recovery Corporation

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# Acknowledgements

State-wide waste characterization studies necessarily involve a large number of people to assist with implementation. For Rhode Island this included the following individuals.

## Rhode Island Resource Recovery Corporation

In addition to all of the spotters and equipment operators who went out of their way to provide the waste for sorting and keep the sorters and enumerators safe, key individuals were:

Mike McGonagle, Project Manager
Brian Card, Director of Operations
Steve Pietrantozzi, Scale Manager
Krystal Noiseux, Report Reviewer
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## Rose Hill Transfer Station/Town of South Kingston

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# Executive Summary

The Rhode Island Resource Recovery Corporation (RIRRC) contracted with DSM Environmental Services, Inc. (DSM) to conduct a characterization study of solid waste that is generated within the State of Rhode Island and managed by RIRRC. DSM sub-contracted with MidAtlantic Solid Waste Consultants to conduct the mixed solid waste (MSW)[1] sorting and Cascadia Consulting Group to statistically analyze the samples (collectively called the Project Team).

The study was carried out over the course of four seasons beginning in November, 2014 (Fall Season), with the final season sort (Summer Season) occurring in July and August, 2015. Waste sampling activities occurred primarily at the RIRRC landfill, with limited sampling occurring at four transfer stations throughout the State. Solid waste from both Residential and ICI (Industrial/Commercial/Institutional) generators, and from municipal and commercial customers, were subject to a statistical sampling process, and the representative, randomly chosen samples characterized in terms of the weight of defined material types.

Surveys of drivers entering the landfill were also conducted during every seasonal sort to more accurately allocate the delivered waste between residential and ICI generators; and, for roll-off waste, between MSW, bulky, and construction and demolition (C&D) loads to further clarify what percent of the waste entering the landfill was represented by the hand sorted MSW loads.

Finally, visual characterizations of loads described by the drivers as “bulky waste” were used to estimate the composition of bulky waste loads entering the landfill, based on allocations of wastes from the roll-off surveys.

A summary of the waste characterization results is presented below, followed by an analysis of all of the data in the main body of the report.

It is important for the reader to note that data are presented two ways in the report to represent both the traditional way that waste characterization studies are typically presented, and to represent the unique way that waste is managed in Rhode Island.

Typically waste characterization studies divide waste between residential waste and ICI waste. This is because residential waste is much more homogeneous than ICI waste, and because programs for managing waste are typically different for residential waste and ICI waste. This report presents the hand sort data this way which makes it easier to compare against other state-wide waste characterization studies.

The data are, however, also presented consistent with the way waste is managed in Rhode Island. Specifically, municipalities are required to assure that residential waste generated in Rhode Island is delivered to the RIRRC landfill. While the bulk of this waste is residential waste, included in this waste is waste generated by municipal activities such as schools and town offices which would typically be considered ICI waste in most states. The remaining waste delivered to the RIRRC landfill comes in at a

[1] For purposes of this report “MSW” refers to residential and commercial mixed solid waste disposed at the RIRRC landfill, not to the common definition in Rhode Island of “Municipal Solid Waste” which is waste delivered to the RIRRC landfill by Rhode Island municipalities.

higher tipping fee and is coded at the landfill as "commercial waste". While the bulk of this waste is in fact ICI waste, some portion of it is generated by multi-family housing, condominiums, and mobile home parks. This waste is similar to residential waste but is collected by private waste haulers and delivered together with ICI waste to the RIRRC landfill as "commercial waste".

The body of this report presents the hand sort data in both ways. However, because of the way waste is managed in Rhode Island, this Executive Summary presents the data aggregated only as "municipal waste" and "commercial waste".

## Waste Streams Categorized In This Report

As illustrated by Table E.1, 1,048,000 tons of waste was disposed at the RIRRC landfill, circa 2015. This waste characterization concentrated on mixed solid waste (municipal and commercial, or residential and ICI MSW) and bulky waste, which combined equaled 583,000 tons, or 56 percent of the total amount of waste delivered to the landfill, c. 2015. The balance of deliveries (44 percent) consisted of processed and unprocessed construction and demolition debris (C&D), soils, sludge, recycling process residues, and rejected recycling loads that were not characterized.

Table E1. Allocation of Waste by Category Managed by RIRRC, c. 2015

| Waste Type By Generator Category | Tons (in 1,000's) | Percent (%) |
|---|---|---|
| ***Mixed Solid Waste*** | | |
| Residential | 303 | 29% |
| ICI | 225 | 21% |
| ***Bulky Waste*** | ***55*** | ***5%*** |
| ***Sub-Total, Wastes Characterized:*** | ***583*** | ***56%*** |
| ***Other Wastes Not Characterized*** | | |
| C&D Waste | 196 | 19% |
| Other Waste | 35 | 3% |
| Special Waste | 233 | 22% |
| **Total Waste:** | **1,048** | **100%** |

## Sampling and Sorting of Municipal and Commercial MSW Loads

Over the course of the four seasons a total of 248 samples of waste were captured and hand sorted to analyze the composition of municipal and commercial MSW delivered to the RIRRC landfill. These samples were primarily obtained from collection vehicles (front-loader, automated, and rear-load trucks) and some roll-offs from municipal drop-off collections and commercial business identified as MSW. One

hundred and five hand sorts of residential waste were completed and 106 ICI hand sorts were completed. An additional 46 targeted commercial generator samples were completed[2].

Ninety-four of the samples were from waste delivered as Municipal Customer Waste, meaning that it originated in one of the municipalities and was coded as municipal waste at a lower tipping fee. Another 91 samples were coded as Commercial Customer Waste, which is waste not delivered under the municipal tipping fee. An additional 26 samples were sorted at the four transfer stations and were not classified as either municipal or commercial waste.

All samples were sorted into 70 material categories. Note that not every sample contained all 70 material types, but 70 material type bins were available for each hand sort for placement of all material meeting that category description.

## Results of Hand Sorts

Figure 1a presents the overall composition by material category (as a percent of all material categories) of the combined municipal and commercial MSW delivered to the RIRRC landfill, c. 2015.

Figure 1b then presents the total tons of MSW delivered to the landfill divided into five categories (shown below), consistent with current and potential management options for MSW disposed at the RIRRC landfill. The tons are calculated by aggregating materials into each of these five categories and multiplying the resulting aggregated percentages by material type to total MSW tons from Table E.1.

The five categories are:

- ***MRF Materials –*** Recyclables currently processed at the RIRRC MRF;
- ***Compostable (any scale) –*** Vegetative food wastes, yard wastes, and dirty paper which could be composted or digested both at the backyard level or municipal level (composting), or composted or anaerobically digested at a central location;
- ***Compostable (large scale)-*** Tree and brush waste that would require grinding before being managed through composting or anaerobic digestion;
- ***Drop-Off –*** Refers to materials that can be recycled or reused at drop-off recycling facilities; and,
- ***Trash –*** All other materials that currently do not have value

Figures 2a-b, and 3a-b then present the composition of municipal customer (Figure 3) and commercial customer waste (Figure 4) separately by these same summary categories.

Note that all quantities in Figures 1b, 2b, and 3b are in thousands (000's) of tons.

[2] Note that nine (9) of the 248 samples were used twice, once as part of the hand sort total of ICI MSW, and once as one of the targeted generator categories.

***Figure 1a.*** *Composition of Combined Municipal and Commercial MSW by Material Category, c.2015*

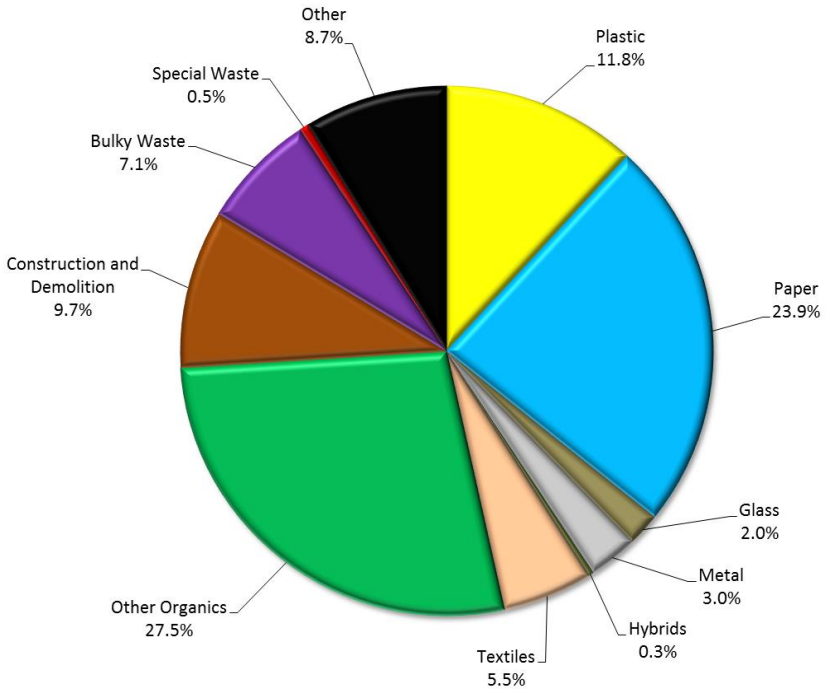



***Figure 1b.*** *Composition of Combined Municipal and Commercial MSW by Management Category*

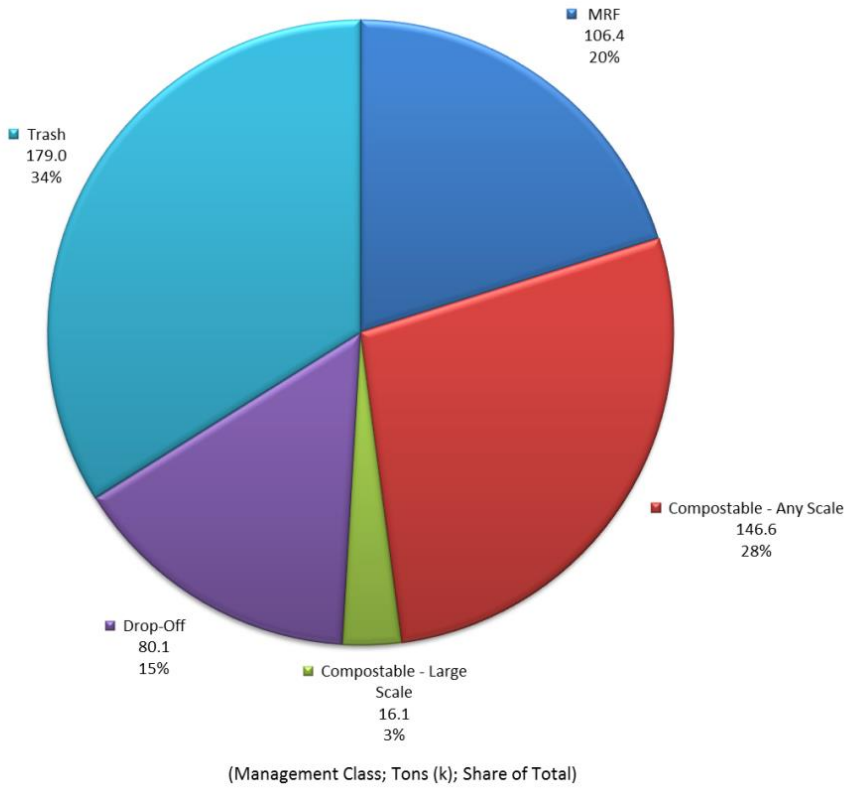


***Figure 2a.*** *Composition of Municipal Customer MSW by Material Category*

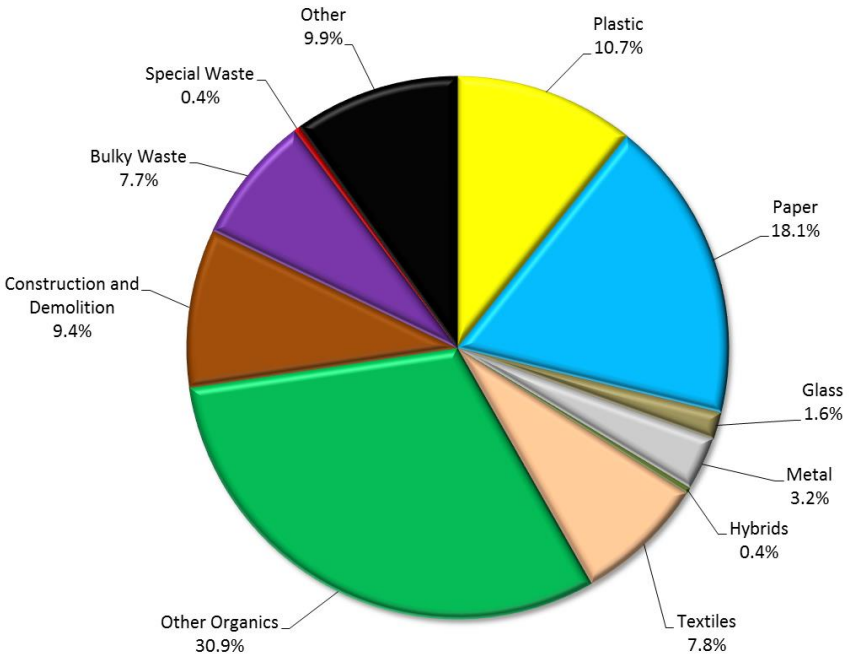



***Figure 2b.*** *Composition of Municipal Customer MSW by Management Category*

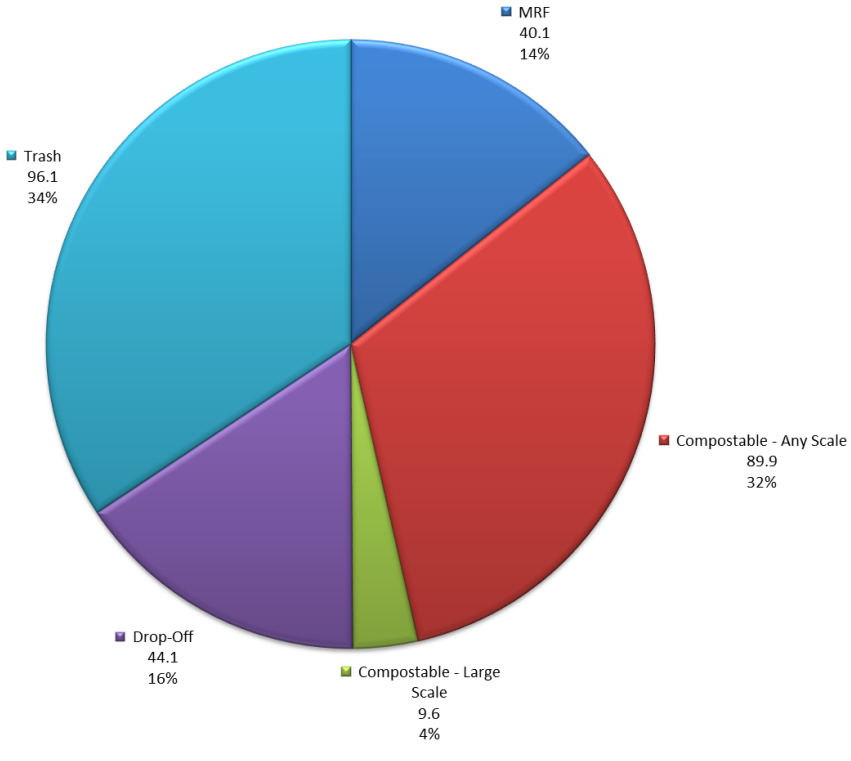


***Figure 3a.*** *Composition of Commercial Customer MSW by Material Category*

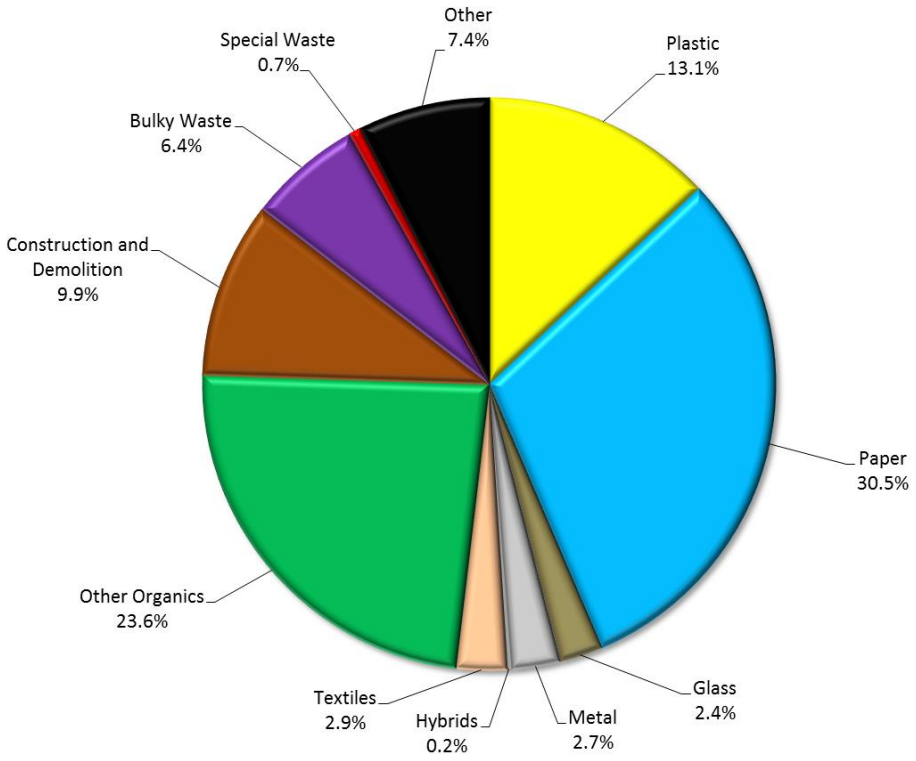
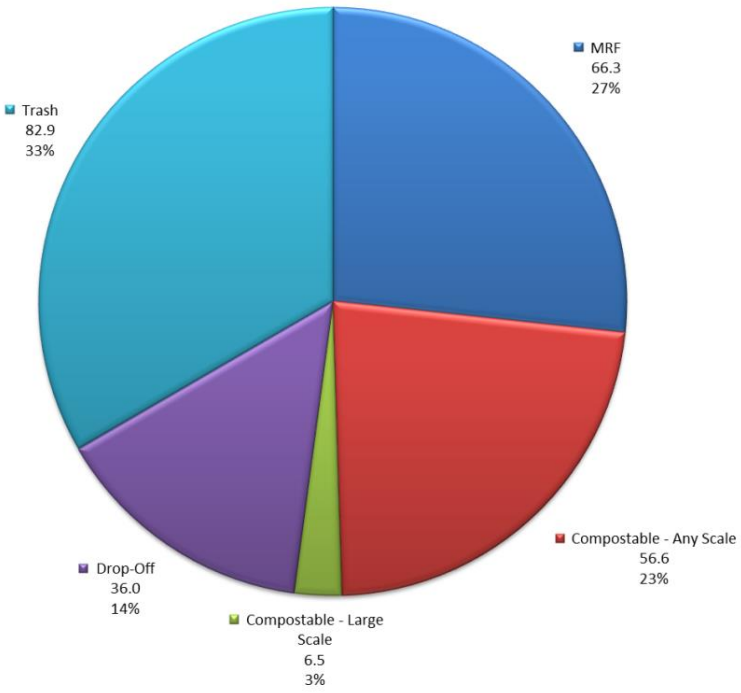



***Figure 4b.*** *Composition of Commercial Customer MSW by Management Category*



## Most Prevalent Materials

As stated above, this waste characterization concentrated on mixed solid waste (MSW) – 528,000 tons rounded, or 50 percent of overall deliveries to the landfill c.2015, and bulky waste – 55,000 tons, or eight percent of deliveries to the landfill in 2015. Tables E.2 and E.3 present the top ten materials, on a tonnage basis, for municipal and commercial MSW calculated by applying the material percentages in Figures 2a and 3a to the MSW tons in Table E.1. Note that Figures 2a and 3a are summary pie charts and that percentages were calculated for all 70 material categories.

Table E.2. Top Ten Municipal Customer Materials, by Weight

| Material Type | Estimated Percent | Cumulative Percent | Estimated Tons |
|---|---|---|---|
| Vegetative food waste | 17.1% | 17.1% | 47,886 |
| Miscellaneous | 9.9% | 27.0% | 27,573 |
| Leaf and yard debris | 7.8% | 34.7% | 21,690 |
| Compostable Paper | 7.3% | 42.0% | 20,349 |
| Treated wood | 6.5% | 48.5% | 18,068 |
| Apparel | 4.8% | 53.3% | 13,520 |
| Carpet and carpet padding | 4.1% | 57.4% | 11,383 |
| Contaminated film/bags | 3.7% | 61.0% | 10,343 |
| Protein food waste | 3.1% | 64.2% | 8,712 |
| Non-apparel textiles | 2.9% | 67.1% | 8,220 |
| ***Subtotal*** | ***67.1%*** | | ***187,744*** |
| All other material types | 32.9% | | 92,051 |
| **Total** | **100.0%** | | **279,795** |

Table E.3. Top Ten Commercial Customer Materials, by Weight

| Material Type | Estimated Percent | Cumulative Percent | Estimated Tons |
|---|---|---|---|
| Vegetative food waste | 14.9% | 14.9% | 36,941 |
| Brown corrugated cardboard boxes & kraft paper | 14.0% | 28.9% | 34,834 |
| Miscellaneous | 7.4% | 36.3% | 18,454 |
| Treated wood | 6.9% | 43.2% | 17,043 |
| Compostable Paper | 5.5% | 48.7% | 13,699 |
| Contaminated film/bags | 4.2% | 52.9% | 10,540 |
| Remainder/composite plastic | 3.4% | 56.4% | 8,563 |
| Protein food waste | 2.6% | 59.0% | 6,491 |
| Furniture | 2.5% | 61.5% | 6,226 |
| Leaf and yard debris | 2.4% | 63.9% | 5,989 |
| ***Subtotal*** | ***63.9%*** | | ***158,781*** |
| All other material types | 36.1% | | 89,591 |
| **Total** | **100.0%** | | **248,373** |

Key observations associated with a review of the MSW composition data are as follows:

- The majority of households in Rhode Island appear to be doing a very good job diverting material for recycling, with relatively low quantities of paper and containers left in the waste stream. Paper, at 18 percent of the residential waste stream is roughly 8 to 10 percentage points lower than what the Project Team has observed in similar studies in other New England States (Vermont, 2012, Connecticut, 2010), and is comparable with Seattle (2010), which is often cited as a model city for recycling in the U.S.
- The largest single waste material in the residential waste stream is vegetative food waste, followed in 3rd and 4th place by leaf and yard debris and "compostable paper", which combined represent 90,000 tons (rounded) of the total of 279,795 tons of municipal waste.
- Leaf and yard debris is almost all generated by the residential sector.
- ICI generators do not appear to be doing as effective a job at diverting potential recyclables, with corrugated containers and kraft (brown) paper the second largest single category of commercial waste at 34,800 tons (rounded), or 14 percent of the total commercial waste delivered to the landfill.

## Bulky Wastes Loads

This study represents one of the first attempts in the U.S., outside of the west coast, to quantify the composition of loads described by the drivers as bulky waste. Bulky wastes are typically wastes that are too large to fit in a standard garbage can or bag and include such items as mattresses, couches, other furniture, large plastic items such as old swimming pools and toys, and other miscellaneous materials often found in attic, garage and barn cleanouts. Figure 4a-b and Table E.4 present the results of the characterization of the 55,000 tons of bulky waste loads entering the RIRRC landfill (separate from bulky waste found in MSW loads) c.2015.

**Figure 4a.** *Composition of Bulky Waste Loads (in %) by Material Category*

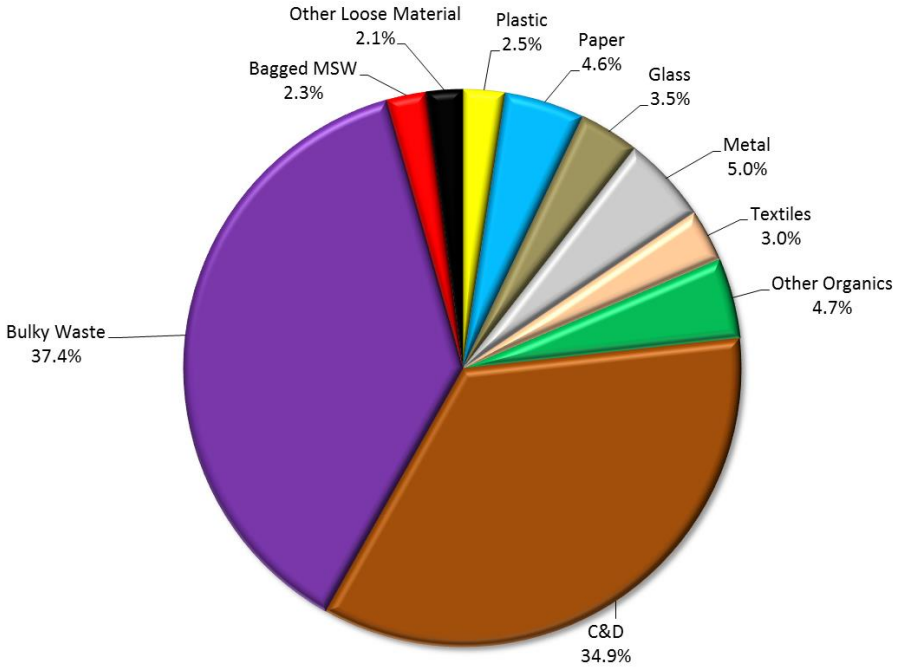


**Figure 4b.** *Composition of Bulky Loads by Potential Management Category (tons in 1000's, and %)*

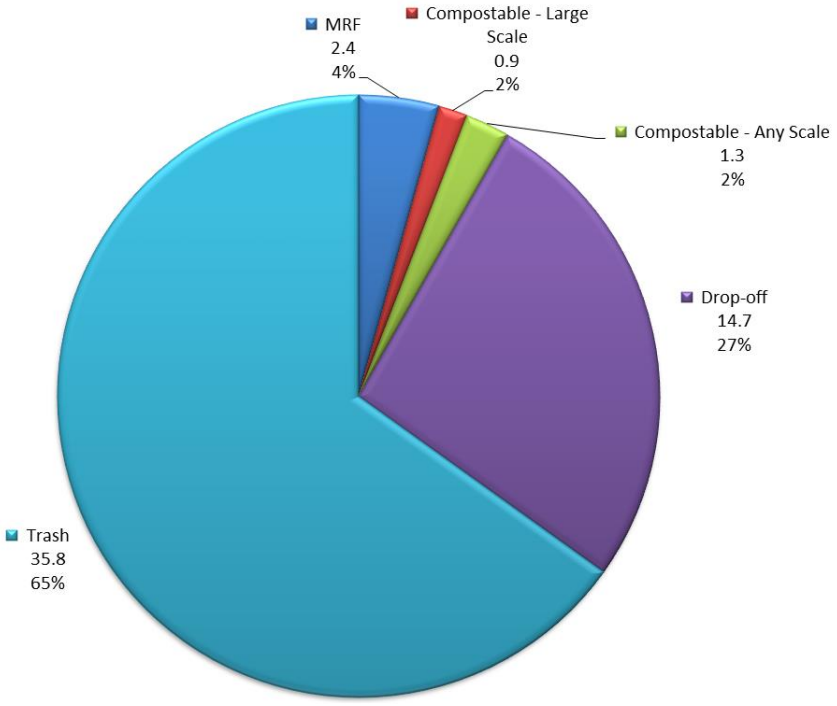



Table E.4. Top Ten Bulky Waste Materials Disposed at the RIRRC Landfill, c.2015

| Material Type | Estimated Percent | Cumulative Percent | Estimated Tons |
|---|---|---|---|
| Couches, chairs, pads and cushions | 13.1% | 13.1% | 7,192 |
| Other C&D | 7.2% | 20.3% | 3,980 |
| Painted and stained lumber | 7.1% | 27.4% | 3,913 |
| Engineered wood | 5.1% | 32.6% | 2,829 |
| Roofing shingles | 5.0% | 37.6% | 2,770 |
| All other bulky waste | 4.7% | 42.3% | 2,595 |
| Wooden furniture | 4.6% | 47.0% | 2,557 |
| Drywall/gypsum board | 4.2% | 51.2% | 2,307 |
| Clean wood | 3.2% | 54.3% | 1,739 |
| Other glass | 3.0% | 57.4% | 1,669 |
| ***Subtotal*** | ***57.4%*** | | ***31,550*** |
| All other material types | 42.6% | | 23,450 |
| **Total** | **100.0%** | | **55,000** |

As illustrated by Figure 4 and Table E.4, upholstered furniture and wooden furniture together represent roughly 17.5 percent of total bulky waste loads, while C&D wastes, combined, make up the greatest quantities, at 35 percent of bulky waste loads.

Key observations associated with a review of the bulky waste load data are as follows:

- The majority of "bulky wastes" are in reality C&D wastes, and the majority of this C&D waste is not readily recoverable because it consists of painted, stained, and engineered wood which is not recoverable except in a wood waste combustion facility.
- While it is potentially possible to recover bulky furniture items from the bulky waste, visuals of this material indicate the much of it is beyond recovery, and at least some of the bulky waste loads were actually rejected materials from Salvation Army and other reuse stores.
- However, roughly 31 percent of the bulky wastes delivered for disposal were conventional recyclables that could have been recycled through the MRF and, especially, through drop-off recycling.

## Targeted Generator Loads

Samples of commercial waste from six generator categories were analyzed as part of this waste characterization. The generator categories were: large retail, small retail, hotel, office, grocery, and restaurant. A detailed analysis of each category is contained in the body of the report.

Key observations include:

- **Large Retailer** waste was found to have significant amounts of corrugated cardboard, plastic films, and food wastes. Relatively little other recyclable fibers and containers were found in this waste stream.
- The **Small Retail** samples contained a large fraction of electronics, although this may be a function of the small sample size for this category. A significant fraction of glass bottles was also noted.
- **Grocery** waste was predominantly food waste (46.4%), corrugated cardboard (19.6%) and plastic (11.1%), much of which was film plastic. Qualitatively, much of the paper and plastic items found in this waste stream were moderately to heavily food contaminated.
- **Office** waste contained significant amounts of recyclable paper and corrugated cardboard. Additionally, compostable paper was relatively high, stemming largely from paper towel wastes from restrooms. There was also a significant quantity of food wastes, probably generated by in-house cafeterias at some of the office generators sampled.
- **Restaurant** wastes were found to be predominantly food wastes (48.1%), with significant fractions of compostable papers (11.6%) such as napkins, paper towels, paper plates, etc., and glass bottles (3.4%).
- **Hotel** waste contained the highest fraction of recyclable bottles and cans. Hotels also disposed of a significant amount of food wastes and compostable papers. Notably high quantities of C&D wastes were also found associated with remodeling of rooms.

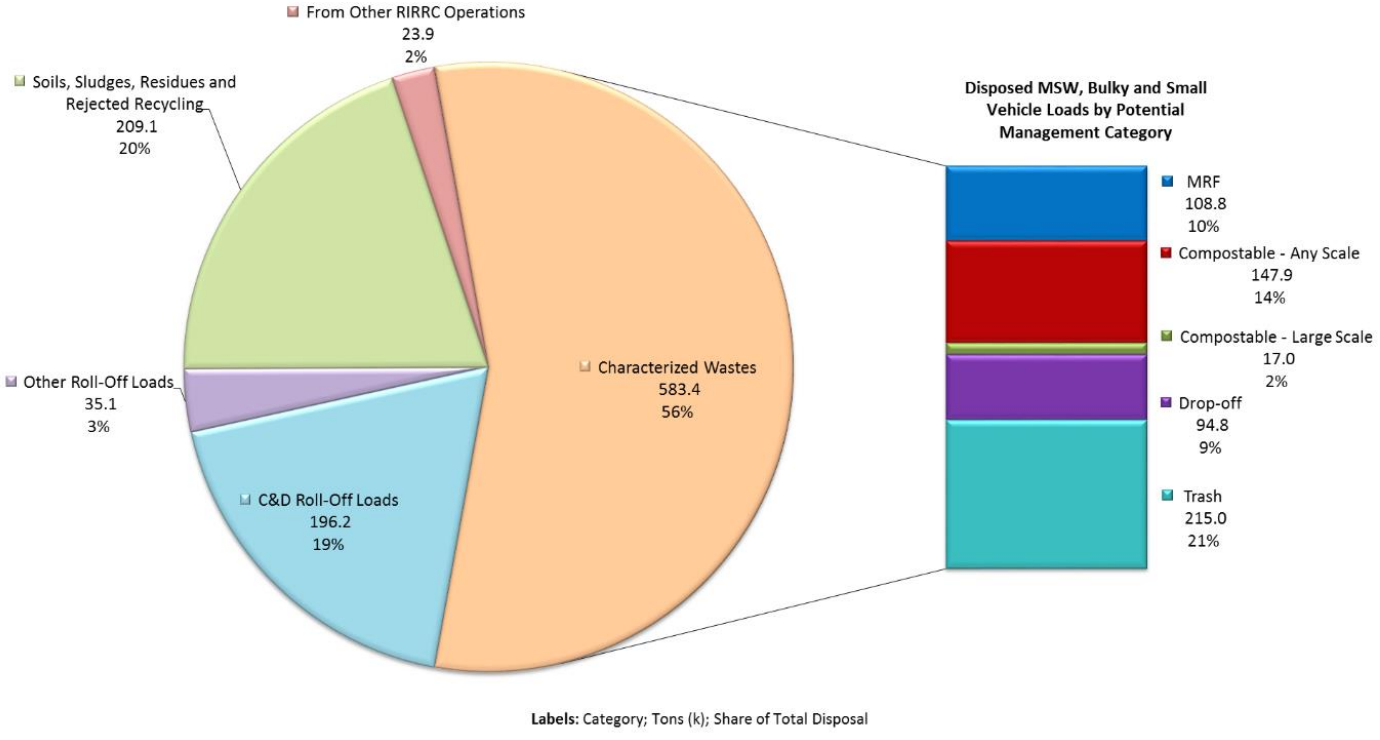
## Potential Diversion

Figure 5 examines the allocations of total MSW and Bulky/Small Vehicle Loads by potential management categories shown in Figures 1b and 4b, and puts them into context with all wastes disposed in the RIRRC Landfill (see Table E.1). Figure 5 illustrates what percent of *total waste* disposed at the RIRRC landfill c. 2015 was potentially recyclable (acceptable at the RIRRC MRF or at drop-offs), or could be potentially diverted through an organics processing facility (composting or anaerobic digestion) from MSW and Bulky loads.[3]

As illustrated by Figure 5, roughly 10 percent, or 108,800 tons currently being landfilled could potentially be recycled through the MRF, with another 9% percent recycled through drop-offs. Another 165,100 tons (16 percent) could be composted or anaerobically digested.

Thus, out of a total of 1,048,000 tons landfilled c. 2015, a maximum of 369,000 tons (35.2 percent) could be diverted from MSW to recycling or organics processing. Note that in reality this maximum would not be achieved because even the highest performing programs rarely recover over 80 percent of the material available for recycling or composting.

***Figure 5.*** *Classification of All Wastes Disposed at the RIRRC Landfill with Potential Management of MSW, c.2015*




[3] This analysis does not include potential diversion from C&D which may be considerable but is left to future research.

## Conclusions

In general, waste delivered to the RIRRC landfill did not contain any significant surprises, with the composition consistent with other waste characterizations that the Project Team has conducted over the past ten years.

General conclusions include:

- Only roughly 56 percent of the total waste delivered to the RIRRC landfill is MSW and bulky waste, with the remainder being processed and unprocessed construction and demolition debris, soils, sludge, and MRF residues, often with much lower potential for diversion
- Rhode Island households and municipalities appear to be doing a very good job of diverting recyclables, with relatively low quantities of household recyclables left in the waste stream characterized by this study. However, rejected recycling loads from some communities do decrease actual diversion of these materials from disposal.
- It appears that there is room for increased diversion from ICI/commercial generators, especially of corrugated cardboard.
- Vegetative food wastes represent the largest remaining category with significant diversion potential. However, readers are cautioned that separate collection of food waste can be prohibitively expensive in some cases, and much of the food waste that was manually sorted during the hand sorts would be much more difficult to sort from contaminants in a food waste processing facility.
- The targeted generator loads clearly illustrate that there is significant variation among ICI/commercial generators, requiring different approaches to increased diversion of additional materials; with some generators being large food waste generators, some large generators of paper – especially corrugated containers, and some not generating significant quantities of divertible material. For this reason, just like the sampling program, any program to increase ICI/commercial diversion will require targeted education and promotion.

# Detailed Description of Data Collection and Analysis

## Study Dates

The waste characterization was carried out over four time periods roughly paralleling the four seasons. Sampling and manual sorting of MSW occurred during the following weeks, with truck surveys, roll-off surveys and bulky waste visuals occurring either at the same time, or within one or two weeks of the manual sorting dates.

***Fall Season*** **-** Fall season sampling started on Wednesday, November 12, 2014 and finished on Tuesday, November 18. An additional two person-days of roll-off surveys were subsequently completed on Friday, December 5, 2014. One day of MSW sampling was carried out at the Rose Hill Regional Transfer Station in South Kingston, with all other days at the RIRRC landfill.

***Winter Season*** **-** Winter season sampling started on Thursday, January 22, 2015 and finished on Thursday, January 29, 2015. The intent was to conduct one full day of MSW sampling at the Waste Management, Newport Transfer Station. However, the January 27 blizzard shut down disposal facility operations and forced a cancellation of sampling at Newport, as well as at the RIRRC landfill. While the RIRRC landfill did re-open on January 28, many trucks could not collect waste due to snow filled streets and parking lots until the end of that week, significantly impacting the Project Team's ability to conduct driver surveys, collect special generator loads, and obtain residential and ICI loads for hand sorting.

***Spring Season*** **-** Spring season sampling started on Monday, April 27, 2015 and finished on Thursday, May 7, 2015. The number of days of sampling was extended to compensate for the impacts of the blizzard during the January sampling. One day of sampling occurred at the Blackstone Valley Regional Transfer Station (Pawtucket), and one day of sampling occurred at the Newport Transfer Station. All other days were at the RIRRC landfill.

***Summer Season*** **-** Summer season sampling started on Monday, July 27 and finished on Friday, July 31. One day of sampling occurred at the Westerly Transfer Station, with all other days at the RIRRC landfill. Two days of bulky waste visuals and roll-off surveys were subsequently completed on August 25 and 26.

## Scope of Work

The following sections provide a summary of the various tasks carried out over the course of the year. A more detailed description of each task can be found in the Final Study Design provided to RIRRC at the onset of the field work.

### Sampling and Sorting of Residential/Municipal and ICI/Commercial MSW Loads

Over the course of the four seasons a total of 257 samples of waste were captured for purposes of analysis of the residential, ICI and targeted generator waste stream. It should be noted that only 248 samples were actually sorted; nine of these samples were randomly selected loads that also were found to be generated by one of the targeted ICI generators (described later), and could therefore be used in both the statewide statistical analysis and the targeted generator analysis. With 248 samples manually sorted, the field data collection effort achieved the target of 248 samples specified in DSM's contract with RIRRC. Table 1 summarizes the number of samples analyzed for each of the material streams included in the analysis.

**Table 1.** Sample Count by Season and Generator Category

| | | | Season 1 Samples | | Season 2 Samples | | Season 3 Samples | | Season 4 Samples | | Total Samples | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Customer Type** | **Generator** | **Truck Type** | Goal | Actual | Goal | Actual | Goal | Actual | Goal | Actual | Goal | Actual |
| **Municipal** | Residential | Collection | 17 | 17 | 18 | 22 | 17 | 26 | 17 | 18 | 69 | 83 |
| | Residential | Roll-Off | 3 | 3 | 3 | 3 | 3 | 2 | 3 | | 12 | 8 |
| | Residential | Dump Truck | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 3 | 0 |
| | ICI | Collection | | | | | | | | | | 0 |
| | ICI | Roll-Off | | | | 2 | | | | | | 2 |
| | ICI | Dump Truck | | 1 | | | | | | | | 1 |
| ***Sub-Total Municipal*** | | | ***21*** | ***21*** | ***21*** | ***27*** | ***21*** | ***28*** | ***21*** | ***18*** | ***84*** | ***94*** |
| **Commercial** | Residential | Collection | | | | | | | | | | |
| | Residential | Roll-Off | | | | | | | | | | |
| | Residential | Dump Truck | | | | | | | | | | |
| | ICI | Collection | 11 | 12 | 10 | 15 | 11 | 19 | 11 | 8 | 43 | 54 |
| | ICI | Roll-Off | 7 | 7 | 8 | 9 | 7 | 10 | 7 | 6 | 29 | 32 |
| | ICI | Dump Truck | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 2 | 8 | 5 |
| ***Sub-Total ICI*** | | | ***20*** | ***20*** | ***20*** | ***25*** | ***20*** | ***30*** | ***20*** | ***16*** | ***80*** | ***91*** |
| **Transfer Station** | Residential | Collection | 4 | 4 | 4 | 0 | 4 | 5 | 4 | 5 | 16 | 14 |
| | Residential | Roll-Off | | | | | | | | | | |
| | Residential | Dump Truck | | | | | | | | | | |
| | ICI | Collection | 5 | 4 | 5 | 0 | 5 | 4 | 5 | 2 | 20 | 10 |
| | ICI | Roll-Off | | 1 | | | | 1 | | | | 2 |
| | ICI | Dump Truck | | | | | | | | | | 0 |
| ***Sub-Total Transfer Station*** | | | ***9*** | ***9*** | ***9*** | ***0*** | ***9*** | ***10*** | ***9*** | ***7*** | ***36*** | ***26*** |
| **Targeted Generators** | Grocery | Compacted RO | 2 | 2 | 2 | 2 | 2 | 7 | 2 | 1 | 8 | 12 |
| | Restaurant | Packer | | | 4 | 0 | 0 | 4 | 4 | 4 | 8 | 8 |
| | Retail-Large | Compacted RO | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 0 | 8 | 7 |
| | Retail-Small | Packer | | | 4 | 0 | 0 | 4 | 4 | 0 | 8 | 4 |
| | Hotel | Packer/RO | | | 4 | 1 | 4 | 6 | 4 | 0 | 12 | 7 |
| | Office | Packer/RO | | | 4 | 0 | 0 | 1 | 4 | 7 | 8 | 8 |
| ***Sub-Total Targeted Generator*** | | | ***4*** | ***4*** | ***20*** | ***5*** | ***8*** | ***25*** | ***20*** | ***12*** | ***52*** | ***46*** |
| **Total Samples** | | | **54** | **54** | **70** | **57** | **58** | **93** | **70** | **53** | **252** | **257** |

Note: Highlighted rows under Targeted Generators have been used solely to differentiate generator categories.

The sample count in Table 1 is broken out in five ways. First is by customer type (municipal or commercial). The second is by generator type (residential or ICI). The third is by truck type, mirroring the rough count of trucks by type crossing the scale. The fourth differentiates between samples obtained at the RIRRC landfill, versus the four transfer stations. And finally, the fifth refers to targeted generator loads which are described in detail below.

As illustrated by Table 1, 105 hand sorts of residential waste were completed and 106 ICI samples were completed. An additional 46 targeted generator samples were completed. As described above, nine of the 257 samples are double counted in that they were randomly sorted as ICI waste, but they also met the criteria for one of the targeted generator samples.

Looking at customer type samples, 94 samples were from waste delivered as Municipal Waste, meaning that it originated in one of the municipalities and was coded as municipal waste at a lower tipping fee. Another 91 samples were coded as Commercial Waste, which is waste not delivered under the municipal tipping fee.

An additional 26 samples were sorted at the four transfer stations. This was below the goal of 36 and due to two factors. First, a blizzard forced cancellation of sorting at the Newport Transfer Station in January. Second, and more importantly, a decision was made by DSM and RIRRC to concentrate on special targeted generator loads at the Newport Transfer Station to increase the number of targeted generator samples, which were also significantly impacted by the blizzard in January.

Finally, a total of 46 targeted generator samples were sorted, two less than the goal. Again, the blizzard in January was responsible for the loss of one small retail load that would have yielded four samples. The Project Team was unable to make up this load during the next two seasons, concentrating instead on the other targeted generator types that had been planned for those two seasons.

## Hand Sort Material Categories

All samples were sorted into 70 material categories, described in detail in Appendix A. Note that not every sample contained all 70 material types, but 70 material type bins were available for each hand sort for placement of all material meeting that category description. A picture of the sorting area at the RIRRC Tipping Facility is shown below.

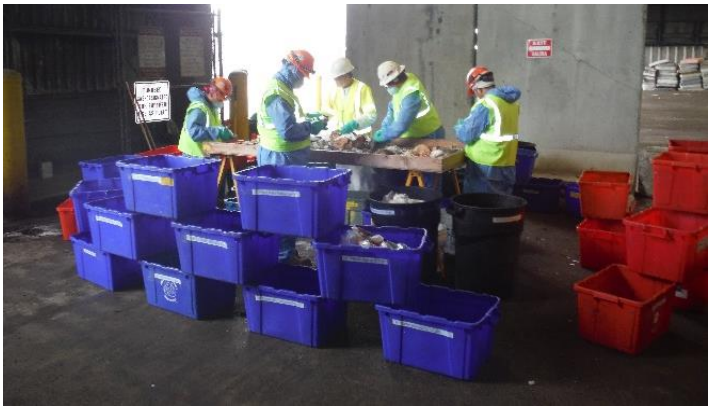


***Figure 1.*** *Hand Sort Crew Sorting on Tipping Floor of Tipping Facility*

## Selection of Vehicles For Sampling

RIRRC provided the Project Team with most recent year landfill deliveries by vehicle type. These were used to determine a proposed sample count by vehicle type for each of the four seasons. Table 2 provides the proposed sample count by vehicle type agreed to in the Final Study Design.

At the beginning of each season of sorting the Field Supervisor worked with the RIRRC scale house to estimate the number of trucks, by truck type, crossing the scale on each day of sorting. This was divided by the total number of trucks, by type, that samples needed to be collected from. This gave a sampling interval number ($n^{th}$ truck) which the scale house could use to determine which trucks would be randomly diverted to the sorting location.

Using Season 1 as an example from Table 2, the intent was to sample waste from 25 residential trucks and 25 ICI trucks over the course of five days. Seventeen of the residential samples were to be from rear and side loading compaction trucks, or roughly 3 to 4 per day.

If the RIRRC scale house estimated that a total of 40 residential side and rear load compactor trucks with residential waste would cross the scale during the day, then the scale house was asked to send every $10^{th}$ residential compactor truck to the sorting location. The truck driver was given a placard by the scale house and directed to the RIRRC Tipping Facility where the driver would notify the RIRRC spotter who controls traffic entering the building. The spotter would notify the Field Supervisor who would designate an area on the tipping floor where the load would be dumped.

The same procedure was followed for each truck type and generator type to randomly select trucks for sampling.

Table 2. Allocation of Samples between Residential and ICI, and by Truck Type

| Generator Type | Truck Type | Season 1 Samples | Season 2 Samples | Season 3 Samples | Season 4 Samples | Total Samples |
|---|---|---|---|---|---|---|
| **Residential** | Collection | 17 | 18 | 17 | 17 | 69 |
| | Roll-Off | 3 | 3 | 3 | 3 | 12 |
| | Dump Truck | 1 | 0 | 1 | 1 | 3 |
| | Transfer Station | 4 | 4 | 4 | 4 | 16 |
| ***Sub-Total Residential*** | | 25 | 25 | 25 | 25 | 100 |
| **ICI** | Collection | 11 | 10 | 11 | 11 | 43 |
| | Roll-Off | 7 | 8 | 7 | 7 | 29 |
| | Dump Truck | 2 | 2 | 2 | 2 | 8 |
| | Transfer Station | 5 | 5 | 5 | 5 | 20 |
| ***Sub-Total ICI*** | | 25 | 25 | 25 | 25 | 100 |
| **Total Samples** | | **50** | **50** | **50** | **50** | **200** |

## Selection of Sample for Hand Sorting

Once the load was dumped on the tipping floor, the Field Supervisor would select an area of the load for selecting one sample. This was also done randomly using the following procedure. If the tipped pile is viewed from the top as a clock face with 12:00 being the part of the load closest to the front of the truck, the first sample was taken from 3 o'clock, followed by 6 o'clock, 9 o'clock, 12 o'clock, and then from 1, 4, 7, and 10 o'clock, and so-on.

A bucket load of waste was then removed by RIRRC loader operator from the designated area of the load and brought to the hand sorting area. The Field Supervisor would then remove 200 pounds of material from the bucket and place this material in garbage cans. Each can would be weighed to assure that the sample weighed a minimum of 200 pounds. This set of cans (typically 3 to 4 cans) would then have a placard designating the sample number placed on it, photographed and set aside for hand sorting. Buckets containing queued samples can be seen to the left of the picture in Figure 2.

***Figure 2.*** *Hand Sort Area with Samples Queued for Sorting*

This same procedure was followed at each of the Transfer Stations (with the exception of Newport where sorting concentrated on targeted generator loads).

## Targeted Generator Loads

In addition to hand sorting mixed ICI loads, the Study Design included sorting of 48 targeted generator loads, as specified in Table 3.

Table 3. Targeted Generator Loads

| Sector | Collection Type | Targeted Recyclable | Will we get samples? | How to get extra samples? | Season 1 | Season 2 | Season 3 | Season 4 | Total |
|---|---|---|---|---|---|---|---|---|---|
| Grocery | Compactor | Food | Possible | Addl Rolloffs | 2 | 2 | 2 | 2 | 8 |
| Restaurant | FL | Food | No | Dedicated route | | 4 | | 4 | 8 |
| Retail - Large | Compactor | Fiber | Possible | Addl Rolloffs | 2 | 2 | 2 | 2 | 8 |
| Retail - Small | FL | Fiber | No | Dedicated route | | 4 | | 4 | 8 |
| Hotel | FL/Rolloff | Containers/ Fiber | No | Dedicated route | | 4 | | 4 | 8 |
| Office | FL/Rolloff | Fiber | Possible | Dedicated route | | 4 | | 4 | 8 |
| **Total** | | | | | **4** | **20** | **4** | **20** | **48** |

While there are obviously some differences in composition between residential waste samples, they are relatively minor when one considers that residential waste comes from many households that all have reasonably similar waste generation profiles. Conversely, the composition of ICI waste samples can vary dramatically. For example, one generator might be a clothing store, the next a restaurant, and the next a warehouse. Individual samples obtained from each of these generators would be expected to have significantly different compositions. Because of the variability of composition from sample to sample, the results of the ICI waste composition analysis, although statistically just as robust and accurate as the residential analysis, are less informative when trying to interpret opportunities for diversion.

As such, the Project Team proposed to obtain samples from targeted generator types, as listed in Table 3. These samples were obtained in three ways.

- First, the RIRRC scale house was asked to identify roll off containers from grocery (supermarket), large retail, and possibly hotel waste. These roll-off loads came from a single generator and could be sampled for that targeted category.
- Second, there were times when one of the roll-offs selected by the scale house as the $n^{th}$ truck for ICI samples, was also from a targeted generator (e.g., large retail), in which case the sample could be included in the ICI sampling protocol as well as included as a targeted generator sample.
- Third, for small retail, restaurant, office and hotel, the Project Team contracted with one of the haulers delivering waste to the landfill to go out and collect waste from between 6 and 10 of their customers representing a single generator type. In this case an enumerator from DSM would ride with the driver to ensure that only that generator type was selected, and when the waste was delivered to the sorting location, four 200 pound samples would be sorted.

As illustrated in Table 1, while a total of 46 of the expected 48 targeted generator samples were obtained and sorted, the Project Team was only able to obtain one small retail load representing four samples, and was one short of the target of 8 samples for hotel and large retail. This was almost entirely due to the blizzard which essentially shut down many collection routes for three of the days that the sort crew was working during the winter season, and the Project Team was unable to make up for these lost loads completely during the next two seasons.

## Truck Surveys

One important component of this waste characterization study was to make sure that the hand sample sorting data were applied only to the residential and ICI waste entering the landfill and not to the entire amount of waste entering the landfill. This is important for two reasons.

- First, some portion of waste delivered as ICI waste is actually residential waste collected from multi-family buildings, condominium complexes and mobile home parks. Reporting this waste as ICI waste rather than residential waste inflates the quantities of ICI materials that might be recovered, and reduces the amount of residential materials that might be recovered.

- Second, there are many waste streams being disposed at the landfill that are not generated by residential or ICI sources. Applying the hand sort percentages to the entire tonnage entering the landfill would therefor inflate estimated quantities of potentially recoverable materials because these other waste types do not contain the same materials.

Driver surveys were carried out by DSM to address the first of these two issues. Driver surveys were carried out both at the scale house and on the landfill face and tipping facility tipping floor. Driver surveys carried out at the scale house concentrated on front, rear and side loading compactor trucks that are typically delivering residential and ICI waste. Each driver entering the scale would be asked what type of waste they were collecting, and if they answered "commercial waste" then the enumerator would ask if they had collected from any apartment complexes, condominiums or mobile home parks. If they said yes, then the enumerator would ask them to estimate what percent of the waste in the truck they believed came from these residential sources and record this percentage along with the truck type. Similarly, if the driver answered "residential waste" then the driver was asked what percent of the waste came from schools and/or municipal buildings which would count as Institutional waste, which is part of the ICI waste stream.

Driver surveys at the landfill face and at the tipping facility were also carried out on trucks delivering waste in roll-off containers. In this case the driver was asked if the waste was from a commercial or residential location (e.g., a store or a residential transfer station), and if not, whether it was from a construction or demolition site (C&D waste), from a clean out (bulky waste), or from some specialized manufacturing or other facility not representative of typical ICI waste.

These driver surveys were carried out at the scale house, landfill face and tipping facility each season, and the results summed to derive the percent of compactor loads (as coded at the scale house) that were ICI versus residential waste; and the percent of roll-off loads (as coded at the scale house) that were residential, ICI, C&D, bulky waste, or other waste.

The RIRRC Project Manager then used the most recent annual tonnage reports of wastes that are not characterized as special wastes delivered to the facility to allocate all deliveries to residential, ICI, C&D, bulky and other tonnages so that the hand sort data could be applied only to the residential and ICI tonnage, respectively, and the bulky waste visuals (see below) only to the bulky waste tonnage.

Tables 4 and 5 present tonnages entering the landfill by generator type. Table 4 illustrates the total estimated tonnages on which the hand sort and visual data were applied, and Table 5 presents tons of special wastes that were delivered to the landfill, but which were not categorized as part of this study.

Note that 288,000 tons of MSW in Table 4 represents waste transferred to the RIRRC facility landfill which were not categorized by driver surveys and therefore had to be allocated based on the assumption that the transfer waste allocation would be similar to the landfill direct-delivery waste allocation. The amounts contained in the column titled *Estimated Total w/Transfer Reallocation* in Table 4 represents the tons to which the waste characterization data were applied, exclusive of the C&D and Other rows which were not categorized.

Table 4. Estimated RIRRC Inbound Non-Special Waste by Generator

| Category | Share Of Total | Share of Non-Transfer | KTons | Reallocated Transfer Ktons (f) | Estimated Total w/ Transfer Reallocation | Share w/ Transfer Reallocation |
|---|---|---|---|---|---|---|
| Residential | 28% | 44% | 229 | 74 | 303 | 37% |
| ICI | 16% | 25% | 130 | 95 | 225 | 28% |
| Bulky | 4% | 6% | 34 | 22 | 55 | 7% |
| C&D | 14% | 21% | 113 | 83 | 196 | 24% |
| Other | 2% | 4% | 20 | 15 | 35 | 4% |
| Transfer | 35% | | 288 | | | |
| Total | 100% | 100% | 815 | 288 | 815 | 100% |

As illustrated by Table 4, the hand sort residential data were applied to 303,000 tons and the hand sort ICI data were applied to 225,000 tons, for a total of 528,000 tons of MSW. Bulky waste visual data (see description below) were applied to 55,000 tons.

As shown in Table 5, C&D and Other wastes were not characterized as part of this study, except insofar as C&D debris was found in the Residential, ICI, and Bulky Waste loads that were expressly targeted.

Table 5. Special Wastes Excluded From Waste Characterization

| Waste Type | Tons (in 1,000s) |
|---|---|
| **Waste Received** | **209** |
| Ground 2" Subgrade Solid Waste | 95.4 |
| Solid Waste Soils w Approval | 70.1 |
| SLUDGE ASH | 15.3 |
| SLUDGE/GRIT/RAGS | 12.5 |
| RECYCLING PROCESS RESIDUE INBOUND (318IN) | 5.0 |
| SHEET ROCK WASTE | 0.3 |
| BOAT/RV/VESSEL DISPOSAL | 0.1 |
| ENVIRONMENTAL/LITTER CLEAN-UP | 0.1 |
| REJECTED RECYCLING ROUTE | 8.4 |
| MRF REJECTED LOAD | 2.0 |
| **Waste Transferred from RIRRC Operations** | **23** |
| MRF PRESORT RESIDUE | 9.6 |
| AGREGATE GLASS - RESIDUE | 7.8 |
| MRF PROCESS RESIDUE | 6.1 |
| Compost Residue | 0.2 |
| SLUDGE/GRIT/RAGS | 0.2 |
| SWMC LOAD/No Charge | 0.1 |
| **Grand Total:** | **233** |

## Bulky Waste Loads Visuals

The final component of the waste characterization study was to attempt to estimate and quantify the composition of bulky waste loads entering the landfill. While some bulky waste is delivered comingled with MSW in compactor trucks (and it therefore accounted for in the hand sort data), a significant amount of bulky waste is delivered in roll-offs associated with clean outs of households and businesses. When asked, a driver will often state that it is “bulky waste”, or “clean out waste”. Often these bulky waste loads contain a mix of furniture and other clean out type wastes combined with C&D materials.

In contrast with C&D loads which have been characterized in many locations around the U.S., to date there are not a lot of data available in the literature on what materials are contained in bulky waste loads, and therefore, to what extent some of these material might be diverted for recycling.

Bulky waste delivered in roll-off containers cannot be adequately characterized by hand sorting of 200 pound samples because of the heterogeneous nature of each load and because of the large size of many bulky items, when compared to MSW wastes, which can be easily hand sorted. One thirty yard roll-off might contain, for example, two mattresses, a sofa, wood furniture, big plastic toys, electronics, MSW, and C&D type wastes. Selecting a representative 200 pound sample would be impossible from a load like this. Therefore, just as with characterization of C&D loads, visual characterization of the entire load is the preferred methodology, with conversion of volumetric composition estimates to pounds/tons using material density data

Table 6 (on the next page), presents the field data collection sheet used in the visual analysis of bulky waste loads. Descriptors and examples are included for categories that are not obvious from the Item Name in the first column. Other categories represent all other material of that type.

All roll-offs that the driver stated were “clean outs” or “bulky waste” were visually characterized over eight person days during two seasons, with the data subsequently converted to pounds/tons based on densities of the materials on the visual characterization sheet.

Table 6. Bulky Waste Visual Characterization Categories

| # | ITEM NAME | DESCRIPTOR | EXAMPLES |
|---|---|---|---|
| | **PAPER** | | |
| 1 | Brown corrugated cardboard boxes and Kraft paper | Layered cardboard, usually with a center "wavy" layer, and unbleached brown paper | Shipping boxes, pieces of shipping boxes, brown paper |
| 2 | Other curbside recyclable paper | | |
| 3 | Other paper | Non recoverable paper | Books |
| | **GLASS** | | |
| 4 | Curbside recyclable glass | | |
| 5 | Other glass | non-recyclable glass items | Car windshields, glass windows, drinking glasses. |
| | **PLASTIC** | | |
| 6 | Large Plastic Items | Plastic items > 2 gallon bucket | Plastic toys, furniture and tools |
| 7 | Recyclable plastic film | Clean industrial film | Pallet wrap, mattress bags, shrink wrap |
| 8 | All other plastic sheet/film | Colored plastics not easily recyclable | Tarps, boat wrap, agricultural film, dirty film |
| 9 | Other plastic | | |
| | **METAL** | | |
| 10 | Roofing, sheet metal, ducting, piping | Corrugated roofing | |
| 11 | Engines, automotive parts, tools | | |
| 12 | Bicycles, Toys, and Playground Equipment | Bicycles, Toys, and playground equipment made of primarily | |
| 13 | All other ferrous scrap metal | Any other ferrous metal item. A magnet will stick to these items (includes stainless steel) | tin food cans, some pots and pans, empty paint cans, metal drums, ferrous metal |
| 14 | All other non-ferrous scrap metal | Any other non-ferrous metal item. A magnet will not stick to these items (excludes stainless steel) | aluminum cans, some pots and pans door knobs, metal hangers , brass bed frames. |
| 15 | Other metal | mixed metal items with a metal content too low to recycle | |
| | **ORGANICS** | | |
| 16 | Branches and Stumps >2 Inches | | |
| 17 | Leaf and yard debris | | |
| 18 | Other organics | | |

Table 6 (continued). Bulky Waste Visual Characterization Categories

| | | | |
|---|---|---|---|
| | **TEXTILES** | | |
| 19 | Apparel | Textiles meant to be worn. INCLUDES: Clothing accessories made of textile. | Shirts, sweaters, pants, skirts, shorts, jackets, |
| 20 | Non-apparel | Textiles not meant to be worn. DOES NOT INCLUDE: Carpeting, mattresses, or rags with hazardous waste on them. | Towels, sheets, linens, fabric |
| | **C&D** | | |
| 21 | Asphalt, Brick, and Concrete | | |
| 22 | Roofing Shingles | | |
| 23 | Drywall/Gypsum Board | | |
| 24 | Treated wood | | |
| 25 | Painted and Stained Lumber | | Fencing, wooden |
| 26 | Clean wood | | |
| 27 | Engineered wood | | Plywood, OSB, MDF, glue lam beams |
| 28 | Insulation | Foam, fiberglass, and cellulose insulation | |
| 29 | Fixtures | | |
| 30 | Other C&D | Construction items made of a mix of materials | Tile attached to drywall or wood framing attached to drywall. |
| | **BULKY WASTES** | | |
| 31 | Major appliances - Large | All appliances > 1/4 yd3 | |
| 32 | Major appliances - Small | Anything with a cord < 1/4 yd3 | Blenders, toaster ovens, vacuum |
| 33 | TVs, computers, computer peripheral devices | | |
| 34 | Small Consumer Electronic and Electrical Devices | | Cell phones, clock radios |
| 35 | Couches, Chairs, Pads and Cushions | All couches, chairs & cushions except for mattresses and wooden and steel furniture | Padded couches, arm chairs, large sofa pillows, etc. |
| 36 | Wooden Furniture | At least 80% wood | Desks, bookshelves, |
| 37 | Steel Furniture | At least 80% steel | Desks, shelving |
| 38 | All Other Furniture | Composite furniture, bedframes | |
| 39 | Tires | | |
| 40 | Carpet and carpet padding | | |
| 41 | Mattresses and box springs | | |
| 42 | All Other Bulky Waste | | |
| 43 | **MSW Bagged** | bagged materials | |
| 44 | **OTHER** loose material not otherwise classified | loose materials not defined elsewhere | |

# Results

Results of the four season waste characterization are presented in the following pages in this order:

- Composition of the combined residential and ICI, MSW material, as categorized by the hand sort results;
- Composition of residential MSW;
- Composition of ICI MSW;
- Composition of MSW delivered as a "municipal customer" based on scale data;
- Composition of MSW delivered as "commercial customer" based on scale data;
- Composition of bulky waste;
- Composition of waste delivered to the small vehicle unloading area; and,
- Composition of targeted generator loads.

It is important to clarify here the differentiation between generator type and customer type.

- Residential waste refers to waste *generated* by households, while ICI waste refers to waste *generated* by Institutional, Commercial and Industrial establishments.
- Municipal waste refers to waste delivered to RIRRC as *municipal customers*, who receive a below market rate tipping fee.
- Commercial waste refers to waste delivered to RIRRC as *commercial customers*, who pay a market based tipping fee.

While most municipal customer waste is residential, some institutional waste is included from school and municipal office complexes. Similarly, while most commercial customer waste is ICI waste, some percent of what is delivered as commercial waste is actually residential waste collected commercially from multi-family buildings and some condominium complexes. As described above, the primary goal of the driver surveys was to allocate scale house data more accurately between residential and ICI waste and between municipal customer waste and commercial customer waste depending on the percent of each load as reported by the driver during the survey.

## Composition of Overall MSW Delivered to the RIRRC Landfill

Table 7, below presents the overall composition of the combined residential and ICI MSW delivered to the RIRRC landfill over the past calendar year. Note that bulky waste reported in Table 7 is bulky waste found in MSW, not bulky waste delivered separately and visually categorized.

Table 7. Overall Composition of Combined Residential and ICI Waste

| Material | Estimated Percent | Standard Deviation | +/- | Estimated Tons | Material | Estimated Percent | Standard Deviation | +/- | Estimated Tons |
|---|---|---|---|---|---|---|---|---|---|
| **Plastic** | **11.8%** | | | **62,514** | **Textiles** | **5.5%** | | | **28,860** |
| Plastic #1 PET bottles, under 2 gallons | 0.9% | 0.1% | 0.1% | 4,715 | Apparel | 3.4% | 0.4% | 0.6% | 17,783 |
| Plastic #2 HDPE bottles and jugs, under 2 gallons | 0.3% | 0.0% | 0.0% | 1,651 | Non-apparel textiles | 2.1% | 0.3% | 0.4% | 11,077 |
| Plastic clamshells, under 2 gallons | 0.1% | 0.0% | 0.0% | 510 | | | | | |
| Plastic blister packaging, under 2 gallons | 0.0% | 0.0% | 0.0% | 221 | **Other Organics** | **27.5%** | | | **145,193** |
| Plastic #1-#7 & unmarked non-bev. containers <2 ga | 1.1% | 0.0% | 0.1% | 5,956 | Branches and stumps >2 inches | 0.2% | 0.2% | 0.3% | 897 |
| Plastic containers, larger than 2 gallons | 0.2% | 0.1% | 0.1% | 1,142 | Leaf and yard debris | 5.2% | 0.6% | 0.9% | 27,679 |
| Bulky plastic >2 gallons | 0.9% | 0.2% | 0.3% | 4,724 | Clean dimensional lumber | 1.3% | 0.3% | 0.5% | 6,992 |
| Retail bags and film | 1.1% | 0.1% | 0.2% | 5,982 | Vegetative food waste | 16.1% | 0.7% | 1.2% | 84,827 |
| Contaminated film/bags | 4.0% | 0.2% | 0.3% | 20,883 | Protein food waste | 2.9% | 0.3% | 0.4% | 15,202 |
| Styrofoam | 0.8% | 0.1% | 0.2% | 4,035 | Other organics | 1.8% | 0.4% | 0.7% | 9,595 |
| Remainder/composite plastic | 2.4% | 0.5% | 0.8% | 12,696 | | | | | |
| | | | | | **Construction and Demolition** | **9.7%** | | | **51,087** |
| **Paper** | **23.9%** | | | **126,391** | Asphalt, brick, and concrete | 0.6% | 0.2% | 0.4% | 3,346 |
| Brown corrugated cardboard boxes and kraft paper | 7.8% | 0.6% | 1.0% | 41,244 | Roofing whingles | 0.1% | 0.1% | 0.2% | 788 |
| Whole pizza boxes | 0.1% | 0.0% | 0.0% | 451 | Drywall/gypsum board | 0.8% | 0.2% | 0.4% | 4,199 |
| Uncoated paperboard/chipboard | 1.6% | 0.2% | 0.3% | 8,633 | Treated wood | 6.6% | 0.7% | 1.1% | 35,111 |
| Coated paperboard, refrigerated and frozen food | 0.3% | 0.0% | 0.0% | 1,417 | Fixtures | 0.2% | 0.1% | 0.1% | 949 |
| Hot paper coffee cups and bowls | 0.3% | 0.1% | 0.1% | 1,713 | All other C&D | 1.3% | 0.3% | 0.4% | 6,695 |
| Shredded paper | 0.4% | 0.2% | 0.3% | 2,236 | | | | | |
| Newsprint | 1.4% | 0.2% | 0.3% | 7,655 | **Bulky Waste** | **7.1%** | | | **37,395** |
| Glossy paper | 0.9% | 0.2% | 0.4% | 4,731 | Major appliances | 0.1% | 0.1% | 0.1% | 280 |
| Tissue paper, gift-wrapping | 0.2% | 0.1% | 0.1% | 1,051 | TVs, computers, computer peripheral devices | 0.4% | 0.1% | 0.2% | 2,194 |
| Compostable Paper | 6.4% | 0.3% | 0.6% | 34,048 | Small consumer electronic and electrical devices | 0.4% | 0.1% | 0.1% | 1,969 |
| Cartons, gabletop | 0.2% | 0.0% | 0.1% | 962 | Furniture | 2.6% | 0.6% | 1.0% | 13,847 |
| Aseptic juice boxes | 0.2% | 0.1% | 0.2% | 1,098 | Tires | 0.2% | 0.1% | 0.2% | 1,123 |
| Paperback books | 0.1% | 0.0% | 0.0% | 543 | Carpet and carpet padding | 2.9% | 0.5% | 0.8% | 15,495 |
| Phone books | 0.1% | 0.0% | 0.0% | 294 | Mattresses and box springs | 0.5% | 0.3% | 0.6% | 2,487 |
| Hardcover books | 0.1% | 0.0% | 0.0% | 297 | | | | | |
| Office/mixed paper | 2.1% | 0.2% | 0.3% | 11,083 | **Special Waste** | **0.5%** | | | **2,782** |
| Remainder/composite paper | 1.7% | 0.4% | 0.7% | 8,934 | Sharps | 0.0% | 0.0% | 0.0% | 33 |
| | | | | | Medications | 0.0% | 0.0% | 0.0% | 254 |
| **Glass** | **2.0%** | | | **10,596** | Propane tanks | 0.0% | 0.0% | 0.0% | 8 |
| Glass bottles and jars | 1.8% | 0.2% | 0.3% | 9,331 | Fluorescent bulbs and ballasts | 0.0% | 0.0% | 0.0% | 120 |
| Remainder composite glass | 0.2% | 0.0% | 0.1% | 1,266 | Batteries: single-use, alkaline | 0.1% | 0.0% | 0.0% | 308 |
| | | | | | Batteries: lead acid (vehicles) | 0.0% | 0.0% | 0.0% | 1 |
| **Metal** | **3.0%** | | | **15,676** | Batteries: all other rechargeable batteries | 0.0% | 0.0% | 0.0% | 9 |
| Aluminum beverage cans | 0.2% | 0.0% | 0.0% | 1,192 | Paints and stains | 0.1% | 0.1% | 0.2% | 637 |
| Aluminum foil and pie plates | 0.3% | 0.0% | 0.1% | 1,705 | Empty liquid and gel HHW containers | 0.1% | 0.0% | 0.0% | 431 |
| Aluminum non-beverage cans | 0.1% | 0.0% | 0.0% | 548 | Other hazardous or household hazardous waste | 0.2% | 0.1% | 0.1% | 981 |
| Ferrous cans | 0.5% | 0.0% | 0.1% | 2,831 | | | | | |
| Small scrap metal | 1.1% | 0.1% | 0.2% | 5,799 | **Other** | **8.7%** | | | **46,028** |
| Large scrap metal | 0.7% | 0.2% | 0.3% | 3,601 | Miscellaneous | 8.7% | 0.7% | 1.2% | 46,028 |
| | | | | | | | | | |
| **Hybrids** | **0.3%** | | | **1,645** | **Totals** | **100.0%** | | | **528,168** |
| Foiled wrappers | 0.2% | 0.0% | 0.0% | 1,002 | **Sample Count** | **211** | | | |
| Mixed material packaging | 0.1% | 0.0% | 0.0% | 643 | | | | | |

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

**The material type "Non-container small plastic odds and ends" used in season one has been added to this material type for the remaining seasons.*

***This material type was named "Paper napkins and towels" in season one. The name has been changed for all remaining seasons to more accurately reflect the materials included here.*

Table 8 takes the data from Table 7 and allocates the materials by the same five management categories used in the Executive Summary to illustrate what percent of total MSW disposed at the landfill could be managed separately. For example, most rigid plastic packaging is accepted at the MRF, and is therefore allocated to the MRF. However, certain plastics, such as retail plastic bags and large plastic items not accepted at the MRF, are accepted at drop-offs, while other types of plastic (e.g. multi-layer packaging, many plastic films, expanded polystyrene, and plastic with metals and other materials embedded in them) must be landfilled, and are therefore included in the trash.

Table 8. Allocation of Overall MSW by Management Category

| | Estimated Percent | Estimated Tons |
|---|---|---|
| **MRF** | **20.1%** | **106,405** |
| Plastic | 2.5% | 13,052 |
| Paper | 14.7% | 77,746 |
| Glass | 1.8% | 9,331 |
| Metal | 1.2% | 6,276 |
| **Compostable - Any Scale** | **27.7%** | **146,555** |
| Paper | 6.4% | 34,048 |
| Other Organics | 21.3% | 112,507 |
| **Compostable - Large Scale** | **3.0%** | **16,099** |
| Other Organics | 3.0% | 16,099 |
| **Drop-Off** | **15.2%** | **80,128** |
| Plastic | 3.0% | 15,883 |
| Paper | 0.5% | 2,533 |
| Metal | 1.8% | 9,400 |
| Textiles | 5.5% | 28,860 |
| Other Organics | 1.3% | 6,992 |
| Construction and Demolition | 1.6% | 8,332 |
| Bulky Waste | 1.2% | 6,084 |
| Special Waste | 0.4% | 2,044 |
| **Trash** | **33.9%** | **178,980** |
| Plastic | 6.4% | 33,579 |
| Paper | 2.3% | 12,063 |
| Glass | 0.2% | 1,266 |
| Hybrids | 0.3% | 1,645 |
| Other Organics | 1.8% | 9,595 |
| Construction and Demolition | 8.1% | 42,755 |
| Bulky Waste | 5.9% | 31,311 |
| Special Waste | 0.1% | 738 |
| Other | 8.7% | 46,028 |
| **Grand Total** | **100.0%** | **528,168** |

## Comparisons with Other Sate-Wide Waste Characterization Studies

The Project Team has completed similar state-wide waste characterization studies in other New England states, including Vermont (2012), Connecticut (2010) and Delaware (2007) which can be benchmarked against the Rhode Island data, albeit with the following caveats.

First, waste composition data are reported as percentages, which are then applied to total tons. If one study has higher percentages of one waste type it will automatically have lower percentages of other categories which can skew comparisons across studies.

Second, two of the other three state-wide waste characterization studies (DE and CT) are now eight and five years old, respectively and are in the process of being conducted again this year. Recyclables have been light-weighted over the past five to ten years which reduces their impact now when compared to older studies.

Third, each generation of studies further refines the sort categories which in some cases makes it difficult to compare against older studies.

Given these caveats, the following observations can be made.

First, as illustrated by Table 7, plastic waste comprised 11.5 percent of total waste on a tonnage basis. This is quite similar to Vermont (roughly 11.5%) and Delaware (11.1%) but less than the 14.7 percent observed in Connecticut, and runs counter to observations that plastic wastes are growing at the expense of other materials (such as glass, steel, and paper) for which plastic continues to be substituted for. The light weight of plastic packaging combined with higher rates of plastic recycling in Rhode Island may explain this variation.

Second, paper (at 23.9%) is slightly less than observed in all three of the other state-wide characterizations (which all fall in the mid-25% range). This could be due to a combination of better paper recycling efforts by Rhode Island residents (see more on this below), combined with shrinking paper quantities in general (with the exception of corrugated).

Third, the percent organics is slightly higher at 27.6 percent, but similar to all three other states (ranging from a low of 23% in Vermont to 25% and 26.7% respectively in Delaware and Connecticut).

Fourth, the percent of C&D found in MSW is also similar to both Vermont and Connecticut, but significantly lower than Delaware, which was (and is) in the middle of a booming housing construction phase.

Finally, glass and metals are all in the same range as the other three states.

## Composition of Residential Waste Delivered to the RIRRC Landfill

Table 9 presents the composition of residential MSW delivered c. 2015 to the RIRRC landfill, and Table 10 then allocates these materials by management category.

### Table 9. Composition of Residential MSW Delivered to the RIRRC Landfill in 2015

| Material | Estimated Percent | Standard Deviation | +/- | Estimated Tons | Material | Estimated Percent | Standard Deviation | +/- | Estimated Tons |
|---|---|---|---|---|---|---|---|---|---|
| **Plastic** | **11.4%** | | | **34,670** | **Textiles** | **7.3%** | | | **22,170** |
| Plastic #1 PET bottles, under 2 gallons | 0.8% | 0.1% | 0.1% | 2,319 | Apparel | 4.5% | 0.5% | 0.9% | 13,775 |
| Plastic #2 HDPE bottles and jugs, under 2 gallons | 0.3% | 0.0% | 0.0% | 960 | Non-apparel textiles | 2.8% | 0.4% | 0.7% | 8,395 |
| Plastic clamshells, under 2 gallons | 0.1% | 0.0% | 0.0% | 284 | | | | | |
| Plastic blister packaging, under 2 gallons | 0.0% | 0.0% | 0.0% | 144 | **Other Organics** | **30.2%** | | | **91,586** |
| Plastic #1-#7 & unmarked non-bev. containers <2 ga | 1.3% | 0.1% | 0.1% | 3,842 | Branches and stumps >2 inches | 0.3% | 0.3% | 0.5% | 891 |
| Plastic containers, larger than 2 gallons | 0.1% | 0.1% | 0.1% | 405 | Leaf and yard debris | 7.4% | 0.9% | 1.5% | 22,535 |
| Bulky plastic >2 gallons | 0.8% | 0.2% | 0.4% | 2,303 | Clean dimensional lumber | 0.9% | 0.3% | 0.6% | 2,752 |
| Retail bags and film | 1.3% | 0.2% | 0.3% | 3,911 | Vegetative food waste | 17.0% | 0.8% | 1.3% | 51,466 |
| Contaminated film/bags | 3.9% | 0.2% | 0.4% | 11,724 | Protein food waste | 3.0% | 0.3% | 0.4% | 9,111 |
| Styrofoam | 0.7% | 0.1% | 0.1% | 2,193 | Other organics | 1.6% | 0.3% | 0.4% | 4,831 |
| Remainder/composite plastic | 2.2% | 0.7% | 1.2% | 6,584 | | | | | |
| | | | | | **Construction and Demolition** | **8.7%** | | | **26,290** |
| **Paper** | **18.5%** | | | **56,199** | Asphalt, brick, and concrete | 0.1% | 0.0% | 0.1% | 349 |
| Brown corrugated cardboard boxes and kraft paper | 2.4% | 0.2% | 0.4% | 7,136 | Roofing whingles | 0.2% | 0.2% | 0.3% | 740 |
| Whole pizza boxes | 0.1% | 0.0% | 0.0% | 245 | Drywall/gypsum board | 0.5% | 0.3% | 0.4% | 1,599 |
| Uncoated paperboard/chipboard | 1.6% | 0.1% | 0.2% | 4,834 | Treated wood | 6.1% | 0.8% | 1.3% | 18,413 |
| Coated paperboard, refrigerated and frozen food | 0.3% | 0.0% | 0.0% | 765 | Fixtures | 0.1% | 0.1% | 0.1% | 275 |
| Hot paper coffee cups and bowls | 0.1% | 0.0% | 0.0% | 420 | All other C&D | 1.6% | 0.4% | 0.6% | 4,913 |
| Shredded paper | 0.2% | 0.1% | 0.1% | 510 | | | | | |
| Newsprint | 1.5% | 0.2% | 0.3% | 4,589 | **Bulky Waste** | **7.9%** | | | **24,052** |
| Glossy paper | 0.8% | 0.1% | 0.2% | 2,549 | Major appliances | 0.0% | 0.0% | 0.0% | 0 |
| Tissue paper, gift-wrapping | 0.3% | 0.1% | 0.2% | 819 | TVs, computers, computer peripheral devices | 0.3% | 0.2% | 0.3% | 928 |
| Compostable Paper | 7.3% | 0.5% | 0.8% | 22,199 | Small consumer electronic and electrical devices | 0.4% | 0.1% | 0.1% | 1,322 |
| Cartons, gabletop | 0.2% | 0.1% | 0.1% | 546 | Furniture | 2.7% | 0.8% | 1.3% | 8,334 |
| Aseptic juice boxes | 0.3% | 0.2% | 0.4% | 846 | Tires | 0.1% | 0.1% | 0.1% | 376 |
| Paperback books | 0.1% | 0.0% | 0.1% | 371 | Carpet and carpet padding | 3.7% | 0.7% | 1.2% | 11,342 |
| Phone books | 0.1% | 0.0% | 0.1% | 192 | Mattresses and box springs | 0.6% | 0.6% | 0.9% | 1,750 |
| Hardcover books | 0.1% | 0.0% | 0.1% | 291 | | | | | |
| Office/mixed paper | 2.2% | 0.2% | 0.4% | 6,695 | **Special Waste** | **0.5%** | | | **1,365** |
| Remainder/composite paper | 1.1% | 0.2% | 0.3% | 3,192 | Sharps | 0.0% | 0.0% | 0.0% | 23 |
| | | | | | Medications | 0.1% | 0.0% | 0.0% | 216 |
| **Glass** | **1.6%** | | | **4,785** | Propane tanks | 0.0% | 0.0% | 0.0% | 0 |
| Glass bottles and jars | 1.3% | 0.1% | 0.2% | 4,014 | Fluorescent bulbs and ballasts | 0.0% | 0.0% | 0.0% | 76 |
| Remainder composite glass | 0.3% | 0.0% | 0.1% | 771 | Batteries: single-use, alkaline | 0.1% | 0.0% | 0.0% | 265 |
| | | | | | Batteries: lead acid (vehicles) | 0.0% | 0.0% | 0.0% | 1 |
| **Metal** | **3.1%** | | | **9,289** | Batteries: all other rechargeable batteries | 0.0% | 0.0% | 0.0% | 4 |
| Aluminum beverage cans | 0.2% | 0.0% | 0.0% | 735 | Paints and stains | 0.0% | 0.0% | 0.0% | 81 |
| Aluminum foil and pie plates | 0.4% | 0.0% | 0.0% | 1,093 | Empty liquid and gel HHW containers | 0.0% | 0.0% | 0.0% | 94 |
| Aluminum non-beverage cans | 0.1% | 0.0% | 0.0% | 399 | Other hazardous or household hazardous waste | 0.2% | 0.1% | 0.2% | 604 |
| Ferrous cans | 0.6% | 0.1% | 0.1% | 1,736 | | | | | |
| Small scrap metal | 1.2% | 0.2% | 0.3% | 3,611 | **Other** | **10.4%** | | | **31,610** |
| Large scrap metal | 0.6% | 0.2% | 0.4% | 1,715 | Miscellaneous | 10.4% | 1.0% | 1.6% | 31,610 |
| | | | | | | | | | |
| **Hybrids** | **0.4%** | | | **1,102** | **Totals** | **100.0%** | | | **303,117** |
| Foiled wrappers | 0.2% | 0.0% | 0.0% | 755 | **Sample Count** | **105** | | | |
| Mixed material packaging | 0.1% | 0.0% | 0.0% | 346 | | | | | |

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

**The material type "Non-container small plastic odds and ends" used in season one has been added to this material type for the remaining seasons.*

***This material type was named "Paper napkins and towels" in season one. The name has been changed for all remaining seasons to more accurately reflect the materials included here.*

Table 10. Allocation of Residential MSW by Management Category

| | Estimated Percent | Estimated Tons |
|---|---|---|
| **MRF** | **14.6%** | **44,348** |
| Plastic | 2.5% | 7,550 |
| Paper | 9.5% | 28,821 |
| Glass | 1.3% | 4,014 |
| Metal | 1.3% | 3,962 |
| **Compostable - Any Scale** | **31.7%** | **96,201** |
| Paper | 7.3% | 22,199 |
| Other Organics | 24.4% | 74,001 |
| **Compostable - Large Scale** | **3.3%** | **10,002** |
| Other Organics | 3.3% | 10,002 |
| **Drop-Off** | **15.4%** | **46,610** |
| Plastic | 2.9% | 8,812 |
| Paper | 0.3% | 802 |
| Metal | 1.8% | 5,326 |
| Textiles | 7.3% | 22,170 |
| Other Organics | 0.9% | 2,752 |
| Construction and Demolition | 0.9% | 2,688 |
| Bulky Waste | 1.0% | 3,054 |
| Special Waste | 0.3% | 1,006 |
| **Trash** | **35.0%** | **105,957** |
| Plastic | 6.0% | 18,308 |
| Paper | 1.4% | 4,376 |
| Glass | 0.3% | 771 |
| Hybrids | 0.4% | 1,102 |
| Other Organics | 1.6% | 4,831 |
| Construction and Demolition | 7.8% | 23,602 |
| Bulky Waste | 6.9% | 20,998 |
| Special Waste | 0.1% | 359 |
| Other | 10.4% | 31,610 |
| **Grand Total** | **100.0%** | **303,117** |

## General Observations

The following general observations are made.

- **Food wastes** are the most prevalent material in the residential waste stream, with an aggregate of 20.4 percent (one-fifth) of the stream consisting of food. The majority of the disposed food waste is vegetative food waste rather than meat/dairy and other proteins.
- There is relatively low incidence of **recyclable paper** items and **recyclable containers** in the Residential MSW stream. This suggests that recycling programs are capturing these items (see below).
- **Yard waste** was significant in the Residential MSW stream, as expected this result was driven by yard waste in the spring and fall seasonal sorting events.

- **Textiles,** both apparel and non-apparel, were significant in Residential MSW. This finding is consistent with other large-scale residential waste characterization studies performed by the Project Team.
- The incidence of **HHW**, **Electronics**, and other **Special Wastes** was quite low. This suggests that programs targeting these materials are achieving success in keeping them out of the MSW stream.
- Over 10 percent of Residential MSW was found to be **Other Miscellaneous** wastes. This category is so large because of the incidence of diapers and other sanitary products, and kitty litter, which are regularly occurring in the residential waste stream and are among the more dense materials.
- **Hybrid**, multi-material packaging was found to be a very small contributor to the overall waste stream. The Project Team believes this result is reasonable because these materials are designed to be extremely light weight. Increased volumes of hybrid packaging will have a relatively low impact on weight-based waste composition.

## Comparison against Other States

The key observation is that Rhode Island appears to be doing a very good job of diverting (recycling) the traditional residential recyclables. Paper, at 18 percent is significantly less than Delaware was in 2007 (30% before adoption of Delaware's Universal Recycling Law), and Connecticut in 2010 (25%), and compares favorably with Seattle (18% in 2010).

Similar comparisons can be made for plastic bottles, glass and metals where Rhode Island is at or below the other states listed above, as well as Iowa and Vermont; even though Vermont, Connecticut and Iowa all have deposits on many beverage containers. For example, total Rhode Island residential glass bottles and jars, at 1.3 percent, compares favorably with Vermont (1.3%), Iowa (1.2%), and Connecticut (1.8%). For PET bottles and jars, Rhode Island residential is at 0.8 percent compared to Vermont (0.7%), Iowa (0.7%) and Connecticut (1.0%).

## Composition of ICI Waste Delivered to RIRRC in 2015

Tables 11 and 12 present the composition of ICI waste delivered to the landfill, both in terms of overall material composition as well as allocated by management category.

### Table 11. Composition of ICI Waste Delivered to the RIRRC Landfill in 2015

| Material | Estimated Percent | Standard Deviation | +/- | Estimated Tons | Material | Estimated Percent | Standard Deviation | +/- | Estimated Tons |
|---|---|---|---|---|---|---|---|---|---|
| **Plastic** | **12.4%** | | | **27,845** | **Textiles** | **3.0%** | | | **6,691** |
| Plastic #1 PET bottles, under 2 gallons | 1.1% | 0.2% | 0.3% | 2,395 | Apparel | 1.8% | 0.4% | 0.7% | 4,008 |
| Plastic #2 HDPE bottles and jugs, under 2 gallons | 0.3% | 0.0% | 0.1% | 690 | Non-apparel textiles | 1.2% | 0.3% | 0.5% | 2,682 |
| Plastic clamshells, under 2 gallons | 0.1% | 0.0% | 0.0% | 226 | | | | | |
| Plastic blister packaging, under 2 gallons | 0.0% | 0.0% | 0.0% | 77 | **Other Organics** | **23.8%** | | | **53,607** |
| Plastic #1-#7 & unmarked non-bev. containers <2 ga | 0.9% | 0.1% | 0.1% | 2,115 | Branches and stumps >2 inches | 0.0% | 0.0% | 0.0% | 6 |
| Plastic containers, larger than 2 gallons | 0.3% | 0.2% | 0.3% | 736 | Leaf and yard debris | 2.3% | 0.6% | 0.9% | 5,144 |
| Bulky plastic >2 gallons | 1.1% | 0.3% | 0.4% | 2,421 | Clean dimensional lumber | 1.9% | 0.5% | 0.8% | 4,240 |
| Retail bags and film | 0.9% | 0.2% | 0.3% | 2,072 | Vegetative food waste | 14.8% | 1.3% | 2.1% | 33,361 |
| Contaminated film/bags | 4.1% | 0.3% | 0.6% | 9,159 | Protein food waste | 2.7% | 0.5% | 0.8% | 6,092 |
| Styrofoam | 0.8% | 0.2% | 0.4% | 1,842 | Other organics | 2.1% | 0.9% | 1.5% | 4,764 |
| Remainder/composite plastic | 2.7% | 0.6% | 1.0% | 6,112 | | | | | |
| | | | | | **Construction and Demolition** | **11.0%** | | | **24,798** |
| **Paper** | **31.2%** | | | **70,192** | Asphalt, brick, and concrete | 1.3% | 0.6% | 0.9% | 2,997 |
| Brown corrugated cardboard boxes and kraft paper | 15.2% | 1.4% | 2.3% | 34,108 | Roofing whingles | 0.0% | 0.0% | 0.0% | 48 |
| Whole pizza boxes | 0.1% | 0.0% | 0.0% | 206 | Drywall/gypsum board | 1.2% | 0.4% | 0.6% | 2,600 |
| Uncoated paperboard/chipboard | 1.7% | 0.4% | 0.7% | 3,800 | Treated wood | 7.4% | 1.1% | 1.8% | 16,698 |
| Coated paperboard, refrigerated and frozen food | 0.3% | 0.1% | 0.1% | 652 | Fixtures | 0.3% | 0.1% | 0.2% | 673 |
| Hot paper coffee cups and bowls | 0.6% | 0.2% | 0.3% | 1,293 | All other C&D | 0.8% | 0.3% | 0.5% | 1,782 |
| Shredded paper | 0.8% | 0.4% | 0.7% | 1,726 | | | | | |
| Newsprint | 1.4% | 0.3% | 0.5% | 3,066 | **Bulky Waste** | **5.9%** | | | **13,342** |
| Glossy paper | 1.0% | 0.5% | 0.9% | 2,182 | Major appliances | 0.1% | 0.1% | 0.2% | 280 |
| Tissue paper, gift-wrapping | 0.1% | 0.0% | 0.0% | 232 | TVs, computers, computer peripheral devices | 0.6% | 0.3% | 0.4% | 1,266 |
| Compostable Paper | 5.3% | 0.5% | 0.8% | 11,849 | Small consumer electronic and electrical devices | 0.3% | 0.1% | 0.2% | 647 |
| Cartons, gabletop | 0.2% | 0.0% | 0.1% | 416 | Furniture | 2.4% | 0.9% | 1.5% | 5,513 |
| Aseptic juice boxes | 0.1% | 0.1% | 0.1% | 252 | Tires | 0.3% | 0.2% | 0.3% | 747 |
| Paperback books | 0.1% | 0.0% | 0.0% | 172 | Carpet and carpet padding | 1.8% | 0.6% | 0.9% | 4,153 |
| Phone books | 0.0% | 0.0% | 0.0% | 102 | Mattresses and box springs | 0.3% | 0.2% | 0.4% | 737 |
| Hardcover books | 0.0% | 0.0% | 0.0% | 6 | | | | | |
| Office/mixed paper | 2.0% | 0.3% | 0.4% | 4,389 | **Special Waste** | **0.6%** | | | **1,417** |
| Remainder/composite paper | 2.6% | 1.0% | 1.6% | 5,742 | Sharps | 0.0% | 0.0% | 0.0% | 10 |
| | | | | | Medications | 0.0% | 0.0% | 0.0% | 38 |
| **Glass** | **2.6%** | | | **5,811** | Propane tanks | 0.0% | 0.0% | 0.0% | 8 |
| Glass bottles and jars | 2.4% | 0.3% | 0.6% | 5,317 | Fluorescent bulbs and ballasts | 0.0% | 0.0% | 0.0% | 43 |
| Remainder composite glass | 0.2% | 0.1% | 0.1% | 495 | Batteries: single-use, alkaline | 0.0% | 0.0% | 0.0% | 43 |
| | | | | | Batteries: lead acid (vehicles) | 0.0% | 0.0% | 0.0% | 0 |
| **Metal** | **2.8%** | | | **6,387** | Batteries: all other rechargeable batteries | 0.0% | 0.0% | 0.0% | 5 |
| Aluminum beverage cans | 0.2% | 0.0% | 0.0% | 457 | Paints and stains | 0.2% | 0.2% | 0.4% | 556 |
| Aluminum foil and pie plates | 0.3% | 0.1% | 0.1% | 612 | Empty liquid and gel HHW containers | 0.1% | 0.0% | 0.1% | 336 |
| Aluminum non-beverage cans | 0.1% | 0.0% | 0.0% | 149 | Other hazardous or household hazardous waste | 0.2% | 0.1% | 0.1% | 376 |
| Ferrous cans | 0.5% | 0.1% | 0.1% | 1,095 | | | | | |
| Small scrap metal | 1.0% | 0.2% | 0.3% | 2,188 | **Other** | **6.4%** | | | **14,418** |
| Large scrap metal | 0.8% | 0.4% | 0.6% | 1,885 | Miscellaneous | 6.4% | 1.1% | 1.9% | 14,418 |
| | | | | | | | | | |
| **Hybrids** | **0.2%** | | | **543** | **Totals** | **100.0%** | | | **225,051** |
| Foiled wrappers | 0.1% | 0.0% | 0.0% | 247 | **Sample Count** | **106** | | | |
| Mixed material packaging | 0.1% | 0.0% | 0.1% | 297 | | | | | |

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

**The material type "Non-container small plastic odds and ends" used in season one has been added to this material type for the remaining seasons.*

***This material type was named "Paper napkins and towels" in season one. The name has been changed for all remaining seasons to more accurately reflect the materials included here.*

Table 12. Allocation of ICI MSW by Management Category

| | Estimated Percent | Estimated Tons |
|---|---|---|
| **MRF** | **27.6%** | **62,057** |
| Plastic | 2.4% | 5,503 |
| Paper | 21.7% | 48,925 |
| Glass | 2.4% | 5,317 |
| Metal | 1.0% | 2,314 |
| **Compostable - Any Scale** | **22.4%** | **50,354** |
| Paper | 5.3% | 11,849 |
| Other Organics | 17.1% | 38,505 |
| **Compostable - Large Scale** | **2.7%** | **6,097** |
| Other Organics | 2.7% | 6,097 |
| **Drop-Off** | **14.9%** | **33,518** |
| Plastic | 3.1% | 7,071 |
| Paper | 0.8% | 1,732 |
| Metal | 1.8% | 4,074 |
| Textiles | 3.0% | 6,691 |
| Other Organics | 1.9% | 4,240 |
| Construction and Demolition | 2.5% | 5,644 |
| Bulky Waste | 1.3% | 3,030 |
| Special Waste | 0.5% | 1,038 |
| **Trash** | **32.4%** | **73,024** |
| Plastic | 6.8% | 15,271 |
| Paper | 3.4% | 7,687 |
| Glass | 0.2% | 495 |
| Hybrids | 0.2% | 543 |
| Other Organics | 2.1% | 4,764 |
| Construction and Demolition | 8.5% | 19,154 |
| Bulky Waste | 4.6% | 10,312 |
| Special Waste | 0.2% | 379 |
| Other | 6.4% | 14,418 |
| **Grand Total** | **100.0%** | **225,051** |

## General Observations

The following observations can be made about ICI MSW based on the results in Table 11.

- There was a higher than expected incidence of **Corrugated Cardboard** (OCC) in the ICI MSW. At almost 15 percent, this finding would suggest that there are significant opportunities to reduce the amount of OCC being disposed from ICI generators.
- **Food Waste** is again one of the most prevalent materials in ICI MSW. Food Waste in the ICI stream is predominantly vegetative.
- There was relatively little **Yard Waste** in the ICI MSW. This appears reasonable and expected, as presumably ICI generators are located on parcels that generate little to no Yard Waste, or else have Yard Wastes managed and removed separately.

Because ICI MSW is generated by such a diverse population of business types, it is harder to draw universal conclusions about ICI waste. Additional information on the composition of wastes from specific targeted generators is presented later in this section.

## Comparison of the Residential and ICI MSW Delivered to the RIRRC Landfill

Table 13 below summarizes the key differences between waste from residential generators and from ICI generators.

Table 13. Comparison of Residential and ICI Waste Composition

| Residential waste contains a higher incidence of: | ICI waste contains a higher incidence of: |
|---|---|
| Textiles (*over twice as much*) | Corrugated Cardboard (*six times as much*) |
| Leaf and Yard Debris (*almost 3 times as much*) | Remainder/Composite Paper (*Over twice as much*) |
| Miscellaneous (*56 percent higher*) | Remainder/Composite Plastic (*58 percent higher*) |
| Carpet/Padding (*over twice as much*) | Glass Bottles (*84 percent higher*) |

## Composition of MSW Delivered From Municipal and Commercial Customers

As described previously, Municipal MSW is predominantly residential, although it includes institutional waste from schools and other government buildings. Conversely, Commercial MSW is predominantly from the ICI sector, but includes residential waste from multi-family and some condominium households. Tables 14 (below) and 15 (on the next page) provide detailed composition results for Municipal MSW, both in total, and then by management category.

**Table 14.** Overall Composition of MSW Delivered from Municipal Customers

| Material | Estimated Percent | Standard Deviation | +/- | Estimated Tons | Material | Estimated Percent | Standard Deviation | +/- | Estimated Tons |
|---|---|---|---|---|---|---|---|---|---|
| **Plastic** | **10.7%** | | | **30,065** | **Textiles** | **7.8%** | | | **21,740** |
| Plastic #1 PET bottles, under 2 gallons | 1.0% | 0.1% | 0.2% | 2,661 | Apparel | 4.8% | 0.6% | 0.9% | 13,520 |
| Plastic #2 HDPE bottles and jugs, under 2 gallons | 0.3% | 0.0% | 0.0% | 834 | Non-apparel textiles | 2.9% | 0.4% | 0.7% | 8,220 |
| Plastic clamshells, under 2 gallons | 0.1% | 0.0% | 0.0% | 261 | | | | | |
| Plastic blister packaging, under 2 gallons | 0.1% | 0.0% | 0.0% | 147 | **Other Organics** | **30.9%** | | | **86,468** |
| Plastic #1-#7 & unmarked non-bev. containers <2 ga | 1.3% | 0.1% | 0.1% | 3,506 | Branches and stumps >2 inches | 0.3% | 0.3% | 0.5% | 891 |
| Plastic containers, larger than 2 gallons | 0.1% | 0.1% | 0.1% | 239 | Leaf and yard debris | 7.8% | 0.9% | 1.5% | 21,690 |
| Bulky plastic >2 gallons | 0.8% | 0.2% | 0.4% | 2,353 | Clean dimensional lumber | 1.1% | 0.4% | 0.7% | 2,950 |
| Retail bags and film | 1.3% | 0.1% | 0.2% | 3,499 | Vegetative food waste | 17.1% | 0.9% | 1.4% | 47,886 |
| Contaminated film/bags | 3.7% | 0.2% | 0.3% | 10,343 | Protein food waste | 3.1% | 0.3% | 0.5% | 8,712 |
| Styrofoam | 0.7% | 0.0% | 0.1% | 2,088 | Other organics | 1.6% | 0.2% | 0.3% | 4,339 |
| Remainder/composite plastic | 1.5% | 0.1% | 0.2% | 4,133 | | | | | |
| | | | | | **Construction and Demolition** | **9.4%** | | | **26,404** |
| **Paper** | **18.1%** | | | **50,530** | Asphalt, brick, and concrete | 0.3% | 0.2% | 0.4% | 911 |
| Brown corrugated cardboard boxes and kraft paper | 2.3% | 0.2% | 0.4% | 6,410 | Roofing whingles | 0.3% | 0.2% | 0.4% | 742 |
| Whole pizza boxes | 0.1% | 0.0% | 0.0% | 245 | Drywall/gypsum board | 0.6% | 0.3% | 0.5% | 1,611 |
| Uncoated paperboard/chipboard | 1.6% | 0.1% | 0.2% | 4,396 | Treated wood | 6.5% | 0.8% | 1.4% | 18,068 |
| Coated paperboard, refrigerated and frozen food | 0.3% | 0.0% | 0.0% | 781 | Fixtures | 0.1% | 0.1% | 0.1% | 275 |
| Hot paper coffee cups and bowls | 0.2% | 0.0% | 0.1% | 452 | All other C&D | 1.7% | 0.4% | 0.7% | 4,795 |
| Shredded paper | 0.2% | 0.1% | 0.1% | 477 | | | | | |
| Newsprint | 1.5% | 0.2% | 0.3% | 4,105 | **Bulky Waste** | **7.7%** | | | **21,448** |
| Glossy paper | 0.8% | 0.1% | 0.2% | 2,254 | Major appliances | 0.0% | 0.0% | 0.0% | 0 |
| Tissue paper, gift-wrapping | 0.2% | 0.1% | 0.2% | 669 | TVs, computers, computer peripheral devices | 0.3% | 0.2% | 0.3% | 928 |
| Compostable Paper | 7.3% | 0.4% | 0.7% | 20,349 | Small consumer electronic and electrical devices | 0.4% | 0.1% | 0.1% | 1,140 |
| Cartons, gabletop | 0.2% | 0.1% | 0.1% | 542 | Furniture | 2.7% | 0.7% | 1.2% | 7,620 |
| Aseptic juice boxes | 0.1% | 0.0% | 0.0% | 154 | Tires | 0.1% | 0.1% | 0.2% | 376 |
| Paperback books | 0.1% | 0.0% | 0.0% | 253 | Carpet and carpet padding | 4.1% | 0.8% | 1.2% | 11,383 |
| Phone books | 0.1% | 0.0% | 0.1% | 192 | Mattresses and box springs | 0.0% | 0.0% | 0.0% | 0 |
| Hardcover books | 0.1% | 0.0% | 0.1% | 291 | | | | | |
| Office/mixed paper | 2.1% | 0.2% | 0.3% | 5,964 | **Special Waste** | **0.4%** | | | **1,061** |
| Remainder/composite paper | 1.1% | 0.2% | 0.4% | 2,996 | Sharps | 0.0% | 0.0% | 0.0% | 23 |
| | | | | | Medications | 0.1% | 0.0% | 0.0% | 210 |
| **Glass** | **1.6%** | | | **4,579** | Propane tanks | 0.0% | 0.0% | 0.0% | 0 |
| Glass bottles and jars | 1.4% | 0.1% | 0.2% | 3,794 | Fluorescent bulbs and ballasts | 0.0% | 0.0% | 0.0% | 26 |
| Remainder composite glass | 0.3% | 0.0% | 0.1% | 785 | Batteries: single-use, alkaline | 0.1% | 0.0% | 0.0% | 247 |
| | | | | | Batteries: lead acid (vehicles) | 0.0% | 0.0% | 0.0% | 1 |
| **Metal** | **3.2%** | | | **8,886** | Batteries: all other rechargeable batteries | 0.0% | 0.0% | 0.0% | 4 |
| Aluminum beverage cans | 0.2% | 0.0% | 0.0% | 669 | Paints and stains | 0.0% | 0.0% | 0.0% | 28 |
| Aluminum foil and pie plates | 0.4% | 0.0% | 0.1% | 1,061 | Empty liquid and gel HHW containers | 0.0% | 0.0% | 0.0% | 124 |
| Aluminum non-beverage cans | 0.1% | 0.0% | 0.0% | 308 | Other hazardous or household hazardous waste | 0.1% | 0.1% | 0.1% | 397 |
| Ferrous cans | 0.6% | 0.1% | 0.1% | 1,655 | | | | | |
| Small scrap metal | 1.3% | 0.2% | 0.3% | 3,716 | **Other** | **9.9%** | | | **27,573** |
| Large scrap metal | 0.5% | 0.2% | 0.4% | 1,478 | Miscellaneous | 9.9% | 0.7% | 1.1% | 27,573 |
| | | | | | | | | | |
| **Hybrids** | **0.4%** | | | **1,041** | **Totals** | **100.0%** | | | **279,795** |
| Foiled wrappers | 0.3% | 0.0% | 0.0% | 709 | **Sample Count** | **105** | | | |
| Mixed material packaging | 0.1% | 0.0% | 0.0% | 333 | | | | | |

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

**The material type "Non-container small plastic odds and ends" used in season one has been added to this material type for the remaining seasons.*

***This material type was named "Paper napkins and towels" in season one. The name has been changed for all remaining seasons to more accurately reflect the materials included here.*

**Table 15**. Allocation of Municipal MSW by Management Category

| | Estimated Percent | Estimated Tons |
|---|---|---|
| **MRF** | **14.3%** | **40,079** |
| Plastic | 2.6% | 7,410 |
| Paper | 9.0% | 25,183 |
| Glass | 1.4% | 3,794 |
| Metal | 1.3% | 3,692 |
| **Compostable - Any Scale** | **32.1%** | **89,926** |
| Paper | 7.3% | 20,349 |
| Other Organics | 24.9% | 69,576 |
| **Compostable - Large Scale** | **3.4%** | **9,603** |
| Other Organics | 3.4% | 9,603 |
| **Drop-Off** | **15.8%** | **44,091** |
| Plastic | 2.9% | 8,179 |
| Paper | 0.3% | 768 |
| Metal | 1.9% | 5,194 |
| Textiles | 7.8% | 21,740 |
| Other Organics | 1.1% | 2,950 |
| Construction and Demolition | 1.2% | 3,265 |
| Bulky Waste | 0.5% | 1,304 |
| Special Waste | 0.2% | 690 |
| **Trash** | **34.3%** | **96,097** |
| Plastic | 5.2% | 14,476 |
| Paper | 1.5% | 4,230 |
| Glass | 0.3% | 785 |
| Hybrids | 0.4% | 1,041 |
| Other Organics | 1.6% | 4,339 |
| Construction and Demolition | 8.3% | 23,139 |
| Bulky Waste | 7.2% | 20,143 |
| Special Waste | 0.1% | 371 |
| Other | 9.9% | 27,573 |
| **Grand Total** | **100.0%** | **279,795** |

Tables 16 (below) and 17 (on the next page) present the same data for overall Commercial MSW.

## Table 16. Composition of MSW Delivered by Commercial Customers in 2015

| Material | Estimated Percent | Standard Deviation | +/- | Estimated Tons |
|---|---|---|---|---|
| **Plastic** | **13.1%** | | | **32,450** |
| Plastic #1 PET bottles, under 2 gallons | 0.8% | 0.1% | 0.1% | 2,053 |
| Plastic #2 HDPE bottles and jugs, under 2 gallons | 0.3% | 0.0% | 0.1% | 816 |
| Plastic clamshells, under 2 gallons | 0.1% | 0.0% | 0.0% | 249 |
| Plastic blister packaging, under 2 gallons | 0.0% | 0.0% | 0.0% | 74 |
| Plastic #1-#7 & unmarked non-bev. containers <2 ga | 1.0% | 0.1% | 0.1% | 2,450 |
| Plastic containers, larger than 2 gallons | 0.4% | 0.2% | 0.3% | 903 |
| Bulky plastic >2 gallons | 1.0% | 0.2% | 0.4% | 2,371 |
| Retail bags and film | 1.0% | 0.2% | 0.4% | 2,483 |
| Contaminated film/bags | 4.2% | 0.3% | 0.6% | 10,540 |
| Styrofoam | 0.8% | 0.2% | 0.4% | 1,947 |
| Remainder/composite plastic | 3.4% | 1.0% | 1.7% | 8,563 |
| | | | | |
| **Paper** | **30.5%** | | | **75,860** |
| Brown corrugated cardboard boxes and kraft paper | 14.0% | 1.3% | 2.1% | 34,834 |
| Whole pizza boxes | 0.1% | 0.0% | 0.0% | 206 |
| Uncoated paperboard/chipboard | 1.7% | 0.4% | 0.6% | 4,237 |
| Coated paperboard, refrigerated and frozen food | 0.3% | 0.0% | 0.1% | 636 |
| Hot paper coffee cups and bowls | 0.5% | 0.2% | 0.3% | 1,261 |
| Shredded paper | 0.7% | 0.4% | 0.7% | 1,759 |
| Newsprint | 1.4% | 0.3% | 0.4% | 3,551 |
| Glossy paper | 1.0% | 0.5% | 0.8% | 2,478 |
| Tissue paper, gift-wrapping | 0.2% | 0.1% | 0.1% | 382 |
| Compostable Paper | 5.5% | 0.5% | 0.9% | 13,699 |
| Cartons, gabletop | 0.2% | 0.0% | 0.1% | 420 |
| Aseptic juice boxes | 0.4% | 0.3% | 0.5% | 943 |
| Paperback books | 0.1% | 0.1% | 0.1% | 290 |
| Phone books | 0.0% | 0.0% | 0.0% | 102 |
| Hardcover books | 0.0% | 0.0% | 0.0% | 6 |
| Office/mixed paper | 2.1% | 0.3% | 0.5% | 5,120 |
| Remainder/composite paper | 2.4% | 0.9% | 1.5% | 5,937 |
| | | | | |
| **Glass** | **2.4%** | | | **6,018** |
| Glass bottles and jars | 2.2% | 0.3% | 0.5% | 5,537 |
| Remainder composite glass | 0.2% | 0.1% | 0.1% | 481 |
| | | | | |
| **Metal** | **2.7%** | | | **6,790** |
| Aluminum beverage cans | 0.2% | 0.0% | 0.0% | 524 |
| Aluminum foil and pie plates | 0.3% | 0.1% | 0.1% | 644 |
| Aluminum non-beverage cans | 0.1% | 0.0% | 0.0% | 240 |
| Ferrous cans | 0.5% | 0.1% | 0.1% | 1,176 |
| Small scrap metal | 0.8% | 0.2% | 0.3% | 2,083 |
| Large scrap metal | 0.9% | 0.4% | 0.6% | 2,122 |
| | | | | |
| **Hybrids** | **0.2%** | | | **604** |
| Foiled wrappers | 0.1% | 0.0% | 0.0% | 293 |
| Mixed material packaging | 0.1% | 0.0% | 0.1% | 310 |
| **Textiles** | **2.9%** | | | **7,120** |
| Apparel | 1.7% | 0.4% | 0.7% | 4,263 |
| Non-apparel textiles | 1.2% | 0.3% | 0.4% | 2,857 |
| | | | | |
| **Other Organics** | **23.6%** | | | **58,725** |
| Branches and stumps >2 inches | 0.0% | 0.0% | 0.0% | 6 |
| Leaf and yard debris | 2.4% | 0.6% | 1.0% | 5,989 |
| Clean dimensional lumber | 1.6% | 0.4% | 0.7% | 4,042 |
| Vegetative food waste | 14.9% | 1.2% | 2.0% | 36,941 |
| Protein food waste | 2.6% | 0.4% | 0.7% | 6,491 |
| Other organics | 2.1% | 0.8% | 1.4% | 5,256 |
| | | | | |
| **Construction and Demolition** | **9.9%** | | | **24,684** |
| Asphalt, brick, and concrete | 1.0% | 0.4% | 0.7% | 2,435 |
| Roofing whingles | 0.0% | 0.0% | 0.0% | 45 |
| Drywall/gypsum board | 1.0% | 0.3% | 0.6% | 2,587 |
| Treated wood | 6.9% | 1.0% | 1.7% | 17,043 |
| Fixtures | 0.3% | 0.1% | 0.2% | 673 |
| All other C&D | 0.8% | 0.3% | 0.4% | 1,900 |
| | | | | |
| **Bulky Waste** | **6.4%** | | | **15,947** |
| Major appliances | 0.1% | 0.1% | 0.2% | 280 |
| TVs, computers, computer peripheral devices | 0.5% | 0.2% | 0.4% | 1,266 |
| Small consumer electronic and electrical devices | 0.3% | 0.1% | 0.2% | 829 |
| Furniture | 2.5% | 1.0% | 1.6% | 6,226 |
| Tires | 0.3% | 0.2% | 0.3% | 747 |
| Carpet and carpet padding | 1.7% | 0.5% | 0.8% | 4,112 |
| Mattresses and box springs | 1.0% | 0.7% | 1.2% | 2,487 |
| | | | | |
| **Special Waste** | **0.7%** | | | **1,721** |
| Sharps | 0.0% | 0.0% | 0.0% | 10 |
| Medications | 0.0% | 0.0% | 0.0% | 44 |
| Propane tanks | 0.0% | 0.0% | 0.0% | 8 |
| Fluorescent bulbs and ballasts | 0.0% | 0.0% | 0.0% | 93 |
| Batteries: single-use, alkaline | 0.0% | 0.0% | 0.0% | 61 |
| Batteries: lead acid (vehicles) | 0.0% | 0.0% | 0.0% | 0 |
| Batteries: all other rechargeable batteries | 0.0% | 0.0% | 0.0% | 5 |
| Paints and stains | 0.2% | 0.2% | 0.3% | 609 |
| Empty liquid and gel HHW containers | 0.1% | 0.0% | 0.1% | 307 |
| Other hazardous or household hazardous waste | 0.2% | 0.1% | 0.2% | 584 |
| | | | | |
| **Other** | **7.4%** | | | **18,454** |
| Miscellaneous | 7.4% | 1.4% | 2.3% | 18,454 |
| | | | | |
| **Totals** | **100.0%** | | | **248,373** |
| **Sample Count** | **106** | | | |

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

**The material type "Non-container small plastic odds and ends" used in season one has been added to this material type for the remaining seasons.*

***This material type was named "Paper napkins and towels" in season one. The name has been changed for all remaining seasons to more accurately reflect the materials included here.*

Table 17. Allocation of MSW by Management Category Delivered by Commercial Customers in 2015

| | Estimated Percent | Estimated Tons |
|---|---|---|
| **MRF** | **26.7%** | **66,326** |
| Plastic | 2.3% | 5,642 |
| Paper | 21.2% | 52,563 |
| Glass | 2.2% | 5,537 |
| Metal | 1.0% | 2,584 |
| **Compostable - Any Scale** | **22.8%** | **56,630** |
| Paper | 5.5% | 13,699 |
| Other Organics | 17.3% | 42,930 |
| **Compostable - Large Scale** | **2.6%** | **6,496** |
| Other Organics | 2.6% | 6,496 |
| **Drop-Off** | **14.5%** | **36,038** |
| Plastic | 3.1% | 7,704 |
| Paper | 0.7% | 1,765 |
| Metal | 1.7% | 4,206 |
| Textiles | 2.9% | 7,120 |
| Other Organics | 1.6% | 4,042 |
| Construction and Demolition | 2.0% | 5,067 |
| Bulky Waste | 1.9% | 4,780 |
| Special Waste | 0.5% | 1,354 |
| **Trash** | **33.4%** | **82,884** |
| Plastic | 7.7% | 19,103 |
| Paper | 3.2% | 7,834 |
| Glass | 0.2% | 481 |
| Hybrids | 0.2% | 604 |
| Other Organics | 2.1% | 5,256 |
| Construction and Demolition | 7.9% | 19,617 |
| Bulky Waste | 4.5% | 11,167 |
| Special Waste | 0.1% | 367 |
| Other | 7.4% | 18,454 |
| **Grand Total** | **100.0%** | **248,373** |

## Composition of Bulky Waste and Self-Haul Waste

Tables 18 and 19 (on the next page) present the composition of all Bulky Waste delivered to the RIRRC landfill in 2015, and then a sub-set of this waste which is waste delivered to the self-haul area (5,000 tons). Typically, large roll-offs of bulky waste, and bulky wastes delivered in tow behind dump trailers is delivered to the landfill face whereas bulky wastes that requiring hand un-loading are delivered to the small vehicle area.

## Table 18. Composition of Bulky Waste Delivered to the RIRRC Landfill in 2015

| Material | Estimated Percent | Standard Deviation | +/- | Estimated Tons | Material | Estimated Percent | Standard Deviation | +/- | Estimated Tons |
|---|---|---|---|---|---|---|---|---|---|
| **Plastic** | **2.5%** | | | **1,355** | **Construction and Demolition** | **34.9%** | | | **19,213** |
| Large plastic items | 2.0% | 0.4% | 0.6% | 1,074 | Asphalt, brick, and concrete | 1.6% | 1.2% | 1.9% | 854 |
| Recyclable plastic film | 0.0% | 0.0% | 0.1% | 23 | Roofing shingles | 5.0% | 2.7% | 4.5% | 2,770 |
| All other plastic sheet/film | 0.1% | 0.0% | 0.1% | 40 | Drywall/gypsum board | 4.2% | 1.8% | 3.0% | 2,307 |
| Other plastic | 0.4% | 0.1% | 0.2% | 219 | Treated wood | 1.1% | 0.4% | 0.7% | 619 |
| | | | | | Painted and stained lumber | 7.1% | 1.2% | 1.9% | 3,913 |
| **Paper** | **4.6%** | | | **2,540** | Clean wood | 3.2% | 0.9% | 1.5% | 1,739 |
| Brown corrugated cardboard boxes and Kraft paper | 2.2% | 0.6% | 1.0% | 1,194 | Engineered wood | 5.1% | 1.2% | 2.0% | 2,829 |
| Other curbside recyclable paper | 1.6% | 0.9% | 1.4% | 855 | Insulation | 0.1% | 0.0% | 0.0% | 36 |
| Other paper | 0.9% | 0.4% | 0.7% | 491 | Fixtures | 0.3% | 0.2% | 0.4% | 166 |
| | | | | | Other C&D | 7.2% | 1.5% | 2.5% | 3,980 |
| **Glass** | **3.5%** | | | **1,912** | | | | | |
| Curbside recyclable glass | 0.4% | 0.4% | 0.7% | 243 | **Bulky Waste** | **37.4%** | | | **20,579** |
| Other glass | 3.0% | 1.6% | 2.6% | 1,669 | Major appliances - large | 1.0% | 0.3% | 0.5% | 560 |
| | | | | | Major appliances - small | 1.5% | 0.3% | 0.5% | 847 |
| **Metal** | **5.0%** | | | **2,758** | TVs, computers, computer peripheral devices | 2.5% | 0.7% | 1.1% | 1,402 |
| Roofing, sheet metal, ducting, piping | 0.0% | 0.0% | 0.0% | 5 | Small consumer electronic and electrical devices | 0.6% | 0.2% | 0.4% | 357 |
| Engines, automotive parts, tools | 0.4% | 0.2% | 0.3% | 237 | Couches, chairs, pads and cushions | 13.1% | 2.8% | 4.6% | 7,192 |
| Bicycles, toys, and playground equipment | 0.4% | 0.1% | 0.2% | 209 | Wooden furniture | 4.6% | 0.8% | 1.2% | 2,557 |
| All other ferrous scrap metal | 1.5% | 0.6% | 0.9% | 847 | Steel furniture | 2.5% | 0.6% | 1.0% | 1,375 |
| All other non-ferrous scrap metal | 2.7% | 1.7% | 2.8% | 1,459 | All other furniture | 2.0% | 0.4% | 0.6% | 1,124 |
| Other metal | 0.0% | 0.0% | 0.0% | 1 | Tires | 0.8% | 0.5% | 0.8% | 417 |
| | | | | | Carpet and carpet padding | 2.8% | 0.6% | 1.0% | 1,513 |
| **Textiles** | **3.0%** | | | **1,666** | Mattresses and box springs | 1.2% | 0.3% | 0.5% | 641 |
| Apparel | 1.4% | 0.6% | 0.9% | 745 | All other bulky waste | 4.7% | 0.7% | 1.1% | 2,595 |
| Non-apparel textile | 1.7% | 0.8% | 1.3% | 921 | | | | | |
| | | | | | **Bagged MSW** | **2.3%** | **0.4%** | **0.7%** | **1,278** |
| **Other Organics** | **4.7%** | | | **2,558** | | | | | |
| Branches and stumps >2 Inches | 1.6% | 0.9% | 1.5% | 889 | **Other Loose Material** | **2.1%** | **0.9%** | **1.4%** | **1,140** |
| Leaf and yard debris | 2.2% | 0.6% | 1.0% | 1,191 | | | | | |
| Other organics | 0.9% | 0.5% | 0.9% | 479 | **Totals** | **100.0%** | | | **55,000** |
| | | | | | **Sample Count** | **100** | | | |

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

## Table 19. Composition of Waste Delivered to the Small Vehicle Area in 2015

| Material | Estimated Percent | Standard Deviation | +/- | Estimated Tons | Material | Estimated Percent | Standard Deviation | +/- | Estimated Tons |
|---|---|---|---|---|---|---|---|---|---|
| **Plastic** | **1.2%** | | | **58** | **Construction and Demolition** | **57.5%** | | | **2,875** |
| Large plastic items | 1.2% | 0.4% | 0.7% | 58 | Asphalt, brick, and concrete | 0.0% | 0.0% | 0.0% | 0 |
| Recyclable plastic film | 0.0% | 0.0% | 0.0% | 0 | Roofing shingles | 0.0% | 0.0% | 0.0% | 0 |
| All other plastic sheet/film | 0.0% | 0.0% | 0.0% | 0 | Drywall/gypsum board | 0.0% | 0.0% | 0.0% | 0 |
| Other plastic | 0.0% | 0.0% | 0.0% | 0 | Treated wood | 0.3% | 0.3% | 0.5% | 16 |
| | | | | | Painted and stained lumber | 14.7% | 7.7% | 12.6% | 735 |
| **Paper** | **1.6%** | | | **78** | Clean wood | 12.8% | 8.2% | 13.5% | 641 |
| Brown corrugated cardboard boxes and Kraft paper | 1.6% | 0.9% | 1.5% | 78 | Engineered wood | 14.6% | 6.8% | 11.2% | 729 |
| Other curbside recyclable paper | 0.0% | 0.0% | 0.0% | 0 | Insulation | 0.0% | 0.0% | 0.0% | 0 |
| Other paper | 0.0% | 0.0% | 0.0% | 0 | Fixtures | 1.0% | 1.0% | 1.6% | 49 |
| | | | | | Other C&D | 14.1% | 6.1% | 10.1% | 705 |
| **Glass** | **0.0%** | | | **0** | | | | | |
| Curbside recyclable glass | 0.0% | 0.0% | 0.0% | 0 | **Bulky Waste** | **22.6%** | | | **1,131** |
| Other glass | 0.0% | 0.0% | 0.0% | 0 | Major appliances - large | 0.0% | 0.0% | 0.0% | 0 |
| | | | | | Major appliances - small | 0.0% | 0.0% | 0.0% | 0 |
| **Metal** | **0.0%** | | | **0** | TVs, computers, computer peripheral devices | 2.3% | 2.3% | 3.8% | 115 |
| Roofing, sheet metal, ducting, piping | 0.0% | 0.0% | 0.0% | 0 | Small consumer electronic and electrical devices | 0.0% | 0.0% | 0.0% | 0 |
| Engines, automotive parts, tools | 0.0% | 0.0% | 0.0% | 0 | Couches, chairs, pads and cushions | 11.8% | 6.4% | 10.5% | 592 |
| Bicycles, toys, and playground equipment | 0.0% | 0.0% | 0.0% | 0 | Wooden furniture | 2.2% | 1.1% | 1.8% | 110 |
| All other ferrous scrap metal | 0.0% | 0.0% | 0.0% | 0 | Steel furniture | 0.0% | 0.0% | 0.0% | 0 |
| All other non-ferrous scrap metal | 0.0% | 0.0% | 0.0% | 0 | All other furniture | 0.9% | 0.9% | 1.5% | 46 |
| Other metal | 0.0% | 0.0% | 0.0% | 0 | Tires | 0.0% | 0.0% | 0.0% | 0 |
| | | | | | Carpet and carpet padding | 3.7% | 2.1% | 3.4% | 186 |
| **Textiles** | **0.5%** | | | **26** | Mattresses and box springs | 0.7% | 0.7% | 1.1% | 33 |
| Apparel | 0.3% | 0.3% | 0.4% | 13 | All other bulky waste | 1.0% | 0.6% | 1.0% | 49 |
| Non-apparel textile | 0.3% | 0.3% | 0.4% | 13 | | | | | |
| | | | | | **Bagged MSW** | **8.5%** | **2.5%** | **4.0%** | **423** |
| **Other Organics** | **5.6%** | | | **281** | | | | | |
| Branches and stumps >2 Inches | 1.0% | 1.0% | 1.6% | 50 | **Other Loose Material** | **2.6%** | **1.7%** | **2.8%** | **128** |
| Leaf and yard debris | 4.6% | 2.9% | 4.8% | 231 | | | | | |
| Other organics | 0.0% | 0.0% | 0.0% | 0 | **Totals** | **100.0%** | | | **5,000** |
| | | | | | **Sample Count** | **6** | | | |

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

Table 20 then allocates total bulky waste to the five management categories.

**Table 20.** Allocation of Bulky Waste by Management Category

| | |
|---|---|
| **MRF** | **4.31%** |
| Brown corrugated cardboard boxes and Kraft paper | 2.12% |
| Other curbside recyclable paper | 1.42% |
| Curbside recyclable glass | 0.40% |
| Other plastic | 0.36% |
| **Compostable - Any Scale** | **2.38%** |
| Leaf and yard debris | 2.38% |
| **Compostable - Large Scale** | **2.36%** |
| Branches and stumps >2 Inches | 1.56% |
| Other organics | 0.80% |
| **Drop-off** | **26.71%** |
| Large plastic items | 1.88% |
| Recyclable plastic film | 0.04% |
| Roofing, sheet metal, ducting, piping | 0.01% |
| Engines, automotive parts, tools | 0.39% |
| Bicycles, toys, and playground equipment | 0.35% |
| All other ferrous scrap metal | 1.41% |
| All other non-ferrous scrap metal | 2.42% |
| Other metal | 0.00% |
| Apparel | 1.26% |
| Non-apparel textile | 1.55% |
| Asphalt, brick, and concrete | 1.42% |
| Drywall/gypsum board | 3.83% |
| Clean wood | 4.00% |
| Major appliances - large | 0.93% |
| TVs, computers, computer peripheral devices | 2.53% |
| Small consumer electronic and electrical devices | 0.59% |
| Steel furniture | 2.28% |
| Tires | 0.69% |
| Mattresses and box springs | 1.12% |
| **Trash** | **64.25%** |
| Other paper | 0.81% |
| Other glass | 2.77% |
| All other plastic sheet/film | 0.07% |
| Roofing shingles | 4.60% |
| Treated wood | 1.06% |
| Painted and stained lumber | 7.77% |
| Engineered wood | 5.96% |
| Insulation | 0.06% |
| Fixtures | 0.36% |
| Other C&D | 7.83% |
| Major appliances - small | 1.41% |
| Couches, chairs, pads and cushions | 12.97% |
| Wooden furniture | 4.44% |
| All other furniture | 1.95% |
| Carpet and carpet padding | 2.84% |
| All other bulky waste | 4.39% |
| Bagged MSW | 2.86% |
| Other loose material | 2.11% |
| **Grand Total** | **100.00%** |

## General Observations

The following general observations are made from these results on bulky waste.

- As illustrated by Table 21, roughly 27 percent (rounded) of Bulky Wastes could be diverted through drop-off recycling if it were kept separate.
- Another four percent could be diverted to the MRF.
- There is a large incidence of various types of **Furniture**, which, when combined, comprise over 22 percent of this waste stream.
- **C&D Debris** is shown to be a wide mix of renovation and construction debris. It contains relatively small fractions of concrete/brick/block (1.8 percent) and roofing shingles, which are two of the densest items in the C&D waste stream and can dominate by weight if present in large quantities. Large amounts of concrete, as well as shingle waste from re-roofing may be going to lower cost disposal or processing alternatives.
- **Bagged MSW** made up only a small fraction of the Bulky Waste stream at 2.3 percent (although was much higher at the Small Vehicle area). This confirms that MSW is being collected separately and composition of MSW was comprehensively captured via manual sorting in this study.

***Figures 3 and 4:*** *Photos of Bulky Waste Loads Characterized*

## Composition of Targeted Generator Loads

Tables 21 through 26 present the composition data (by percentage only) of the targeted generator categories. These tables do not contain tons because we do not know how many tons are generated by each of these ICI sectors. Each generator sector is discussed briefly, followed by the detailed tabular composition results

- **Large Retailer** waste was found to have significant amounts of Corrugated Cardboard, Plastic Films (primarily shrink wrap), and Food Wastes. Relatively little other recyclable fibers and containers were found in this waste stream.
- The **Small Retail** Generator samples contained a large fraction of electronics. Given that only four samples were obtained for this generator, it is likely that this result obscures the overall waste composition from this sector. However, it may be the case that small retailers have fewer resources to manage electronic waste compared to the other generator categories included in this study (which are usually larger entities), and therefore end up disposing of these items. A significant fraction of Glass Bottles was also noted from this generator category.
- **Grocery** waste was predominantly Food Waste (46.4%), Corrugated Cardboard (19.6%) and Plastic (11.1%), much of which was film plastic. Qualitatively, much of the paper and plastic items found in this waste stream were moderately to heavily food contaminated and the weight of these items is likely inflated as a result of the moisture and food contamination.
- **Office** waste contained significant amounts of recyclable paper and Corrugated Cardboard. Additionally, the Compostable Paper was relatively high, stemming largely from paper towel wastes from restrooms. The incidence of recyclable bottles and cans was lower than expected, given that a fair amount of food wastes were found, and usually bottled and canned beverages are consumed in an office setting. Based on observations of the DSM enumerator, in some cases the office waste sample was taken from a smaller dumpster at the generator site, while a larger roll-off – which may have contained more typical office waste – was not collected because of the truck type collecting the sample (front-loader). However, if this is the case then it shows that a significant amount of Food Waste can be present in some large office settings with kitchens.
- **Restaurant** wastes were found to be predominantly Food Wastes (48.1%), with significant fractions of Compostable papers (11.6%) such as napkins, paper towels, paper plates, etc., and Glass Bottles (3.4%). Not surprisingly, Contaminated Film was high, and it is likely that the weight of other paper and plastic items is somewhat inflated due to moisture and food waste contamination in this waste stream.
- **Hotel** waste contained the highest fraction of recyclable bottles and cans. Hotels also disposed of a significant amount of food wastes and compostable papers. Notably high incidence of Painted/Stained/Treated wood and Carpet/Padding were driven by several samples that obviously contained hotel remodeling. While this might mean that these categories are overstated, it is also common for hotels to remodel rooms

## Table 21. Composition of Large Retailers Waste

| Material | Estimated Percent | Standard Deviation | +/- | Material | Estimated Percent | Standard Deviation | +/- |
|---|---|---|---|---|---|---|---|
| **Plastic** | **23.8%** | | | **Textiles** | **0.1%** | | |
| Plastic #1 PET bottles, under 2 gallons | 1.1% | 0.4% | 0.6% | Apparel | 0.1% | 0.1% | 0.2% |
| Plastic #2 HDPE bottles and jugs, under 2 gallons | 0.1% | 0.1% | 0.1% | Non-apparel | 0.0% | 0.0% | 0.0% |
| Plastic clamshells, under 2 gallons | 0.4% | 0.3% | 0.5% | | | | |
| Plastic blister packaging, under 2 gallons | 0.0% | 0.0% | 0.0% | **Other Organics** | **24.6%** | | |
| Plastic #1-#7 & unmarked non-bev. containers <2 gal. | 0.7% | 0.2% | 0.3% | Branches and stumps >2 inches | 0.0% | 0.0% | 0.0% |
| Plastic containers, larger than 2 gallons | 0.0% | 0.0% | 0.0% | Leaf and yard debris | 0.0% | 0.0% | 0.0% |
| Bulky plastic >2 gallons | 5.2% | 3.7% | 6.0% | Clean dimensional lumber | 4.6% | 2.7% | 4.5% |
| Retail bags and film | 8.5% | 7.6% | 12.5% | Vegetative food waste | 14.1% | 5.2% | 8.6% |
| Contaminated film/bags | 4.4% | 1.5% | 2.4% | Protein food waste | 4.6% | 3.7% | 6.1% |
| Styrofoam | 0.9% | 0.5% | 0.8% | Other organics | 1.2% | 0.7% | 1.2% |
| Remainder/composite plastic* | 2.5% | 0.6% | 0.9% | | | | |
| | | | | **Construction and Demolition** | **5.4%** | | |
| **Paper** | **42.0%** | | | Asphalt, brick, and concrete | 0.1% | 0.1% | 0.1% |
| Brown corrugated cardboard boxes and kraft paper | 29.1% | 8.6% | 14.1% | Roofing shingles | 0.0% | 0.0% | 0.0% |
| Whole pizza boxes | 0.0% | 0.0% | 0.0% | Drywall/gypsum board | 0.0% | 0.0% | 0.0% |
| Uncoated paperboard/chipboard | 2.5% | 1.0% | 1.6% | Treated wood | 4.6% | 2.5% | 4.1% |
| Coated paperboard, refrigerated and frozen food | 0.5% | 0.4% | 0.7% | Fixtures | 0.5% | 0.5% | 0.9% |
| Hot paper coffee cups and bowls | 0.7% | 0.3% | 0.5% | All other C&D | 0.2% | 0.1% | 0.2% |
| Shredded paper | 0.0% | 0.0% | 0.1% | | | | |
| Newsprint | 0.0% | 0.0% | 0.0% | **Bulky Waste** | **0.7%** | | |
| Glossy paper | 0.0% | 0.0% | 0.0% | Major appliances | 0.0% | 0.0% | 0.0% |
| Tissue paper, gift-wrapping | 0.0% | 0.0% | 0.0% | TVs, computers, computer peripheral devices | 0.0% | 0.0% | 0.0% |
| Compostable paper** | 4.4% | 1.6% | 2.7% | Small consumer electronic and electrical devices | 0.7% | 0.7% | 1.1% |
| Cartons, gabletop | 0.1% | 0.1% | 0.1% | Furniture | 0.0% | 0.0% | 0.0% |
| Aseptic juice boxes | 0.0% | 0.0% | 0.0% | Tires | 0.0% | 0.0% | 0.0% |
| Paperback books | 0.0% | 0.0% | 0.0% | Carpet and carpet padding | 0.1% | 0.1% | 0.1% |
| Phone books | 0.0% | 0.0% | 0.0% | Mattresses and box springs | 0.0% | 0.0% | 0.0% |
| Hardcover books | 0.0% | 0.0% | 0.0% | | | | |
| Office/mixed paper | 3.6% | 1.2% | 2.0% | **Special Waste** | **0.4%** | | |
| Remainder/composite paper | 0.8% | 0.5% | 0.8% | Sharps | 0.0% | 0.0% | 0.0% |
| | | | | Medications | 0.1% | 0.1% | 0.1% |
| **Glass** | **0.5%** | | | Propane tanks | 0.0% | 0.0% | 0.0% |
| Glass bottles and jars | 0.5% | 0.3% | 0.5% | Fluorescent bulbs and ballasts | 0.0% | 0.0% | 0.0% |
| Remainder composite glass | 0.0% | 0.0% | 0.1% | Batteries: single-use, alkaline | 0.0% | 0.0% | 0.0% |
| | | | | Batteries: lead acid (vehicles) | 0.0% | 0.0% | 0.0% |
| **Metal** | **0.7%** | | | Batteries: all other rechargeable batteries | 0.0% | 0.0% | 0.0% |
| Aluminum beverage cans | 0.1% | 0.0% | 0.1% | Paints and stains | 0.0% | 0.0% | 0.0% |
| Aluminum foil and pie plates | 0.0% | 0.0% | 0.0% | Empty liquid and gel HHW containers | 0.1% | 0.1% | 0.2% |
| Aluminum non-beverage cans | 0.0% | 0.0% | 0.0% | Other hazardous or household hazardous waste | 0.2% | 0.1% | 0.2% |
| Ferrous cans | 0.2% | 0.1% | 0.2% | | | | |
| Small scrap metal | 0.4% | 0.2% | 0.3% | **Other** | **1.5%** | | |
| Large scrap metal | 0.0% | 0.0% | 0.0% | Miscellaneous | 1.5% | 0.9% | 1.4% |
| | | | | | | | |
| **Hybrids** | **0.2%** | | | **Totals** | **100.0%** | | |
| Foiled wrappers | 0.1% | 0.0% | 0.1% | **Sample Count** | **7** | | |
| Mixed material packaging | 0.1% | 0.1% | 0.2% | | | | |

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

**The material type "Non-container small plastic odds and ends" used in season one has been added to this material type for the remaining seasons.*

***This material type was named "Paper napkins and towels" in season one. The name has been changed for all remaining seasons to more accurately reflect the materials included here.*

## Table 22. Composition of Small Retail Generators

| Material | Estimated Percent | Standard Deviation | +/- | Material | Estimated Percent | Standard Deviation | +/- |
|---|---|---|---|---|---|---|---|
| **Plastic** | **14.4%** | | | **Textiles** | **1.7%** | | |
| Plastic #1 PET bottles, under 2 gallons | 0.4% | 0.1% | 0.1% | Apparel | 1.7% | 1.4% | 2.3% |
| Plastic #2 HDPE bottles and jugs, under 2 gallons | 0.2% | 0.1% | 0.1% | Non-apparel | 0.1% | 0.1% | 0.1% |
| Plastic clamshells, under 2 gallons | 0.1% | 0.1% | 0.1% | | | | |
| Plastic blister packaging, under 2 gallons | 0.0% | 0.0% | 0.0% | **Other Organics** | **10.0%** | | |
| Plastic #1-#7 & unmarked non-bev. containers <2 gal. | 0.9% | 0.1% | 0.2% | Branches and stumps >2 inches | 0.0% | 0.0% | 0.0% |
| Plastic containers, larger than 2 gallons | 0.8% | 0.8% | 1.3% | Leaf and yard debris | 1.7% | 1.7% | 2.8% |
| Bulky plastic >2 gallons | 6.0% | 5.9% | 9.8% | Clean dimensional lumber | 0.5% | 0.4% | 0.6% |
| Retail bags and film | 2.6% | 0.9% | 1.4% | Vegetative food waste | 5.8% | 1.9% | 3.2% |
| Contaminated film/bags | 1.3% | 0.1% | 0.1% | Protein food waste | 1.8% | 1.2% | 2.0% |
| Styrofoam | 1.6% | 1.4% | 2.4% | Other organics | 0.1% | 0.1% | 0.1% |
| Remainder/composite plastic* | 0.6% | 0.4% | 0.7% | | | | |
| | | | | **Construction and Demolition** | **0.9%** | | |
| **Paper** | **13.3%** | | | Asphalt, brick, and concrete | 0.0% | 0.0% | 0.0% |
| Brown corrugated cardboard boxes and kraft paper | 8.2% | 6.1% | 10.0% | Roofing shingles | 0.0% | 0.0% | 0.0% |
| Whole pizza boxes | 0.0% | 0.0% | 0.0% | Drywall/gypsum board | 0.2% | 0.2% | 0.3% |
| Uncoated paperboard/chipboard | 0.1% | 0.1% | 0.1% | Treated wood | 0.0% | 0.0% | 0.0% |
| Coated paperboard, refrigerated and frozen food | 0.5% | 0.4% | 0.7% | Fixtures | 0.0% | 0.0% | 0.0% |
| Hot paper coffee cups and bowls | 0.1% | 0.0% | 0.1% | All other C&D | 0.7% | 0.7% | 1.1% |
| Shredded paper | 0.0% | 0.0% | 0.0% | | | | |
| Newsprint | 0.5% | 0.1% | 0.2% | **Bulky Waste** | **27.9%** | | |
| Glossy paper | 0.1% | 0.1% | 0.1% | Major appliances | 0.0% | 0.0% | 0.0% |
| Tissue paper, gift-wrapping | 0.0% | 0.0% | 0.0% | TVs, computers, computer peripheral devices | 15.8% | 15.7% | 25.9% |
| Compostable paper** | 3.1% | 0.8% | 1.4% | Small consumer electronic and electrical devices | 0.6% | 0.6% | 1.0% |
| Cartons, gabletop | 0.0% | 0.0% | 0.0% | Furniture | 7.0% | 7.0% | 11.5% |
| Aseptic juice boxes | 0.0% | 0.0% | 0.0% | Tires | 0.0% | 0.0% | 0.0% |
| Paperback books | 0.1% | 0.1% | 0.1% | Carpet and carpet padding | 4.4% | 4.4% | 7.2% |
| Phone books | 0.0% | 0.0% | 0.0% | Mattresses and box springs | 0.0% | 0.0% | 0.0% |
| Hardcover books | 0.0% | 0.0% | 0.0% | | | | |
| Office/mixed paper | 0.5% | 0.1% | 0.2% | **Special Waste** | **0.0%** | | |
| Remainder/composite paper | 0.1% | 0.0% | 0.1% | Sharps | 0.0% | 0.0% | 0.0% |
| | | | | Medications | 0.0% | 0.0% | 0.0% |
| **Glass** | **11.9%** | | | Propane tanks | 0.0% | 0.0% | 0.0% |
| Glass bottles and jars | 7.4% | 4.2% | 6.9% | Fluorescent bulbs and ballasts | 0.0% | 0.0% | 0.0% |
| Remainder composite glass | 4.5% | 4.3% | 7.0% | Batteries: single-use, alkaline | 0.0% | 0.0% | 0.0% |
| | | | | Batteries: lead acid (vehicles) | 0.0% | 0.0% | 0.0% |
| **Metal** | **15.8%** | | | Batteries: all other rechargeable batteries | 0.0% | 0.0% | 0.0% |
| Aluminum beverage cans | 0.2% | 0.1% | 0.1% | Paints and stains | 0.0% | 0.0% | 0.0% |
| Aluminum foil and pie plates | 0.1% | 0.0% | 0.0% | Empty liquid and gel HHW containers | 0.0% | 0.0% | 0.0% |
| Aluminum non-beverage cans | 0.0% | 0.0% | 0.0% | Other hazardous or household hazardous waste | 0.0% | 0.0% | 0.0% |
| Ferrous cans | 0.3% | 0.1% | 0.2% | | | | |
| Small scrap metal | 6.8% | 6.4% | 10.6% | **Other** | **4.1%** | | |
| Large scrap metal | 8.4% | 4.9% | 8.1% | Miscellaneous | 4.1% | 3.5% | 5.7% |
| | | | | | | | |
| **Hybrids** | **0.1%** | | | **Totals** | **100.0%** | | |
| Foiled wrappers | 0.1% | 0.0% | 0.1% | **Sample Count** | **4** | | |
| Mixed material packaging | 0.0% | 0.0% | 0.1% | | | | |

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

**The material type "Non-container small plastic odds and ends" used in season one has been added to this material type for the remaining seasons.*

***This material type was named "Paper napkins and towels" in season one. The name has been changed for all remaining seasons to more accurately reflect the materials included here.*

## Table 23. Composition of Grocery Generators

| Material | Estimated Percent | Standard Deviation | +/- | Material | Estimated Percent | Standard Deviation | +/- |
|---|---|---|---|---|---|---|---|
| **Plastic** | **11.1%** | | | **Textiles** | **0.8%** | | |
| Plastic #1 PET bottles, under 2 gallons | 0.5% | 0.1% | 0.2% | Apparel | 0.6% | 0.4% | 0.6% |
| Plastic #2 HDPE bottles and jugs, under 2 gallons | 0.1% | 0.1% | 0.1% | Non-apparel | 0.2% | 0.2% | 0.3% |
| Plastic clamshells, under 2 gallons | 0.2% | 0.1% | 0.1% | | | | |
| Plastic blister packaging, under 2 gallons | 0.0% | 0.0% | 0.0% | **Other Organics** | **47.9%** | | |
| Plastic #1-#7 & unmarked non-bev. containers <2 gal. | 1.1% | 0.2% | 0.3% | Branches and stumps >2 inches | 0.0% | 0.0% | 0.0% |
| Plastic containers, larger than 2 gallons | 0.3% | 0.3% | 0.5% | Leaf and yard debris | 0.4% | 0.3% | 0.6% |
| Bulky plastic >2 gallons | 0.5% | 0.2% | 0.4% | Clean dimensional lumber | 0.2% | 0.2% | 0.3% |
| Retail bags and film | 2.6% | 1.3% | 2.2% | Vegetative food waste | 41.4% | 5.6% | 9.3% |
| Contaminated film/bags | 4.8% | 1.1% | 1.8% | Protein food waste | 5.0% | 2.0% | 3.3% |
| Styrofoam | 0.5% | 0.2% | 0.3% | Other organics | 0.9% | 0.4% | 0.7% |
| Remainder/composite plastic* | 0.5% | 0.2% | 0.3% | | | | |
| | | | | **Construction and Demolition** | **3.9%** | | |
| **Paper** | **32.8%** | | | Asphalt, brick, and concrete | 0.0% | 0.0% | 0.0% |
| Brown corrugated cardboard boxes and kraft paper | 19.6% | 4.2% | 6.9% | Roofing shingles | 0.0% | 0.0% | 0.0% |
| Whole pizza boxes | 0.0% | 0.0% | 0.0% | Drywall/gypsum board | 0.0% | 0.0% | 0.0% |
| Uncoated paperboard/chipboard | 0.9% | 0.2% | 0.3% | Treated wood | 3.9% | 2.2% | 3.6% |
| Coated paperboard, refrigerated and frozen food | 0.1% | 0.1% | 0.1% | Fixtures | 0.0% | 0.0% | 0.0% |
| Hot paper coffee cups and bowls | 0.1% | 0.0% | 0.0% | All other C&D | 0.0% | 0.0% | 0.0% |
| Shredded paper | 0.0% | 0.0% | 0.0% | | | | |
| Newsprint | 1.3% | 0.6% | 1.0% | **Bulky Waste** | **0.0%** | | |
| Glossy paper | 0.1% | 0.1% | 0.1% | Major appliances | 0.0% | 0.0% | 0.0% |
| Tissue paper, gift-wrapping | 0.1% | 0.1% | 0.1% | TVs, computers, computer peripheral devices | 0.0% | 0.0% | 0.0% |
| Compostable paper** | 8.2% | 1.9% | 3.0% | Small consumer electronic and electrical devices | 0.0% | 0.0% | 0.0% |
| Cartons, gabletop | 0.1% | 0.1% | 0.1% | Furniture | 0.0% | 0.0% | 0.0% |
| Aseptic juice boxes | 0.0% | 0.0% | 0.0% | Tires | 0.0% | 0.0% | 0.0% |
| Paperback books | 0.1% | 0.1% | 0.1% | Carpet and carpet padding | 0.0% | 0.0% | 0.0% |
| Phone books | 0.0% | 0.0% | 0.0% | Mattresses and box springs | 0.0% | 0.0% | 0.0% |
| Hardcover books | 0.0% | 0.0% | 0.0% | | | | |
| Office/mixed paper | 1.3% | 0.4% | 0.6% | **Special Waste** | **0.2%** | | |
| Remainder/composite paper | 1.0% | 0.4% | 0.6% | Sharps | 0.0% | 0.0% | 0.0% |
| | | | | Medications | 0.2% | 0.2% | 0.3% |
| **Glass** | **0.5%** | | | Propane tanks | 0.0% | 0.0% | 0.0% |
| Glass bottles and jars | 0.5% | 0.2% | 0.3% | Fluorescent bulbs and ballasts | 0.0% | 0.0% | 0.0% |
| Remainder composite glass | 0.0% | 0.0% | 0.1% | Batteries: single-use, alkaline | 0.0% | 0.0% | 0.0% |
| | | | | Batteries: lead acid (vehicles) | 0.0% | 0.0% | 0.0% |
| **Metal** | **0.8%** | | | Batteries: all other rechargeable batteries | 0.0% | 0.0% | 0.0% |
| Aluminum beverage cans | 0.1% | 0.0% | 0.0% | Paints and stains | 0.0% | 0.0% | 0.0% |
| Aluminum foil and pie plates | 0.2% | 0.1% | 0.1% | Empty liquid and gel HHW containers | 0.0% | 0.0% | 0.0% |
| Aluminum non-beverage cans | 0.0% | 0.0% | 0.0% | Other hazardous or household hazardous waste | 0.0% | 0.0% | 0.0% |
| Ferrous cans | 0.4% | 0.1% | 0.2% | | | | |
| Small scrap metal | 0.1% | 0.1% | 0.2% | **Other** | **1.9%** | | |
| Large scrap metal | 0.0% | 0.0% | 0.0% | Miscellaneous | 1.9% | 0.6% | 0.9% |
| | | | | | | | |
| **Hybrids** | **0.2%** | | | **Totals** | **100.0%** | | |
| Foiled wrappers | 0.1% | 0.0% | 0.1% | **Sample Count** | **12** | | |
| Mixed material packaging | 0.1% | 0.1% | 0.1% | | | | |

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

**The material type "Non-container small plastic odds and ends" used in season one has been added to this material type for the remaining seasons.*

***This material type was named "Paper napkins and towels" in season one. The name has been changed for all remaining seasons to more accurately reflect the materials included here.*

## Table 24. Composition of Office Generators

| Material | Estimated Percent | Standard Deviation | +/- | Material | Estimated Percent | Standard Deviation | +/- |
|---|---|---|---|---|---|---|---|
| **Plastic** | **7.4%** | | | **Textiles** | **0.5%** | | |
| Plastic #1 PET bottles, under 2 gallons | 0.9% | 0.2% | 0.2% | Apparel | 0.2% | 0.1% | 0.2% |
| Plastic #2 HDPE bottles and jugs, under 2 gallons | 0.1% | 0.0% | 0.1% | Non-apparel | 0.3% | 0.2% | 0.3% |
| Plastic clamshells, under 2 gallons | 0.1% | 0.1% | 0.1% | | | | |
| Plastic blister packaging, under 2 gallons | 0.0% | 0.0% | 0.0% | **Other Organics** | **43.5%** | | |
| Plastic #1-#7 & unmarked non-bev. containers <2 gal. | 1.4% | 0.4% | 0.6% | Branches and stumps >2 inches | 0.0% | 0.0% | 0.0% |
| Plastic containers, larger than 2 gallons | 0.0% | 0.0% | 0.0% | Leaf and yard debris | 9.2% | 7.8% | 12.8% |
| Bulky plastic >2 gallons | 0.0% | 0.0% | 0.1% | Clean dimensional lumber | 0.0% | 0.0% | 0.0% |
| Retail bags and film | 0.2% | 0.2% | 0.3% | Vegetative food waste | 26.0% | 9.2% | 15.1% |
| Contaminated film/bags | 3.7% | 0.8% | 1.4% | Protein food waste | 2.0% | 0.9% | 1.5% |
| Styrofoam | 0.4% | 0.2% | 0.3% | Other organics | 6.3% | 4.5% | 7.5% |
| Remainder/composite plastic* | 0.7% | 0.2% | 0.3% | | | | |
| | | | | **Construction and Demolition** | **8.1%** | | |
| **Paper** | **34.4%** | | | Asphalt, brick, and concrete | 1.3% | 0.9% | 1.5% |
| Brown corrugated cardboard boxes and kraft paper | 7.2% | 3.5% | 5.7% | Roofing shingles | 0.0% | 0.0% | 0.0% |
| Whole pizza boxes | 0.0% | 0.0% | 0.0% | Drywall/gypsum board | 4.7% | 4.6% | 7.5% |
| Uncoated paperboard/chipboard | 0.8% | 0.3% | 0.5% | Treated wood | 0.1% | 0.1% | 0.1% |
| Coated paperboard, refrigerated and frozen food | 0.1% | 0.1% | 0.1% | Fixtures | 0.0% | 0.0% | 0.0% |
| Hot paper coffee cups and bowls | 0.3% | 0.1% | 0.1% | All other C&D | 2.0% | 1.4% | 2.2% |
| Shredded paper | 0.6% | 0.5% | 0.8% | | | | |
| Newsprint | 1.4% | 0.6% | 1.0% | **Bulky Waste** | **0.5%** | | |
| Glossy paper | 0.6% | 0.3% | 0.4% | Major appliances | 0.0% | 0.0% | 0.0% |
| Tissue paper, gift-wrapping | 0.0% | 0.0% | 0.0% | TVs, computers, computer peripheral devices | 0.0% | 0.0% | 0.0% |
| Compostable paper** | 10.4% | 2.3% | 3.7% | Small consumer electronic and electrical devices | 0.3% | 0.2% | 0.3% |
| Cartons, gabletop | 0.1% | 0.0% | 0.0% | Furniture | 0.0% | 0.0% | 0.0% |
| Aseptic juice boxes | 0.0% | 0.0% | 0.0% | Tires | 0.0% | 0.0% | 0.0% |
| Paperback books | 0.0% | 0.0% | 0.0% | Carpet and carpet padding | 0.3% | 0.3% | 0.5% |
| Phone books | 0.0% | 0.0% | 0.0% | Mattresses and box springs | 0.0% | 0.0% | 0.0% |
| Hardcover books | 0.0% | 0.0% | 0.0% | | | | |
| Office/mixed paper | 4.8% | 1.5% | 2.5% | **Special Waste** | **1.3%** | | |
| Remainder/composite paper | 7.9% | 7.3% | 12.0% | Sharps | 0.0% | 0.0% | 0.0% |
| | | | | Medications | 0.0% | 0.0% | 0.0% |
| **Glass** | **0.9%** | | | Propane tanks | 0.0% | 0.0% | 0.0% |
| Glass bottles and jars | 0.1% | 0.1% | 0.1% | Fluorescent bulbs and ballasts | 0.0% | 0.0% | 0.0% |
| Remainder composite glass | 0.8% | 0.5% | 0.8% | Batteries: single-use, alkaline | 0.0% | 0.0% | 0.0% |
| | | | | Batteries: lead acid (vehicles) | 0.0% | 0.0% | 0.0% |
| **Metal** | **1.7%** | | | Batteries: all other rechargeable batteries | 0.0% | 0.0% | 0.0% |
| Aluminum beverage cans | 0.2% | 0.1% | 0.1% | Paints and stains | 1.1% | 0.5% | 0.9% |
| Aluminum foil and pie plates | 0.2% | 0.0% | 0.1% | Empty liquid and gel HHW containers | 0.2% | 0.2% | 0.4% |
| Aluminum non-beverage cans | 0.0% | 0.0% | 0.0% | Other hazardous or household hazardous waste | 0.0% | 0.0% | 0.0% |
| Ferrous cans | 0.1% | 0.1% | 0.1% | | | | |
| Small scrap metal | 0.6% | 0.4% | 0.7% | **Other** | **1.4%** | | |
| Large scrap metal | 0.6% | 0.5% | 0.8% | Miscellaneous | 1.4% | 1.0% | 1.6% |
| | | | | | | | |
| **Hybrids** | **0.2%** | | | **Totals** | **100.0%** | | |
| Foiled wrappers | 0.1% | 0.0% | 0.1% | **Sample Count** | **8** | | |
| Mixed material packaging | 0.1% | 0.0% | 0.1% | | | | |

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

**The material type "Non-container small plastic odds and ends" used in season one has been added to this material type for the remaining seasons.*

***This material type was named "Paper napkins and towels" in season one. The name has been changed for all remaining seasons to more accurately reflect the materials included here.*

## Table 25. Composition of Restaurant Waste

| Material | Estimated Percent | Standard Deviation | +/- | Material | Estimated Percent | Standard Deviation | +/- |
|---|---|---|---|---|---|---|---|
| **Plastic** | **13.9%** | | | **Textiles** | **0.3%** | | |
| Plastic #1 PET bottles, under 2 gallons | 0.5% | 0.1% | 0.2% | Apparel | 0.0% | 0.0% | 0.0% |
| Plastic #2 HDPE bottles and jugs, under 2 gallons | 0.6% | 0.2% | 0.3% | Non-apparel | 0.3% | 0.1% | 0.2% |
| Plastic clamshells, under 2 gallons | 0.0% | 0.0% | 0.0% | | | | |
| Plastic blister packaging, under 2 gallons | 0.0% | 0.0% | 0.0% | **Other Organics** | **53.0%** | | |
| Plastic #1-#7 & unmarked non-bev. containers <2 gal. | 1.9% | 0.3% | 0.5% | Branches and stumps >2 inches | 0.0% | 0.0% | 0.0% |
| Plastic containers, larger than 2 gallons | 0.8% | 0.7% | 1.1% | Leaf and yard debris | 4.4% | 3.2% | 5.3% |
| Bulky plastic >2 gallons | 1.1% | 1.1% | 1.7% | Clean dimensional lumber | 0.0% | 0.0% | 0.0% |
| Retail bags and film | 1.5% | 0.8% | 1.3% | Vegetative food waste | 41.3% | 3.2% | 5.3% |
| Contaminated film/bags | 6.7% | 1.2% | 1.9% | Protein food waste | 6.8% | 2.4% | 3.9% |
| Styrofoam | 0.2% | 0.0% | 0.1% | Other organics | 0.5% | 0.4% | 0.7% |
| Remainder/composite plastic* | 0.6% | 0.2% | 0.3% | | | | |
| | | | | **Construction and Demolition** | **1.3%** | | |
| **Paper** | **24.2%** | | | Asphalt, brick, and concrete | 0.6% | 0.6% | 1.1% |
| Brown corrugated cardboard boxes and kraft paper | 9.7% | 1.9% | 3.0% | Roofing shingles | 0.0% | 0.0% | 0.0% |
| Whole pizza boxes | 0.0% | 0.0% | 0.0% | Drywall/gypsum board | 0.0% | 0.0% | 0.0% |
| Uncoated paperboard/chipboard | 1.3% | 0.2% | 0.3% | Treated wood | 0.2% | 0.2% | 0.3% |
| Coated paperboard, refrigerated and frozen food | 0.0% | 0.0% | 0.0% | Fixtures | 0.0% | 0.0% | 0.0% |
| Hot paper coffee cups and bowls | 0.5% | 0.2% | 0.3% | All other C&D | 0.5% | 0.5% | 0.8% |
| Shredded paper | 0.0% | 0.0% | 0.0% | | | | |
| Newsprint | 0.4% | 0.3% | 0.5% | **Bulky Waste** | **0.0%** | | |
| Glossy paper | 0.0% | 0.0% | 0.1% | Major appliances | 0.0% | 0.0% | 0.0% |
| Tissue paper, gift-wrapping | 0.0% | 0.0% | 0.0% | TVs, computers, computer peripheral devices | 0.0% | 0.0% | 0.0% |
| Compostable paper** | 11.6% | 2.4% | 4.0% | Small consumer electronic and electrical devices | 0.0% | 0.0% | 0.0% |
| Cartons, gabletop | 0.3% | 0.2% | 0.3% | Furniture | 0.0% | 0.0% | 0.0% |
| Aseptic juice boxes | 0.0% | 0.0% | 0.0% | Tires | 0.0% | 0.0% | 0.0% |
| Paperback books | 0.0% | 0.0% | 0.0% | Carpet and carpet padding | 0.0% | 0.0% | 0.0% |
| Phone books | 0.0% | 0.0% | 0.0% | Mattresses and box springs | 0.0% | 0.0% | 0.0% |
| Hardcover books | 0.0% | 0.0% | 0.0% | | | | |
| Office/mixed paper | 0.3% | 0.2% | 0.3% | **Special Waste** | **0.0%** | | |
| Remainder/composite paper | 0.0% | 0.0% | 0.0% | Sharps | 0.0% | 0.0% | 0.0% |
| | | | | Medications | 0.0% | 0.0% | 0.0% |
| **Glass** | **3.5%** | | | Propane tanks | 0.0% | 0.0% | 0.0% |
| Glass bottles and jars | 3.4% | 1.1% | 1.8% | Fluorescent bulbs and ballasts | 0.0% | 0.0% | 0.0% |
| Remainder composite glass | 0.2% | 0.1% | 0.2% | Batteries: single-use, alkaline | 0.0% | 0.0% | 0.0% |
| | | | | Batteries: lead acid (vehicles) | 0.0% | 0.0% | 0.0% |
| **Metal** | **1.5%** | | | Batteries: all other rechargeable batteries | 0.0% | 0.0% | 0.0% |
| Aluminum beverage cans | 0.1% | 0.1% | 0.1% | Paints and stains | 0.0% | 0.0% | 0.0% |
| Aluminum foil and pie plates | 0.2% | 0.1% | 0.1% | Empty liquid and gel HHW containers | 0.0% | 0.0% | 0.0% |
| Aluminum non-beverage cans | 0.1% | 0.1% | 0.1% | Other hazardous or household hazardous waste | 0.0% | 0.0% | 0.0% |
| Ferrous cans | 0.9% | 0.4% | 0.6% | | | | |
| Small scrap metal | 0.1% | 0.1% | 0.1% | **Other** | **2.2%** | | |
| Large scrap metal | 0.0% | 0.0% | 0.0% | Miscellaneous | 2.2% | 1.0% | 1.6% |
| | | | | | | | |
| **Hybrids** | **0.1%** | | | **Totals** | **100.0%** | | |
| Foiled wrappers | 0.1% | 0.1% | 0.1% | **Sample Count** | **8** | | |
| Mixed material packaging | 0.0% | 0.0% | 0.0% | | | | |

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

**The material type "Non-container small plastic odds and ends" used in season one has been added to this material type for the remaining seasons.*

***This material type was named "Paper napkins and towels" in season one. The name has been changed for all remaining seasons to more accurately reflect the materials included here.*

## Table 26. Composition of Hotel Waste

| Material | Estimated Percent | Standard Deviation | +/- | Material | Estimated Percent | Standard Deviation | +/- |
|---|---|---|---|---|---|---|---|
| **Plastic** | **13.5%** | | | **Textiles** | **3.5%** | | |
| Plastic #1 PET bottles, under 2 gallons | 2.5% | 0.5% | 0.8% | Apparel | 0.4% | 0.2% | 0.3% |
| Plastic #2 HDPE bottles and jugs, under 2 gallons | 0.6% | 0.2% | 0.3% | Non-apparel | 3.1% | 1.7% | 2.8% |
| Plastic clamshells, under 2 gallons | 0.1% | 0.0% | 0.1% | | | | |
| Plastic blister packaging, under 2 gallons | 0.0% | 0.0% | 0.0% | **Other Organics** | **30.3%** | | |
| Plastic #1-#7 & unmarked non-bev. containers <2 gal. | 1.2% | 0.2% | 0.4% | Branches and stumps >2 inches | 0.0% | 0.0% | 0.0% |
| Plastic containers, larger than 2 gallons | 0.1% | 0.1% | 0.1% | Leaf and yard debris | 1.1% | 0.8% | 1.4% |
| Bulky plastic >2 gallons | 2.0% | 1.2% | 1.9% | Clean dimensional lumber | 0.0% | 0.0% | 0.0% |
| Retail bags and film | 2.2% | 0.9% | 1.4% | Vegetative food waste | 22.7% | 5.2% | 8.6% |
| Contaminated film/bags | 2.8% | 1.0% | 1.7% | Protein food waste | 5.5% | 3.8% | 6.3% |
| Styrofoam | 0.7% | 0.5% | 0.9% | Other organics | 1.0% | 0.5% | 0.8% |
| Remainder/composite plastic* | 1.2% | 0.3% | 0.5% | | | | |
| | | | | **Construction and Demolition** | **17.0%** | | |
| **Paper** | **21.1%** | | | Asphalt, brick, and concrete | 0.0% | 0.0% | 0.0% |
| Brown corrugated cardboard boxes and kraft paper | 5.6% | 2.9% | 4.7% | Roofing shingles | 0.0% | 0.0% | 0.0% |
| Whole pizza boxes | 0.1% | 0.0% | 0.1% | Drywall/gypsum board | 0.0% | 0.0% | 0.0% |
| Uncoated paperboard/chipboard | 1.1% | 0.2% | 0.4% | Treated wood | 15.2% | 7.5% | 12.4% |
| Coated paperboard, refrigerated and frozen food | 0.5% | 0.2% | 0.4% | Fixtures | 1.5% | 1.5% | 2.4% |
| Hot paper coffee cups and bowls | 1.3% | 0.3% | 0.5% | All other C&D | 0.3% | 0.3% | 0.4% |
| Shredded paper | 1.0% | 0.8% | 1.4% | | | | |
| Newsprint | 1.9% | 0.7% | 1.2% | **Bulky Waste** | **5.6%** | | |
| Glossy paper | 0.3% | 0.2% | 0.3% | Major appliances | 0.0% | 0.0% | 0.0% |
| Tissue paper, gift-wrapping | 0.1% | 0.1% | 0.2% | TVs, computers, computer peripheral devices | 0.0% | 0.0% | 0.0% |
| Compostable paper** | 7.6% | 2.5% | 4.1% | Small consumer electronic and electrical devices | 0.0% | 0.0% | 0.0% |
| Cartons, gabletop | 0.2% | 0.1% | 0.1% | Furniture | 0.0% | 0.0% | 0.0% |
| Aseptic juice boxes | 0.1% | 0.0% | 0.1% | Tires | 0.0% | 0.0% | 0.0% |
| Paperback books | 0.1% | 0.1% | 0.2% | Carpet and carpet padding | 5.6% | 3.7% | 6.2% |
| Phone books | 0.0% | 0.0% | 0.0% | Mattresses and box springs | 0.0% | 0.0% | 0.0% |
| Hardcover books | 0.0% | 0.0% | 0.0% | | | | |
| Office/mixed paper | 1.0% | 0.3% | 0.5% | **Special Waste** | **0.4%** | | |
| Remainder/composite paper | 0.2% | 0.1% | 0.2% | Sharps | 0.0% | 0.0% | 0.0% |
| | | | | Medications | 0.0% | 0.0% | 0.0% |
| **Glass** | **4.5%** | | | Propane tanks | 0.0% | 0.0% | 0.0% |
| Glass bottles and jars | 4.5% | 0.9% | 1.4% | Fluorescent bulbs and ballasts | 0.0% | 0.0% | 0.0% |
| Remainder composite glass | 0.0% | 0.0% | 0.0% | Batteries: single-use, alkaline | 0.0% | 0.0% | 0.0% |
| | | | | Batteries: lead acid (vehicles) | 0.0% | 0.0% | 0.0% |
| **Metal** | **2.4%** | | | Batteries: all other rechargeable batteries | 0.0% | 0.0% | 0.0% |
| Aluminum beverage cans | 0.3% | 0.1% | 0.1% | Paints and stains | 0.0% | 0.0% | 0.0% |
| Aluminum foil and pie plates | 0.1% | 0.0% | 0.1% | Empty liquid and gel HHW containers | 0.1% | 0.1% | 0.1% |
| Aluminum non-beverage cans | 0.2% | 0.1% | 0.1% | Other hazardous or household hazardous waste | 0.3% | 0.2% | 0.3% |
| Ferrous cans | 0.2% | 0.1% | 0.2% | | | | |
| Small scrap metal | 1.0% | 0.6% | 1.0% | **Other** | **1.6%** | | |
| Large scrap metal | 0.7% | 0.5% | 0.7% | Miscellaneous | 1.6% | 0.7% | 1.1% |
| | | | | | | | |
| **Hybrids** | **0.2%** | | | **Totals** | **100.0%** | | |
| Foiled wrappers | 0.2% | 0.0% | 0.1% | **Sample Count** | **7** | | |
| Mixed material packaging | 0.1% | 0.0% | 0.1% | | | | |

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

**The material type "Non-container small plastic odds and ends" used in season one has been added to this material type for the remaining seasons.*

***This material type was named "Paper napkins and towels" in season one. The name has been changed for all remaining seasons to more accurately reflect the materials included here.*

# APPENDIX A

## DEFINITIONS OF MATERIAL CATEGORIES

# APPENDIX A – Definitions of Material Categories

RIRRC Materials Sort List: All attempts should be made, within reason, to empty contents from containers and sort/weigh separately.

| Material Group | Material Category and Definition with Examples |
|---|---|
| Plastic | 1. Plastic #1 PET bottles, under 2 gallons: Plastic containers with significantly skinnier necks as compared to their wider bases that are usually transparent or tinted green; when marked bear a "1" inside a recycling symbol or "PET" or "PETE". INCLUDES: any plastic tops from these containers (i.e. caps, spray triggers, and pumps). Examples: Water bottles, soda bottles, clear hand soap bottles, clear spray bottles for cleaners. |
| Plastic | 2. Plastic #2 HDPE bottles and jugs, under 2 gallons: Plastic containers with significantly skinnier necks as compared to their wider bases, that are typically milky white in color, or solid white or a solid color; when marked bear a "2" inside a recycling symbol or "HDPE". INCLUDES: any plastic tops from these containers (i.e. caps, spray triggers, and pumps). DOES NOT INCLUDE: bottles once containing (1) automotive fluids, (2) pipe/drain cleaner, or (3) pesticides Examples: Gallon milk jugs, laundry jugs, shampoo bottles, solid white or colored hand soap or spray cleaners. |
| Plastic | 3. Plastic clamshells, under 2 gallons: Hinged plastic containers designed to hold food; may be clear or have a color tint. DOES NOT INCLUDE: Expanded Polystyrene ("Styrofoam"). Examples: Salad bar take-out containers. |
| Plastic | 4. Plastic blister packaging, under 2 gallons: Clear plastic packaging for consumer products, often molded into the shape of the product it protects, and often having paperboard backing or a cardboard insert. NOTE: Detach any paperboard backing and sort accordingly. Examples: Packaging for a refillable razor, packaging for a set of earbuds/headphones. |
| Plastic | 5. Plastic #1 -#7 and unmarked non-beverage bottles, jars, tubs, trays and cups <2 gallons: Plastic bottles, trays, tubs and lids marked bearing a "#1 - #7 or unmarked inside a recycling symbol or "PET, PVC, LDEP, PP, PS, or Other". INCLUDES: tops i.e. caps and lids. Does not include bottles with #1 PET or #2 HDEP; fast food cup lids; or containers once containing (1) automotive fluids, (2) pipe/drain cleaner, or (3) pesticides. Examples: Peanut butter jars, margarine tubs, iced coffee cups, salad dressing bottles, cookie trays, |
| Plastic | 6. Plastic containers, larger than 2 gallons: Any plastic container (i.e. designed to hold another product) that is larger than 2 gallons in size Examples: 5-gallon bucket, kitty litter bucket, storage containers, recycling bins |
| Plastic | 7. Non-container small plastic odds and ends: Any non-container plastic item, that would completely fit inside a 2-gallon bucket Examples: Pens, straws, small toys, disposable tape dispensers, any plastic knick-knacks |

| | |
|---|---|
| Plastic | 8. Bulky Plastic >2 Gallons: Any non-container plastic item, that would not completely fit inside a 2-gallon bucket Examples: Children's playhouses, plastic pallets and shelving |
| Plastic | 9. Retail Bags and Film: Plastic bags and film that are transparent or translucent (clear or tinted but still somewhat see-through), and can stretch, at least a little. DOES NOT INCLUDE: clingy food wrap. Examples: Shopping bags from grocery stores and pharmacies, dry cleaner bags, newspaper sleeves, cereal box liners, bubble wrap, shrink wrap, overwrap (from paper towels or toilet paper). |
| Plastic | 10. Contaminated Film/Bags: Plastic bags and film that are opaque (not see through) AND/OR don't stretch at all. INCLUDES: clingy food wrap. DOES NOT INCLUDE: wrappers for snack food like candy or chips Examples: Dark colored shopping bags, bags for potting soil and other agricultural needs, wrap from produce or meat trays. |
| Plastic | 11. Styrofoam: Semi-rigid foam. DOES NOT INCLUDE: Spongy polyethylene. Examples: Hot coffee cups, packing peanuts, shipping blocks |
| Plastic | 12. Remainder/Composite Plastic: Any plastic that does not fit into any other category. Examples: New linoleum, fiberglass, LDPE tubing, PVC tubing. |
| Paper | 13. Brown corrugated cardboard boxes and Kraft paper: Layered cardboard, usually with a center "wavy" layer, and unbleached brown paper, neither having wax coating inside or out; includes detached covers from pizza boxes. DOES NOT INCLUDE: Intact Pizza boxes. Examples: Shipping boxes, pieces of shipping boxes, brown paper grocery bags or lunch bags, pizza box tops. |
| Paper | 14. Whole Pizza Boxes: Whole pizza box, bottom and cover still connected. DOES NOT INCLUDE: paperboard boxes for frozen pizza Examples: Intact pizza boxes only |
| Paper | 15. Uncoated Paperboard/Chipboard: Thin cardboard (no layers or center wave) that is free of wax coating, poly-lining, or chemical treatment. DOES NOT INCLUDE: frozen or refrigerated food boxes; hot paper coffee, soup, or oatmeal cups Examples: Examples include cereal boxes, cake boxes, pasta boxes, and shoe boxes. |
| Paper | 16. Coated paperboard, refrigerated and frozen food: Thin cardboard (no layers or center wave) that is wax-coated, poly-lined, or chemically treated so as to remain waterproof. DOES INCLUDE: Aseptic or Gabletop cartons. Examples: 6-pack boxes for beer, 12-pack boxes for soda, butter boxes, cream cheese boxes, frozen food boxes of an kind |
| Paper | 17. Hot paper coffee cups and bowls: Paper cups with a poly liner designed to hold hot food or beverages Examples: Paper coffee cups, paper soup cups, paper oatmeal cups |
| Paper | 18. Shredded paper: Office paper and mail that has been shredded lengthwise, crosswise or both, to conceal personal information |
| Paper | 19. Newsprint: Uncoated, thin paper, used chiefly for printing newspapers. DOES NOT INCLUDE: Phonebooks. Examples: Examples include newspaper, uncoated advertisements |
| Paper | 20. Glossy paper: Paper that is usually slick or smooth to the touch, and reflects light Examples: Magazines, catalogs, coated advertisements, gift bags, wrapping paper |

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| Paper | 21. Tissue paper, gift-wrapping: Thin paper used to pre-wrap gifts, or for decoration in gift-wrapping |
| Paper | 22. Paper napkins and Towels: Ultra-thin paper used for the purpose of absorption. DOES NOT INCLUDE: Tissues, toilet paper, diapers, tampons, or sanitary napkins Examples: Paper napkins, paper towels. |
| Paper | 23. Cartons, gabletop: Wet-strength paperboard boxes designed to hold a liquid in a refrigerator Examples: ½ gallon milk, ½ gallon juice |
| Paper | 24. Aseptic Juice Boxes: Wet-strength paperboard boxes designed to hold a liquid outside of a refrigerator prior to opening (shelf stable) Examples: juice boxes, soymilk, soup, broth |
| Paper | 25. Paperback books: Thin paper between a coated cover. DOES NOT INCLUDE: Phonebooks. |
| Paper | 26. Phone books: Paperback telephone number directories containing pages of newsprint-like paper |
| Paper | 27. Hardcover books: Thin paper between a hard cover and spine |
| Paper | 28. Office/Mixed paper: All other paper not treated to be waterproof; primarily used for drawing, writing, or printing. NOTE: Most paper falls here. Examples: Office paper, printer paper, writing paper, notebooks, envelopes, folders, cardstock |
| Paper | 29. Remainder/Composite Paper: Any paper that does not fit into any other category Examples: wax paper, butcher's paper, facial tissues toilet tissue paper plates, half pizza boxes, and molded paper |
| Glass | 30. Glass bottles and jars: Glass containers normally used for storing food, beverage, or other consumer products, for distribution Examples: Beer bottles, wine bottles, jam and jelly jars, pasta sauce jars |
| Glass | 31. Remainder Composite Glass: Any glass that does not fit into the above category Examples: dishes, mugs, Pyrex, corning ware, crystal, other glass tableware, windows, auto glass, mirrors, non-fluorescent light bulbs |
| Metal | 32. Aluminum beverage cans: Aluminum cans designed to hold liquid for consumption; will not stick to a magnet Examples: Beer cans, soda cans |
| Metal | 33. Aluminum foil and pie plates: Aluminum cans foil used to wrap food or bake pies; will not stick to a magnet Examples: foil used to wrap food, baking pie and turkey trays |
| Metal | 34. Aluminum non-beverage cans: Non-beverage aluminum cans and empty aluminum aerosol cans. Cans will not stick to a magnet Examples: cat food and other aluminum food cans, some hair spray cans, cooking spray cans |
| Metal | 35. Ferrous cans: Cans (mainly steel) designed to hold food and beverage; may be tin lined; sticks to a magnet Examples: Canned fruits, vegetables, and meat, dog and cat food, evaporated milk |
| Metal | 36. Small scrap metal: Any other metal item, that would completely fit inside a 2-gallon bucket Examples: Silverware, wire hangers, nuts, bolts, and screws |

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| Metal | 37. Large scrap metal: Any other metal item, that would not completely fit inside a 2-gallon bucket Examples: Metal pipes, metal drums, metal fencing, automotive parts |
| Hybrids | 38. Foiled wrappers: Foil-like plastic wrappers, used mainly for snack food Examples: Candy wrappers, chip wrappers |
| Hybrids | 39. Mixed material packaging: Any packaging made out of 2 parts equal material or 3+ materials Examples: Dog food bags, bubble-lined envelopes, foil lined paper cans |
| Textile | 40. Apparel : Textiles meant to be worn. INCLUDES: Clothing accessories made of textile. Examples: Shirts, sweaters, pants, skirts, shorts, jackets, undergarments, hats, gloves, scarfs, socks, shoes |
| Textile | 41. Non-apparel: Textiles not meant to be worn. DOES NOT INCLUDE: Carpeting, mattresses, or rags with hazardous waste on them (e.g. oil rags). Examples: Towels, sheets, linens, fabric |
| Other Organics | 42. Branches and Stumps >2 Inches: Trees, stumps, branches larger than 2" in diameter Examples: Trees, stumps, branches larger than 2" in diameter |
| Other Organics | 43. Leaf and yard debris: Brush and branches less than 2" inches in diameter; leaves, twigs and grass clippings free of any trash. INCLUDES: Paper leaf and yard waste bags. Examples: Yard waste less than 2 inches |
| Other Organics | 44. Clean Dimensional Lumber: Dimensional lumber free of adhesive, paint, stain, preservatives, etc. Can have nails and screws. Examples: 2 x 4, 4 x 4, 1 x 4 clean lumber |
| Other Organics | 45. Vegetative Food Waste: Vegetative food material resulting from the processing, storage, preparation, cooking, handling, or storage of vegetative food. Examples: Fruits, vegetables, peels, rinds, cores, coffee grounds, tea bags, , bread, cereal, grains, dried beans/rice, non-protein snacks, candy, pasta without meat or cheese, take-out,, vegetable oil, corn oil, olive oil |
| Other Organics | 46. Protein Food Waste: Protein food material resulting from the processing, storage, preparation, cooking, handling, or storage of protein food waste. Examples: Eggs, meat, dairy, pizza, lard shortening, vegetables or pasta mixed with meat or cheese. |
| Other Organics | 47. Other organics: Any other organic item (i.e. made of something that was once living) that does not fit into any other category Examples: Cork, rope, hair, toothpicks, sawdust, dryer lint |
| Construction & Demolition | 48. Asphalt, Brick, and Concrete: Black or brown tar-like material mixed with aggregate and used for paving; hard materials made from sand, gravel, aggregate, cement mix, and water. DOES NOT INCLUDE: roofing shingles. Examples: Portions of building foundations, concrete paving, cinder blocks |
| Construction & Demolition | 49. Roofing Shingles: Asphalt shingles and tarpaper roofing |
| Construction & Demolition | 50. Drywall/Gypsum Board: Interior wall covering made out of a sheet of gypsum sandwiched between paper layers Examples: sheetrock, drywall, gypsum board, plasterboard, wallboard |

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| Construction & Demolition | 51. Treated wood: Wood that contains adhesive, paint, stain, preservatives, etc. |
| Construction & Demolition | 52. Fixtures: Porcelain, fiberglass, or acrylic fixtures, usually from kitchens and bathrooms. Excludes any non-metallic fixtures. Examples: Non-metallic sinks, tubs, toilets |
| Construction & Demolition | 53. All other C&D : Any other C&D item that does not fit into any other category |
| Bulky Waste | 54. Major appliances: Large appliances primarily encased in metal Examples: Refrigerators, freezers, stoves, washers, dryers |
| Bulky Waste | 55. TVs, computers, computer peripheral devices: TVs, monitors, hard drives, laptops, mice, keyboard, printers. Examples: TVs, monitors, hard drives, laptops, mice, keyboard, printers |
| Bulky Waste | 56. Small Consumer Electronic and Electrical Devices: Anything other electric item with a plug or that comes with a plug for charging, that does not fit into either of the two categories above. Examples: Tablets, cell phones, chargers for portable electronic devices, coffee pots, blenders, irons, hairdryers, curling irons, alarm clocks, space heaters |
| Bulky Waste | 57. Furniture : DOES NOT INCLUDE: Carpets and Mattresses Examples: Sofas, couches, chairs, tables, dressers, bookshelves, bed frames |
| Bulky Waste | 58. Tires: Ring-shaped covering around any wheel rim Examples: Cars, trucks, motorcycles, bicycles |
| Bulky Waste | 59. Carpet and carpet padding: Flooring applications consisting of natural or synthetic fibers bonded to a backing material; underlay Examples: |
| Bulky Waste | 60. Mattresses and box springs: DOES NOT INCLUDE: Disassembled parts of mattresses and box springs; solid foam (i.e. memory foam); bagged mattresses marked with a “BB”. DOES INCLUDE: Mattresses without inner springs, but made from polyurethane foam and cotton or synthetic batting (this includes crib mattresses). |
| Special Waste | 61. Sharps: Injection devises used in human or animal patient care Examples: Hypodermic needles, lancets |
| Special Waste | 62. Medications: Over-the-counter or prescription drugs in liquid or solid form Examples: Pills, ointments, syrups |
| Special Waste | 63. Propane tanks: Compressed fuel containers used in lanterns, camp stoves, grills, RVs |
| Special Waste | 64. Fluorescent bulbs and ballasts: Tubular fluorescent light bulbs, compact “twisty” fluorescent light bulbs, and devise that electronically control fluorescent light fixtures |
| Special Waste | 65. Batteries: single-use, alkaline : Batteries that do not contain household hazardous waste Examples: AA, AAA, C, D, batteries intended for a single use |
| Special Waste | 66. Batteries: lead acid (vehicles): Vehicle batteries that do contain household hazardous waste Examples: Car batteries, truck batteries, motorcycles batteries |

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| Special Waste | 67. Batteries: all other rechargeable batteries: Other batteries that do contain household hazardous waste, intended for charging in a battery charger or by plugging their device into a wall. Examples: AA, AAA, C, D, batteries intended for a charger, cell phone catteries, tablet batteries, computer batteries, |
| Special Waste | 68. Paints and stains: NOTE: Weigh in can Examples: Latex paint and stain, other water-based paints and stains, oil-based paints and stains |
| Special Waste | 69. "Empty" Containers that once household viscous hazardous materials : Seemingly empty containers that once contained (1) automotive fluid, (2) pipe/drain cleaner, or (3) pesticides |
| Special Waste | 70. Other Hazardous or Household Hazardous Waste. : Any other hazardous waste item that does not fit into any other category |
| Other Waste | 71. Miscellaneous: Any other type of waste material not listed in any other sort category. Examples: Sanitary napkins, toilet paper, kitty litter, bottles of shampoo, tubes of toothpaste, facial cream, cosmetics, inter materials, dryer sheets "Swifter sheets", etc.. |