COVANTA

SEMASS

2022 WASTE CHARACTERIZATION STUDY

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Prepared under contract to SAK Environmental, LLC

SAK Environmental, LLC
advise ◆ remediate ◆ sustain

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1. INTRODUCTION

1.1 INTRODUCTION

In Massachusetts, combustion facilities with Class II Recycling Programs are required to conduct a waste characterization study (WCS) within 18 months of receiving their Class II Recycling Program certification from the Massachusetts Department of Environmental Protection (MassDEP) and every three years thereafter. Inaugural WCSs were conducted in calendar year 2010, with subsequent studies completed in 2013, 2016, and 2019.

The most recent MassDEP Guidance Document for the conduct of waste characterization studies at qualifying Class II Recycling Program facilities was published in 2021. The document, titled "2022 Class II Recycling Program Waste Characterization Scope and Methodology Guidance," (WCS Guidance) includes guidance on the scope, methodology and protocols to be used in conducting the waste characterization studies that are required by state regulation. This WCS Guidance document relies in turn on the methodologies and protocols described in ASTM Test Method for Determination of the Composition of Unprocessed Municipal Solid Waste, Designation D 5231 – 92 (2016).

Per the Class II Recycling Program regulations, the Covanta-operated Southeastern Massachusetts Resource Recovery Facility (SEMASS) engaged MSW Consultants, LLC, working as a subcontractor to SAK Environmental, LLC to complete a WCS of waste arriving at the SEMASS facility located in West Wareham, Massachusetts.

Pursuant to the WCS Guidance document, the objectives of the WCS were to:

1. Characterize, in a statistically defensible manner, the waste stream at the SEMASS facility according to MassDEP protocols; and
2. Provide representative waste characterization raw data and statistics that can subsequently be aggregated with other WCS study data and used by MassDEP in subsequent data analysis to be performed by MassDEP, to
    a. Estimate statewide waste characterization information.
    b. Measure the success of future waste reduction efforts.
    c. Identify specific materials for increased diversion; and
    d. Help guide MassDEP policy and program initiatives in solid waste management.

This report contains the results of the Covanta SEMASS 2022 WCS.

1.2 SEMASS SITE OVERVIEW

The Covanta SEMASS Resource Recovery Facility (SEMASS), located in West Wareham, Massachusetts, provides over 50 communities in southeastern Massachusetts, Cape Cod, and the surrounding metropolitan Boston area with an environmentally responsible means of disposing of the region's municipal solid waste. The 95-acre facility currently processes approximately 3,300 tons per day, or approximately 1.22 million tons of solid waste (MSW) each year. One-sixth of the total waste tonnage entering SEMASS originates from long-term contracts, while five-sixths of the waste is delivered by commercial accounts and private haulers.

The SEMASS facility has one in-bound truck scale used to weigh trucks as they arrive at the facility. The incoming trucks follow the traffic pattern around the facility and line up in a staging area just outside the entrance to the tip floor. Depending on the traffic flow, trucks can queue in two lines, taking turns entering the building when directed to do so by facility personnel. Trucks dump their loads on the tip floor before exiting the tip area via the exit door, leading back to one out-bound scale.

1. INTRODUCTION

1.3 REPORT ORGANIZATION

The remainder of this report presents the methodology and results of the SEMASS waste composition study. The report is divided into the following sections:

- **Methodology**: This section provides an overview of waste disposal data available from SEMASS scale reports and supplemented with direct surveys to establish reasonable estimates by generator sector and provides the detailed sampling plan that was developed to govern the study process and to provide statistically defensible data. This section also summarizes the field data collection methods and analytical methods applied in the study.
- **Results**: Detailed results about the composition of the combusted waste are presented in this section. Results are presented primarily in tabular format with some summary graphics to highlight findings of interest.
- **Appendices**: Detailed waste category definitions and the tabular 2022 study results are contained in the appendices.

It should also be noted that the raw data captured for this study has been delivered electronically in spreadsheet format for use by SEMASS and for subsequent transmittal to MassDEP.

2. METHODOLOGY

2.1 WASTE DISPOSAL QUANTITIES

Covanta SEMASS provided MSW Consultants with annual waste totals for 2022. Table 2-1 shows the total annual waste received at the facility by waste type.

Table 2-1 2022 Waste Disposal Quantities

Waste Type	Total Tons	Percent
MSW-10	695,531	63.8%
MSW-Rail	1,719	0.2%
TSMSW	391,658	35.9%
Other (Non-MSW)	1,296	0.1%
Grand Total	1,090,203	100.0%

Note: Excludes special and liquid wastes (i.e., non-MSW). The tonnages shown above are consistent with reported waste streams from 2019 and prior waste composition studies.

As shown in Table 2-1, the majority of wastes received are coded as type MSW-10. It was reported by the facility that TSMSW is defined as MSW received from transfer stations as is MSW-Rail. While these loads would have been considered of mixed generator sector and consequently were not sampled (as described more fully below), these wastes are included in the overall WCS analysis.

2.2 TRUCK TYPES

Covanta SEMASS uses scale house software to record the truck type for all incoming deliveries in a manner that is consistent with MassDEP guidance. The following truck types were defined and segregated during the WCS. Scale data differentiates:

- Rear Load and Side Load compacting vehicles,
- Frontload compacting vehicles,
- Roll-off compactors,
- Roll-off open top containers, and
- Roll-off closed top containers.

The SEMASS facility receives a significant quantity of waste from transfer trailers. Because it is not possible to determine the generating sector of origin for wastes contained on transfer trailers, these loads were excluded from sampling during the WCS. Table 2-2 shows the total tons and percent of waste by vehicle type in 2022, separating the transfer trailer waste from direct haul loads.

Table 2-2 2022 Waste Deliveries by Vehicle Type

Vehicle Type	Total Vehicles	Percent of Vehicles	Total Tons	Percent of Tons
Rear Loader	13,274	23.8%	122,912	11.3%
Side Loader	1,886	3.4%	18,347	1.7%
Front Loader	5,813	10.4%	63,852	5.9%
Roll-off Compactor	5,076	9.1%	30,209	2.8%
Roll-off Open Top	1,759	3.2%	8,981	0.8%
Roll-off Closed Top	244	0.4%	1,566	0.1%
Acceptable Vehicle Total	**28,052**	**50.3%**	**245,865**	**22.6%**
Rail	334	0.6%	79,645	7.3%
Other Vehicle Types	97	0.2%	80	0.0%
Tractor/Transfer Trailer	27,237	48.9%	764,612	70.1%
Unacceptable Vehicle Total	**27,668**	**49.7%**	**844,338**	**77.4%**
Grand Total	**55,720**	**100.0%**	**1,090,203**	**100.0%**

2.3 GENERATOR SECTORS

Consistent with MassDEP's WCS Guidance, samples obtained in this study were classified into one of three generator types:

- **Residential**: Residential waste was defined in this study as waste from vehicles in which 80 percent or more of the waste originated from single family or multi-family residential sources. These vehicles included residential drop-off containers (i.e. roll-offs, dedicated transfer trailers from municipal drop-off programs) and both side load and rear load compacting vehicles.
- **ICI - Industrial/Commercial/Institutional**: This category included wastes generated by non-residential sources including commercial businesses, institutions, and industrial facilities (excepting any special industrial wastes or industrial wastes elsewhere classified). ICI waste was defined in this study as waste from vehicles in which 80 percent or more of the waste was generated by ICI sources. Typically waste from ICI vehicles included compactor boxes, open top boxes and front-load compacting vehicles.
- **Unacceptable Loads**: Unacceptable loads were defined as loads that contained less than 80 percent of either residential or ICI waste; loads that were more than 50 percent construction and demolition (C&D) material; and loads that originated from out of state. Unacceptable loads were not sampled or sorted during the WCS.

The proportion of waste delivered to the facility by each of these generator types was not tracked or known by the facility operators prior to this study. Random sampling of incoming loads was therefore used to assure appropriate allocation of samples to each generator sector. It was agreed upon that MassDEP did not intend for Unacceptable Loads to undergo sampling and sorting as part of the study. Unacceptable Loads were defined as:

- Front Load and Rear Load compacting trucks that mix Residential (including multi-family) and ICI accounts on the same route such that neither the Residential nor the ICI fraction exceeds 80 percent of the load;

- All Transfer/Tractor Trailers. These usually originate at commercial transfer stations that accept a mix of Residential and ICI wastes; or originate at transfer stations that may accept waste from out-of-state.

If encountered during the random sampling, Unacceptable Loads were excluded from the composition analysis. However, consistent with MassDEP's reporting requirements, the overall fraction of wastes arriving in Unacceptable Loads from Front and Rear Load vehicles were documented for the facility by randomly selecting vehicles and surveying the drivers regarding load origination.

Table 2-3 shows the results of the random sampling conducted at the SEMASS facility. Results are shown both in terms of the percentage of loads (top half) and the percentage of waste by weight (bottom half).

Table 2-3 Incoming Vehicle Random Sample Results

	Vehicle Type	Residential	ICI	Mixed	Total
Percent by Number of Loads	Rear Loader	60.0%	40.0%	0.0%	100.0%
	Side Loader	100.0%	0.0%	0.0%	100.0%
	Front Loader	0.0%	100.0%	0.0%	100.0%
	Roll-off Compactor	0.0%	100.0%	0.0%	100.0%
	Roll-off Open Top	50.0%	50.0%	0.0%	100.0%
	Roll-off Closed Top	0.0%	0.0%	0.0%	0.0%
	Transfer Trailers	0.0%	0.0%	0.0%	0.0%
Percent by Weight of Loads	Rear Loader	47.5%	52.5%	0.0%	100.0%
	Side Loader	100.0%	0.0%	0.0%	100.0%
	Front Loader	0.0%	100.0%	0.0%	100.0%
	Roll-off Compactor	0.0%	100.0%	0.0%	100.0%
	Roll-off Open Top	39.9%	60.1%	0.0%	100.0%
	Roll-off Closed Top	0.0%	0.0%	0.0%	0.0%
	Transfer Trailers	0.0%	0.0%	0.0%	0.0%

These survey results in Table 2-3 were subsequently applied to the total waste deliveries by truck type to estimate the proportion of wastes delivered by generator sector. Quantities of waste were summed by generator sector. The results of this exercise are shown in Table 2-4. As shown, the survey data collected during this study suggest that the SEMASS facility receives roughly 64 percent ICI waste and 36 percent Residential waste. This assumes that the Mixed Waste entering the facility is the same split as the direct haul waste. Further study would be required to improve on the estimate below.

Table 2-4 Residential/ICI Split

Allocation Method	Residential	ICI	Mixed	Total
By Load Count	19.6%	27.4%	53.0%	100.0%
By Weight of Load	7.6%	13.3%	79.0%	100.0%
By Weight Excluding Mixed	**36.4%**	**63.6%**	**N/A**	**100.0%**

It should also be noted that MassDEP's WCS Guidance document calls for a 55 percent to 45 percent split between ICI and residential waste as the state-wide average. MSW Consultants understands that this split was intended only as a guideline in the absence of actual data. For this WCS, the weighting factors derived from the random samples and the truck type stratification were used to calculate results.

2.4 SAMPLE ALLOCATION

Table 2-5 below shows the proposed and actual allocation of samples by truck type and by season, based on 2020 scale house data. The latest 2022 scale data is shown for comparison.

This table also shows how the 52 total samples were stratified, with random sampling performed for each stratum. Finally, the actual samples obtained in the study are shown. From this information, the study reasonably achieved the targeted sampling stratification.

Table 2-5 Proposed Samples vs. Actual Samples Collected (Excluding Transfer Trailers)

Vehicle Type	2020 Percent Tons*	2022 Percent Tons	Proposed Samples	Proposed Percent	Actual Samples	Actual Percent
Rear/Side Loader	63.7%	59.2%	33	63.5%	33	61.1%
Front Loader	24.1%	24.9%	13	25.0%	15	27.8%
Roll-off Compactor	9.1%	11.8%	4	7.7%	4	7.4%
Roll-off Open Top	3.0%	3.5%	2	3.8%	2	3.7%
Roll-off Closed Top	0.1%	0.6%	0	0.0%	0	0.0%
Other	0.0%	N/A	0	0.0%	0	0.0%
Grand Total	**100.0%**	**100.0%**	**52**	**100.0%**	**54**	**100.0%**

*2020 Tonnage percentages were used in the Study Design protocol to establish sample allocations.

During the study, 54 samples were obtained, 24 from the Residential generator sector and 30 from ICI generators. The two extra samples were collected to keep the sort table busy while awaiting targeted trucks.

2.5 WASTE CATEGORIES

This study sorted wastes into the nine (9) primary categories and 62 secondary categories identified by MassDEP in the WCS Guidance document. Table 2-6 on the following page summarizes these waste categories. More detailed definitions of each of the 62 waste categories are provided in Appendix A.

For the 2022 WCS, MassDEP amended the material categories to include a new plastic category, and an amended category. The new category is "#5 Polypropylene Bottles & Containers", which serves to include all (#5) polypropylene bottles and containers. The amended category is the "Other Plastic Bottles & Containers (which originally contained non-hazardous material)," which will no longer include any #5 polypropylene. Table 2-6 summarizes these material categories. More detailed definitions of each of the 62 material categories are provided in Appendix A.

The 2022 material list retains the protocol to capture the estimated percent composition of mattresses and box springs in each load, which was introduced in the 2016 WCS.

Table 2-6 Waste Categories

PAPER	
Uncoated Corrugated Cardboard/Kraft Paper	Newsprint
Waxed Cardboard	Other Recyclable Paper
High Grade Office Paper	Compostable Paper
Magazines/Catalogs	Remainder/Composite Paper
PLASTICS	
#1 PET Beverage Containers (non-MA deposit containers)	Expanded Polystyrene Non-Food Grade
PET Containers other than Beverage Containers	Bulk Rigid Plastic Items
Plastic MA Deposit Beverage Containers	Film (non-bag clean commercial and industrial packaging film)
#2 HDPE Bottles, colored and natural	Grocery and Other Merchandise Bags
#5 PP Bottles & Containers*	Plastic Film - Other
Other Plastic Bottles & Containers (non-hazardous) *	Remainder/Composite Plastic
Expanded Polystyrene Food Grade	
METALS	
Aluminium Beverage Containers (non-MA deposit containers)	Other Ferrous and Non-Ferrous
Aluminum MA Deposit Beverage Containers	White Goods
Tin/Steel Containers	Remainder/Composite Metal
Other Aluminum	
GLASS	
Glass Beverage Containers (non-MA deposit containers)	Glass MA Deposit Beverage Containers
Other Glass Packaging Containers (non-MA deposit containers)	Remainder/Composite Glass
ORGANICS	
Food Waste	Manures
Branches and Stumps	Remainder/Composite Organic
Pruning, Trimmings, Leaves and Grass	
C&D MATERIALS	
Asphalt Pavement, Brick, and Concrete	Asphalt Roofing
Aggregates, Stone, Rock	Drywall/Gypsum Board
Wood – Treated	Carpet and Carpet Padding
Wood – Untreated	Remainder/Composite Construction and Demolition
HOUSEHOLD HAZARDOUS WASTE	
Ballasts, CFLs, and Other Fluorescents	Bio-Hazardous
Batteries – Lead Acid	Vehicle and Equipment Fluids
Batteries – Other	Empty Metal, Glass, and Plastic Containers (that originally contained toxic materials)
Paints	Other Hazardous or Household Hazardous Waste
ELECTRONICS	
Computer-related Electronics	Televisions & Computer Monitors
Other “Brown Goods”	
OTHER MATERIALS	
Tires and Other Rubber	Mattresses
Textiles	Restaurant Fats, Oils and Grease
Bulky Materials	Other Miscellaneous

*Replaces former "Plastic Containers #3-#7” Category

2.6 SEASONALITY

To ensure that the final results captured seasonal fluctuations in the composition of the waste stream, the study was performed over two seasons. Consistent with MassDEP guidance, the first season field sort occurred during the first quarter period (between January 15 and March 15, 2022, and the second season field sort occurred during the fourth quarter period between October 15 and December 15, 2022. Field sorting was scheduled to avoid the days immediately preceding and following major holidays.

The Study Design proposed 26 samples to be collected equally between each of the two seasons for a total of 52 samples. The sampling targets were achieved. Table 2-7 shows the field data collection schedule.

Table 2-7 Sampling and Sorting Schedule

Day of Week	Winter Season	Fall Season
Monday	February 7, 2022	November 7, 2022
Tuesday	February 8, 2022	November 8, 2022
Wednesday	February 9, 2022	November 9, 2022

2.7 FIELD DATA COLLECTION

2.7.1 LOAD SELECTION

For each of the truck types identified above, MSW Consultants used a systematic selection of incoming vehicles. Sufficient incoming scale data was provided by the SEMASS facility prior to the study to estimate the expected number of loads delivered by each truck type. An "Nth Vehicle" approach was used each season for each truck type. Systematic sampling is intended to remove any sampling bias that may arise from an individual selecting specific incoming vehicles. MSW Consultants divided the number of incoming loads (by vehicle type) by the number of samples needed that day from the facility. The resulting number was the sampling frequency and determined whether every third vehicle, every sixth vehicle, or every 20th vehicle will be selected for sampling. This strategy is known as the "Nth Vehicle" approach.

The Field Supervisor, working in coordination with facility personnel, kept a tally of vehicles from each truck type as they entered the facility. When the designated nth truck arrived, the vehicle was directed to the sampling area.

The Field Supervisor interviewed the drivers of selected loads to obtain information about origin of the load, validation of waste generating sector, hauler, vehicle type and number, and other data. This information was noted on the Field Supervisor's vehicle selection form, along with a unique identifying number associated with that vehicle on that day.

2.7.2 TAKING RANDOM SAMPLES FOR MANUAL SORTING

Once the incoming load was identified and discharged on the tipping floor, a sample was taken using the method described in ASTM standards. A front-end loader removed material longitudinally along one entire side of the discharged load in order to obtain a representative cross-section of the material. The Field Supervisor and loader operator attempted to remove approximately 1,000 pounds of material, based on a visual assessment. This equates to four times the targeted sample weight of 250 pounds. The loader operator then mixed, coned, and quartered the sample material.

The Field Supervisor then systematically selected roughly one quarter of the material to be taken via a grab sample. For samples that contained heavy or bulky materials, the Field Supervisor estimated the fraction of the sample occupied by the bulky item and applied that percentage to the overall weight of the bulky item. For example, if a sofa bed was part of the grab sample that has been dumped for sampling, Field

Supervisor estimated what fraction of the sofa bed was contained within the regular municipal solid waste sample and recorded the fractional weight of the bulky item as part of the overall sample.

The Field Supervisor then placed the material for sorting in 35-gallon barrels and pre-weighed each barrel to ensure the sample used for sorting was at least 225 pounds. A white board with the sample number was placed in the barrel and staged for the sorting by the field sorting crew. Figure 2-1 shows samples staged for sorting.

Figure 2-1 Tipped Load Awaiting Sample Collection

Figure 2-2 Sort Crew

2.7.3 Manual Sorting

Once the sample was acquired and placed in barrels, the material was manually sorted into the prescribed component categories. Plastic 20-gallon bins with sealed bottoms were used to contain the separated components. A picture of the sorting crew working the sort table and bins is shown in Figure 2-2.

2.7.4 Data Recording

The weigh-out and data recording process is the most critical process of the sort. The Crew Chief was singularly responsible for overseeing all weighing and data recording of each sample. Once each sample was sorted the weigh-out was performed. Each bin containing sorted materials from the just-completed samples was physically carried over to a digital scale. Sorting laborers assisted with carrying and weighing the bins of sorted material, and the Crew Chief recorded all data.

The Crew Chief used a rugged tablet computer to record the composition weights. The tablet allowed samples to be tallied in real time so that field data collection could immediately identify and rectify errors associated with light sample weights. The tablet periodically synchronized with the cloud via cellular signal, providing excellent data security. Each sample was cross-referenced against the Field Supervisor's sample sheet to assure accurate tracking of the samples each day.

This real-time data entry system offers several important advantages:

- The template contains built-in logic and error checking to prevent erroneous entries.
- The template sums sample weights in real time so the Crew Chief can confirm achievement of weight targets for each and every sample.
- Except where host facilities are outside of cell phone range, the data file syncs routinely and can be accessed and checked by MSW Consultants QA/QC staff back at the office. For remote facilities that cannot synchronize during the workday, it is usually possible to sync in the evening upon returning to the hotel.

The Crew Chief also carried paper field forms as a back-up in case the tablet computer encountered unforeseen technical difficulties.

2.7.5 STATISTICAL METHODS

The following statistical measures were calculated to determine the overall composition of each waste generator sector.

- **Sample Mean:** The sample mean, or average, composition is considered the "most likely" fraction for each material category in the waste stream. The sample mean is determined by (i) summing the weight of each material in each sample; (ii) summing the total weight of all samples, and (iii) dividing the first value by the second value to determine the percent-by-weight composition. Note that the sample mean, while a good estimate, is unlikely to be identical to the population mean value. The meaningfulness of the sample mean is enhanced by the following statistical measures.
- **Standard Deviation**: The standard deviation measures how widely values within the data set are dispersed from the sample mean. A higher standard deviation denotes higher variation in the underlying samples for each material, while a lower standard deviation reflects lower variation among the individual samples. The standard deviation is stated in the same unit as the sample mean, which in this case is percent by weight.
- **Confidence Intervals:** When a sample of data is obtained, it is analyzed in an attempt to determine certain values that describe the entire population of data under analysis. For example, in a poll of likely voters, the intent of the poll is to determine the percentage of all voters who support a given candidate, not simply the percentage of voters in the poll who support that candidate. The percentage of voters who support a given candidate in the poll can easily vary from sample to sample; but the percentage of all voters who support that candidate is a fixed value. In our sample of incoming loads of waste, we are not primarily interested in the percentage composition of the sampled loads, but rather in trying to determine what the composition of the sampled loads tells us about the composition of all waste generated. A confidence interval is a statistical concept that attempts to indicate the likely range within which the true value lies. The confidence intervals reflect the upper and lower range within which the population mean can be expected to fall. Confidence intervals require the following "inputs":
  - The "level of confidence", or how sure one wants to be that the interval being constructed will actually encompass the population mean;
  - The sample mean, around which the confidence interval will be constructed;
  - The sample standard deviation, which is used as a measure of the variability of the population from which the sample was obtained; and
  - The number of sampling units that comprised the sample (a.k.a. sample size).

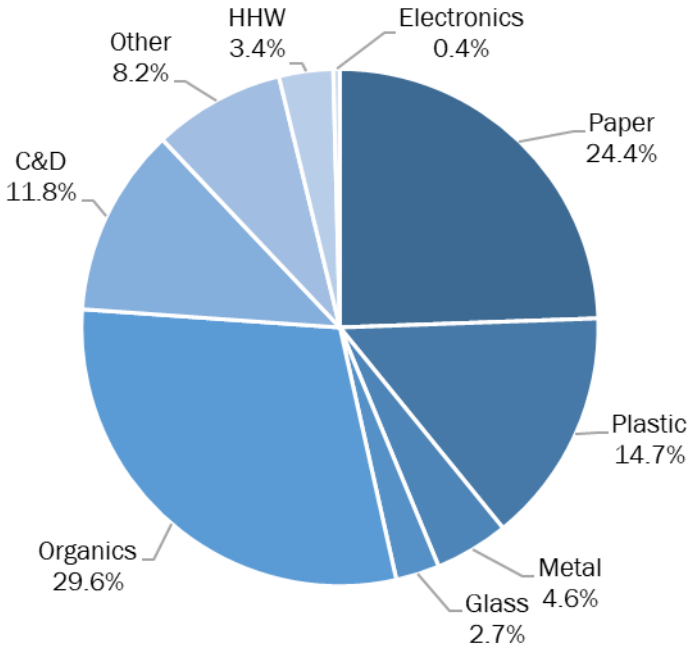
Consistent with MassDEP guidance, confidence intervals were calculated at a 90 percent level of confidence, meaning that we can be 90 percent sure that the mean falls within the upper and lower confidence intervals shown. (The converse is also true: that there is a 10 percent chance that the mean falls outside of the sample mean.) In general, as the number of samples increases, the width of the confidence intervals decreases, although the more variable the underlying waste stream composition, the less noticeable the improvement for adding incremental samples.

3. RESULTS

3.1 AGGREGATE WASTE COMPOSITION

Figure 3-1 shows the breakdown of major material groups for the aggregate overall municipal solid waste stream entering the facility. Results are shown in percentage terms. As shown, Organics and Paper are the most prevalent materials in the aggregate disposal stream.

Figure 3-1 Overall Waste Composition by Material Group



3. RESULTS

Table 3-1 shows the top 10 most prevalent material categories in the overall MSW stream, as well as for the Residential and ICI streams. Not surprisingly, Food Waste is the single most prevalent category. However, corrugated cardboard and compostable paper were also found to be prevalent.

Table 3-1 Top 10 Most Prevalent Material Categories

	Aggregate	Residential	ICI
1	Food Waste (20.5%)	Food Waste (16.8%)	Food Waste (23.4%)
2	Remainder/Composite Organic (7.6%)	Remainder/Composite Organic (8.7%)	Uncoated Corrugated Cardboard/Kraft Paper (9.4%)
3	Compostable Paper (7.3%)	Compostable Paper (7.8%)	Compostable Paper (6.9%)
4	Uncoated Corrugated Cardboard/Kraft Paper (6.9%)	Bulky Materials (5.3%)	Remainder/Composite Organic (6.7%)
5	Other Film (5.4%)	Other Film (4.9%)	Other Film (5.9%)
6	Remainder/Composite Paper (4.2%)	Textiles (4.5%)	Remainder/Composite Paper (4.1%)
7	Textiles (3.7%)	Other Recyclable Paper (4.3%)	Carpet and Carpet Padding (3.1%)
8	Other Recyclable Paper (3.6%)	Remainder/Composite Paper (4.2%)	Other Recyclable Paper (3.1%)
9	Bio-Hazardous (3.1%)	Uncoated Corrugated Cardboard/Kraft Paper (3.9%)	Textiles (3.0%)
10	Wood – Treated (2.9%)	Wood – Treated (3.5%)	Bio-Hazardous (3.0%)
	Subtotal = 65.2%	**Subtotal = 63.9%**	**Subtotal = 68.5%**

Table 3-2 on the following page provides a detailed statistical profile of the overall disposed MSW stream. For each material category, the estimated disposed tons, mean percent, and lower and upper confidence intervals are shown. Confidence intervals are calculated at a 90 percent level of confidence.

Table 3-2 Detailed Aggregate MSW Composition

Material	Percent	Std. Dev	Conf Int (+/-)
Paper	**24.4%**	**10.6%**	**2.4%**
Uncoated Corrugated Cardboard/Kraft Pape	6.9%	9.2%	2.1%
Waxed Cardboard	0.7%	2.3%	0.5%
High Grade Office Paper	0.6%	1.0%	0.2%
Magazines/Catalogs	0.6%	0.9%	0.2%
Newsprint	0.5%	0.7%	0.1%
Other Recyclable Paper	3.6%	2.6%	0.6%
Compostable Paper	7.3%	4.2%	0.9%
Remainder/Composite Paper	4.2%	3.3%	0.7%
Plastic	**14.7%**	**5.7%**	**1.3%**
PET Beverage Containers (non-MA deposit cc	1.0%	0.6%	0.1%
PET Containers other than Beverage Contain	0.7%	0.5%	0.1%
Plastic MA Deposit Beverage Containers	0.2%	0.2%	0.0%
HDPE Bottles	0.7%	0.5%	0.1%
#5 PP Bottles & Containers	0.9%	0.6%	0.1%
Other Plastic Bottles & Containers (non-haz.)	0.3%	0.5%	0.1%
Expanded Polystyrene Food Grade	0.3%	0.3%	0.1%
Expanded Polystyrene Non-food Grade	0.2%	0.3%	0.1%
Bulk Rigid Plastic Items	2.0%	2.7%	0.6%
Film (non-bag clean com/industrial film)	1.0%	1.9%	0.4%
Grocery and other Merchandise Bags	0.3%	0.4%	0.1%
Other Film	5.4%	2.9%	0.6%
Remainder/Composite Plastic	1.7%	1.2%	0.3%
Metal	**4.6%**	**4.3%**	**1.0%**
Al. Beverage Containers (non-MA deposit)	0.1%	0.3%	0.1%
Al. MA Deposit Beverage Containers	0.3%	0.3%	0.1%
Tin/Steel Containers	0.9%	0.7%	0.2%
Other Aluminum	0.4%	0.3%	0.1%
Other Ferrous and Non-Ferrous	1.1%	2.9%	0.7%
White Goods	0.0%	0.0%	0.0%
Remainder/Composite Metal	1.8%	2.7%	0.6%
Glass	**2.7%**	**3.1%**	**0.7%**
Glass Beverage Containers (non-MA deposit)	1.2%	1.7%	0.4%
Other Glass Pkg Containers (non-MA deposit	0.6%	0.7%	0.2%
Glass MA Deposit Beverage Containers	0.4%	0.8%	0.2%
Remainder/Composite Glass	0.6%	1.3%	0.3%

Material	Percent	Std. Dev	Conf Int (+/-)
Organics	**29.6%**	**15.5%**	**3.5%**
Food Waste	20.5%	13.5%	3.1%
Branches and Stumps	0.6%	3.6%	0.8%
Prunings, Trimmings, Leaves and Gras	0.6%	1.8%	0.4%
Manures	0.4%	2.1%	0.5%
Remainder/Composite Organic	7.6%	11.6%	2.6%
C&D	**11.8%**	**12.8%**	**2.9%**
Asphalt Pavement, Brick, and Concret	0.3%	1.9%	0.4%
Aggregates, Stone, Rock, Soil, Fines	0.6%	2.2%	0.5%
Wood - Treated	2.9%	4.3%	1.0%
Wood - Untreated	2.3%	5.6%	1.3%
Asphalt Roofing	0.6%	3.6%	0.8%
Drywall/Gypsum Board	0.7%	2.7%	0.6%
Carpet and Carpet Padding	2.3%	6.0%	1.4%
Remainder/Composite C&D	2.2%	4.8%	1.1%
Household Hazardous Waste	**3.4%**	**1.5%**	**0.3%**
Ballasts, CFLs, and Other Fluorescent	0.0%	0.0%	0.0%
Batteries - Lead Acid	0.0%	0.0%	0.0%
Batteries - Other	0.1%	0.5%	0.1%
Paint	0.0%	0.0%	0.0%
Bio-Hazardous	3.1%	3.4%	0.8%
Vehicle and Equipment Fluids	0.0%	0.0%	0.0%
Empty Mtl, Glass, & Plas. Cont. (forme	0.1%	0.3%	0.1%
Other Hazardous or HHW	0.1%	0.2%	0.1%
Electronics	**0.4%**	**11.4%**	**2.6%**
Computer-related Electronics	0.2%	1.1%	0.2%
Other "Brown Goods"	0.2%	1.1%	0.2%
Televisions and Computer Monitors	0.0%	0.0%	0.0%
Other	**8.2%**	**3.5%**	**0.8%**
Tires and Other Rubber	0.2%	0.8%	0.2%
Textiles	3.7%	3.9%	0.9%
Bulky Materials	2.4%	11.3%	2.6%
Mattresses	0.0%	0.0%	0.0%
Restaurant Fats, Oils and Grease	0.0%	0.0%	0.0%
Other Miscellaneous	2.0%	1.7%	0.4%
Totals	**100.0%**		
Sample Count	**52**		

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

3.2 WASTE COMPOSITION BY GENERATOR SECTOR

Table 3-3 compares the detailed composition of the aggregate disposed waste stream with the Residential and ICI generator sectors individually. This table illustrates the differences in Residential and ICI wastes, and the need for programs to target specific material streams by generator sector.

3. RESULTS

Table 3-3 Composition of Waste Composition by Generator Sector

Material	Aggregate	Resi-dential	ICI
Paper	**24.4%**	**22.5%**	**26.0%**
Uncoated Corrugated Cardboard/Kraft Pape	6.9%	3.9%	9.4%
Waxed Cardboard	0.7%	0.0%	1.3%
High Grade Office Paper	0.6%	0.7%	0.5%
Magazines/Catalogs	0.6%	0.9%	0.3%
Newsprint	0.5%	0.7%	0.3%
Other Recyclable Paper	3.6%	4.3%	3.1%
Compostable Paper	7.3%	7.8%	6.9%
Remainder/Composite Paper	4.2%	4.2%	4.1%
Plastic	**14.7%**	**14.9%**	**14.5%**
PET Beverage Containers (non-MA deposit c	1.0%	1.0%	1.0%
PET Containers other than Beverage Contai	0.7%	0.8%	0.7%
Plastic MA Deposit Beverage Containers	0.2%	0.2%	0.2%
HDPE Bottles	0.7%	0.7%	0.7%
#5 PP Bottles & Containers	0.9%	0.9%	0.8%
Other Plastic Bottles & Containers (non-haz.	0.3%	0.3%	0.3%
Expanded Polystyrene Food Grade	0.3%	0.3%	0.3%
Expanded Polystyrene Non-food Grade	0.2%	0.2%	0.1%
Bulk Rigid Plastic Items	2.0%	2.8%	1.4%
Film (non-bag clean com/industrial film)	1.0%	0.5%	1.3%
Grocery and other Merchandise Bags	0.3%	0.5%	0.2%
Other Film	5.4%	4.9%	5.9%
Remainder/Composite Plastic	1.7%	1.8%	1.5%
Metal	**4.6%**	**3.5%**	**5.5%**
Al. Beverage Containers (non-MA deposit)	0.1%	0.1%	0.1%
Al. MA Deposit Beverage Containers	0.3%	0.3%	0.3%
Tin/Steel Containers	0.9%	0.8%	0.9%
Other Aluminum	0.4%	0.5%	0.3%
Other Ferrous and Non-Ferrous	1.1%	0.3%	1.7%
White Goods	0.0%	0.0%	0.0%
Remainder/Composite Metal	1.8%	1.4%	2.2%
Glass	**2.7%**	**2.9%**	**2.6%**
Glass Beverage Containers (non-MA deposit	1.2%	1.3%	1.1%
Other Glass Pkg Containers (non-MA deposi	0.6%	0.9%	0.3%
Glass MA Deposit Beverage Containers	0.4%	0.3%	0.5%
Remainder/Composite Glass	0.6%	0.4%	0.7%

Material	Aggregate	Resi-dential	ICI
Organics	**29.6%**	**27.6%**	**31.3%**
Food Waste	20.5%	16.8%	23.4%
Branches and Stumps	0.6%	0.3%	0.8%
Prunings, Trimmings, Leaves and Gra	0.6%	0.9%	0.3%
Manures	0.4%	0.8%	0.0%
Remainder/Composite Organic	7.6%	8.7%	6.7%
C&D	**11.8%**	**12.4%**	**11.3%**
Asphalt Pavement, Brick, and Concre	0.3%	0.0%	0.6%
Aggregates, Stone, Rock, Soil, Fines	0.6%	1.0%	0.3%
Wood - Treated	2.9%	3.5%	2.4%
Wood - Untreated	2.3%	1.8%	2.7%
Asphalt Roofing	0.6%	1.0%	0.3%
Drywall/Gypsum Board	0.7%	0.7%	0.6%
Carpet and Carpet Padding	2.3%	1.2%	3.1%
Remainder/Composite C&D	2.2%	3.3%	1.3%
Household Hazardous Waste	**3.4%**	**3.6%**	**3.2%**
Ballasts, CFLs, and Other Fluorescent	0.0%	0.0%	0.0%
Batteries - Lead Acid	0.0%	0.0%	0.0%
Batteries - Other	0.1%	0.3%	0.0%
Paint	0.0%	0.0%	0.0%
Bio-Hazardous	3.1%	3.2%	3.0%
Vehicle and Equipment Fluids	0.0%	0.0%	0.0%
Empty Mtl, Glass, & Plas. Cont. (forme	0.1%	0.2%	0.1%
Other Hazardous or HHW	0.1%	0.0%	0.1%
Electronics	**0.4%**	**0.7%**	**0.2%**
Computer-related Electronics	0.2%	0.4%	0.1%
Other "Brown Goods"	0.2%	0.3%	0.2%
Televisions and Computer Monitors	0.0%	0.0%	0.0%
Other	**8.2%**	**11.9%**	**5.4%**
Tires and Other Rubber	0.2%	0.2%	0.1%
Textiles	3.7%	4.5%	3.0%
Bulky Materials	2.4%	5.3%	0.0%
Mattresses	0.0%	0.2%	0.0%
Restaurant Fats, Oils and Grease	0.0%	0.0%	0.0%
Other Miscellaneous	2.0%	1.7%	2.3%
Totals	**100.0%**	**100.0%**	**100.0%**
Sample Count	**54**	**24**	**30**

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

3.3 WASTE COMPOSITION BY VEHICLE TYPE

This study also sought to capture and report on waste composition by truck type, shown in Table 3-4. It should be noted that these results are based on an increasingly small number of samples, which in turn increases the width of the confidence intervals. Further, outlier samples will have a much greater potential to skew results given the progressively smaller sample counts. For this reason, the reader is cautioned that the data below are limited in their ability to convey details about waste composition.

Table 3-4 Comparison of Waste Composition by Truck Type

Material	Aggregate	Rear Load	Side Load	Front Load	Roll-off Compactor	Roll-off Open Top
Paper	**24.4%**	**24.0%**	**22.3%**	**24.7%**	**24.2%**	**36.5%**
Uncoated Corrugated Cardboard/Kraft Paper	6.9%	5.7%	2.3%	8.5%	3.7%	35.1%
Waxed Cardboard	0.7%	0.2%	0.0%	1.1%	4.5%	0.0%
High Grade Office Paper	0.6%	0.5%	1.5%	0.4%	0.8%	0.0%
Magazines/Catalogs	0.6%	0.7%	0.5%	0.4%	0.4%	0.0%
Newsprint	0.5%	0.5%	0.9%	0.3%	0.9%	0.4%
Other Recyclable Paper	3.6%	4.0%	4.6%	3.5%	1.1%	0.1%
Compostable Paper	7.3%	7.7%	8.3%	7.0%	7.8%	0.6%
Remainder/Composite Paper	4.2%	4.7%	4.2%	3.5%	5.1%	0.3%
Plastic	**14.7%**	**14.6%**	**15.3%**	**14.7%**	**18.8%**	**5.1%**
PET Beverage Containers (non-MA deposit containers)	1.0%	1.1%	1.1%	0.9%	0.9%	0.2%
PET Containers other than Beverage Containers	0.7%	0.7%	0.8%	0.6%	1.4%	0.2%
Plastic MA Deposit Beverage Containers	0.2%	0.2%	0.2%	0.2%	0.2%	0.1%
HDPE Bottles	0.7%	0.7%	0.9%	0.9%	0.6%	0.0%
#5 PP Bottles & Containers	0.9%	0.9%	1.0%	0.7%	1.8%	0.2%
Other Plastic Bottles & Containers (non-haz.)	0.3%	0.2%	0.6%	0.3%	1.0%	0.0%
Expanded Polystyrene Food Grade	0.3%	0.3%	0.4%	0.3%	0.5%	0.0%
Expanded Polystyrene Non-food Grade	0.2%	0.2%	0.1%	0.2%	0.3%	0.0%
Bulk Rigid Plastic Items	2.0%	2.7%	2.0%	0.8%	2.3%	1.9%
Film (non-bag clean com/industrial film)	1.0%	0.7%	0.2%	1.3%	2.5%	1.6%
Grocery and other Merchandise Bags	0.3%	0.3%	0.5%	0.2%	0.4%	0.1%
Other Film	5.4%	5.2%	5.2%	6.5%	5.9%	0.6%
Remainder/Composite Plastic	1.7%	1.5%	2.3%	1.9%	1.1%	0.3%
Metal	**4.6%**	**4.1%**	**4.5%**	**7.0%**	**1.5%**	**0.3%**
Al. Beverage Containers (non-MA deposit)	0.1%	0.2%	0.1%	0.2%	0.0%	0.0%
Al. MA Deposit Beverage Containers	0.3%	0.4%	0.4%	0.3%	0.2%	0.1%
Tin/Steel Containers	0.9%	0.9%	1.0%	1.0%	0.5%	0.2%
Other Aluminum	0.4%	0.4%	0.4%	0.4%	0.2%	0.0%
Other Ferrous and Non-Ferrous	1.1%	0.4%	0.7%	2.8%	0.1%	0.0%
White Goods	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Remainder/Composite Metal	1.8%	1.9%	1.9%	2.3%	0.3%	0.0%
Glass	**2.7%**	**3.2%**	**2.1%**	**3.3%**	**0.4%**	**0.0%**
Glass Beverage Containers (non-MA deposit)	1.2%	1.4%	0.8%	1.5%	0.1%	0.0%
Other Glass Pkg Containers (non-MA deposit)	0.6%	0.7%	0.7%	0.5%	0.2%	0.0%
Glass MA Deposit Beverage Containers	0.4%	0.6%	0.3%	0.4%	0.1%	0.0%
Remainder/Composite Glass	0.6%	0.5%	0.4%	0.9%	0.1%	0.0%
Organics	**29.6%**	**27.4%**	**35.0%**	**29.1%**	**42.7%**	**13.5%**
Food Waste	20.5%	20.6%	17.8%	24.7%	19.8%	0.3%
Branches and Stumps	0.6%	1.3%	0.0%	0.0%	0.0%	0.0%
Prunings, Trimmings, Leaves and Grass	0.6%	0.8%	1.2%	0.1%	0.0%	0.0%
Manures	0.4%	0.0%	2.5%	0.0%	0.0%	0.0%
Remainder/Composite Organic	7.6%	4.7%	13.5%	4.3%	22.9%	13.2%
C&D	**11.8%**	**13.6%**	**7.7%**	**11.7%**	**3.9%**	**22.0%**
Asphalt Pavement, Brick, and Concrete	0.3%	0.6%	0.0%	0.1%	0.6%	0.0%
Aggregates, Stone, Rock, Soil, Fines	0.6%	1.2%	0.1%	0.0%	0.0%	0.0%
Wood - Treated	2.9%	2.9%	2.1%	3.5%	0.2%	7.3%
Wood - Untreated	2.3%	1.5%	0.8%	3.3%	0.5%	14.7%
Asphalt Roofing	0.6%	1.0%	0.0%	0.6%	0.0%	0.0%
Drywall/Gypsum Board	0.7%	0.9%	0.0%	0.8%	0.0%	0.0%
Carpet and Carpet Padding	2.3%	3.3%	0.2%	2.6%	0.0%	0.0%
Remainder/Composite C&D	2.2%	2.3%	4.4%	0.9%	2.6%	0.0%

Table 3-4 Comparison of Waste Composition by Truck Type (continued)

Material	Aggregate	Rear Load	Side Load	Front Load	Roll-off Compactor	Roll-off Open Top
Household Hazardous Waste	**3.4%**	**3.5%**	**3.0%**	**3.4%**	**4.8%**	**0.2%**
Ballasts, CFLs, and Other Fluorescents	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Batteries - Lead Acid	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Batteries - Other	0.1%	0.2%	0.1%	0.0%	0.0%	0.0%
Paint	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Bio-Hazardous	3.1%	3.0%	2.9%	3.2%	4.6%	0.0%
Vehicle and Equipment Fluids	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Empty Mtl, Glass, & Plas. Cont. (former HHW)	0.1%	0.2%	0.0%	0.1%	0.2%	0.2%
Other Hazardous or HHW	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%
Electronics	**0.4%**	**0.2%**	**1.2%**	**0.4%**	**0.0%**	**0.0%**
Computer-related Electronics	0.2%	0.0%	1.2%	0.1%	0.0%	0.0%
Other "Brown Goods"	0.2%	0.2%	0.0%	0.3%	0.0%	0.0%
Televisions and Computer Monitors	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other	**8.2%**	**9.3%**	**8.8%**	**5.7%**	**3.8%**	**22.4%**
Tires and Other Rubber	0.2%	0.0%	0.7%	0.1%	0.0%	0.0%
Textiles	3.7%	3.9%	5.0%	2.9%	1.9%	5.0%
Bulky Materials	2.4%	3.7%	0.0%	0.0%	0.0%	17.2%
Mattresses	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%
Restaurant Fats, Oils and Grease	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other Miscellaneous	2.0%	1.5%	3.0%	2.7%	1.8%	0.2%
Totals	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
Sample Count	**54**	**25**	**8**	**15**	**4**	**2**

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

3.4 COMPARISON WITH PRIOR WASTE COMPOSITION

As a final note, this study updates comparable studies performed in 2010, 2013, 2016, and 2019and contains the same results sets as in these prior studies. For the convenience of the reader, Table 3-5 compares the aggregate waste composition from this 2022 update with the previous studies. Similar comparisons can be made for all of the results contained in this 2022 Study update.

Table 3-5 Comparison of 2022 Results with Prior Studies

Material	2022 Aggregate	2019 Aggregate	2016 Aggregate	2013 Aggregate	2010 Aggregate
Paper	**24.4%**	**24.3%**	**20.7%**	**25.0%**	**23.7%**
Uncoated Corrugated Cardboard/Kraft Paper	6.9%	6.7%	8.3%	6.8%	9.2%
Waxed Cardboard	0.7%	0.2%	0.2%	0.9%	0.1%
High Grade Office Paper	0.6%	0.3%	0.6%	1.0%	0.9%
Magazines/Catalogs	0.6%	0.7%	0.7%	1.8%	1.4%
Newsprint	0.5%	1.1%	0.7%	1.8%	1.5%
Other Recyclable Paper	3.6%	2.9%	3.6%	4.0%	4.6%
Compostable Paper	7.3%	9.9%	5.9%	6.9%	4.7%
Remainder/Composite Paper	4.2%	2.4%	0.7%	1.8%	1.4%
Plastic	**14.7%**	**16.7%**	**13.0%**	**14.8%**	**13.4%**
PET Beverage Containers (non-MA deposit con	1.0%	1.0%	0.8%	0.6%	0.6%
PET Containers other than Beverage Container	0.7%	0.4%	0.2%	0.2%	0.2%
Plastic MA Deposit Beverage Containers	0.2%	0.1%	0.1%	0.1%	0.1%
HDPE Bottles	0.7%	0.4%	0.4%	0.6%	0.4%
#5 PP Bottles & Containers	0.9%	N/A	N/A	N/A	N/A
Other Plastic Bottles & Containers (non-haz.)	0.3%	N/A	N/A	N/A	N/A
Injection Molded Plastic Tubs/Lids	N/A	0.2%	0.4%	0.5%	0.2%
#3 - #7 Plastic Containers	N/A	1.2%	0.3%	0.7%	0.4%
Expanded Polystyrene Food Grade	0.3%	0.5%	0.3%	1.7%	0.4%
Expanded Polystyrene Non-food Grade	0.2%	0.1%	0.2%	0.1%	0.3%
Bulk Rigid Plastic Items	2.0%	1.5%	1.0%	1.6%	3.1%
Film (non-bag clean com/industrial film)	1.0%	0.8%	0.6%	1.2%	0.2%
Grocery and other Merchandise Bags	0.3%	0.5%	0.3%	0.7%	0.5%
Other Film	5.4%	6.0%	5.0%	4.9%	3.2%
Remainder/Composite Plastic	1.7%	4.1%	3.4%	1.7%	3.7%
Metal	**4.6%**	**4.1%**	**4.3%**	**3.0%**	**5.5%**
Al. Beverage Containers (non-MA deposit)	0.1%	0.0%	0.0%	0.1%	0.0%
Al. MA Deposit Beverage Containers	0.3%	0.3%	0.1%	0.1%	0.1%
Tin/Steel Containers	0.9%	0.6%	0.7%	0.5%	0.7%
Other Aluminum	0.4%	0.4%	0.3%	0.4%	0.2%
Other Ferrous and Non-Ferrous	1.1%	2.0%	0.7%	0.4%	1.7%
White Goods	0.0%	0.0%	0.3%	0.4%	0.6%
Remainder/Composite Metal	1.8%	0.8%	2.1%	1.0%	2.2%
Glass	**2.7%**	**4.3%**	**1.9%**	**2.2%**	**1.7%**
Glass Beverage Containers (non-MA deposit)	1.2%	2.2%	0.7%	0.7%	0.4%
Other Glass Pkg Containers (non-MA deposit)	0.6%	0.8%	0.4%	0.4%	0.3%
Glass MA Deposit Beverage Containers	0.4%	0.7%	0.2%	0.6%	0.3%
Remainder/Composite Glass	0.6%	0.6%	0.6%	0.3%	0.6%
Organics	**29.6%**	**23.4%**	**29.9%**	**27.9%**	**21.3%**
Food Waste	20.5%	18.0%	26.3%	20.5%	14.4%
Branches and Stumps	0.6%	0.0%	0.0%	0.0%	1.9%
Prunings, Trimmings, Leaves and Grass	0.6%	2.8%	2.2%	3.4%	2.7%
Manures	0.4%	0.1%	0.0%	0.1%	0.6%
Remainder/Composite Organic	7.6%	2.5%	1.4%	3.9%	1.8%

Table 3-6 Comparison of 2022 Results with Prior Studies (continued)

Material	2022 Aggregate	2019 Aggregate	2016 Aggregate	2013 Aggregate	2010 Aggregate
C&D	**11.8%**	**14.9%**	**16.9%**	**8.9%**	**13.2%**
Asphalt Pavement, Brick, and Concrete	0.3%	0.4%	0.0%	0.3%	0.1%
Aggregates, Stone, Rock, Soil, Fines	0.6%	0.1%	0.4%	0.3%	0.5%
Wood - Treated	2.9%	6.0%	5.9%	2.2%	5.4%
Wood - Untreated	2.3%	2.0%	1.7%	0.8%	2.5%
Asphalt Roofing	0.6%	0.0%	0.6%	0.0%	0.5%
Drywall/Gypsum Board	0.7%	0.7%	0.6%	0.8%	0.4%
Carpet and Carpet Padding	2.3%	3.3%	4.4%	1.8%	2.8%
Remainder/Composite C&D	2.2%	2.4%	3.3%	2.7%	1.0%
Household Hazardous Waste	**3.4%**	**4.3%**	**5.1%**	**2.8%**	**2.9%**
Ballasts, CFLs, and Other Fluorescents	0.0%	0.0%	0.0%	0.3%	0.0%
Batteries - Lead Acid	0.0%	0.0%	0.0%	0.0%	0.1%
Batteries - Other	0.1%	0.1%	0.0%	0.1%	0.1%
Paint	0.0%	0.0%	0.0%	0.0%	0.1%
Bio-Hazardous	3.1%	3.9%	4.4%	2.2%	2.4%
Vehicle and Equipment Fluids	0.0%	0.0%	0.3%	0.1%	0.0%
Empty Mtl, Glass, & Plas. Cont. (former HHW)	0.1%	0.1%	0.2%	0.0%	0.1%
Pesticides and Fertilizers	N/A	N/A	N/A	0.0%	0.0%
Other Hazardous or HHW	0.1%	0.1%	0.3%	0.0%	0.1%
Electronics	**0.4%**	**0.7%**	**1.2%**	**1.6%**	**4.1%**
Computer-related Electronics	0.2%	0.2%	0.1%	0.6%	0.9%
Other "Brown Goods"	0.2%	0.5%	0.7%	0.8%	2.1%
Televisions and Computer Monitors	0.0%	0.0%	0.4%	0.2%	1.1%
Other	**8.2%**	**7.4%**	**7.0%**	**13.8%**	**14.2%**
Tires and Other Rubber	0.2%	0.6%	0.6%	2.5%	2.1%
Textiles	3.7%	2.8%	5.1%	5.2%	6.0%
Bulky Materials	2.4%	2.5%	0.8%	4.3%	3.4%
Mattresses	0.0%	0.0%	0.0%	N/A	N/A
Restaurant Fats, Oils and Grease	0.0%	0.0%	0.0%	0.2%	0.0%
Other Miscellaneous	2.0%	1.4%	0.4%	1.7%	2.6%
Totals	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
Sample Count	**54**	**52**	**52**	**52**	**52**

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

Injection Molded Tubs/Lids and #3 - #7 Plastics were replaced in 2022 with #5 PP Bottles & Containers and Other Plastic Bottles & Containers (non-hazardous), respectively.

APPENDIX A

MATERIAL CATEGORIES & DEFINITIONS

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APPENDIX A – MATERIAL DEFINITIONS

A 1. PRIMARY CATEGORIES (9)

1. Paper
2. Plastics
3. Metals
4. Glass
5. Organic Materials
6. Construction and Demolition (in the MSW stream)
7. Household Hazardous Materials
8. Electronics
9. Other Waste

A 2. SECONDARY CATEGORIES (62)

Paper

1. Uncoated Corrugated Cardboard/Kraft Paper means corrugated boxes or paper bags made from Kraft paper. Uncoated Corrugated Cardboard has a wavy center layer and is sandwiched between the two outer layers and does not have any wax coating on the inside or outside. Examples include entire cardboard containers, such as shipping and moving boxes, computer packaging cartons, and sheets and pieces of boxes and cartons. This type does not include chipboard. Examples of Kraft paper include paper grocery bags, un-soiled fast food bags, department store bags, and heavyweight sheets of Kraft packing paper.

2. Waxed Cardboard means cardboard with wax coating on the inside or outside.

3. High Grade Office Paper means the type of paper that is free of ground wood fibers; usually sulfite or sulphate paper; includes office printing and writing papers such as white ledger, color ledger, envelopes, and computer printout paper, bond, rag, or stationary grade paper. This subtype does not include fluorescent dyed paper or deep-tone dyed paper such a goldenrod colored paper.

4. Magazines/Catalogs means items made of glossy coated paper. This paper is usually slick, smooth to the touch, and reflects light. Examples include glossy magazines, catalogs, brochures, and pamphlets.

5. Newsprint means the class or kind of paper chiefly used for printing newspapers – i.e. uncoated groundwood paper.

6. Other Recyclable Paper means paper, other than the paper mentioned above, which can be recycled. Examples include manila folders, manila envelopes, index cards, white envelopes, notebook paper, carbonless forms, junk mail, chipboard and uncoated paperboard, phone directories, non-glossy catalogs, offshore cardboard and deep-toned or fluorescent dyed paper.

7. Compostable Paper means low grade paper that is not capable of being recycled, as well as food contaminated paper. Examples include paper towels, paper plates, waxed papers, egg cartons, pizza boxes, and tissues.

8. Remainder/Composite Paper means items made mostly of paper but combined with large amounts of other materials such as plastic, metal, glues, foil, and moisture. Examples include plastic coated corrugated cardboard, cellulose insulation, aseptic packages, poly-coated (gable top) cartons, blueprints,

sepia, onionskin, foiled lined fast food wrappers, frozen juice containers, carbon paper, self-adhesive notes, softcover and hardcover books, and photographs.

Plastics

9. PET Beverage Containers (non-MA deposit containers) means clear or colored PET beverage bottles other than MA deposit containers (water, flavored water, juice, sports drinks, etc.). When marked for identification, it bears the number —1 in the center of the triangular recycling symbol and may also bear the letters "PETE" or "PET". A PET container usually has a small dot left from the manufacturing process, not a seam.

10. PET Containers other than Beverage Containers (which originally contained non-hazardous material) means types of containers such as PET jars, rectangular PET containers used for produce; egg cartons, etc.

11. Plastic MA Deposit Beverage Containers means plastic beverage containers subject to MA's bottle bill and marked as deposit containers in Massachusetts.

12. HDPE Bottles, colored and natural, (which originally contained non-hazardous material) means natural and colored HDPE containers. This plastic is usually either cloudy white, allowing light to pass through it (natural) or a solid color, preventing light from passing through it (colored). When marked for identification, it bears the number "2" in the triangular recycling symbol and may also bear the letters "HDPE".

13. #5 PP Bottles & Containers includes bottles (other than those marked for MA deposit), tubs, lids, trays, clamshells and other containers labeled #5 PP.

14. Other Plastic Bottles & Containers (which originally contained non-hazardous material) means plastic bottles (other than those marked for MA deposit), tubs, tubes, trays, clamshells and other containers made of types of plastic other than PET, HDPE or PP. These containers are rigid (i.e., not expanded or film) plastic, and when marked for identification, may bear the number 3, 4, 6, or 7 in the triangular recycling symbol. This subtype also includes unmarked plastic containers.

15. Expanded Polystyrene Food Grade means "Styrofoam" products includes food packaging and finished products made of expanded polystyrene including cups, plates, trays, clamshells, etc.

16. Expanded Polystyrene Non-food Grade includes non-food packaging and finished products made of expanded polystyrene including packing peanuts and other packaging materials.

17. Bulk Rigid Plastic Items means plastic objects other than disposable package items. These items are usually made to last for a few months up to many years. These include the plastics used in children toys, furniture, plastic landscape ties, buckets, crates, pallets, sporting goods, etc.

18. Film (non-bag clean commercial and industrial packaging film) means film plastic used for large-scale packaging or transport packaging. Examples include shrink-wrap, mattress bags, furniture wrap, and film bubble wrap.

19. Grocery and other Merchandise Bags means plastic shopping bags, used to contain merchandise to transport from the place of purchase, given out by the store with the purchase. Includes dry-cleaning plastic bags intended for one-time use and other plastic film commonly recycled with grocery bags.

20. Other Film means plastic film Examples include garbage bags and other types of plastic bags (sandwich bags, zipper-recloseable bags, produce bags, frozen vegetable bags, newspaper bags), painting tarps, food wrappers such as candy-bar wrappers, mailing pouches, bank bags, X-ray film, metallized film (wine containers and balloons), and plastic food wrap.

21. Remainder/Composite Plastic means plastic that cannot be put in any other type or subtype. This type includes items made mostly of plastic but combined with other materials. Examples include auto parts made of plastic attached to metal, plastic drinking straws, foam packing blocks (not including expanded polystyrene blocks), plastic strapping, new plastic laminate (e.g., Formica), vinyl, linoleum, plastic lumber, imitation ceramics, handles and knobs, some kitchen ware, plastic string (as used for hay bales), and plastic rigid bubble/foil packaging (as for medications); CD's, and rigid plastic housewares, such as mop buckets, dishes, cups, and cutlery.

Metals

22. Aluminum Beverage Containers (non-MA deposit containers) means beverage containers made from aluminum other than MA deposit containers.

23. Aluminum MA Deposit Beverage Containers means metal beverage containers subject to MA's bottle bill and marked as deposit containers in Massachusetts.

24. Tin/Steel Containers means rigid containers made mainly of steel, such as food and beverage containers. These items will stick to a magnet and may be tin-coated.

25. Other Aluminum – includes foil, food containers, aerosols (empty), etc.

26. Other Ferrous and Non-Ferrous means any iron or steel that is magnetic and metal items that are not magnetic (copper, brass, lead, zinc, etc). This subtype does not include "tin/steel containers". Examples include empty or dry paint cans, structural steel beams, boilers, clothes hangers, pipes, some cookware, security bars, scrap ferrous/nonferrous items, and galvanized items such as nails and flashing.

27. White Goods means appliances that employ electricity, oil, natural gas, or liquefied propane and to preserve or cook food; wash or dry clothing, kitchen utensils, or related items; or to cool or heat air or water. These are primarily encased in metal, and include items such as refrigerators, freezers, stoves, water heaters, propane/compressed tanks, water coolers, dishwashers, clothes dryers, air conditioners, gas or electric ovens and ranges. White goods does not include microwaves.

28. Remainder/Composite Metal means metal that cannot be put in any other type. This type includes items made mostly of metal but combined with other materials and items made of both ferrous metal and nonferrous metal combined. Examples include microwaves, bikes, motors, insulated wire, and finished products that contain a mixture of metals, or metals and other materials, whose weight is derived significantly from the metal portion of its construction.

Glass

29. Glass Beverage Containers (non-MA deposit containers) includes wine bottles, nonalcoholic beverage containers, liquor bottles, etc.

30. Other Glass Packaging Containers (non-MA deposit containers) includes glass food and non-food containers such as sauces, jars, perfume containers, etc.

31. Glass MA Deposit Beverage Containers means glass beverage containers subject to MA's bottle bill and marked as deposit containers in Massachusetts.

32. Remainder/Composite Glass means glass that cannot be put in any other type. It may include items made mostly of glass but combined with other materials. Examples include Pyrex, Corningware, crystal, plate glass, window and door glass, ceramics, porcelain, and other glass tableware, mirrors, non-fluorescent light bulbs, auto windshields, laminated glass, or any curved glass.

Organic Materials

33. Food Waste means food material resulting from the processing, storage, preparation, cooking, handling, or consumption of food. This type includes material from industrial, commercial, or residential sources. Examples include discarded meat scraps, dairy products, eggshells, fruit or vegetable peels, and other food items from homes, stores and restaurants. This type includes apple pomace and other processed residues or material from canneries, wineries or other industrial sources.

34. Branches and Stumps means trees, stumps, branches, or other wood greater than 1 inch in diameter generated from landscapes, clearing land for commercial or residential development, road construction, agricultural land clearing, storms, or natural disaster.

35. Prunings, Trimmings, Leaves and Grass means plant material, except woody material 1inch or less in diameter from any public or private landscapes. Examples include branches, prunings, shrubs, leaves, grass clippings, and plants. This subtype does not include woody material greater than 4 inches in diameter.

36. Manures means manure and soiled bedding materials from domestic, farm, wild, or ranch animals. Examples include manure and soiled bedding from animal production operations, racetracks, riding stables, animal hospitals, laboratories, zoos, nature centers, and other sources.

37. Remainder/Composite Organic means organic material that cannot be put in any other type or subtype. This type includes items made mostly of organic materials but combined with other materials. Examples include cork, hemp rope, hair, cigarette butts, full vacuum bags, sawdust, and animal feces.

Construction and Demolition (in the MSW stream)

38. Asphalt Pavement, Brick, and Concrete includes asphalt pavement, brick, and concrete from construction activities and demolition of buildings, roads, and bridges and similar sources. Asphalt pavement also includes other black or brown, tar-like material mixed with aggregate and used as a paving material. Brick also includes masonry brick, landscaping or walkway brick. Concrete also includes pieces of building foundations, concrete paving, and cinder blocks.

39. Aggregates, Stone, Rock, Soil, Fines includes non-organic material from construction and landscaping activities. May also include products made predominately from these materials (i.e. granite counters).

40. Wood - Treated means wood that contains an adhesive, paint, stain, fire retardant, pesticide or preservative.

41. Wood - Untreated refers to any wood which does not contain an adhesive, paint, stain, fire retardant, pesticide or preservative; includes such items as pallets, skids, spools, packaging materials, bulky wood waste or scraps from newly built wood products. Does not including land clearing debris or yard waste prunings and trimmings

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

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

44. Carpet and Carpet Padding means flooring applications consisting of various natural or synthetic fibers which maybe bonded to some type of backing material and plastic, foam, felt, or other material used under carpet to provide insulation and padding.

45. Remainder/Composite Construction and Demolition means construction and demolition material that cannot be put in any other type or subtype. This type may include items from different types combined, which would be very hard to separate.

Household Hazardous Waste

46. Ballasts, CFLs, and Other Fluorescents include ballasts, which are devices that electrically control fluorescent light fixtures and that include a capacitor, CFLs, which are compact fluorescent bulbs, and other fluorescent lighting, which includes tubular fluorescent lamps, neon lamps, black lights, and other lamps used for sanitation or cosmetic purposes.

47. Batteries – Lead Acid means lead acid storage batteries most commonly used in vehicles such as cars, trucks, boats, etc.

48. Batteries – Other means alkaline (including alkaline rechargeable) or household batteries such as AA, AAA, C, D, 4.5-volt, button cell, rechargeable and 9-volt used for flashlights, small appliances, and electronic devices.

49. Paint means containers with paint in them. Examples include latex paint, oil-based paint, and tubes of pigment or fine art paint. This type does not include dried paint, empty paint cans, or empty aerosol containers.

50. Bio-Hazardous - means discarded animal or human medical/treatment wastes including needles, first aid wastes, diapers and other products which are used in relation to animal or human care. This category does not include cat litter or animal feces.

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

52. Empty Metal, Glass, and Plastic Containers (that originally contained toxic materials) means all containers that are empty but that at one time contained toxic or hazardous fluids or other materials. Examples include empty antifreeze, oil, or lye containers.

53. Other Hazardous or Household Hazardous Waste means all household or commercial products characterized as toxic, corrosive, flammable, ignitable, radioactive, poisonous, or reactive. Includes pesticides and fertilizers.

Electronics

54. Computer-related Electronics includes computer CPUs, laptop computers, notebook computers, processors, printers, scanners, keyboards, etc. This category does not include automated typewriters or typesetters, portable handheld calculators, portable digital assistants or other similar devices.

55. Other "Brown Goods" includes cell phones, iPods, PDAs, small electronic appliances such as toasters, telephones, stereos, radios, clocks, hair dryers etc.

56. Televisions and Computer Monitors means a stand-alone display system containing a CRT or any other type of display primarily intended to receive video programming via broadcast. Examples also include non-CRT units such as plasma and LCD monitors.

Other Materials

57. Tires and other rubber means a continuous solid or pneumatic rubber covering intended for use on any type of vehicle (including bicycles), or trailer to be used in tandem with any type vehicle and other rubber products.

58. Textiles means natural or man-made textile materials such as cottons, wools, silk, nylon, polyester. Includes clothing, curtains, towels and other fabric materials.

59. Mattresses – means mattresses and box springs.

60. Bulky Materials means products made from multiple materials and large in size, which are meant for extended use. Includes furniture (non-plastic), sinks, toilets, and other non-metal items

61. Restaurant Fats, Oils and Grease means any fats, oils and grease generated from the food preparation process.

62. Other Miscellaneous means any other type of waste not listed in any other sort category.

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