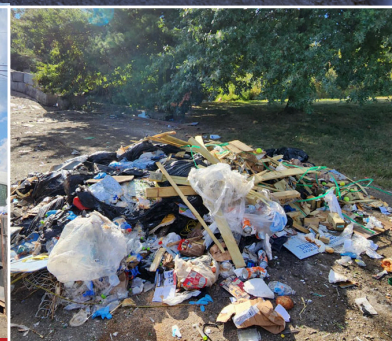




Waste Characterization Study FINAL REPORT

April 17, 2023




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1. INTRODUCTION

1.1 OVERVIEW

The University of Kentucky (UK) is a large public research university located in Lexington. The campus has a broad range of resources where approximately 20,000 students reside annually. UK touts a Division I athletics department with 22 sports programs dedicated to competing at the highest level nationally and in the Southeastern Conference. From stadiums, to classrooms, dining, housing, hospitals, medical offices, and research buildings, the campus spans 918 acres.

The UK has a fluid, but dedicated and well-developed Sustainability Strategic Plan. Released in 2018, the Sustainability Plan strives each year to improve upon its six identified and interwoven pillars: Socio-Economical, Social Progress, Socio-Environmental, Economic Growth, Eco-Efficiency, and Environmental Stewardship. As part of the overarching Environmental Stewardship pillar, Zero Waste has been listed as one of many primary focus areas. The mission to achieve Zero Waste is to gain a deeper understanding of the life of materials at the UK; engage in education, waste reduction, landfill diversion and seek to improve the sustainability of material purchased across all areas in the University. One of the actionable steps in addressing the Zero Waste mission is to better understand UK's waste stream and program performance by conducting waste audits. MSW Consultants was retained in 2023 to update a campus-wide material composition study from an inaugural study conducted in 2018 (2018 Study).

At the time of this first study, recycling programs on campus were in place for single stream recycling and a variety of divertible materials (e.g., electronics, hazardous waste, construction and demolition material). The 2018 study focused on characterizing only the University's disposed waste stream, which served as a baseline understanding for the types and quantities of potentially recoverable waste generated on campus.

By 2022 the University had improved its recycling and diversion programs and mostly recovered from facility operation disruptions as a result of the Covid-19 pandemic. MSW Consultants was engaged to update the campus-wide waste characterization study to assess changes to disposal behaviors, and also to evaluate the composition and contamination of the current recyclable stream for the first time. The main goals of the 2022 Study included:

- ◆ Determine the main waste generating functions (hospitals, dorms, general campus, etc.) within the campus.
- ◆ Representatively obtain samples of wastes and recyclables generated within each of the identified functions.
- ◆ Conduct a sort to quantify the material types and quantities in the waste and recycling streams, by each generator sector.
- ◆ Identify the prevalence of cross-contamination between the waste and recycling streams and opportunities to improve diversion based on the type and quantity of potentially recoverable materials still present in the disposed waste stream.
- ◆ Analyze the resulting refuse and recycling generation and composition data, and compare these results to the 2018 Study data.

1.2 SIMILARITIES & DIFFERENCES

The 2022 and 2018 waste characterization studies followed identical methodologies. The following elements of the 2022 study design were enhanced and/or modified from the 2018 Study.

1. INTRODUCTION

- ◆ **Single Stream Recycling Assessment:** Similar to the 2018 study, the 2022 study included a plan to sample from all targeted generator sectors/campus buildings that had recycling service. Incorporating recyclables into the composition analysis enabled the calculation of capture rates.
- ◆ **Updated Generator Sectors:** Based on feedback from UK staff, the defined generator sectors were reduced from seven to six so that sampling could better focus on the highest and most variable waste generating activities.

1.3 REPORT ORGANIZATION

The remainder of this report presents the 2022 Study findings and is further divided into the following sections:

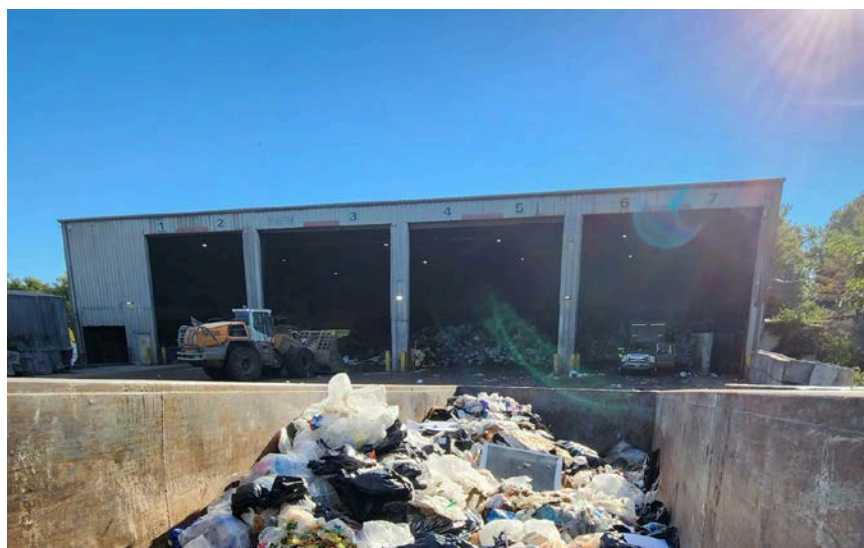
- ◆ **Methodology:** Summarizes the University's waste and recycling generator sectors and annual tonnages as well as the sampling plan, field data collection procedures and analytical methods used in the study.
- ◆ **Results:** Provides detailed composition results of the University's waste and recycling streams selected for sampling. Results are presented in both tabular and graphical format and include comparisons to the 2018 Study.
- ◆ **Conclusions and Recommendations:** Presents the final conclusions and recommendations for further consideration by the University.
- ◆ **Appendices:** Supplemental results tables and other study details are provided in the appendices.

2. METHODOLOGY

2.1 STUDY DESIGN

MSW Consultants generally followed the 2018 Study methodology. The 2022 Study was performed over one week at Lexington's Bluegrass Transfer Station on Old Frankfort Pike from September 19 through 23, 2022. The University's primary hauler, Central Kentucky Hauling delivers waste and recycling to the Bluegrass Transfer Station, shown in Figure 2-1. Compared to the 2018 Study, minimal material is hauled directly by the University's own collection vehicles.

Figure 2-1 Bluegrass Transfer Station



2.1.1 WASTE GENERATOR SECTORS

The University identified six generator sectors to be studied in 2022. Generator sectors are based on the unique functions that occur on a university campus. The following generator sectors were included in the 2022 waste composition study:

- ◆ **Front Loader Truck:** Mixed waste collected daily from throughout campus locations such as student and office buildings, medical offices, athletic fields, and laboratories. Recycling is collected on this route Mondays and Thursdays. Football waste is collected with the front loader truck on Mondays following home games, separate from the other campus waste, so that this material is weighed separately for record keeping.
- ◆ **General Campus:** Waste and recycling collected from compactors located at research buildings, laboratories, classroom/office buildings, and medical offices.
- ◆ **Dorms:** Includes waste and recycling collected from compactors located at student housing.
- ◆ **Dining:** Includes front- and back-of-house waste and recycling from compactors used by dining halls, cafeterias, restaurants, and cafes.
- ◆ **Football Stadium:** Includes front- and back-of-house waste and recycling from the stadium's tailgate, seating, event and food generating areas that is collected through a front loader dumpster route, compactor service and open top roll-offs. Open top roll-off service is a new route for the football stadium as of 2022.

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- ◆ **Hospital:** Includes waste and recycling collected from the compactors located at the on-campus hospital loading docks.

The 2018 Study included an additional generator sector for a bulky dump truck route. This material stream was omitted from the 2022 Study in favor of capturing material from new campus buildings that may have more variable waste.

The annual tonnage for disposed waste and recycling by the University is shown in Table 2-1. Of the six generator sectors studied in 2022, the Hospital sector remains the largest proportion of the disposed solid waste stream, despite a slight reduction in waste disposal from 2018 to 2022.

Table 2-1 Annual Tonnage by Generator Sector

Generator Type	2018		2022	
	Waste-to-Landfill Tons	Percent of Total	Waste-to-Landfill Tons	Percent Total
Front Loader Truck	3,014	29.7%	1,461	19.3%
General Campus	1,236	12.2%	786	10.4%
Dorms	366	3.6%	360	4.8%
Dining	666	6.6%	493	6.5%
Football Stadium	151	1.5%	357	4.7%
Hospital	4,718	46.5%	4,106	54.3%
Total	10,151	100.0%	7,562	100.0%
<i>Recycled/Diverted Tons</i>	<i>3,142</i>		<i>3,302</i>	
<i>Diversion Rate</i>	<i>31%</i>		<i>44%</i>	

As shown in this table, the quantity of waste to landfill decreased while the capture of recyclables slightly increased. As a result, UK was found to have increased its recycling rate.

2.1.2 SAMPLING PLAN

Based on the tonnage distribution and feedback from University staff that specified sample counts, MSW Consultants proposed to collect and sort 50 samples, divided between waste and recycling. The samples collected by generator sector and campus building are shown in Table 2-2.

Table 2-2 Sampling Distribution

Generator Sector	Refuse Samples	Recycling Samples	Total Samples
Front Load	10	4	14
Dining	2	2	4
The 90	1	1	2
Student Center	1	1	2
Football Stadium	3	4	7
Kroger Field	1	1	2
Gate 1 Football	2	2	4
Football Front Load	0	1	1
Hospital	4	2	6
Good Sam	1	0	1
Hospital PAV A (Dock 1)	2	0	2
Hospital PAV H (Dock 2)	1	2	3
Dorms	5	4	9
Haggin Hall	2	1	3
Holmes Hall	1	1	2
Dorm-Univ Flats North	1	1	2
Woodland Glenn 3	1	1	2
General Campus	6	4	10
Whitehall Trash	1	1	2
RB2	1	1	2
Taylor Lot	1	0	1
Wethington	2	1	3
Chem/Phys	1	1	2
Total	30	20	50

2.1.3 SEASONALITY

The 2022 Study was performed in September, a few weeks into the fall semester, to ensure the University was fully operational, and also to capture waste from a home football game. Saturday football waste and recycling was retrieved from the regular Monday collection route. All other generator sectors were sampled Monday through Friday, with refuse collection taking place daily and recycling only collected on Mondays and Thursdays, when the Bluegrass Transfer Station accepts recycling for transfer offsite.

2.1.4 MATERIAL CATEGORIES

University staff opted to retain the 2018 study categories for comparability with the 2022 study, with a few changes to material definitions primarily related to expansion of the single stream recycling program. The University changed recycling processors in May 2020 to a processor that accepts a wider variety of materials that were not allowable in the University's previous program.

The 2022 Study included the 66 material categories listed in Table 2-3. This table also shows the recoverability classification of each category, based on whether a material can be recycled or diverted from

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disposal. A complete list of material categories and definitions can be found in Appendix A. The recoverability classifications include the following categories:

- ◆ **Single Stream Recycling:** The University’s “All-in-One-Stream” recycling program includes traditional recyclables such as corrugated cardboard, fiber board/box board, office paper, newspaper, magazines, #1 and #2 plastics (plastic bottles and jugs), aluminum and steel cans, and glass bottles and jugs. However, this program was significantly expanded in 2020 to include:
 - ◆ Paper bags – white or brown, including empty fast food and gift bags
 - ◆ Pizza boxes – clean or dirty, including grease
 - ◆ Food boxes and cartons – including frozen meals and refrigerator beverage containers
 - ◆ Paper take out containers (any shape) – with or without a coating
 - ◆ Plastic food containers – such as clam shells, frozen meal trays
 - ◆ Plastic and paper cups – with or without a coating
 - ◆ Plastic #4 and #5 bottles, (e.g., saline bottles and other plastics like pipette holders)
 - ◆ Foil pans and aluminum foil
 - ◆ Food grade plastics (#4 and #5s) – such as plastic yogurt cups, peanut butter jars, butter and cottage cheese containers
- ◆ **Other Targeted Recyclables:** Recyclable items not accepted in the University’s single stream recycling but that the University has established an alternate recycling program for such as plastics and textiles generated by the Hospital.
- ◆ **Potential New Recyclables:** Includes items that are not currently recycled but may be recyclable by a third party.
- ◆ **Compostables:** There is a significant volume of materials which are fully compostable if they can be source-separated and kept free of contamination. These include:
 - ◆ **Food**, as long as it is removed from all packaging;
 - ◆ **Green Waste**, including leaves, grass clippings, and small brush and prunings; and
 - ◆ **Compostable Paper**, which includes low-grade, non-recyclable papers such as napkins and paper towels.
- ◆ **Potential C&D Recyclables:** Includes material generated from construction and demolition (C&D) activities that can be recycled if source separated and collected in sufficient volume.
- ◆ **HHW/E-waste Recycling:** The University currently collects certain electronic items and hazardous materials for recycling and/or appropriate disposal outside of the MSW stream such as televisions, computer hard drives, motor oil, light ballasts and batteries.
- ◆ **Non-Recoverable:** Materials that are not known to be recyclable or do not have a local market in Lexington or Fayette County.

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Table 2-3 Material Categories and Recoverability Classification

Paper	Recoverability Class	Organics	Recoverability Class
Corrugated Cardboard/Kraft Paper (Uncoated)	Single Stream Recycling	Food Waste	Compostable Food
Office Paper (High Grade)	Single Stream Recycling	Yard Waste Grass, Leaves & Brush	Compostable Green Waste
Mixed Recyclable Paper (Low Grade, ONP)	Single Stream Recycling	Miscellaneous Organics	Non-Recoverable
Magazines, catalogs, soft bound books	Single Stream Recycling	Pallets	Other Targeted Recyclable
Hardbound Books	Other Targeted Recyclable	C&D	Recoverability Class
Aseptic Boxes & Gable Top Cartons	Single Stream Recycling	Wood - Treated	Potential C&D Recyclable
Compostable Paper	Compostable Paper	Wood - Untreated	Potential C&D Recyclable
Remainder/Composite Paper	Non-Recoverable	Asphalt	Potential C&D Recyclable
Plastic	Recoverability Class	Asphalt Roofing	Potential C&D Recyclable
Plastics # 1 PET Bottles Only	Single Stream Recycling	Brick, Concrete, and Rock	Potential C&D Recyclable
Plastics #1 PET Non-bottle Containers	Single Stream Recycling	Carpet & Carpet Padding	Potential C&D Recyclable
Plastic # 2 (HDPE - Bottles & jugs)	Single Stream Recycling	Drywall/Gypsum Board	Potential C&D Recyclable
Plastic Containers #3 thru #7	Single Stream Recycling	Remainder/Composite C&D	Non-Recoverable
#4 Plastic Bottles	Single Stream Recycling	HHW	Recoverability Class
#5 Pipette holders and lids	Single Stream Recycling	Household Hazardous Waste	HHW/E-Waste Recycling
#5 Hospital pitchers, basins, saline bottles	Single Stream Recycling	Aerosol cans	HHW/E-Waste Recycling
#5 Christmas tree adaptors	Other Targeted Recyclable	Treated Medical Waste	HHW/E-Waste Recycling
Plastic Film & Bags - Clean	Other Targeted Recyclable	Batteries	HHW/E-Waste Recycling
Plastic Film & Bags - Other	Non-Recoverable	Ballasts	HHW/E-Waste Recycling
Data Storage Film	Other Targeted Recyclable	Lightbulbs	HHW/E-Waste Recycling
Expanded Polystyrene "Styrofoam"	Non-Recoverable	Paint	HHW/E-Waste Recycling
Polystyrene Lab transport containers	Potential New Recyclable	Electronics	Recoverability Class
Remainder/Composite Plastic	Non-Recoverable	Small Consumer Electronics	HHW/E-Waste Recycling
Metal	Recoverability Class	Computers and Related Electronics	HHW/E-Waste Recycling
Aluminum Cans	Single Stream Recycling	Flat screen Televisions and Monitors	HHW/E-Waste Recycling
Aluminum Containers, Plates and foils	Single Stream Recycling	CRT Televisions and Monitors	HHW/E-Waste Recycling
Steel Cans & Containers	Single Stream Recycling	Other	Recoverability Class
Other Ferrous (magnetic)	Other Targeted Recyclable	Mixed Medical Facility Waste	Non-Recoverable
Other Non-Ferrous (not magnetic)	Other Targeted Recyclable	Textiles	Potential New Recyclable
Remainder/Composite Metal	Non-Recoverable	Hospital Textiles	Other Targeted Recyclable
Refrigerators/Freezers	Potential New Recyclable	Rubber Products	Non-Recoverable
Glass	Recoverability Class	Disposable Diapers & Sanitary Products	Non-Recoverable
Glass Bottles and Jars (clear or colored)	Single Stream Recycling	Bottom Fines & Dirt	Non-Recoverable
Glass Containers - Non-Beverage	Single Stream Recycling	Other Bulky Items	Non-Recoverable
Glass Lab Containers	Other Targeted Recyclable	Old Furniture	Non-Recoverable
Remainder/Composite Glass	Non-Recoverable	Tires	Other Targeted Recyclable
		Other Miscellaneous	Non-Recoverable

2.2 FIELD DATA COLLECTION

The University, Central Kentucky Hauling and Bluegrass Transfer Station staff coordinated the successful delivery of targeted routes and trucks to the transfer station for analysis by MSW Consultants. University staff was instrumental in arranging hauler deliveries, identifying desired loads and meeting trucks to secure targeted material.

2.2.1 SAMPLE SELECTION

Trucks targeted for sampling were typically delivered between 4am and 4pm. Upon arrival of a pre-selected truck, University staff and the MSW Consultants Field Supervisor intercepted the truck to tip in a designated bay door at the transfer station, so the load remained separate from other collection vehicles. Once the load was tipped in the designated area, a skid steer operator was directed to retrieve systematic “grabs” from the perimeter or cross-section of the load. Several scoops of material were collected from

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each the load to ensure enough materials was available for the MSW Field Supervisor to make one to two samples from each pile. Material was brought from the tip floor to the sort area located at the top of the facility's truck turn around area, away from traffic.

From the tipped piles, the Field Supervisor photographed the sample area and loaded material for sorting into 35-gallon barrels until 200-250 pounds was achieved. The Field Supervisor then used a placard to assign a unique sample ID to the sample, photographed the sample and staged it adjacent to the sort table.

2.2.2 SORTING & DATA RECORDING

Staged samples were then individually placed on the sort table by the MSW Consultants Crew Chief. Samples were sorted into 5-gallon, 18-gallon and 35-gallon containers surrounding the sort label that were labeled with each material category, as shown in Figure 2-2. Samples were sorted down to a small particle size, approximately 1/2" or less, until a homogenous mix was achieved that could be allocated to the representative category such as Food Waste, Compostable Paper, or Bottom Fines & Dirt.

Figure 2-2 Sort Setup



The MSW Consultants field team was comprised of three professional traveling staff from MSW as well as three locally recruited sorters. Sorters were trained to specialize in select material categories as well as on the sample acquisition and weigh out process to aid the Field Supervisor and Crew Chief. MSW Consultants supervisors regularly checked each sort bin to ensure categories were accurately sorted. One each sample was weighed in its entirety, bins containing any material were moved to the weigh out scale and recorded in a tablet by the Crew Chief using MSW Consultant's *WasteInsight™* data management platform. The *WasteInsight™* program allows for photos and weights to be recorded for each individual sample. Once a sample is weighed in its entirety the pre- and post-sort weights can be compared to check for consistency, allowing for in the field QA/QC to review any potential errors and allow for sample targets to be tracked.

Following the weigh-out, MSW Consultants used two open top roll-offs provided by the transfer station for recycling and refuse discards to be kept separate for return to the designated areas of the transfer station tip floor. Sort bins were then reset in the same locations around the table before starting the next sample.

2.2.3 DATA ANALYSIS

Throughout the sort shift and at a minimum at the conclusion of each day, the electronic tablet was synced to *WasteInsight™*. Collected data was then statistically analyzed to determine the estimated weight and mean percent for each material category and waste and recycling generator sector. These results are presented in tabular and graphic format in the next section.

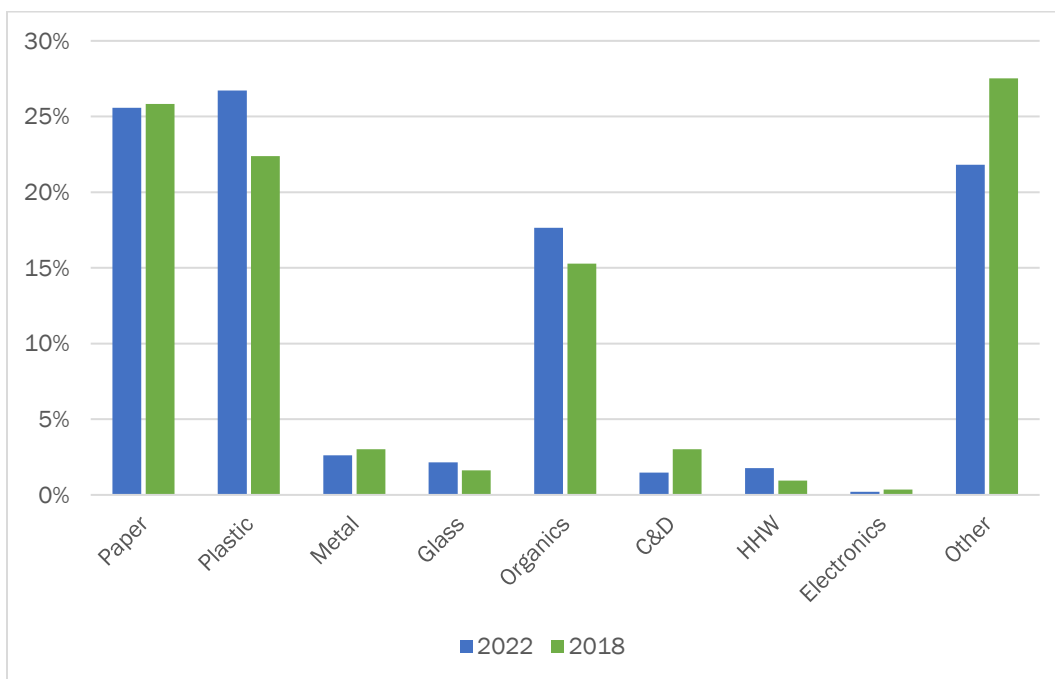
3. RESULTS

3.1 REFUSE COMPOSITION

This section presents the findings of the 2022 Study and compares these results with those from the 2018 Study where applicable. The aggregate waste stream is comprised of the six generator sectors selected for this study by the University, which include the Front Loader Truck route, General Campus, Dorms, Dining, Football Stadium, and Hospital. Results in this section focus on aggregate refuse data.

Figure 3-1 and Figure 3-2 show the percent composition and tonnage, respectively, by material group for the University’s aggregate waste stream. Plastics and Paper were the top disposed material categories in 2022, followed by Other and Organics. The Other category is primarily driven by the prevalence of Mixed Medical waste that is bagged or loose, collected from hospitals.

Figure 3-1 Weighted Refuse Composition by Material Group (Percent)



3. RESULTS

Figure 3-2 Weighted Refuse Composition by Material Group (Tons)

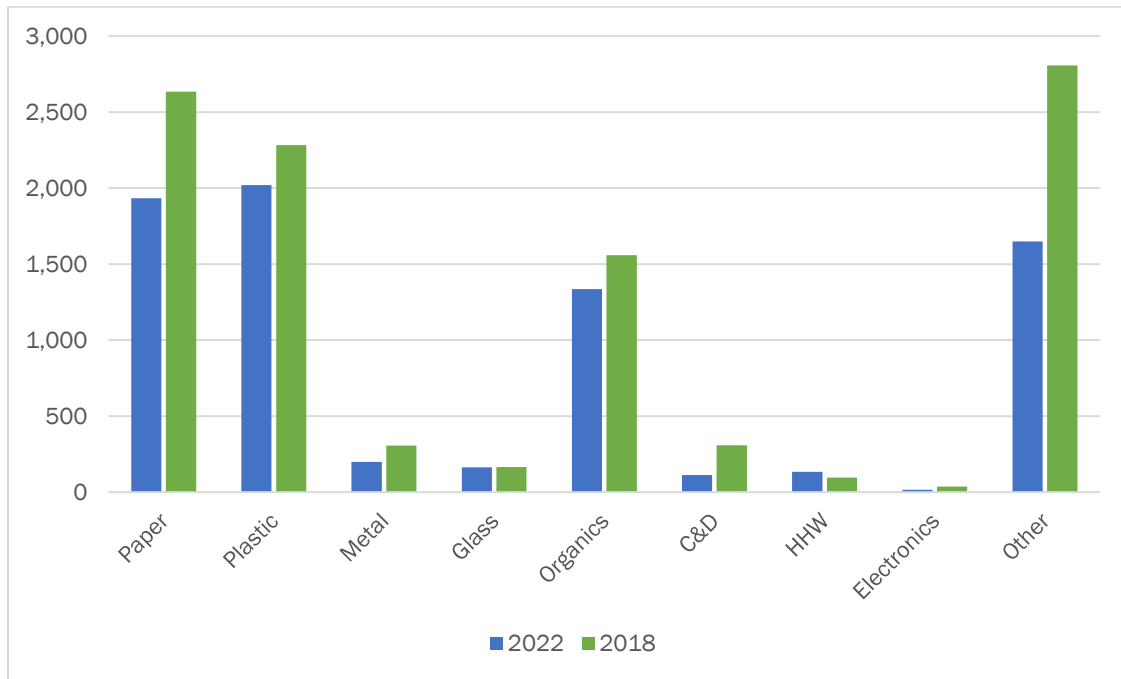
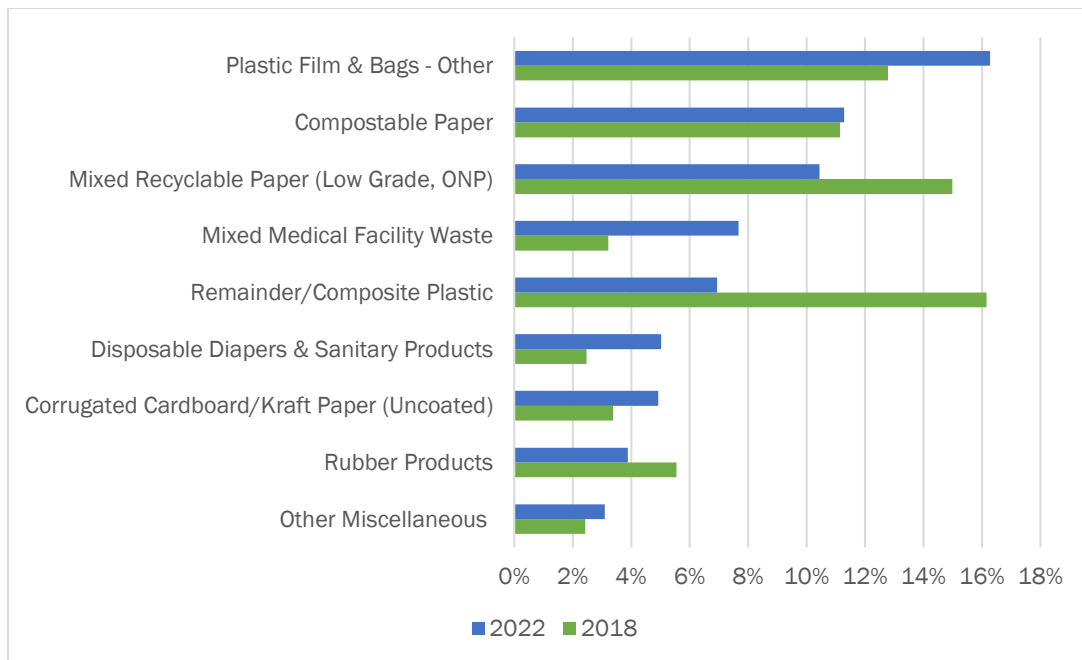


Figure 3-3 shows the 10 most commonly disposed material categories in UK’s waste stream. It is encouraging that, with the exception of Mixed Recyclable Paper and Corrugated Cardboard/Kraft Paper, the majority of these categories are difficult to recycle, or not currently recoverable, as there are limited to no markets for these materials.

Figure 3-3 Top 10 Materials in University Landfilled Waste



3. RESULTS

The detailed statistical results for the University’s weighted aggregate waste stream are shown in Table 3-1. For each material group and category, the mean composition, margin of error (MOE), and annualized tonnage are shown. Confidence intervals are calculated at a 90 percent level of confidence. It should be noted that the sum of the mean percentages for all of the individual materials within a material group sum to the mean percentage shown for the group, though sums may be slightly different due to rounding.

Table 3-1 Detailed Waste Composition

Material Category	Mean	MOE	Tons	Material Category	Mean	MOE	Tons
Paper	25.6%	3.0%	1,933.7	Organics	17.7%	2.9%	1,335.4
Corrugated Cardboard/Kraft Paper (Uncoated)	3.9%	1.1%	293.4	Food Waste	16.3%	3.2%	1,231.0
Office Paper (High Grade)	0.7%	0.6%	49.2	Yard Waste Grass, Leaves & Brush	0.1%	0.2%	7.8
Mixed Recyclable Paper (Low Grade, ONP)	7.7%	1.6%	579.9	Miscellaneous Organics	0.4%	0.3%	32.7
Magazines, catalogs, soft bound books	0.3%	0.3%	19.2	Pallets	0.8%	1.4%	63.8
Hardbound Books	0.3%	0.5%	23.2	C&D	1.5%	1.3%	111.4
Aseptic Boxes & Gable Top Cartons	0.4%	0.1%	31.5	Wood - Treated	0.4%	0.8%	30.3
Compostable Paper	10.4%	3.0%	789.7	Wood - Untreated	0.4%	0.3%	31.9
Remainder/Composite Paper	2.0%	0.6%	147.8	Asphalt	0.0%	0.0%	0.0
Plastic	26.7%	1.6%	2,019.7	Asphalt Roofing	0.0%	0.0%	0.0
Plastics # 1 PET Bottles Only	2.5%	1.0%	185.6	Brick, Concrete, and Rock	0.0%	0.0%	0.0
Plastics #1 PET Non-bottle Containers	0.7%	0.1%	55.7	Carpet & Carpet Padding	0.2%	0.5%	17.6
Plastic # 2 HDPE - Bottles and Jugs	0.8%	0.2%	57.6	Drywall/Gypsum Board	0.2%	0.1%	15.3
Plastic Containers #3 thru #7	2.4%	0.6%	177.8	Remainder/Composite C&D	0.2%	0.3%	16.9
#4 Plastic Bottles	0.1%	0.2%	4.1	HHW	1.8%	0.7%	133.4
#5 Pipette holders and lids	0.2%	0.2%	14.2	Household Hazardous Waste	0.0%	0.0%	2.9
#5 Hospital pitchers, basins, saline bottles	0.7%	0.2%	52.3	Aerosol cans	0.1%	0.0%	4.4
#5 Christmas tree adaptors	0.0%	0.0%	0.0	Treated Medical Waste	1.6%	0.7%	121.8
Plastic Film & Bags - Clean	0.7%	0.3%	52.2	Batteries	0.1%	0.0%	3.9
Plastic Film & Bags - Other	11.3%	0.9%	853.3	Ballasts	0.0%	0.0%	0.0
Data Storage Film	0.0%	0.0%	0.2	Lightbulbs	0.0%	0.0%	0.4
Expanded Polystyrene "Styrofoam"	2.2%	0.3%	167.1	Paint	0.0%	0.0%	0.0
Polystyrene (Styrofoam) Lab Containers	0.3%	0.1%	20.8	Electronics	0.2%	0.3%	15.3
Remainder/Composite Plastic	5.0%	0.9%	379.4	Small Consumer Electronics	0.1%	0.2%	6.4
Metal	2.6%	0.7%	198.3	Computers and Related Electronics	0.0%	0.0%	0.0
Aluminum Cans	0.8%	0.3%	61.4	Flat screen Televisions and Monitors	0.1%	0.3%	8.9
Aluminum Containers, Plates and foils	0.2%	0.1%	18.0	CRT Televisions and Monitors	0.0%	0.0%	0.0
Steel Cans & Containers	0.6%	0.4%	42.2	Other	21.8%	3.9%	1,650.2
Other Ferrous (magnetic)	0.4%	0.2%	30.7	Textiles	1.6%	0.3%	118.8
Other Non-Ferrous (not magnetic)	0.1%	0.0%	7.0	Hospital Textiles	0.5%	0.1%	35.1
Remainder/Composite Metal	0.5%	0.5%	39.0	Rubber Products	3.1%	0.6%	234.2
Refrigerators/Freezers	0.0%	0.0%	0.0	Disposable Diapers & Sanitary Products	4.9%	1.0%	372.7
Glass	2.2%	1.6%	163.4	Bottom Fines & Dirt	0.3%	0.1%	25.8
Glass Bottles and Jars (clear or colored)	1.4%	1.4%	107.0	Other Bulky Items	0.8%	1.3%	61.2
Glass Containers - Non-Beverage	0.1%	0.1%	7.0	Old Furniture	0.6%	1.2%	47.6
Glass Lab Containers	0.4%	1.0%	32.8	Tires	0.0%	0.0%	0.0
Remainder/Composite Glass	0.2%	0.2%	16.7	Other Miscellaneous	3.0%	1.4%	229.9
	0.0%	0.0%	0.0	Mixed Medical Facility Waste	6.9%	1.4%	524.8
				Grand Total	100.0%		7,560.8
				No. of Samples		30	

The detailed composition data for each generator sector is provided in Appendix B.

3.2 RECOVERABILITY

Figure 3-4 shows the recoverability potential of waste disposed by the University in the 2022 Study. Despite improvements to the recycling and organics collection programs over the years, upwards of 23 percent of disposed waste could have been recovered through the existing single stream recycling program. In total, about 58 percent of the waste stream could potentially be diverted through existing or future recycling and organics programs. (Note that these estimates reflect the maximum theoretical recoverability

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that could be achieved. The weight of recoverable material is likely inflated due to contamination, and additionally some recoverable materials may have been degraded to the point of non-recoverability prior to placement in the refuse stream.)

Figure 3-4 Potential Recoverability of Refuse

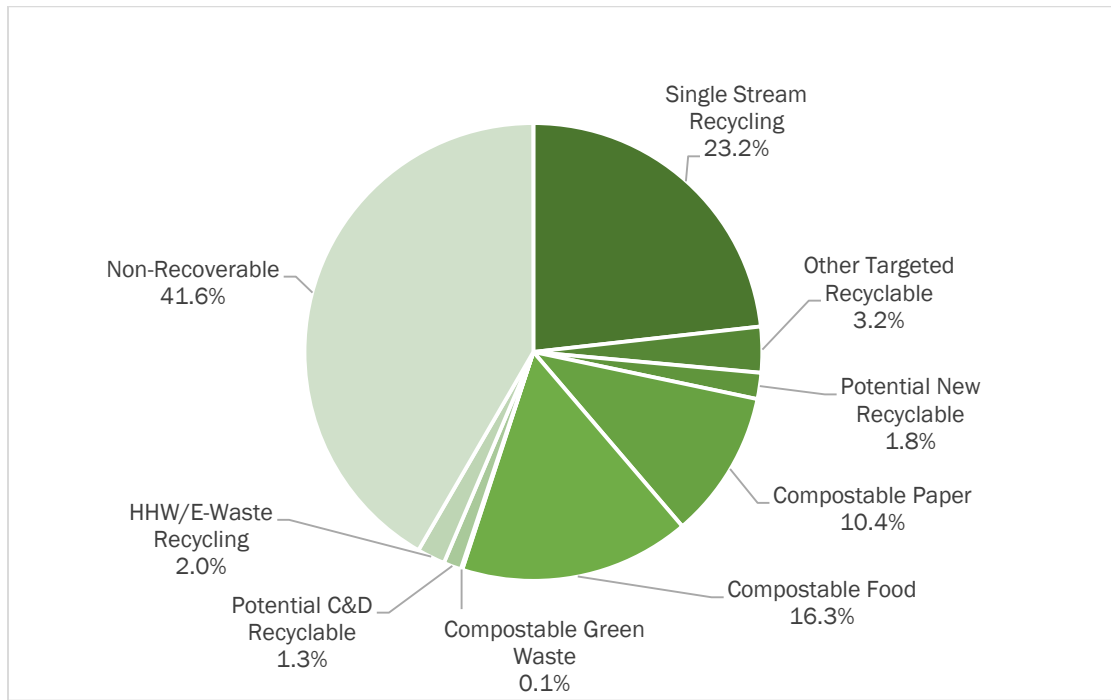
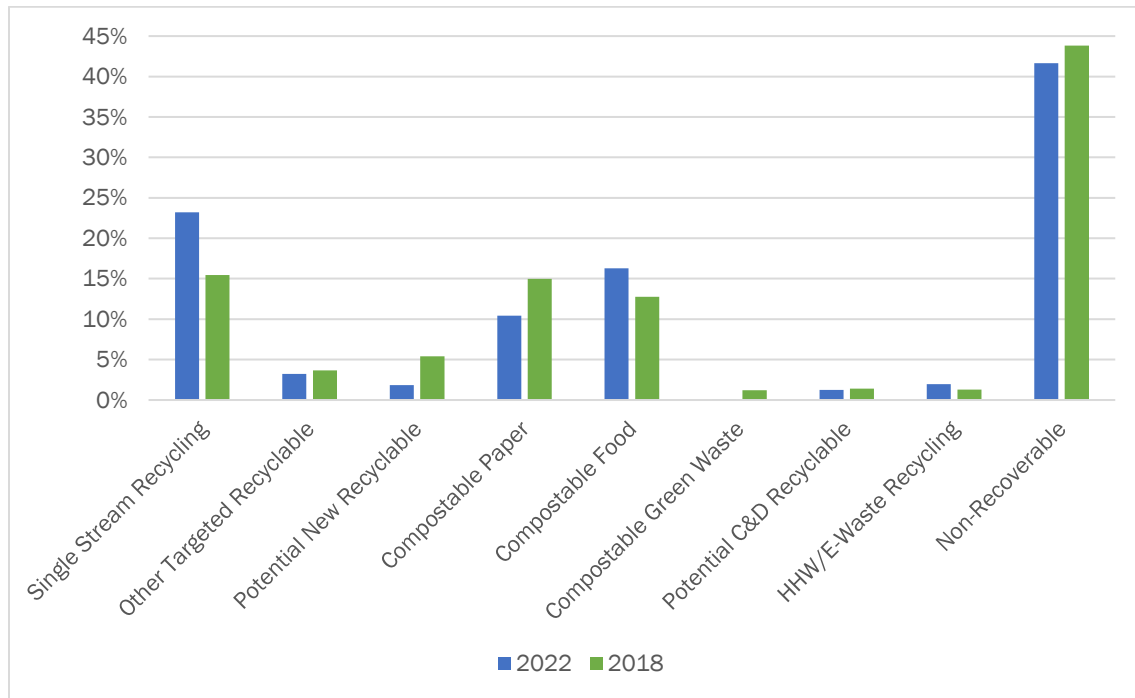


Figure 3-5 shows the comparison of recoverability between the 2018 and 2022 studies. Overall, the recoverability of materials slightly decreased from 2022 to 2018 as less recoverable material (56 percent) was disposed in 2018, compared to 2022 (58 percent).

Figure 3-5 Comparison of the Recoverability of Refuse (2022 vs 2018)



The following observations are offered about the incidence of recoverable items in the disposed waste stream:

- ◆ **Composting:** The University continues to expand its food waste collection program, mostly from the hospital. However, at almost 17 percent of the disposed waste stream being Food Waste, there is still an opportunity to capture more food waste to improve diversion from landfill.
- ◆ **Single Stream Recycling:** Just over 23 percent of the disposed wastes stream could be recovered in UK’s single stream recycling program, an 8 percent increase from the 2018 study. Though this study is a one-week snapshot of campus activities, this suggests that ongoing education with campus staff and students on acceptable recyclable materials is needed.
- ◆ **Non-Recoverable:** This category is primarily made up of Mixed Medical Facility Wastes that may not have a recovery program. It was beyond the scope of this study to evaluate whether hospital staff are actively working to remove recoverables such as hospital textiles and rigid plastics and are properly disposing biomedical hazards in the alternate disposal programs. The University should continue to evaluate this stream for ongoing opportunities to divert these materials.

3.3 RECYCLING COMPOSITION

As an update to the 2018 study, the 2022 study incorporated analysis of single stream recycling front loader routes and compactors from the targeted generator sectors. This section presents the weighted average composition of single stream recycling.

Figure 3-6 shows the aggregate recycling composition for the University, with Paper being the most prevalent recycled category. The detailed recycling composition data for each generator sector is provided in Appendix B.

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Figure 3-6 Weighted Recycling Composition by Material Group

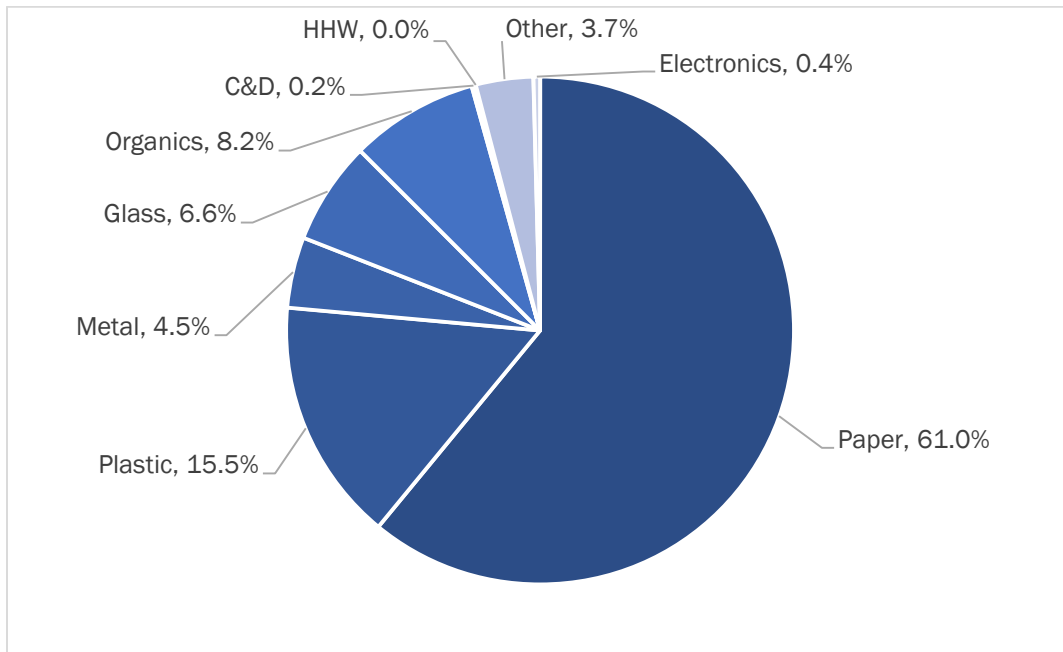


Figure 3-7 shows the aggregate recycling composition by type of targeted material for the University. Targeted cardboard and targeted paper make up roughly 55 percent of the recycling stream and the total of all targeted materials makes up nearly 75 percent of the recycling stream.

Figure 3-7 Weighted Recycling Composition by Targeted Type

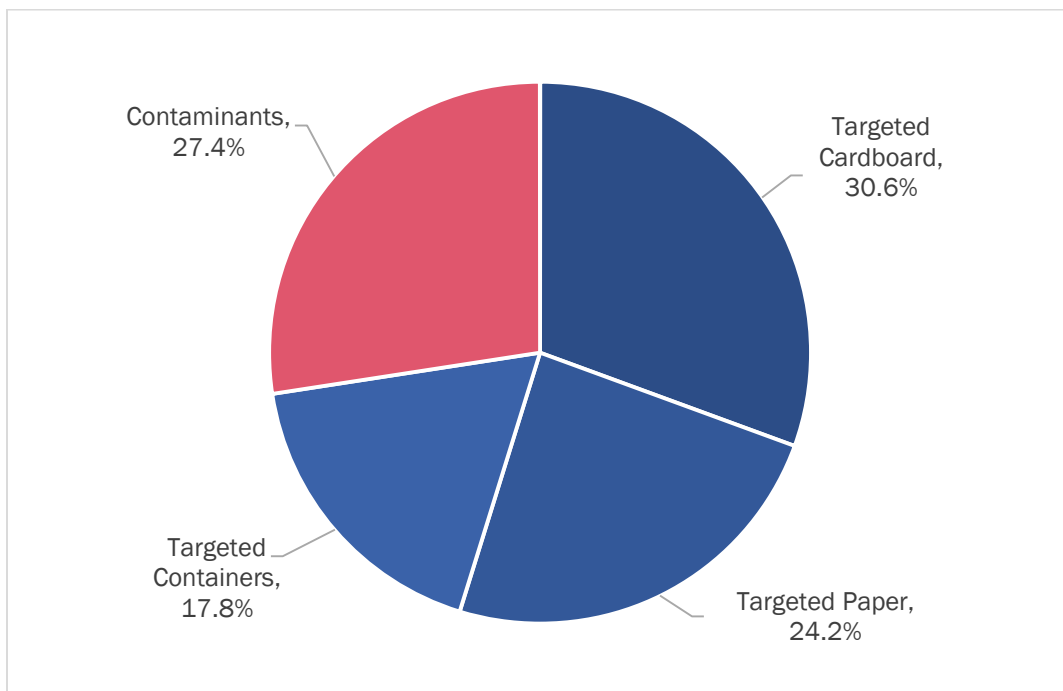


Figure 3-8 shows the top 10 most commonly recycled material categories in the University’s existing recycling program. With the exception of Food Waste, Plastic Film and Bags, and Compostable Paper, all other materials are currently accepted in the University’s recycling program.

Figure 3-8 Top 10 Materials in University Recycling

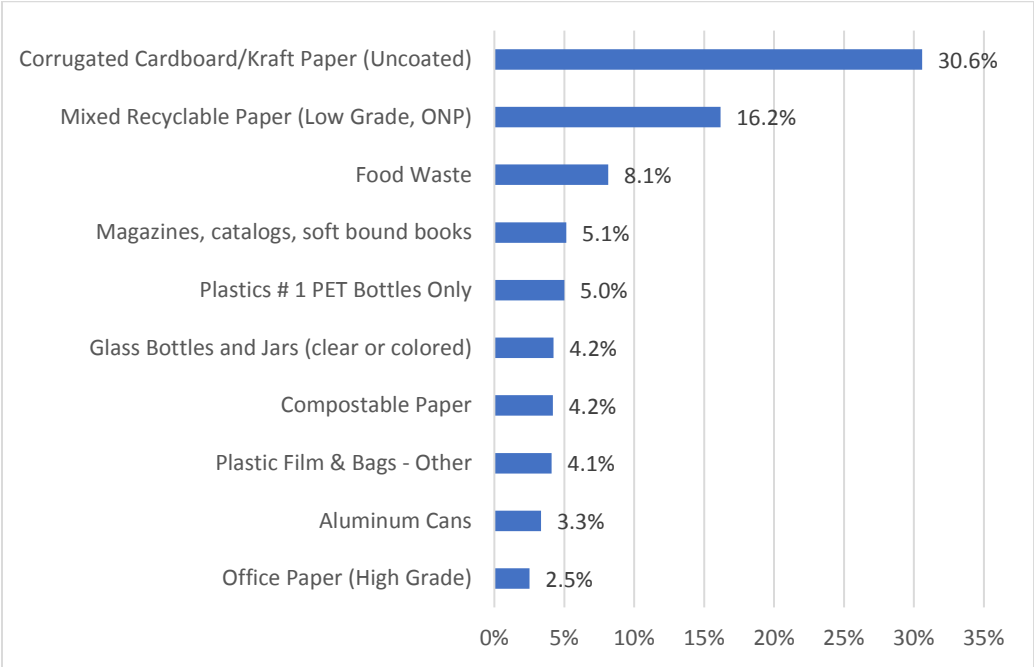


Table 3-2 presents the detailed statistical results for the weighted aggregate University recycling stream.

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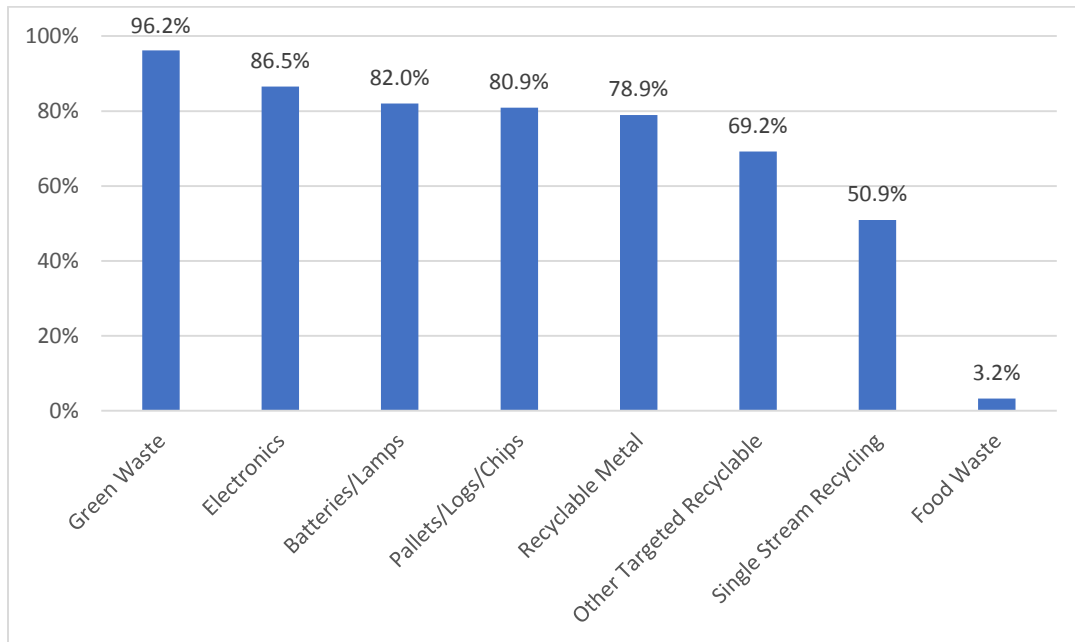
Table 3-2 Detailed Recycling Composition

Material Category	Mean	MOE	Tons	Material Category	Mean	MOE	Tons
Paper	61.0%	7.5%	533.0	Organics	8.2%	4.1%	71.3
Corrugated Cardboard/Kraft Paper (Uncoated)	30.6%	6.8%	267.4	Food Waste	8.1%	4.1%	71.2
Office Paper (High Grade)	2.5%	1.9%	22.0	Yard Waste Grass, Leaves & Brush	0.0%	0.0%	0.0
Mixed Recyclable Paper (Low Grade, ONP)	16.2%	2.9%	141.4	Miscellaneous Organics	0.0%	0.0%	0.1
Magazines, catalogs, soft bound books	5.1%	3.8%	45.0	Pallets	0.0%	0.0%	0.0
Hardbound Books	0.3%	0.3%	3.1	C&D	0.2%	0.1%	2.1
Aseptic Boxes & Gable Top Cartons	0.4%	0.2%	3.2	Wood - Treated	0.2%	0.1%	1.8
Compostable Paper	4.2%	2.5%	36.5	Wood - Untreated	0.0%	0.0%	0.0
Remainder/Composite Paper	1.7%	0.8%	14.4	Asphalt	0.0%	0.0%	0.0
Plastic	15.5%	3.1%	135.2	Asphalt Roofing	0.0%	0.0%	0.0
Plastics # 1 PET Bottles Only	5.0%	2.2%	43.7	Brick, Concrete, and Rock	0.0%	0.0%	0.0
Plastics #1 PET Non-bottle Containers	0.4%	0.1%	3.5	Carpet & Carpet Padding	0.0%	0.0%	0.0
Plastic # 2 HDPE - Bottles and Jugs	1.7%	0.5%	15.0	Drywall/Gypsum Board	0.0%	0.0%	0.0
Plastic Containers #3 thru #7	1.8%	1.0%	15.6	Remainder/Composite C&D	0.0%	0.1%	0.3
#4 Plastic Bottles	0.0%	0.0%	0.0	HHW	0.0%	0.0%	0.3
#5 Pipette holders and lids	0.2%	0.1%	1.4	Household Hazardous Waste	0.0%	0.0%	0.0
#5 Hospital pitchers, basins, saline bottles	0.0%	0.0%	0.0	Aerosol cans	0.0%	0.0%	0.3
#5 Christmas tree adaptors	0.0%	0.0%	0.0	Treated Medical Waste	0.0%	0.0%	0.0
Plastic Film & Bags - Clean	0.4%	0.4%	3.3	Batteries	0.0%	0.0%	0.0
Plastic Film & Bags - Other	4.1%	0.6%	35.8	Ballasts	0.0%	0.0%	0.0
Data Storage Film	0.0%	0.0%	0.0	Lightbulbs	0.0%	0.0%	0.0
Expanded Polystyrene "Styrofoam"	0.2%	0.1%	1.9	Paint	0.0%	0.0%	0.0
Polystyrene (Styrofoam) Lab Containers	0.1%	0.1%	1.1	Electronics	0.4%	0.3%	3.6
Remainder/Composite Plastic	1.6%	0.4%	14.0	Small Consumer Electronics	0.4%	0.3%	3.6
Metal	4.5%	0.9%	39.4	Computers and Related Electronics	0.0%	0.0%	0.0
Aluminum Cans	3.3%	0.8%	29.2	Flat screen Televisions and Monitors	0.0%	0.0%	0.0
Aluminum Containers, Plates and foils	0.1%	0.0%	0.6	CRT Televisions and Monitors	0.0%	0.0%	0.0
Steel Cans & Containers	0.8%	0.6%	7.1	Other	3.7%	1.2%	31.9
Other Ferrous (magnetic)	0.1%	0.0%	0.5	Textiles	1.0%	0.4%	8.9
Other Non-Ferrous (not magnetic)	0.2%	0.1%	1.9	Hospital Textiles	0.0%	0.0%	0.0
Remainder/Composite Metal	0.0%	0.0%	0.1	Rubber Products	0.1%	0.1%	0.7
Refrigerators/Freezers	0.0%	0.0%	0.0	Disposable Diapers & Sanitary Products	0.0%	0.0%	0.1
Glass	6.6%	3.3%	57.3	Bottom Fines & Dirt	0.6%	0.2%	5.4
Glass Bottles and Jars (clear or colored)	4.2%	1.7%	37.0	Other Bulky Items	0.9%	0.8%	8.1
Glass Containers - Non-Beverage	0.3%	0.5%	2.3	Old Furniture	0.0%	0.0%	0.0
Glass Lab Containers	1.5%	2.8%	12.7	Tires	0.0%	0.0%	0.0
Remainder/Composite Glass	0.6%	0.4%	5.2	Other Miscellaneous	0.8%	0.6%	7.1
	0.0%	0.0%	0.0	Mixed Medical Facility Waste	0.2%	0.3%	1.5
				Grand Total	100.0%		874.2
				No. of Samples	20		

3.4 CAPTURE RATE

The University's current diversion program is robust in that it includes the single stream recycling program as well as various special collection programs for materials such as hospital textiles and plastics, lab products (glass and plastic), electronics, scrap metals, batteries/bulbs, pallets, and some organics. Figure 3-9 shows the capture rates for the University's existing recycling programs. Detailed disposal and recycling tonnage by material category, as well as individual capture rates for recycling/diversion programs, are provided in Appendix C.

Figure 3-9 Current Capture Rates by Diversion Program



The Other Targeted Recyclables category includes the following material categories:

Hardbound Books	Paint
Data Storage Film	Wood - Treated
Tires	Wood - Untreated
Cooking Oil	Asphalt
Mixed Media	Asphalt Roofing
Toner/Cartridges	Brick, Concrete, and Rock
Motor Oil	Carpet & Carpet Padding
Plastic Film & Bags - Clean	Drywall/Gypsum Board
#5 Christmas tree adaptors	Hospital Textiles
Polystyrene (Styrofoam) lab transport containers	Household Hazardous Waste
Glass Lab Containers	Aerosol cans

Table 3-3 presents the underlying data depicted in Figure 3-9. With a capture rate of only 51 percent for single stream recycling, there are opportunities for improving the collection of the materials included in this program. The University is performing well in the capture of special wastes such as metals, batteries/lamps, electronics, and pallets/logs/chips. While the University is doing very well in the capture of organic green waste, there is room for improvement to expand the organics food waste collection program as currently only about 3 percent of the food waste generated on campus is captured for diversion.

3. RESULTS

Table 3-3 Current Capture Rates

Material Category	Disposed Tons	Recycled Tons	Generated Tons	Capture Rate
Single Stream Recyclable	1,769	1,836	3,605	50.9%
Other Targeted Recyclable	261	587	848	69.2%
Recyclable Metal	75	280	355	78.9%
Electronics	14	93	107	86.5%
Batteries/Lamps	4	19	24	82.0%
Green Waste	8	188	196	96.2%
Pallets/Logs/Chips	61	257	318	80.9%
Food Waste	1,248	42	1,290	3.2%
Disposed	4,122	-	4,122	0.0%
	7,562	3,302	10,864	30.4%

4. CONCLUSIONS

4.1 CONCLUSIONS

Based on extrapolated results from 2022, approximately 7,500 tons of waste are being landfilled annually. This reflects a reduction of 2,500 tons from 2018, when over 10,000 tons to landfill were reported. Despite an increase in the student population from 30,473 to 32,710 from the 2017-2018 to the 2022-2023 school year, the University has been able to reduce the tonnage to landfill.

All things considered, the results from this material composition analysis provide insight into how materials move through the campus and where they end up for disposal. This type of targeted information can inform the administration to invest in improvements to diversion programs, including training and education in the facilities departments as well as programmatic changes to best communicate to students about the sustainability efforts on campus and how they can do their part.

Based on our assessment and findings from 2022, including a comparative analysis from 2018, we offer the following conclusions:

- ◆ **Current Recycling Programs:** The University has continually improved its single stream recycling program to include more materials since the 2018 Study and continues to successfully divert special wastes from the disposed waste streams such as electronics and other hazardous materials collection, pallets, green waste and construction and demolition debris.
- ◆ **Opportunity for Diversion of Organics:** With organics materials categories such as food waste and potentially compostable paper contributing 27 percent to the disposed waste stream there is an opportunity to expand the current organics collection program to collect more material for organics diversion, particularly from back-of-house food generating areas of campus such as cafeterias. However, studies at other universities and institutions have found that more forensic recycling strategies are required, such as differentiating programs for front-of-house (student facing) and back-of-house (employee-facing) waste generating areas.
- ◆ **Cross Contamination:** The prevalence of single stream recycling in the waste stream and, alternatively, unwanted contaminants in the recycling stream, suggests that increased education and collection container management improvements may be needed.

4.2 RECOMMENDATIONS

MSW Consultants offers the following ideas for consideration by the University as it continues its commitment to sustainability:

- ◆ **Non-Recoverable:** The non-recoverable fraction, driven largely by Mixed Medical Facility Wastes, has reduced since 2018 but still remains a contributor to the waste stream. The University should continue to explore outlets for these materials as it has done with other difficult to divert materials such as hospital textiles and plastics.
- ◆ **Education on Single Stream Recycling:** Although the current single stream recycling program has been in place since 2020, there is still a meaningful fraction of these materials being lost to landfill disposal. This suggests a need for continued education and outreach to UK staff and students on what is accepted in the recycling program. Best practices for improving the capture of recycling include paired waste and recycling containers with detailed signage, color coding streams and electronic/social media blasts. Recycling containers should be available in all common areas, classrooms, and food service areas, ideally always paired with a waste container.
- ◆ **Enhanced Organics Collection:** The University should continue to expand its food waste collection program beyond the hospitals to other large generating food areas such as back-of-house areas of student cafeterias/dining halls. As this program expands the University can include front-of-house

4. CONCLUSIONS

food waste collection from students and staff, provided this program is complemented by robust education and outreach, including container signage and color coding, to keep contamination levels low. The University should research local processors that can take food waste and ideally compostable paper products from the campus.

- ◆ **Perform Campus-wide and Generator-specific Waste Audits:** The University should perform a campus wide audit of front-of-house waste and recycling container set ups and evaluate the need for more containers, better signage, container design and so on. Additionally, individual buildings should be monitored or audited routinely for their recycling performance. For example, conducting routine audits of laboratories to ensure all single stream recycling and special wastes (glass lab containers, polystyrene shipping containers, and plastic pipette holders) are properly disposed of.

APPENDIX A
MATERIAL CATEGORIES & DEFINITIONS

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2022 University of Kentucky Waste Characterization Study
Material Definitions

1 CORRUGATED CARDBOARD/KRAFT PAPER (UNCOATED): Corrugated boxes or paper bags made from Kraft paper. Wavy center layer sandwiched between two outer layers without wax coating on the inside or outside. Examples include cardboard shipping containers and moving boxes, computer packaging cartons, and sheets and pieces of boxes and cartons. Does not include chipboard. Examples of Kraft paper include paper grocery bags, corrugated pizza boxes (clean or dirty), department store bags, and heavyweight sheets of Kraft packing paper.

2 OFFICE PAPER (HIGH GRADE): 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 as goldenrod colored paper.

3 MIXED RECYCLABLE PAPER (LOW GRADE, ONP): Recyclable paper other than the paper mentioned above. Examples include newspaper, manila folders, manila envelopes, index cards, white envelopes, white window envelopes, notebook paper, carbonless forms, junk mail, chipboard and uncoated paperboard, groundwood paper, deep toned or fluorescent dyed paper, paper bags, pizza boxes, food boxes and cartons including frozen), take-out containers (with or without coating)

4 MAGAZINES, CATALOGS, SOFT BOUND BOOKS: Glossy paper magazines or catalogs; Bound books bearing a soft cover. Includes phone books

5 HARDBOUND BOOKS: Thin paper books bound between a hard book cover.

6 ASEPTIC BOXES & GABLE TOP CARTONS: Aseptic containers (multi-layered packaging that contains shelf-stable food products such as apple juice, soup, soy/rice milk, etc.) and "gable top" cartons (non-refrigerated items such as granola and crackers; refrigerated items such as milk, juice, egg substitutes, etc.). Rigid food and beverage cartons are usually paper-based, may be any shape, and may include a plastic pour spout as part of the carton.

7 COMPOSTABLE PAPER: Low-grade, biodegradable paper that cannot be recycled, as well as food contaminated paper. Examples include paper towels, paper plates, waxed papers and waxed cardboard, and tissues.

8 REMAINDER/COMPOSITE PAPER: Products made mostly of paper but combined with large amounts of other materials such as plastic, metal, glues, foil, and moisture. Examples include corrugated cardboard coated with plastic, cellulose insulation, blueprints, sepia, onion skin, foil lined fast food wrappers, frozen juice containers, carbon paper, selfadhesive notes, softcover and hardcover books, and photographs.

9 PLASTICS # 1 PET BOTTLES ONLY: Clear or colored PET bottles (may have state deposit markings). The plastic resin number "1" is visible 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. It does not turn white when bent. This category only includes PET bottles or jars that did not previously contain hazardous materials.

10 PLASTICS #1 PET NON-BOTTLE CONTAINERS: Non-bottle containers such as PET jars, rectangular PET clamshell or tray containers used for produce or take-out. The plastic resin number "1" is visible in the center of the triangular recycling symbol and may also bear the letters "PETE" or "PET". The color is usually transparent, green, or clear.

2022 University of Kentucky Waste Characterization Study
Material Definitions

11 PLASTIC # 2 (HDPE - CLEAR, COLORED BOTTLES AND JUGS ONLY): Natural colored HDPE bottles/jars. This plastic is usually either cloudy white, allowing light to pass through it (natural). When marked for identification, it bears the number "2" in the triangular recycling symbol and may also bear the letters "HDPE. This category only includes HDPE containers that did not previously contain hazardous materials. Includes natural buckets, pails or paint cans made of HDPE and designed to hold 5 gallons or less of material. Colored HDPE bottles/jars. In contrast with natural HDPE, the colored HDPE is usually a solid color and opaque. When marked for identification, it bears the number "2" in the triangular recycling symbol and may also bear the letters "HDPE." This category only includes HDPE bottles that did not previously contain hazardous materials.

12 PLASTIC CONTAINERS #3 THRU #7 : Tubs, cups, lids and take-out containers. Containers made of types of plastic other than HDPE or PET. Items may be made of PVC, PP, or PS. When marked for identification, these items may bear the number 3, 4, 5, 6, or 7 in the triangular recycling symbol. This subtype also includes unmarked plastic containers. This category only includes plastic #3-#7 containers that did not previously contain hazardous materials. Also, this category does NOT include Hospital-related #5 plastics (see Categories 14 and 15).

13 #4 PLASTIC BOTTLES: Hospital-related plastic bottles bearing the #4 resin number.

14 #5 PIPETTE HOLDERS AND LIDS: Plastic stands and holders for holding pipettes (any type)

15 #5 HOSPITAL PITCHERS, BASINS, SALINE BOTTLES: Hospital pitchers, basins, saline bottles bearing the #5 plastic resin number.

16 #5 CHRISTMAS TREE ADAPTORS: Small green plastic adapters – about 2 inches long.

17 PLASTIC FILM & BAGS - CLEAN: Clean film plastic retail bags used to contain merchandise to transport from the place of purchase, given out by the store with the purchase. Also includes dry-cleaning plastic bags intended for one-time use, and non-bag commercial and industrial packaging film used for large-scale packaging or transport packaging. Examples include shrink-wrap, mattress bags, furniture wrap, and film bubble wrap.

18 PLASTIC FILM & BAGS - OTHER: Plastic film or bags that are contaminated or otherwise non recyclable. Examples include garbage bags, contaminated shopping bags, and other types of plastic bags (sandwich bags, zip (recloseable) bags, produce bags, frozen vegetable bags), flexible plastic packaging, painting tarps, food wrappers such as candy bar wrappers.

19 DATA STORAGE FILM : X-ray films, and CDs, DVD, VHS tapes, and other film type material (data storage)

20 EXPANDED POLYSTYRENE "STYROFOAM": Food and Non-food packaging. Includes clamshell "Styrofoam" food containers, as well as cups, plates, and bowls. Includes finished products made of expanded polystyrene such as block Styrofoam padding and packing peanuts.

21 POLYSTYRENE (STYROFOAM) LAB TRANSPORT CONTAINERS: Expanded polystyrene containers typically used to transport cold-pack laboratory shipments.

22 REMAINDER/COMPOSITE PLASTIC: Plastic that cannot be put in any other type or subtype. Includes items made mostly of plastic but combined with other materials. Examples include auto parts made of plastic attached to metal, plastic drinking straws, produce trays, 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, plastic lids, some kitchen ware, toys, plastic string (as used for hay bales), and plastic rigid bubble/foil packaging (as for medications); durable plastic such as plastic outdoor furniture, plastic toys and sporting goods, CDs, and rigid plastic housewares (such as mop buckets), dishes, cups, and cutlery.

2022 University of Kentucky Waste Characterization Study

Material Definitions

- 23 ALUMINUM CANS: Aluminum beverage containers (may have state deposit markings).
- 24 ALUMINUM CONTAINERS, PLATES AND FOILS: Aluminum food containers, includes cat food cans, aluminum pie plates and non-rigid baking pans, as well as aluminum foils.
- 25 STEEL CANS & CONTAINERS: Steel or tin food or other containers including empty steel aerosol containers.
- OTHER FERROUS (MAGNETIC): Any other iron or steel that is magnetic. This subtype does not include steel cans or containers for food. Examples include empty or dry paint cans, structural steel beams, boilers, metal clothes
- 26 hangers, metal pipes, some cookware, security window bars, scrap ferrous items and galvanized items such as nails and flashing. This category also includes mixed metal items made of both ferrous metal and non-ferrous metal combined. Examples include small non-electronic appliances such as toasters and motors.
- OTHER NON-FERROUS (NOT MAGNETIC): Any metal item that is not magnetic, as well as stainless steel.
- 27 These items may be made of copper, brass, bronze, lead, zinc, or other metals. Examples include copper wire, shell casings, and brass pipe.
- REMAINDER/COMPOSITE METAL : Items made mostly of metal but combined with other materials (such as
- 28 plastics, wood, etc.). Examples: hair dryers, insulated wire, and finished products that contain a mixture of metals and other materials, whose weight is derived significantly from the metal portion of its construction.
- 29 REFRIGERATORS/FREEZERS: Refrigerators or freezers of any type or size.
- GLASS BOTTLES AND JARS (CLEAR OR COLORED): Includes all non-deposit glass beverage containers,
- 30 regardless of color (may include deposit markings from other states). Includes examples such as wine bottles, beer and soft drink bottles.
- 31 GLASS CONTAINERS - NON-BEVERAGE: All glass non-beverage containers, such as those for mayonnaise, jam jars, and other food and non-food products. Does not include laboratory glass (see Category #32).
- 32 GLASS LAB CONTAINERS: Laboratory glassware, including Pyrex type lab materials.
- REMAINDER/COMPOSITE GLASS : Glass that cannot be put in any other type. It includes items made mostly
- 33 of glass but combined with other materials. Examples include Pyrex (non-lab), Corningware, crystal and other glass tableware, mirrors, non-fluorescent light bulbs, auto windshields, laminated glass, or any curved glass. Uncoated plate glass - includes window and door glass, table-tops, and some auto glass (side windows).
- FOOD WASTE: Food wastes and scraps, including meat, bone, dairy, grains, rinds, teabags, coffee grounds with
- 34 filters, etc. Excludes the weight of food containers, except when container weight is not appreciable compared to the food inside. Compostable peanuts, food packaging with food scraps, and small wooden produce crates are also included in this category.
- YARD WASTE GRASS, LEAVES & BRUSH: Plant material, including woody material, from any public or
- 35 private landscapes. Examples include leaves, grass clippings, plants, brush and branch prunings, trimmings & stumps.
- 36 MISCELLANEOUS ORGANICS: Organic material that is not food or yard waste. Includes cork, popsicle sticks, hair, animal waste, cigarette butts, chopsticks, woven baskets, and small non-construction related wood products.
- 37 PALLETS : Painted/treated and Unpainted/untreated wood from pallets, either whole or broken. Does not include pallets made from other materials, such as plastic.
- 38 WOOD – TREATED: Wood that contains an adhesive, paint, stain, fire retardant, pesticide or preservative. Does not include wood furniture.
- WOOD – UNTREATED : Any wood which does not contain an adhesive, paint, stain, fire retardant, pesticide or
- 39 preservative; includes such items as bulky wood waste or scraps from newly built wood products. Does not including land clearing debris or yard waste prunings and trimmings.
- 40 ASPHALT: Includes asphalt paving materials, set or unset.

2022 University of Kentucky Waste Characterization Study

Material Definitions

- 41 ASPHALT ROOFING: Composite shingles and other roofing material made with asphalt. Examples include asphalt shingles and attached roofing tar and tar paper.
- 42 BRICK, CONCRETE, AND ROCK: Includes all types of fire-clay bricks. Includes Portland cement mixtures (set or unset), with or without aggregate materials (gravel, etc.). Includes rock gravel larger than 2" in diameter.
- 43 CARPET & CARPET PADDING: Flooring applications consisting of various natural or synthetic fibers bonded to some type of backing material. Carpet padding may include plastic, foam, felt, or other material used under the carpet to provide insulation and padding.
- 44 DRYWALL/GYPSUM BOARD: 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.
- 45 REMAINDER/COMPOSITE CONSTRUCTION & DEMOLITION : 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. Also includes fiberglass insulation, ceramic fixtures, and other miscellaneous C&D Materials not mentioned above.
- 46 HOUSEHOLD HAZARDOUS WASTE: Hazardous household items such as solvents, vehicle equipment fluids, cleaners, pesticides/herbicides and fertilizers.
- 47 AEROSOL CANS: Empty or full aerosol cans of any material.
- 48 TREATED MEDICAL WASTE: Bags of medical waste specifically labelled as "Treated" or showing an "Autoclaved" marking. These bags will not be opened, but placed directly in the sorting bin.
- 49 BATTERIES: All batteries, including "dry" type, rechargeable, and lead-acid batteries.
- 50 BALLASTS: Fluorescent light ballasts - metal box type voltage regulator for fluorescent lighting fixtures.
- 51 LIGHTBULBS: Incandescent type light bulbs for indoor or outdoor lighting. Does not include CFLs
- 52 PAINT: Liquid paints of water or oil-based variety.
- 53 SMALL CONSUMER ELECTRONICS: Includes personal computers, laptop computers, notebook computers, processors, keyboards, etc. Includes stereos, VCRs, DVD players, etc. This category does not include automated typewriters or typesetters.
- 54 COMPUTERS AND RELATED ELECTRONICS: Desktop or laptop computer systems, including removed hard drives and peripheral electronics such as mice, keyboards, and printers. (Return hard drives to University staff).
- 55 FLAT SCREEN TELEVISIONS AND MONITORS: Stand-alone flat screen display systems for television or computer use. Includes plasma and LCD monitors.
- 56 CRT TELEVISIONS AND MONITORS: Cathode Ray Tube (CRT) type televisions or monitors (not flat screen type).
- 57 MIXED MEDICAL WASTE: Untreated medical waste. Includes bandages, gauze, diabetic strips, syringes, needles, other sharps, fluid filled medical bags, and medical tubing. Includes similar items from veterinary usage, medical research, or industrial laboratories.
- 58 TEXTILES: Includes clothing, fabrics, curtains, blankets, stuffed animals, and other cloth material. Does not include carpeting. Includes hospital-related textiles sorted from hospital-generated samples.
- 59 HOSPITAL TEXTILES: Includes white single sheets, white woven cotton blankets, white cotton pillow cases, and pillows. These items should only be searched for in the loads from the hospitals (Dock 2, Dock 1/Linen Dock/Auger, Good Samaritan).
- 60 RUBBER PRODUCTS: Finished products and scrap materials made of natural and synthetic rubber, such as bathmats, inner tubes (not tires), rubber hoses, and foam rubber. Includes rubber gloves and footwear (if predominately rubber).

2022 University of Kentucky Waste Characterization Study
Material Definitions

- 61 DISPOSABLE DIAPERS & SANITARY PRODUCTS: Adult and baby disposable diapers, and feminine hygiene products.
- 62 BOTTOM FINES & DIRT: Small mixed fragments 2" and smaller, and includes miscellaneous fines (paper, plastic, glass, etc.), sand, and dirt.
- 63 OTHER BULKY ITEMS: Large, hard-to-handle items that are not defined separately.
- 64 OLD FURNITURE: Examples include all sizes and types of furniture, mattresses, box springs, and base components.
- 65 TIRES: Any rubber tire intended to be used on a motorized vehicle or bicycle.
- 66 OTHER MISCELLANEOUS : Any other type of waste material not listed in any other sort category. Includes cosmetics, shampoos, lotions, etc.

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APPENDIX B
DETAILED STATISTICAL RESULTS
BY GENERATOR SECTOR

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Appendix B - Detailed Results by Generator Sector (Recycling)

Material Category	Front Loader Truck			General Campus			Dorms			Dining		
	Mean	Conf. Int	Tons	Mean	Conf. Int	Tons	Mean	Conf. Int	Tons	Mean	Conf. Int	Tons
	Percent	(+/-)		Percent	(+/-)		Percent	(+/-)		Percent	(+/-)	
Paper	52.6%	6.9%	257.4	71.2%	17.2%	111.1	57.7%	8.8%	24.9	81.0%	33.7%	85.4
Corrugated Cardboard/Kraft Paper (Uncoated)	20.1%	4.8%	98.5	43.2%	4.4%	67.5	26.6%	4.9%	11.5	66.4%	62.6%	70.1
Office Paper (High Grade)	1.0%	1.2%	4.8	9.0%	8.8%	14.0	1.7%	3.3%	0.7	0.8%	2.2%	0.8
Mixed Recyclable Paper (Low Grade, ONP)	20.3%	5.0%	99.4	10.2%	4.2%	15.8	23.0%	7.3%	9.9	7.3%	9.4%	7.7
Magazines, catalogs, soft bound books	3.8%	4.5%	18.6	4.4%	4.2%	6.9	0.1%	0.1%	0.1	0.0%	0.0%	0.0
Hardbound Books	0.5%	1.0%	2.2	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Aseptic Boxes & Gable Top Cartons	0.4%	0.3%	1.9	0.1%	0.1%	0.1	1.5%	0.7%	0.6	0.4%	1.3%	0.5
Compostable Paper	5.3%	4.5%	26.1	1.1%	0.7%	1.7	2.9%	1.3%	1.3	6.0%	15.9%	6.3
Remainder/Composite Paper	1.2%	0.9%	5.9	3.3%	3.7%	5.1	1.9%	1.4%	0.8	0.0%	0.1%	0.0
Plastic	17.0%	0.7%	83.0	11.4%	4.2%	17.8	23.4%	1.9%	10.1	8.1%	9.6%	8.6
Plastics # 1 PET Bottles Only	5.0%	0.8%	24.6	4.2%	1.2%	6.6	10.8%	1.2%	4.7	0.6%	1.6%	0.6
Plastics #1 PET Non-bottle Containers	0.4%	0.2%	1.9	0.4%	0.3%	0.7	1.0%	0.3%	0.4	0.1%	0.4%	0.1
Plastic # 2 (HDPE - Clear, colored bottles and jugs only)	1.9%	2.3%	9.4	0.6%	0.6%	0.9	1.9%	0.9%	0.8	2.8%	2.1%	2.9
Plastic Containers #3 thru #7	2.3%	0.7%	11.0	0.8%	0.5%	1.2	1.7%	0.1%	0.7	0.9%	2.6%	0.9
#4 Plastic Bottles	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0
#5 Pipette holders and lids	0.1%	0.2%	0.6	0.5%	0.6%	0.8	0.0%	0.0%	0.0	0.0%	0.0%	0.0
#5 Hospital pitchers, basins, saline bottles	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0
#5 Christmas tree adaptors	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Plastic Film & Bags - Clean	0.2%	0.3%	1.2	0.2%	0.2%	0.3	0.7%	0.9%	0.3	0.0%	0.0%	0.0
Plastic Film & Bags - Other	4.5%	1.8%	22.0	2.8%	1.6%	4.4	5.5%	0.9%	2.4	3.3%	5.7%	3.5
Data Storage Film	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Expanded Polystyrene "Styrofoam"	0.3%	0.3%	1.2	0.2%	0.1%	0.3	0.5%	0.5%	0.2	0.0%	0.0%	0.0
Polystyrene (Styrofoam) lab transport containers	0.1%	0.3%	0.7	0.3%	0.4%	0.4	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Remainder/Composite Plastic	2.1%	0.9%	10.2	1.4%	1.4%	2.2	1.2%	0.8%	0.5	0.5%	1.4%	0.5
Metal	5.7%	2.5%	27.9	2.9%	1.4%	4.5	4.5%	1.2%	2.0	3.5%	10.2%	3.7
Aluminum Cans	4.7%	2.7%	23.0	2.2%	1.7%	3.4	3.0%	0.9%	1.3	0.2%	0.7%	0.3
Aluminum Containers, Plates and foils	0.1%	0.2%	0.6	0.0%	0.0%	0.0	0.0%	0.1%	0.0	0.0%	0.0%	0.0
Steel Cans & Containers	0.5%	0.5%	2.2	0.5%	0.7%	0.8	1.4%	0.9%	0.6	3.2%	9.3%	3.4
Other Ferrous (magnetic)	0.0%	0.1%	0.1	0.1%	0.2%	0.2	0.0%	0.0%	0.0	0.1%	0.2%	0.1
Other Non-Ferrous (not magnetic)	0.4%	0.5%	1.9	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Remainder/Composite Metal	0.0%	0.0%	0.1	0.0%	0.0%	0.0	0.1%	0.3%	0.1	0.0%	0.0%	0.0
Refrigerators/Freezers	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Glass	7.2%	0.9%	35.3	10.6%	19.6%	16.5	7.6%	6.6%	3.3	0.4%	1.0%	0.4
Glass Bottles and Jars (clear or colored)	6.3%	2.0%	30.8	1.2%	0.6%	1.8	4.9%	7.9%	2.1	0.4%	1.0%	0.4
Glass Containers - Non-Beverage	0.0%	0.0%	0.0	1.2%	2.6%	1.9	0.9%	1.7%	0.4	0.0%	0.0%	0.0
Glass Lab Containers	0.0%	0.0%	0.0	8.2%	17.4%	12.7	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Remainder/Composite Glass	0.9%	1.2%	4.5	0.0%	0.0%	0.0	1.8%	1.9%	0.8	0.0%	0.0%	0.0
Organics	12.0%	4.7%	58.8	1.3%	0.8%	2.0	2.5%	3.1%	1.1	3.1%	1.2%	3.2
Food Waste	12.0%	4.7%	58.8	1.3%	0.8%	2.0	2.5%	3.0%	1.1	3.0%	1.0%	3.2
Yard Waste Grass, Leaves & Brush	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Miscellaneous Organics	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.1%	0.2%	0.1
Pallets	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0
C&D	0.4%	0.4%	1.7	0.0%	0.0%	0.0	0.3%	0.4%	0.1	0.0%	0.0%	0.0
Wood - Treated	0.4%	0.4%	1.7	0.0%	0.0%	0.0	0.2%	0.4%	0.1	0.0%	0.0%	0.0
Wood - Untreated	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.1%	0.2%	0.0	0.0%	0.0%	0.0
Asphalt	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Asphalt Roofing	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Brick, Concrete, and Rock	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Carpet & Carpet Padding	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Drywall/Gypsum Board	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Remainder/Composite Construction & Demolition	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0
HHW	0.1%	0.1%	0.3	0.0%	0.0%	0.0	0.0%	0.1%	0.0	0.0%	0.0%	0.0
Household Hazardous Waste	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Aerosol cans	0.1%	0.1%	0.3	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Treated Medical Waste	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Batteries	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Ballasts	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Lightbulbs	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.1%	0.0	0.0%	0.0%	0.0
Paint	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Electronics	0.7%	1.6%	3.6	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Small Consumer Electronics	0.7%	1.6%	3.6	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Computers and Related Electronics	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Flat screen Televisions and Monitors	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0
CRT Televisions and Monitors	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Other	4.4%	2.7%	21.6	2.7%	2.0%	4.2	3.9%	5.3%	1.7	4.0%	11.7%	4.2
Mixed Medical Facility Waste	0.0%	0.0%	0.0	1.0%	2.1%	1.5	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Textiles	1.6%	2.2%	7.7	0.4%	0.7%	0.5	0.3%	0.2%	0.1	0.3%	1.0%	0.4
Hospital Textiles	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Rubber Products	0.0%	0.0%	0.2	0.2%	0.3%	0.3	0.0%	0.0%	0.0	0.1%	0.4%	0.2
Disposable Diapers & Sanitary Products	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.1%	0.2%	0.0	0.0%	0.0%	0.0
Bottom Fines & Dirt	0.9%	0.2%	4.4	0.2%	0.4%	0.4	1.0%	0.5%	0.4	0.2%	0.5%	0.2
Other Bulky Items	1.3%	2.8%	6.5	0.6%	1.2%	0.9	1.8%	3.8%	0.8	0.0%	0.0%	0.0
Old Furniture	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Tires	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Other Miscellaneous	0.6%	0.7%	2.7	0.3%	0.4%	0.5	0.7%	1.6%	0.3	3.3%	9.8%	3.5
Total	100.0%		489.6	100.0%		156.0	100.0%		43.1	100.0%		105.5
<i>Number of Samples</i>	4			4			4			2		

Appendix B - Detailed Results by Generator Sector (Recycling)

Material Category	Football Stadium			Hospital		
	Mean	Conf. Int	Tons	Mean	Conf. Int	Tons
	Percent	(+/-)		Percent	(+/-)	
Paper	30.8%	7.0%	5.7	78.9%	1.5%	48.5
Corrugated Cardboard/Kraft Paper (Uncoated)	16.5%	3.6%	3.0	27.5%	26.9%	16.9
Office Paper (High Grade)	0.0%	0.0%	0.0	2.8%	3.6%	1.7
Mixed Recyclable Paper (Low Grade, ONP)	8.7%	5.2%	1.6	11.2%	5.8%	6.9
Magazines, catalogs, soft bound books	0.0%	0.0%	0.0	31.6%	20.9%	19.4
Hardbound Books	0.0%	0.0%	0.0	1.3%	3.9%	0.8
Aseptic Boxes & Gable Top Cartons	0.0%	0.0%	0.0	0.2%	0.5%	0.1
Compostable Paper	4.9%	0.4%	0.9	0.3%	0.7%	0.2
Remainder/Composite Paper	0.7%	0.5%	0.1	4.0%	0.2%	2.4
Plastic	31.0%	3.2%	5.7	16.4%	5.1%	10.1
Plastics # 1 PET Bottles Only	17.4%	2.6%	3.2	6.4%	2.2%	4.0
Plastics #1 PET Non-bottle Containers	0.5%	0.4%	0.1	0.3%	0.5%	0.2
Plastic # 2 (HDPE - Clear, colored bottles and jugs only)	0.1%	0.1%	0.0	1.6%	0.4%	1.0
Plastic Containers #3 thru #7	7.3%	2.2%	1.3	0.5%	0.0%	0.3
#4 Plastic Bottles	0.0%	0.0%	0.0	0.0%	0.0%	0.0
#5 Pipette holders and lids	0.0%	0.0%	0.0	0.0%	0.0%	0.0
#5 Hospital pitchers, basins, saline bottles	0.0%	0.0%	0.0	0.0%	0.0%	0.0
#5 Christmas tree adaptors	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Plastic Film & Bags - Clean	0.0%	0.0%	0.0	2.4%	6.2%	1.5
Plastic Film & Bags - Other	4.4%	1.5%	0.8	4.5%	2.1%	2.8
Data Storage Film	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Expanded Polystyrene "Styrofoam"	0.0%	0.1%	0.0	0.2%	0.2%	0.1
Polystyrene (Styrofoam) lab transport containers	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Remainder/Composite Plastic	1.3%	0.8%	0.2	0.4%	0.7%	0.3
Metal	3.3%	3.0%	0.6	1.2%	0.5%	0.7
Aluminum Cans	3.0%	3.2%	0.6	1.2%	0.5%	0.7
Aluminum Containers, Plates and foils	0.1%	0.1%	0.0	0.0%	0.0%	0.0
Steel Cans & Containers	0.1%	0.1%	0.0	0.0%	0.0%	0.0
Other Ferrous (magnetic)	0.1%	0.2%	0.0	0.0%	0.0%	0.0
Other Non-Ferrous (not magnetic)	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Remainder/Composite Metal	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Refrigerators/Freezers	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Glass	6.6%	4.6%	1.2	1.1%	3.3%	0.7
Glass Bottles and Jars (clear or colored)	6.6%	4.6%	1.2	1.1%	3.3%	0.7
Glass Containers - Non-Beverage	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Glass Lab Containers	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Remainder/Composite Glass	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Organics	27.3%	5.5%	5.0	1.9%	0.8%	1.2
Food Waste	27.3%	5.5%	5.0	1.9%	0.8%	1.2
Yard Waste Grass, Leaves & Brush	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Miscellaneous Organics	0.1%	0.1%	0.0	0.0%	0.0%	0.0
Pallets	0.0%	0.0%	0.0	0.0%	0.0%	0.0
C&D	0.0%	0.0%	0.0	0.4%	1.2%	0.3
Wood - Treated	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Wood - Untreated	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Asphalt	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Asphalt Roofing	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Brick, Concrete, and Rock	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Carpet & Carpet Padding	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Drywall/Gypsum Board	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Remainder/Composite Construction & Demolition	0.0%	0.0%	0.0	0.4%	1.2%	0.3
HHW	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Household Hazardous Waste	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Aerosol cans	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Treated Medical Waste	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Batteries	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Ballasts	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Lightbulbs	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Paint	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Electronics	0.0%	0.0%	0.0	0.1%	0.3%	0.1
Small Consumer Electronics	0.0%	0.0%	0.0	0.1%	0.3%	0.1
Computers and Related Electronics	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Flat screen Televisions and Monitors	0.0%	0.0%	0.0	0.0%	0.0%	0.0
CRT Televisions and Monitors	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Other	0.9%	0.9%	0.2	0.1%	0.2%	0.0
Mixed Medical Facility Waste	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Textiles	0.5%	0.6%	0.1	0.0%	0.1%	0.0
Hospital Textiles	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Rubber Products	0.2%	0.1%	0.0	0.0%	0.1%	0.0
Disposable Diapers & Sanitary Products	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Bottom Fines & Dirt	0.3%	0.2%	0.1	0.0%	0.0%	0.0
Other Bulky Items	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Old Furniture	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Tires	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Other Miscellaneous	0.1%	0.1%	0.0	0.0%	0.0%	0.0
Total	100.0%		18.5	100.0%		61.5
Number of Samples		4		2		

Appendix B - Detailed Results by Generator Sector (Refuse)

Material Category	Front Loader Truck			General Campus			Dorms			Dining		
	Mean	Conf. Int	Tons	Mean	Conf. Int	Tons	Mean	Conf. Int	Tons	Mean	Conf. Int	Tons
	Percent	(+/-)		Percent	(+/-)		Percent	(+/-)		Percent	(+/-)	
Paper	34.2%	4.0%	500.1	27.2%	11.0%	213.6	37.6%	4.7%	135.3	26.8%	23.5%	132.0
Corrugated Cardboard/Kraft Paper (Uncoated)	7.3%	2.3%	106.6	2.9%	1.5%	23.1	3.8%	1.9%	13.5	1.2%	2.5%	6.0
Office Paper (High Grade)	1.4%	1.1%	21.0	1.7%	2.6%	13.5	0.5%	0.6%	1.8	0.0%	0.0%	0.0
Mixed Recyclable Paper (Low Grade, ONP)	9.4%	2.7%	137.2	6.7%	3.0%	53.0	17.2%	2.4%	62.0	11.6%	20.5%	57.1
Magazines, catalogs, soft bound books	0.6%	0.9%	9.4	0.6%	1.0%	4.8	0.5%	0.3%	1.6	0.0%	0.0%	0.0
Hardbound Books	1.6%	1.8%	23.1	0.0%	0.0%	0.0	0.0%	0.0%	0.1	0.0%	0.0%	0.0
Aseptic Boxes & Gable Top Cartons	0.3%	0.2%	4.6	0.4%	0.3%	3.0	0.3%	0.1%	1.2	1.2%	1.7%	6.0
Compostable Paper	10.7%	3.0%	156.6	13.2%	5.6%	104.0	13.0%	3.1%	46.9	11.5%	6.0%	56.5
Remainder/Composite Paper	2.8%	1.8%	41.6	1.5%	0.8%	12.1	2.3%	0.7%	8.2	1.3%	2.3%	6.3
Plastic	23.8%	1.7%	347.9	24.1%	7.2%	189.7	25.2%	1.8%	90.6	19.3%	3.5%	95.3
Plastics # 1 PET Bottles Only	3.7%	1.5%	54.2	2.2%	0.9%	17.0	4.8%	0.7%	17.3	2.0%	2.4%	9.9
Plastics #1 PET Non-bottle Containers	0.4%	0.2%	6.6	0.3%	0.2%	2.5	0.8%	0.3%	2.8	0.3%	0.3%	1.6
Plastic # 2 (HDPE - Clear, colored bottles and jugs only)	0.7%	0.3%	10.1	1.2%	1.0%	9.8	1.1%	0.3%	3.8	1.3%	1.4%	6.5
Plastic Containers #3 thru #7	3.0%	0.7%	43.2	2.7%	1.3%	21.5	4.1%	0.9%	14.6	1.6%	2.7%	7.7
#4 Plastic Bottles	0.0%	0.0%	0.0	0.0%	0.1%	0.3	0.0%	0.0%	0.0	0.0%	0.0%	0.0
#5 Pipette holders and lids	0.0%	0.0%	0.3	0.7%	0.8%	5.8	0.0%	0.0%	0.0	0.0%	0.0%	0.0
#5 Hospital pitchers, basins, saline bottles	0.0%	0.0%	0.0	0.2%	0.3%	1.4	0.0%	0.0%	0.0	0.0%	0.0%	0.0
#5 Christmas tree adaptors	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Plastic Film & Bags - Clean	0.0%	0.0%	0.3	0.4%	0.8%	3.4	0.4%	0.2%	1.3	0.0%	0.0%	0.0
Plastic Film & Bags - Other	10.6%	1.5%	154.5	9.3%	3.8%	72.8	10.1%	1.1%	36.4	13.2%	0.2%	65.1
Data Storage Film	0.0%	0.0%	0.0	0.0%	0.0%	0.2	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Expanded Polystyrene "Styrofoam"	1.2%	0.5%	16.9	0.8%	0.6%	6.1	1.8%	0.5%	6.6	0.2%	0.4%	0.8
Polystyrene (Styrofoam) lab transport containers	0.0%	0.0%	0.0	0.4%	0.7%	3.1	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Remainder/Composite Plastic	4.2%	1.9%	61.8	5.8%	2.1%	45.9	2.2%	0.4%	7.8	0.7%	1.2%	3.6
Metal	3.9%	1.1%	56.4	3.3%	2.9%	26.2	4.1%	1.5%	14.7	4.7%	4.3%	23.2
Aluminum Cans	1.3%	0.4%	18.8	0.6%	0.3%	4.5	2.3%	0.8%	8.2	0.2%	0.1%	0.9
Aluminum Containers, Plates and foils	0.3%	0.2%	4.2	0.5%	0.5%	4.2	0.4%	0.2%	1.4	0.4%	0.1%	1.9
Steel Cans & Containers	0.5%	0.4%	7.5	0.2%	0.2%	1.3	1.3%	0.9%	4.6	4.1%	4.4%	20.4
Other Ferrous (magnetic)	0.6%	0.5%	8.2	0.9%	0.5%	7.1	0.1%	0.1%	0.4	0.0%	0.1%	0.1
Other Non-Ferrous (not magnetic)	0.0%	0.1%	0.6	0.1%	0.1%	0.4	0.0%	0.0%	0.1	0.0%	0.0%	0.0
Remainder/Composite Metal	1.2%	1.2%	17.1	1.1%	2.0%	8.6	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Refrigerators/Freezers	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Glass	3.2%	4.0%	46.6	5.9%	4.4%	46.4	5.2%	0.6%	18.6	1.1%	1.4%	5.6
Glass Bottles and Jars (clear or colored)	3.0%	4.0%	43.8	0.6%	0.5%	4.8	4.6%	0.8%	16.5	1.0%	1.8%	5.0
Glass Containers - Non-Beverage	0.1%	0.1%	1.6	0.3%	0.3%	2.4	0.4%	0.3%	1.5	0.0%	0.0%	0.0
Glass Lab Containers	0.0%	0.0%	0.3	4.1%	4.9%	32.5	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Remainder/Composite Glass	0.1%	0.1%	0.9	0.9%	1.2%	6.7	0.2%	0.3%	0.6	0.1%	0.4%	0.7
Organics	20.8%	4.7%	304.5	15.9%	5.7%	124.9	23.8%	3.1%	85.5	36.6%	25.3%	180.4
Food Waste	17.2%	4.5%	251.6	11.4%	6.4%	90.0	23.2%	3.0%	83.4	36.4%	25.6%	179.6
Yard Waste Grass, Leaves & Brush	0.2%	0.4%	3.3	0.6%	1.1%	4.6	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Miscellaneous Organics	1.3%	1.1%	19.3	0.3%	0.2%	2.7	0.6%	0.6%	2.1	0.2%	0.4%	0.8
Pallets	2.1%	2.8%	30.3	3.5%	6.8%	27.6	0.0%	0.0%	0.0	0.0%	0.0%	0.0
C&D	2.5%	1.8%	36.6	4.1%	6.8%	32.3	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Wood - Treated	0.1%	0.2%	1.8	2.4%	4.6%	18.6	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Wood - Untreated	0.8%	1.1%	11.4	0.4%	0.7%	3.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Asphalt	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Asphalt Roofing	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Brick, Concrete, and Rock	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Carpet & Carpet Padding	1.2%	1.8%	17.6	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Drywall/Gypsum Board	0.0%	0.0%	0.0	0.4%	0.7%	3.2	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Remainder/Composite Construction & Demolition	0.4%	0.4%	5.8	0.9%	1.6%	7.5	0.0%	0.0%	0.0	0.0%	0.0%	0.0
HHW	0.2%	0.1%	3.1	0.2%	0.1%	1.2	0.3%	0.3%	1.2	0.1%	0.3%	0.4
Household Hazardous Waste	0.0%	0.0%	0.4	0.1%	0.1%	0.6	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Aerosol cans	0.1%	0.1%	2.1	0.0%	0.0%	0.1	0.1%	0.1%	0.4	0.1%	0.3%	0.4
Treated Medical Waste	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.1%	0.1%	0.2	0.0%	0.0%	0.0
Batteries	0.0%	0.0%	0.2	0.1%	0.1%	0.5	0.2%	0.1%	0.6	0.0%	0.0%	0.0
Ballasts	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Lightbulbs	0.0%	0.0%	0.4	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Paint	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Electronics	0.6%	1.1%	9.1	0.5%	0.7%	3.6	0.7%	0.5%	2.6	0.0%	0.0%	0.0
Small Consumer Electronics	0.0%	0.0%	0.2	0.5%	0.7%	3.6	0.7%	0.5%	2.6	0.0%	0.0%	0.0
Computers and Related Electronics	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Flat screen Televisions and Monitors	0.6%	1.1%	8.9	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0
CRT Televisions and Monitors	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Other	10.7%	7.9%	156.5	18.8%	8.3%	147.9	3.1%	1.5%	11.1	11.4%	7.1%	56.3
Mixed Medical Facility Waste	0.0%	0.0%	0.2	2.5%	2.9%	19.7	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Textiles	1.5%	0.6%	22.4	1.0%	0.9%	8.2	0.5%	0.2%	1.7	0.0%	0.1%	0.1
Hospital Textiles	0.0%	0.0%	0.0	0.3%	0.4%	2.3	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Rubber Products	1.7%	1.3%	24.7	1.9%	1.2%	15.0	0.1%	0.0%	0.2	2.9%	0.3%	14.1
Disposable Diapers & Sanitary Products	0.5%	0.4%	6.9	0.1%	0.1%	1.2	0.9%	0.6%	3.2	0.0%	0.0%	0.0
Bottom Fines & Dirt	0.7%	0.4%	10.6	0.5%	0.2%	3.5	0.6%	0.5%	2.0	0.2%	0.1%	1.0
Other Bulky Items	1.3%	1.7%	19.7	4.9%	6.6%	38.7	0.5%	1.1%	2.0	0.0%	0.0%	0.0
Old Furniture	1.6%	3.0%	24.0	3.0%	4.7%	23.6	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Tires	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Other Miscellaneous	3.3%	3.0%	48.1	4.5%	5.4%	35.7	0.5%	0.5%	2.0	8.3%	7.5%	41.1
Total	100.0%		1,460.7	100.0%		785.9	100.0%		359.6	100.0%		493.2
Number of Samples	10			6			5			2		

Appendix B - Detailed Results by Generator Sector (Refuse)

Material Category	Football Stadium			Hospital		
	Mean	Conf. Int	Tons	Mean	Conf. Int	Tons
	Percent	(+/-)		Percent	(+/-)	
Paper	29.1%	7.1%	104.1	20.7%	6.0%	848.7
Corrugated Cardboard/Kraft Paper (Uncoated)	5.3%	4.8%	18.8	3.0%	2.0%	125.2
Office Paper (High Grade)	0.0%	0.0%	0.0	0.3%	0.4%	12.8
Mixed Recyclable Paper (Low Grade, ONP)	10.7%	1.0%	38.2	5.7%	1.1%	232.5
Magazines, catalogs, soft bound books	0.0%	0.0%	0.0	0.1%	0.1%	3.4
Hardbound Books	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Aseptic Boxes & Gable Top Cartons	0.1%	0.1%	0.2	0.4%	0.5%	16.4
Compostable Paper	11.5%	6.4%	41.2	9.4%	2.2%	384.4
Remainder/Composite Paper	1.6%	0.5%	5.6	1.8%	1.9%	73.9
Plastic	26.6%	4.5%	94.9	29.3%	3.6%	1,202.1
Plastics # 1 PET Bottles Only	8.2%	5.8%	29.4	1.4%	0.7%	57.8
Plastics #1 PET Non-bottle Containers	0.3%	0.2%	1.2	1.0%	1.0%	41.1
Plastic # 2 (HDPE - Clear, colored bottles and jugs only)	0.1%	0.2%	0.4	0.7%	0.5%	27.0
Plastic Containers #3 thru #7	6.0%	2.5%	21.5	1.7%	0.5%	69.3
#4 Plastic Bottles	1.1%	2.3%	3.9	0.0%	0.0%	0.0
#5 Pipette holders and lids	0.0%	0.0%	0.0	0.2%	0.4%	8.1
#5 Hospital pitchers, basins, saline bottles	0.0%	0.0%	0.0	1.2%	0.9%	50.9
#5 Christmas tree adaptors	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Plastic Film & Bags - Clean	0.2%	0.2%	0.6	1.1%	2.1%	46.6
Plastic Film & Bags - Other	8.4%	3.3%	30.1	12.0%	2.7%	494.4
Data Storage Film	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Expanded Polystyrene "Styrofoam"	0.3%	0.3%	1.1	3.3%	0.5%	135.5
Polystyrene (Styrofoam) lab transport containers	0.0%	0.0%	0.0	0.4%	0.6%	17.7
Remainder/Composite Plastic	1.9%	0.9%	6.8	6.2%	1.8%	253.6
Metal	2.9%	2.1%	10.3	1.6%	0.1%	67.4
Aluminum Cans	2.0%	1.8%	7.2	0.5%	0.1%	21.8
Aluminum Containers, Plates and foils	0.5%	0.3%	1.7	0.1%	0.2%	4.6
Steel Cans & Containers	0.1%	0.2%	0.4	0.2%	0.2%	7.9
Other Ferrous (magnetic)	0.2%	0.4%	0.8	0.3%	0.5%	14.0
Other Non-Ferrous (not magnetic)	0.0%	0.0%	0.0	0.1%	0.3%	6.0
Remainder/Composite Metal	0.0%	0.1%	0.2	0.3%	0.4%	13.1
Refrigerators/Freezers	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Glass	7.1%	7.1%	25.4	0.5%	0.6%	20.8
Glass Bottles and Jars (clear or colored)	7.0%	7.0%	25.0	0.3%	0.3%	12.0
Glass Containers - Non-Beverage	0.0%	0.0%	0.0	0.0%	0.1%	1.5
Glass Lab Containers	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Remainder/Composite Glass	0.1%	0.2%	0.4	0.2%	0.3%	7.4
Organics	31.1%	11.1%	111.3	12.9%	3.0%	528.9
Food Waste	30.7%	11.2%	109.6	12.6%	3.5%	516.8
Yard Waste Grass, Leaves & Brush	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Miscellaneous Organics	0.5%	0.3%	1.6	0.2%	0.3%	6.2
Pallets	0.0%	0.0%	0.0	0.1%	0.3%	5.9
C&D	0.0%	0.0%	0.0	1.0%	1.4%	43.1
Wood - Treated	0.0%	0.0%	0.0	0.2%	0.5%	9.9
Wood - Untreated	0.0%	0.0%	0.0	0.4%	0.9%	17.5
Asphalt	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Asphalt Roofing	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Brick, Concrete, and Rock	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Carpet & Carpet Padding	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Drywall/Gypsum Board	0.0%	0.0%	0.0	0.3%	0.4%	12.1
Remainder/Composite Construction & Demolition	0.0%	0.0%	0.0	0.1%	0.2%	3.6
HHW	0.1%	0.1%	0.2	3.1%	6.2%	127.3
Household Hazardous Waste	0.0%	0.0%	0.0	0.0%	0.1%	2.0
Aerosol cans	0.0%	0.1%	0.1	0.0%	0.0%	1.2
Treated Medical Waste	0.0%	0.0%	0.0	3.0%	6.3%	121.6
Batteries	0.0%	0.1%	0.1	0.1%	0.1%	2.5
Ballasts	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Lightbulbs	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Paint	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Electronics	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Small Consumer Electronics	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Computers and Related Electronics	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Flat screen Televisions and Monitors	0.0%	0.0%	0.0	0.0%	0.0%	0.0
CRT Televisions and Monitors	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Other	3.1%	3.6%	11.2	30.9%	9.5%	1,267.3
Mixed Medical Facility Waste	0.0%	0.0%	0.0	12.3%	2.8%	505.0
Textiles	1.5%	1.7%	5.5	2.0%	1.3%	80.9
Hospital Textiles	0.0%	0.0%	0.0	0.8%	0.3%	32.7
Rubber Products	0.2%	0.2%	0.6	4.4%	1.3%	179.6
Disposable Diapers & Sanitary Products	0.5%	0.9%	1.9	8.8%	4.4%	359.6
Bottom Fines & Dirt	0.2%	0.1%	0.9	0.2%	0.2%	7.9
Other Bulky Items	0.2%	0.5%	0.8	0.0%	0.0%	0.0
Old Furniture	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Tires	0.0%	0.0%	0.0	0.0%	0.0%	0.0
Other Miscellaneous	0.4%	0.6%	1.5	2.5%	1.6%	101.6
Total	100.0%		357.2	100.0%		4,105.5
Number of Samples		3		4		

APPENDIX C

DETAILED CAPTURE RATE RESULTS

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Appendix C - Detailed Capture Rate Results

Material	Disposed (tons)	Recycled (tons)	Generated (tons)	Capture Rate
Single Stream Recyclable	1,756.0	1,836.0	3,592.0	51.1%
Corrugated Cardboard/Kraft Paper (Uncoated)	293.4			
Office Paper (High Grade)	49.2			
Mixed Recyclable Paper (Low Grade, ONP)	579.9			
Magazines, catalogs, soft bound books	19.2			
Plastics # 1 PET Bottles Only	185.6			
Plastic # 2 (HDPE - Clear, colored bottles and jugs only)	57.6			
Aluminum Cans	61.4			
Aluminum Containers, Plates and foils	18.0			
Steel Cans & Containers	42.2			
Glass Bottles and Jars (clear or colored)	107.0			
Glass Containers - Non-Beverage	7.0			
#4 Plastic Bottles	4.1			
#5 Pipette holders and lids	14.2			
#5 Hospital pitchers, basins, saline bottles	52.3			
Aseptic Boxes & Gable Top Cartons	31.5			
Plastics #1 PET Non-bottle Containers	55.7			
Plastic Containers #3 thru #7	177.8			
Other Targeted Recyclable	266.6	587.0	853.6	68.8%
Hardbound Books	23.2	7.2	30.3	23.6%
Data Storage Film	0.2	0.0	0.2	5.5%
Tires	0.0	5.8	5.8	100.0%
Cooking Oil	0.0	241.0	241.0	100.0%
Mixed Media	0.0	0.8	0.8	100.0%
Toner/Cartridges	0.0	9.1	9.1	100.0%
Motor Oil	0.0	7.5	7.5	100.0%
Plastic Film & Bags - Clean	52.2	0.6	52.8	1.1%
#5 Christmas tree adaptors	0.0			
Polystyrene (Styrofoam) lab transport containers	20.8	5.9	26.7	22.2%
Glass Lab Containers	32.8	4.5	37.3	12.2%
Paint	0.0	0.2	0.2	100.0%
Wood - Treated	30.3			
Wood - Untreated	31.9			
Asphalt	0.0			
Asphalt Roofing	0.0			
Brick, Concrete, and Rock	0.0			
Carpet & Carpet Padding	17.6			
Drywall/Gypsum Board	15.3			
Hospital Textiles*	35.1			
Household Hazardous Waste	2.9			
Aerosol cans	4.4			
Recyclable Metal	76.7	279.9	356.6	78.5%
Other Ferrous (magnetic)	30.7			
Other Non-Ferrous (not magnetic)	7.0			
Remainder/Composite Metal	39.0			
Refrigerators/Freezers	0.0			
Electronics	15.3	92.7	108.0	85.8%
Small Consumer Electronics	6.4			
Computers and Related Electronics	0.0			
Flat screen Televisions and Monitors	8.9			
CRT Televisions and Monitors	0.0			
Green Waste	7.8	188.2	196.0	96.0%
Yard Waste Grass, Leaves & Brush	7.8			
Pallets/Logs/Chips/Wood Crates	63.8	256.9	320.7	80.1%
Pallets	63.8			

Appendix C - Detailed Capture Rate Results

Material Category	Disposed (tons)	Recycled (tons)	Generated (tons)	Capture Rate
Food Waste	1,231.0	41.9	1,272.9	3.3%
Food Waste	1,231.0			
Batteries/Lamps	4.2	19.3	23.6	82.0%
Batteries	3.9	14.0	17.9	78.4%
Ballasts	0.0	1.1	1.1	100.0%
Lightbulbs	0.4	4.2	4.5	91.8%
Disposed	4,140.6	0.0	4,140.6	0.0%
Compostable Paper	789.7			
Remainder/Composite Paper	147.8			
Plastic Film & Bags - Other	853.3			
Expanded Polystyrene "Styrofoam"	167.1			
Remainder/Composite Plastic	379.4			
Remainder/Composite Glass	16.7			
Miscellaneous Organics	32.7			
Remainder/Composite Construction & Demolition	16.9			
Treated Medical Waste	121.8			
Mixed Medical Facility Waste	524.8			
Textiles	118.8			
Rubber Products	234.2			
Disposable Diapers & Sanitary Products	372.7			
Bottom Fines & Dirt	25.8			
Other Bulky Items	61.2			
Old Furniture	47.6			
Other Miscellaneous	229.9			
Total	7,562.1	3,301.9	10,864	30.4%





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