Public Works Department
SOLID WASTE AND RECYCLING SERVICES
1 N. University Drive, Suite 400 • Plantation, Florida 33324 • 954-765-4999 • FAX 954-577-2391

June 3, 2024

Dear Municipal Administrators:

As you may already be aware, on behalf of the Solid Waste Working Group in 2022, Broward County engaged a consultant, SCS Engineers, to conduct both a Waste Generation Study (WGS) and a Waste Characterization Study (WCS). The WCS involved an analysis of three different waste streams including recycling, construction and demolition/bulk waste, and solid waste to assess opportunities to increase waste diversion and recycling. The WGS determines the average amount of waste generated at Broward residential and commercial establishments and provides a basis for a special assessment.

The WCS is completed and is attached for your information. The WGS is being finalized and once finalized will be forwarded to you.

If you have any questions, please feel free to contact me at (954) 474-1880 or naustin@broward.org.

Sincerely,

NOTOSHA AUSTIN
Digitally signed by NOTOSHA AUSTIN
Date: 2024.06.03 15:04:21 -04'00'

Notosha Austin
Interim Director

Attachment

c: Kevin Kelleher, Assistant County Administrator
Trevor M.A. Fisher, P.E., MBA, Director, Public Works Department
Todd Storti, Executive Director, Solid Waste Disposal and Recyclable Materials Processing Authority of Broward County

Broward County
2023 Waste Characterization Study
Final Report

Broward County, Florida
Solid Waste and Recycling Services
1 N. University Drive, Suite 400
Plantation, FL 33324

SCS ENGINEERS

09222033.00 | April 30, 2024

10752 Deerwood Park Blvd. Ste. 100
Jacksonville, FL 32256
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1 EXECUTIVE SUMMARY

Broward County together with 30 of its 31 municipalities created the Solid Waste Working Group (SWWG) in 2019 to explore recycling opportunities and provide long-term and sustainable solid waste solutions. The SWWG is comprised of members from various municipalities and the County. To inform the SWWG as they consider programs and facilities that meet the direction of the Interlocal Agreement (ILA) developed by the SWWG, SCS Engineers (SCS) was engaged to perform a waste characterization study to examine and document what is generated by businesses and residents. The objectives of the waste characterization study are as follows:

1. Use field collection methods that measure the types and representative proportions of materials disposed of and recycled in Broward County,

2. Develop countywide waste composition profiles for the following four waste streams:

    1) Residential/Commercial recycling
    2) Residential municipal solid waste
    3) Commercial municipal solid waste
    4) Construction and demolition/bulk waste

3. Perform standard statistical analyses of the waste composition data and calculate the 90 percent confidence intervals for each material type,

4. Estimate the proportion of waste currently disposed of in the county that can be diverted through new or expanded reuse, recycling, and composting programs, and

5. Document the current study to establish a baseline so that it can be compared to future waste characterization studies to assess waste disposal trends and to evaluate impact of future programs and facilities.

At the direction of the SWWG, Broward County contracted with SCS to perform a waste characterization study. SCS coordinated with both private and county-owned facilities to select appropriate locations to sample waste and recyclables and develop site-specific sampling plans and health and safety plans for each selected location.

Over the course of four seasonal field efforts, 135 waste samples (from residential and commercial sources) and 50 recycling samples (from residential and commercial sources) were collected, weighing in total 30,000 and 8,400 pounds, respectively. Recycling samples were hand sorted into 17 material types[1] (see **Table 2**); waste samples were hand-sorted into 46 material types (see **Table 3**). In addition, over 250 waste loads containing construction and demolition debris (C&D) or bulky materials were visually characterized into 30 material types (see **Table 4**).

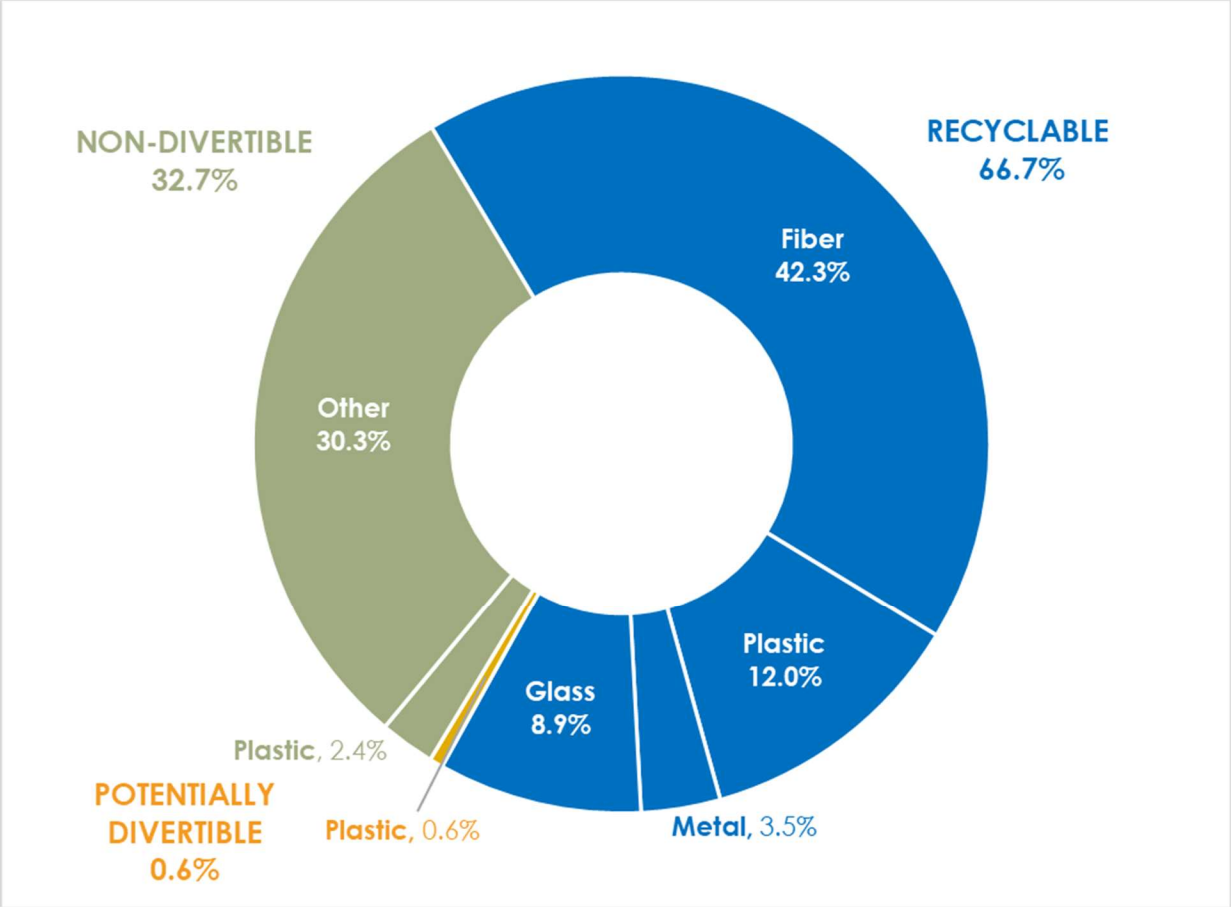
Summary graphics that represent the four waste streams are presented below.

[1] It should be noted that residential recycling samples are derived from multiple municipalities with varying recycling programs which support different recyclable materials.

1.1 SOURCE SEPARATED RECYCLING

As presented in **Exhibit 1**, about 67 percent of the recycling stream consists of materials that are accepted for recycling programs in the County, including cardboard, newspaper, #1 and #2 plastic containers, metal cans, and glass bottles. The remaining 33 percent of the recyclable stream are materials that are not accepted for recycling and have been classified as either non-divertible (32.7 percent) or potentially divertible (less than one percent).

Exhibit 1. Residential/Commercial Recyclables Stream Classification by Material Type



Percentages may not add up to 100% due to rounding. Composition is based on 50 150-pound samples.

Individual material types that comprise the largest proportions of residential/commercial recycling include:

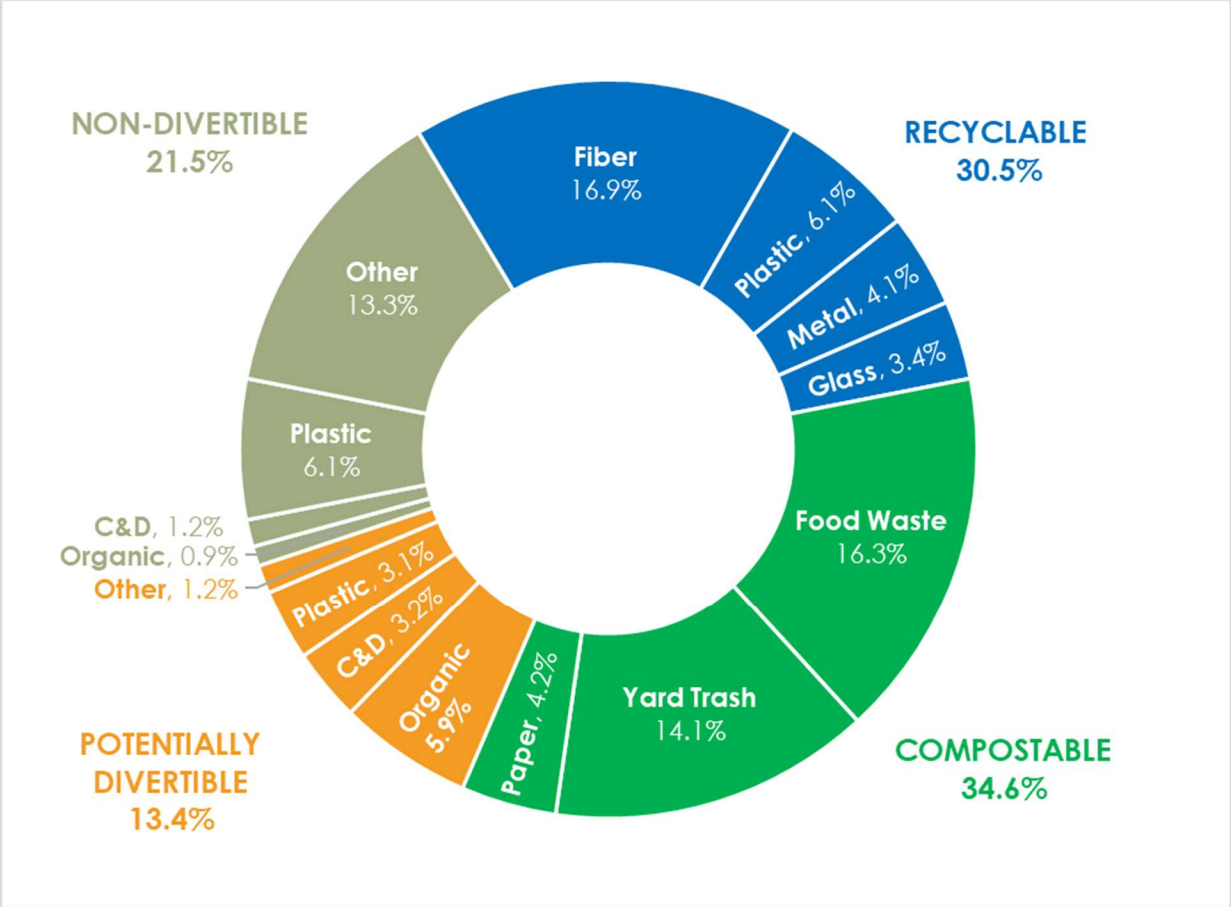
- Residue (contamination) at 32.7 percent (non-divertible)
- Corrugated Cardboard at 19.2 percent (recyclable)
- Mixed Paper at 11.6 percent (recyclable)
- Glass Containers at 8.9 percent (recyclable)
- PET Bottles at 5.8 percent (recyclable)

Refer to **Table 5** for detailed composition by material type.

1.2 RESIDENTIAL MSW

As presented in **Exhibit 2**, about 31 percent of the residential MSW material stream consists of recyclable materials that could be diverted through existing programs. Another 35 percent of residential MSW is compostable, which includes food scraps that comprise 16 percent. The remaining composition includes about 13 percent potentially divertible materials and 22 percent is non-divertible.

Exhibit 2. Residential MSW Classification by Material Type



Percentages may not add to 100% due to rounding. Composition is based on 91 200-pound samples.

Individual material types that comprise the largest proportions of residential MSW include:

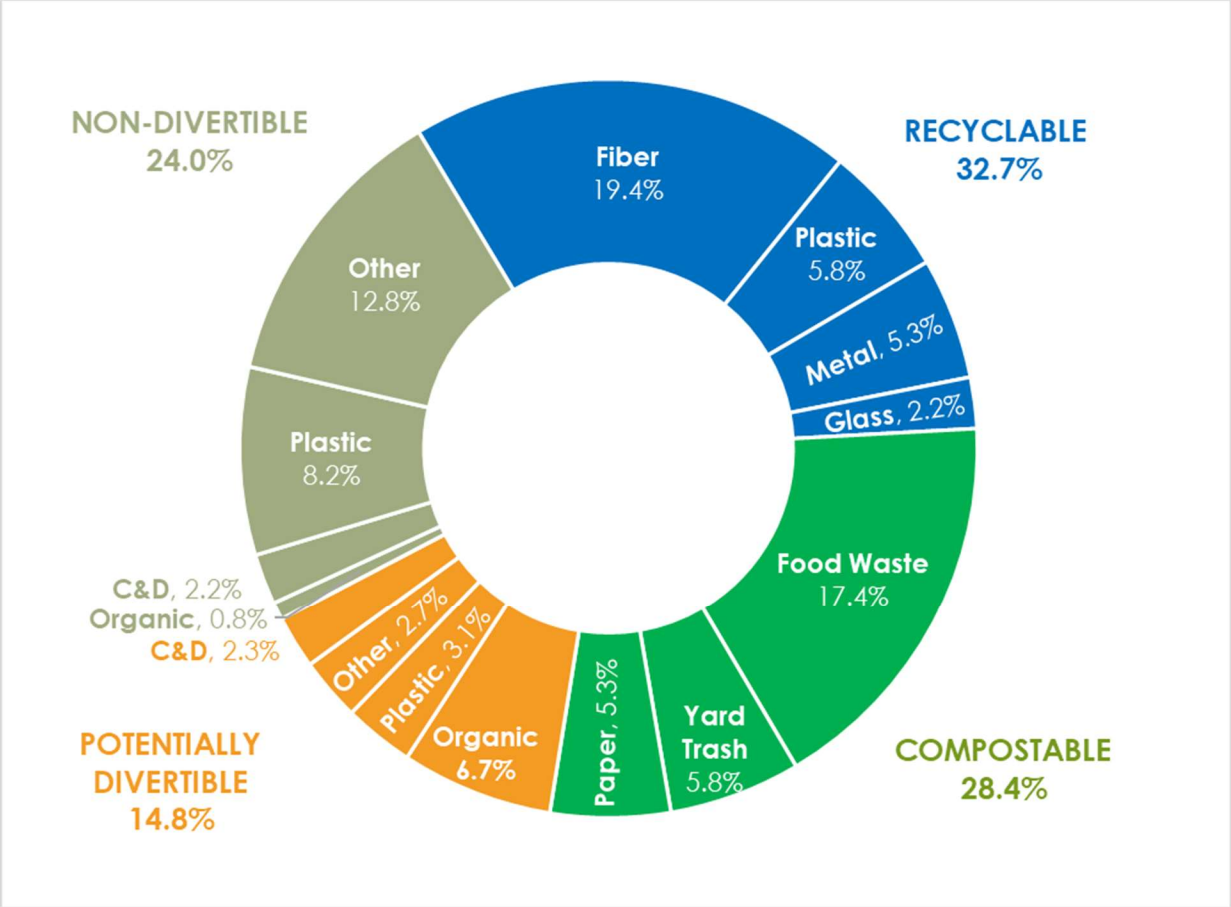
- Food Waste at 16.3 percent (compostable)
- Yard Waste at 14.1 percent (compostable)
- Miscellaneous materials (not classified) at 13.3 percent (non-divertible)
- Mixed Paper at 8.9 percent (recyclable)
- Textiles at 5.7 percent (potentially divertible)

Refer to **Table 6** for detailed composition by material type.

1.3 COMMERCIAL MSW

As presented in **Exhibit 3**, about 33 percent of the commercial MSW material stream consists of recyclable materials that could be diverted through existing programs. Another 28 percent of commercial MSW is compostable, including food scraps that comprise 17 percent. The remaining composition includes about 15 percent potentially divertible materials and 24 percent non-divertible materials.

Exhibit 3. Commercial MSW Classification by Material Type



Percentages may not add up to 100% due to rounding. Composition is based on 44 200-pound samples.

Individual material types that comprise the largest proportions of commercial MSW include:

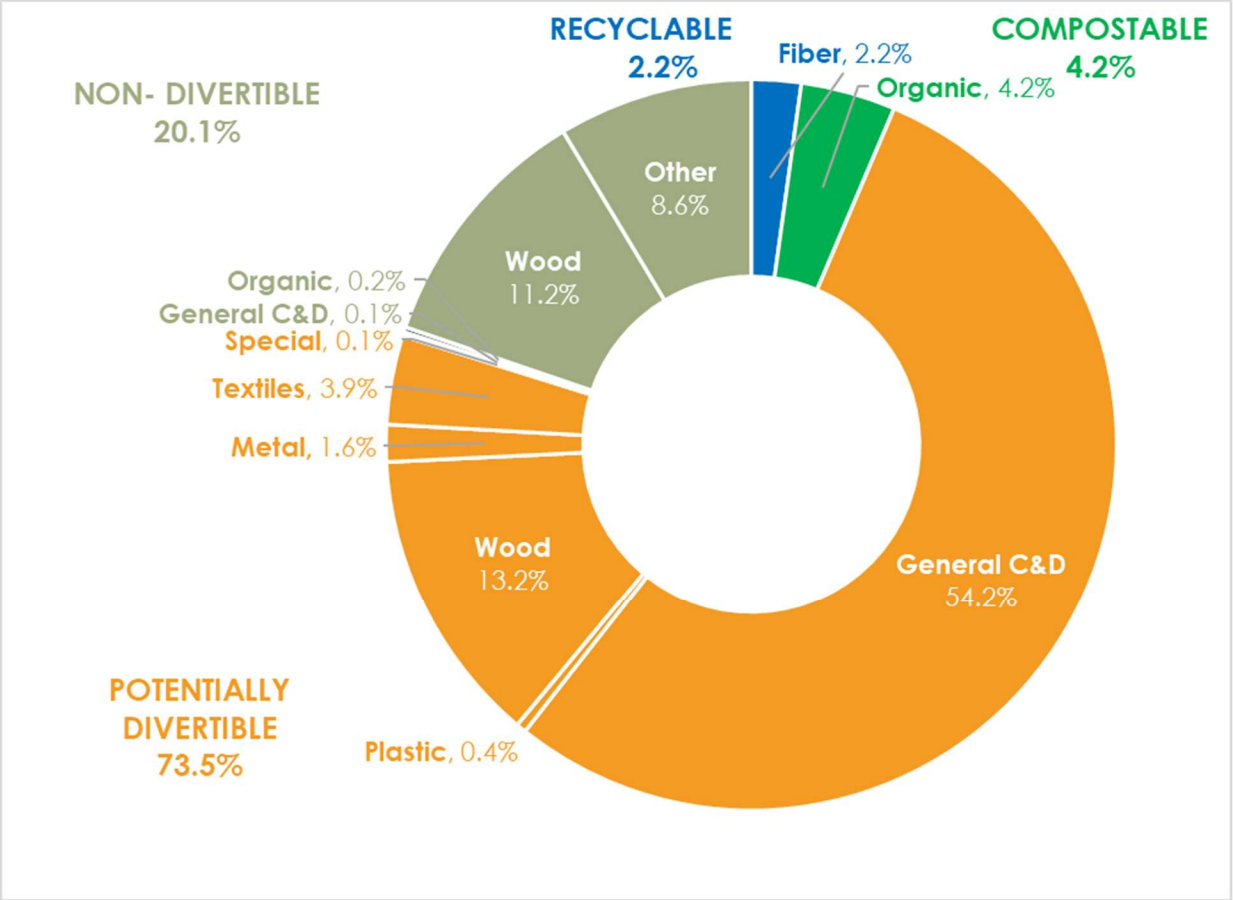
- Food Waste at 17.4 percent (compostable)
- Miscellaneous materials (not classified) at 12.8 percent (non-divertible)
- Corrugated Cardboard at 8.7 percent (recyclable)
- Mixed Paper at 6.9 percent (recyclable)
- Yard Trash at 5.8 percent (compostable)

Refer to **Table 7** for detailed composition by material type.

1.4 CONSTRUCTION AND DEMOLITION DEBRIS/BULKY WASTE

As presented in **Exhibit 4**, nearly three-quarters of the disposed C&D/bulky waste material stream is classified as potentially divertible, which includes items such as concrete, brick, asphalt roofing, wood, and textiles. SCS estimated that about two percent of this material stream is recyclable cardboard and four percent is organic material, primarily yard waste. The remaining 20 percent is classified as non-divertible and includes items such as treated wood, bagged waste, bulky waste, and insulation.

Exhibit 4. C&D/Bulky Waste Classification by Material Type



Percentages may not add up to 100% due to rounding.
Composition is based on 252 visually characterized waste loads.

Individual material types that comprise the largest proportions of C&D/Bulky Waste include:

- Asphalt Roofing at 25.7 percent (potentially divertible)
- Clean Engineered Wood at 13.2 percent (potentially divertible)
- Treated Wood at 11.2 percent (potentially divertible)
- Brick at 8.8 percent (potentially divertible)
- Concrete at 8.0 percent (potentially divertible)

Refer to **Table 8** for detailed composition by material type.

1.5 CONCLUSIONS AND RECOMMENDATIONS

This study provides data and information about the disposed and recycled waste stream in Broward County to evaluate the effectiveness of existing waste diversion programs and identify opportunities to create programs or develop facilities to divert additional materials from landfill disposal or incineration. Comparison of future waste compositions to the waste compositions in this report can also help identify trends and changes in waste generation in the County.

The following recommendations are based on the waste composition data presented in this report:

1. **Improving Existing Recycling Behavior:** By weight, 30.5 percent of materials placed in recycling collection containers are not recyclable in Broward County, either because there is no viable market or because the material is not considered recyclable (e.g., food). Public education and outreach should inform residents and businesses about proper recycling.

2. **Reduce the Amount of Recyclable Material Disposed as MSW:** By weight, 30.5 of the County's residential MSW and 32.7 percent of commercial MSW are recyclable materials. This represents a lost opportunity to conserve resources, receive revenue from the sale of recyclable commodities, and reduce greenhouse gas emissions from disposal and mining for virgin materials. Cardboard and mixed paper comprise the largest portions of recyclable materials in MSW.

3. **Focus on Diverting Compostable Materials**: Compostable materials (compostable paper, food, and yard trash) comprise 34.6 percent of residential MSW and 28.4 percent of commercial MSW. There is significantly more yard trash in residential MSW than commercial MSW. Nationwide, there continues to be growing interest in diverting materials for composting and other organic processing technologies. The opportunity for diverting compostable materials in Broward County is tremendous (34.6 percent of residential waste and 28.4 percent of commercial waste is compostable), and the County should further assess programs, facilities, and technologies for processing organics.

4. **Focus on Programs to Further Divert C&D/Bulky Waste:** About 80 percent of C&D/Bulky waste is recyclable (cardboard), compostable, or potentially divertible. The County can assess markets for recovered C&D materials in the region and could work with contractors and self-haulers to separate materials that could be recovered. Asphalt roofing, clean engineered wood, concrete and brick comprise the greatest portions of C&D/Bulky waste. The Broward County Landfill (BCL) also could develop holding areas for divertible materials that are segregated and then transport them to a processor when sufficient quantities accumulate. This could promote waste diversion and reduce the financial burden on small contractors and self-haulers to recycle.

5. **Continue Performing Waste Characterization Studies:** Over the last two decades, waste characterization studies have provided local governments with valuable information on how the waste stream is changing. This allows governments to make decisions about the programs and policies needed to reduce disposal, recover resources, and boost the economy. The County should continue conducting these studies on an incremental basis to further track changes in the waste stream.

2 BACKGROUND

Broward County together with 30 of its 31 municipalities created the Solid Waste Working Group (SWWG) in 2019 to explore recycling opportunities and provide long-term and sustainable solid waste solutions. To inform the SWWG as they consider programs and facilities that meet the direction of the Interlocal Agreement (ILA) developed by the SWWG, SCS was engaged to perform a waste characterization study to examine and document what is being generated. The objectives of the waste characterization study are as follows:

1. Use field collection methods that measure the types and representative proportions of materials disposed of and recycled in Broward County,

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5. Document the current study to establish a baseline so that it can be compared to future waste characterization studies to assess waste disposal trends and to evaluate impact of future programs and facilities.

The SWWG through Broward County contracted with SCS to perform a multi-season waste characterization study. SCS coordinated with both private and county-owned facilities to select appropriate locations to sample waste and recyclables and develop site-specific sampling plans and health and safety plans for each selected location.

Broward has 31 municipalities and the Broward Municipal Services District (unincorporated Broward), the majority of which have one exclusive franchised hauler for collection of residential waste. Commercial waste collection is also franchised with most municipalities having multiple haulers. The county is home to a population of just under two million residents living in 867,215 households, 67 percent of which are single-family homes. There are over 67,000 businesses providing over 710,000 jobs in the County. The top five industries by employment include retail trade, healthcare and social assistance, accommodation and food service, administrative and waste management service, and professional, scientific, and technical services.

This study assessed four separate waste streams generated:

- Source Separated Recycling (SSR): Most municipalities are serviced by private haulers that direct-haul SSR (separated at the point of origin) from residential and commercial sources to the Deerfield Beach Recycling and Transfer Facility. From the Transfer Facility, the materials are aggregated and transported via transfer trailer to Reuter Recycling in Pembroke Pines for processing. Recyclable materials from both residential and commercial sources are combined prior to delivery to Reuter Recycling.

- **Municipal Solid Waste (MSW):** A significant amount of MSW generated in Broward County is collected by private and municipal haulers and disposed of at the South Broward Waste-to-Energy Facility in Fort Lauderdale (owned and operated by WIN Waste Innovations). To reduce transportation time, many haulers deliver waste to the North Broward Transfer Station (owned by Waste Management, Inc. and operated by WIN Waste Innovations) in unincorporated Broward near Pompano Beach where it is aggregated and eventually transported to a final disposal destination.

  Representatives at WIN Waste Innovations provided accommodations to sample incoming waste deliveries at the North Broward Transfer Station. Waste loads from the following communities were sampled: Coconut Creek, Coral Springs, Davie, Fort Lauderdale, Lauderdale Lakes, Lauderhill, Lighthouse Point, Margate, North Lauderdale, and Tamarac,

  - Residential, generated by mostly single-family homes, and
  - Commercial, generated by businesses, institutions, and industrial operations.

- **Construction and Demolition Debris (C&D) and Bulky Materials:** The Broward County Landfill (BCL) receives a significant amount of C&D and self-hauled bulky waste materials from a broad spectrum of municipalities and generating sectors. This site was selected because:

  - Only waste originating from within Broward County is accepted.

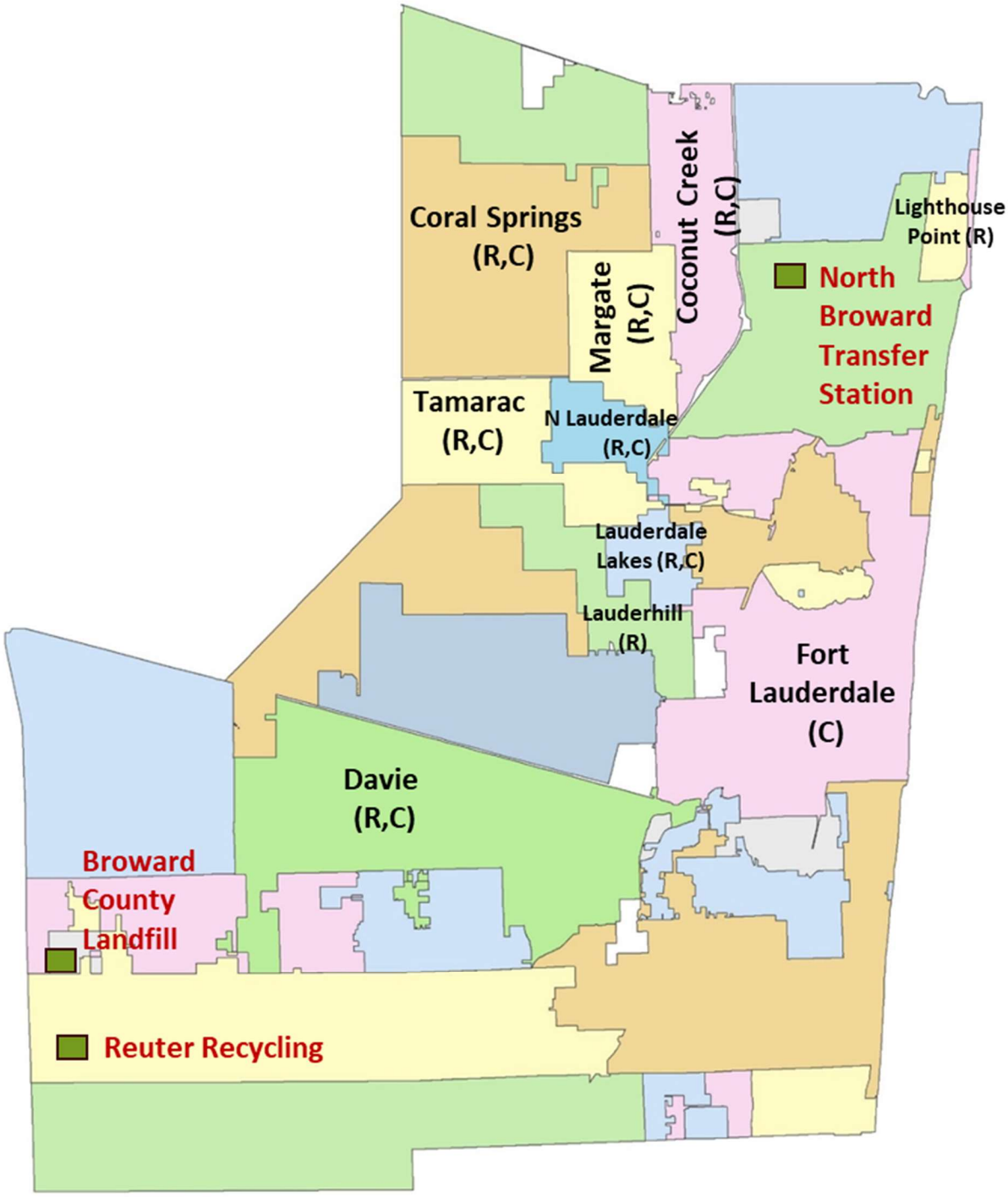
  - The site prohibits disposal of MSW, hazardous waste, biomedical waste, lead-acid batteries, used oil, liquid waste (unless specifically approved by an authorized individual), and waste containing polychlorinated biphenyls (PCB's),

  - The site volunteered to accommodate the visual characterization staff and provided space to observe and record contents of waste loads.

  - The BCL does not accept bulk waste materials from franchise haulers providing service to municipalities. C&D is typically generated by larger commercial establishments while homeowners and small businesses tend to generate what is categorized as bulky waste materials.

MSW and SSR sampling included manually sorting samples from residential and commercial sources. C&D/Bulky waste was visually characterized. **Exhibit 5** presents a map of the facilities where fieldwork was conducted and identifies the cities for which MSW was sampled. An "R" represents residential MSW, and "C" represents commercial MSW.

Exhibit 5. Map of Facilities Where Fieldwork Was Conducted and Cities Incorporated into MSW Sampling



3 METHODS

This section details the methods for completing the material characterization study for the County. Considerable planning was involved in the design and execution of field sampling for each material stream. Our field efforts prioritized the following:

- **Health and Safety** – The top priority was the health and safety of all individuals completing field activities for this project. This included SCS and its subcontractors as well as the facility staff who provided support. **Appendix A** contains site-specific health and safety plans for each site where fieldwork was conducted.

- **Reliable Data and Results** – Development of a sampling plan for each site and coordination with facility staff were key to obtaining representative data for the material streams evaluated as part of this project. **Appendix B** contains the field procedures for the study; pertinent sections are included below.

3.1 HEALTH AND SAFETY

A site-specific health and safety plan was developed for each solid waste facility where fieldwork was performed for this project. Each plan detailed site-specific hazards the team needed to understand to perform the work safely and special hazards involved in handling and characterizing MSW and C&D materials. Site operators reviewed each plan prior to fieldwork to confirm conformance to facility requirements. The health and safety plans are included in Appendix A.

3.2 PROJECT SCHEDULE AND FIELDWORK SUMMARY

Field activities for this project occurred over four (4) seasons beginning in August 2022 and concluding in June 2023 and are summarized in **Table 1.** Four seasonal field efforts were included so that the broad range of conditions that affect waste composition such as tourism and climate would be incorporated; hence the waste composition derived would be more representative and hence improve reliability of results.

Each seasonal field activity varied in duration to accommodate evaluation of multiple streams (MSW, recyclables, and C&D) over the course of a year. Field activities were scheduled for times when normal waste generation conditions were expected. This meant field activities avoided holidays and other special events, so the materials characterized were representative of typical materials generated in Broward County. Field activities were also scheduled when sufficient quantities of MSW were delivered to the North Broward Transfer Station, recyclables to Reuter Recycling, and C&D to the Broward County Landfill.

The number of samples obtained and characterized from each generating sector for both waste and recyclable materials was established in the field procedures, included in **Appendix B**. The distribution of samples was based on material generation quantities by sector. In general, SCS prioritized obtaining one waste sample per collection vehicle. However, truck arrival times varied significantly, which necessitated obtaining multiple samples from some trucks to maintain sorting momentum and to make the best use of the field team's time and resources. A total of 135 MSW samples were manually characterized, 50 samples of recyclable materials were manually characterized, and 252 samples of C&D were visually characterized. **Table 1** details each seasonal field sampling event and documents the number and type of samples characterized.

Table 1. Sampling Schedule by Season

Season	Days in the Field	Material Stream		
		Recyclables Reuter Recycling	**MSW** North Broward Transfer Station	**C&D** Broward County Landfill
Summer Aug/Sep 2022	11	20 samples	50 samples	60 samples
Fall December 2022	4	--	30 samples	61 Samples
Winter March 2023	9	30 samples	48 Samples	66 samples
Spring June 2023	2	--	7 samples	65 samples
Total	**26**	**50 samples**	**135 samples**	**252 samples**

Field efforts to acquire and sort recycling samples at Reuter Recycling and C&D samples at the BCL were successful (the actual number of samples met or exceeded the planned number of samples); however, meeting the Bulky Waste and MSW sampling goals was challenging. The North Broward Transfer Station's safety rules prevented outside contractors (such as SCS) from being near the tipping floor area; hence SCS was not able to observe bulky waste deliveries to the site. Additionally, a strong storm in June 2023 resulted in suspending fieldwork at the North Broward Transfer Station because strong winds made the site unsafe for sorting operations. Subsequent site flooding limited the site's ability to support our fieldwork; this resulted in just seven samples out of the planned 22 samples that could be acquired and sorted during that field effort. The other three seasonal field efforts were able to acquire and sort the targeted number of samples.

3.3 FIELD PROCEDURES

3.3.1 Source-Separated Recyclables

Reuter Recycling in Pembroke Pines, owned and operated by Waste Management, Inc., processes most of the recyclable material generated in Broward County. Recyclable materials are direct-hauled to the Deerfield Beach Recycling and Transfer facility where they are aggregated and transported via transfer trailer to Reuter Recycling. Recyclable materials from both residential and commercial sources are combined prior to delivery to Reuter Recycling. SCS staff coordinated with Reuter Recycling staff each day to confirm that the targeted transfer trailers contained recyclable material collected in Broward County only.

Field procedures for sampling and sorting recyclables are described in detail in Appendix B. Below is a summary of the sampling and sorting process at Reuter Recycling:

Sample Screening

SCS coordinated with staff from Reuter Recycling who coordinated with staff from the Deerfield Beach Recycling and Transfer facility to create transfer trailer loads of recyclables that were generated exclusively in Broward County. Reuter Recycling receives and processes recyclables from both inside and outside Broward County; hence, Reuter Recycling staff communicated the number of

transfer trailer loads of recyclables generated exclusively in Broward County that would be delivered each day. Between one and three transfer trailers were sampled each day.

Sample Acquisition

SCS staff directed a heavy equipment operator (provided by Reuter Recycling) to scoop recycling samples from random locations of the targeted discharged transfer trailer loads. Samples were aggregated in a designated area until the sorting crew was able to hand sort them.

Sample Sorting

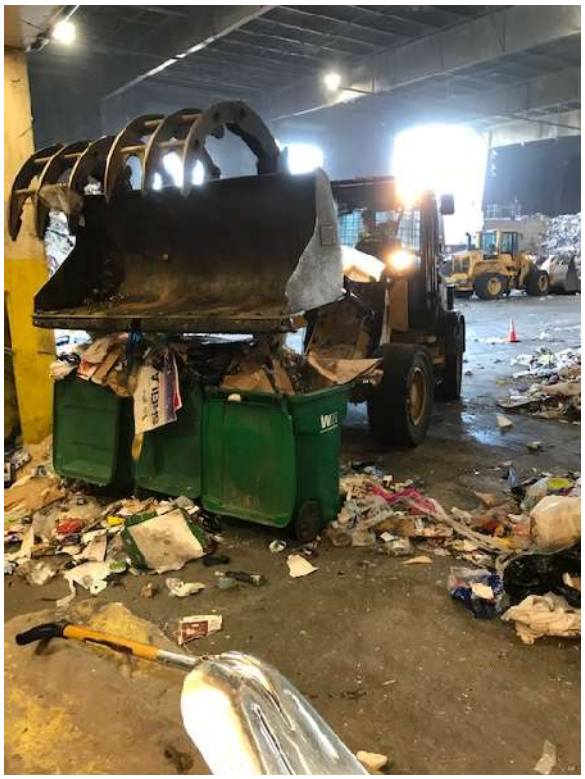
Procedures for sorting samples of recyclable materials were the same as the procedures for sorting MSW. Staff from Reuter Recycling routinely conduct their own sampling and sorting program to assess contamination, and they were able to offer the use of their sorting table, which was permanently affixed to the floor in their facility. The sorting table was about four feet by eight feet and about eight inches deep, constructed of metal with a mesh bottom through which fine material passed into removable containers below the table. This material was weighed for each sample and documented as residue as the facility does not process and market material that small.

Exhibit 6. Photos of Recycling Sampling and Sorting

Transfer Trailer Load of Discharged Recyclables

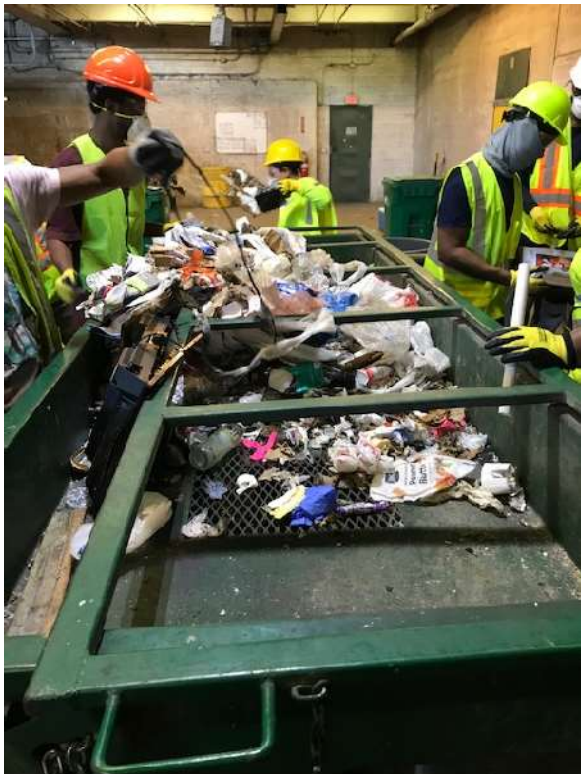
Recycling Samples in Queue

Closer Look at Transfer Trailer Load of Discharged Recyclables



Loader Conveying Recycling Samples Into Holding Container

Field Team Sorting Recycling Sample



Field Team Sorting Recycling Sample

Source-Separated Recyclable Material Categories

Table 2 presents the material categories into which the source-separated recyclable material samples were sorted.

Table 2. Source-Separated Recyclable (SSR) Material Categories

SSR Material Category		Examples
Recyclable Fiber	Aseptic Cartons	Plastic- or wax-coated containers, milk & juice cartons
	Corrugated Cardboard	Packing or shipping boxes
	Magazines	Glossy or higher-grade paper magazines/catalogs
	Mixed Paper	Envelopes, junk mail, construction paper, wrapping paper
	Newspaper	Newspapers, coated newspaper inserts, newsprint
	Office Paper	White or colored printing/copier paper, file folders
Recyclable Plastic	#1 PET Bottles	Rigid clear or colored bottles for soda, mouthwash, juice, water, etc.
	#2 HDPE Color Containers	Opaque white or colored bottles for milk, juice, syrups, cleaning products, etc.
	#2 HDPE Natural Containers	Translucent containers for shampoos, detergents, milk, juice, syrup, etc.
	Other Mixed Plastic Containers	Rigid containers/bottles numbered #3, #4, #5, or #7
Recyclable Glass	Glass Containers	Colored or clear glass containers or bottles
Recyclable Metal	Aluminum Cans	Soda and beer cans
	Steel Cans	Ferrous food, beverage, and non-hazardous aerosol cans
Contaminant	Grocery Store Bags	Grocery store bags
	Plastic Film	Thin plastic wrap or food packaging
	Polystyrene	Food packaging (clamshells), cups, packing peanuts, CD cases with #6
	Residue	Other non-recyclable contamination

3.3.2 Municipal Solid Waste (MSW)

SCS follows American Society of Testing and Measurement (ASTM) Method Number D5231-92(2016), "Standard Test Method for Determination of the Composition of Unprocessed Municipal Solid Waste" for acquiring representative waste samples and manually sorting the waste samples into material types. The ASTM method outlines equipment needed, potential hazards, calibration of the scale(s) used to weigh sorted materials, suggested material types for sorting procedures, documentation of sorting container tare weights, selection of waste samples, and sorting procedures.

The methods described below reflect the ASTM method.

Waste Load Screening

Win Waste assigned a staff member to target waste loads and coordinate with heavy equipment operators to gather waste samples. SCS instructed the Win Waste staff member on targeting waste loads that were appropriate for this study. SCS staff worked with the Win Waste staff to record information about the targeted waste loads such as hauler name, origin/location of the materials, and generating sector (residential or commercial) of the materials. If the vehicle driver indicated the material was mixed from multiple generators (i.e., residential and commercial waste mixed together or material generated outside Broward County) the Win Waste staff member was instructed to reject the load.

A few times, the driver of the targeted load indicated to the Win Waste staff member that their waste load was residential. The Win Waste staff member proceeded to direct a heavy equipment operator to grab a random sample and deliver it to the sorting crew. Upon inspection of the sample, SCS staff found the waste was commercial and therefore rejected the sample. This happened less than five times over the course of the study.

Waste loads were targeted throughout each sample day so that a variety of sectors (residential and commercial) and originating communities were sampled.

Sample Acquisition

Once a waste load had been selected for sampling, the Win Waste staff member (with direction from SCS staff) directed a heavy equipment operator to scoop up a waste sample from a random area of the discharged pile. In general, a loader with a one cubic yard bucket/scoop is sufficient. SCS staff placed each sample in holding containers and weighed the materials until approximately 220 pounds had been obtained. This protocol aligns with the ASTM standard for the characterization of unprocessed municipal solid waste.

Sample Sorting

Sorting of waste samples was led by an experienced SCS Sorting Manager with the support of a six-person sort crew. Fundamental to this task is a consistent, methodical, statistically-valid sorting program that was repeated for each waste sample. The Sorting Manager supervised the entire sorting process and was actively conducting quality control measures to make sure materials were sorted and weighed properly. Each member of the sort crew was assigned a select material group for sorting (i.e., fiber categories, plastic categories, etc.). This practice generally improves the efficiency and accuracy of the sorting process because sort staff specialize and become experts in sorting the materials they are assigned. The basic procedures and objectives for sorting were identical for each sample as described in the systematic approach in **Appendix B**.

Exhibit 7. Photos of MSW Sampling and Sorting

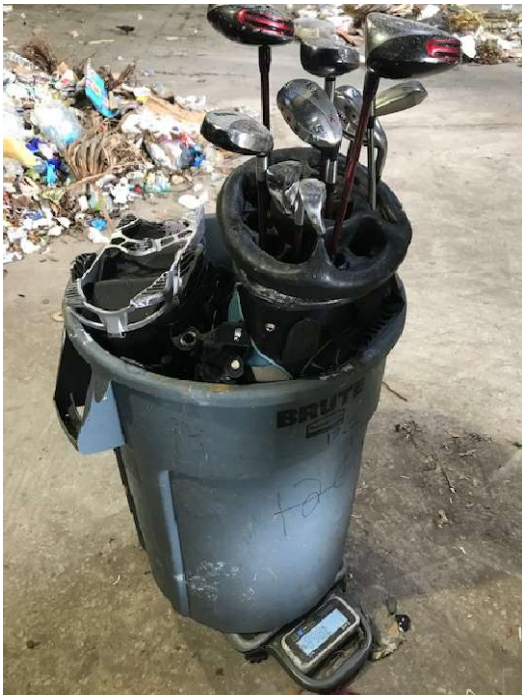
Pre-Sorted Sample

Field Team Sorting MSW Sample

Field Team Sorting MSW Sample

Field Team Sorting MSW Sample

Pre-Weighed MSW Samples in Queue



Golf Clubs in MSW Sample

Medicine in MSW Sample
(medicine remained in containers to avoid hazards to sorters)

Waste samples were maintained in as-disposed conditions. Proper site layout and close supervision of sampling avoided the need to handle waste samples multiple times. Prior to fieldwork, each container to be used in the sorting process was noted with its tare weight which was also used when determining the gross weight of materials sorted.

MSW Material Categories

Table 3 presents the material categories into which the MSW samples will be sorted.

Table 3. MSW Material Categories

MSW Material Category		Examples
Fiber	Aseptic Cartons	Plastic- or wax-coated containers, milk & juice cartons, take-out boxes
	Compostable Paper	Food-contaminated paper towels, napkins
	Corrugated Cardboard	Packing or shipping boxes
	Magazines	Glossy or higher-grade paper magazines/catalogs
	Mixed Paper	Envelopes, junk mail, construction paper, wrapping paper
	Newspaper	Daily/weekly newspapers, coated newspaper inserts, newsprint
	Office Paper	White or colored printing/copier paper, file folders
Plastics	#1 PET Bottles	Rigid clear or colored bottles for soda, mouthwash, juice, water, etc.
	#2 HDPE Color Containers	Opaque white or colored bottles for milk, juice, syrups, cleaning products, etc.
	#2 HDPE Natural Containers	Translucent containers for shampoos, detergents, automobile fluids, milk, juice, syrup, etc.
	Grocery Store Bags	Grocery store bags
	Other Mixed Plastic Containers	Rigid containers/bottles numbered #3, #4, #5, or #7
	Plastic Films	Thin plastic wrap or food packaging (NO garbage bags)
	Polystyrene	Food packaging (clamshells), cups, packing peanuts, CD cases with #6
	Rigid Plastics	Hard plastic toys, outdoor chairs, large containers
	Shrink Wrap	Film plastic typically used to wrap pallets or bulk items
Glass	Glass Containers	Colored or clear glass containers or bottles
Metal	Aluminum Cans	Soda and beer cans
	Ferrous Metals	Steel and bi-metal scraps such as wire coat hangers, nails, screws, auto parts, and other magnetic items
	Non-Ferrous Metals	Aluminum pans, scraps; brass, copper, or other alloys not containing iron
	Steel Cans	Ferrous food, beverage, and non-hazardous aerosol cans

MSW Material Category		Examples
Organic	Food Waste	Food scraps, rotten food, meat, fruit, vegetables, etc.
	Other Organic (Wood)	Furniture such as couches, wooden tables or chairs, cabinets, shelves
	Other Uncategorized	Commingled waste/scraps, otherwise not categorized
	Textiles	Clothing, linens, leather, blankets, curtains, rubber. Includes natural and synthetic fibers
	Yard Trash	Grass, leaves, brush, sticks and twigs
Bulky/C&D	Asphalt Paving	Broken chunks of asphalt
	Asphalt Roofing	Asphalt shingles
	Brick	Clay or limestone bricks for masonry, walls, pavements
	Bulky Waste	Bulky materials that do not fit other categories
	Carpet & Carpet Padding	Carpets and rugs, padding & non-slip grips
	Clean Engineered Wood	Wooden boards, pallets
	Concrete	Cinderblocks, concrete chunks/debris
	Gypsum Board/Drywall	Drywall chunks/debris, sheetrock
	Insulation	Mineral wool, fiberglass, natural fiber insulation
	Mattresses/Box springs	Mattresses/mattress materials & box springs
	Other Metal	Other metal scraps non-categorized
	PVC Pipe	Thermoplastic resin commonly used for manufacturing sewage pipes, water mains and irrigation
	Rebar	Reinforcing steel bars
	Rock	Stones, pebbles, slate, gravel
	Treated Wood	Stained or painted wood
	White Goods	Large electrical appliances such as refrigerators, washing machines, microwaves
Other	Garbage Bags	Plastic bags used to contain garbage
	HHW	Compact fluorescent lightbulbs, fluorescent tubes, household cleaners, medical waste
	Miscellaneous	Not classified elsewhere
	Special	Household batteries, electronics, latex paint
	Tires	Automobile, bicycle, wheelbarrow, or other tires

3.3.3 Construction & Demolition Debris (C&D) and Bulky Waste

The Broward County Landfill (BCL) is a Class III landfill which does not accept MSW but receives a significant amount of C&D and bulky waste materials. All materials are delivered by the generator as BCL does not accept waste from franchised haulers providing municipal bulk waste collection services. BCL only accepts waste generated in Broward County, which is utilized by many businesses and residents located throughout the County.

Due to the heavy and bulky nature of most materials contained in C&D and bulk waste loads, acquiring a representative sample is not feasible due to the heavy nature of materials such as concrete, rock, and asphalt and the bulky nature of other items such as white goods and furniture. For the same reasons, sorting by hand is also not feasible. Therefore, C&D and bulky waste loads are visually characterized by volume and later converted to weight using published volume-to-weight conversion factors.

Sample Screening

SCS designated a C&D and bulky waste characterization manager who selected loads to screen and visually characterize. C&D and bulky loads were characterized as they arrived at the landfill throughout the day each season. The SCS professional walked around the entire pile (when safe to do so) and noted the materials present and the volume represented in the waste load. Estimated volumes were converted to weights using volume-to-weight conversion factors published by the US Environmental Protection Agency.

Waste Load Characterization

Visual characterization methods for C&D and Bulky Waste loads were developed by the California Integrated Waste Management Board. Once the selected load is dumped, the visual estimator performs the following steps.

- **Step 1: Measure load volume.** After the driver dumps the load onto the ground, the visual estimator estimates the length, width, and height of the load and records the information on the visual sample form.

- **Step 2: Note which material classes and materials are present.** The visual estimator walks entirely around the load and indicates on the visual sample form which materials and material classes are present in the load.

- **Step 3: Estimate composition by volume for each material class.** Beginning with the largest material class present by volume, the visual estimator then estimates the volumetric percentage of this material class and records it on the form. This process is repeated for the next most common material class, and so forth, until the volume percentage of every material class has been estimated.

- **Step 4: Check and reconcile percentage data.** The visual estimator then verifies that the percentage estimates for the material classes add up to 100 percent.

Exhibit 8. Photos of Select C&D and Bulky Loads

Example C&D/Bulky Waste Load

Example C&D/Bulky Waste Load

Example C&D/Bulky Waste Load

C&D and Bulky Waste Material Categories

Table 4 presents the material categories into which the C&D and Bulky Waste vehicle loads are visually characterized.

Table 4. C&D/Bulky Self-Haul Material Categories

C&D/Bulky Material Category		Examples
Fiber	Corrugated Cardboard	Packing or shipping boxes
Plastics	Plastic Film	Thin plastic wrap or food packaging (NO garbage bags)
	PVC Pipe	Thermoplastic resin commonly used for manufacturing sewage pipes, water mains and irrigation
	Rigid Plastics	Hard plastic toys, outdoor chairs, large containers
Wood	Clean Engineered Wood	Wooden boards, pallets
	Other Wood	Furniture such as couches, wooden tables or chairs, cabinets, shelves
	Treated Wood	Stained or painted wood
Metal	Ferrous Metals	Wire coat hangers, nails, screws, auto parts, and other magnetic items
	Non-Ferrous Metals	Aluminum cans, pans, scraps; brass, copper, or other
	Other Metal	Other metal scraps non-categorized
	Rebar	Reinforcing steel bars
	White Goods	Large electrical appliances such as refrigerators, washing
Textiles	Carpet & Carpet Padding	Carpets and rugs, padding & non-slip grips
	Furniture	Couches, chairs, dining tables, etc.
	Mattresses/box springs	Mattresses/mattress materials and box springs
	Textiles	Clothing, linens, leather, synthetic fibers, blankets, rubber
Organic	Food Waste	Food scraps, rotten food, meat, fruit, vegetables, etc.
	Yard Trash	Grass, leaves, brush, sticks and twigs
General	Asphalt Paving	Broken chunks of asphalt
	Asphalt Roofing	Asphalt shingles
	Brick	Clay or limestone bricks for masonry, walls, pavements
	Concrete	Cinderblocks, concrete chunks/debris
	Gypsum Board	Drywall chunks/debris, sheetrock
	Insulation	Mineral wool, fiberglass, natural fiber insulation
	Rock	Stones, pebbles, slate, gravel
Special	HHW	Compact fluorescent lightbulbs, fluorescent tubes, household cleaners, medical waste
	Special	Household batteries, electronics, latex paint
	Tires	Automobile, bicycle, wheelbarrow, or other tires
Other	Bulky Waste	Bulky materials that do not fit other categories
	Miscellaneous or Bagged MSW	Commingled waste/scraps, otherwise not categorized

3.4 DATA REDUCTION AND ANALYSIS

3.4.1 Waste Composition by Waste Type

MSW and Recycling

Upon completion of each seasonal field activity the data obtained was processed as follows:

1. Data was reviewed twice for accuracy and completeness; once at the conclusion of each day in the field and a second time prior to transcribing the data electronically.

2. Data was entered into a customized database (MS Excel) to facilitate processing.

3. Standard statistical analysis was completed to calculate the mean composition (percent), standard error, and confidence intervals at the ninety percent (90%) confidence level for each material stream, material category, generating sector, and the County as a whole. Mean composition for each sample was calculated using the ratio of the material's weight to the total sample weight.

4. Individual sample data was aggregated to calculate profiles for the following material streams and generating sectors: residential MSW, commercial MSW, recyclable materials, and C&D.

Waste samples are acquired to estimate the true waste composition of the waste stream (i.e., the proportion of each material present in waste collected by the County). The mean is the arithmetic average of all samples, and the standard deviation is a measure of the dispersion in the samples. Together, the mean and standard deviation determine the confidence interval. A 90 percent confidence interval is said to contain the true proportion of a waste component with 90 percent confidence (i.e., similar studies will produce the same results 90 percent of the time).

C&D and Bulky Waste

For C&D and bulky waste loads, the volumetric proportions of materials comprising selected waste loads were recorded. Using volume-to-weight conversion factors, the volumetric proportions identified in each waste load were converted to weight by material type. The material type weights for each waste load were summed for all sampled waste loads and divided by the summed total weight of all sampled waste loads to derive a compositional summary of C&D and bulky waste. These summarized compositional summaries are presented in Section 4.

3.4.2 Divertibility Analysis

Each of the 17 recycling material types, 46 MSW material types, and 30 C&D and Bulky Waste material types were classified into one of four divertibility groups:

- Recyclable Materials - This includes materials that are currently recycled in Broward County, have a market, and can be placed into residential curbside recycling bins.
- Compostable Materials - This includes organic materials that can be separated from MSW and composted.
- Potentially Divertible - This includes materials for which there are programs to collect these materials that avoid landfill disposal such as HHW, electronics, and textiles. It also includes

some C&D materials that could be diverted through specialized recycling programs such as concrete and asphalt paving.

- **Other Materials -** This includes materials that do not fit any of the definitions above and that are not easily diverted from landfill disposal.

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4 RESULTS

This section describes the data analysis performed on the data collected for each seasonal field activity along with the profiles for each of the material streams analyzed for this study.

4.1 MATERIAL CHARACTERIZATION PROFILES

SCS prepared material characterization profiles based on the data obtained during seasonal field activities. The material characterization profiles are listed and defined as follows:

1) **Source Separated Recycling –** Recyclable materials separated from garbage at the household and business level and placed in a separate cart for collection curbside.

2) **Residential MSW –** Residential garbage collected curbside from single-family homes in various communities in Broward County. Garbage may be collected directly by the municipality or by private haulers.

3) **Commercial MSW –** Commercial garbage collected onsite from businesses, including office buildings, grocery stores, restaurants, and other light industrial type businesses. In general, garbage is collected by private haulers.

4) **C&D/Bulky –** Large or bulky waste items generated from construction and demolition projects or residential or commercial clean-outs that are transported by a third-party hauler or self-hauled to the Broward County Landfill.

The material characterization profiles provided in this section are organized as follows:

- **Circle Graphs** – Circle graphs are used to show the material types that comprise the recyclable, compostable (if applicable), potentially divertible, and non-divertible classifications.

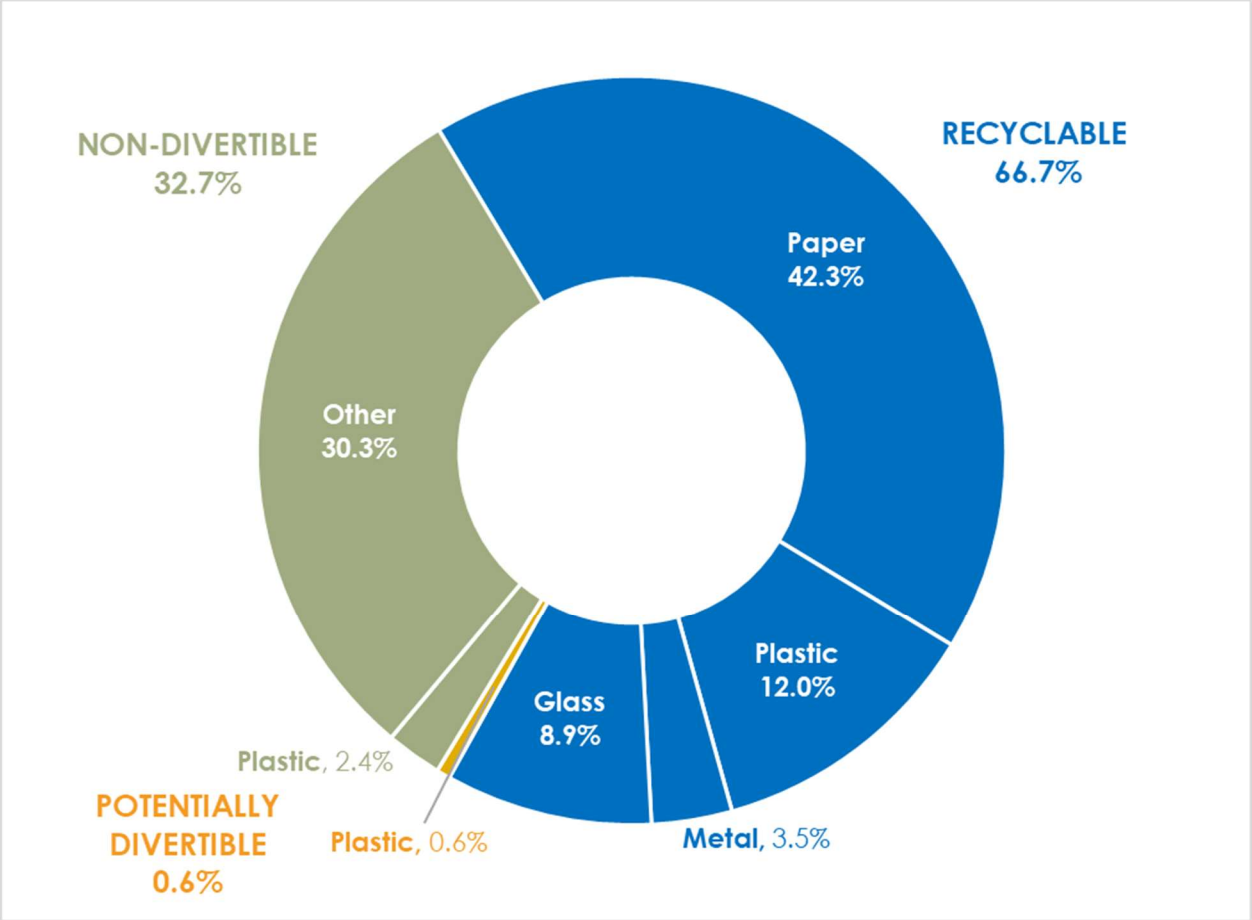
- **Tables** – Detailed tables provide the percentages for all specific materials sorted and measured for each material stream. The tables also include the calculated standard deviations and 90 percent confidence intervals for each material.

Data provided in the circle graphs and tables in this report are overall composition results. The data for each material stream was aggregated from each of the seasonal field activities completed for this study.

4.1.1 Source-Separated Recycling

Fifty samples of source separated recycling, comprising 8,376 pounds, were acquired and sorted over two seasonal field efforts into 17 material types. About 67 percent of the recycling stream consists of materials that are accepted for recycling programs in the County, including cardboard, newspaper, #1 and #2 plastic containers, metal cans, and glass bottles. The remaining 33 percent of the recyclable material stream are materials that are not accepted for recycling and have been classified as either potentially divertible (about one percent) and non-divertible (about 32 percent). **Exhibit 9** and **Table 5** provide the detailed breakdown of the composition of the recycling stream in Broward County.

Exhibit 9. Residential Recyclables Stream Classification by Material Type



Percentages may not add up to 100% due to rounding. Composition is based on 50 200-pound samples.

Non-divertible waste materials considered "residue" or "contamination" comprise 32.7 percent of recyclable materials collected. As presented in **Table 5**, materials that comprise the largest proportions of residential curbside recycling include:

- Corrugated Cardboard at 19.2 percent (recyclable)
- Mixed Paper at 11.6 percent (recyclable)
- Glass Containers at 8.9 percent (recyclable)
- PET Bottles at 5.8 percent (recyclable)
- Magazines at 4.7 percent (recyclable)

Table 5. Detailed Recyclable Materials Composition

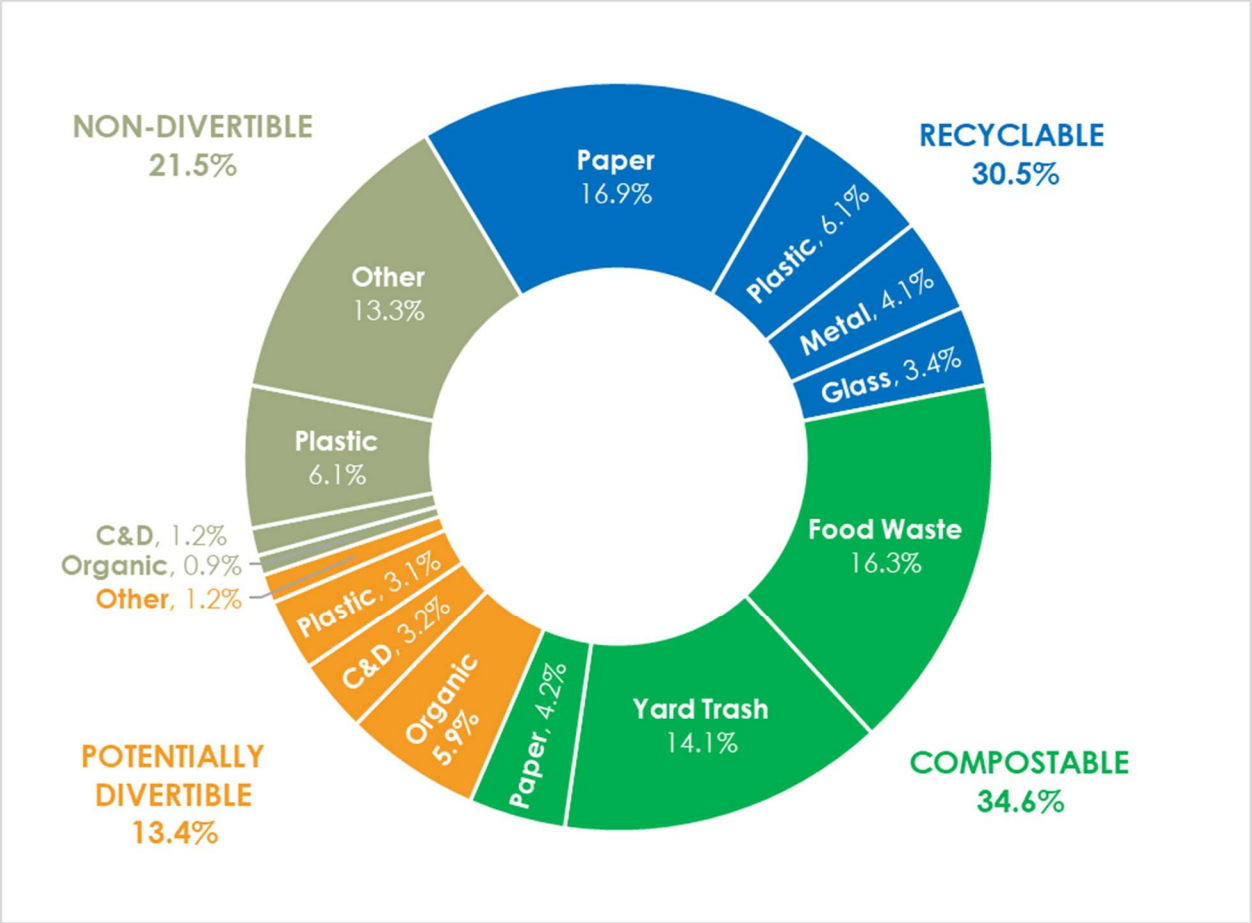
MATERIAL		Mean Composition	Standard Deviation	Confidence Limits Lower	Confidence Limits Upper
RECYCLABLE					
Fiber	Corrugated Cardboard	19.2%	7.4%	17.5%	21.0%
	Mixed Paper	11.6%	2.7%	11.0%	12.3%
	Magazines	4.7%	2.6%	4.1%	5.3%
	Newspaper	3.1%	3.9%	2.1%	4.0%
	Office Paper	3.1%	1.7%	2.7%	3.5%
	Aseptic Containers	0.6%	0.3%	0.5%	0.7%
Plastic	#1 PET Bottles	5.8%	1.2%	5.5%	6.1%
	Other Mixed Plastic Containers	3.3%	1.6%	3.0%	3.7%
	#2 HDPE Colored Containers	1.8%	0.8%	1.6%	2.0%
	#2 HDPE Natural Containers	1.1%	0.6%	0.9%	1.2%
Metal	Steel Cans	1.8%	1.1%	1.5%	2.1%
	Aluminum Cans	1.7%	0.4%	1.6%	1.8%
Glass	Glass Containers	8.9%	3.6%	8.1%	9.8%
	Total Recyclable	**66.7%**			
POTENTIALLY DIVERTIBLE					
Plastic	Shopping Bags	0.6%	1.3%	0.3%	0.9%
	Total Potentially Divertible	**0.6%**			
NON-DIVERTIBLE					
Plastic	Plastic Films	2.0%	0.7%	1.8%	2.1%
	Expanded Polystyrene (Styrofoam)	0.4%	0.5%	0.3%	0.6%
Other	Residue	30.3%	7.9%	28.4%	32.1%
	Total Non-Divertible	**32.7%**			
TOTAL		**100.0%**			

Percentages may not add up to 100% due to rounding. Composition is based on 50 200-pound samples.

4.1.2 Residential MSW

91 samples of residential MSW, comprising 20,134 pounds, were acquired and sorted over four seasonal field efforts into 46 material types. About 31 percent of the residential MSW material stream is comprised of recyclable materials that could be diverted through existing programs. Another 35 percent of residential MSW is compostable, which includes food scraps that comprise 16 percent. The remaining composition includes about 13 percent potentially divertible materials and 22 percent non-divertible (**Exhibit 10** and **Table 6**).

Exhibit 10. Residential MSW Classification by Material Type



Percentages may not add to 100% due to rounding. Composition is based on 91 200-pound samples.

As presented in **Table 6**, materials that comprise the largest proportions of residential MSW include:

- Food Waste at 16.3 percent (compostable)
- Yard Waste at 14.1 percent (compostable)
- Miscellaneous materials (not classified) at 13.3 percent (non-divertible)
- Mixed Paper at 8.9 percent (recyclable)
- Textiles at 5.7 percent (potentially divertible)

Table 6. Detailed Residential MSW Composition

MATERIAL		Mean Composition	Standard Deviation	Confidence Limits Lower	Confidence Limits Upper
RECYCLABLE					
Fiber	Mixed Paper	8.9%	3.9%	8.2%	9.5%
	Corrugated Cardboard	4.5%	5.5%	3.6%	5.5%
	Office Paper	1.6%	2.6%	1.2%	2.1%
	Newspaper	0.9%	1.6%	0.6%	1.1%
	Magazines	0.8%	2.0%	0.4%	1.1%
	Aseptic Containers	0.3%	0.2%	0.2%	0.3%
Plastic	Other Mixed Plastic Containers	2.6%	1.1%	2.4%	2.7%
	#1 PET Bottles	2.5%	1.6%	2.2%	2.8%
	#2 HDPE Colored Containers	0.7%	0.7%	0.6%	0.8%
	#2 HDPE Natural Containers	0.3%	0.4%	0.3%	0.4%
Metal	Ferrous Metals	1.7%	3.0%	1.2%	2.2%
	Steel Cans	1.1%	1.1%	0.9%	1.3%
	Aluminum Cans	0.8%	0.5%	0.7%	0.9%
	Non-Ferrous Metals	0.5%	0.7%	0.4%	0.7%
Glass	Glass Containers	3.4%	2.5%	3.0%	3.9%
	Total Recyclable	**30.5%**			
COMPOSTABLE					
Paper	Compostable Paper	4.2%	2.2%	3.8%	4.6%
Organic	Food Waste	16.3%	10.2%	14.5%	18.0%
	Yard Trash	14.1%	13.1%	11.8%	16.4%
	Total Compostable	**34.6%**			
POTENTIALLY DIVERTIBLE					
Plastic	Rigid Plastics	1.6%	2.1%	1.2%	1.9%
	Grocery Store Bags	1.6%	0.8%	1.4%	1.7%
	Shrink Wrap	<0.1%	0.2%	<0.1%	0.1%
Organic	Textiles	5.7%	4.7%	4.9%	6.5%
	Other Organic (wood)	0.2%	0.8%	<0.1%	0.3%

Detailed Residential MSW Composition (continued)

MATERIAL		Mean Composition	Standard Deviation	Confidence Limits Lower	Confidence Limits Upper
POTENTIALLY DIVERTIBLE (continued)					
Construction & Demolition	Rock	1.7%	6.5%	0.6%	2.9%
	Concrete	0.4%	1.7%	0.1%	0.7%
	Carpet/Carpet Padding	0.4%	1.3%	0.1%	0.6%
	White Goods	0.2%	1.8%	<0.1%	0.5%
	Clean Engineered Wood	0.2%	0.6%	<0.1%	0.3%
	Other Metal	0.1%	1.0%	<0.1%	0.3%
	Gypsum Board/Drywall	0.1%	0.6%	<0.1%	0.2%
	Mattresses/Box Springs	<0.1%	0.2%	<0.1%	0.1%
	Brick	<0.1%	0.2%	<0.1%	0.1%
	PVC Pipe	<0.1%	0.1%	<0.1%	0.0%
	Asphalt Roofing	<0.1%	0.0%	<0.1%	0.0%
	Asphalt Paving	<0.1%	0.0%	<0.1%	0.0%
	Rebar	<0.1%	0.0%	<0.1%	0.0%
Other	Special Waste	1.2%	2.2%	0.8%	1.5%
	HHW	<0.1%	0.3%	<0.1%	0.1%
	Tires	<0.1%	0.0%	<0.1%	0.0%
	Total Potentially Divertible	**13.4%**			
NON-DIVERTIBLE					
Plastic	Plastic Films	3.7%	2.3%	3.3%	4.0%
	Garbage Bags	1.5%	0.9%	1.4%	1.7%
	Expanded Polystyrene (Styrofoam)	1.0%	0.5%	0.9%	1.0%
Organic	Other Uncategorized	0.9%	3.2%	0.3%	1.4%
Construction & Demolition	Treated Wood	1.1%	1.8%	0.8%	1.4%
	Bulky Waste	<0.1%	0.7%	<0.1%	0.2%
	Insulation	<0.1%	0.2%	<0.1%	0.1%
Other	Miscellaneous	13.3%	8.2%	11.9%	14.7%
	Total Non-Divertible	**21.5%**			
TOTAL		**100.0%**			

Percentages may not add to 100% due to rounding. Composition is based on 91 200-pound samples.

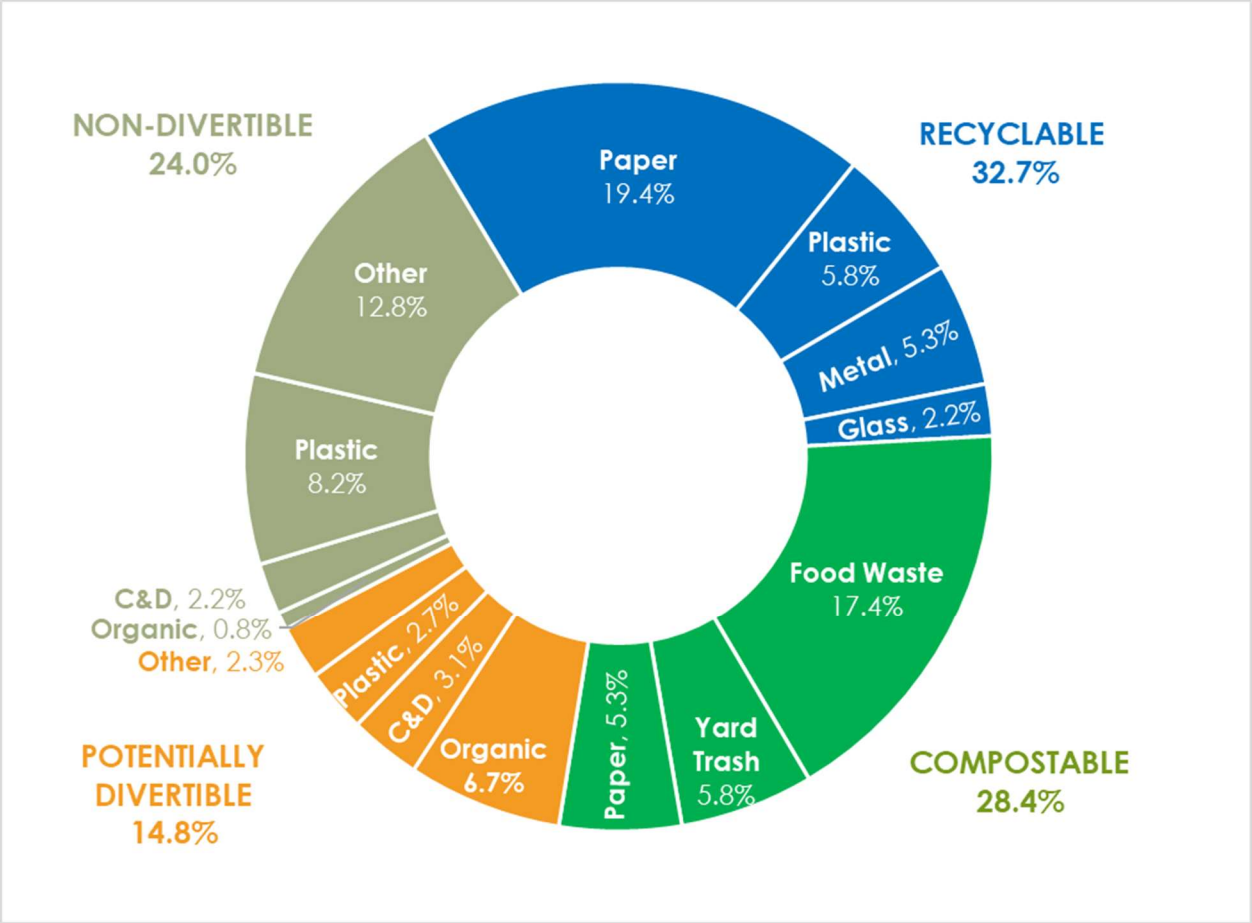
Residential MSW samples were acquired from the following cities:

- Margate – 16 samples
- Tamarac – 16 samples
- North Lauderdale – 15 samples
- Coral Springs – 11 samples
- Coconut Creek – 9 samples
- Lighthouse Point – 9 samples
- Davie – 7 samples
- Lauderdale Lakes – 6 samples
- Lauderhill – 2 samples

4.1.3 Commercial MSW

44 samples of commercial MSW, comprising 9,868 pounds, were acquired and sorted over four seasonal field efforts into 46 material types. About 33 percent of the commercial MSW material stream consists of recyclable materials that could be diverted through existing programs. Another 28 percent of commercial MSW is compostable, which includes food scraps that comprise 17 percent. The remaining composition includes about 15 percent potentially divertible materials and 24 percent non-divertible (**Exhibit 11** and **Table 7**).

Exhibit 11. Commercial MSW Classification by Material Type



Percentages may not add up to 100% due to rounding. Composition is based on 44 200-pound samples.

As presented in **Table 7**, materials that comprise the largest proportions of commercial MSW include:

- Food Waste at 17.4 percent (compostable)
- Miscellaneous materials (not classified) at 12.8 percent (non-divertible)
- Corrugated Cardboard at 8.7 percent (recyclable)
- Mixed Paper at 6.9 percent (recyclable)
- Yard Trash at 5.8 percent (compostable)

Table 7. Detailed Commercial MSW Composition

MATERIAL		Mean Composition	Standard Deviation	Confidence Limits Lower	Confidence Limits Upper
RECYCLABLE					
Fiber	Corrugated Cardboard	8.7%	6.0%	7.2%	10.2%
	Mixed Paper	6.9%	3.8%	5.9%	7.8%
	Office Paper	1.9%	3.2%	1.1%	2.7%
	Magazines	1.0%	2.4%	0.4%	1.6%
	Newspaper	0.5%	1.0%	0.3%	0.8%
	Aseptic Containers	0.4%	0.6%	0.2%	0.6%
Plastic	Other Mixed Plastic Containers	2.4%	1.5%	2.0%	2.7%
	#1 PET Bottles	2.3%	1.7%	1.9%	2.8%
	#2 HDPE Colored Containers	0.6%	0.8%	0.5%	0.8%
	#2 HDPE Natural Containers	0.4%	0.4%	0.3%	0.5%
Metal	Ferrous Metals	3.2%	7.0%	1.4%	4.9%
	Non-Ferrous Metals	0.8%	2.0%	0.3%	1.4%
	Aluminum Cans	0.7%	0.7%	0.6%	0.9%
	Steel Cans	0.6%	0.5%	0.4%	0.7%
Glass	Glass Containers	2.2%	2.0%	1.7%	2.7%
	Total Recyclable	**32.7%**			
COMPOSTABLE					
Paper	Compostable Paper	5.3%	4.7%	4.1%	6.4%
Organic	Food Waste	17.4%	10.6%	14.8%	20.0%
	Yard Trash	5.8%	9.5%	3.4%	8.1%
	Total Compostable	**28.4%**			
POTENTIALLY DIVERTIBLE					
Plastic	Rigid Plastics	1.5%	2.4%	1.0%	2.1%
	Grocery Store Bags	1.4%	1.2%	1.1%	1.7%
	Shrink Wrap	0.1%	0.5%	<0.1%	0.3%
Organic	Textiles	4.2%	4.6%	3.0%	5.3%
	Other Organic (wood)	2.5%	6.3%	0.9%	4.0%

Detailed Commercial MSW Composition (continued)

MATERIAL		Mean Composition	Standard Deviation	Confidence Limits Lower	Confidence Limits Upper
POTENTIALLY DIVERTIBLE (continued)					
Construction & Demolition	Concrete	1.1%	5.1%	<0.1%	2.4%
	Carpet/Carpet Padding	0.5%	2.4%	<0.1%	1.1%
	Mattresses/Box Springs	0.5%	2.1%	<0.1%	1.0%
	Clean Engineered Wood	0.1%	0.6%	<0.1%	0.3%
	Brick	<0.1%	0.3%	<0.1%	0.2%
	PVC Pipe	<0.1%	0.1%	<0.1%	0.0%
	Gypsum Board/Drywall	<0.1%	0.0%	<0.1%	0.0%
	Asphalt Roofing	<0.1%	0.0%	<0.1%	0.0%
	Asphalt Paving	<0.1%	0.0%	<0.1%	0.0%
	Other Metal	<0.1%	0.0%	<0.1%	0.0%
	Rebar	<0.1%	0.0%	<0.1%	0.0%
	Rock	<0.1%	0.0%	<0.1%	0.0%
	White Goods	<0.1%	0.0%	<0.1%	0.0%
Other	HHW	1.2%	7.9%	<0.1%	3.2%
	Special Waste	0.8%	1.3%	0.5%	1.1%
	Tires	0.8%	5.0%	<0.1%	2.0%
Total Potentially Divertible		**14.8%**			
NON-DIVERTIBLE					
Plastic	Plastic Films	5.1%	2.8%	4.4%	5.8%
	Garbage Bags	2.1%	1.4%	1.8%	2.5%
	Expanded Polystyrene (Styrofoam)	1.0%	1.2%	0.7%	1.3%
Organic	Other Uncategorized	0.8%	2.4%	0.2%	1.4%
Construction & Demolition	Treated Wood	2.1%	6.1%	0.6%	3.6%
	Bulky Waste	<0.1%	0.4%	<0.1%	0.1%
	Insulation	<0.1%	0.2%	<0.1%	0.1%
Other	Miscellaneous	12.8%	8.6%	10.7%	14.9%
Total Non-Divertible		**24.0%**			
TOTAL		**100.0%**			

Percentages may not add up to 100% due to rounding. Composition is based on 44 200-pound samples.

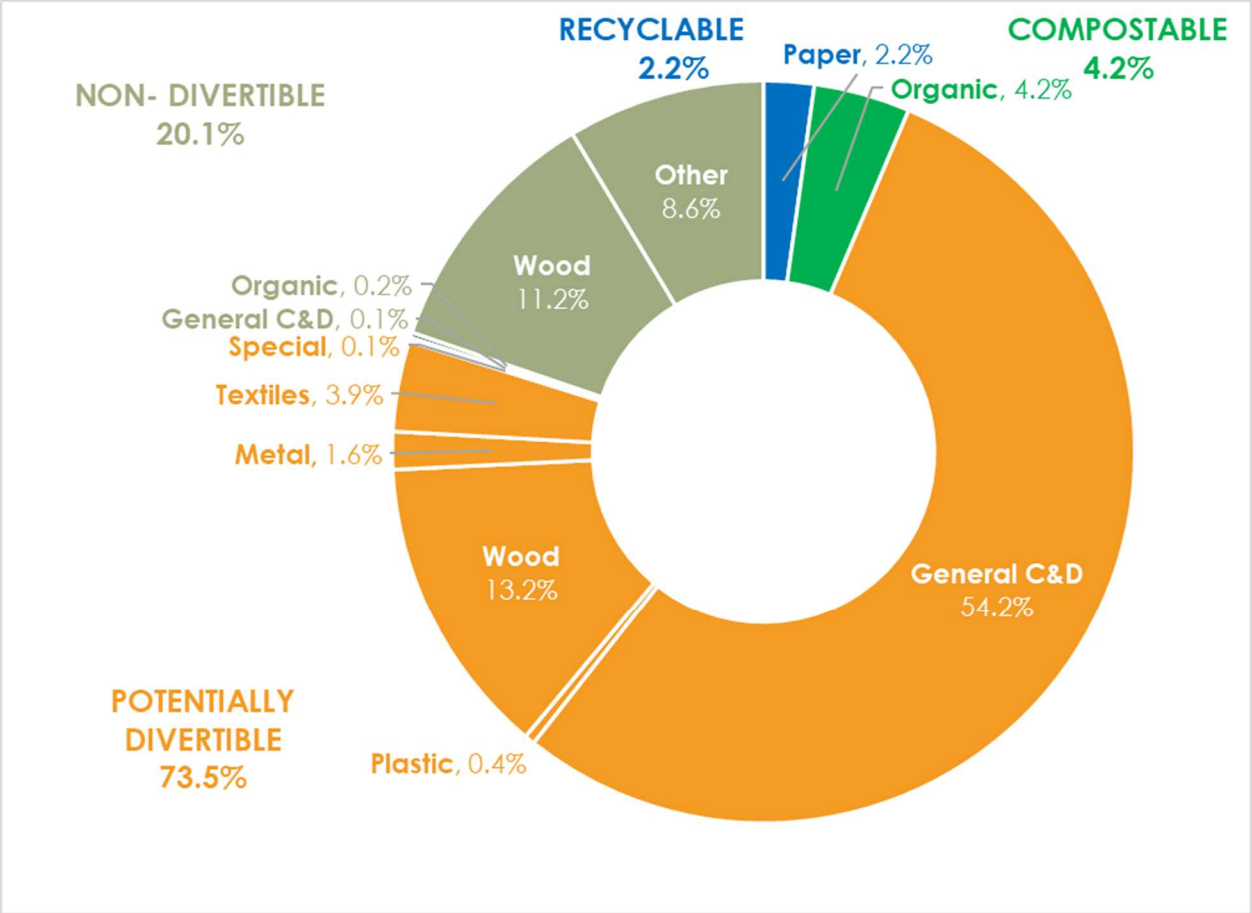
Commercial MSW samples were acquired from the following cities:

- Fort Lauderdale – 13 samples
- Tamarac – 8 samples
- Coconut Creek – 7 samples
- Coral Springs – 5 samples
- Margate – 4 samples
- North Lauderdale – 3 samples
- Davie – 2 samples
- Lauderdale Lakes – 2 samples

4.1.4 Construction and Demolition Debris/Bulky Waste

252 C&D and bulky waste loads were visually characterized over four seasonal field efforts into 30 material types. Nearly three-quarters of the disposed C&D/bulky waste material stream is classified as potentially divertible, which includes items such as concrete, brick, asphalt roofing, wood, and textiles. SCS estimated about two percent of this material stream is recyclable cardboard and four percent is organic material, primarily yard waste. The remaining 20 percent is classified as non-divertible and includes items such as treated wood, bagged waste, bulky waste, and insulation. **Exhibit 6** and **Table 9** provide the detailed breakdown of the composition of the C&D/bulky waste stream in Broward County.

Exhibit 12. C&D/Bulky Waste Classification by Material Type



Percentages may not add up to 100% due to rounding. Composition is based on 252 visually characterized waste loads

As presented in **Table 8**, materials that comprise the largest proportions of C&D/Bulky Waste include:

- Asphalt Roofing at 25.7 percent (potentially divertible)
- Clean Engineered Wood at 13.2 percent (potentially divertible)
- Treated Wood at 11.2 percent (non-divertible)
- Brick at 8.8 percent (potentially divertible)
- Concrete at 8.0 percent (potentially divertible

Table 8. Detailed C&D/Bulky Waste Composition

MATERIAL		Mean Composition
RECYCLABLE		
Fiber	Cardboard	2.2%
	Total Recyclable	**2.2%**
COMPOSTABLE		
Organic	Yard Trash	3.9%
	Food Waste	0.3%
	Total Compostable	**4.2%**
POTENTIALLY DIVERTIBLE		
General C&D	Asphalt Roofing	25.7%
	Brick	8.8%
	Concrete	8.0%
	Gypsum Board/Drywall	7.3%
	Rock	2.8%
	Asphalt Paving	1.6%
Plastic	Rigid Plastics	0.4%
Wood	Clean Engineered Wood	13.2%
Metal	Non-Ferrous Metals	0.8%
	Ferrous Metals	0.5%
	White Goods	0.3%
	Rebar	<0.1%
	Other Metal	<0.1%
Textiles	Furniture	1.9%
	Carpet/Carpet Padding	1.2%
	Mattresses/Box Springs	0.8%
	Textiles	<0.1%
Special	Tires	<0.1%
	Special Waste	<0.1%
	HHW	<0.1%
	Total Potentially Divertible	**73.5%**
NON-DIVERTIBLE		
General C&D	Insulation	0.1%
Plastic	PVC Pipe	<0.1%
	Plastic Films	0.1%
Wood	Treated Wood	11.2%
	Other Wood	<0.1%
Other	Miscellaneous / Bagged Waste	8.2%
	Bulky Waste	0.4%
	Total Non-Divertible	**20.1%**
TOTAL		**100.0%**

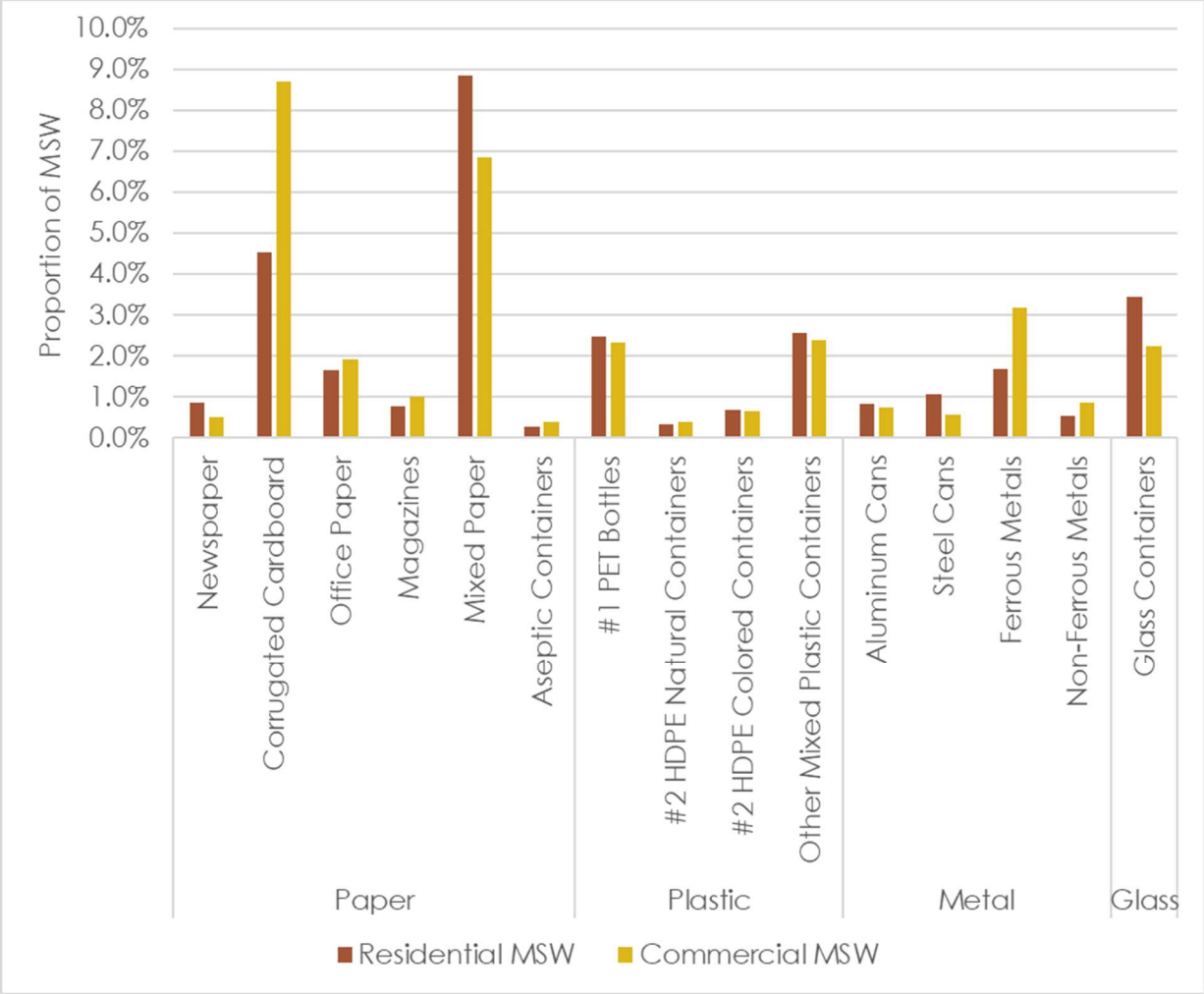
Percentages may not add up to 100% due to rounding.
Composition is based on 252 visually characterized waste loads.

4.2 FINDINGS

Residential vs Commercial MSW

Identifying differences between residential and commercial MSW can help pinpoint and develop targeted outreach and education efforts. Statistically significant differences are identified when the 90-percent confidence intervals do not overlap. **Exhibit 13** presents the proportions of recyclable materials for both residential and commercial MSW.

Exhibit 13. Recyclable Materials in MSW – Comparison of Residential vs Commercial



Commercial MSW has higher proportions of the following materials with statistical significance:

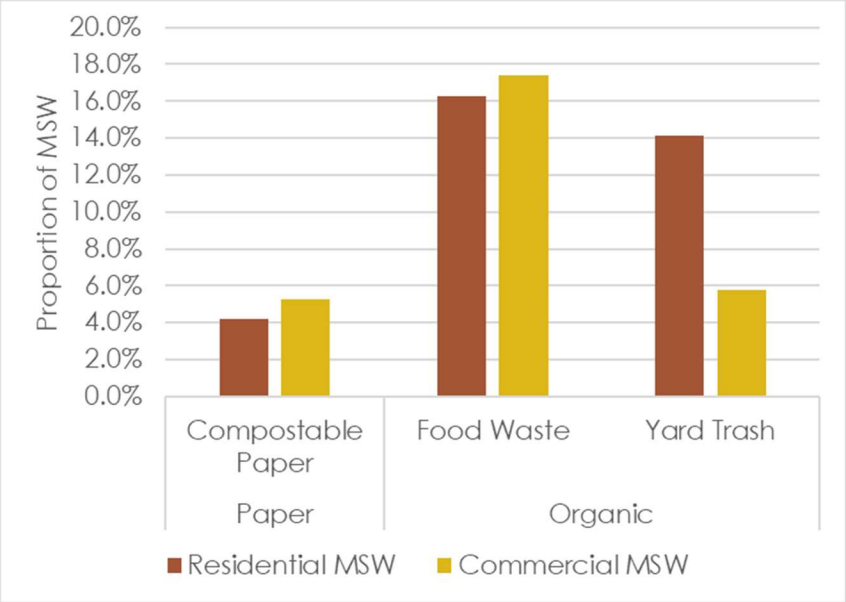
- Corrugated Cardboard (8.7 percent in commercial MSW vs 4.5 percent in residential MSW).

Residential MSW has higher proportions of the following materials with statistical significance:

- Mixed Paper (8.9 percent in residential MSW vs 6.9 percent in commercial MSW)
- Steel Cans (1.1 percent in residential MSW vs 0.6 percent in commercial MSW)
- Glass Containers (3.4 percent in residential MSW vs 2.2 percent in commercial MSW)

Exhibit 14 presents the proportions of compostable materials for both residential and commercial MSW.

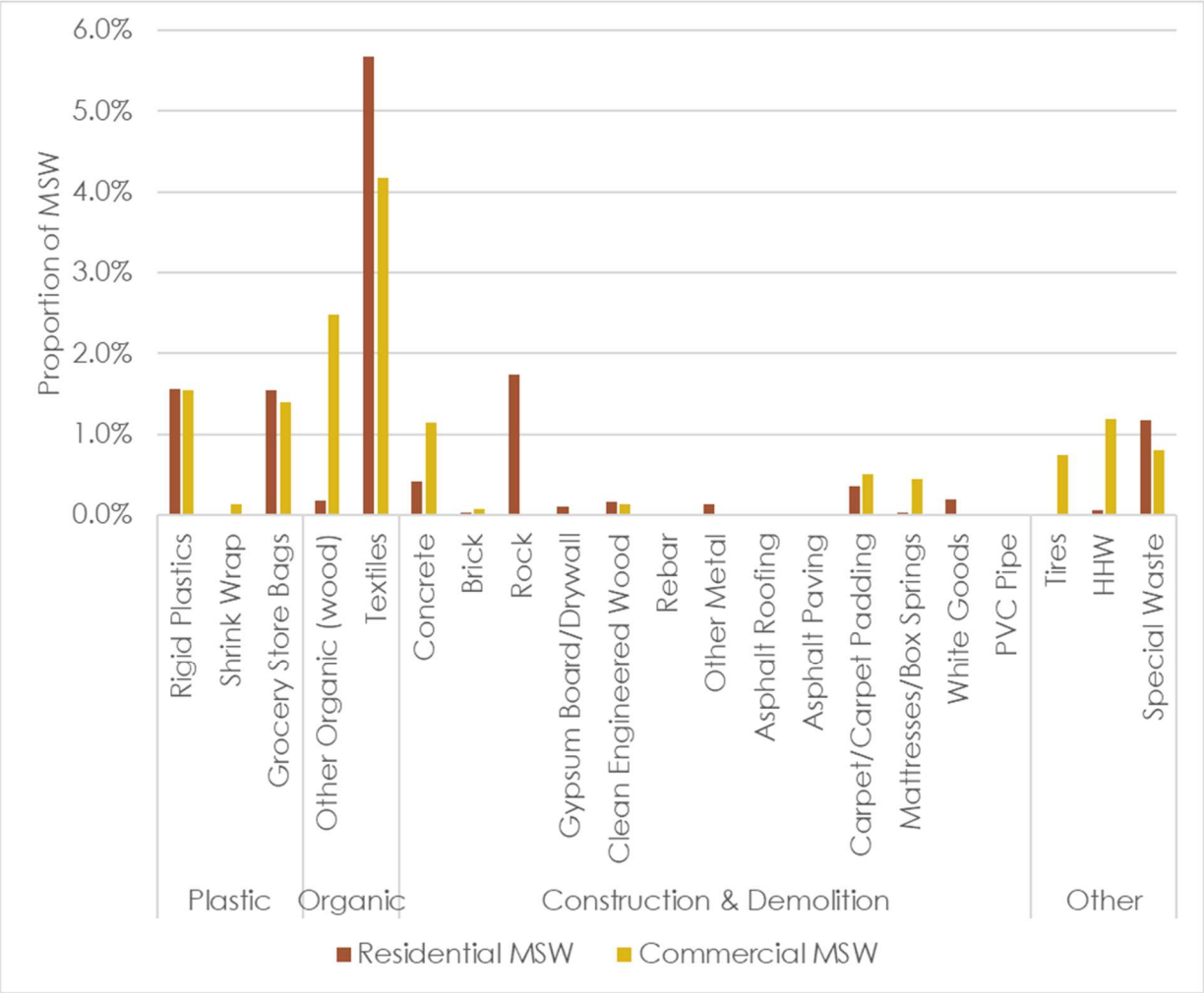
Exhibit 14. Compostable Materials in MSW – Comparison of Residential vs Commercial



Residential MSW has higher proportions of Yard Trash (14.1 percent in residential MSW vs 5.8 percent in commercial MSW).

Exhibit 15 presents the proportions of potentially divertible materials for both residential and commercial MSW.

Exhibit 15. Potentially Divertible Materials in MSW
Comparison of Residential vs Commercial



Textiles in both residential and commercial MSW represent a significant opportunity for waste diversion.

Divertibility Comparison

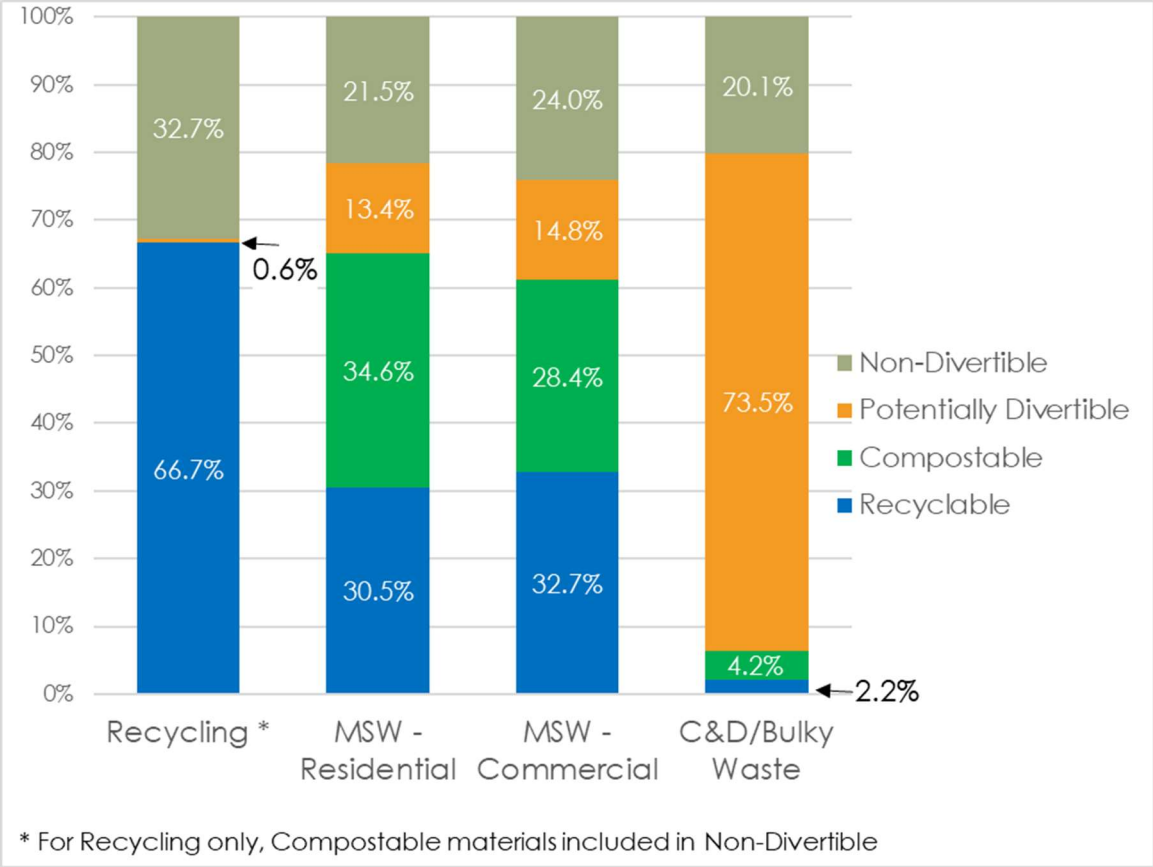
Exhibit 16 presents a comparison of waste streams generated and characterized according to divertibility:

- Residential curbside recycling contamination (non-divertible materials that should not be placed in the recycling cart) represents about one third (32.7 percent) of recyclable materials. High contamination rates result in higher processing costs since the technology is designed for processing acceptable materials. Increased education and communication could reduce the level of contamination.

- Residential and commercial MSW have similar compositions with about 76 to 78.5 percent of the waste stream being divertible. Commercial waste has slightly more recyclable materials and potentially divertible materials. Residential waste has more compostable materials.

- Much of the C&D/Bulky Waste stream is potentially divertible with Asphalt Roofing comprising 25.7 percent, Clean Engineered Wood representing 13.2 percent, and Brick representing 8.8 percent.

Exhibit 16. Divertibility Comparison by Stream



5 CONCLUSIONS AND RECOMMENDATIONS

This study provides data and information about the various waste streams in Broward County to evaluate the effectiveness of existing waste diversion programs and identify opportunities to create programs or develop facilities to divert additional materials from landfill disposal or incineration. Comparison of future waste compositions to the waste compositions in this report can also help identify trends and changes in waste generation in the County.

The following recommendations are based on the waste composition data presented in this report:

1. **Improving Existing Recycling Behavior:** By weight, 30.5 percent of residential MSW and about one third of materials set aside for recycling are not recyclable in Broward County. Non-recyclable materials that are placed into recycling collection containers are called contamination. Types of contamination are variable and include soiled/wet paper, plastic and metal containers that still contain food, appliances, plastic bags, and yard trash, among others. In 2018, China enacted its National Sword Policies which prohibit shipments of contaminated recyclables from outside the country. While additional recycling processing capacity is being developed in the U.S., the technology to separate single-stream recyclable materials into marketable commodities is not designed to handle significant contamination. Public education and outreach should inform residents and businesses about proper recycling.

2. **Reduce the Amount of Recyclable Material Disposed as MSW:** By weight, 30.5 of the County's residential MSW and 32.7 percent of commercial MSW are recyclable materials. This represents a lost opportunity to conserve resources, receive revenue from the sale of recyclable commodities, and reduce greenhouse gas emissions from disposal and mining for virgin materials. Cardboard and mixed paper comprise the largest portions of recyclable materials in MSW.

3. **Focus on Diverting Compostable Materials**: Compostable materials (compostable paper, food, and yard trash) comprise 34.6 percent of residential MSW and 28.4 percent of commercial MSW. There is significantly more yard trash in residential MSW than commercial MSW. Nationwide, there continues to be growing interest in diverting materials for composting and other organic processing technologies. The opportunity for diverting compostable materials in Broward County is tremendous, and the County should further assess programs, facilities, and technologies for processing organics.

4. **Develop Programs to Divert C&D/Bulky Waste:** About 80 percent of C&D/Bulky waste is recyclable (cardboard), compostable, or potentially divertible. The County should assess markets for recovered C&D materials in the region and could work with contractors and self-haulers to separate materials that could be recovered. Asphalt roofing, clean engineered wood, concrete and brick comprise the greatest portions of C&D/Bulky waste. The BCL also could develop holding areas for divertible materials and then transport them to a processor when sufficient quantities accumulate. This could promote waste diversion and reduce the financial burden on small contractors and self-haulers to recycle.

5. **Continue Performing Waste Characterization Studies:** Over the last two decades, waste characterization studies have provided local governments with valuable information on how the waste stream is changing. This allows governments to make decisions on the programs and policies needed to reduce disposal, recover resources, and boost the economy. The County should continue conducting these studies on an incremental basis to further track changes in the waste stream.

Appendix A
Health & Safety Plans

North Broward Transfer Station
Owned by Waste Management
Operated by Win Waste

Site-Specific Health and Safety Plan
Win Waste North Broward Transfer Station

Broward County
Waste Characterization Study
September 15, 2022

REQUIRED APPROVAL			
SCS OSHC or designee:	John Jones	Date:	September 15, 2022
SCS PM:	Stacey Demers	Date:	September 15, 2022

Project No.:	09222033.00 Tasks 701, 702, 703, 704
Project Name:	Broward Co Waste Characterization Study
Site Address:	2600 Wiles Road, Coconut Creek (Pompano Beach), FL 33073
Client Contact:	Davin Siewrattan

EMERGENCY TELEPHONE NUMBERS	
Fire:	911 or (954) 764-4357 (non emergency)
Police:	911 or (954) 764-4357 (non-emergency)
Hospital	(954) 341-8300 Broward Health North Emergency Room
Ambulance:	911
WorkCare Service for SCS Employees	1-800-455-6155
The directions and information on the nearest hospital are found on Page **3.**	

ACKNOWLEDGEMENT PAGE

"I have read the attached Health and Safety Plan for the Waste Characterization Study. I have discussed any questions and/or concerns that I have regarding the contents of this document with the designated SCS project safety representative, and I understand its requirements.

Name	Signature	Company	Date

Table of Contents

1 INTRODUCTION

At SCS, protection of human health and the environment is paramount. This Site-Specific Health and Safety Plan (SSHSP) provides information to identify hazards that may be present and/or introduced by project's activities onto SCS job sites, and details needed precautions that employees should follow to protect themselves. Tasks performed on site or during projects should be analyzed to determine if physical or chemical hazards requiring safeguards or additional Personal Protective Equipment (PPE) exist. This plan will be modified as necessary if any new hazards are identified during the project that require that additional safeguards be put in place. This plan is in the draft stage, approval will be gained from the SCS Office Safety and Health Coordinator prior to any field activities.

PROJECT ORGANIZATION

On-site Health and Safety Representative:	Brent Dieleman Alexis Vento Katherine Hinojosa	202-841-9827
Project Manager:	Stacey Demers	703-929-2986
Client Representative:	Davin Siewrattan	954-581-6606 ext 212

SCOPE OF WORK – WASTE CHARACTERIZATION

Material characterization involves collecting field samples and sorting the municipal solid waste into designated categories.

Accidents may occur due to the potential hazards associated with the presence of heavy equipment at the site, the components of the waste itself (potentially sharp objects, broken glass), climatic conditions, trips and falls from stairs in the MRF, and carelessness. At transfer stations and landfills, combustion of the waste materials on the tipping floor or in "Hot Loads" from refuse vehicles can present potential hazards.

The presence of heavy equipment in operation at the site (end loaders, graders, transfer station compactors, garbage trucks, etc.) presents potential hazards which can be avoided with the use of general common sense and staying visible. The equipment operators generally are involved in performing their tasks and may be unaware of the presence of other individuals within the immediate area. Personnel will be trained to be aware of the movement and location of equipment at all times. Also, highly visible clothing, including safety vests and hard hats, is required.

The components of municipal solid waste (and MRF residuals) present potential physical hazards. These include, but are not limited to, cuts from broken glass and sharp metal objects; splinters from pieces of wood; punctures from nails and other sharp objects; and scrapes and

abrasions from the general handling of the solid waste. There also exists the potential for exposure to household products, such as bleach, cleansers, and other toxic chemicals.

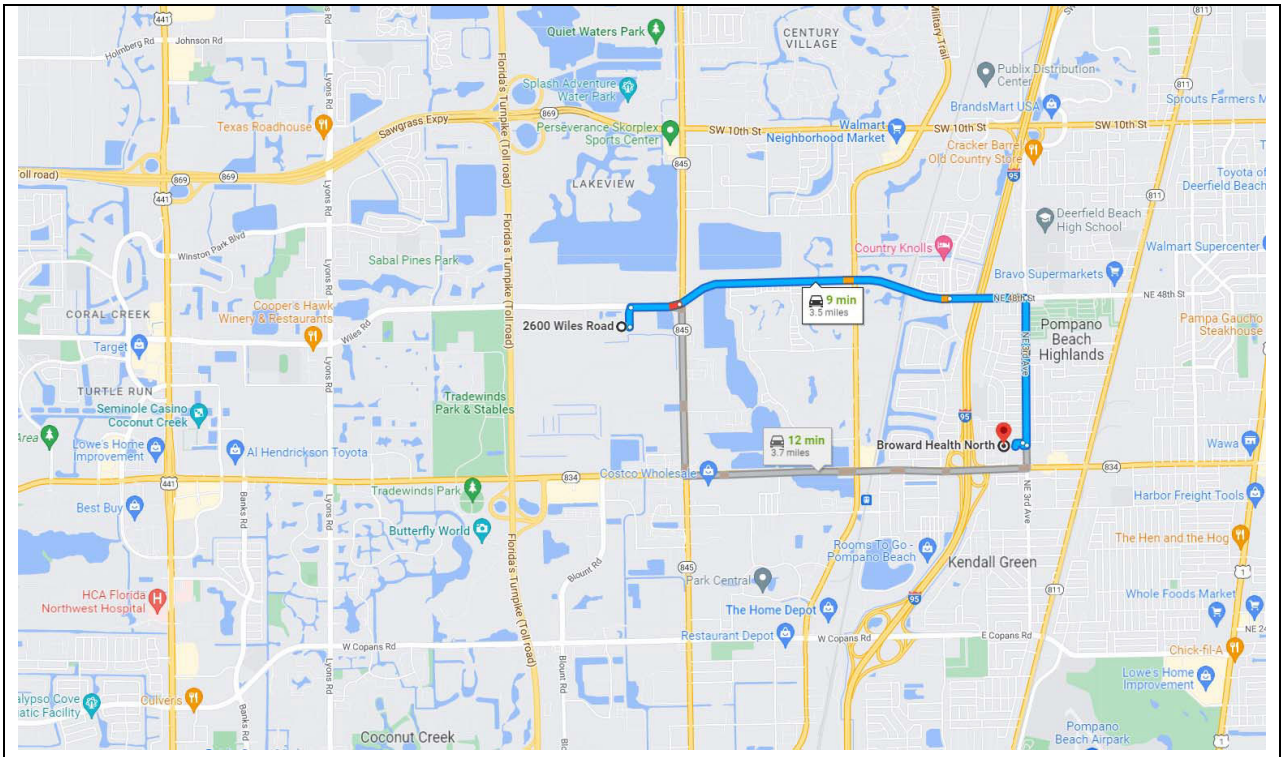
To alleviate the possibility of injury, caution should be employed at all times when physically handling the solid waste. Protective clothing, including gloves and safety glasses, should be worn at all times. If there is any question about the handling of a component of solid waste, the Crew Chief should be notified.

Caution should be taken to avoid the possibility of heat stress due to protective clothing or weather.

Materials deposited at the site can pose a potential fire hazard. Fires can be started through carelessness, sparks, or from "Hot Loads" handled at the refuse facilities. If fire or smoke is observed, site personnel should be notified immediately, all SCS personnel and subcontractors should leave the immediate area at once, and the local emergency fire department should be notified.

2 EMERGENCY RESPONSE AND MEDICAL TREATMENT PROCEDURES

EMERGENCY CONTACT AND NOTIFICATION INFORMATION



1. Head north toward NW 48th St/Wiles Rd
2. Turn right onto NW 48th St/Wiles Rd
3. Continue onto NW 49th Ct/Green Rd (follow Green Rd)
4. Continue onto NW 48th St
5. Turn right onto NE 3rd Ave
6. Turn right after in 194 feet
7. Turn left in 325 feet

Figure 1. Map to the Hospital and Directions

Broward Health North Hospital – Emergency Room
201 E. Sample Rd, Pompano Beach, FL 33064
954-941-8300

ACCIDENT OR INCIDENT REPORTING SYSTEM

In the event of an emergency at the site, project personnel should call 911 for emergency assistance. After the immediate emergency situation has been addressed by emergency personnel, SCS project personnel should call the SCS Project Manager and the Client Representative and inform them of the situation. The Project Manager should evaluate the nature of the emergency and direct project personnel actions from that point.

NOTIFICATION PROCEDURES FOR INCIDENTS (CLIENT, LOCAL, STATE, OR FEDERAL)

Site personnel should contact their supervisor immediately when an accident or injury occurs, and provide any needed information so that additional notifications can be determined and completed as needed.

METHODS TO SUMMON EMERGENCY RESPONSE TEAM

Emergency services can be summoned through 911, as this service is active in the area.

RESCUE AND MEDICAL TREATMENT REQUIREMENTS

Stop work authority should be exercised when an injury or accident occurs. The appropriate emergency agency should be contacted and first aid administered, if possible. If the injury is not life-threatening and does not require emergency response, contact WorkCare (SCS health advice service) at (800) 455-6155. First aid kits and fire extinguishers are available in each SCS work truck.

3 SITE DESCRIPTION

LOCATION DESCRIPTION

The facility is located at 20701 Pembroke Road, Pembroke Pines, FL 33029.

4 GENERAL FIELD SAFETY PROCEDURES

General Standard Operating Procedures (SOPs) and additional SCS Health and Safety procedures and requirements are included in the current SCS Injury Illness Protection Program (IIPP) and on the SCS intranet. These documents are considered a part of this plan.

SCS team members will conduct themselves in a professional manner at all times. The following restrictions will also be observed by all SCS personnel and subcontractors to SCS:

- Working while under the influence of intoxicants, narcotics, or controlled substances is prohibited.

- Smoking anywhere on site is prohibited.

- Loose clothing will not be worn on-site. Long hair will be worn up inside hard hat.
- Eating, drinking, chewing gum, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited on-site, unless in designated break areas.
- No personnel will be admitted to the site without the proper safety equipment, clearance or other approval.
- All personnel must comply with established safety procedures. Any staff member who does not comply with safety policy, as established by the Site Manager, will be immediately dismissed from the site.
- No unapproved work clothes or equipment will be allowed on-site.
- Prescription drugs should not be taken by personnel where the potential for contact with toxic substances exist. Use must be specifically approved by a qualified physician.
- Work areas for various operational activities will be established.
- Work areas will be established based on prevailing site conditions and are subject to change. Personnel should check with the SCS Site Manager for current and appropriate procedures regularly.
- Contact with contaminated or potentially contaminated material should be avoided. Whenever possible, do not walk through puddles, mud, or any discolored ground surface. Do not kneel on the ground. Do not lean, sit or place equipment on drums, containers, or vehicles.
- Due caution will be observed when proceeding on foot through open areas. Personnel will not cross the line of cones that will separate the sorting area from the area where heavy equipment will be operating.
- Any medical emergency supersedes routine safety requirements.

APPLICABLE STANDARD OPERATING PROCEDURES (SOPS) AND PROGRAMS

The following SOPs are incorporated by reference and available on the SCS intranet.

	SOP Number and Name		SOP Number and Name
X	01 - General Code of Safe Work Practices		22 - Safe Procedures for Working with Sites That Contain Hydrogen Sulfide
X	04 - JTSA and PPE Assessment Procedures	X	24 - Avoidance of Slips, Trips, and Falls
	05 - Work Permits	X	25 - Avoidance and Prevention of Heat and Cold Stress, and Other Weather-Related Hazards
X	06 - Forklift and Heavy Machinery Operations		26 - All-Terrain Vehicles and Watercraft
X	07 - Compressed Air and Compressed Gas Cylinders		27 - OSHA and Other Regulatory Inspections
	08 - Drilling and Well Installation Procedures		
	09 - Electrical Safety		**Appendix Letter and Program Name**
	10 - Fall Protection	X	B - Hazard Communication
X	11 - Fire Extinguishers		C - HAZWOPER
	12 - Hand and Power Tools		D - Exposure Assessment
	13 - Working Safely with Ladders	X	E - PPE Other Than Respiratory Protection
	14 - Landfill Leachate and Condensate Safe Procedures	X	F - Respiratory Protection
	15 - Lockout and Tagout	X	G - Motor Vehicle and Fleet Safety
	17 - Materials Use and Handling		H - Hearing Conservation
	18 - Polyethylene (PE) Pipe Work Safe Procedures	X	I - Bloodborne Pathogens
X	19 - Site Sanitation Procedures		J - Excavation and Construction Earthwork Program
	20 - Safe Work Practices for Scaffolds		K - Confined Space Entry
X	21 - Safe Procedures for Biological Hazards (Snakes, Insects, Vegetation, Bacteria)		L - Ergonomics Program

JOB TASK SAFETY ANALYSIS (JTSA) AND PPE ASSESSMENT

JTSAs for activities performed at this site have been completed as indicated below and are included as **Attachment 1**. A completed JTSA is required for all work tasks performed at the site. JTSAs are designed to identify steps which involve potential hazards to employees and should be reviewed and understood (and signed providing evidence of understanding) before performing any task at the site. If additional steps or hazards are present, the JTSA should be revised (and the revision signed by all affected staff) to indicate that all items have been appropriately addressed and are understood before proceeding with the task.

Unless identified in an attached Job Task Safety Analysis (JTSA) form, all project tasks are anticipated to only require **Level D** PPE, as defined by the Occupational Safety and Health Administration (OSHA).

SCS field personnel (including subcontractors) will be informed in the use of safety equipment and will be required to wear protective clothing appropriate for the tasks in which they will be involved.

Extra equipment will be located on-site. This equipment will include the following items:

- Tyvek Coverall Suits
- Gloves (nitrile and HexArmor: SharpsMaster II)
- High Visibility Safety Vests
- Eye Protection
- Ear Protection
- Hard Hats
- First Aid Kit

SCS will provide sufficient water for personal use on-site daily.

OTHER INSPECTION PROCEDURES

Periodic site inspections may be made by the Project Supervisor, Project Manager, and Regional Compliance Auditor or Safety Specialist. There is also the potential for the client or regulatory agencies to visit and inspect the site. SCS personnel are to perform tasks in compliance with all contractual, regulatory, and company requirements at all times.

SITE CONTROL

SCS and its subcontractors will be restricted to the sorting area at the Site. A loader will be used to transfer waste samples from the bale area to the sorting area. **Under no circumstances will SCS employees or subcontractors enter unauthorized locations at the Materials Recovery Facility.**

Our clients are responsible for providing SCS employees with safe site access, which includes sites that are free of threats from transients or other aggressive people or animals. If an SCS employee encounters an aggressive person or animal, they should withdraw from the site and contact the Site Representative and their SCS supervisor. The Site Owner is responsible for removing the threats, and SCS employees should not take any affirmative action of their own.

DECONTAMINATION PROCEDURES

The risks of illness due to ingestion of diseased or decomposing materials from the work site are significant. To minimize these risks, all personnel should remove and store the outer layer of their protective clothing (i.e., coveralls, gloves, hard hat, etc.) on-site. Hands, face, and nails should be thoroughly washed, or scrubbed, with soap and water prior to engaging in any activity likely to transmit materials encountered on-site into the mouth. If waste materials come in contact with the skin, that crew member will be temporarily excused to thoroughly wash the affected area with soap and water.

HANDLING OF HAZARDOUS WASTE MATERIALS

Hazardous materials will be avoided during sample selection. If hazardous materials are encountered during the waste sorting activities, they will be segregated from the normal waste and recycling streams and put in separate containers.

Caution will be taken when handling mercury-containing wastes such as fluorescent light bulbs. Care will be taken to not break the glass bulb, and to avoid samples with excess amounts of fluorescent light bulbs. Gloves and Tyvek suits will provide skin protection from mercury compounds.

Extreme care will be taken when handling and disposing of hazardous materials. If subcontractors encounter any material that may be considered hazardous, they will be instructed to report it to the Site Manager immediately.

HOUSEKEEPING REQUIREMENTS

Hand sanitizer and soap will be made available to assist with decontamination. The designated break area is located in the front of the MRF.

5 SITE HAZARDS

Chemical and Physical Agent Hazards

The following chemical and physical hazards should be considered before performing any task or work at the site. The analysis will depend on a thorough understanding of the site's physical characteristics and the task(s) being performed.

Toxic Compounds: Non-Methane Organic Compounds (NMOCs), as well as inorganic toxic contaminants such as mercury, and sometimes even radioactive contaminants such as tritium, may be present on a site. NMOCs include such toxic compounds as benzene, toluene, chloroform, vinyl chloride, carbon tetrachloride, and trichloroethane, which, although commonly less than 1 percent by weight, are hazardous. These potential hazards should be evaluated on a case-by-case basis. Additional precautions will be established as needed.

Poisons: Pesticides, cleaners, or other toxic materials of various types may be present in the waste stream. Avoid contact with these items. Pay close attention to where you walk and what you touch such that materials do not accidentally come into contact with skin, eyes, mouth, or clothing. Immediately remove any contaminated clothing, and wash with soapy water any skin that becomes contaminated. Avoid contact at all times.

Flammables: Fuel such as gasoline and diesel may be present in the waste stream. Additionally, paint thinners or other flammable materials may be present in the waste. The primary risk associated with these materials is fire. Keep all ignition sources away from flammable materials. Do not smoke, unless in designated areas. Pay close attention to where you walk and what you touch such that materials do not accidentally come into contact with skin, eyes, mouth, or clothing. Immediately remove any contaminated clothing, and wash with soapy water any skin that becomes contaminated. Avoid contact at all times.

Oxidizers: Fertilizers, pool chemicals, chlorine, or other oxidizers may be present in the waste stream. These materials may be in use at water treatment plants or in the waste at the site. The primary risk from oxidizers is an increased fire potential. Keep fire and fuel or oil away from oxidizers. Do not smoke, unless in designated areas. Pay close attention to where you walk and what you touch such that materials do not accidentally come into contact with skin, eyes, mouth, or clothing. Immediately remove any contaminated clothing, and wash with soapy water any skin that becomes contaminated. Avoid contact at all times.

Corrosives: Acidic and caustic materials may be present in the waste stream. These materials may be in use at water treatment plants or in the waste at the site. The primary risk from corrosives is damage to the skin or eyes. Pay close attention to where you walk and what you touch such that materials do not accidentally come into contact with skin, eyes, mouth, or clothing. Immediately remove any contaminated clothing, and wash with soapy water any skin that becomes contaminated. Avoid contact at all times.

Physical Hazards

The following physical hazards should be considered before performing any task or work at the site. Depending on the task(s) being performed, any or all of these hazards may be present.

Heavy Equipment: Compactors, bull dozers, loaders, track hoes, forklifts and large trucks, and other vehicles are present at the MRF. Loud noise and limited visibility can increase the threat of being run over or crushed by these vehicles. Wear high-visibility vests (recommend Class III) and coordinate with vehicle operators when working in the vicinity of these pieces of equipment. Heavy equipment hazards are especially present at or near the tipping floor. When working in this area, equipment operators must be notified. The use of a second person (as a spotter) should be done when working in this area

Heat-Related Injuries: Elevated body temperatures can cause serious injury or death. Working outdoors or in the sun increases the chance of heat-related injuries. This hazard is especially critical when PPE (such as coveralls or rain gear) is worn, since heat from the body becomes trapped inside clothing. Personnel should drink plenty of liquids and take breaks as needed. The following describes the various effects of heat-related injuries.

Heat Disorders and Health Effects:

- **Heat Stroke:** This disorder occurs when the body's system of temperature regulation (e.g., sweating and evaporation) fails and body temperature rises to critical levels. The condition is caused by a combination of highly variable factors, and its occurrence is difficult to predict. Heat stroke is a serious hazard, however. Primary signs and symptoms are confusion, irrational behavior, loss of consciousness, convulsions, a lack of sweating (usually), hot, dry skin, and an abnormally high body temperature. If a worker shows signs of possible heat stroke, call 911 to obtain **immediate** medical assistance. The worker should be placed in a shady area, and his or her outer clothing should be removed. The worker's skin should also be wetted and air movement around the body increased to improve evaporative cooling until professional methods of cooling are initiated and the seriousness of the condition can be assessed. Fluids should be replaced as soon as possible--by mouth only if the worker is conscious. The medical outcome of an episode of heat stroke depends on the victim's physical fitness and the timing and effectiveness of first aid treatment. Regardless of the worker's protests, **no** employee suspected of being ill from heat stroke should be sent home or left unattended unless a physician has specifically approved such an order.

- **Heat Exhaustion:** The signs and symptoms of heat exhaustion include clammy skin, headache, nausea, vertigo, weakness, thirst, and giddiness. Fortunately, heat exhaustion responds readily to prompt treatment. This condition, however, should not be dismissed lightly, for several reasons. One is that fainting associated with heat exhaustion can be dangerous because the victim may be operating machinery or controlling an operation that should not be left unattended. The victim could also be injured when he or she faints. While the signs and symptoms associated with heat exhaustion are similar to those of heat stroke, the notable difference (with heat

exhaustion) is clammy skin. Workers suffering from heat exhaustion should be removed from hot environments and given fluid replacement, by mouth only if the workers are conscious. They should also be encouraged to get adequate rest.

- **Heat Rashes:** The most common problem occurring in hot work environments is heat rash. Prickly heat is manifested as red papules and usually appears in areas where the clothing is restrictive. As sweating increases, the papules give rise to a prickling sensation. Prickly heat occurs in skin that is persistently wetted by unevaporated sweat, and papules may become infected if they are not treated. In most cases, heat rash will disappear when the affected individual returns to a cool environment.

- **Heat Fatigue:** One factor that predisposes individuals to heat fatigue is the lack of acclimatization. Use of a program of acclimatization and training for work in hot environments are advisable. The signs and symptoms of heat fatigue include impaired performance of skilled sensorimotor, high-concentration, or high-vigilance activities. The sole treatment available for heat fatigue is to remove heat stress and increase fluid replacement before a more serious heat-related condition develops.

Biological Hazards

Rodents, poisonous insects, snakes, other animals and/or plants are a natural part of any ecosystem. They are sometimes difficult to eliminate or avoid on some sites because of the location. Employees should be aware of the potential for encountering these types of animals and plants. Where possible, nesting places should be removed or access to them should be limited. If several infestations occur, remedies should be discussed with a supervisor and the client (see **SCS IIPP, SOP-21**, for precautions and treatment for biological hazards). The following could be encountered in performance of the operation, maintenance, and monitoring functions of a project:

Hantavirus: Infection typically occurs by the inhalation of tiny airborne droplets of fresh or dried rodent excretions. Transmission to humans may also occur through direct contact with rodents or rodent-contaminated materials, and ingestion of contaminated food or water is also a possible route of transmission. Sweeping or "shaking out" rodent-contaminated materials should be avoided unless performed using respiratory protection. The early symptoms of hantavirus disease are flu-like (fever, chills, muscle aches). For a very short period of time, the infected person starts to feel better. Then, within 1 to 2 days, he or she may develop shortness of breath. The disease gets worse quickly and leads to respiratory failure, a condition known as Hantavirus Pulmonary Syndrome (HPS). About half of all HPS patients experience these symptoms, which usually occur 1 to 5 weeks from contracting the illness.

Bloodborn Pathogens: Human blood can contain harmful viruses such as the Human Immunodeficiency Virus (HIV) and Hepatitis B Virus (HBV). Contact with affected blood, as well as materials contaminated by this blood, can result in transmitting viruses and the life-threatening conditions they cause.

SCS has adopted a Bloodborne Pathogen Exposure Control Plan to protect employees who may come into contact with blood, or materials contaminated with blood, during the performance of

tasks. Although the program is intended to comply with OSHA's Bloodborne Pathogens Standard, 29 CFR 1910.1030, the primary purpose for adopting the plan is to help employees avoid bloodborne pathogens at work.

When an employee is involved in an exposure incident, it must be reported in accordance with the Health and Safety Injury and Illness Prevention Plan. All employees involved in an exposure incident will be offered post-exposure evaluation and follow-up, in accordance with the OSHA standard. Follow-up will include:

- Documentation of the route of exposure and the circumstances related to the incident.
- If possible, identification of the source individual and, if possible, the status of the source individual. The blood of the source individual will be tested (after consent is obtained) for HIV/HBV infectivity.
- Results of testing of the source individual will be made available to the exposed employee, along with applicable laws and regulations concerning disclosure of the identity and infectivity of the source individual.
- The employee will be offered the option of having blood collected for testing of that employee's HIV/HBV serological status. The blood sample will be preserved for at least 90 days to allow the employee to decide if the blood should be tested for HIV serological status. However, if the employee decides, prior to that time, that testing will be conducted, the appropriate action can be taken and the blood sample discarded.
- The employee will be offered post-exposure counseling in accordance with current recommendations of the U.S. Public Health Service.
- The employee will be given appropriate counseling concerning precautions to take during the period after the exposure incident. The employee will also be given information regarding potential illnesses and procedures for reporting related symptoms to appropriate personnel.

Attachment 1 – Job Task Safety Analysis and PPE Assessment Form

JOB TASK SAFETY ANALYSIS AND PPE ASSESSMENT FORM-
JTSA-ES- 16- WASTE SORT

Job Task Safety Analysis Form-01				
Task Type (Check all that Apply)	Solid Waste	**Task Description (include an estimate of task duration in hrs/day)** Five day waste sort, approximately 8 hours per day.		**Location or Project:** Reuter Recycling Facility of Florida, Pembroke Pines **Date Revised:** August 26, 2020 **Project #/Revision #:** 09222033.00
Analysis Team Member	**Position Title**		**Reviewed by**	**Position Title**
Stacey Demers	Project Director			
Brent Dieleman	Project Manager			
Alexis Vento	Staff Professional			
Katherine Hinojosa	Project Professional			
Special Training Required		Bloodborne pathogens training		
Applicable SAFE Checklist(s): Specify type and category number		Environmental Services/Solid Waste Checklist		

This form is the certification that the hazard assessment has been performed for the workplace as required by 29 CFR 1910.132.

Job Task Step	Potential Environmental and Personnel Hazards[1]	Critical Actions	PPE Required
1. Drive to site, set up sorting table and containers.	Heavy lifting Slips/trips/falls Vehicle traffic	• Check in w/facility • Ensure work area is secured/isolated • Use buddy system • Employ safe lifting behaviors • Stretch/warm-up	Head: Hardhat Body: Safety vest, Tyvek Foot: Steel--toe ANSI boots Hand: Nitrile + Leather outer glove Respiratory: None Hearing: None Eye/Face: Safety glasses
2. Collect solid waste samples from the tipping floor area	Heavy lifting Vehicle/HE traffic Slips/trips/falls Medical/bio waste Sharps Chemical exposures	• Use buddy system • Stay visible • Use safe lifting • Set up away from traffic • Give directions to bobcat operator • Avoid Heavy EQ traffic	Head: Hardhat Body: Safety vest, Tyvek Foot: Steel--toe ANSI boots Hand: Nitrile + Puncture Resistant Gloves Respiratory: Dust mask Hearing: Earplugs Eye/Face: Safety glasses
3. Hand-sort solid waste materials on the sorting table. (At the MRF)	Heavy lifting Vehicle/HE traffic Slips/trips/falls Medical/bio waste Sharps Chemical exposures Stress/hygiene concerns	• Use buddy system • Stay visible • Use safe lifting • Set up away from traffic • Brush trash (vs digging) • Wash hands freq. • Stay hydrated • Shift breaks	Head: Hardhat Body: Safety vest, Tyvek Foot: Steel--toe ANSI boots Hand: Nitrile + Puncture Resistant Gloves Respiratory: Dust mask (optional) Hearing: Earplugs (optional) Eye/Face: Safety glasses

Job Task Step	Potential Environmental and Personnel Hazards[1]	Critical Actions	PPE Required
4. Cleanup and Decontaminate	Heavy lifting Slips/trips/falls Vehicle traffic	• Ensure work area is secured/isolated • Use buddy system • Employ safe lifting behaviors • Stretch/warm-up • Decontaminate PPE	Head: Hardhat Body: Safety vest, Tyvek Foot: Steel--toe ANSI boots Hand: Nitrile + Leather outer glove Respiratory: Dust mask (optional) Hearing: None Eye/Face: Safety glasses
5. Demo	Vehicle/HE traffic	• Check out w/facility	Head: None Body: High Visibility Vest Foot: Steel--toe ANSI boots Hand: None Respiratory: None Hearing: None Eye/Face: None
End of JTSA Form			

Appendix A (continued)
Health & Safety Plans

Reuter Recycling
Owned and Operated by Waste Management

Site-Specific Health and Safety Plan
Reuter Recycling of Florida

Broward County
Waste Characterization Study
August 29, 2022

REQUIRED APPROVAL			
SCS OSHC or designee:	John Jones	Date:	August 15, 2022
SCS PM:	Stacey Demers	Date:	August 15, 2022

Project No.:	09222033.00 Tasks 701 and 703
Project Name:	Broward Co Waste Characterization Study
Site Address:	20701 Pembroke Road, Pembroke Pines, FL 33029
Client Contact:	Kenny Caldararo

EMERGENCY TELEPHONE NUMBERS	
Fire:	911 or (954) 764-4357 (non emergency)
Police:	911 or (954) 764-4357 (non-emergency)
Hospital	(954) 538-5000 Memorial Healthcare System - Miramar
Ambulance:	911
WorkCare Service for SCS Employees	1-800-455-6155
The directions and information on the nearest hospital are found on Page **3.**	

ACKNOWLEDGEMENT PAGE

"I have read the attached Health and Safety Plan for the Waste Characterization Study. I have discussed any questions and/or concerns that I have regarding the contents of this document with the designated SCS project safety representative, and I understand its requirements.

Name	Signature	Company	Date

Table of Contents

1 INTRODUCTION

At SCS, protection of human health and the environment is paramount. This Site-Specific Health and Safety Plan (SSHSP) provides information to identify hazards that may be present and/or introduced by project's activities onto SCS job sites, and details needed precautions that employees should follow to protect themselves. Tasks performed on site or during projects should be analyzed to determine if physical or chemical hazards requiring safeguards or additional Personal Protective Equipment (PPE) exist. This plan will be modified as necessary if any new hazards are identified during the project that require that additional safeguards be put in place. This plan is in the draft stage, approval will be gained from the SCS Office Safety and Health Coordinator prior to any field activities.

PROJECT ORGANIZATION

On-site Health and Safety Representative:	Brent Dieleman Alexis Vento Katherine Hinojosa	202-841-9827
Project Manager:	Stacey Demers	703-929-2986
Client Representative:	Kenny Caldararo	561-352-5334

SCOPE OF WORK – WASTE CHARACTERIZATION

Material characterization involves collecting field samples and sorting the municipal solid waste into designated categories.

Accidents may occur due to the potential hazards associated with the presence of heavy equipment at the site, the components of the waste itself (potentially sharp objects, broken glass), climatic conditions, trips and falls from stairs in the MRF, and carelessness. At transfer stations and landfills, combustion of the waste materials on the tipping floor or in "Hot Loads" from refuse vehicles can present potential hazards.

The presence of heavy equipment in operation at the site (end loaders, graders, transfer station compactors, garbage trucks, etc.) presents potential hazards which can be avoided with the use of general common sense and staying visible. The equipment operators generally are involved in performing their tasks and may be unaware of the presence of other individuals within the immediate area. Personnel will be trained to be aware of the movement and location of equipment at all times. Also, highly visible clothing, including safety vests and hard hats, is required.

The components of municipal solid waste (and MRF residuals) present potential physical hazards. These include, but are not limited to, cuts from broken glass and sharp metal objects; splinters from pieces of wood; punctures from nails and other sharp objects; and scrapes and abrasions from the general handling of the solid waste. There also exists the potential for exposure to household products, such as bleach, cleansers, and other toxic chemicals.

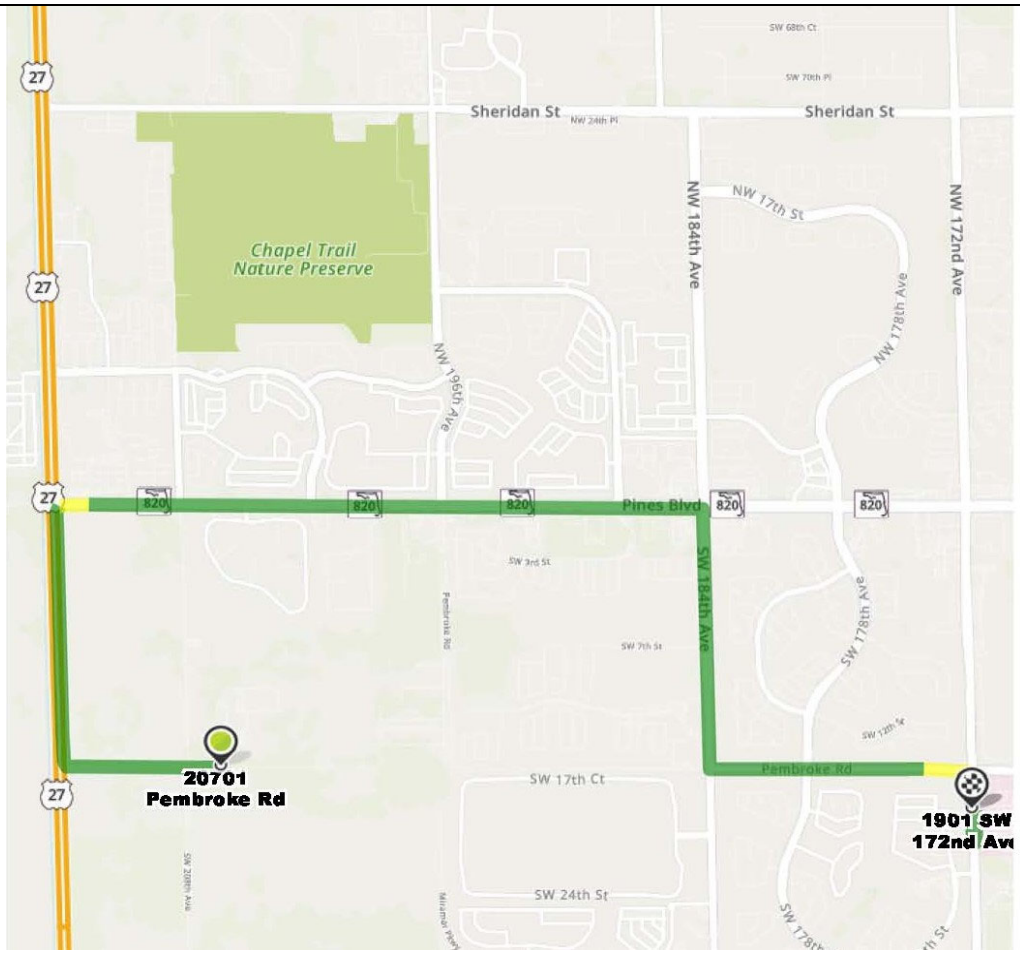
To alleviate the possibility of injury, caution should be employed at all times when physically handling the solid waste. Protective clothing, including gloves and safety glasses, should be worn at all times. If there is any question about the handling of a component of solid waste, the Crew Chief should be notified.

Caution should be taken to avoid the possibility of heat stress due to protective clothing or weather.

Materials deposited at the site can pose a potential fire hazard. Fires can be started through carelessness, sparks, or from "Hot Loads" handled at the refuse facilities. If fire or smoke is observed, site personnel should be notified immediately, all SCS personnel and subcontractors should leave the immediate area at once, and the local emergency fire department should be notified.

2 EMERGENCY RESPONSE AND MEDICAL TREATMENT PROCEDURES

EMERGENCY CONTACT AND NOTIFICATION INFORMATION



1. West on Pembroke Road Toward N 208th Ave
2. Turn 2nd right on US Highway 27 (N/FL-25)
3. Take 1st right onto Pines Blvd (FL-820).
4. Turn left onto Pembroke Rd
5. Turn right onto SW 172 Ave
6. Make a U-Turn onto SW 172 Ave
7. See Memorial Hospital on right

Figure 1. Map to the Hospital and Directions

Memorial Healthcare Hospital - Miramar
1901 SW 172 Ave, Miramar, FL 33029
954-538-5000

ACCIDENT OR INCIDENT REPORTING SYSTEM

In the event of an emergency at the site, project personnel should call 911 for emergency assistance. After the immediate emergency situation has been addressed by emergency personnel, SCS project personnel should call the SCS Project Manager and the Client Representative and inform them of the situation. The Project Manager should evaluate the nature of the emergency and direct project personnel actions from that point.

NOTIFICATION PROCEDURES FOR INCIDENTS (CLIENT, LOCAL, STATE, OR FEDERAL)

Site personnel should contact their supervisor immediately when an accident or injury occurs, and provide any needed information so that additional notifications can be determined and completed as needed.

METHODS TO SUMMON EMERGENCY RESPONSE TEAM

Emergency services can be summoned through 911, as this service is active in the area.

RESCUE AND MEDICAL TREATMENT REQUIREMENTS

Stop work authority should be exercised when an injury or accident occurs. The appropriate emergency agency should be contacted and first aid administered, if possible. If the injury is not life-threatening and does not require emergency response, contact WorkCare (SCS health advice service) at (800) 455-6155. First aid kits and fire extinguishers are available in each SCS work truck.

3 SITE DESCRIPTION

LOCATION DESCRIPTION

The facility is located at 20701 Pembroke Road, Pembroke Pines, FL 33029.

4 GENERAL FIELD SAFETY PROCEDURES

General Standard Operating Procedures (SOPs) and additional SCS Health and Safety procedures and requirements are included in the current SCS Injury Illness Protection Program (IIPP) and on the SCS intranet. These documents are considered a part of this plan.

SCS team members will conduct themselves in a professional manner at all times. The following restrictions will also be observed by all SCS personnel and subcontractors to SCS:

- Working while under the influence of intoxicants, narcotics, or controlled substances is prohibited.

- Smoking anywhere on site is prohibited.

- Loose clothing will not be worn on-site. Long hair will be worn up inside hard hat.
- Eating, drinking, chewing gum, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited on-site, unless in designated break areas.
- No personnel will be admitted to the site without the proper safety equipment, clearance or other approval.
- All personnel must comply with established safety procedures. Any staff member who does not comply with safety policy, as established by the Site Manager, will be immediately dismissed from the site.
- No unapproved work clothes or equipment will be allowed on-site.
- Prescription drugs should not be taken by personnel where the potential for contact with toxic substances exist. Use must be specifically approved by a qualified physician.
- Work areas for various operational activities will be established.
- Work areas will be established based on prevailing site conditions and are subject to change. Personnel should check with the SCS Site Manager for current and appropriate procedures regularly.
- Contact with contaminated or potentially contaminated material should be avoided. Whenever possible, do not walk through puddles, mud, or any discolored ground surface. Do not kneel on the ground. Do not lean, sit or place equipment on drums, containers, or vehicles.
- Due caution will be observed when proceeding on foot through open areas. Personnel will not cross the line of cones that will separate the sorting area from the area where heavy equipment will be operating.
- Any medical emergency supersedes routine safety requirements.

APPLICABLE STANDARD OPERATING PROCEDURES (SOPS) AND PROGRAMS

The following SOPs are incorporated by reference and available on the SCS intranet.

	SOP Number and Name		SOP Number and Name
X	01 - General Code of Safe Work Practices		22 - Safe Procedures for Working with Sites That Contain Hydrogen Sulfide
X	04 - JTSA and PPE Assessment Procedures	X	24 - Avoidance of Slips, Trips, and Falls
	05 - Work Permits	X	25 - Avoidance and Prevention of Heat and Cold Stress, and Other Weather-Related Hazards
X	06 - Forklift and Heavy Machinery Operations		26 - All-Terrain Vehicles and Watercraft
X	07 - Compressed Air and Compressed Gas Cylinders		27 - OSHA and Other Regulatory Inspections
	08 - Drilling and Well Installation Procedures		
	09 - Electrical Safety		**Appendix Letter and Program Name**
	10 - Fall Protection	X	B - Hazard Communication
X	11 - Fire Extinguishers		C - HAZWOPER
	12 - Hand and Power Tools		D - Exposure Assessment
	13 - Working Safely with Ladders	X	E - PPE Other Than Respiratory Protection
	14 - Landfill Leachate and Condensate Safe Procedures	X	F - Respiratory Protection
	15 - Lockout and Tagout	X	G - Motor Vehicle and Fleet Safety
	17 - Materials Use and Handling		H - Hearing Conservation
	18 - Polyethylene (PE) Pipe Work Safe Procedures	X	I - Bloodborne Pathogens
X	19 - Site Sanitation Procedures		J - Excavation and Construction Earthwork Program
	20 - Safe Work Practices for Scaffolds		K - Confined Space Entry
X	21 - Safe Procedures for Biological Hazards (Snakes, Insects, Vegetation, Bacteria)		L - Ergonomics Program

JOB TASK SAFETY ANALYSIS (JTSA) AND PPE ASSESSMENT

JTSAs for activities performed at this site have been completed as indicated below and are included as **Attachment 1**. A completed JTSA is required for all work tasks performed at the site. JTSAs are designed to identify steps which involve potential hazards to employees and should be reviewed and understood (and signed providing evidence of understanding) before performing any task at the site. If additional steps or hazards are present, the JTSA should be revised (and the revision signed by all affected staff) to indicate that all items have been appropriately addressed and are understood before proceeding with the task.

Unless identified in an attached Job Task Safety Analysis (JTSA) form, all project tasks are anticipated to only require **Level D** PPE, as defined by the Occupational Safety and Health Administration (OSHA).

SCS field personnel (including subcontractors) will be informed in the use of safety equipment and will be required to wear protective clothing appropriate for the tasks in which they will be involved.

Extra equipment will be located on-site. This equipment will include the following items:

- Tyvek Coverall Suits
- Gloves (nitrile and HexArmor: SharpsMaster II)
- High Visibility Safety Vests
- Eye Protection
- Ear Protection
- Hard Hats
- First Aid Kit

SCS will provide sufficient water for personal use on-site daily.

OTHER INSPECTION PROCEDURES

Periodic site inspections may be made by the Project Supervisor, Project Manager, and Regional Compliance Auditor or Safety Specialist. There is also the potential for the client or regulatory agencies to visit and inspect the site. SCS personnel are to perform tasks in compliance with all contractual, regulatory, and company requirements at all times.

SITE CONTROL

SCS and its subcontractors will be restricted to the sorting area at the Site. A loader will be used to transfer waste samples from the bale area to the sorting area. **Under no circumstances will SCS employees or subcontractors enter unauthorized locations at the Materials Recovery Facility.**

Our clients are responsible for providing SCS employees with safe site access, which includes sites that are free of threats from transients or other aggressive people or animals. If an SCS employee encounters an aggressive person or animal, they should withdraw from the site and contact the Site Representative and their SCS supervisor. The Site Owner is responsible for removing the threats, and SCS employees should not take any affirmative action of their own.

DECONTAMINATION PROCEDURES

The risks of illness due to ingestion of diseased or decomposing materials from the work site are significant. To minimize these risks, all personnel should remove and store the outer layer of their protective clothing (i.e., coveralls, gloves, hard hat, etc.) on-site. Hands, face, and nails should be thoroughly washed, or scrubbed, with soap and water prior to engaging in any activity likely to transmit materials encountered on-site into the mouth. If waste materials come in contact with the skin, that crew member will be temporarily excused to thoroughly wash the affected area with soap and water.

HANDLING OF HAZARDOUS WASTE MATERIALS

Hazardous materials will be avoided during sample selection. If hazardous materials are encountered during the waste sorting activities, they will be segregated from the normal waste and recycling streams and put in separate containers.

Caution will be taken when handling mercury-containing wastes such as fluorescent light bulbs. Care will be taken to not break the glass bulb, and to avoid samples with excess amounts of fluorescent light bulbs. Gloves and Tyvek suits will provide skin protection from mercury compounds.

Extreme care will be taken when handling and disposing of hazardous materials. If subcontractors encounter any material that may be considered hazardous, they will be instructed to report it to the Site Manager immediately.

HOUSEKEEPING REQUIREMENTS

Hand sanitizer and soap will be made available to assist with decontamination. The designated break area is located in the front of the MRF.

5 SITE HAZARDS

Chemical and Physical Agent Hazards

The following chemical and physical hazards should be considered before performing any task or work at the site. The analysis will depend on a thorough understanding of the site's physical characteristics and the task(s) being performed.

Toxic Compounds: Non-Methane Organic Compounds (NMOCs), as well as inorganic toxic contaminants such as mercury, and sometimes even radioactive contaminants such as tritium, may be present on a site. NMOCs include such toxic compounds as benzene, toluene, chloroform, vinyl chloride, carbon tetrachloride, and trichloroethane, which, although commonly less than 1 percent by weight, are hazardous. These potential hazards should be evaluated on a case-by-case basis. Additional precautions will be established as needed.

Poisons: Pesticides, cleaners, or other toxic materials of various types may be present in the waste stream. Avoid contact with these items. Pay close attention to where you walk and what you touch such that materials do not accidentally come into contact with skin, eyes, mouth, or clothing. Immediately remove any contaminated clothing, and wash with soapy water any skin that becomes contaminated. Avoid contact at all times.

Flammables: Fuel such as gasoline and diesel may be present in the waste stream. Additionally, paint thinners or other flammable materials may be present in the waste. The primary risk associated with these materials is fire. Keep all ignition sources away from flammable materials. Do not smoke, unless in designated areas. Pay close attention to where you walk and what you touch such that materials do not accidentally come into contact with skin, eyes, mouth, or clothing. Immediately remove any contaminated clothing, and wash with soapy water any skin that becomes contaminated. Avoid contact at all times.

Oxidizers: Fertilizers, pool chemicals, chlorine, or other oxidizers may be present in the waste stream. These materials may be in use at water treatment plants or in the waste at the site. The primary risk from oxidizers is an increased fire potential. Keep fire and fuel or oil away from oxidizers. Do not smoke, unless in designated areas. Pay close attention to where you walk and what you touch such that materials do not accidentally come into contact with skin, eyes, mouth, or clothing. Immediately remove any contaminated clothing, and wash with soapy water any skin that becomes contaminated. Avoid contact at all times.

Corrosives: Acidic and caustic materials may be present in the waste stream. These materials may be in use at water treatment plants or in the waste at the site. The primary risk from corrosives is damage to the skin or eyes. Pay close attention to where you walk and what you touch such that materials do not accidentally come into contact with skin, eyes, mouth, or clothing. Immediately remove any contaminated clothing, and wash with soapy water any skin that becomes contaminated. Avoid contact at all times.

Physical Hazards

The following physical hazards should be considered before performing any task or work at the site. Depending on the task(s) being performed, any or all of these hazards may be present.

Heavy Equipment: Compactors, bull dozers, loaders, track hoes, forklifts and large trucks, and other vehicles are present at the MRF. Loud noise and limited visibility can increase the threat of being run over or crushed by these vehicles. Wear high-visibility vests (recommend Class III) and coordinate with vehicle operators when working in the vicinity of these pieces of equipment. Heavy equipment hazards are especially present at or near the tipping floor. When working in this area, equipment operators must be notified. The use of a second person (as a spotter) should be done when working in this area

Heat-Related Injuries: Elevated body temperatures can cause serious injury or death. Working outdoors or in the sun increases the chance of heat-related injuries. This hazard is especially critical when PPE (such as coveralls or rain gear) is worn, since heat from the body becomes trapped inside clothing. Personnel should drink plenty of liquids and take breaks as needed. The following describes the various effects of heat-related injuries.

Heat Disorders and Health Effects:

- **Heat Stroke:** This disorder occurs when the body's system of temperature regulation (e.g., sweating and evaporation) fails and body temperature rises to critical levels. The condition is caused by a combination of highly variable factors, and its occurrence is difficult to predict. Heat stroke is a serious hazard, however. Primary signs and symptoms are confusion, irrational behavior, loss of consciousness, convulsions, a lack of sweating (usually), hot, dry skin, and an abnormally high body temperature. If a worker shows signs of possible heat stroke, call 911 to obtain **immediate** medical assistance. The worker should be placed in a shady area, and his or her outer clothing should be removed. The worker's skin should also be wetted and air movement around the body increased to improve evaporative cooling until professional methods of cooling are initiated and the seriousness of the condition can be assessed. Fluids should be replaced as soon as possible--by mouth only if the worker is conscious. The medical outcome of an episode of heat stroke depends on the victim's physical fitness and the timing and effectiveness of first aid treatment. Regardless of the worker's protests, **no** employee suspected of being ill from heat stroke should be sent home or left unattended unless a physician has specifically approved such an order.

- **Heat Exhaustion:** The signs and symptoms of heat exhaustion include clammy skin, headache, nausea, vertigo, weakness, thirst, and giddiness. Fortunately, heat exhaustion responds readily to prompt treatment. This condition, however, should not be dismissed lightly, for several reasons. One is that fainting associated with heat exhaustion can be dangerous because the victim may be operating machinery or controlling an operation that should not be left unattended. The victim could also be injured when he or she faints. While the signs and symptoms associated with heat exhaustion are similar to those of heat stroke, the notable difference (with heat

exhaustion) is clammy skin. Workers suffering from heat exhaustion should be removed from hot environments and given fluid replacement, by mouth only if the workers are conscious. They should also be encouraged to get adequate rest.

- **Heat Rashes:** The most common problem occurring in hot work environments is heat rash. Prickly heat is manifested as red papules and usually appears in areas where the clothing is restrictive. As sweating increases, the papules give rise to a prickling sensation. Prickly heat occurs in skin that is persistently wetted by unevaporated sweat, and papules may become infected if they are not treated. In most cases, heat rash will disappear when the affected individual returns to a cool environment.

- **Heat Fatigue:** One factor that predisposes individuals to heat fatigue is the lack of acclimatization. Use of a program of acclimatization and training for work in hot environments are advisable. The signs and symptoms of heat fatigue include impaired performance of skilled sensorimotor, high-concentration, or high-vigilance activities. The sole treatment available for heat fatigue is to remove heat stress and increase fluid replacement before a more serious heat-related condition develops.

Biological Hazards

Rodents, poisonous insects, snakes, other animals and/or plants are a natural part of any ecosystem. They are sometimes difficult to eliminate or avoid on some sites because of the location. Employees should be aware of the potential for encountering these types of animals and plants. Where possible, nesting places should be removed or access to them should be limited. If several infestations occur, remedies should be discussed with a supervisor and the client (see **SCS IIPP, SOP-21**, for precautions and treatment for biological hazards). The following could be encountered in performance of the operation, maintenance, and monitoring functions of a project:

Hantavirus: Infection typically occurs by the inhalation of tiny airborne droplets of fresh or dried rodent excretions. Transmission to humans may also occur through direct contact with rodents or rodent-contaminated materials, and ingestion of contaminated food or water is also a possible route of transmission. Sweeping or "shaking out" rodent-contaminated materials should be avoided unless performed using respiratory protection. The early symptoms of hantavirus disease are flu-like (fever, chills, muscle aches). For a very short period of time, the infected person starts to feel better. Then, within 1 to 2 days, he or she may develop shortness of breath. The disease gets worse quickly and leads to respiratory failure, a condition known as Hantavirus Pulmonary Syndrome (HPS). About half of all HPS patients experience these symptoms, which usually occur 1 to 5 weeks from contracting the illness.

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SCS has adopted a Bloodborne Pathogen Exposure Control Plan to protect employees who may come into contact with blood, or materials contaminated with blood, during the performance of

tasks. Although the program is intended to comply with OSHA's Bloodborne Pathogens Standard, 29 CFR 1910.1030, the primary purpose for adopting the plan is to help employees avoid bloodborne pathogens at work.

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- Documentation of the route of exposure and the circumstances related to the incident.
- If possible, identification of the source individual and, if possible, the status of the source individual. The blood of the source individual will be tested (after consent is obtained) for HIV/HBV infectivity.
- Results of testing of the source individual will be made available to the exposed employee, along with applicable laws and regulations concerning disclosure of the identity and infectivity of the source individual.
- The employee will be offered the option of having blood collected for testing of that employee's HIV/HBV serological status. The blood sample will be preserved for at least 90 days to allow the employee to decide if the blood should be tested for HIV serological status. However, if the employee decides, prior to that time, that testing will be conducted, the appropriate action can be taken and the blood sample discarded.
- The employee will be offered post-exposure counseling in accordance with current recommendations of the U.S. Public Health Service.
- The employee will be given appropriate counseling concerning precautions to take during the period after the exposure incident. The employee will also be given information regarding potential illnesses and procedures for reporting related symptoms to appropriate personnel.

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JTSA-ES- 16- WASTE SORT

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Analysis Team Member	**Position Title**		**Reviewed by**	**Position Title**
Stacey Demers	Project Director			
Brent Dieleman	Project Manager			
Alexis Vento	Staff Professional			
Katherine Hinojosa	Project Professional			
Special Training Required		Bloodborne pathogens training		
Applicable SAFE Checklist(s): Specify type and category number		Environmental Services/Solid Waste Checklist		

This form is the certification that the hazard assessment has been performed for the workplace as required by 29 CFR 1910.132.

Job Task Step	Potential Environmental and Personnel Hazards[1]	Critical Actions	PPE Required
1. Drive to site, set up sorting table and containers.	Heavy lifting Slips/trips/falls Vehicle traffic	• Check in w/facility • Ensure work area is secured/isolated • Use buddy system • Employ safe lifting behaviors • Stretch/warm-up	Head: Hardhat Body: Safety vest, Tyvek Foot: Steel--toe ANSI boots Hand: Nitrile + Leather outer glove Respiratory: None Hearing: None Eye/Face: Safety glasses
2. Collect solid waste samples from the tipping floor area	Heavy lifting Vehicle/HE traffic Slips/trips/falls Medical/bio waste Sharps Chemical exposures	• Use buddy system • Stay visible • Use safe lifting • Set up away from traffic • Give directions to bobcat operator • Avoid Heavy EQ traffic	Head: Hardhat Body: Safety vest, Tyvek Foot: Steel--toe ANSI boots Hand: Nitrile + Puncture Resistant Gloves Respiratory: Dust mask Hearing: Earplugs Eye/Face: Safety glasses
3. Hand-sort solid waste materials on the sorting table. (At the MRF)	Heavy lifting Vehicle/HE traffic Slips/trips/falls Medical/bio waste Sharps Chemical exposures Stress/hygiene concerns	• Use buddy system • Stay visible • Use safe lifting • Set up away from traffic • Brush trash (vs digging) • Wash hands freq. • Stay hydrated • Shift breaks	Head: Hardhat Body: Safety vest, Tyvek Foot: Steel--toe ANSI boots Hand: Nitrile + Puncture Resistant Gloves Respiratory: Dust mask (optional) Hearing: Earplugs (optional) Eye/Face: Safety glasses

Job Task Step	Potential Environmental and Personnel Hazards[1]	Critical Actions	PPE Required
4. Cleanup and Decontaminate	Heavy lifting Slips/trips/falls Vehicle traffic	• Ensure work area is secured/isolated • Use buddy system • Employ safe lifting behaviors • Stretch/warm-up • Decontaminate PPE	Head: Hardhat Body: Safety vest, Tyvek Foot: Steel--toe ANSI boots Hand: Nitrile + Leather outer glove Respiratory: Dust mask (optional) Hearing: None Eye/Face: Safety glasses
5. Demo	Vehicle/HE traffic	• Check out w/facility	Head: None Body: High Visibility Vest Foot: Steel--toe ANSI boots Hand: None Respiratory: None Hearing: None Eye/Face: None
End of JTSA Form			

Appendix A (continued)
Health & Safety Plans

Broward County Landfill
Owned and Operated by Broward County Government

Site-Specific Health and Safety Plan
Broward County Landfill

Broward County
Waste Characterization Study
September 15, 2022

REQUIRED APPROVAL			
SCS OSHC or designee:	John Jones	Date:	September 15, 2022
SCS PM:	Stacey Demers	Date:	September 15, 2022

Project No.:	09222033.00 Tasks 701, 702, 703, 704
Project Name:	Broward Co Waste Characterization Study
Site Address:	7101 SW 205th Ave, Southwest Ranches, FL 33029
Client Contact:	Dale Henderson

EMERGENCY TELEPHONE NUMBERS	
Fire:	911 or (954) 434-0008 (non emergency)
Police:	911 or (954) 764-4357 (non-emergency)
Hospital	(954) 276-1285 Memorial Urgent Care
Ambulance:	911
WorkCare Service for SCS Employees	1-800-455-6155
The directions and information on the nearest hospital are found on Page **3.**	

ACKNOWLEDGEMENT PAGE

"I have read the attached Health and Safety Plan for the Waste Characterization Study. I have discussed any questions and/or concerns that I have regarding the contents of this document with the designated SCS project safety representative, and I understand its requirements.

Name	Signature	Company	Date

Table of Contents

1 INTRODUCTION

At SCS, protection of human health and the environment is paramount. This Site-Specific Health and Safety Plan (SSHSP) provides information to identify hazards that may be present and/or introduced by project's activities onto SCS job sites, and details needed precautions that employees should follow to protect themselves. Tasks performed on site or during projects should be analyzed to determine if physical or chemical hazards requiring safeguards or additional Personal Protective Equipment (PPE) exist. This plan will be modified as necessary if any new hazards are identified during the project that require that additional safeguards be put in place. This plan is in the draft stage, approval will be gained from the SCS Office Safety and Health Coordinator prior to any field activities.

PROJECT ORGANIZATION

On-site Health and Safety Representative:	Brent Dieleman Alexis Vento Katherine Hinojosa	202-841-9827
Project Manager:	Stacey Demers	703-929-2986
Client Representative:	Notosha Austin	954-474-1880

SCOPE OF WORK – WASTE CHARACTERIZATION

Material characterization involves collecting field samples and sorting the municipal solid waste into designated categories.

Accidents may occur due to the potential hazards associated with the presence of heavy equipment at the site, the components of the waste itself (potentially sharp objects, broken glass), climatic conditions, trips and falls from stairs in the MRF, and carelessness. At transfer stations and landfills, combustion of the waste materials on the tipping floor or in "Hot Loads" from refuse vehicles can present potential hazards.

The presence of heavy equipment in operation at the site (end loaders, graders, transfer station compactors, garbage trucks, etc.) presents potential hazards which can be avoided with the use of general common sense and staying visible. The equipment operators generally are involved in performing their tasks and may be unaware of the presence of other individuals within the immediate area. Personnel will be trained to be aware of the movement and location of equipment at all times. Also, highly visible clothing, including safety vests and hard hats, is required.

The components of municipal solid waste (and MRF residuals) present potential physical hazards. These include, but are not limited to, cuts from broken glass and sharp metal objects; splinters from pieces of wood; punctures from nails and other sharp objects; and scrapes and abrasions from the general handling of the solid waste. There also exists the potential for exposure to household products, such as bleach, cleansers, and other toxic chemicals.

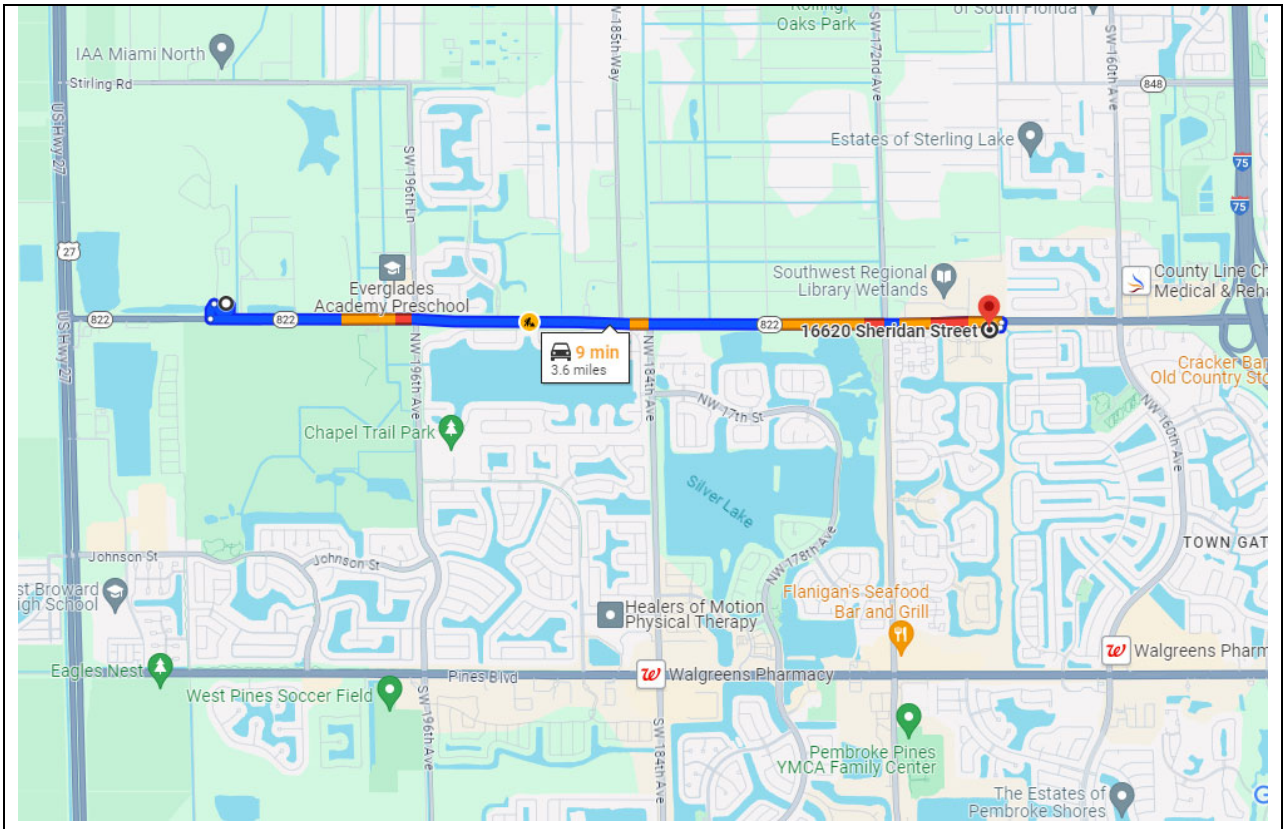
To alleviate the possibility of injury, caution should be employed at all times when physically handling the solid waste. Protective clothing, including gloves and safety glasses, should be worn at all times. If there is any question about the handling of a component of solid waste, the Crew Chief should be notified.

Caution should be taken to avoid the possibility of heat stress due to protective clothing or weather.

Materials deposited at the site can pose a potential fire hazard. Fires can be started through carelessness, sparks, or from "Hot Loads" handled at the refuse facilities. If fire or smoke is observed, site personnel should be notified immediately, all SCS personnel and subcontractors should leave the immediate area at once, and the local emergency fire department should be notified.

2 EMERGENCY RESPONSE AND MEDICAL TREATMENT PROCEDURES

EMERGENCY CONTACT AND NOTIFICATION INFORMATION



1. Make a Left onto Sheridan St (FL 822)
2. Continue on Sheridan St (FL 822) for 3.4 miles
3. Turn right at 16620 Sheridan St (FL 822)

Figure 1. Map to the Hospital and Directions

Memorial Urgent Care Center Pembroke Pines
16620 Sheridan Street, Pembroke Pines, FL 33331
954-276-1285

ACCIDENT OR INCIDENT REPORTING SYSTEM

In the event of an emergency at the site, project personnel should call 911 for emergency assistance. After the immediate emergency situation has been addressed by emergency personnel, SCS project personnel should call the SCS Project Manager and the Client Representative and inform them of the situation. The Project Manager should evaluate the nature of the emergency and direct project personnel actions from that point.

NOTIFICATION PROCEDURES FOR INCIDENTS (CLIENT, LOCAL, STATE, OR FEDERAL)

Site personnel should contact their supervisor immediately when an accident or injury occurs, and provide any needed information so that additional notifications can be determined and completed as needed.

METHODS TO SUMMON EMERGENCY RESPONSE TEAM

Emergency services can be summoned through 911, as this service is active in the area.

RESCUE AND MEDICAL TREATMENT REQUIREMENTS

Stop work authority should be exercised when an injury or accident occurs. The appropriate emergency agency should be contacted and first aid administered, if possible. If the injury is not life-threatening and does not require emergency response, contact WorkCare (SCS health advice service) at (800) 455-6155. First aid kits and fire extinguishers are available in each SCS work truck.

3 SITE DESCRIPTION

LOCATION DESCRIPTION

The facility is located at 20701 Pembroke Road, Pembroke Pines, FL 33029.

4 GENERAL FIELD SAFETY PROCEDURES

General Standard Operating Procedures (SOPs) and additional SCS Health and Safety procedures and requirements are included in the current SCS Injury Illness Protection Program (IIPP) and on the SCS intranet. These documents are considered a part of this plan.

SCS team members will conduct themselves in a professional manner at all times. The following restrictions will also be observed by all SCS personnel and subcontractors to SCS:

- Working while under the influence of intoxicants, narcotics, or controlled substances is prohibited.

- Smoking anywhere on site is prohibited.

- Loose clothing will not be worn on-site. Long hair will be worn up inside hard hat.
- Eating, drinking, chewing gum, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited on-site, unless in designated break areas.
- No personnel will be admitted to the site without the proper safety equipment, clearance or other approval.
- All personnel must comply with established safety procedures. Any staff member who does not comply with safety policy, as established by the Site Manager, will be immediately dismissed from the site.
- No unapproved work clothes or equipment will be allowed on-site.
- Prescription drugs should not be taken by personnel where the potential for contact with toxic substances exist. Use must be specifically approved by a qualified physician.
- Work areas for various operational activities will be established.
- Work areas will be established based on prevailing site conditions and are subject to change. Personnel should check with the SCS Site Manager for current and appropriate procedures regularly.
- Contact with contaminated or potentially contaminated material should be avoided. Whenever possible, do not walk through puddles, mud, or any discolored ground surface. Do not kneel on the ground. Do not lean, sit or place equipment on drums, containers, or vehicles.
- Due caution will be observed when proceeding on foot through open areas. Personnel will not cross the line of cones that will separate the sorting area from the area where heavy equipment will be operating.
- Any medical emergency supersedes routine safety requirements.

APPLICABLE STANDARD OPERATING PROCEDURES (SOPS) AND PROGRAMS

The following SOPs are incorporated by reference and available on the SCS intranet.

	SOP Number and Name		SOP Number and Name
X	01 - General Code of Safe Work Practices		22 - Safe Procedures for Working with Sites That Contain Hydrogen Sulfide
X	04 - JTSA and PPE Assessment Procedures	X	24 - Avoidance of Slips, Trips, and Falls
	05 - Work Permits	X	25 - Avoidance and Prevention of Heat and Cold Stress, and Other Weather-Related Hazards
X	06 - Forklift and Heavy Machinery Operations		26 - All-Terrain Vehicles and Watercraft
X	07 - Compressed Air and Compressed Gas Cylinders		27 - OSHA and Other Regulatory Inspections
	08 - Drilling and Well Installation Procedures		
	09 - Electrical Safety		**Appendix Letter and Program Name**
	10 - Fall Protection	X	B - Hazard Communication
X	11 - Fire Extinguishers		C - HAZWOPER
	12 - Hand and Power Tools		D - Exposure Assessment
	13 - Working Safely with Ladders	X	E - PPE Other Than Respiratory Protection
	14 - Landfill Leachate and Condensate Safe Procedures	X	F - Respiratory Protection
	15 - Lockout and Tagout	X	G - Motor Vehicle and Fleet Safety
	17 - Materials Use and Handling		H - Hearing Conservation
	18 - Polyethylene (PE) Pipe Work Safe Procedures	X	I - Bloodborne Pathogens
X	19 - Site Sanitation Procedures		J - Excavation and Construction Earthwork Program
	20 - Safe Work Practices for Scaffolds		K - Confined Space Entry
X	21 - Safe Procedures for Biological Hazards (Snakes, Insects, Vegetation, Bacteria)		L - Ergonomics Program

JOB TASK SAFETY ANALYSIS (JTSA) AND PPE ASSESSMENT

JTSAs for activities performed at this site have been completed as indicated below and are included as **Attachment 1**. A completed JTSA is required for all work tasks performed at the site. JTSAs are designed to identify steps which involve potential hazards to employees and should be reviewed and understood (and signed providing evidence of understanding) before performing any task at the site. If additional steps or hazards are present, the JTSA should be revised (and the revision signed by all affected staff) to indicate that all items have been appropriately addressed and are understood before proceeding with the task.

Unless identified in an attached Job Task Safety Analysis (JTSA) form, all project tasks are anticipated to only require **Level D** PPE, as defined by the Occupational Safety and Health Administration (OSHA).

SCS field personnel (including subcontractors) will be informed in the use of safety equipment and will be required to wear protective clothing appropriate for the tasks in which they will be involved.

Extra equipment will be located on-site. This equipment will include the following items:

- Tyvek Coverall Suits
- Gloves (nitrile and HexArmor: SharpsMaster II)
- High Visibility Safety Vests
- Eye Protection
- Ear Protection
- Hard Hats
- First Aid Kit

SCS will provide sufficient water for personal use on-site daily.

OTHER INSPECTION PROCEDURES

Periodic site inspections may be made by the Project Supervisor, Project Manager, and Regional Compliance Auditor or Safety Specialist. There is also the potential for the client or regulatory agencies to visit and inspect the site. SCS personnel are to perform tasks in compliance with all contractual, regulatory, and company requirements at all times.

SITE CONTROL

SCS and its subcontractors will be restricted to the sorting area at the Site. A loader will be used to transfer waste samples from the bale area to the sorting area. **Under no circumstances will SCS employees or subcontractors enter unauthorized locations at the Materials Recovery Facility.**

Our clients are responsible for providing SCS employees with safe site access, which includes sites that are free of threats from transients or other aggressive people or animals. If an SCS employee encounters an aggressive person or animal, they should withdraw from the site and contact the Site Representative and their SCS supervisor. The Site Owner is responsible for removing the threats, and SCS employees should not take any affirmative action of their own.

DECONTAMINATION PROCEDURES

The risks of illness due to ingestion of diseased or decomposing materials from the work site are significant. To minimize these risks, all personnel should remove and store the outer layer of their protective clothing (i.e., coveralls, gloves, hard hat, etc.) on-site. Hands, face, and nails should be thoroughly washed, or scrubbed, with soap and water prior to engaging in any activity likely to transmit materials encountered on-site into the mouth. If waste materials come in contact with the skin, that crew member will be temporarily excused to thoroughly wash the affected area with soap and water.

HANDLING OF HAZARDOUS WASTE MATERIALS

Hazardous materials will be avoided during sample selection. If hazardous materials are encountered during the waste sorting activities, they will be segregated from the normal waste and recycling streams and put in separate containers.

Caution will be taken when handling mercury-containing wastes such as fluorescent light bulbs. Care will be taken to not break the glass bulb, and to avoid samples with excess amounts of fluorescent light bulbs. Gloves and Tyvek suits will provide skin protection from mercury compounds.

Extreme care will be taken when handling and disposing of hazardous materials. If subcontractors encounter any material that may be considered hazardous, they will be instructed to report it to the Site Manager immediately.

HOUSEKEEPING REQUIREMENTS

Hand sanitizer and soap will be made available to assist with decontamination. The designated break area is located in the front of the MRF.

5 SITE HAZARDS

Chemical and Physical Agent Hazards

The following chemical and physical hazards should be considered before performing any task or work at the site. The analysis will depend on a thorough understanding of the site's physical characteristics and the task(s) being performed.

Toxic Compounds: Non-Methane Organic Compounds (NMOCs), as well as inorganic toxic contaminants such as mercury, and sometimes even radioactive contaminants such as tritium, may be present on a site. NMOCs include such toxic compounds as benzene, toluene, chloroform, vinyl chloride, carbon tetrachloride, and trichloroethane, which, although commonly less than 1 percent by weight, are hazardous. These potential hazards should be evaluated on a case-by-case basis. Additional precautions will be established as needed.

Poisons: Pesticides, cleaners, or other toxic materials of various types may be present in the waste stream. Avoid contact with these items. Pay close attention to where you walk and what you touch such that materials do not accidentally come into contact with skin, eyes, mouth, or clothing. Immediately remove any contaminated clothing, and wash with soapy water any skin that becomes contaminated. Avoid contact at all times.

Flammables: Fuel such as gasoline and diesel may be present in the waste stream. Additionally, paint thinners or other flammable materials may be present in the waste. The primary risk associated with these materials is fire. Keep all ignition sources away from flammable materials. Do not smoke, unless in designated areas. Pay close attention to where you walk and what you touch such that materials do not accidentally come into contact with skin, eyes, mouth, or clothing. Immediately remove any contaminated clothing, and wash with soapy water any skin that becomes contaminated. Avoid contact at all times.

Oxidizers: Fertilizers, pool chemicals, chlorine, or other oxidizers may be present in the waste stream. These materials may be in use at water treatment plants or in the waste at the site. The primary risk from oxidizers is an increased fire potential. Keep fire and fuel or oil away from oxidizers. Do not smoke, unless in designated areas. Pay close attention to where you walk and what you touch such that materials do not accidentally come into contact with skin, eyes, mouth, or clothing. Immediately remove any contaminated clothing, and wash with soapy water any skin that becomes contaminated. Avoid contact at all times.

Corrosives: Acidic and caustic materials may be present in the waste stream. These materials may be in use at water treatment plants or in the waste at the site. The primary risk from corrosives is damage to the skin or eyes. Pay close attention to where you walk and what you touch such that materials do not accidentally come into contact with skin, eyes, mouth, or clothing. Immediately remove any contaminated clothing, and wash with soapy water any skin that becomes contaminated. Avoid contact at all times.

Physical Hazards

The following physical hazards should be considered before performing any task or work at the site. Depending on the task(s) being performed, any or all of these hazards may be present.

Heavy Equipment: Compactors, bull dozers, loaders, track hoes, forklifts and large trucks, and other vehicles are present at the MRF. Loud noise and limited visibility can increase the threat of being run over or crushed by these vehicles. Wear high-visibility vests (recommend Class III) and coordinate with vehicle operators when working in the vicinity of these pieces of equipment. Heavy equipment hazards are especially present at or near the tipping floor. When working in this area, equipment operators must be notified. The use of a second person (as a spotter) should be done when working in this area

Heat-Related Injuries: Elevated body temperatures can cause serious injury or death. Working outdoors or in the sun increases the chance of heat-related injuries. This hazard is especially critical when PPE (such as coveralls or rain gear) is worn, since heat from the body becomes trapped inside clothing. Personnel should drink plenty of liquids and take breaks as needed. The following describes the various effects of heat-related injuries.

Heat Disorders and Health Effects:

- **Heat Stroke:** This disorder occurs when the body's system of temperature regulation (e.g., sweating and evaporation) fails and body temperature rises to critical levels. The condition is caused by a combination of highly variable factors, and its occurrence is difficult to predict. Heat stroke is a serious hazard, however. Primary signs and symptoms are confusion, irrational behavior, loss of consciousness, convulsions, a lack of sweating (usually), hot, dry skin, and an abnormally high body temperature. If a worker shows signs of possible heat stroke, call 911 to obtain **immediate** medical assistance. The worker should be placed in a shady area, and his or her outer clothing should be removed. The worker's skin should also be wetted and air movement around the body increased to improve evaporative cooling until professional methods of cooling are initiated and the seriousness of the condition can be assessed. Fluids should be replaced as soon as possible--by mouth only if the worker is conscious. The medical outcome of an episode of heat stroke depends on the victim's physical fitness and the timing and effectiveness of first aid treatment. Regardless of the worker's protests, **no** employee suspected of being ill from heat stroke should be sent home or left unattended unless a physician has specifically approved such an order.

- **Heat Exhaustion:** The signs and symptoms of heat exhaustion include clammy skin, headache, nausea, vertigo, weakness, thirst, and giddiness. Fortunately, heat exhaustion responds readily to prompt treatment. This condition, however, should not be dismissed lightly, for several reasons. One is that fainting associated with heat exhaustion can be dangerous because the victim may be operating machinery or controlling an operation that should not be left unattended. The victim could also be injured when he or she faints. While the signs and symptoms associated with heat exhaustion are similar to those of heat stroke, the notable difference (with heat

exhaustion) is clammy skin. Workers suffering from heat exhaustion should be removed from hot environments and given fluid replacement, by mouth only if the workers are conscious. They should also be encouraged to get adequate rest.

- **Heat Rashes:** The most common problem occurring in hot work environments is heat rash. Prickly heat is manifested as red papules and usually appears in areas where the clothing is restrictive. As sweating increases, the papules give rise to a prickling sensation. Prickly heat occurs in skin that is persistently wetted by unevaporated sweat, and papules may become infected if they are not treated. In most cases, heat rash will disappear when the affected individual returns to a cool environment.

- **Heat Fatigue:** One factor that predisposes individuals to heat fatigue is the lack of acclimatization. Use of a program of acclimatization and training for work in hot environments are advisable. The signs and symptoms of heat fatigue include impaired performance of skilled sensorimotor, high-concentration, or high-vigilance activities. The sole treatment available for heat fatigue is to remove heat stress and increase fluid replacement before a more serious heat-related condition develops.

Biological Hazards

Rodents, poisonous insects, snakes, other animals and/or plants are a natural part of any ecosystem. They are sometimes difficult to eliminate or avoid on some sites because of the location. Employees should be aware of the potential for encountering these types of animals and plants. Where possible, nesting places should be removed or access to them should be limited. If several infestations occur, remedies should be discussed with a supervisor and the client (see **SCS IIPP, SOP-21**, for precautions and treatment for biological hazards). The following could be encountered in performance of the operation, maintenance, and monitoring functions of a project:

Hantavirus: Infection typically occurs by the inhalation of tiny airborne droplets of fresh or dried rodent excretions. Transmission to humans may also occur through direct contact with rodents or rodent-contaminated materials, and ingestion of contaminated food or water is also a possible route of transmission. Sweeping or "shaking out" rodent-contaminated materials should be avoided unless performed using respiratory protection. The early symptoms of hantavirus disease are flu-like (fever, chills, muscle aches). For a very short period of time, the infected person starts to feel better. Then, within 1 to 2 days, he or she may develop shortness of breath. The disease gets worse quickly and leads to respiratory failure, a condition known as Hantavirus Pulmonary Syndrome (HPS). About half of all HPS patients experience these symptoms, which usually occur 1 to 5 weeks from contracting the illness.

Bloodborn Pathogens: Human blood can contain harmful viruses such as the Human Immunodeficiency Virus (HIV) and Hepatitis B Virus (HBV). Contact with affected blood, as well as materials contaminated by this blood, can result in transmitting viruses and the life-threatening conditions they cause.

SCS has adopted a Bloodborne Pathogen Exposure Control Plan to protect employees who may come into contact with blood, or materials contaminated with blood, during the performance of

tasks. Although the program is intended to comply with OSHA's Bloodborne Pathogens Standard, 29 CFR 1910.1030, the primary purpose for adopting the plan is to help employees avoid bloodborne pathogens at work.

When an employee is involved in an exposure incident, it must be reported in accordance with the Health and Safety Injury and Illness Prevention Plan. All employees involved in an exposure incident will be offered post-exposure evaluation and follow-up, in accordance with the OSHA standard. Follow-up will include:

- Documentation of the route of exposure and the circumstances related to the incident.
- If possible, identification of the source individual and, if possible, the status of the source individual. The blood of the source individual will be tested (after consent is obtained) for HIV/HBV infectivity.
- Results of testing of the source individual will be made available to the exposed employee, along with applicable laws and regulations concerning disclosure of the identity and infectivity of the source individual.
- The employee will be offered the option of having blood collected for testing of that employee's HIV/HBV serological status. The blood sample will be preserved for at least 90 days to allow the employee to decide if the blood should be tested for HIV serological status. However, if the employee decides, prior to that time, that testing will be conducted, the appropriate action can be taken and the blood sample discarded.
- The employee will be offered post-exposure counseling in accordance with current recommendations of the U.S. Public Health Service.
- The employee will be given appropriate counseling concerning precautions to take during the period after the exposure incident. The employee will also be given information regarding potential illnesses and procedures for reporting related symptoms to appropriate personnel.

Attachment 1 – Job Task Safety Analysis and PPE Assessment Form

JOB TASK SAFETY ANALYSIS AND PPE ASSESSMENT FORM-
JTSA-ES- 16- WASTE SORT

Job Task Safety Analysis Form-01				
Task Type (Check all that Apply)	Solid Waste	**Task Description (include an estimate of task duration in hrs/day)** Five day waste sort, approximately 8 hours per day.		**Location or Project:** Reuter Recycling Facility of Florida, Pembroke Pines **Date Revised:** August 26, 2020 **Project #/Revision #:** 09222033.00
Analysis Team Member	**Position Title**		**Reviewed by**	**Position Title**
Stacey Demers	Project Director			
Brent Dieleman	Project Manager			
Alexis Vento	Staff Professional			
Katherine Hinojosa	Project Professional			
Special Training Required		Bloodborne pathogens training		
Applicable SAFE Checklist(s): Specify type and category number		Environmental Services/Solid Waste Checklist		

This form is the certification that the hazard assessment has been performed for the workplace as required by 29 CFR 1910.132.

Job Task Step	Potential Environmental and Personnel Hazards[1]	Critical Actions	PPE Required
1. Drive to site, set up sorting table and containers.	Heavy lifting Slips/trips/falls Vehicle traffic	• Check in w/facility • Ensure work area is secured/isolated • Use buddy system • Employ safe lifting behaviors • Stretch/warm-up	Head: Hardhat Body: Safety vest, Tyvek Foot: Steel--toe ANSI boots Hand: Nitrile + Leather outer glove Respiratory: None Hearing: None Eye/Face: Safety glasses
2. Collect solid waste samples from the tipping floor area	Heavy lifting Vehicle/HE traffic Slips/trips/falls Medical/bio waste Sharps Chemical exposures	• Use buddy system • Stay visible • Use safe lifting • Set up away from traffic • Give directions to bobcat operator • Avoid Heavy EQ traffic	Head: Hardhat Body: Safety vest, Tyvek Foot: Steel--toe ANSI boots Hand: Nitrile + Puncture Resistant Gloves Respiratory: Dust mask Hearing: Earplugs Eye/Face: Safety glasses
3. Hand-sort solid waste materials on the sorting table. (At the MRF)	Heavy lifting Vehicle/HE traffic Slips/trips/falls Medical/bio waste Sharps Chemical exposures Stress/hygiene concerns	• Use buddy system • Stay visible • Use safe lifting • Set up away from traffic • Brush trash (vs digging) • Wash hands freq. • Stay hydrated • Shift breaks	Head: Hardhat Body: Safety vest, Tyvek Foot: Steel--toe ANSI boots Hand: Nitrile + Puncture Resistant Gloves Respiratory: Dust mask (optional) Hearing: Earplugs (optional) Eye/Face: Safety glasses

Job Task Step	Potential Environmental and Personnel Hazards[1]	Critical Actions	PPE Required
4. Cleanup and Decontaminate	Heavy lifting Slips/trips/falls Vehicle traffic	• Ensure work area is secured/isolated • Use buddy system • Employ safe lifting behaviors • Stretch/warm-up • Decontaminate PPE	Head: Hardhat Body: Safety vest, Tyvek Foot: Steel--toe ANSI boots Hand: Nitrile + Leather outer glove Respiratory: Dust mask (optional) Hearing: None Eye/Face: Safety glasses
5. Demo	Vehicle/HE traffic	• Check out w/facility	Head: None Body: High Visibility Vest Foot: Steel--toe ANSI boots Hand: None Respiratory: None Hearing: None Eye/Face: None
End of JTSA Form			

Appendix B
Field Procedures

Waste Composition Study Field Procedures and Report Summary

Broward County, Florida
Solid Waste and Recycling Services
1 N. University Drive, Suite 400
Plantation, FL 33324

SCS ENGINEERS

09222033.00 | November 29, 2022

10752 Deerwood Park Blvd. Ste. 100
Jacksonville, FL 32256
904-431-6900

Table of Contents

Section Page

1 INTRODUCTION

PURPOSE

The purpose of this document is to provide Broward County with a reference guide detailing the characterization and sorting procedures to be used during the four-season waste composition study that also includes a two-season recycling composition study. This document will serve as a technical reference during the field activities and support the project's subsequent data analysis.

STAFFING AND RESPONSIBILITIES

Two SCS professionals will be onsite in the field and will be responsible for adherence to the established procedures and protocols described in this document. This includes the SCS Field Supervisor and Assistant Field Supervisor. Each of these individuals will understand the County's goals and objectives for this study as well as the project's scope and requirements. SCS field staff have the authority to make project level decisions regarding procedural changes and execution as needed during changing field conditions and both individuals are empowered to stop work if unsafe conditions exist. The SCS Field Supervisor has the following primary responsibilities:

- Training SCS staff and subcontractors in field activities.
- Requiring health and safety procedures be followed and required personal protective equipment (PPE) is available and worn by field staff in accordance with the Site-Specific Health and Safety Plan.
- Confirming established waste screening and sorting procedures are available and properly implemented by SCS and subcontractor personnel.
- Identifying and correcting procedures or processes that may compromise the integrity of the data.
- Communicating daily with the SCS Project Manager.

The Assistant SCS Field Supervisor will support the SCS Field Supervisor in enforcing and executing the responsibilities described above.

2 FIELD PROCEDURES

This section describes the field procedures for characterizing municipal solid waste (MSW), source-separated recyclables, construction and demolition (C&D) materials and bulky waste.

MUNICIPAL SOLID WASTE (MSW)

MSW includes waste materials destined for landfill or waste-to-energy (WTE) disposal. SCS follows American Society of Testing and Measurement (ASTM) Method Number D5231-92(2016), "Standard Test Method for Determination of the Composition of Unprocessed Municipal Solid Waste" for acquiring representative waste samples and manually sorting the waste samples into material types.

Most MSW generated in Broward County is disposed through the Wheelabrator South Broward Waste-to-Energy facility (owned and operated by WIN Waste Innovations) and the North Broward Transfer Station (owned by Waste Management, Inc. and operated by WIN Waste Innovations). Representatives at WIN Waste Innovations allowed the County to conduct the waste sampling and sorting at the North Broward Transfer Station.

Waste Load Screening

Vehicles entering the solid waste disposal facility will be screened to assess whether the materials on the truck should be sampled as part of the study. SCS staff will work with facility operators to establish a procedure where SCS staff can record information about the targeted waste loads such as hauler name, origin/location of the materials, and generating sector(s) of the materials. If the vehicle driver indicates the material is mixed from multiple generators (i.e. residential and commercial waste mixed together) or SCS staff otherwise believe the materials are not representative, the wasteload will not be sampled. Information obtained from the driver will be compared to the sampling plan to confirm whether the load is part of the project's sampling plan. SCS may request scalehouse data for each day of field activities to have an idea of how much and what locations and generating sectors of materials may be arriving at the facility each day.

Based on the driver interview, if SCS staff determine the materials could be included as part of the study, the driver will be directed to a pre-arranged area of the facility for load discharge. Once the driver has dumped the waste in the designated area, SCS staff will visually inspect the waste pile by walking around it and note unusual characteristics. At SCS staff's discretion, the waste sample may be discarded and another one obtained if the material is not deemed representative for sampling. However, if the material appears to be acceptable and representative, SCS staff will record details of the sample and where it originated on the waste sample data form and may take a photo of the material.

Waste loads will be targeted throughout each sample day so that a variety of sectors (residential and commercial) and originating communities are sampled. Due to limited space available to stage waste samples for hand-sorting, waste loads will be targeted for sampling as space becomes available to store the sample until the sorting crew is ready to hand-sort the sample.

Sample Acquisition

Once a waste load has been selected for sampling, SCS staff will visually separate the pile into six subsections and use a random number generator to select which section of the pile the sample is obtained. SCS staff will direct a heavy equipment operator (to be provided by the host facility) to

scoop up a waste sample from the designed section. In general, a loader with a one cubic yard bucket/scoop is sufficient. SCS staff will place each sample in containers and weigh the materials until approximately 220 pounds has been obtained. This protocol aligns with the ASTM standard for the characterization of unprocessed municipal solid waste.

Sample Sorting

Sorting of waste samples will be led by an experienced Sorting Manager with the support of a six person sort crew. Fundamental to this task is a consistent, methodical, statistically-valid sorting program that will be repeated for each waste sample. The Sorting Manager will oversee the entire sorting process and will be actively conducting quality control measures to make sure materials are sorted and weighed properly. Each member of the sort crew will be assigned a select material group(s) for sorting (i.e. paper categories, plastic categories, etc.). This improves the efficiency and accuracy of the sorting process because sort staff specialize and become experts in sorting the materials they are assigned. The basic procedures and objectives for sorting will be identical for each sample as described in the systematic approach below.

Step #	MSW Sorting Activity
1	Material sample is transferred from containers to sort table; large or heavy items, such as cardboard, wood panels, or bulky waste are examined and placed directly into the appropriate container for subsequent weighing.
2	Plastic bags containing materials are opened and the contents are manually separated according to the material category list and placed in the appropriate container; this process continues until the sample has been characterized down to a particle size of 2-inches or less; the SCS Sorting Manager will oversee operations and provide continual quality control of the sorted material categories.
3	Containers with the sorted materials will be individually weighed by the SCS Sorting Manager who will also perform additional quality control measures to confirm the purity of each sorted material category; tare weights of the empty containers and containers with the materials will be recorded on each sample data sheet, which is unique for every sample; measurements will be made to the nearest tenth of a pound.
4	Small waste items (2-inches or less) will be swept off the sort table in a separate container for weighing. These small items are considered “fines.”
5	Upon completion of weighing all sorted materials, materials will be deposited in specified containers (or location) for recycling or disposal. Each host facility will be responsible for disposal or recycling of materials.

Waste samples are maintained in as-disposed conditions. Proper site layout and close supervision of sampling avoids the need to handle waste samples multiple times. Prior to fieldwork, the tare weight

of each container used to hold sorted materials is recorded directly on the container and noted when recording the entire weight of the container and contents.

MSW Material Categories

Table 1 presents the material categories into which the MSW samples will be sorted.

Table 1. MSW Material Categories

Material Category		Examples
Paper	Compostable Paper	Food-contaminated paper towels, napkins
	Newspaper	Daily/weekly newspapers, coated newspaper inserts, newsprint
	Corrugated Cardboard	Packing or shipping boxes
	Office Paper	White or colored printing/copier paper, file folders
	Magazines	Glossy or higher grade paper magazines/catalogs
	Mixed Paper	Envelopes, junk mail, construction paper, wrapping paper
	Aseptic Cartons	Plastic- or wax-coated containers, milk & juice cartons, take-out boxes
Plastics	#1 PET Bottles	Rigid clear or colored bottles for soda, mouthwash, juice, water, etc.
	#2 HDPE Natural Containers	Translucent containers for shampoos, detergents, automobile fluids, milk, juice, syrup, etc.
	#2 HDPE Color Containers	Opaque white or colored bottles for milk, juice, syrups, cleaning products, etc.
	Other Mixed Plastic Containers	Rigid containers/bottles numbered #3, #4, #5, or #7
	Polystyrene	Food packaging (clamshells), cups, packing peanuts, CD cases with #6
	Rigid Plastics	Hard plastic toys, outdoor chairs, large containers
	Shrink Wrap	Film plastic typically used to wrap pallets or bulk items
	Grocery Store Bags	Grocery store bags
	Plastic Films	Thin plastic wrap or food packaging (NO trash bags)
Glass	Glass Containers	Colored or clear glass containers or bottles
Me	Non-Ferrous Metals	Aluminum pans, scraps; brass, copper, or other alloys not containing iron

Material Category		Examples
	Ferrous Metals	Steel and bi-metal scraps such as wire coat hangers, nails, screws, auto parts, and other magnetic items
	Steel Cans	Ferrous food, beverage, and non-hazardous aerosol cans
	Aluminum Cans	Soda and beer cans
Organics	Food Waste	Food scraps, rotten food, meat, fruit, vegetables, etc.
	Other Organic (Wood)	Furniture such as couches, wooden tables or chairs, cabinets, shelves
	Other Uncategorized	Commingled waste/scraps, otherwise not categorized
	Yard Trash	Grass, leaves, brush, sticks and twigs
	Textiles	Clothing, linens, leather, synthetic fibers, blankets, rubber
Bulky/C&D	Concrete	Cinderblocks, concrete chunks/debris
	Brick	Clay or limestone bricks for masonry, walls, pavements
	Rock	Stones, pebbles, slate, gravel
	Gypsum Board/Drywall	Drywall chunks/debris, sheetrock
	Insulation	Mineral wool, fiberglass, natural fiber insulation
	Clean Engineered Wood	Wooden boards, pallets
	Treated Wood	Stained or painted wood
	Rebar	Reinforcing steel bars
	Other Metal	Other metal scraps non-categorized
	Asphalt Roofing	Asphalt shingles
	Asphalt Paving	Broken chunks of asphalt
	Carpet & Carpet Padding	Carpets and rugs, padding & non-slip grips
	Mattresses/Box springs	Mattresses/mattress materials & box springs
	Bulky Waste	Bulky materials that do not fit other categories
	White Goods	Large electrical appliances such as refrigerators, washing machines, microwaves
	PVC Pipe	Thermoplastic resin commonly used for manufacturing sewage pipes, water mains and irrigation
Other	Tires	Automobile, bicycle, wheelbarrow or other tires
	HHW	Compact fluorescent lightbulbs, fluorescent tubes, household cleaners, medical waste
	Special	Household batteries, electronics, latex paint
	Miscellaneous	Not classified above, includes trash bags

SOURCE-SEPARATED RECYCLABLES

Reuter Recycling in Pembroke Pines, owned and operated by Waste Management, Inc., processes most of the recyclable material generated in Broward County. Recyclable materials are direct hauled to the Deerfield Beach Recycling and Transfer facility where they are aggregated and transported via transfer trailer to Reuter Recycling. Recyclable materials from both residential and commercial sources is combined prior to delivery to Reuters Recycling.

Sample Screening

Transfer trailers that deliver materials generated in Broward County and aggregated in Deerfield Beach will be targeted for sampling and sorting activities. If the vehicle driver indicates the material is atypical or SCS staff otherwise believe the materials are not representative, the load will not be sampled.

Once the driver has dumped the load of recyclable materials, SCS staff will visually inspect the waste pile by walking around it and note unusual characteristics. At SCS staff's discretion, the sample may be discarded and another one obtained if the material is not deemed representative for sampling. However, if the material appears to be acceptable and representative, SCS staff will record details of the sample and where it originated on the sample data form and may take a photo of the material.

Sample Acquisition

Once a recycling load has been selected for sampling, SCS staff will visually separate the pile into six subsections and use a random number generator to select which section of the pile the sample is obtained. SCS staff will direct a heavy equipment operator (to be provided by the host facility) to scoop up a waste sample from the designed section. In general, a loader with a one cubic yard bucket/scoop is sufficient. SCS staff will place each sample in containers and weigh the materials until approximately 150 pounds has been obtained.

Sample Sorting

Sorting of recycling samples will be led by an experienced Sorting Manager with the support of a six person sort crew. Fundamental to this task is a consistent, methodical, statistically-valid sorting program that will be repeated for each recycling sample. The Sorting Manager will oversee the entire sorting process and will be actively conducting quality control measures to make sure materials are sorted and weighed properly. Each member of the sort crew will be assigned a select material group(s) for sorting (i.e. paper categories, plastic categories, etc.). This improves the efficiency and accuracy of the sorting process because sort staff specialize and become experts in sorting the materials they are assigned. The basic procedures and objectives for sorting will be identical for each sample as described in the systematic approach below.

Step #	Recycling Sorting Activity
1	Material sample is transferred from holding containers to sort table; large or heavy items, such as cardboard, are examined and placed directly into the appropriate container for subsequent weighing.

Step #	Recycling Sorting Activity
2	Plastic bags containing recyclable materials are opened and the contents are manually separated according to the material category list and placed in the appropriate container; this process continues until the sample has been characterized down to a particle size of 2-inches or less; the SCS Sorting Manager will oversee operations and provide continual quality control of the sorted material categories.
3	Containers with the sorted materials will be individually weighed by the SCS Sorting Manager who will also perform additional quality control measures to confirm the purity of each sorted material category; tare weights of the empty containers and containers with the materials will be recorded on each sample data sheet, which is unique for every sample; measurements will be made to the nearest tenth of a pound.
4	Small waste items (2-inches or less) will be swept off the sort table in a separate container for weighing. These small items are considered "fines."
5	Upon completion of weighing all sorted materials, materials will be deposited in specified containers (or location) for recycling or disposal. Each host facility will be responsible for disposal or recycling of materials.

Recycling samples are maintained in as-disposed conditions. Proper site layout and close supervision of sampling avoids the need to handle waste samples multiple times. Prior to fieldwork, the tare weight of each container used to hold sorted materials is recorded directly on the container and noted when recording the entire weight of the container and contents.

Source-Separated Recyclable Material Categories

Table 2 presents the material categories into which the source-separated recyclable material samples will be sorted.

Table 2. Source-Separated Recyclable Material Categories

Material Category	Examples
Newspaper	Newspapers, coated newspaper inserts, newsprint
Corrugated Cardboard	Packing or shipping boxes
Office Paper	White or colored printing/copier paper, file folders
Magazines	Glossy or higher grade paper magazines/catalogs
Mixed Paper	Envelopes, junk mail, construction paper, wrapping paper
Aseptic Cartons	Plastic- or wax-coated containers, milk & juice cartons
#1 PET Bottles	Rigid clear or colored bottles for soda, mouthwash, juice, water, etc.

Material Category	Examples
#2 HDPE Natural Containers	Translucent containers for shampoos, detergents, milk, juice, syrup, etc.
#2 HDPE Color Containers	Opaque white or colored bottles for milk, juice, syrups, cleaning products, etc.
Other Mixed Plastic Containers	Rigid containers/bottles numbered #3, #4, #5, or #7
Polystyrene	Food packaging (clamshells), cups, packing peanuts, CD cases with #6
Glass Containers	Colored or clear glass containers or bottles
Steel Cans	Ferrous food, beverage, and non-hazardous aerosol cans
Aluminum Cans	Soda and beer cans
Grocery Store Bags	Grocery store bags
Plastic Film	Thin plastic wrap or food packaging (NO trash bags)
Residue	Other non-recyclable contamination

CONSTRUCTION & DEMOLITION (C&D) AND BULKY WASTE

The Broward County Landfill receives a significant amount of C&D and self-haul bulky waste materials from a broad spectrum of municipalities and generating sectors that facilitate a representative characterization process. These materials are not conducive to manual sorting. Obtaining a 220-pound sample of this material (similar to the protocol for waste (MSW) and source-separated recyclable materials) would not be representative due to the size and weight of the material. As a result, C&D and bulky waste loads delivered to the Broward County Landfill will be visually characterized.

Sample Screening

SCS will designate one C&D and bulky waste characterization manager that will select loads to screen and visually characterize. This professional will interview drivers to confirm origins of each sample. Once a selected load is discharged, the SCS professional will walk around the entire pile and make notes on the materials present. Based on volume, the SCS professional will estimate the percent composition of each of the designated material components (from agreed upon material category list for both C&D and bulky waste) in the load and record the data on the sample record. This individual will confirm that the percentages for each sample equal 100 percent. Estimated volumes will be converted to weights using volume-to-weight conversion factors.

Waste Load Characterization

C&D and Bulky Waste loads will be characterized visually using a method that was developed by the California Integrated Waste Management Board. For these samples, the entire load of each sampled vehicle is characterized. Once the selected load is dumped, the visual estimator performs the following steps.

- **Step 1: Measure load volume.** After the driver dumps the load onto the ground, the visual estimator estimates the length, width, and height of the load and records the information on the visual sample form.

- **Step 2: Note which material classes and materials are present.** The visual estimator walks entirely around the load and indicated on the visual sample form which materials and material classes were present in the load.

- **Step 3: Estimate composition by volume for each material class.** Beginning with the largest material class present by volume, the visual estimator then estimates the volumetric percentage of this material class and records it on the form. This process iss repeated for the next most common material class, and so forth, until the volume percentage of every material class had been estimated. The estimator then calculated the total for this step, ensuring that it totaled 100 percent.

- **Step 5: Check and reconcile percentage data.** The visual estimator then verifies the percentage estimates for the material classes added to 100 percent.

C&D and Bulky Waste Material Categories

Table 3 presents the material categories into which the C&D and Bulky Waste vehicle loads will be visually characterized.

Table 3. C&D/Bulky Self-Haul Material Categories

Material Category	Examples
Concrete	Cinderblocks, concrete chunks/debris
Brick	Clay or limestone bricks for masonry, walls, pavements
Rock	Stones, pebbles, slate, gravel
Gypsum Board	Drywall chunks/debris, sheetrock
Insulation	Mineral wool, fiberglass, natural fiber insulation
Clean Engineered Wood	Wooden boards, pallets
Treated Wood	Stained or painted wood
Rebar	Reinforcing steel bars
Other Metal	Other metal scraps non-categorized
Asphalt Roofing	Asphalt shingles
Asphalt Paving	Broken chunks of asphalt
Carpet & Carpet Padding	Carpets and rugs, padding & non-slip grips
Mattresses/box springs	Mattresses/mattress materials and box springs
Furniture	Couches, chairs, dining tables, etc.
Yard Trash	Grass, leaves, brush, sticks and twigs
Food Waste	Food scraps, rotten food, meat, fruit, vegetables, etc.
Other Organic (Wood)	Furniture such as couches, wooden tables or chairs, cabinets, shelves
Bulky Waste	Bulky materials that do not fit other categories

Material Category	Examples
White Goods	Large electrical appliances such as refrigerators, washing machines, microwaves
Non-Ferrous Metals	Aluminum cans, pans, scraps; brass, copper, or other alloys not containing iron
Ferrous Metals	Wire coat hangers, nails, screws, auto parts, and other magnetic items
Textiles	Clothing, linens, leather, synthetic fibers, blankets, rubber
Tires	Automobile, bicycle, wheelbarrow or other tires
HHW	Compact fluorescent lightbulbs, fluorescent tubes, household cleaners, medical waste
Special	Household batteries, electronics, latex paint
Rigid Plastics	Hard plastic toys, outdoor chairs, large containers
PVC Pipe	Thermoplastic resin commonly used for manufacturing sewage pipes, water mains and irrigation
Plastic Film	Thin plastic wrap or food packaging (NO trash bags)
Miscellaneous or Bagged MSW	Commingled waste/scraps, otherwise not categorized

3 PROJECT DURATION AND NUMBER OF SAMPLES

We anticipate field activities for each of four seasonal waste characterization events between Summer 2022 and Spring 2023. Scheduling of field activities should take into consideration normal waste generation conditions to obtain representative samples. The scheduling of field activities should be done when sufficient quantities of waste and recyclable materials are expected to be delivered to the host facility.

SCHEDULE AND NUMBER OF SAMPLES

Table 4 below presents the waste streams to be analyzed by season along with the anticipated number of samples to be characterized.

Table 4. Anticipated Schedule and Number of Samples

Season	Waste Stream (Method of Characterizing Samples)			
	MSW (Manual)	**Recyclables (Manual)**	**C&D (Visual)**	**Bulky Waste (Visual)**
Summer August/September 2022	50 samples (WNB)	20 samples (Reuters)	60 samples (BCL)	--
Fall December 2022	30 samples (WNB)	--	60 Samples (BCL)	20 samples (WNB)
Winter February 2023	50 Samples (WNB)	30 samples (Reuters)	60 samples (BCL)	--
Spring April 2023	20 samples (WNB)	--	60 samples (BCL)	20 samples (WNB)
Total	**150 samples (45 COM 105 RES)**	**50 samples (RES)**	**240 samples (COM)**	**40 samples**

Note:

- WNB is Wheelabrator North Broward Transfer Station
- Reuters is Reuters Recycling Facility
- BCL is Broward County Landfill

SITE AND SCS REQUIREMENTS

SCS will provide the following to complete this study for each of the anticipated four seasons:

- Labor to conduct sorting/characterization activities, which includes a minimum of two experienced SCS professionals and six workers from a temporary labor agency
- Personal protective equipment for all SCS staff and subcontractors (to be identified in the Site Specific Health and Safety Plan)
- Sorting equipment including sorting table, containers, tarpaulins, scales, and other equipment to accurately sort waste and record the data

SCS requires the site operator to provide the location for the sampling and sorting activities. SCS requests the following support from the owner or operator of the facility where field activities will occur.

- A safe work area that is covered and at least 20' x 20' and separated/isolated from facility operations;
- Access to waste/recyclable/C&D materials delivered to the facility for sample selection and sorting;
- Use of bathroom facilities with running water in close proximity to designated sorting location;
- An open-air/outside location or break room where our team can take a break;
- Dedicated equipment operator that can work with the SCS Sampling Manager to obtain samples from discharged loads and transport of the materials to the sorting location;
- Direct contact information for someone located at the facility that can be reached quickly for questions or in case of an emergency.

SCS will manually characterize up to ten samples of waste or source-separated recyclable material per day for each day in the field. Our plan is designed to collect more samples than required for statistical confidence. Hence, if there are some disruptions during fieldwork which prevent 10 samples per day, the results will still be statistically valid.

The number of samples taken from each generating sector for both waste and recyclable materials will be established in the sampling plan. The distribution of samples will be based on material generation quantities from each sector. The specified approach will be to obtain one waste sample per targeted vehicle, although multiple samples from a vehicle may be required due to the frequency of truck traffic and the limited number of days in the field.

4 DATA ANALYSIS

DATA REDUCTION AND ANALYSIS

SCS will complete the following activities upon conclusion of the field activities:

1. Perform all data entry and analysis.
2. Conduct quality control measures to confirm accuracy of data entered.
3. Provide standard statistical analysis to estimate the mean composition (weight and percent), standard error, and confidence intervals at the ninety percent (90%) confidence level for each material stream, category, generating sector, and the County as a whole.

Following field activities, SCS staff will enter data recorded on the data sheets into a customized database and review it for data entry errors. The data entered will be verified for accuracy and adherence to hand-written sampling forms. We will calculate composition estimates using the ratio of the material's weight to the total sample weight.

WASTE COMPOSITION PROFILES

To develop waste characterization and quantity profiles for this study, three main steps will be taken as follows:

1. Convert volumetric estimates of materials to weight for the visually characterized C&D and Bulky Waste samples.
2. Calculate the estimated composition of each sample based on the sample weight.
3. Combine the results for individual streams (MSW, recycling, C&D, Bulky Waste) to produce a waste composition profile for each.

Converting Volumes to Weights

The composition calculations rely on the availability of individual material weights for each sample. SCS will convert volume estimates to weights using accepted waste density conversion factors using the following formula:

$$c = m \text{ x } v \text{ x } d$$

where:

c = the total weight of the specific material in the sample
m = percentage estimate of the material
v = total volume of the sample (in cubic yards)
d = density conversion of the material (in pounds/cubic yard)

Composition Calculations

Within each sample, the composition estimates represent the **ratio of the material's weight to the total sample weight**. For each material type, the individual sample percentages for that material are averaged.

Once data are entered, the composition of each waste sample will be calculated. The waste composition calculations represent the ratio of the components' weight to the total sample weight for each material component sorted.

Composition estimates are derived by summing each component's weight across all of the relevant samples and dividing by the sum of the total weight of waste, as shown in the following equation:

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

where:

- r = the ratio of the material component weight to the total weight of the waste samples
- c = weight of particular material component
- w = sum of all component weights for i = 1 to n, where n = number of selected samples and j = 1 to m, where m = number of material components

The confidence interval for this estimate is derived in two steps. First, the variance around the estimate was calculated, accounting for the fact that the ratio included two random variables (the component and total sample weights). The variance of the ratio estimator equation follows:

$$Var_{r_j} = \left(\frac{1}{n}\right) \cdot \left(\frac{1}{\overline{w}^2}\right) \cdot \left(\frac{\sum_i \left(c_{ij} - r_j w_i\right)^2}{n-1}\right)$$

where:

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

(Note: the standard deviation is the square root of the variance term.)

Second, confidence intervals at the 90% confidence level are calculated for a component's mean as follows:

$$r_j \pm \left(t \cdot \sqrt{Var_{r_j}}\right)$$

where:

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

SCS will prepare material characterization profiles for the County based on the data obtained. The profiles will be organized as follows:

1) Material Stream (i.e. MSW, recyclable materials, bulky, and C&D) – SCS will develop sector-specific waste characterization profiles for each material stream designated by the County. This will be done by aggregating the waste composition data from each sample within that stream.
2) Generating Sector (residential and commercial) – For the material streams where specific samples of residential and commercial materials are sampled and sorted, SCS will prepare separate material profiles for both residential and commercial.

5 FINAL REPORT

SCS will prepare and submit the final project report that includes the study's data and results. The final report will consist of information obtained during field activities and analysis of the data and results. The major sections of the final report will include:

- Executive Summary
- Background
- Methods
- Results
- Conclusion
- Appendices (including sampling plans, site specific health and safety plans, etc.)

SCS can modify the major sections of the final report based on the requirements of the County. Study results will be presented in the following ways:

- Circle graphs indicating the proportion of waste for each major material category
- Circle graphs that show the proportion of each individual material type
- Detailed composition tables that present the estimated proportion of each material type present in each material stream and the confidence interval surrounding each estimate

SCS will submit draft report to the County for review and comment. We will update the report and submit the final version that incorporates the County's comments.

Appendix
Field Data Forms

MSW Sampling/Sorting Form

SCS ENGINEERS

BROWARD COUNTY SOLID WASTE COMPOSITION STUDY

SAMPLE INFORMATION:	RANDOM SEGMENT:	# OF CANS:
SAMPLE NUMBER:	PHOTO	

VEHICLE INFORMATION: DATE/TIME:

HAULER_____ TRUCK #_____ TRUCK TYPE_____COLLECTION LOCATION _____

SORT DATA			
PAPER			
Compostable Paper		Magazines	
Newspaper		Mixed Paper	
Corrugated Cardboard		Aseptic Containers	
Office Paper			
PLASTIC			
#1 PET Bottles		Rigid Plastics	
#2 HDPE Natural Containers		Shrink Wrap	
#2 HDPE Color Containers		Grocery Store Bags	
Other Mixed Plastic Containers		Plastic Films	
Polystyrene			
METALS/GLASS			
Non-Ferrous Metals		Aluminum Cans	
Ferrous Metals		Glass	
Steel Cans			
ORGANIC MATERIALS			
Food Waste		Yard Trash	
Other Organic (Wood)		Textiles	
Other Uncategorized			
BULKY/C&D			
Concrete		Other Metal	
Brick		Asphalt Roofing	
Rock		Asphalt Paving	
Gypsum Board/Drywall		Carpet & Carpet Padding	
Insulation		Mattress/Box Springs	
Clean Engineered Wood		Bulky Waste	
Treated Wood		White Goods	
Rebar		PVC Pipe	
OTHER WASTE			
Tires			
HHW			
Special Waste			
Miscellaneous			

COMMENTS/OBSERVATIONS:

Recycling Sampling/Sorting Form

SCS ENGINEERS

BROWARD COUNTY SOLID WASTE COMPOSITION STUDY - 2022

SAMPLE INFORMATION:	RANDOM SEGMENT:	# OF CANS:
SAMPLE NUMBER:	PHOTO	

VEHICLE INFORMATION: DATE/TIME:

HAULER_____ TRUCK #_____ TRUCK TYPE_____COLLECTION LOCATION _____

SORT DATA	
PAPER	
Newspaper	
Corrugated Cardboard	
Office Paper	
Magazines	
Mixed Paper	
Aseptic Containers	
PLASTIC	
#1 PET Bottles	
#2 HDPE Natural Containers	
#2 HDPE Color Containers	
Other Mixed Plastic Containers	
Polystyrene	
Grocery Store Bags	
Plastic Films	
METALS/GLASS	
Glass Containers	
Steel Cans	
Aluminum Cans	
OTHER WASTE	
Residue	

COMMENTS/OBSERVATIONS:

C&D Visual Characterization Form

SCS ENGINEERS

BROWARD COUNTY CONSTRUCTION/DEMOLITION (CDD) COMPOSITION STUDY

SAMPLE INFORMATION:

SAMPLE NUMBER: PHOTO

VEHICLE INFORMATION: DATE/TIME:

HAULER_____ TRUCK #_____ TRUCK TYPE_____COLLECTION LOCATION _____

SORT DATA

General	Concrete	
	Brick	
	Rock	
	Gypsum Board	
	Insulation	
	Asphalt Roofing	
	Asphalt Paving	
Plastic	Rigid Plastics	
	PVC Pipe	
	Plastic Film	
Wood	Clean Engineered Wood	
	Treated Wood	
	Other Wood	
Metal	White Goods	
	Non-Ferrous Metals	
	Ferrous Metals	
	Rebar	
	Other Metal	
Textiles	Textiles	
	Carpet & Carpet Padding	
	Mattresses/Box Springs	
	Furniture	
Organic	Yard Trash	
	Food Waste	
Special	Tires	
	HHW	
	Special Waste	
Other	Corrogated Cardboard	
	Bulky Waste	
	Miscellaneous/Bagged MSW	

COMMENTS/OBSERVATIONS: