SIMS Municipal Recycling of New York
New York City Department of Sanitation

2017 Waste Characterization Study
Field Procedures Manual

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TABLE OF CONTENTS

List of Appendices

List of Figures

List of Tables

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EXECUTIVE SUMMARY

ES 1. INTRODUCTION

The New York City Department of Sanitation (DSNY) and Sims Municipal Recycling of New York (SMRNY) conducted comprehensive Waste Characterization Study (WCS) in 2017. The 2017 WCS updated prior studies conducted in 2013 and 2005, and closely followed the 2013 WCS methodology to assure highly comparable results. The 2017 WCS also incorporated an analysis of residential curbside Organics, which have been added since the 2013 WCS, as well as School Wastes and Refuse from representative New York City Housing Authority (NYCHA) properties.

The 2017 Waste Characterization Study specifically sought to meet the following objectives:

- Update the characterization of MGP for use in updating the composition table used to calculate the value of MGP as specified in the processing contract between SMRNY and DSNY;
- Assess changes in the composition of designated MGP Recycling, designated Paper Recycling, and Refuse;
- Baseline the residential curbside Organics composition;
- Baseline the composition of refuse generated at NYCHA properties;
- Baseline the composition of Refuse, MGP, and Paper generated at the City's schools;
- Quantify the composition of Plastics discards by resin and product type (comparable to the 2013 Study); and
- Quantify the number of expanded polystyrene (EPS) clamshells and retail bags (both paper and plastic) in the waste stream.

This report describes the planning and implementation of the 2017 WCS.

ES 2. SAMPLING PLAN

Overview: The 2017 WCS separately analyzed Refuse, MGP, Paper, and Organics and was conducted over three seasonal data collection events in April, July and September 2017. Results were generated for each of the three streams individually, as well as for the aggregate of the three streams, which represented all Waste collected curbside by DSNY. Table ES-1 summarizes the sampling targets for the entire study.

Table ES-1 Sampling Plan

Source	Material				
	Refuse	MGP	Paper	Organics	Total
Residential Curbside	247	168	124	45	584
NYC Schools	40	30	20	0	90
NYCHA	40	0	0	0	40
Total	**327**	**198**	**144**	**45**	**714**

Consequently, Table ES-2 summarizes the distribution of samples obtained by borough and by material stream, including contingency samples. Sampling targets were met for the 2017 WCS. Seasonal distribution of samples mirrored the 2013 WCS.

Table ES-2 2017 WCS Sample Summary by Borough and Stream

	Bronx Samples	Brooklyn Samples	Manhattan Samples	Queens Samples	Staten Island Samples	Total Samples
Residential MGP	37	38	37	38	37	**187**
Residential Paper	25	35	27	34	27	**148**
Residential Organics	11	29	0	27	12	**79**
Residential Refuse	44	65	42	54	41	**246**
School MGP	11	12	0	9	0	**32**
School Paper	7	9	0	4	0	**20**
School Refuse	14	17	0	13	0	**44**
NYCHA Refuse	16	16	18	4	0	**54**
Total	**165**	**221**	**124**	**183**	**117**	**810**

Random Sampling and Sample Distribution: Samples were randomly selected from the universe of routes operated by DSNY at any given time. Samples were distributed across boroughs, districts, and sections in conformance with the DSNY route management system and were also distributed across the six days of the week on which DSNY provides collection services. In the case of Refuse, which is collected more than once per week in many areas of the City, the sampling plan also allowed for appropriate allocation of samples on the first collection day of the week, which is known to be relatively heavier, and for the remaining collection days per week.

Sample Weights: Throughout the 2017 WCS, sample weight was targeted at 100 lbs. for MGP, 100 lbs. for Paper, 100 lbs. for Organics, and 200 lbs. for Refuse. This weight target is consistent with both industry literature and also with prior WCS's performed by DSNY.

Material Categories and Subsorts: The list of material categories used in the 2017 WCS was intended to be consistent with prior WCS performed by DSNY. For summary reporting purposes throughout this report, 70 primary material categories are defined, and are split into nine material groups (Paper, Plastic, Organics, etc.). The 2017 WCS also included comprehensive subsorting plastics by resin, as well as subsorts of several special items identified by DSNY.

As a result of the primary sorting and subsorting for the 2017 WCS, 279 unique material categories were mathematically possible during this study.

Sampling Sites: DSNY currently delivers Wastes to 18 different acceptance facilities across the five boroughs and in New Jersey. Table ES-3 summarizes the facilities that hosted sampling for all seasons of the 2017 WCS by material stream type.

Table ES-3 Number of Host Facilities Sampled by Location and Material Stream

	BX	BK	MN	QN	SI	NJ
Paper	1	1	0	0	1	0
MGP	1	1	0	0	0	0
Refuse	2	0	0	1	1	1
Organics	1	0	0	1	1	0
Total	**5**	**2**	**0**	**2**	**3**	**1**

Sorting Location: DSNY made available the Plant 2 Building on its Fresh Kills Landfill on Staten Island, accessible through the West Service Road entrance, for use as the sort location. All samples were transported from the host acceptance facilities to this location to undergo the sorting protocol.

ES 3. SAMPLING LOGISTICS

Obtaining samples of Refuse, MGP, Paper and Organics required extensive coordination with DSNY and each host facility throughout the study. Randomly selected routes were provided to DSNY in advance of the study. DSNY personnel were responsible for deploying each randomly selected load to one of the participating host facilities during the overnight shift. DSNY drivers were informed of the need to communicate with the Sample Managers upon arrival at the host facility to assure samples were obtained.

Each night of the study, Sample Managers were deployed to each host facility to obtain samples from the randomly selected loads, load the samples into carts for overnight storage and transportation, and deliver the samples to the sort location. As targeted loads arrived, the driver was interviewed to confirm contents of the load, and the vehicle was directed to tip the full load in the designated location. From the tipped load, the Sampling Manager directed a loader operator (provided by each host facility) to take a scoop of material (Refuse, MGP, Paper or Organics) from a randomly selected quadrant of the tipped load. Material from the loader bucket was systematically loaded into carts for transport and sorting. To the extent bulky items were contained in a scoop, the Sample Manager recorded the weight of the bulky item and the fraction of the bulky item judged to be within the sample. All data was recorded on sampling field data collection sheets and affixed to the cart (as well as recorded by the Sample Manager).

ES 4. SORT LOGISTICS

Sorting was conducted by a dedicated sorting team comprised of professional supervisory staff, crew chiefs, and sorters. Field supervisors inventoried incoming samples from the prior night against the targeted routes to confirm adherence to the sampling plan. Individual samples were processed by sorting teams assembled to focus on Refuse, MGP or Paper, with appropriate modifications made for each material stream. Each sorting team processed each sample across a sequence of two sorting stations:

- The **Main Sort Table** was where the entire sample was first emptied and sorted into many final categories, with resins and other special items separated for further subsorting.
- The **Subsort Table** received the majority of plastics categories for further breakdown into specific resin codes and product types, and also received drinking cups, paper bags, plastic bags and EPS for further subsorts.

Each Main Sort Table and each Subsort Table was managed by a professional staff member serving as a Crew Chief, and each table had its own scale for weigh-outs. Crew Chiefs were responsible for manually recording weight data for sorted categories, and at the conclusion of the processing of each sample, completed field forms were collected by supervisor staff for scanning and data entry.

ES 5. DATA RECORDING AND ANALYSIS

Each sample was entered into a custom database for quality assurance and analysis. Individual field forms were reviewed for accuracy and logical consistency with material category definitions. Macro queries were applied to test for outliers and miscodes.

The mean composition percentage for each material stream in each borough was calculated from the universe of samples. In addition to the mean composition, confidence intervals were calculated at a 90 percent level of confidence. FY17 waste quantities were used as the basis for developing weighting factors for each material stream and for applying the results of the composition analysis.

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1 INTRODUCTION

1.1 BACKGROUND

1.1.1 PRIOR WASTE COMPOSITION STUDIES

In order to better manage its waste stream, DSNY has intermittently conducted comprehensive analyses of the composition of the DSNY-managed MSW stream. Since 1990, the following waste composition studies (WCS) have been performed.

- **1990 Waste Composition Study (1990 WCS):** In 1990, DSNY carried out its first WCS (1990 WCS), focusing only on Refuse and using Sanitation Districts as the geographical unit of analysis. Results were tabulated by borough and for the City as a whole using weighted averages based on tonnage collected within each Sanitation District. This study also addressed commercial waste.
- **2004 Preliminary Waste Characterization Study (PWCS):** In 2004/05, DSNY conducted a more comprehensive WCS to examine the generation and composition of both Refuse and Recycling from residences/institutions and street baskets (but not from commercial sources). This effort included a preliminary phase, termed the Preliminary Waste Composition Study (PWCS), which relied on 200 Refuse samples, 100 MGP samples, and 100 Paper samples to determine composition by Borough and for the City as a whole. The PWCS served as a proof-of-concept for a comprehensive sampling and sorting methodology that would be used for the complete study to follow.
- **2005 Waste Composition Study (2005 WCS):** Following the PWCS was a large-scale, comprehensive four-season study (referred to in its final reporting simply as the "Waste Characterization Study" or 2005 WCS). The 2005 WCS included stratified sampling and sorting of wastes from nine different zones of the City with mutually exclusive housing density and per capita income characteristics. The 2005 WCS collected 1,609 Refuse samples, 1,300 MGP samples, and 325 Paper samples. The results of these sorts enabled the estimation of seasonal characterizations specific to income and housing density in different zones of the City. These estimates were then extrapolated to provide seasonal and annual characterization data for Districts, Boroughs, and the City as a whole. This was accomplished by weighting each District, Borough, and the City by the population in each income and housing density category.
- **2013 Waste Composition Study (2013 WCS):** The 2013 WCS included sampling and sorting of wastes from random selected routes across all five boroughs, using the 2004 PWCS as a basis for sampling targets and sample distribution. The 2013 WCS collected 256 Refuse samples, 183 MGP samples, and 130 Paper samples. The results of these sorts provided a basis for establishing the value of the City's recyclables processing contracts, and also updated characterization data for all five boroughs and the City as a whole.
- **2017 Waste Composition Study (2017 WCS):** This Field Procedures Manual contains an update to the 2013 WCS, using substantially similar sampling distribution and sorting protocols to assure that the resulting time series provides highly comparable results from study to study. The 2017 WCS included supplementary sampling and sorting of Wastes from Schools, and of Refuse from NYCHA.

All four of these WCS reports have provided detailed and invaluable data about the waste stream managed by DSNY. Of particular interest, the aggregate results of the 2004 PWCS and the 2005 WCS on a Citywide and Borough-wide level were very similar, despite the significantly larger sampling targets in the 2005 WCS. The fact that two separate studies (the PWCS and the 2005 WCS) each using quite different sampling methodologies yielded similar results was important to inform the 2013 study methodology. It strongly suggested that both methodologies were able to accurately characterize the curbside MGP, Paper and Refuse streams by Borough and for the City overall. For this reason, the 2013 study and the current study

closely follow the methodology established in the PWCS instead of the logistically more complicated but statistically equivalent 2005 WCS. However, as a result of the new program, the 2017 Study for the first time included separate sampling and sorting of Organics.

1.1.2 CURRENT PROCESSING CONTRACT

In September 2008, DSNY entered into a contract with Sims Municipal Recycling of New York LLC., (SMRNY) for the acceptance, processing and marketing of Recyclables. At present, SMRNY is responsible for processing all of the MGP and half of the paper collected by DSNY under this contract.

DSNY's contract with SMRNY contains complex provisions that enable revenue sharing between the two parties, as well as insulation of both parties from the effects of market price fluctuations. Invoicing is carried out using a set of formulas that reflect monthly changes in commodity prices and delivered tonnages to SMRNY. Because it is not possible to characterize each delivered load as it comes in, every ton of delivered MGP is assumed, for the purpose of the contract, to have the same material composition. This composition of each ton delivered, presented in the contract's Composition Table, is based on the results of the 2013 WCS.

1.2 REPORT ORGANIZATION

Throughout this report, we refer to this update as the 2017 Waste Characterization Study (2017 WCS) even though the field data collection occurred across the City's 2017 and 2018 fiscal years (in April 2017 and September 2017). Broadly, the 2017 WCS intends to duplicate the 2013 WCS in scope and complexity. Specific details about the 2017 WCS are contained in this Field Procedures Manual.

This Field Procedures Manual will be the only written document for the 2017 WCS. The Field Procedures Manual was intended to record, in detail, all planned and executed operations of the project such that the operational and statistical methods could be readily understood and recreated.

In addition to the description of procedures to carry out the 2017 WCS, the manual includes a description of data recording, entry, coding, quality assurance, and analysis methods used throughout the study; and a detailed description of statistical methodology used in calculating results.

The Manual is organized in the following sections:

- **Section 2 – General Study Design:** This section provides an overview of the 2017 WCS from sampling through field data collection through analysis.
- **Section 3 - Sampling Logistics:** DSNY maintains electronic systems that compile and report in detail on the routes and material quantities collected by DSNY. This section describes how the data extracted from this system was used to representatively sample loads of Refuse, MGP, Organics, and Paper, and also described the sampling process at acceptance facilities receiving City Waste.
- **Section 4 - Sorting Logistics:** Because of the complexity of the composition requirements for this project, a highly detailed and customized sorting protocol was developed. This section describes the sorting logistics in detail.
- **Section 5 - Data Management and Analysis:** Throughout the 2017 WCS, it was critical to properly manage the extensive amount of data collected for this project. This section describes the data management procedures as well as the statistical processes used for analysis.
- **Section 6 – Conclusions:** While it was beyond the scope of this Field Procedures Manual to provide extensive analysis and interpretation of the results of the composition analysis, this section briefly comments on the success of the 2017 WCS in meeting study objectives.
- **Glossary/Acronyms**: A number of terms and acronyms have been compiled in a glossary for constancy. These terms are generally capitalized throughout the report.

- **Appendices:** A great deal of the documentation required for the performance of the 2017 WCS is contained in a library of appendices. Specific appendices are shown in the Table of Contents.

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2 GENERAL STUDY DESIGN

2.1 INTRODUCTION

In general, the 2017 WCS sought to duplicate the methodology of the 2013 WCS. However, a number of refinements were made to address the objectives of the 2017 WCS, and also to expand upon aspects of the 2013 WCS protocol. The sections below itemize critical elements of the 2017 WCS study design. Detailed descriptions of sampling logistics and sorting logistics are contained in subsequent sections.

2.2 STAFFING

The Project Management team for the 2017 WCS included the following roles:

- The **Project Manager** was responsible for the overall performance of the project, before, during and after the field data collection. During field data collection, the Project Manager resided in the New York City metropolitan area and was on-site during project performance.
- The **Assistant Project Manager** assisted the Project Manager in all facets of the project.
- The Project Team's **Data Manager** was responsible for the upload and statistical analysis of sorted samples during the analysis phase of the project.
- The Project Team incorporated a **QA/QC Officer** to provide separate, independent technical input during the planning, execution, and analysis phases of the project.
- The **Safety Manager** was responsible for assisting in the preparation and site set-up for sampling and sorting execution.

2.3 SAMPLE MASS

The 2017 WCS relied on same sample mass targets used in the 2013 WCS of 100 lbs. for MGP, 100 lbs. for Paper, and 200 lbs. for Refuse (whether from curbside collection, NCYHA or Schools). The Project Team's professional experience and industry literature supports these sample masses as being sufficient for the material streams. The target weight for Residential Organics samples was also set at 100 lbs.

2.4 SAMPLING TARGETS

The 2017 WCS included an almost identical number of samples as the 2013 WCS for the repeated streams Residential Refuse (247 samples), Residential MGP (168 samples), and Residential Paper (124 samples). The 2017 study includes four new streams not included in 2013: Residential Organics (45 samples), School MGP (30 samples), School Paper (20 samples), School Refuse (40 samples), and NYCHA Refuse (40 samples).

Residential samples for all streams were allocated to Boroughs using the same methods as 2013, i.e., on a tonnage weighted basis with minimum sampling targets. School samples and NYCHA sampling targets were based on the minimum sample sizes of 40 for Refuse, 30 for MGP and 20 for Paper, with samples allocated across boroughs based on tonnage contribution.

In practice, a significant number of contingency samples were selected over and above the sampling targets. Contingency samples were selected to overcome problems that might arise in capturing the targeted number of samples, and to assure that borough sampling quotas were met.

The following notes apply to the sampling targets:

- There are no Residential Organics sampling targets for Manhattan because collections of organics were limited in Manhattan at the outset of the study (although organics routes were added during the course of the study).
- There are no School MGP or Paper sampling targets for Manhattan and Staten Island because some of the waste streams generated at schools in these boroughs are collected with wastes from other

sectors and it is not possible to capture samples of these streams. Rather, all sampling for Schools was performed in boroughs where School Refuse, School Paper and School MGP are collected in dedicated collection vehicles.

As shown, a total of 810 samples were obtained for the 2017 WCS. Table 2-1 summarizes the final sample distribution, by stream and by borough. In both 2017 and 2013, very few samples were missed, and perhaps future studies should slightly reduce the contingency levels.

Table 2-1 2017 WCS Sample Distribution by Borough and Stream

	Bronx Samples	Brooklyn Samples	Manhattan Samples	Queens Samples	Staten Island Samples	Total Samples
Residential MGP	37	38	37	38	37	**187**
Residential Paper	25	35	27	34	27	**148**
Residential Organics	11	29	0	27	12	**79**
Residential Refuse	44	65	42	54	41	**246**
School MGP	11	12	0	9	0	**32**
School Paper	7	9	0	4	0	**20**
School Refuse	14	17	0	13	0	**44**
NYCHA Refuse	16	16	18	4	0	**54**
Total	**165**	**221**	**124**	**183**	**117**	**810**

2.5 SEASONALITY

The seasonal distribution of samples in the 2017 WCS mirrored the 2013 WCS. Specifically, MGP samples were split evenly between two seasons, while Refuse and Paper samples were collected entirely within one season. Because Organics had not previously been analyzed, and because of known fluctuations in the generation of yards wastes that are targeted in this program, Organics sorting occurred over three seasons (spring, summer and fall). Table 2-2 summarizes the sampling targets by season, including contingencies.

Table 2-2 2017 WCS Sample Distribution by Season and Stream

	Spring Samples (April 19-May 5)	Summer Samples (July 10-15)	Fall Samples (Sept 9-Oct 7)	Total Samples
Residential MGP	106	0	81	187
Residential Paper	148	0	0	148
Residential Organics	21	40	18	79
Residential Refuse	0	0	246	246
School MGP	18	0	14	32
School Paper	20	0	0	20
School Refuse	0	0	44	44
NYCHA Refuse	0	0	54	54
Total	**313**	**40**	**457**	**810**

Appendix A contains the detailed sampling schedule and list of routes sampled for all three seasons.

2.6 ROUTE SELECTION

In the 2017 WCS, the first step in selecting routes for sampling was to identify the number of existing routes that were randomly sampled as part of the 2013 WCS, and to use these routes as a starting point.

DSNY provided a list of all regular Residential and Schools collection routes for Refuse, Organics, Paper and MGP from the DSNY maintained systems. From this list, the extant 2017 WCS routes were identified and then additional routes were chosen.1

The Project Team assigned each route a unique route number composed of the borough, district, section, day, route, and sector. All Monday or Tuesday collections were designated as early week routes. All collections on Thursday, Friday, or Saturday were designated as late week collections. Wednesday routes with a twice per week collection frequency were designated as Early Week while those with three times a week collection was designated as Late Week.
There are almost 9,000 curbside routes that serve the City. Because some 2013 WCS routes no longer exist, and because the current study includes new streams and sectors, some of the current study routes were selected using a random route selection process. The selection process is detailed in the following sections.

2.6.1 RESIDENTIAL REFUSE SAMPLE ALLOCATION AND SELECTION

In a slight change from prior WCS's, the sample target for each borough was not further subdivided into Early Week and Late Week targets. The differentiation of Early Week and Late Week targets for each borough was originally incorporated to reflect that slightly more waste is generated early in the week (after the weekend) and slightly less later in the week. Where past WCSs have allocated samples in proportion to the Early Week and Late Week tonnage collected from each borough, the 2017 WCS allocated samples strictly by number of routes. Table 2-3 summarizes the targets for Refuse by borough. Although not shown, roughly half were from Early Week routes and half from Late Week routes.

Table 2-3 Refuse Targets by Borough

	Total Samples			
Borough	Target	Contin-gency	Total	Newly Selected Samples [1]
Bronx	42	2	44	1
Brooklyn	66	2	68	63
Manhattan	42	2	44	1
Queens	55	2	57	20
Staten Island	42	2	44	0
Total	**247**	**10**	**257**	**85**

[1] Denotes the routes that were selected anew in 2017. All other routes were sampled during both the 2013 and 2017 WCSs.

[1] It was further reported by DSNY that some routes, while still covering the same general service area and using the same route and neighborhood identification number in FY2013, may have a new mix of premises served and/or may have been split (i.e., a new route added) in high development areas.

Table 2-3 also shows the newly selected routes that were sampled in 2017. There were 192 extant 2013 Refuse routes, 172 of which were retained as sample routes in the 2017 WCS. The Project Team randomly selected for sampling 85 routes from the remaining routes.

Routes were randomly selected using the following three steps:

- **Step 1**: All non-2004/2005 PWCS routes were assigned a random number using the =rand () function in Microsoft Excel.
- **Step 2**: Routes were sorted by borough, Early or Late Week collection, and random number.
- **Step 3**: Routes were selected in order from largest random number to smallest random number for each borough until the Early Week and Late Week sampling targets were met.
- **Step 4**: Randomly sampled routes were bundled so that no more than three boroughs were sampled on a given night. In practice, this meant that some randomly sampled routes were passed over if inclusion of such route would trigger collection at a fourth facility.

Appendix A contains a detailed list of the Refuse routes selected.

2.6.2 RESIDENTIAL MGP SAMPLE ALLOCATION AND SELECTION

The 2017 WCS methodology set a sampling target of 193 MGP samples allocated to boroughs as described previously. To ensure that the sampling targets are met the Project Team will selected three additional routes for sampling in each borough as contingencies in the Spring season. Contingency samples collected over and above the sampling target were retained in the analysis (thereby increasing the sample count and reducing the uncertainty of resulting composition data). The total number of samples for each borough, including contingencies, is shown in Table 2-4.

Table 2-4 MGP Targets by Borough

	Total Samples			
Borough	Target	Contin-gency	Total	Newly Selected Samples [1]
Bronx	35	4	39	4
Brooklyn	35	3	38	27
Manhattan	35	3	38	7
Queens	36	3	39	6
Staten Island	36	3	39	13
Total	**177**	**16**	**193**	**57**

[1] Denotes the routes that were selected anew in 2017. All other routes were sampled during both the 2013 and 2017 WCSs.

Table 2-4 also shows the newly selected routes that were sampled in 2017. There are 177 extant 2013 WCS MGP routes, all of which are retained as routes eligible for sampling in the 2017 WCS. Of those 177 routes the project team selected 136 for sampling during the Spring and Fall season plus an additional 57 routes for sampling from the remaining non-2013 WCS routes, distributed as shown in Table 2-4, using the three steps outlined below.

- **Step 1**: All non-2013 WCS routes were assigned a random number using the =rand () function in Microsoft Excel.
- **Step 2**: Routes were sorted by borough and random number.

- **Step 3**: Routes were selected in order from largest random number to smallest random number for each borough until the sampling targets were met.

Appendix A contains a detailed list of the MGP routes selected.

2.6.3 RESIDENTIAL PAPER SAMPLE ALLOCATION AND SELECTION

The 2017 WCS methodology set a single season sampling target of 149 Residential Paper samples allocated to boroughs as described previously. To ensure that the sampling targets were met the Project Team selected two additional routes for sampling in each borough as contingencies. Contingency samples collected over and above the sampling target were retained in the analysis (thereby increasing the sample count and reducing the uncertainty of resulting composition data). The total number of samples for each borough, including contingencies, is shown in Table 2-5.

Table 2-5 Residential Paper Targets by Borough

	Total Samples			
Borough	Target	Contin-gency	Total	Newly Selected Samples [1]
Bronx	22	2	24	9
Brooklyn	33	2	35	18
Manhattan	26	2	28	12
Queens	33	2	35	8
Staten Island	25	2	27	16
Total	**139**	**10**	**149**	**63**

[1] Denotes the routes that were selected anew in 2017. All other routes were sampled during both the 2013 and 2017 WCSs.

Table 2-5 also shows the newly selected Paper routes. There are 127 extant 2013 WCS Paper routes, all of which were retained as routes eligible for sampling in the 2017 WCS. Of those 127 routes the project team selected 86 for the Spring season. The Project Team randomly selected an additional 63 routes for sampling from the remaining non-2013 WCS routes, as shown in Table 2-5, using the same three steps as in the Residential MGP sampling.

Appendix A contains a detailed list of the Paper routes selected.

2.6.4 RESIDENTIAL ORGANICS SAMPLE ALLOCATION AND SELECTION

The 2017 WCS methodology set sampling targets of 15 Residential Organics samples per season, allocated to boroughs as described previously. To ensure that the sampling targets were met the Project Team selected two additional routes for sampling in each borough as contingencies. In addition, the number of summer samples was increased simply because the sampling and sorting team had the capacity to do so. The total number of samples for each borough, including contingencies, is shown in Table 2-6.

Table 2-6 Residential Organics Targets by Borough and Season

Borough	First Season Samples			Second Season Samples			Third Season Samples			Total Samples		
	Target	Contin-gency	Total	Target	Contin-gency	Total	Target	Contain-gency	Total	Target	Contin-gency	Total
Bronx	2	2	4	4	0	4	3	0	3	9	2	11
Brooklyn	5	2	7	9	7	16	6	0	6	20	9	29
Manhattan	0	0	0	0	0	0	0	0	0	0	0	0
Queens	6	2	8	9	6	15	6	0	6	21	8	29
Staten Is.	2	2	4	3	2	5	3	0	3	8	4	12
Total	**15**	**8**	**23**	**25**	**15**	**40**	**18**	**0**	**18**	**58**	**23**	**81**

Residential Organics is a new stream for the 2017 WCS so all routes selected for sampling were randomly selected from the roughly 650 eligible routes[2] using the same three steps as in the Residential MGP selection.

2.6.5 SCHOOL MGP SAMPLE ALLOCATION AND SELECTION

The 2017 WCS methodology set a sampling target of 15 School MGP samples per season allocated to boroughs as described previously. To ensure that the sampling targets were met the Project Team will selected one additional route for sampling in each borough as contingencies. To the extent contingency samples are successfully collected over and above the sampling target, these samples will be retained in the analysis (thereby increasing the sample count and reducing the uncertainty of resulting composition data). The total number of samples for each borough, including contingencies, is shown in Table 2-7.

Table 2-7 School MGP Targets by Borough and Season

Borough	First Season Samples			Second Season Samples			Total Samples		
	Target	Contin-gency	Total	Target	Contin-gency	Total	Target	Contin-gency	Total
Bronx	5	1	6	4	1	5	9	2	11
Brooklyn	6	1	7	5	1	6	11	2	13
Manhattan	0	0	0	0	0	0	0	0	0
Queens	4	1	5	4	1	5	8	2	10
Staten Island	0	0	0	0	0	0	0	0	0
Total	**15**	**3**	**18**	**13**	**3**	**16**	**28**	**6**	**34**

School MGP is a new stream for the 2017 WCS so all routes selected for sampling were randomly selected from the 69 eligible routes[3] using the same three steps as in the Residential MGP selection.

2.6.6 SCHOOL PAPER SAMPLE ALLOCATION AND SELECTION

The 2017 WCS methodology set a Fall season sampling target of 20 School Paper samples allocated to boroughs as described previously. To ensure that the sampling targets were met the Project Team selected

[2] Each season the City transmitted the currently operating Organics routes for use in sampling. In July there were 672 routes, and in September there were 635 routes.

[3] Each season the City transmitted the currently operating School MGP routes for use in sampling. In April there were 34 routes, and in September there were 69 routes

two additional routes for sampling in each borough as contingencies. Contingency samples collected over and above the sampling target were retained in the analysis (thereby increasing the sample count and reducing the uncertainty of resulting composition data). The total number of School Paper samples for each borough, including contingencies, is shown in Table 2-8.

Table 2-8 School Paper Targets by Borough

Borough	Total Samples		
	Target	Contin-gency	Total
Bronx	7	1	8
Brooklyn	9	1	10
Manhattan	0	0	0
Queens	4	1	5
Staten Island	0	0	0
Total	**20**	**3**	**23**

School Paper is a new stream for the 2017 WCS so all routes selected for sampling were randomly selected from the 102 eligible routes using the same three steps as in the Residential MGP selection.

2.6.7 SCHOOL REFUSE SAMPLE ALLOCATION AND SELECTION

The 2017 WCS methodology set a Fall season sampling target of 48 School Refuse samples allocated to boroughs as described previously. To ensure that the sampling targets are met the Project Team selected two additional routes for sampling in each borough as contingencies. Contingency samples collected over and above the sampling target were retained in the analysis (thereby increasing the sample count and reducing the uncertainty of resulting composition data). The total number of School Refuse samples for each borough, including contingencies, is shown in Table 2-9.

Table 2-9 School Refuse Targets by Borough

Borough	Total Samples		
	Target	Contin-gency	Total
Bronx	13	2	15
Brooklyn	15	3	18
Manhattan	0	0	0
Queens	13	2	15
Staten Island	0	0	0
Total	**41**	**7**	**48**

School Refuse is a new stream for the 2017 WCS so all routes selected for sampling were randomly selected from the 73 eligible routes using the same three steps as in the Residential MGP selection.

2.6.8 NYCHA REFUSE SAMPLE ALLOCATION AND SELECTION

The 2017 WCS methodology set a Fall season sampling target of 40 NYCHA Refuse samples selected at random from the universe of NYCHA properties. Unlike curbside collections, which are routed and performed routinely each week, NYCHA Refuse is collected in roll-on/roll-off (RO-RO) containers and may be collected intermittently (as containers fill up). Therefore, it was not possible to sample routes.

Rather, NYCHA properties were sampled based on the tonnage by individual property. DSNY maintains detailed tonnage records for each NYCHA property served. Annualized tonnage by property was used as the basis for selecting properties, with each property given a tonnage-weighted chance to be selected (that is higher tonnage properties were more likely to be selected). The borough in which a NYCHA property is located was not directly considered in the sampling; however, borough representation was obtained indirectly from the sampling method used. A total of 53 NYCHA properties were randomly selected for sampling.

At the request of NYCHA, the 2017 WCS integrated additional sampling and sorting for three properties:

- A site that offers residents a bulky waste crusher, and was samples three times;
- A site that offers a food waste grinder on site and was sampled three times.
- A site that also has a food waste grinder and was sampled three times.

All other NYCHA samples were believed to be from properties receiving nothing more than standard RO-RO service.

2.7 MATERIAL CATEGORIES

The Project Team developed and agreed upon a comprehensive list of material categories for the 2017 WCS, which closely followed the 2013 WCS framework. The sorting requirement for the 2017 WCS includes the same sorting requirements for all three material streams (Refuse, Paper, MGP, Organics) to permit a detailed calculation of the Capture Rate for materials and to aggregate the composition data from any combination of the streams. The primary material categories and subsorts are described below.

2.7.1 PRIMARY MATERIAL CATEGORIES

Table 2-10 below summarizes the final categories used for final reporting purposes. Detailed definitions of the primary material categories are contained in Appendix B.

- Exhibit B-1 contains the definition for the primary material category definitions for the materials used in this 2017 WCS, and as shown in Table 2-10.
- Exhibit B-2 identifies the categories that underwent additional subsorting. These included drinking cups, expanded polystyrene, k-cups, and retail bags.
- Exhibit B-3 itemizes the plastic resins into which all plastic items were sorted.

Table 2-10 Primary Material Categories in the 2017 WCS

Group	Material	Group	Material
Paper	Newspaper Plain OCC/Kraft Paper High Grade Paper Mixed Low-Grade Paper Compostable/Soiled Paper/Waxed OCC/Kraft Other Nonrecyclable Paper	**Organic**	Yard Waste Food Non-C&D Wood Textiles: Non-Clothing Textiles: Clothing Carpet/Upholstery Disposable Diapers & Sanitary Products Animal By-Products Shoes/ Rubber/ Leather Fines Miscellaneous Organics
Beverage Cartons	Beverage Cartons and Aseptic Boxes		
Plastic	#1 PET Bottles #2 HDPE Natural Bottles #2 HDPE Pigmented Bottles Other Plastic Bottles Rigid Plastic Containers/ Packaging #6 Expanded Polystyrene (EPS) Film: Retail Bags & Sleeves Film: Garbage Bags Film: Pouches Film: All Other Film Single-Use Plates, Cups, Cutlery (excluding #6 EPS) Appliances: Plastic Bulk/Rigid Plastic Other Plastics Materials Not Elsewhere Classified	**Electronics**	Audio/Visual Equipment (TV Peripherals - Covered) Audio/Visual Equipment (Non-Covered) Computer Monitors Televisions Other Computer Equipment
		Constr. Debris	Untreated Dimension Lumber, Pallets, Crates Treated/Contaminated/ Composite Wood Other C&D Debris Not Elsewhere Classified
		Misc.	Miscellaneous Inorganics
Glass	Clear Container Glass Green Container Glass Brown Container Glass Other Color Container Glass Mixed Cullet Other Glass	**HHW**	Oil Filters Antifreeze Wet-Cell Batteries Water-Based Adhesives/Glues Latex Paint Oil-Based Paint/Solvent Pesticides/Herbicides/ Rodenticides Dry-Cell Batteries: Fluorescent Tubes/CFLs Mercury-Laden Wastes Compressed Gas Cylinders, Fire Extinguishers Home Medical Products Other Potentially Harmful Wastes
Metal	Aluminum Cans Aluminum Foil/Containers Other Aluminum Other Nonferrous Steel/Tin Food Cans Empty Aerosol Cans Other Ferrous Mixed Metals Appliances: Ferrous Appliances: Nonferrous		

2.7.2 PLASTIC RESIN SUBSORT CATEGORIES

A particularly challenging requirement of the 2017 WCS involved segregating each and every plastic item into its labeled plastic resin code. Plastics were further segregated between rigid plastics, expanded

polystyrene plastics, and film plastics. Every plastic material category underwent the resin subsort. Table 2-11 summarizes the specific plastic resins and resin combinations that were captured in the subsorting.

Table 2-11 Plastic Resin Subsort Categories

	Resin Subsort	Allowable Labeling
1	#1 PET [1]	Labeled
2	#2 HDPE Natural	Labeled
3	#2 HDPE Pigmented	Labeled
4	#3 PVC	Labeled/Unlabeled
5	#4 LDPE/LLDPE	Labeled
6	#5 PP Rigid	Labeled
7	#5 PP Expanded	Labeled/Unlabeled
8	#6 PS Rigid	Labeled/Unlabeled
9	#6 PS Expanded	Labeled/Unlabeled
10	#7 Other	Labeled
11	Polyethylene (PE) Film (HD/LD/LLD)	Labeled/Unlabeled
12	Non-PE Film	Labeled/Unlabeled
13	Compostable	Labeled
14	Other & Unlabeled Resin	Labeled

[1] #1 PET Bottles were further subsorted into three colors: (i) Clear, (ii) Green and (iii) Other

Table 2-12 lists the primary material categories that required subsorting into different resin types.

Table 2-12 Primary Material Categories Requiring Resin Subsort

K-Cups	Appliances: Plastic
Plastic Bottles	Bulk/Rigid Plastic: Crates/Soda Bottle Carriers
Thermoforms	Bulk/Rigid Plastic: Toys/Housewares
Tubs, Cups and Lids	Bulk/Rigid Plastic: Other Durable
Rigid Containers/Packaging	Other Plastics
Single Use Plastic Plates/Cups/Cutlery	

Note: Many primary material categories already isolated the resin and did not need to be further sorted by resin (e.g. #6 EPS).

Resin subsort categories are also included in Appendix B.

2.7.3 OTHER SUBSORT CATEGORIES

The City identified several constituents that required additional subsorting during the 2017 WCS. Table 2-13 lists the 15-total bottle, can and carton subsort categories, and definitions of each are also included in Appendix B.

Table 2-13 Other Subsorts

Constituent	Subsorts
Paper Retail Bags	Kraft Grocery Bags
	Non-food Retail Bags
	Fast Food Bags
	Compostable/Soiled Bags
Paper Cups	Compostable Paper Cups
	Coated/Non-Compostable Paper Cups
Plastic Cups	Single Use Plastic Cups
	Durable Plastic Cups
K-Cups	Predominantly Plastic
	Predominantly Metal
	Predominantly Compostable
Plastic Retails Bags	Grocery/Merchandise Bags
	Produce Bags
	Newspaper/Drycleaner Sleeves
Expanded Polystyrene	Clamshells
	Single Use Cups
	Single Use Plates/Bowls
	Food Packaging
	Non-Food Packaging

2.7.4 TOTAL MATERIAL CATEGORIES

In total, the sorting requirements for this project result in the potential for there to be 229 material categories. In practice, not every combination of primary sort and subsort was found.

2.7.5 CONTAMINATION TESTING

Because of the potential for several constituents in the waste stream to be impacted by City regulatory policies, additional laboratory testing was performed to allow for more detailed calculations of the number of such constituents in the Waste stream.

Specifically, throughout the spring and fall seasons, small samples (from 0.5 to 2 lbs.) of these constituents were collected for laboratory testing. Laboratory tests identified and quantified two types of contamination:

- **Moisture**: liquids that originated from some other constituent or from precipitation during collection, and
- **Particulates**: dirt, grit, broken glass, and other small particles that originated from some other constituent in the waste stream or during collection.

Table 2-14 identifies the constituents and summarizes the number of samples collected and shipped to the lab. A total of 105 moisture and particulate samples were collected during the Spring and Fall seasons.

Table 2-14 Contamination Testing Categories and Targets

Constituent	Refuse	MGP	Paper	Organics	Total
Kraft Paper Bags	7	2	13	0	22
Non-Food Retail Paper Bags	15	0	7	0	22
EPS Clamshells	21	3	2	0	26
Grocery/Merchandise Plastic Bags	17	11	2	5	35
Total	**60**	**16**	**24**	**5**	**105**

2.8 SAMPLING SITES

Although DSNY delivers Refuse, MGP, Paper and Organics to roughly 30 different acceptance facilities across the five boroughs and in New Jersey, only a small fraction of these facilities hosted sampling for the 2017 WCS. Table 2-15 summarizes these facilities.

Table 2-15 Acceptance Facility Locations Receiving DSNY MGP, Paper, Refuse and Organics

	BX	BK	MN	QN	SI	NJ
Paper	1	1	0	0	1	0
MGP	1	1	0	0	0	0
Refuse	2	0	0	1	1	1
Organics	1	0	0	1	1	0
Total	**5**	**2**	**0**	**2**	**3**	**1**

A significant logistical aspect of this project involved determining how to obtain samples from these sites. There are two options for doing so: (1) deploying sample takers to each acceptance facility to obtain samples within the regular DSNY delivery framework, or (2) diverting DSNY collection vehicles to a subset of acceptance facilities under a special arrangement for this project. Ultimately, based on input from SMRNY and DSNY, a subset of acceptance facilities was selected to host sampling and sorting, and selected DSNY collection vehicles were diverted to these acceptance facilities by special arrangement.

2.9 SORTING SITE

Significant space was needed to perform the sorting activity. DSNY made available the Plant 2 Building at Fresh Kills on Staten Island, accessible through the West Service Road entrance, for use as the sort location. Work site layouts are included in Appendix D.

3 SAMPLING LOGISTICS

3.1 INTRODUCTION

This section summarizes the sampling logistics and procedures.

3.2 STAFFING

Sampling of materials will be performed by traveling teams that deploy each evening from the sort location to the acceptance facility. The Sampling Team will consist of three primary roles:

- The **Sampling Supervisor** will be responsible for overall management and training of the members of the sampling team. The Supervisor will be responsible for receiving and validating City-provided load delivery data. The Supervisor will create assignments and deploy personnel and equipment on a daily basis. The Sampling Supervisor will be ultimately responsible for the overall success of the sampling effort.
- **Sampling Managers** will lead the actual sampling on a nightly basis. They will be responsible for driving equipment and other staff to the assigned acceptance facility, coordinating with the acceptance facility management and operations staff, and carrying out the acquisition of samples based on the targeted loads assigned. The Sampling Manager in particular will train and coordinate with loader operators in the proper taking of samples from tipped loads.
- **Sampling Helpers** will support the physical sampling process, including loading of sampled material into the carts for transport back to the sorting location. Sampling Helpers will assist with acceptance facility clean-up to the extent it will be necessary.

It should also be noted that DSNY will deploy a uniformed staff person to each acceptance facility each night of the study to assure cooperation from the acceptance facility and from DSNY equipment operators charged with delivering targeted loads.

3.3 PROVISION OF EQUIPMENT

Sampling teams will require transportation for collecting samples from acceptance facilities, containers for the samples themselves, and a variety of small tools to aid in sample taking. Personal protective equipment (PPE) will also be required at the facilities. Table 3-1 summarizes the vehicles, equipment, and PPE to be used by the Sampling Team.

Table 3-1 Sampling Team Equipment Needs

Work Equipment	Personal Protective Equipment
Box truck to transport staff and samples	Small first aid kit
96 gallon carts to hold samples	Reflective vest
Shovels	Steel toed boots
Three prong rake	Work gloves
Broom	Eye protection
Crowbar	Dust mask
Portable scale (0.05 to 300.0 lb.)	Tyvek suit
Replacement batteries for scale	
Clipboards	
Digital cameras	

It should be noted that all participating acceptance facilities (except for the Staten Island Transfer Station for compost) provided a bobcat, skid steer or loader and an operator to assist in acquiring samples from

tipped loads. The SITS compost area is unstaffed on the 12am-8am shift so the Sample Manager collected samples by hand at this site. Access to restrooms was available at the acceptance facilities.

Also, although Sampling Managers carried digital cameras, the low lighting at host acceptance facilities generally prevented effective use of the cameras for all but a few bulky items, which were recorded when the Sampling Manager had a question about the proper assignment of the bulky item to a category.

3.4 SAMPLING COLLECTION TRAINING

Prior to the beginning of each season the Sample Collection Team spent a day verifying the driving directions, ensuring the collection vehicles have sufficient overhead clearance to reach the sample sites without incident, and reviewing the operation of the sample collection vehicles.[1]

The Sample Collection Team completed one night of training on the first night of the study. The Sampling Supervisor led the entire team of Sampling Managers through the sampling process on the first night. As part of the training the Team:

- Reviewed the sampling procedures to ensure that all staff are familiar with the project-specific processes for collecting samples and establish a consistent collection method to reduce the sources of sampling bias.
- Reviewed the project field forms to ensure the proper documentation of samples and create a chain of custody necessary for resolving any sampling questions.
- Reviewed the material definitions to assist with the proper classification of bulky materials.
- Participated in safety trainings led by the host acceptance facility.
- Collected samples at one of the sampling sites to help establish consistent sampling procedures and to familiarize sampling site staff with the sampling procedures.
- Practiced the bulky weight collection and reporting processes to ensure that bulky weight processing is consistent and that the documentation is complete and accurate. Because bulky items were left at the sampling site, proper documentation by sampling staff was critical to the characterization process.

Many of the Sample Collection Team participated in the 2013 WCS and were able to share lessons learned with new Sample Collection Team members.

3.5 SAMPLING COORDINATION WITH DSNY

Prior to the field data collection, it was necessary to provide the target list of routes and develop a procedure for communicating with DSNY each day of the study to assure targeted routes will be delivered on schedule.

The Project Team supplied the list of randomly selected routes and NYCHA buildings to DSNY in advance of the study each season. DSNY was responsible for scheduling targeted routes to be delivered to the host acceptance facilities each night. The daily list of routes was known as the "Rizzo Sheet," named after the DSNY supervisor responsible for the internal coordination.

Each night, DSNY compiled the specific truck numbers and deployed equipment operators to deliver targeted loads to the acceptance facilities. This data was transmitted via e-mail to the Project Team, as well as to DSNY and SMRNY project managers, on the nightly Rizzo Sheet. The Project Team was responsible for verifying the accuracy of the Rizzo Sheet, recording arrival times, and returning the completed Rizzo Sheet back to DSNY after the last sample is obtained. This process was performed via e-mail. A copy of the blank and completed Rizzo Sheet is included in Appendix C.

[1] The summer season sort focused only on Organics samples and was managed by senior, experienced project team staff. No training was performed in advance of the summer season.

3.6 SAMPLE COLLECTION

All sampling occurred between midnight and 8am, Monday through Saturday. Samples were collected the day after the route was run. Routes run Monday were sampled on Tuesday beginning at midnight. Routes run on Saturday were sampled beginning at midnight on Sunday.

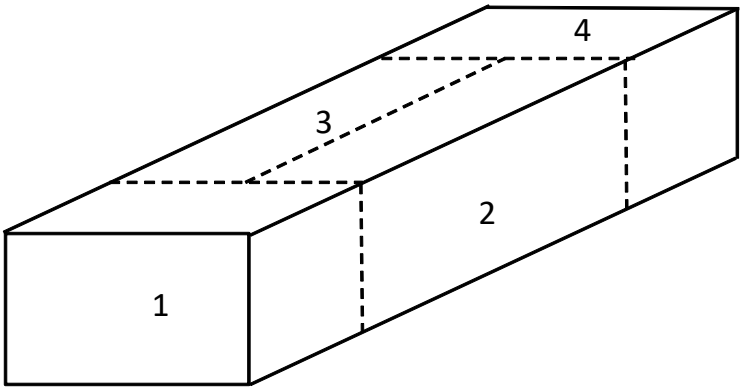
The Sample Collection Team consisted of one consultant Sampling Supervisor, consultant Sampling Managers, temporary labor Sampling Helpers, and DSNY uniformed staff. One consultant Sample Manager, one temporary Laborer, and one DSNY uniformed staff were present at each sampling location each night. The consultant Sampling Supervisor alternated between sites ensuring the consistent application of sampling procedures and troubleshooting issues.

Regardless of sector (Residential, Schools, or NYCHA) the minimum Refuse sample weight was 200 pounds, the minimum MGP, Organics, and Paper sample weight was 100 pounds.

The sample collection procedure for all material streams followed the same basic methodology and is detailed in the following 10 steps. This procedure was repeated each sampling day.

- **Step 1**: DSNY provided the truck numbers for each morning's sampling (Rizzo Sheet) by noon the previous day.
- **Step 2**: DSNY reported any changes to the expected truck numbers by 9pm.
- **Step 3**: The Sampling Team met each evening at 10pm to review and resolve any questions regarding the previous evening's sampling and paperwork as well as to review the upcoming night's work. The team addressed any special circumstances or logistics and reviewed the sampling protocols to ensure consistency across teams. Sampling Managers were given the specific list of targeted loads for their acceptance facility from the Rizzo Sheet.
- **Step 4**: The Sample Collection Teams arrived at their respective acceptance facilities by 11:45 pm.
- **Step 5**: DSNY uniformed staff at each facility verified the expected truck numbers with DSNY central dispatch again and communicated any changes to the Sampling Managers.
- **Step 6**: When a selected vehicle arrived at the acceptance facility, it scaled in normally, and then the DSNY staff directed the vehicle to the area of the tipping floor designated for study vehicles. The selected vehicle tipped its load in the designated area and returned to its garage.
- **Step 7**: The Sampling Manager selected a sample from the tipped load using an imaginary four-cell grid (as shown in Figure 3-1) superimposed over the dumped material. The Sampling Manager directed a facility-provided loader and operator to collect a sample from a randomly selected cell within this grid. If the selected cell was inaccessible then the selected cell number plus one was used (if cell four is inaccessible then cell one will be used).

Figure 3-1 Four Cell Grid Used for Sample Collection



- **Step 8**: The Sampling Manager directed the facility loader operator to collect a scoop of material from the selected cell. Material was raked from the loader bucket into 96-gallon carts until the required sample size was achieved, typically between one and two full carts for Refuse and Organics; between one and three carts for MGP; and one cart for Paper. Material was raked beginning at the left side of the bucket and material was removed in vertical slices from the bucket to ensure that all bagged, unbagged, large, and small items were raked into the carts. The Sample Collection Team targeted 205-225 pounds for Refuse samples, and 105-120 pounds for MGP, Organics, and Paper to ensure that the minimum sample weights are achieved. Each Sample Collection Team will have had a portable scale used to weigh samples as they were collected. The Sampling Manager completed and attached to each cart a Sample Placard with all sample information. An example of the Sample Placard is included in Appendix C. The Sampling Manager also noted information about that sample in the Rizzo Sheet, an example of which is also contained in Appendix C.
- **Step 9**: When bulky items were encountered within a sample, they were set aside and weighed at the sampling facility. The Sampling Manager estimated the fraction of the bulky item contained in the sample and noted the weight of the bulky item (or fraction thereof) along with a description on the Sample Placard and on the daily vehicle selection sheet.
- **Step 10**: Before leaving the sampling facility the Sampling Manager reviewed the Rizzo Sheet for completeness and accuracy. Rizzo Sheets were returned to the Sampling Supervisor at the end of each night. The Sampling Supervisor provided to the Sorting Supervisor the Rizzo Sheet at the end of each sampling shift.

3.7 DETAILED SUMMARY OF SAMPLES

Appendix A contains a detailed summary of the samples that were obtained for this project.

4 SORTING LOGISTICS

4.1 INTRODUCTION

This section summarizes the sorting logistics and procedures.

4.2 STAFFING

Sorting of materials was performed by dedicated teams at the sort location. The Sorting Team consisted of five primary roles:

- The **Sorting Operations Supervisor** was responsible for overall management of the sorting team and sort facility. In this role, the Sorting Operations Supervisor tracked and assigned incoming samples to Crew Chiefs; verified sort team staffing assignments; tracked field data forms; and managed all operating needs of the sorting team and facility. The Sorting Operations Supervisor was ultimately responsible for the overall success of the sorting effort
- The **Safety Manager** was responsible for planning and conducting on-site health and safety training for all sorting personnel and performed work-site safety inspections. The Safety Manager managed the health and safety accident prevention, accident reporting and emergency response plans. At the end of each sort, the Safety Manager reviewed the safety performance.
- The **Sort Training Manager** was responsible development, implementation, and verification of the sorting process required to segregate all materials in the Refuse, Paper and MGP streams to their respective main sort or subsort categories. The Sort Training Manager participated in the sorting site set-up and the development of sorting processes and field forms. The Sort Training Manager led a training day attended by the Project Team professional staff to pilot test the sorting procedures and refine both the procedures and the field data forms.
- The **Main Table Crew Chiefs** were responsible for managing the sorting at the Main Sort Table for MGP, Paper and Refuse. The Main Table Crew Chiefs were responsible for managing a specific sort table, including crew management, sorting productivity and accuracy, data recording, work site health and safety, and cleaning up at the end of the day. The Main Table Crew Chiefs were also responsible for coordinating the handoff of materials from the Main Sort Table to the Subsort Table Crew Chiefs.
- The **Subsort Table Crew Chiefs** were responsible for managing the sorting at a subsort table where all secondary sorting of plastics by resin as well as other intermediate sorts. The Subsort Crew Chiefs were responsible for managing their specific sort table and for helping out on the Main Sort Table if requested. Subsort Crew Chiefs were also asked to assist on the other subsort table if their subsorting was completed and additional resources were needed to keep the entire sorting process on schedule. Subsort Crew Chiefs were professional staff with recycling and waste management experience and worked without the assistance of sorters. They were responsible for sorting productivity and accuracy, data recording, work site health and safety, and cleaning up at the end of the day.
- **Sorters**: The Project Team included one local light-industrial temporary labor company which consistently supplied workers to serve as sort labor, primarily on the Main Sort Table. Sorters were trained and managed to conduct the majority of the sorting of materials on the Main Sort Tables. Sorters also worked in cooperation to weigh out sorted samples, and to maintain a clean work area during and after each day of sorting.

DSNY staff were invited to observe and participate in the sorting process on a regular basis during both seasonal sorts.

4.3 PROVISION OF EQUIPMENT

The Sorting Team required a variety of specialized equipment to manage the sorting operation. Personal protective equipment (PPE) was also required. Table 4-1 summarizes the equipment and PPE used by the Sorting Team.

Table 4-1 Sorting Team Equipment Needs

Work Equipment	Personal Protective Equipment
Pick-up truck to transport supplies	First aid kit
Sort tables	Steel toed boots
20-gallon bins for sorted materials	Work gloves and glove liners
5-gallon buckets for sub-sorting	Eye protection
Shovels	Dust mask (optional)
Brooms	Tyvek suit
Work table and chairs	
Crowbar	
One portable scale (0.05 to 300.0 lbs.) per sort table	
Clipboards	
Digital cameras	
Notebook/laptop/scanner	
Open top container for discarding sorted samples	
Coolers with ice and fresh water	
Fire extinguisher	

The Project Team also supplied men's and women's portable restroom facilities, and a roller sink with fresh water and soap.

The Sorting Team spent one to two days setting up the sort areas at the sort facility prior to each seasonal sort. This time included assembly of sorting and subsorting tables; labeling of bins for sorted materials; charging, configuring, and testing the scales to be used for weigh-outs; acquisition of remaining tools and equipment; and final preparation of the sort facility for sorting.

4.4 SORTING FACILITY CONFIGURATION

During the first season sort, sorting was performed with one MGP sort crew and one Paper sort crew. Occasionally, the crews will break out of their routine material streams to sort an Organics sample, or help the other table to sort a sample, in the case of a backlog. During the second season, sorting was performed with one Organics sort crew. For the third and final season, there were three sort crews, with one focusing on refuse, one on MGP, and on a mix pf Refuse and Organics. Appendix D contains a schematic of the sorting facility that shows the layout of the Main Sort and Subsort tables, discard containers, and carts containing samples for sorting.

4.5 HEALTH & SAFETY

The Project Team included an OSHA-certified, waste characterization experienced health and safety professional to lead the project safety program. On this project, the health and safety program generally conformed with MSW Consultants' official Safety and Health Plan, which is included in Appendix E. Additionally, the Safety Manager prepared and delivered a PowerPoint safety presentation to the entire

Sorting Team on the morning of the first day of sorting each season. This presentation is included in Appendix H.

4.6 SORTING PROCEDURES

It was a requirement for this project to sort all material streams into the same set of material categories and subsort categories. Accordingly, the sorting procedures for all substreams are relatively similar, and this section is written to reflect the generic sorting procedures. Where differences arise between material streams, it is pointed out.

Each sorting crew was responsible for a total of sort tables, each with a particular role and layout:

- The **Main Sort Table** was where the entire sample was first emptied and sorted into many final categories, with plastic bottles, other plastic film, oversized film, paper bags, rigid plastic, bulky rigid plastic, expanded polystyrene, K-cups, plastic appliances, drinking cups separated for further subsorting.
- The **Subsort Table** received all paper and plastic bags, expanded polystyrene packaging, drinking cups, K-cups, and large plastic film, which was then characterized into subcategories. All plastic items were also sorted into their respective resins on the Subsort Table. Further, rigid plastics and plastic bottles were passed through a 2" screen to ascertain the weight of sub-2" particles.
- If a sample had been identified for **Contamination Testing** of one of the targeted constituents (Kraft grocery bag or non-food retail paper bag, expanded polystyrene clamshell, and plastic grocery/merchandise bag), a small sample of the subcategories were packaged, and sent to Intertek Chemicals and Materials lab in Allentown, PA for moisture content analysis.

The Main Sort area received the samples and was used primarily for the separation of the recyclables and sorting of Refuse material categories. The Subsort Tables provided the detailed, specialized sorting required for plastics and other special items.

It should be noted that the Paper sort and the Organics sort generally found only trace amounts of materials requiring subsorting. As a consequence, these amounts were subsorted on one of the other subsort tables.

4.6.1 MAIN SORT TABLE

The Main Sort Table equipment included a 4' x 8' sorting table supported by two steel saw horses and a 4' x 8' wood/hardware cloth (½ inch) to screen out fines. The table was surrounded by an assortment of 20-gallon recycling bins and several 35-gallon wheeled carts for the more voluminous material categories. The 20-gallon and 35-gallon recycling bins were labeled according to the Main Sort Table material categories (as shown in Appendix B, Exhibit C-2). Table 4-2 summarizes the material categories requiring the large recycling bins and/or two bins/carts.

Table 4-2 Material Categories Requiring Large Bins (or a Second Bin)

MGP	Paper	Refuse
Garbage Bags	OCC	Garbage Bags
Plastic Bottles	Newspaper	Rigid Plastics
	High Grade Paper	
	Mixed Low-Grade Paper	

Samples were queued by the Sorting Operations Supervisor at each Main Sort Table. The Crew Chief, assisted by the Sorters, would first lift and empty the 96-gallon sample carts onto the table, a task that required two sorting staff members.

After the initial portion of a sample was deposited on the sort table, the sort team would immediately begin identifying and placing the materials in their respective, labeled containers or passing them along the table to the sorter closest to a given sort container. If materials in the sample were held within a plastic bag, the bag was torn open, its contents unloaded onto the screen, and the bag passed to the end of the table for placement into one of the plastic film sort containers. This sorting process was repeated with sample's second and/or third carts until all identifiable sample materials had been removed from the sample screen and placed into their appropriate sorting containers.

When the sample content atop the screen was reduced to an amalgamation of miscellaneous small pieces (2-inch minus), the Sorting Operations Supervisor would allocate the materials by handfuls to appropriate broad material categories including but not limited to Compostable Paper, Food Waste, Miscellaneous Organics; etc. The portion of the sample that fell through the ½" mesh screen mesh onto the sorting table was characterized as "Fines." The fines were swept from the table with a push broom into the appropriate bin.

At this point, members of the Sort Team typically delivered bins requiring subsorting to the Subsort table for further characterization. All of the remaining sort containers, with contents, were weighed at the Main Sort Table's designated electronic scale, and the weights entered onto a data sheet by the Crew Chief. Sorters were asked to specialize in certain material groups, with someone handling the paper categories, another the plastics, another the glass and metals, and so on. In this way, sorters became highly knowledgeable in a short period of time as to the definitions of individual material categories.

The Crew Chief monitored the bins as each sample was sorted, resorting materials that were improperly classified. Open bins allowed the Crew Chief to see the material at all times. The Crew Chief also verified the purity of each component during the weigh-out (discussed below).

As the data were recorded, the contents of the weighed and recorded sample bins were dumped into the 96-gallon wheeled carts for disposal. When the sample sort was completed and the sorted materials moved outside of the Main Sort area, the sort container array was replicated on the same footprint to help maintain the sorters' familiarity with the location of separate sorting bins and carts.

4.6.2 SUBSORT TABLE

The Subsort characterized plastic bottles, rigid plastic, bulky rigid plastic, plastic appliances, expanded polystyrene, paper bags, K-cups, drinking cups, plastic film, and oversized plastic film, which were pre-sorted at the Main Sort Table by material and type. One to two professional staff conducted the subsort. The subsort began with the delivery of all material categories labeled for subsort indicated by an "S" on the sorting container label, from the Main Sort area, shown in Section 2, Table 2-11.

Materials in the subsort containers were deposited onto the sort table then separated into a combination of 5-gallon plastic buckets or 20-gallon recycling bins depending on material volume. Additional sorting was performed according to the colors of plastic, resin types, and purpose of the bags in the sample. The sorting buckets and bins were weighed at the Subsort Table scale and the weights recorded onto the data sheet. After the materials were weighed, the contents of the sorting buckets and bins were deposited into one or more 96-gallon wheeled carts for disposal. This weigh-out process was repeated for the all of the materials categories and product types.

The 2017 sorts will follow the same routines developed and perfected during the 2013 sorts. The following provides some sorting details by material category:

- Plastic bottles, jugs, and oversized film will be typically sorted first due to their volume. HDPE plastics will be divided into natural and colored fractions, and then further sorted into 13 possible product types.

- PET plastic containers will be separated into clear/green/other colored fractions. "Other" color PET is expected to be predominantly blue (including light blue tints), although will also include amber, orange, yellow, red, painted, and opaque.
- In 2017, the sorting of plastic bottles other than #1 PET and #2 HDPE was the most challenging. Considerable scrutiny was required to identify whether the items were marked with resin codes #3 PVC, #4 LDPE, #5 PP, #6 PS or #7 Other, Dual labeled, labeled as BioPlastic, or unlabeled and we expect the same to hold true in future studies. Containers coded #1 PET and #2 HDPE were occasionally found in the sorting bin and were weighed and assigned to their proper resin.
- At times, there were instances of materials that came from the Main Sort Table that were not in the right material category. The subsort staff made notes on the field forms of their corrections to be later included by the Data Entry Clerk during data entry. This acted as the last line of defense for any mischaracterization of materials.

4.6.3 CONTAINER UNIT COUNTS

Although not a requirement for every sample, a number of ad hoc unit counts will be performed during the beverage container subsort to compile estimated weights per container for the range of material types. After each material weigh-out, the number of items making up the weight of the material will be counted and recorded on a separate data sheet. Broken glass containers will not be included in the unit count.

Although not in the sort plan, an effort will be undertaken to establish the weight of a fixed number of containers for a given material. For example, 100 assorted 12 oz. PET water bottles will be accumulated and weighed to determine that the 100 water bottles weighed 3.4 pounds.

4.6.4 SORTING PROCEDURES SCHEMATICS

Appendix G contains a set of schematics illustrating the detailed breakdown of sort categories at the Main, Intermediate, and Resin Subsort Tables. Appendix G contains the following schematics:

- **Main Sort Table Procedures**: Describes the materials that will be sorted entirely at the Main Table, and distinguishes the categories that will be passed on to Subsort Tables for further sorting. The Main Tables will have substantially the same procedures for Refuse, MGP, Organics and Paper. However, a second schematic is shown for the Paper Main Table to reflect the slightly less complicated requirements of the Paper sorting, as well as the Refuse sorting is the only stream type that requires a ½ inch screen to sift out any fine material.
- **Intermediate Procedures**: Shows the same process for further segregating paper bags, expanded polystyrene, plastic film, K-cups, and drinking cups in to numerous product types. Similarly, all paper bags, expanded polystyrene, plastic film, K-cups, and drinking cups will be sent to the Subsort Table for the MGP and Paper samples; this is shown in a separate exhibit.
- **Resin Procedures**: Details the systematic process required to characterize the plastic resin types of categories derived from the main table such as, plastic bottles, K-cups, plastic appliances, bulky rigid plastic, rigid plastic, and plastic drinking cups.

4.6.5 MOISTURE SAMPLING AND TESTING

Moisture and particulate samples were collected from randomly-selected hand-sort samples. From the selected refuse, MGP, Paper, or Organics sample, a discrete sample was collected of one of four constituents: Kraft paper bags, non-food retail paper bags, EPS clamshells, and grocery/merchandise plastic bags.

Collection of the moisture and particulate sample was coordinated with the Crew Chief after the weigh-out phase was completed, when all sorting category weights had been recorded at the main and subsort/intermediate tables. The intermediate/subsort manager was informed of the targeted material for sample collection. Upon completing the subsort phase of the manual sorting process, the sample was

collected. Each individual bag or clamshell was counted and weighed before being double-bagged in airtight plastic bags and placed on ice. A maximum sample size was understood to be "football" size. In situations where no constituents were present in a particular hand-sort sample, arrangements were made to collect the constituent from the next manual sample, preferably from the same waste stream.

The moisture and particulate samples were shipped to Woods End Laboratories in Mt. Vernon, Maine under chain-of-custody protocol. Each sample was analyzed for percent gravimetric moisture and contamination (grainy fines, dirt and other material).

4.7 DELIVERY OF FIELD FORMS

As mentioned above, sort field forms will be filled in by hand during the weigh-out. The Sorting Operations Supervisor will spend considerable time traversing the sorting areas to collect completed field forms for review, scanning, and data entry. Each field form will be confirmed to have the correct sample identification number, and all three field forms (Main, Intermediate, and Resin) will be stapled together along with the Sample Placard and placed in the portable office for safekeeping and processing.

Appendix H contains the final sorting field forms.

5 DATA MANAGEMENT AND ANALYSIS

5.1 INTRODUCTION

Like all waste characterization studies, the 2017 WCS required the use and management of a large number of complicated field data collection forms which required careful design and management. Hard copy forms, rather than electronic/digital data recording, were used for the project because manually filled forms better handle the complexity of the sorting requirements for individual samples, and also because the tracking and management of these forms can be closely controlled.

This section describes the overall data management practices employed on the project, and also summarizes the statistical methods to be used for the analysis.

5.2 STAFFING

Data entry, management and analysis was performed by a dedicated team performing the following roles:

- The **Data Manager** was responsible for the development of the project database and for developing the statistical and other queries needed to quality-control and analyze the data. The Data Manager worked closely with the Data Entry Architect in this process.
- The **Field Forms and Data Entry Architect** developed the field forms based on final material categories identified by SMRNY and DSNY, and constructed customized data entry forms. The Data Entry Architect worked closely with the Data Manager to assure seamless and consistent upload of entered data into the statistical database for statistical analysis.
- The **Assistant Data Manager** was responsible for running the queries and conducting quality-control data checks. The Assistant Data Manager worked closely with the Data Manager for all data analysis.
- The **Data Entry Clerk** was responsible for receiving the field forms from the Sort Operations Manager and immediately scanning the forms into digital format for upload to backup. The Data Entry Clerk subsequently entered the data into the custom spreadsheet developed for this project by the Data Entry Architect.

Other project team members assisted with a wide array of quality control reviews.

5.3 FIELD FORMS

There were two sets of field forms in used for the project:

- The Sampling Team used lists of nightly trucks and routes to track the targeted samples arriving at each acceptance facility. These lists were derived from the pre-selected routes sampled for this project, managed via the Rizzo Sheet in communications with DSNY. Informational placards were affixed to each sample for transport from acceptance facilities to the sorting facility. The forms and placards associated with the sampling process are contained in Appendix C.
- The Sorting Team relied on complex data collection forms that required careful tracking from Sorting Operations Supervisor to Crew Chiefs, and back to Sorting Operations Supervisor for processing and entry. The customized sorting forms for this project are contained in Appendix H.

5.4 DOCUMENT CHAIN OF CUSTODY

This section describes the chain of custody for sorting field forms.

Samples were assigned each day to each sort table by the Sorting Operations Supervisor, who was ultimately responsible for all field sorting forms. The Sorting Operations Supervisor pre-filled the headers of sort forms based on the placards affixed to each sample cart. The pre-filled sort forms were then provided to the team of Crew Chiefs who simultaneously received the physical sample of material (whether Residential Refuse, Residential MGP, Residential Paper, Residential Organics, School Paper, School

Refuse, and School MGP). Crew Chiefs stored the active sort forms on their work tables attached to a clipboard next to each sorting table.

After each sample was sorted, Crew Chiefs were singularly responsible for overseeing all weighing and data recording of each manually sorted sample. Each bin containing sorted materials from the just-completed samples was carried over to a digital scale. Sorters assisted with carrying and weighing the bins of sorted material, and the Crew Chiefs recorded all data. In the case of subsort tables, all sorting and weighing was performed by professional staff without the assistance of Sorters.

The Crew Chiefs populated the field forms by hand to record the sorted sample weights, as well as to record other sampling requirements. For materials in a labeled bin or bucket, the gross weight was recorded and the bin/bucket tare weight backed out during the data analysis. For the subsort tables and for larger items that did not fit into a bin, the net weight was recorded and annotated on the data entry forms. Specific coding on the field forms followed the convention of:

- Gross weights entries have no special notation;
- Net weights entries were circled on the field form;
- Crew chiefs had the option to enter the gross weight, a subtraction sign, and the tare weight of a bin or bucket. This formula was circled to reflect to the data entry staff that the tare weight needed to be deducted.
- In the case of a light-weight item that doesn't register a value exceeding zero on the scale, the Crew Chief rounded up to a net weight of 0.01 indicating that that item existed in the sample.

As samples were weighed out, each field form containing the sorted weights of each sample was returned to the Sorting Operations Supervisor for matching against the daily sample sheet to assure accurate tracking of the samples each day. The Sorting Operations Supervisor assembled all field forms and the incoming placard for each sample, and passed this package of forms to the Data Entry Clerk and Project Manager for scanning and data entry.

Finally, selected testing of certain materials was performed to measure the level of moisture and particulate contamination. Subsamples of these four materials were obtained from sorted materials, double bagged, labeled, and placed in a cooler for storage and transportation to the laboratory. Contamination samples were logged in at the laboratory for analysis. Results of the moisture and particulate contamination testing were provided by the lab, showing the chain of identification numbers to be traced back to the source sample.

Appendix I contains a flow chart of the sorting field form chain of custody. This flow chart also contains the steps of quality control performed on the data once it was scanned and entered into the database.

5.5 STATISTICAL ANALYSIS

5.5.1 BASIC STATISTICS

Material composition estimates were calculated using a method that gives equal weighting or "importance" to each sample within a given substream (MGP from Manhattan, for example). Confidence intervals (error ranges) were calculated based on assumptions of normality in the composition estimates. In practice, most material categories were normally distributed in the waste stream in the sense that they appeared in most samples. Non-normally distributed materials are those that showed up infrequently – such as individual HHW items. Fortunately, non-normally distributed material categories in the municipal solid waste stream tend to occur in low percentages.

In the descriptions of calculation methods, the following variables are used frequently:

i denotes an individual sample;

j denotes the material type;

c_j is the weight of the material type j in a sample;

w is the weight of an entire sample;

r_j is the composition estimate for material j (r stands for ratio);

a denotes a Borough (a stands for area);

s denotes a particular substream (Residential MGP, Residential Paper, etc.); and

n denotes the number of samples in the particular group that is being analyzed at that step.

The following method was used to estimate the material composition for each Borough.

For a given substream (that is, for the samples belonging to the same material stream within the same Borough), the composition estimate denoted by r_j represents the ratio of the component's weight to the total weight of all the samples in the substream. This estimate was derived by summing each component's weight across all of the selected samples belonging to a given substream and dividing by the sum of the total weight of material for all of the samples in that substream, as shown in the following equation:

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

where:

c = weight of particular component;

w = sum of all component weights;

for i = 1 to n, where n = number of selected samples; and

for j = 1 to m, where m = number of components.

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

$$\mathrm{Var}(r_j) \approx \left(\frac{1}{n}\right)\left(\frac{1}{\overline{w}^2}\right)\left(\frac{\sum_i \left(c_{ij} - r_j w_i\right)^2}{n-1}\right)$$

where:

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

(For more information regarding Equation 2, refer to Sampling Techniques, 3rd Edition by William G. Cochran [John Wiley & Sons, Inc., 1977].)

Second, precision levels at the 90 percent confidence level were calculated for a component's mean as follows:

$$r_j \pm \left(z\sqrt{\mathrm{Var}(r_j)}\right)$$

where z = the value of the z-statistic (1.645) corresponding to a 90 percent confidence level.

5.5.2 AGGREGATING RESULTS

Composition results for all streams were combined, using a weighted averaging method, to estimate the composition of the entire City-wide waste stream. The relative tonnages associated with each material stream served as the weighting factors. The calculation was performed as follows:

$$O_j = \left(p_1 * r_{j1}\right) + \left(p_2 * r_{j2}\right) + \left(p_3 * r_{j3}\right) + \ldots$$

where:

p = the proportion of tonnage contributed by the noted material stream (the weighting factor);

r = ratio of component weight to total material weight in the noted material stream (the composition percent for the given material component); and

for j = 1 to m, where m = number of material components.

The variance of the weighted average was calculated as follows:

$$\mathrm{Var}(O_j) = \left(p_1^2\ \mathrm{Var}(r_{j1})\right) + \left(p_2^2\ \mathrm{Var}(r_{j2})\right) + \left(p_3^2\ \mathrm{Var}(r_{j3})\right) + \ldots$$

5.5.3 COMPARISONS WITH 2013 WCS STATISTICAL ANALYSIS

Consistent with the 2013 WCS, the 2017 WCS used the statistical methods described above for determining base composition and aggregating composition from borough to City level. As both studies included similar sample counts and use similar statistical methods, the findings from the 2017 study were highly comparable with the 2013 findings.

6 CONCLUSIONS

The following conclusions can be drawn from the 2017 WCS:

- **Comprehensiveness**: The 2017 WCS was successfully able to obtain and analyze a statistically significant, representative number of samples of Curbside Refuse, MGP, Paper, and Organics. With almost 660 samples captured, the study provided a comprehensive snapshot of the Waste stream managed by DSNY, using FY2017 as the time period for applying the data.
- **Comparability**: The results of the 2017 WCS can be closely compared to prior studies. While it was beyond the scope of this report to include extensive comparative data, the material categories, sampling methods and sorting methods largely paralleled the 2013 and 2005 WCS as well as the 2004 Preliminary Waste Characterization Study. Results for composition, contaminants in the Recycling Stream, and Capture Rates have all been calculated in the same manner as in the 2005 WCS.
- **Baseline School Waste Composition**: The 2017 WCS integrated representative sampling of School Refuse, School Paper and School MGP, providing detailed composition data for these streams for the first time. Although School Organics were not analyzed, it is possible to apply the results of this study to construct the overall composition of School Wastes, assuming school waste generation is reasonably similar regardless of the collection programs offered.
- **Baseline NYCHA Refuse Composition**: The 2017 WCS integrated representative sampling of NYCHA Refuse, providing detailed composition data for this stream for the first time. NYCHA Refuse was confirmed to have significantly higher fractions of Targeted Paper and Targeted MGP compared to residential curbside material, which was expected given the lack of recycling program availability at NYCHA properties.
- **Plastic Resin and Product Composition**: Consistent with the prior study, the 2017 WCS required that every rigid plastic item be characterized both by a range of product/use types, and also by resin number. These subsorts confirm the increase in plastic products and the growth in plastic films and other lightweight packaging.

Extensive analysis is required to identify specific changes in the waste stream since 2013, and it was beyond the scope of this manual to undertake such analysis. However, the results derived in this study provide a wealth of information to the City and interested stakeholders in the continued effort to reduce waste disposal and achieve the City's zero waste targets.

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7 GLOSSARY/ACRONYMS

Borough: The five political/geographic areas of New York City: Manhattan, Brooklyn, Bronx, Queens, and Staten Island.

Bottles, Cans and Cartons: Refers to recyclable bottles, cans, cartons and film pouches that contain beverages as well as non-beverage products, and which underwent comprehensive subsorting. Serves to update the legacy term "Beverage Containers" which arose from original bottle deposit legislation that targeted only bottles and cans that contained certain beverages.

Bulk Item: As defined for the NYC WCS, any item of waste that will not fit into a 96-gallon container.

C&D: An abbreviation of construction and demolition debris, a material group in the NYC WCS.

City: New York City

Composition Table: The tabular data contained in the contract between DSNY and SMRNY that dictates the composition of the MGP stream for purposes of calculating the value of the MGP

Confidence Interval: A range within which the true Mean of the population is believed to lie with the given confidence level.

Confidence Level: The certainty with which the true Mean lies within the interval determined. For the NYC WCS, a 90 percent confidence level is the industry standard for Waste Characterization Studies. Note that the use of a 90 percent level instead of a 95 percent level (the standard for scientific research) does not (a) affect the calculation of means, only the width of intervals around the means or (b) preclude the application of a 95 percent confidence level to results if such an analysis is of interest.

Contamination Rate: The percentage of material that is found in the containers set out for residential recycling collection that is not accepted in New York City's curbside recycling program.

Count: The process of counting the individual items that were subsorted.

Curbside Collection: The collection of residential refuse or recycling in bins or bags set out in proximity to residences that generate these types of waste. DSNY provides curbside refuse collection to all residents two or three times per week and recycling curbside collection once per week.

Deposit (containers): Beverage containers for which, under the New York State Redeemable Container Law, the purchaser is required to pay a deposit. The deposit may be redeemed when the empty containers are returned to a retailer or authorized redemption center.

District: The 59 areas within New York City used by the Department of Sanitation to administer the City's waste management program. These districts are co-terminus, or identical, to the 59 Community Districts.

7. GLOSSARY/ACRONYMS

DSNY: New York City Department of Sanitation.

Dual-bin Trucks: DSNY collection trucks with two compartments used for the simultaneous collection of curbside residential Paper and MGP.

Field Procedures Manual: This document, summarizing the methods for planning, executing, and analyzing the results of the New York City 2017 Waste Characterization Study.

Film (Plastic): A category of flexible plastic material used for packaging, trash bags and other applications, typically made of polyethylene or polypropylene.

HDPE: An abbreviation for high density polyethylene; a plastic denoted by a #2 inside the "chasing arrows" recycling symbol.

HHW: An abbreviation for Household Hazardous Waste, one of the material groups in the NYC WCS.

Late Week/ Early Week: A criterion used in the PWCS and 2017 study based on the idea that the composition of the waste discarded during the latter part of the week differs significantly from the composition of waste discarded during the early part of the week.

LDPE: An abbreviation for low density polyethylene, a plastic denoted by a #4 inside the "chasing arrows" recycling symbol.

Main Sort Table: The first table on which a sample is loaded during the sorting process.

Material Categories: The classification of all materials in the waste stream into categories for sorting, weighing, and counting purposes. In the NYC WCS, 91 Material Categories were used to characterize the City's waste stream.

Material Groups: Groupings of material categories used to simplify or generalize results. The Material Groups used in the NYC WCS are: Paper, Plastic, Glass, Metal, Organics, Appliances/Electronics, Construction and Demolition Debris, Miscellaneous Inorganics, and Household Hazardous Waste.

Mean: The sum of the values of all observations divided by the number of observations, also known as average. In analyzing the composition of samples of waste, the best estimate of the true percentage of each material in the population is the Mean percentage of that material from all of the samples.

MGP: An acronym for Metal, Glass, Plastic and Cartons. One of the three streams of recycling collected by the DSNY consisting of plastic bottles and jugs; glass bottles and jars; metal cans and household objects; aluminum foil, trays and cans, and gable top beverage cartons. The other streams of recycling collected by DSNY are Organics and Paper.

Mixed Cullet: Broken glass in small pieces (under 3" x 3") of mixed color.

MSW: An acronym for Municipal Solid Waste.

Non-deposit (containers): Beverage containers which are not designated as deposit containers under the New York State Redeemable Container Law.

NYC: New York City

NYC WCS: New York City Waste Characterization Study

OCC: An abbreviation for old corrugated cardboard, one of the material categories in the PWCS and the NYC WCS.

ONP: An abbreviation for old newspaper, one of the material categories in the PWCS and the NYC WCS.

Organics: The second of three streams of recyclable materials collected by DSNY consisting of food, food soiled paper, leaves, grass, prunings, trimmings, house plants, and other yard debris. The other streams are Paper and Metals/Glass/Plastic/Cartons (MGP).

Paper: The third of three streams of recyclable materials collected by DSNY consisting of newspapers; magazines; catalogues; junk mail; white office paper; mixed paper; and gray and corrugated cardboard/paperboard. The other streams are Organics and Metals/Glass/Plastic/Cartons (MGP).

PET: An abbreviation for polyethylene terephthalate, a plastic denoted by #1 inside the "chasing arrows" recycling symbol.

Plastics: Materials made of plastic, whether rigid, expanded or film.

PP: An abbreviation for polyethylene propylene, a plastic denoted by #5 inside the "chasing arrows" recycling symbol.

PPE: An acronym for Personal Protective Equipment.

PS: An abbreviation for polystyrene, a plastic denoted by #6 inside the "chasing arrows" recycling symbol.

PWCS: The preliminary waste characterization study conducted by the New York City Department of Sanitation in 2004.

PVC: An abbreviation for polyvinyl chloride, a plastic denoted by #3 inside the "chasing arrows" recycling symbol.

Recyclables: Materials that have been targeted by NYC for recovery and return to the stream of commerce.

Recycling: The act of recovering items or materials that might have been discarded and, usually after processing, returning them to the stream of commerce. Also, the materials that are set out for recycling collection.

Refuse: Items or materials that are discarded and disposed.

Rizzo Sheet: The list of routes to be sampled each night of the study, as recorded in an Excel file prepared by the City and used as the basis for communicating with the Sampling Coordinator.

Sample: A portion of a population used to estimate the composition of the population as a whole. The Sample is made up of multiple Sampling Units.

Sample Acquisition, or Sampling: The procedure for selecting Sampling Units for the population.

Sample Mass: The weight of a sample.

Sample Number: The number of Sampling Units in a sample.

Sample Weight: The weight of Sampling Unit. In the WCS, each refuse sampling unit was between 200 and 300 pounds. The weight of all recycling samples was between 100 and 120 pounds.

Sampling Unit: A single elementary unit used as the basis for estimating the composition of the population.

Section: Each of the City's 59 Sanitation Districts is divided into 3 to 5 Sanitation District Sections within which routes are designed and tonnage data is collected daily.

SMRNY: Sims Municipal Recycling of New York LLC.

Sorting: The procedure for separating a heterogeneous amount of material, such as a 200 pound Sampling Unit of refuse, into its constituent material categories.

Sorting Period: The days or weeks when the sampling and sorting of waste took place during the NYC WCS.

Standard Deviation: A measure of the dispersion or variability around the Mean of the weights of a group of Sampling Units of New York City waste.

Subsorts: The process of sorting a particular material into smaller constituent components (e.g. drinking containers were subsorted into deposit and non-deposit containers).

Subsort Table: A secondary sort table which receives a subset of materials from the Main Sort Table that have been partially sorted and require a second, more detailed sort.

Targeted: Refers to a recyclable metal, glass, plastic or paper commodity that is designated recyclable in New York City's recycling program.

Waste: The combination of Refuse and Recycling.

Waste Stream: Either the Refuse, Paper, Organics or MGP material streams collected by DSNY.

Waste Generation: The rate at which waste is set out for collection, typically reported in terms of amounts per generator per time period (e.g. pounds per capita per week).

WCS: The waste characterization studies conducted over four seasons by the New York City Department of Sanitation in 1990, 2005, 2013 and 2017.

APPENDIX A

SAMPLING SCHEDULE AND TARGETS

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Exhibit A-1 Spring Season Sample Summary

Study Route	DSNY Collection Day	DSNY Collection Date	Sampling Day	Sampling Date	Collected
K051T1M	Tuesday	4/18/2017	Wednesday	4/19/2017	Yes
K051T1P	Tuesday	4/18/2017	Wednesday	4/19/2017	Yes
Q033T1P	Tuesday	4/18/2017	Wednesday	4/19/2017	Yes
Q042T1P	Tuesday	4/18/2017	Wednesday	4/19/2017	Yes
Q054T1P	Tuesday	4/18/2017	Wednesday	4/19/2017	Yes
Q101T1M	Tuesday	4/18/2017	Wednesday	4/19/2017	Yes
Q101T1P	Tuesday	4/18/2017	Wednesday	4/19/2017	Yes
Q121T1M	Tuesday	4/18/2017	Wednesday	4/19/2017	Yes
Q121T1P	Tuesday	4/18/2017	Wednesday	4/19/2017	Yes
Q125T1M	Tuesday	4/18/2017	Wednesday	4/19/2017	Yes
Q125T1P	Tuesday	4/18/2017	Wednesday	4/19/2017	Yes
Q136T2P	Tuesday	4/18/2017	Wednesday	4/19/2017	Yes
Q138T1P	Tuesday	4/18/2017	Wednesday	4/19/2017	Yes
X011T1P	Tuesday	4/18/2017	Wednesday	4/19/2017	Yes
X041T1M	Tuesday	4/18/2017	Wednesday	4/19/2017	Yes
X043T1M	Tuesday	4/18/2017	Wednesday	4/19/2017	Yes
X052T1P	Tuesday	4/18/2017	Wednesday	4/19/2017	Yes
X081T1P	Tuesday	4/18/2017	Wednesday	4/19/2017	Yes
X111T1M	Tuesday	4/18/2017	Wednesday	4/19/2017	Yes
X123T1M	Tuesday	4/18/2017	Wednesday	4/19/2017	Yes
K021W1P	Wednesday	4/19/2017	Thursday	4/20/2017	Yes
K112W1P	Wednesday	4/19/2017	Thursday	4/20/2017	Yes
K113W1M	Wednesday	4/19/2017	Thursday	4/20/2017	Yes
K113W1P	Wednesday	4/19/2017	Thursday	4/20/2017	Yes
K131W1M	Wednesday	4/19/2017	Thursday	4/20/2017	Yes
K131W1P	Wednesday	4/19/2017	Thursday	4/20/2017	Yes
K152W1M	Wednesday	4/19/2017	Thursday	4/20/2017	Yes
K152W1P	Wednesday	4/19/2017	Thursday	4/20/2017	Yes
K152W2P	Wednesday	4/19/2017	Thursday	4/20/2017	Yes
K171W1P	Wednesday	4/19/2017	Thursday	4/20/2017	Yes
K173W1M	Wednesday	4/19/2017	Thursday	4/20/2017	Yes
K185W1P	Wednesday	4/19/2017	Thursday	4/20/2017	Yes
S011W1M	Wednesday	4/19/2017	Thursday	4/20/2017	Yes
S011W1P	Wednesday	4/19/2017	Thursday	4/20/2017	Yes
S021W1P	Wednesday	4/19/2017	Thursday	4/20/2017	Yes
S031W1P	Wednesday	4/19/2017	Thursday	4/20/2017	Yes
X031W1M	Wednesday	4/19/2017	Thursday	4/20/2017	Yes
X062W1P	Wednesday	4/19/2017	Thursday	4/20/2017	Yes
X102W1M	Wednesday	4/19/2017	Thursday	4/20/2017	Yes
X111W1M	Wednesday	4/19/2017	Thursday	4/20/2017	Yes
X121W1M	Wednesday	4/19/2017	Thursday	4/20/2017	Yes
K111H1M	Thursday	4/20/2017	Friday	4/21/2017	Yes
K175H2P	Thursday	4/20/2017	Friday	4/21/2017	Yes

Exhibit A-1 Spring Season Sample Summary

Study Route	DSNY Collection Day	DSNY Collection Date	Sampling Day	Sampling Date	Collected
M052H1M	Thursday	4/20/2017	Friday	4/21/2017	Yes
M061H1M	Thursday	4/20/2017	Friday	4/21/2017	Yes
M061H1P	Thursday	4/20/2017	Friday	4/21/2017	Yes
M073H1P	Thursday	4/20/2017	Friday	4/21/2017	Yes
M092H1P	Thursday	4/20/2017	Friday	4/21/2017	Yes
M121H1P	Thursday	4/20/2017	Friday	4/21/2017	Yes
M121H2M	Thursday	4/20/2017	Friday	4/21/2017	Yes
M122H1M	Thursday	4/20/2017	Friday	4/21/2017	Yes
S012H1P	Thursday	4/20/2017	Friday	4/21/2017	Yes
S034H1P	Thursday	4/20/2017	Friday	4/21/2017	Yes
X021H1P	Thursday	4/20/2017	Friday	4/21/2017	Yes
X072H1M	Thursday	4/20/2017	Friday	4/21/2017	Yes
X083H1M	Thursday	4/20/2017	Friday	4/21/2017	Yes
X083H1P	Thursday	4/20/2017	Friday	4/21/2017	Yes
X092H1P	Thursday	4/20/2017	Friday	4/21/2017	Yes
X102H1P	Thursday	4/20/2017	Friday	4/21/2017	Yes
X103H1P	Thursday	4/20/2017	Friday	4/21/2017	Yes
X112H1M	Thursday	4/20/2017	Friday	4/21/2017	Yes
X112H1P	Thursday	4/20/2017	Friday	4/21/2017	Yes
X124H1M	Thursday	4/20/2017	Friday	4/21/2017	Yes
X124H1P	Thursday	4/20/2017	Friday	4/21/2017	Yes
X125H1M	Thursday	4/20/2017	Friday	4/21/2017	Yes
K042F1M	Friday	4/21/2017	Saturday	4/22/2017	Yes
K042F1P	Friday	4/21/2017	Saturday	4/22/2017	Yes
K062F1P	Friday	4/21/2017	Saturday	4/22/2017	Yes
K083F1P	Friday	4/21/2017	Saturday	4/22/2017	Yes
K091F1P	Friday	4/21/2017	Saturday	4/22/2017	Yes
K111F1P	Friday	4/21/2017	Saturday	4/22/2017	Yes
K125F1P	Friday	4/21/2017	Saturday	4/22/2017	Yes
M011F1M	Friday	4/21/2017	Saturday	4/22/2017	Yes
M011F1P	Friday	4/21/2017	Saturday	4/22/2017	Yes
M011F2M	Friday	4/21/2017	Saturday	4/22/2017	Yes
S012F3P	Friday	4/21/2017	Saturday	4/22/2017	Yes
S014F3P	Friday	4/21/2017	Saturday	4/22/2017	Yes
S014F6P	Friday	4/21/2017	Saturday	4/22/2017	Yes
S023F1P	Friday	4/21/2017	Saturday	4/22/2017	Yes
S024F1P	Friday	4/21/2017	Saturday	4/22/2017	Yes
S024F2P	Friday	4/21/2017	Saturday	4/22/2017	Yes
S034F1M	Friday	4/21/2017	Saturday	4/22/2017	Yes
S034F1P	Friday	4/21/2017	Saturday	4/22/2017	Yes
S038F1P	Friday	4/21/2017	Saturday	4/22/2017	Yes
X012F1P	Friday	4/21/2017	Saturday	4/22/2017	Yes
X081F5SP	Friday	4/21/2017	Saturday	4/22/2017	Yes

Exhibit A-1 Spring Season Sample Summary

Study Route	DSNY Collection Day	DSNY Collection Date	Sampling Day	Sampling Date	Collected
X083F1M	Friday	4/21/2017	Saturday	4/22/2017	Yes
X102F1O	Friday	4/21/2017	Saturday	4/22/2017	Yes
M021S1P	Saturday	4/22/2017	Monday	4/24/2017	Yes
M084S1M	Saturday	4/22/2017	Monday	4/24/2017	Yes
M085S2M	Saturday	4/22/2017	Monday	4/24/2017	Yes
M085S2P	Saturday	4/22/2017	Monday	4/24/2017	Yes
M091S1P	Saturday	4/22/2017	Monday	4/24/2017	Yes
M124S1M	Saturday	4/22/2017	Monday	4/24/2017	Yes
M124S1P	Saturday	4/22/2017	Monday	4/24/2017	Yes
Q051S1P	Saturday	4/22/2017	Monday	4/24/2017	Yes
Q071S1M	Saturday	4/22/2017	Monday	4/24/2017	Yes
Q091S1P	Saturday	4/22/2017	Monday	4/24/2017	Yes
Q103S1P	Saturday	4/22/2017	Monday	4/24/2017	Yes
Q123S1M	Saturday	4/22/2017	Monday	4/24/2017	Yes
Q123S1P	Saturday	4/22/2017	Monday	4/24/2017	Yes
Q127S1P	Saturday	4/22/2017	Monday	4/24/2017	Yes
S012S1M	Saturday	4/22/2017	Monday	4/24/2017	Yes
S012S1P	Saturday	4/22/2017	Monday	4/24/2017	Yes
S012S3M	Saturday	4/22/2017	Monday	4/24/2017	Yes
S023S1M	Saturday	4/22/2017	Monday	4/24/2017	Yes
S023S2M	Saturday	4/22/2017	Monday	4/24/2017	Yes
S034S1P	Saturday	4/22/2017	Monday	4/24/2017	Yes
S034S3M	Saturday	4/22/2017	Monday	4/24/2017	Yes
S035S3M	Saturday	4/22/2017	Monday	4/24/2017	No
K141M5SP	Monday	4/24/2017	Tuesday	4/25/2017	Yes
K181M5SP	Monday	4/24/2017	Tuesday	4/25/2017	Yes
M023M1M	Monday	4/24/2017	Tuesday	4/25/2017	Yes
M023M1P	Monday	4/24/2017	Tuesday	4/25/2017	Yes
Q013M1P	Monday	4/24/2017	Tuesday	4/25/2017	Yes
Q021M1M	Monday	4/24/2017	Tuesday	4/25/2017	Yes
Q042M1P	Monday	4/24/2017	Tuesday	4/25/2017	Yes
Q054M1M	Monday	4/24/2017	Tuesday	4/25/2017	Yes
Q054M1P	Monday	4/24/2017	Tuesday	4/25/2017	Yes
Q072M1M	Monday	4/24/2017	Tuesday	4/25/2017	Yes
Q072M1P	Monday	4/24/2017	Tuesday	4/25/2017	Yes
Q078M1P	Monday	4/24/2017	Tuesday	4/25/2017	Yes
Q081M1M	Monday	4/24/2017	Tuesday	4/25/2017	Yes
Q081M1P	Monday	4/24/2017	Tuesday	4/25/2017	Yes
Q082M1P	Monday	4/24/2017	Tuesday	4/25/2017	Yes
Q101M1M	Monday	4/24/2017	Tuesday	4/25/2017	Yes
Q101M1P	Monday	4/24/2017	Tuesday	4/25/2017	Yes
Q102M2P	Monday	4/24/2017	Tuesday	4/25/2017	Yes
S013M1O	Monday	4/24/2017	Tuesday	4/25/2017	Yes

Exhibit A-1 Spring Season Sample Summary

Study Route	DSNY Collection Day	DSNY Collection Date	Sampling Day	Sampling Date	Collected
S021M1P	Monday	4/24/2017	Tuesday	4/25/2017	Yes
S021M2M	Monday	4/24/2017	Tuesday	4/25/2017	Yes
S021M4M	Monday	4/24/2017	Tuesday	4/25/2017	Yes
S021M5P	Monday	4/24/2017	Tuesday	4/25/2017	Yes
S022M1M	Monday	4/24/2017	Tuesday	4/25/2017	Yes
S022M4P	Monday	4/24/2017	Tuesday	4/25/2017	Yes
S031M1M	Monday	4/24/2017	Tuesday	4/25/2017	Yes
S031M1P	Monday	4/24/2017	Tuesday	4/25/2017	Yes
S032M1P	Monday	4/24/2017	Tuesday	4/25/2017	Yes
K032T1P	Tuesday	4/25/2017	Wednesday	4/26/2017	Yes
K041T1P	Tuesday	4/25/2017	Wednesday	4/26/2017	Yes
K051T2M	Tuesday	4/25/2017	Wednesday	4/26/2017	Yes
K052T1M	Tuesday	4/25/2017	Wednesday	4/26/2017	Yes
K061T1M	Tuesday	4/25/2017	Wednesday	4/26/2017	Yes
K081T1P	Tuesday	4/25/2017	Wednesday	4/26/2017	Yes
K081T2P	Tuesday	4/25/2017	Wednesday	4/26/2017	Yes
K081T3P	Tuesday	4/25/2017	Wednesday	4/26/2017	Yes
K083T1P	Tuesday	4/25/2017	Wednesday	4/26/2017	Yes
K093T1M	Tuesday	4/25/2017	Wednesday	4/26/2017	Yes
K101T1P	Tuesday	4/25/2017	Wednesday	4/26/2017	Yes
K126T1P	Tuesday	4/25/2017	Wednesday	4/26/2017	Yes
K131T1M	Tuesday	4/25/2017	Wednesday	4/26/2017	Yes
K131T1P	Tuesday	4/25/2017	Wednesday	4/26/2017	Yes
K132T1M	Tuesday	4/25/2017	Wednesday	4/26/2017	Yes
K152T1M	Tuesday	4/25/2017	Wednesday	4/26/2017	Yes
K152T1P	Tuesday	4/25/2017	Wednesday	4/26/2017	Yes
K152T2P	Tuesday	4/25/2017	Wednesday	4/26/2017	Yes
K185T1M	Tuesday	4/25/2017	Wednesday	4/26/2017	Yes
K185T1P	Tuesday	4/25/2017	Wednesday	4/26/2017	Yes
M051T1M	Tuesday	4/25/2017	Wednesday	4/26/2017	Yes
S011T1M	Tuesday	4/25/2017	Wednesday	4/26/2017	Yes
S011T1P	Tuesday	4/25/2017	Wednesday	4/26/2017	Yes
S031T1M	Tuesday	4/25/2017	Wednesday	4/26/2017	Yes
S031T1P	Tuesday	4/25/2017	Wednesday	4/26/2017	Yes
K031W1SP	Wednesday	4/26/2017	Thursday	4/27/2017	Yes
K101W1M	Wednesday	4/26/2017	Thursday	4/27/2017	Yes
M021W1P	Wednesday	4/26/2017	Thursday	4/27/2017	Yes
M022W2P	Wednesday	4/26/2017	Thursday	4/27/2017	Yes
M032W1M	Wednesday	4/26/2017	Thursday	4/27/2017	Yes
Q013W1M	Wednesday	4/26/2017	Thursday	4/27/2017	Yes
Q013W1P	Wednesday	4/26/2017	Thursday	4/27/2017	Yes
Q015W1P	Wednesday	4/26/2017	Thursday	4/27/2017	Yes
Q021W1P	Wednesday	4/26/2017	Thursday	4/27/2017	Yes

Exhibit A-1 Spring Season Sample Summary

Study Route	DSNY Collection Day	DSNY Collection Date	Sampling Day	Sampling Date	Collected
Q031W1M	Wednesday	4/26/2017	Thursday	4/27/2017	Yes
Q072W1M	Wednesday	4/26/2017	Thursday	4/27/2017	Yes
Q072W1P	Wednesday	4/26/2017	Thursday	4/27/2017	Yes
Q093W1M	Wednesday	4/26/2017	Thursday	4/27/2017	Yes
Q093W1P	Wednesday	4/26/2017	Thursday	4/27/2017	Yes
Q111W1M	Wednesday	4/26/2017	Thursday	4/27/2017	Yes
Q111W1P	Wednesday	4/26/2017	Thursday	4/27/2017	Yes
Q114W1M	Wednesday	4/26/2017	Thursday	4/27/2017	Yes
Q114W1P	Wednesday	4/26/2017	Thursday	4/27/2017	Yes
S013W1O	Wednesday	4/26/2017	Thursday	4/27/2017	Yes
K023H1P	Thursday	4/27/2017	Friday	4/28/2017	Yes
K062H1M	Thursday	4/27/2017	Friday	4/28/2017	Yes
K174H1P	Thursday	4/27/2017	Friday	4/28/2017	Yes
K174H3P	Thursday	4/27/2017	Friday	4/28/2017	Yes
K175H3P	Thursday	4/27/2017	Friday	4/28/2017	Yes
M011H1P	Thursday	4/27/2017	Friday	4/28/2017	Yes
M023H1P	Thursday	4/27/2017	Friday	4/28/2017	Yes
M023H2P	Thursday	4/27/2017	Friday	4/28/2017	Yes
M032H1P	Thursday	4/27/2017	Friday	4/28/2017	No
M043H1P	Thursday	4/27/2017	Friday	4/28/2017	Yes
M061H3P	Thursday	4/27/2017	Friday	4/28/2017	Yes
M062H3P	Thursday	4/27/2017	Friday	4/28/2017	Yes
M062H4P	Thursday	4/27/2017	Friday	4/28/2017	Yes
M073H1M	Thursday	4/27/2017	Friday	4/28/2017	Yes
M073H3P	Thursday	4/27/2017	Friday	4/28/2017	Yes
M074H1M	Thursday	4/27/2017	Friday	4/28/2017	Yes
M101H1P	Thursday	4/27/2017	Friday	4/28/2017	Yes
S012H1M	Thursday	4/27/2017	Friday	4/28/2017	Yes
S014H5M	Thursday	4/27/2017	Friday	4/28/2017	Yes
S023H1P	Thursday	4/27/2017	Friday	4/28/2017	Yes
S023H3M	Thursday	4/27/2017	Friday	4/28/2017	Yes
S024H2M	Thursday	4/27/2017	Friday	4/28/2017	Yes
S034H4M	Thursday	4/27/2017	Friday	4/28/2017	Yes
X021H2M	Thursday	4/27/2017	Friday	4/28/2017	Yes
K031F1SP	Friday	4/28/2017	Saturday	4/29/2017	Yes
K041F1SP	Friday	4/28/2017	Saturday	4/29/2017	Yes
K071F1O	Friday	4/28/2017	Saturday	4/29/2017	Yes
K071F2O	Friday	4/28/2017	Saturday	4/29/2017	Yes
K073F1P	Friday	4/28/2017	Saturday	4/29/2017	Yes
K102F2O	Friday	4/28/2017	Saturday	4/29/2017	Yes
K132F1P	Friday	4/28/2017	Saturday	4/29/2017	Yes
K141F1M	Friday	4/28/2017	Saturday	4/29/2017	Yes
K141F1P	Friday	4/28/2017	Saturday	4/29/2017	Yes

Exhibit A-1 Spring Season Sample Summary

Study Route	DSNY Collection Day	DSNY Collection Date	Sampling Day	Sampling Date	Collected
M101F1M	Friday	4/28/2017	Saturday	4/29/2017	Yes
M101F1P	Friday	4/28/2017	Saturday	4/29/2017	Yes
Q016F1SP	Friday	4/28/2017	Saturday	4/29/2017	Yes
Q021F1SP	Friday	4/28/2017	Saturday	4/29/2017	Yes
Q054F1O	Friday	4/28/2017	Saturday	4/29/2017	Yes
Q081F1SP	Friday	4/28/2017	Saturday	4/29/2017	Yes
S012F1P	Friday	4/28/2017	Saturday	4/29/2017	Yes
S023F2P	Friday	4/28/2017	Saturday	4/29/2017	Yes
S035F1P	Friday	4/28/2017	Saturday	4/29/2017	Yes
X011F1SP	Friday	4/28/2017	Saturday	4/29/2017	Yes
X081F5SP	Friday	4/28/2017	Saturday	4/29/2017	Yes
K101S1O	Saturday	4/29/2017	Monday	5/1/2017	Yes
M084S1P	Saturday	4/29/2017	Monday	5/1/2017	Yes
M084S3P	Saturday	4/29/2017	Monday	5/1/2017	Yes
M085S4P	Saturday	4/29/2017	Monday	5/1/2017	Yes
M093S1P	Saturday	4/29/2017	Monday	5/1/2017	Yes
Q011S1M	Saturday	4/29/2017	Monday	5/1/2017	Yes
Q022S1M	Saturday	4/29/2017	Monday	5/1/2017	Yes
Q051S2P	Saturday	4/29/2017	Monday	5/1/2017	Yes
Q091S1M	Saturday	4/29/2017	Monday	5/1/2017	Yes
Q091S1P	Saturday	4/29/2017	Monday	5/1/2017	Yes
Q093S2M	Saturday	4/29/2017	Monday	5/1/2017	No
Q103S2P	Saturday	4/29/2017	Monday	5/1/2017	Yes
S024S1M	Saturday	4/29/2017	Monday	5/1/2017	Yes
S034S2M	Saturday	4/29/2017	Monday	5/1/2017	Yes
X083S1O	Saturday	4/29/2017	Monday	5/1/2017	Yes
K022M1M	Monday	5/1/2017	Tuesday	5/2/2017	Yes
K031M1SP	Monday	5/1/2017	Tuesday	5/2/2017	Yes
K041M1SP	Monday	5/1/2017	Tuesday	5/2/2017	Yes
K051M1M	Monday	5/1/2017	Tuesday	5/2/2017	Yes
K064M2O	Monday	5/1/2017	Tuesday	5/2/2017	Yes
K071M1M	Monday	5/1/2017	Tuesday	5/2/2017	Yes
K171M5SP	Monday	5/1/2017	Tuesday	5/2/2017	No
Q093M1M	Monday	5/1/2017	Tuesday	5/2/2017	Yes
Q093M1P	Monday	5/1/2017	Tuesday	5/2/2017	Yes
Q101M1O	Monday	5/1/2017	Tuesday	5/2/2017	Yes
Q111M1P	Monday	5/1/2017	Tuesday	5/2/2017	Yes
Q111M1SP	Monday	5/1/2017	Tuesday	5/2/2017	Yes
Q113M1O	Monday	5/1/2017	Tuesday	5/2/2017	Yes
Q135M1M	Monday	5/1/2017	Tuesday	5/2/2017	Yes
Q136M1P	Monday	5/1/2017	Tuesday	5/2/2017	Yes
X011M1M	Monday	5/1/2017	Tuesday	5/2/2017	Yes
X041M3SP	Monday	5/1/2017	Tuesday	5/2/2017	Yes

Exhibit A-1 Spring Season Sample Summary

Study Route	DSNY Collection Day	DSNY Collection Date	Sampling Day	Sampling Date	Collected
X053M1P	Monday	5/1/2017	Tuesday	5/2/2017	Yes
X073M1M	Monday	5/1/2017	Tuesday	5/2/2017	Yes
X073M1P	Monday	5/1/2017	Tuesday	5/2/2017	Yes
X081M1M	Monday	5/1/2017	Tuesday	5/2/2017	Yes
X081M5SP	Monday	5/1/2017	Tuesday	5/2/2017	Yes
X101M1M	Monday	5/1/2017	Tuesday	5/2/2017	Yes
X101M2M	Monday	5/1/2017	Tuesday	5/2/2017	Yes
X111M1M	Monday	5/1/2017	Tuesday	5/2/2017	Yes
X111M1P	Monday	5/1/2017	Tuesday	5/2/2017	Yes
X111M2P	Monday	5/1/2017	Tuesday	5/2/2017	Yes
X121M1P	Monday	5/1/2017	Tuesday	5/2/2017	Yes
K031T1SM	Tuesday	5/2/2017	Wednesday	5/3/2017	Yes
K065T2O	Tuesday	5/2/2017	Wednesday	5/3/2017	Yes
K141T5SM	Tuesday	5/2/2017	Wednesday	5/3/2017	Yes
K181T5SM	Tuesday	5/2/2017	Wednesday	5/3/2017	Yes
M083T1M	Tuesday	5/2/2017	Wednesday	5/3/2017	Yes
M103T1M	Tuesday	5/2/2017	Wednesday	5/3/2017	Yes
M123T1M	Tuesday	5/2/2017	Wednesday	5/3/2017	Yes
Q016T1SM	Tuesday	5/2/2017	Wednesday	5/3/2017	Yes
Q055T2O	Tuesday	5/2/2017	Wednesday	5/3/2017	Yes
Q081T1SM	Tuesday	5/2/2017	Wednesday	5/3/2017	Yes
Q081T2SM	Tuesday	5/2/2017	Wednesday	5/3/2017	No
Q111T1SM	Tuesday	5/2/2017	Wednesday	5/3/2017	Yes
S013T1O	Tuesday	5/2/2017	Wednesday	5/3/2017	Yes
S013T3O	Tuesday	5/2/2017	Wednesday	5/3/2017	Yes
X021T2SM	Tuesday	5/2/2017	Wednesday	5/3/2017	Yes
X041T3SM	Tuesday	5/2/2017	Wednesday	5/3/2017	Yes
X051T4SM	Tuesday	5/2/2017	Wednesday	5/3/2017	Yes
X061T1P	Tuesday	5/2/2017	Wednesday	5/3/2017	Yes
X091T1P	Tuesday	5/2/2017	Wednesday	5/3/2017	Yes
X101T1M	Tuesday	5/2/2017	Wednesday	5/3/2017	Yes
X101T1P	Tuesday	5/2/2017	Wednesday	5/3/2017	Yes
X122T1P	Tuesday	5/2/2017	Wednesday	5/3/2017	Yes
K031H1SM	Wednesday	5/3/2017	Thursday	5/4/2017	Yes
K031W1SP	Wednesday	5/3/2017	Thursday	5/4/2017	Yes
K101W1O	Wednesday	5/3/2017	Thursday	5/4/2017	Yes
K141W5SP	Wednesday	5/3/2017	Thursday	5/4/2017	Yes
K181H5SM	Wednesday	5/3/2017	Thursday	5/4/2017	Yes
M083W1M	Wednesday	5/3/2017	Thursday	5/4/2017	Yes
M083W1P	Wednesday	5/3/2017	Thursday	5/4/2017	Yes
M092W1M	Wednesday	5/3/2017	Thursday	5/4/2017	Yes
M121W1M	Wednesday	5/3/2017	Thursday	5/4/2017	Yes
Q033W1M	Wednesday	5/3/2017	Thursday	5/4/2017	Yes

Exhibit A-1 Spring Season Sample Summary

Study Route	DSNY Collection Day	DSNY Collection Date	Sampling Day	Sampling Date	Collected
Q052W2O	Wednesday	5/3/2017	Thursday	5/4/2017	Yes
Q113W1SP	Wednesday	5/3/2017	Thursday	5/4/2017	Yes
Q113W2O	Wednesday	5/3/2017	Thursday	5/4/2017	Yes
S011W2M	Wednesday	5/3/2017	Thursday	5/4/2017	Yes
S011W2P	Wednesday	5/3/2017	Thursday	5/4/2017	Yes
X011W1SP	Wednesday	5/3/2017	Thursday	5/4/2017	Yes
X031W1P	Wednesday	5/3/2017	Thursday	5/4/2017	Yes
X072W1P	Wednesday	5/3/2017	Thursday	5/4/2017	Yes
X081W5SP	Wednesday	5/3/2017	Thursday	5/4/2017	Yes
X082W1P	Wednesday	5/3/2017	Thursday	5/4/2017	Yes
X091W7SP	Wednesday	5/3/2017	Thursday	5/4/2017	Yes
K041H1SM	Thursday	5/4/2017	Friday	5/5/2017	Yes
K171H5SM	Thursday	5/4/2017	Friday	5/5/2017	Yes
Q016H1SM	Thursday	5/4/2017	Friday	5/5/2017	Yes
Q081H1SM	Thursday	5/4/2017	Friday	5/5/2017	Yes
Q101H4O	Thursday	5/4/2017	Friday	5/5/2017	Yes
Q111H1O	Thursday	5/4/2017	Friday	5/5/2017	Yes
X021H2SM	Thursday	5/4/2017	Friday	5/5/2017	Yes
X051H4SM	Thursday	5/4/2017	Friday	5/5/2017	Yes
X071H6SM	Thursday	5/4/2017	Friday	5/5/2017	Yes
X083H1O	Thursday	5/4/2017	Friday	5/5/2017	Yes
X102H3O	Thursday	5/4/2017	Friday	5/5/2017	Yes

Exhibit A-2 Summer Season Sample Summary

Study Route	DSNY Collection Day	DSNY Collection Date	Sampling Day	Sampling Date	Collected
X102S4O	Saturday	7/8/2017	Monday	7/10/2017	Yes
Q103S6O	Saturday	7/8/2017	Monday	7/10/2017	Yes
K064S3O	Saturday	7/8/2017	Monday	7/10/2017	Yes
Q054S4O	Saturday	7/8/2017	Monday	7/10/2017	Yes
K104S2O	Saturday	7/8/2017	Monday	7/10/2017	Yes
Q052S2O	Saturday	7/8/2017	Monday	7/10/2017	Yes
Q115M1O	Monday	7/10/2017	Tuesday	7/11/2017	Yes
Q101M3O	Monday	7/10/2017	Tuesday	7/11/2017	Yes
K103M3O	Monday	7/10/2017	Tuesday	7/11/2017	Yes
K064M1O	Monday	7/10/2017	Tuesday	7/11/2017	Yes
K131M1O	Monday	7/10/2017	Tuesday	7/11/2017	Yes
K124M1O	Monday	7/10/2017	Tuesday	7/11/2017	Yes
S013M2O	Monday	7/10/2017	Tuesday	7/11/2017	Yes
Q101T4O	Tuesday	7/11/2017	Wednesday	7/12/2017	Yes
X102T1O	Tuesday	7/11/2017	Wednesday	7/12/2017	Yes
Q103T5O	Tuesday	7/11/2017	Wednesday	7/12/2017	Yes
K063T3O	Tuesday	7/11/2017	Wednesday	7/12/2017	Yes
K102T3O	Tuesday	7/11/2017	Wednesday	7/12/2017	Yes
K112T1O	Tuesday	7/11/2017	Wednesday	7/12/2017	Yes
S013T1O	Tuesday	7/11/2017	Wednesday	7/12/2017	Yes
Q111W2O	Wednesday	7/12/2017	Thursday	7/13/2017	Yes
Q104W1O	Wednesday	7/12/2017	Thursday	7/13/2017	Yes
K161W1O	Wednesday	7/12/2017	Thursday	7/13/2017	Yes
K062W2O	Wednesday	7/12/2017	Thursday	7/13/2017	Yes
K124W1O	Wednesday	7/12/2017	Thursday	7/13/2017	Yes
Q051W2O	Wednesday	7/12/2017	Thursday	7/13/2017	Yes
S013W2O	Wednesday	7/12/2017	Thursday	7/13/2017	Yes
X102H4O	Thursday	7/13/2017	Friday	7/14/2017	Yes
Q114H1O	Thursday	7/13/2017	Friday	7/14/2017	Yes
Q111H3O	Thursday	7/13/2017	Friday	7/14/2017	Yes
K102H2O	Thursday	7/13/2017	Friday	7/14/2017	Yes
K023H1O	Thursday	7/13/2017	Friday	7/14/2017	Yes
K161H1O	Thursday	7/13/2017	Friday	7/14/2017	Yes
S014H4O	Thursday	7/13/2017	Friday	7/14/2017	Yes
X083F1O	Friday	7/14/2017	Saturday	7/15/2017	Yes
Q111F1O	Friday	7/14/2017	Saturday	7/15/2017	Yes
Q052F2O	Friday	7/14/2017	Saturday	7/15/2017	Yes
Q052F4O	Friday	7/14/2017	Saturday	7/15/2017	Yes
K063F2O	Friday	7/14/2017	Saturday	7/15/2017	Yes
S014F3O	Friday	7/14/2017	Saturday	7/15/2017	Yes

Exhibit A-3 Fall Season Sample Summary

Study Route	DSNY Collection Day	DSNY Collection Date	Sampling Day	Sampling Date	Collected
X083S1O	Saturday	9/9/2017	Monday	9/11/2017	Yes
Q113S1O	Saturday	9/9/2017	Monday	9/11/2017	Yes
K042S2R	Saturday	9/9/2017	Monday	9/11/2017	Yes
K021S3R	Saturday	9/9/2017	Monday	9/11/2017	Yes
K186S2R	Saturday	9/9/2017	Monday	9/11/2017	Yes
K175S2R	Saturday	9/9/2017	Monday	9/11/2017	Yes
K125S1R	Saturday	9/9/2017	Monday	9/11/2017	Yes
K091S1R	Saturday	9/9/2017	Monday	9/11/2017	Yes
K152M1O	Monday	9/11/2017	Tuesday	9/12/2017	Yes
Q103M1O	Monday	9/11/2017	Tuesday	9/12/2017	Yes
X092M3R	Monday	9/11/2017	Tuesday	9/12/2017	Yes
X043M2R	Monday	9/11/2017	Tuesday	9/12/2017	Yes
X123M2R	Monday	9/11/2017	Tuesday	9/12/2017	Yes
S024M1R	Monday	9/11/2017	Tuesday	9/12/2017	Yes
S023M5R	Monday	9/11/2017	Tuesday	9/12/2017	Yes
M075M2M	Monday	9/11/2017	Tuesday	9/12/2017	Yes
X112M3R	Monday	9/11/2017	Tuesday	9/12/2017	Yes
X094M3R	Monday	9/11/2017	Tuesday	9/12/2017	Yes
X103M1R	Monday	9/11/2017	Tuesday	9/12/2017	Yes
S24M9R	Monday	9/11/2017	Tuesday	9/12/2017	Yes
S034M1R	Monday	9/11/2017	Tuesday	9/12/2017	Yes
X081M5SR	Monday	9/11/2017	Tuesday	9/12/2017	Yes
S032M1M	Monday	9/11/2017	Tuesday	9/12/2017	Yes
K081M1M	Monday	9/11/2017	Tuesday	9/12/2017	Yes
K185M2M	Monday	9/11/2017	Tuesday	9/12/2017	Yes
M10TNHARL	Tuesday	9/12/2017	Tuesday	9/12/2017	Yes
S022T1M	Tuesday	9/12/2017	Wednesday	9/13/2017	Yes
S013T2O	Tuesday	9/12/2017	Wednesday	9/13/2017	Yes
Q112T1O	Tuesday	9/12/2017	Wednesday	9/13/2017	Yes
Q054T7O	Tuesday	9/12/2017	Wednesday	9/13/2017	Yes
K062T2O	Tuesday	9/12/2017	Wednesday	9/13/2017	Yes
K104T6O	Tuesday	9/12/2017	Wednesday	9/13/2017	Yes
M101T1R	Tuesday	9/12/2017	Wednesday	9/13/2017	Yes
X061T4R	Tuesday	9/12/2017	Wednesday	9/13/2017	Yes
K141T5SM	Tuesday	9/12/2017	Wednesday	9/13/2017	Yes
M113T2R	Tuesday	9/12/2017	Wednesday	9/13/2017	Yes
M082T3R	Tuesday	9/12/2017	Wednesday	9/13/2017	Yes
S014T2R	Tuesday	9/12/2017	Wednesday	9/13/2017	Yes
X091T7SR	Tuesday	9/12/2017	Wednesday	9/13/2017	Yes
K173T1M	Tuesday	9/12/2017	Wednesday	9/13/2017	Yes
K104T5M	Tuesday	9/12/2017	Wednesday	9/13/2017	Yes
M091T1R	Tuesday	9/12/2017	Wednesday	9/13/2017	Yes
K171T5SM	Tuesday	9/12/2017	Wednesday	9/13/2017	Yes

Exhibit A-3 Fall Season Sample Summary

Study Route	DSNY Collection Day	DSNY Collection Date	Sampling Day	Sampling Date	Collected
K011T1SM	Tuesday	9/12/2017	Wednesday	9/13/2017	Yes
M121T4R	Tuesday	9/12/2017	Wednesday	9/13/2017	Yes
S024T3R	Tuesday	9/12/2017	Wednesday	9/13/2017	Yes
S035T1R	Tuesday	9/12/2017	Wednesday	9/13/2017	Yes
S022T6R	Tuesday	9/12/2017	Wednesday	9/13/2017	Yes
X094T2R	Tuesday	9/12/2017	Wednesday	9/13/2017	Yes
X051T4SR	Tuesday	9/12/2017	Wednesday	9/13/2017	Yes
S036T1R	Tuesday	9/12/2017	Wednesday	9/13/2017	Yes
X061T3R	Tuesday	9/12/2017	Wednesday	9/13/2017	Yes
X101T2R	Tuesday	9/12/2017	Wednesday	9/13/2017	Yes
S013W2O	Wednesday	9/13/2017	Thursday	9/14/2017	Yes
Q021W1M	Wednesday	9/13/2017	Thursday	9/14/2017	Yes
X092W1M	Wednesday	9/13/2017	Thursday	9/14/2017	Yes
X052W1M	Wednesday	9/13/2017	Thursday	9/14/2017	Yes
X012W1R	Wednesday	9/13/2017	Thursday	9/14/2017	Yes
X092W2R	Wednesday	9/13/2017	Thursday	9/14/2017	Yes
X031W1SR	Wednesday	9/13/2017	Thursday	9/14/2017	Yes
X081W5SR	Wednesday	9/13/2017	Thursday	9/14/2017	Yes
S011W2R	Wednesday	9/13/2017	Thursday	9/14/2017	Yes
X091W2R	Wednesday	9/13/2017	Thursday	9/14/2017	Yes
X062W2R	Wednesday	9/13/2017	Thursday	9/14/2017	Yes
X072W2R	Wednesday	9/13/2017	Thursday	9/14/2017	Yes
X083W3R	Wednesday	9/13/2017	Thursday	9/14/2017	Yes
X051W3R	Wednesday	9/13/2017	Thursday	9/14/2017	Yes
X011W1SR	Wednesday	9/13/2017	Thursday	9/14/2017	Yes
S033W1R	Wednesday	9/13/2017	Thursday	9/14/2017	Yes
K141W3R	Wednesday	9/13/2017	Thursday	9/14/2017	Yes
K051W1SR	Wednesday	9/13/2017	Thursday	9/14/2017	Yes
K187W2R	Wednesday	9/13/2017	Thursday	9/14/2017	Yes
K141W5SR	Wednesday	9/13/2017	Thursday	9/14/2017	Yes
K011W1SR	Wednesday	9/13/2017	Thursday	9/14/2017	Yes
K116W3R	Wednesday	9/13/2017	Thursday	9/14/2017	Yes
X102H2O	Thursday	9/14/2017	Friday	9/15/2017	Yes
M122H2M	Thursday	9/14/2017	Friday	9/15/2017	Yes
X072H2M	Thursday	9/14/2017	Friday	9/15/2017	Yes
X113H1M	Thursday	9/14/2017	Friday	9/15/2017	Yes
X092H2M	Thursday	9/14/2017	Friday	9/15/2017	Yes
M082H2M	Thursday	9/14/2017	Friday	9/15/2017	Yes
X102H1M	Thursday	9/14/2017	Friday	9/15/2017	Yes
M101H1M	Thursday	9/14/2017	Friday	9/15/2017	Yes
X124H2M	Thursday	9/14/2017	Friday	9/15/2017	Yes
Q052H1O	Thursday	9/14/2017	Friday	9/29/2017	Yes
S033H3R	Thursday	9/14/2017	Friday	9/15/2017	Yes

Exhibit A-3 Fall Season Sample Summary

Study Route	DSNY Collection Day	DSNY Collection Date	Sampling Day	Sampling Date	Collected
X102H2R	Thursday	9/14/2017	Friday	9/15/2017	Yes
S035H3R	Thursday	9/14/2017	Friday	9/15/2017	Yes
S011H6R	Thursday	9/14/2017	Friday	9/15/2017	Yes
S013H2R	Thursday	9/14/2017	Friday	9/15/2017	Yes
X061H2R	Thursday	9/14/2017	Friday	9/15/2017	Yes
S021H4R	Thursday	9/14/2017	Friday	9/15/2017	Yes
X012H2R	Thursday	9/14/2017	Friday	9/15/2017	Yes
S033H2R	Thursday	9/14/2017	Friday	9/15/2017	Yes
Q052H1O	Thursday	9/14/2017	Friday	9/15/2017	No
M051F1M	Friday	9/15/2017	Saturday	9/16/2017	Yes
S024F1M	Friday	9/15/2017	Saturday	9/16/2017	Yes
S034F2M	Friday	9/15/2017	Saturday	9/16/2017	Yes
S038F1M	Friday	9/15/2017	Saturday	9/16/2017	Yes
Q104F2O	Friday	9/15/2017	Saturday	9/16/2017	Yes
K024F1O	Friday	9/15/2017	Saturday	9/16/2017	Yes
X083F1O	Friday	9/15/2017	Saturday	9/16/2017	Yes
S035F2M	Friday	9/15/2017	Saturday	9/16/2017	Yes
K141F1M	Friday	9/15/2017	Saturday	9/16/2017	Yes
S014F1M	Friday	9/15/2017	Saturday	9/16/2017	Yes
K115F3M	Friday	9/15/2017	Saturday	9/16/2017	Yes
K141F2M	Friday	9/15/2017	Saturday	9/16/2017	Yes
S035F1M	Friday	9/15/2017	Saturday	9/16/2017	Yes
X09FNMONR	Friday	9/15/2017	Friday	9/15/2017	Yes
X01FNMELR	Friday	9/15/2017	Friday	9/15/2017	Yes
M121F3R	Friday	9/15/2017	Saturday	9/16/2017	Yes
S033F3R	Friday	9/15/2017	Saturday	9/16/2017	Yes
M111F3R	Friday	9/15/2017	Saturday	9/16/2017	Yes
M085F2R	Friday	9/15/2017	Saturday	9/16/2017	Yes
S012F3R	Friday	9/15/2017	Saturday	9/16/2017	Yes
M083F3R	Friday	9/15/2017	Saturday	9/16/2017	Yes
M093F2R	Friday	9/15/2017	Saturday	9/16/2017	Yes
X041F3SR	Friday	9/15/2017	Saturday	9/16/2017	Yes
X083F2R	Friday	9/15/2017	Saturday	9/16/2017	Yes
S038F2R	Friday	9/15/2017	Saturday	9/16/2017	Yes
S038F1R	Friday	9/15/2017	Saturday	9/16/2017	Yes
M091F2R	Friday	9/15/2017	Saturday	9/16/2017	Yes
M122F1R	Friday	9/15/2017	Saturday	9/16/2017	Yes
X051F4SR	Friday	9/15/2017	Saturday	9/16/2017	Yes
M083F1R	Friday	9/15/2017	Saturday	9/16/2017	Yes
S014S3O	Saturday	9/16/2017	Monday	9/18/2017	Yes
K116S2O	Saturday	9/16/2017	Monday	9/18/2017	Yes
K121S1O	Saturday	9/16/2017	Monday	9/18/2017	Yes
Q103S1M	Saturday	9/16/2017	Monday	9/18/2017	Yes

Exhibit A-3 Fall Season Sample Summary

Study Route	DSNY Collection Day	DSNY Collection Date	Sampling Day	Sampling Date	Collected
Q043S1M	Saturday	9/16/2017	Monday	9/18/2017	Yes
Q053S1M	Saturday	9/16/2017	Monday	9/18/2017	Yes
Q023S1M	Saturday	9/16/2017	Monday	9/18/2017	Yes
Q014S1R	Saturday	9/16/2017	Monday	9/18/2017	Yes
K052S4R	Saturday	9/16/2017	Monday	9/18/2017	Yes
Q126S1R	Saturday	9/16/2017	Monday	9/18/2017	Yes
Q103S5R	Saturday	9/16/2017	Monday	9/18/2017	Yes
Q134S3R	Saturday	9/16/2017	Monday	9/18/2017	Yes
Q116S2R	Saturday	9/16/2017	Monday	9/18/2017	Yes
Q124S3R	Saturday	9/16/2017	Monday	9/18/2017	Yes
Q132S1R	Saturday	9/16/2017	Monday	9/18/2017	Yes
Q013S4R	Saturday	9/16/2017	Monday	9/18/2017	Yes
K073S2R	Saturday	9/16/2017	Monday	9/18/2017	Yes
K103S1R	Saturday	9/16/2017	Monday	9/18/2017	Yes
X021M1R	Monday	9/18/2017	Tuesday	9/19/2017	Yes
Q013M4R	Monday	9/18/2017	Tuesday	9/19/2017	Yes
X113M3R	Monday	9/18/2017	Tuesday	9/19/2017	Yes
X092M1R	Monday	9/18/2017	Tuesday	9/19/2017	Yes
X043M3R	Monday	9/18/2017	Tuesday	9/19/2017	Yes
S037M3R	Monday	9/18/2017	Tuesday	9/19/2017	Yes
K074M4R	Monday	9/18/2017	Tuesday	9/19/2017	Yes
Q125M3R	Monday	9/18/2017	Tuesday	9/19/2017	Yes
K101M1R	Monday	9/18/2017	Tuesday	9/19/2017	Yes
S012M1R	Monday	9/18/2017	Tuesday	9/19/2017	Yes
S021M1R	Monday	9/18/2017	Tuesday	9/19/2017	Yes
K052M5R	Monday	9/18/2017	Tuesday	9/19/2017	Yes
Q114M2R	Monday	9/18/2017	Tuesday	9/19/2017	Yes
Q01RAVETN	Monday	9/18/2017	Tuesday	9/19/2017	Yes
K093M1R	Monday	9/18/2017	Tuesday	9/19/2017	Yes
K142M1R	Monday	9/18/2017	Tuesday	9/19/2017	Yes
K011M1SR	Monday	9/18/2017	Tuesday	9/19/2017	Yes
Q041M2R	Monday	9/18/2017	Wednesday	9/20/2017	Yes
K141M5SR	Monday	9/18/2017	Tuesday	9/19/2017	No
Q041M2R	Monday	9/18/2017	Tuesday	9/19/2017	No
K083T1SM	Tuesday	9/19/2017	Wednesday	9/20/2017	Yes
M051T1M	Tuesday	9/19/2017	Wednesday	9/20/2017	Yes
K187T3M	Tuesday	9/19/2017	Wednesday	9/20/2017	Yes
Q125T2R	Tuesday	9/19/2017	Wednesday	9/20/2017	Yes
Q101T1R	Tuesday	9/19/2017	Wednesday	9/20/2017	Yes
S032T2M	Tuesday	9/19/2017	Wednesday	9/20/2017	Yes
K121T1SM	Tuesday	9/19/2017	Wednesday	9/20/2017	Yes
Q01QUEEWN	Tuesday	9/19/2017	Wednesday	9/20/2017	Yes
Q111T1SM	Tuesday	9/19/2017	Wednesday	9/20/2017	Yes

Exhibit A-3 Fall Season Sample Summary

Study Route	DSNY Collection Day	DSNY Collection Date	Sampling Day	Sampling Date	Collected
S022T5M	Tuesday	9/19/2017	Wednesday	9/20/2017	Yes
K131T5SM	Tuesday	9/19/2017	Wednesday	9/20/2017	Yes
X081T5SM	Tuesday	9/19/2017	Wednesday	9/20/2017	Yes
K124T4R	Tuesday	9/19/2017	Wednesday	9/20/2017	Yes
X031T1SM	Tuesday	9/19/2017	Wednesday	9/20/2017	Yes
X041T3SM	Tuesday	9/19/2017	Wednesday	9/20/2017	Yes
Q127T4R	Tuesday	9/19/2017	Wednesday	9/20/2017	Yes
Q136T4R	Tuesday	9/19/2017	Wednesday	9/20/2017	Yes
Q138T1SR	Tuesday	9/19/2017	Wednesday	9/20/2017	Yes
S011T3R	Tuesday	9/19/2017	Wednesday	9/20/2017	Yes
S012T5R	Tuesday	9/19/2017	Wednesday	9/20/2017	Yes
S013T3R	Tuesday	9/19/2017	Wednesday	9/20/2017	Yes
S023T4R	Tuesday	9/19/2017	Wednesday	9/20/2017	Yes
S033T3R	Tuesday	9/19/2017	Wednesday	9/20/2017	Yes
K042T1R	Tuesday	9/19/2017	Wednesday	9/20/2017	Yes
Q016W1SR	Wednesday	9/20/2017	Thursday	9/21/2017	Yes
S036W2R	Wednesday	9/20/2017	Thursday	9/21/2017	Yes
X091W3R	Wednesday	9/20/2017	Thursday	9/21/2017	Yes
Q113W1SR	Wednesday	9/20/2017	Thursday	9/21/2017	Yes
Q016W1R	Wednesday	9/20/2017	Thursday	9/21/2017	Yes
Q137W2R	Wednesday	9/20/2017	Thursday	9/21/2017	Yes
X101W7SR	Wednesday	9/20/2017	Thursday	9/21/2017	Yes
X091W4R	Wednesday	9/20/2017	Thursday	9/21/2017	Yes
S014W4R	Wednesday	9/20/2017	Thursday	9/21/2017	Yes
S035W1R	Wednesday	9/20/2017	Thursday	9/21/2017	Yes
S023W4R	Wednesday	9/20/2017	Thursday	9/21/2017	Yes
Q138W1SR	Wednesday	9/20/2017	Thursday	9/21/2017	Yes
X062W3R	Wednesday	9/20/2017	Thursday	9/21/2017	Yes
S023W2R	Wednesday	9/20/2017	Thursday	9/21/2017	Yes
X051W4SR	Wednesday	9/20/2017	Thursday	9/21/2017	Yes
Q12HNBAIS	Thursday	9/21/2017	Thursday	9/21/2017	Yes
M10HNHARL	Thursday	9/21/2017	Thursday	9/21/2017	Yes
M062H1M	Thursday	9/21/2017	Friday	9/22/2017	Yes
S014H2M	Thursday	9/21/2017	Friday	9/22/2017	Yes
M043H2M	Thursday	9/21/2017	Friday	9/22/2017	Yes
S024H3M	Thursday	9/21/2017	Friday	9/22/2017	Yes
S036H1M	Thursday	9/21/2017	Friday	9/22/2017	Yes
S014H3M	Thursday	9/21/2017	Friday	9/22/2017	Yes
K125H2M	Thursday	9/21/2017	Friday	9/22/2017	Yes
K154H3M	Thursday	9/21/2017	Friday	9/22/2017	Yes
X061H6R	Thursday	9/21/2017	Friday	9/22/2017	Yes
S031H3R	Thursday	9/21/2017	Friday	9/22/2017	Yes
X052H1R	Thursday	9/21/2017	Friday	9/22/2017	Yes

Exhibit A-3 Fall Season Sample Summary

Study Route	DSNY Collection Day	DSNY Collection Date	Sampling Day	Sampling Date	Collected
S024H8R	Thursday	9/21/2017	Friday	9/22/2017	Yes
S014H3R	Thursday	9/21/2017	Friday	9/22/2017	Yes
S023H1R	Thursday	9/21/2017	Friday	9/22/2017	Yes
K015H2R	Thursday	9/21/2017	Friday	9/22/2017	Yes
K173H2R	Thursday	9/21/2017	Friday	9/22/2017	Yes
S013H6R	Thursday	9/21/2017	Friday	9/22/2017	Yes
S021H2R	Thursday	9/21/2017	Friday	9/22/2017	Yes
K121H4R	Thursday	9/21/2017	Friday	9/22/2017	Yes
S014H1R	Thursday	9/21/2017	Friday	9/22/2017	Yes
X031H4R	Thursday	9/21/2017	Friday	9/22/2017	Yes
X071H6SR	Thursday	9/21/2017	Friday	9/22/2017	No
K121F1R	Friday	9/22/2017	Saturday	9/23/2017	Yes
Q126F4R	Friday	9/22/2017	Saturday	9/23/2017	Yes
K043F3R	Friday	9/22/2017	Saturday	9/23/2017	Yes
Q032F4M	Friday	9/22/2017	Saturday	9/23/2017	Yes
S014F2R	Friday	9/22/2017	Saturday	9/23/2017	Yes
Q136F2R	Friday	9/22/2017	Saturday	9/23/2017	Yes
Q138F3R	Friday	9/22/2017	Saturday	9/23/2017	Yes
S023F2R	Friday	9/22/2017	Saturday	9/23/2017	Yes
Q041F1M	Friday	9/22/2017	Saturday	9/23/2017	Yes
S023F3R	Friday	9/22/2017	Monday	9/25/2017	Yes
K111S3M	Friday	9/22/2017	Monday	9/25/2017	Yes
K114F2R	Friday	9/22/2017	Saturday	9/23/2017	Yes
Q122F3R	Friday	9/22/2017	Saturday	9/23/2017	Yes
M043F1R	Friday	9/22/2017	Saturday	9/23/2017	Yes
K063F2R	Friday	9/22/2017	Saturday	9/23/2017	Yes
K125F1R	Friday	9/22/2017	Saturday	9/23/2017	Yes
M072F1R	Friday	9/22/2017	Saturday	9/23/2017	Yes
M072F3R	Friday	9/22/2017	Saturday	9/23/2017	Yes
M013F1R	Friday	9/22/2017	Saturday	9/23/2017	Yes
S023F3R	Friday	9/22/2017	Saturday	9/23/2017	No
Q016F1SR	Friday	9/22/2017	Saturday	9/23/2017	No
Q103S1R	Saturday	9/23/2017	Monday	9/25/2017	Yes
M013S1M	Saturday	9/23/2017	Monday	9/25/2017	Yes
Q12SNSJAM	Saturday	9/23/2017	Saturday	9/23/2017	Yes
K143S1M	Saturday	9/23/2017	Monday	9/25/2017	Yes
Q055S1R	Saturday	9/23/2017	Monday	9/25/2017	Yes
Q136S3R	Saturday	9/23/2017	Monday	9/25/2017	Yes
X01SNMILL	Monday	9/25/2017	Monday	9/25/2017	Yes
M03SNBARU	Monday	9/25/2017	Friday	9/29/2017	Yes
M11SNWASH	Monday	9/25/2017	Monday	9/25/2017	Yes
M10SNHARL	Monday	9/25/2017	Monday	9/25/2017	Yes
K113M1R	Monday	9/25/2017	Tuesday	9/26/2017	Yes

Exhibit A-3 Fall Season Sample Summary

Study Route	DSNY Collection Day	DSNY Collection Date	Sampling Day	Sampling Date	Collected
Q102M1M	Monday	9/25/2017	Tuesday	9/26/2017	Yes
Q111M1M	Monday	9/25/2017	Tuesday	9/26/2017	Yes
X041M3SR	Monday	9/25/2017	Tuesday	9/26/2017	Yes
Q122M3R	Monday	9/25/2017	Tuesday	9/26/2017	Yes
Q016M1SR	Monday	9/25/2017	Tuesday	9/26/2017	Yes
M09SNGRAN	Monday	9/25/2017	Monday	9/25/2017	Yes
X113M2R	Monday	9/25/2017	Tuesday	9/26/2017	Yes
Q113M1R	Monday	9/25/2017	Tuesday	9/26/2017	Yes
X122M1M	Monday	9/25/2017	Tuesday	9/26/2017	Yes
X111M2M	Monday	9/25/2017	Tuesday	9/26/2017	Yes
X123M1M	Monday	9/25/2017	Tuesday	9/26/2017	Yes
X091M2M	Monday	9/25/2017	Tuesday	9/26/2017	Yes
Q133M5R	Monday	9/25/2017	Tuesday	9/26/2017	Yes
K172M3R	Monday	9/25/2017	Tuesday	9/26/2017	Yes
K151M4R	Monday	9/25/2017	Tuesday	9/26/2017	Yes
Q125M6R	Monday	9/25/2017	Tuesday	9/26/2017	Yes
K125M2R	Monday	9/25/2017	Tuesday	9/26/2017	Yes
X053M2R	Monday	9/25/2017	Tuesday	9/26/2017	Yes
K033M6R	Monday	9/25/2017	Tuesday	9/26/2017	Yes
K181M1R	Monday	9/25/2017	Tuesday	9/26/2017	Yes
Q082M1M	Monday	9/25/2017	Tuesday	9/26/2017	No
K131M3R	Monday	9/25/2017	Tuesday	9/26/2017	No
X03MNMORR	Tuesday	9/26/2017	Tuesday	9/26/2017	Yes
X11MNEAST	Tuesday	9/26/2017	Tuesday	9/26/2017	Yes
M081T1R	Tuesday	9/26/2017	Wednesday	9/27/2017	Yes
M034T1R	Tuesday	9/26/2017	Wednesday	9/27/2017	Yes
M021T2R	Tuesday	9/26/2017	Wednesday	9/27/2017	Yes
M061T3R	Tuesday	9/26/2017	Wednesday	9/27/2017	Yes
Q055T4R	Tuesday	9/26/2017	Wednesday	9/27/2017	Yes
K173T4R	Tuesday	9/26/2017	Wednesday	9/27/2017	Yes
Q016T1SM	Tuesday	9/26/2017	Wednesday	9/27/2017	Yes
M111T1M	Tuesday	9/26/2017	Wednesday	9/27/2017	Yes
Q138T1SM	Tuesday	9/26/2017	Wednesday	9/27/2017	Yes
X071T6SM	Tuesday	9/26/2017	Wednesday	9/27/2017	Yes
K182T4R	Tuesday	9/26/2017	Wednesday	9/27/2017	Yes
Q136T3M	Tuesday	9/26/2017	Wednesday	9/27/2017	Yes
Q016T1SM	Tuesday	9/26/2017	Wednesday	9/27/2017	Yes
M083T2M	Tuesday	9/26/2017	Wednesday	9/27/2017	Yes
Q016T1SR	Tuesday	9/26/2017	Wednesday	9/27/2017	Yes
K184T4R	Tuesday	9/26/2017	Wednesday	9/27/2017	Yes
M041T1R	Tuesday	9/26/2017	Wednesday	9/27/2017	Yes
M033T1R	Tuesday	9/26/2017	Wednesday	9/27/2017	Yes
X041T3SR	Tuesday	9/26/2017	Wednesday	9/27/2017	Yes

Exhibit A-3 Fall Season Sample Summary

Study Route	DSNY Collection Day	DSNY Collection Date	Sampling Day	Sampling Date	Collected
K083T3R	Tuesday	9/26/2017	Wednesday	9/27/2017	Yes
M124T1R	Tuesday	9/26/2017	Wednesday	9/27/2017	Yes
Q111T1SR	Tuesday	9/26/2017	Wednesday	9/27/2017	Yes
Q011T3R	Tuesday	9/26/2017	Wednesday	9/27/2017	Yes
X122T3R	Tuesday	9/26/2017	Wednesday	9/27/2017	Yes
M084T2R	Tuesday	9/26/2017	Wednesday	9/27/2017	Yes
K014T1R	Tuesday	9/26/2017	Wednesday	9/27/2017	Yes
K131T5SR	Tuesday	9/26/2017	Wednesday	9/27/2017	Yes
K181T2R	Tuesday	9/26/2017	Wednesday	9/27/2017	Yes
K051T1SR	Tuesday	9/26/2017	Wednesday	9/27/2017	Yes
K043T3R	Tuesday	9/26/2017	Wednesday	9/27/2017	Yes
M083T2M	Tuesday	9/26/2017	Wednesday	9/27/2017	No
Q052T1SM	Tuesday	9/26/2017	Wednesday	9/27/2017	No
K131W5SR	Wednesday	9/27/2017	Thursday	9/28/2017	Yes
X082W2M	Wednesday	9/27/2017	Thursday	9/28/2017	Yes
K051W1R	Wednesday	9/27/2017	Thursday	9/28/2017	Yes
M022W1R	Wednesday	9/27/2017	Thursday	9/28/2017	Yes
K114W2R	Wednesday	9/27/2017	Thursday	9/28/2017	Yes
X092W1R	Wednesday	9/27/2017	Thursday	9/28/2017	Yes
X052W2M	Wednesday	9/27/2017	Thursday	9/28/2017	Yes
M122W1M	Wednesday	9/27/2017	Thursday	9/28/2017	Yes
Q061W3M	Wednesday	9/27/2017	Thursday	9/28/2017	Yes
X041W3SR	Wednesday	9/27/2017	Thursday	9/28/2017	Yes
K031W1SR	Wednesday	9/27/2017	Thursday	9/28/2017	Yes
M085W1M	Wednesday	9/27/2017	Thursday	9/28/2017	Yes
X051W1R	Wednesday	9/27/2017	Thursday	9/28/2017	Yes
X082W2R	Wednesday	9/27/2017	Thursday	9/28/2017	Yes
X125W2R	Wednesday	9/27/2017	Thursday	9/28/2017	Yes
X083H3R	Wednesday	9/27/2017	Friday	9/29/2017	Yes
K06HNGOWA	Thursday	9/28/2017	Thursday	9/28/2017	Yes
K03HNSTUY	Thursday	9/28/2017	Thursday	9/28/2017	Yes
M11WNJEFF	Thursday	9/28/2017	Thursday	9/28/2017	Yes
K011H1R	Thursday	9/28/2017	Friday	9/29/2017	Yes
Q031H5R	Thursday	9/28/2017	Friday	9/29/2017	Yes
Q134H3R	Thursday	9/28/2017	Friday	9/29/2017	Yes
K042H4R	Thursday	9/28/2017	Friday	9/29/2017	Yes
K123H2R	Thursday	9/28/2017	Friday	9/29/2017	Yes
X122H1R	Thursday	9/28/2017	Friday	9/29/2017	Yes
X011H2R	Thursday	9/28/2017	Friday	9/29/2017	Yes
K132H2R	Thursday	9/28/2017	Friday	9/29/2017	Yes
X11FNGUN	Friday	9/29/2017	Friday	9/29/2017	Yes
M03FNBARU	Friday	9/29/2017	Friday	9/29/2017	Yes
M11FNWASH	Friday	9/29/2017	Friday	9/29/2017	Yes

Exhibit A-3 Fall Season Sample Summary

Study Route	DSNY Collection Day	DSNY Collection Date	Sampling Day	Sampling Date	Collected
X11FNBOST	Friday	9/29/2017	Friday	9/29/2017	Yes
X03FNBUTL	Friday	9/29/2017	Friday	9/29/2017	Yes
K16FNTILD	Friday	9/29/2017	Friday	9/29/2017	Yes
K18FNBAYV	Friday	9/29/2017	Friday	9/29/2017	Yes
K093F3R	Friday	9/29/2017	Saturday	9/30/2017	Yes
Q062F3R	Friday	9/29/2017	Saturday	9/30/2017	Yes
Q102F3R	Friday	9/29/2017	Saturday	9/30/2017	Yes
X011F1SR	Friday	9/29/2017	Saturday	9/30/2017	Yes
K053F3R	Friday	9/29/2017	Saturday	9/30/2017	Yes
M101F2R	Friday	9/29/2017	Saturday	9/30/2017	Yes
M085F1R	Friday	9/29/2017	Saturday	9/30/2017	Yes
M062F1R	Friday	9/29/2017	Saturday	9/30/2017	Yes
M082F4R	Friday	9/29/2017	Saturday	9/30/2017	Yes
M123F1R	Friday	9/29/2017	Saturday	9/30/2017	Yes
K171F5SR	Friday	9/29/2017	Saturday	9/30/2017	Yes
M022F1R	Friday	9/29/2017	Saturday	9/30/2017	Yes
M124F4R	Friday	9/29/2017	Saturday	9/30/2017	Yes
M051F1R	Friday	9/29/2017	Saturday	9/30/2017	Yes
Q033F2R	Friday	9/29/2017	Saturday	9/30/2017	Yes
Q111F2SR	Friday	9/29/2017	Saturday	9/30/2017	Yes
Q102F1R	Friday	9/29/2017	Saturday	9/30/2017	Yes
Q132F4R	Friday	9/29/2017	Saturday	9/30/2017	Yes
M022F2R	Friday	9/29/2017	Saturday	9/30/2017	Yes
K13SNMARL	Saturday	9/30/2017	Saturday	9/30/2017	Yes
K03SNBREV	Saturday	9/30/2017	Saturday	9/30/2017	Yes
K052S1R	Saturday	9/30/2017	Monday	10/2/2017	Yes
K131S1R	Saturday	9/30/2017	Monday	10/2/2017	Yes
K03SNTOMP	Saturday	9/30/2017	Saturday	9/30/2017	Yes
K123S2R	Saturday	9/30/2017	Monday	10/2/2017	Yes
K174S2R	Saturday	9/30/2017	Monday	10/2/2017	Yes
K187S2R	Saturday	9/30/2017	Monday	10/2/2017	Yes
K182S1R	Saturday	9/30/2017	Monday	10/2/2017	Yes
M021S2R	Saturday	9/30/2017	Monday	10/2/2017	Yes
M071S2R	Saturday	9/30/2017	Monday	10/2/2017	Yes
M03MNSMIT	Monday	10/2/2017	Monday	10/2/2017	Yes
Q082M1M	Monday	10/2/2017	Tuesday	10/3/2017	Yes
M10MNKING	Monday	10/2/2017	Monday	10/2/2017	Yes
M09MNMANH	Monday	10/2/2017	Monday	10/2/2017	Yes
X09MNBRON	Monday	10/2/2017	Monday	10/2/2017	Yes
M11MNJOHN	Monday	10/2/2017	Monday	10/2/2017	Yes
Q013M1M	Monday	10/2/2017	Tuesday	10/3/2017	Yes
K074M1R	Monday	10/2/2017	Tuesday	10/3/2017	Yes
K171M5SR	Monday	10/2/2017	Tuesday	10/3/2017	Yes

Exhibit A-3 Fall Season Sample Summary

Study Route	DSNY Collection Day	DSNY Collection Date	Sampling Day	Sampling Date	Collected
X121M1M	Monday	10/2/2017	Tuesday	10/3/2017	Yes
X073M2M	Monday	10/2/2017	Tuesday	10/3/2017	Yes
Q016M1SR	Monday	10/2/2017	Tuesday	9/26/2017	Yes
Q127M3R	Monday	10/2/2017	Tuesday	10/3/2017	Yes
Q132M1R	Monday	10/2/2017	Tuesday	10/3/2017	Yes
Q031M7R	Monday	10/2/2017	Tuesday	10/3/2017	Yes
Q013M3R	Monday	10/2/2017	Tuesday	10/3/2017	Yes
X043M1M	Monday	10/2/2017	Tuesday	10/3/2017	Yes
Q078M1M	Monday	10/2/2017	Tuesday	10/3/2017	Yes
Q075M1M	Monday	10/2/2017	Tuesday	10/3/2017	Yes
Q111M1SR	Monday	10/2/2017	Tuesday	10/3/2017	Yes
Q134M2R	Monday	10/2/2017	Tuesday	10/3/2017	Yes
Q011M1R	Monday	10/2/2017	Tuesday	10/3/2017	Yes
Q041M3R	Monday	10/2/2017	Tuesday	10/3/2017	Yes
K031M1SR	Monday	10/2/2017	Tuesday	10/3/2017	Yes
K131M5SR	Monday	10/2/2017	Tuesday	10/3/2017	No
X03TNMORR	Monday	10/2/2017	Tuesday	10/2/2017	No
M07TNDOUG	Monday	10/2/2017	Tuesday	10/2/2017	No
K06TNREDE	Tuesday	10/3/2017	Tuesday	10/3/2017	Yes
Q138M1SR	Tuesday	10/3/2017	Tuesday	10/3/2017	Yes
K15TNSHEE	Tuesday	10/3/2017	Tuesday	10/3/2017	Yes
Q135T4R	Tuesday	10/3/2017	Wednesday	10/4/2017	Yes
M083T6R	Tuesday	10/3/2017	Wednesday	10/4/2017	Yes
Q031T6R	Tuesday	10/3/2017	Wednesday	10/4/2017	Yes
K021T4R	Tuesday	10/3/2017	Wednesday	10/4/2017	Yes
Q134T1R	Tuesday	10/3/2017	Wednesday	10/4/2017	Yes
Q103T4R	Tuesday	10/3/2017	Wednesday	10/4/2017	Yes
Q015T3R	Tuesday	10/3/2017	Wednesday	10/4/2017	Yes
M073T3R	Tuesday	10/3/2017	Wednesday	10/4/2017	Yes
Q104T4R	Tuesday	10/3/2017	Wednesday	10/4/2017	Yes
M122T2R	Tuesday	10/3/2017	Wednesday	10/4/2017	Yes
Q102T4M	Tuesday	10/3/2017	Wednesday	10/4/2017	Yes
X011T1SM	Tuesday	10/3/2017	Wednesday	10/4/2017	Yes
Q055T2M	Tuesday	10/3/2017	Wednesday	10/4/2017	Yes
M123T2M	Tuesday	10/3/2017	Wednesday	10/4/2017	Yes
K073T3R	Tuesday	10/3/2017	Wednesday	10/4/2017	Yes
K082T4R	Tuesday	10/3/2017	Wednesday	10/4/2017	Yes
K051T1R	Tuesday	10/3/2017	Wednesday	10/4/2017	Yes
K171T5SR	Tuesday	10/3/2017	Wednesday	10/4/2017	Yes
K112T1R	Tuesday	10/3/2017	Wednesday	10/4/2017	Yes
K011T1SR	Tuesday	10/3/2017	Wednesday	10/4/2017	Yes
Q138T1SR	Tuesday	10/3/2017	Wednesday	9/20/2017	Yes
K031T1SR	Tuesday	10/3/2017	Wednesday	10/4/2017	Yes

Exhibit A-3 Fall Season Sample Summary

Study Route	DSNY Collection Day	DSNY Collection Date	Sampling Day	Sampling Date	Collected
M073T2R	Tuesday	10/3/2017	Wednesday	10/4/2017	Yes
K024T1R	Tuesday	10/3/2017	Wednesday	10/4/2017	Yes
M074T1R	Tuesday	10/3/2017	Wednesday	10/4/2017	Yes
K035T2R	Tuesday	10/3/2017	Wednesday	10/4/2017	Yes
K05TNPINK	Tuesday	10/3/2017	Tuesday	10/3/2017	No
S032W3M	Wednesday	10/4/2017	Thursday	10/5/2017	Yes
M034W1M	Wednesday	10/4/2017	Thursday	10/5/2017	Yes
K171W5SR	Wednesday	10/4/2017	Thursday	10/5/2017	Yes
K042W1R	Wednesday	10/4/2017	Thursday	10/5/2017	Yes
K155W3R	Wednesday	10/4/2017	Thursday	10/5/2017	Yes
X012W2R	Wednesday	10/4/2017	Thursday	10/5/2017	Yes
K126W1M	Wednesday	10/4/2017	Thursday	10/5/2017	Yes
S022W6M	Wednesday	10/4/2017	Thursday	10/5/2017	Yes
K043W1M	Wednesday	10/4/2017	Thursday	10/5/2017	Yes
K01HNBORI	Thursday	10/5/2017	Thursday	10/5/2017	Yes
K18HNGLEN	Thursday	10/5/2017	Thursday	10/5/2017	Yes
M11HNWAGN	Thursday	10/5/2017	Thursday	10/5/2017	Yes
K06HRWYCK	Thursday	10/5/2017	Thursday	10/5/2017	Yes
X01HNMITC	Thursday	10/5/2017	Thursday	10/5/2017	Yes
X09HNCAST	Thursday	10/5/2017	Thursday	10/5/2017	Yes
X03HNDAVI	Thursday	10/5/2017	Thursday	10/5/2017	Yes
M10HNDREW	Thursday	10/5/2017	Thursday	10/5/2017	Yes
M11HNTAFT	Thursday	10/5/2017	Thursday	10/5/2017	Yes
K031H1R	Thursday	10/5/2017	Friday	10/6/2017	Yes
K014H3R	Thursday	10/5/2017	Friday	10/6/2017	Yes
M062H1R	Thursday	10/5/2017	Friday	10/6/2017	Yes
M051H2R	Thursday	10/5/2017	Friday	10/6/2017	Yes
X101H1R	Thursday	10/5/2017	Friday	10/6/2017	Yes
K074H3M	Thursday	10/5/2017	Friday	10/6/2017	Yes
K181H3M	Thursday	10/5/2017	Friday	10/6/2017	Yes
M062H2M	Thursday	10/5/2017	Friday	10/6/2017	Yes
K074H2M	Thursday	10/5/2017	Friday	10/6/2017	Yes
M074H2M	Thursday	10/5/2017	Friday	10/6/2017	Yes
Q122H2R	Thursday	10/5/2017	Friday	10/6/2017	Yes
X082H1R	Thursday	10/5/2017	Friday	10/6/2017	Yes
K073H3R	Thursday	10/5/2017	Friday	10/6/2017	Yes
Q041H6R	Thursday	10/5/2017	Friday	10/6/2017	Yes
K06FNREDW	Friday	10/6/2017	Friday	10/6/2017	Yes
M03FNWALD	Friday	10/6/2017	Friday	10/6/2017	Yes
X09FNBRIV	Friday	10/6/2017	Friday	10/6/2017	Yes
K03FNSUMN	Friday	10/6/2017	Friday	10/6/2017	Yes
K16FNHOWA	Friday	10/6/2017	Friday	10/6/2017	Yes
K131F5SR	Friday	10/6/2017	Saturday	10/7/2017	Yes

Exhibit A-3 Fall Season Sample Summary

Study Route	DSNY Collection Day	DSNY Collection Date	Sampling Day	Sampling Date	Collected
Q132F3R	Friday	10/6/2017	Saturday	10/7/2017	Yes
Q033F3R	Friday	10/6/2017	Saturday	10/7/2017	Yes
Q111F1SR	Friday	10/6/2017	Saturday	10/7/2017	Yes
K051F1SR	Friday	10/6/2017	Saturday	10/7/2017	Yes
Q054F3R	Friday	10/6/2017	Saturday	10/7/2017	Yes
Q138F1SR	Friday	10/6/2017	Saturday	10/7/2017	Yes
Q135F3R	Friday	10/6/2017	Saturday	10/7/2017	Yes
M04FNCHEL	Friday	10/6/2017	Friday	10/6/2017	No
M11SNWASH	Saturday	10/7/2017	Saturday	10/7/2017	Yes
X10SNTHRO	Saturday	10/7/2017	Saturday	10/7/2017	Yes
M03SNBARU	Saturday	10/7/2017	Saturday	10/7/2017	Yes
X01SNPATT	Saturday	10/7/2017	Saturday	10/7/2017	Yes
K08SNALBA	Saturday	10/7/2017	Saturday	10/7/2017	Yes
K02SNINGE	Saturday	10/7/2017	Saturday	10/7/2017	Yes
K01SNTAYL	Saturday	10/7/2017	Saturday	10/7/2017	Yes
X07SNBAIL	Saturday	10/7/2017	Saturday	10/7/2017	Yes

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APPENDIX B

MATERIAL CATEGORIES AND DEFINITIONS

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Exhibit B-1 Material Category Definitions

Group	No. old		Category	Aggregation Method for Subsort	Description	Intermediate Subsort (2017)	Resin Subsort (2017)	Notes 2017
Paper	1	1	NEWSPAPER		Printed ground wood newsprint (Advertising "slicks" (glossy paper), if found mixed with newspaper; otherwise, ad slicks are included with mixed low grade.).			
Paper	2	2	PLAIN OCC/KRAFT PAPER		Old unwaxed/uncoated corrugated container boxes, and Kraft paper. Does **not** include paper bags			
Paper	N	3	PAPER BAGS	Paper Bags Bin	All paper bags including those made of Kraft paper	X		Count & Moisture-Particulate Test for Retail/Grocery Bags
Paper	3	4	HIGH GRADE PAPER		White and lightly colored bond, rag, or stationery grade paper. This includes white or lightly colored sulfite/sulfate bond, copy papers, notebook paper, envelopes, Continuous-feed sulfite/sulfate computer printouts and forms of all types, excluding carbonless copy paper			
Paper	4	5	MIXED LOW GRADE PAPER		Includes junk mail, magazines, colored papers, bleached Kraft including bags, boxboard, mailing tubes, carbonless copy paper, ground wood computer printouts, telephone directories, paperback books, hardcover books			
Paper	5	6	COMPOSTABLE/SOILED PAPER/WAXED OCC/KRAFT		Waxed papers and cardboards, other papers that were soiled with food during use (e.g., pizza box inserts); paper towels, wipes and napkins; paper plates, platters, cups, and bowls			
Paper	N	7	COMPOSTABLE SCHOOL PLATES/TRAYS		Compartmentalized compostable paper plates or trays used widely in the school system throughout the City.			
Paper	N	7b	COMPOSTABLE SCHOOL BOATS		Takeout food trays shaped like a boat, made from biodegradable paper, and used widely in the school system throughout the City.			
Paper	6	8	OTHER NONRECYCLABLE PAPER		Polycoated frozen food and ice cream containers/packaging and other polycoated papers (excluding milk/juice cartons and aseptic packaging); paper with other materials attached (e.g. orange juice cans and spiral notebooks), and other non-recyclable papers such as carbon copy paper, label backing, and photographs. Includes gypsum board tape rolls.			
Paper	7	9	BEVERAGE CARTONS AND ASEPTIC BOXES		Beverage and food containers made of bleached and unbleached paperboard coated with HDPE film. This includes polycoated milk and juice containers, and aseptic juice boxes, including those with plastic spouts attached. Excludes juice concentrate cans.			
Paper	N	10	SHREDDED PAPER		All shredded paper that is contained in bags or is still relatively intact within the sample and can be manually separated in handfuls. Does not include loose, dispersed shredded paper which may end up in Fines, Compostable Paper, or Other Organics as part of the sample residual.			
Multi-Material	N	11	CUPS - PAPER AND PLASTIC	Drinking Cups Bin	Any single use or durable drinking cup made of paper (wax-coated or uncoated and lined or unlined) or plastic resin (including EPS cups). This category does not include yogurt/food cups.	X	X - plastic cups only	
Multi-Material	N	12	K-CUPS	K-Cups Bucket	Single-serve or single-portion coffee containers or pods. May be made of predominantly plastic, predominantly metal, or compostable material.	X	X - plastic cups only	
Plastic	8	13	#1 PET BOTTLES CLEAR & GREEN		#1 Polyethylene terephthalate translucent bottles and jars that are clear or green colored.			

Exhibit B-1 Material Category Definitions

Group	No. old		Category	Aggregation Method for Subsort	Description	Intermediate Subsort (2017)	Resin Subsort (2017)	Notes 2017
Plastic	9	14	#1 PET BOTTLES ALL OTHER COLORS	Plastic Bottles Bin	#1 Polyethylene terephthalate translucent bottles and jars that are other colors including blue, red, amber, yellow, orange, and opaque			
Plastic	10	15	#2 HDPE NATURAL BOTTLES		High-density translucent polyethylene (#2) milk, juice, beverage, vinegar, distilled water bottles with necks and jars.		X	
Plastic	11	16	#2 HDPE COLORED BOTTLES		High-density colored (incuding opaque white) polyethylene (#2) bottles. Liquid detergent bottles, some hair care bottles with necks and jars. Includes empty motor oil bottles.			
Plastic	12	17	#3-#7 AND UNLABELED BOTTLES		All other bottles and jars labeled #3 through #7 or unlabeled. Includes #3 polyvinyl chloride bottles (primarily cleaning products and soaps/shampoos); #4 low-density polyethylene bottles (children's' squeezable juice bottles, some saline/medical rinse bottles); #5 polypropylene bottles (examples include syrup, ketchup, tea); #6 polystyrene bottles; Bottles labeled #7 Other; bottles with two resin codes, and unlabeled bottles.			
Plastic	13	18	THERMOFORMS	Rigid Plastics Bin	Thermoform trays of all resin types, clamshells, and other packaging, typically used for grocery items. Examples include produce trays and clamshells, plastic pie plates and covers, and food product packaging made by press-molding a flat sheet of plastic.	X	X	Subsort source material from Categories 18, 20, and 22
Plastic	14	19	OTHER PVC		White plumbing pipe, identifiable PVC packaging other than PVC bottles/tubs			
Plastic	15	20	TUBS AND LIDS	Rigid Plastics Bin	Injection molded wide mouth tubs without a neck, such as cottage cheese and margarine, of any resin type. Includes lids to the tubs. Includes plastic bottle caps. Includes pill bottles.	X	X	Subsort source material from Categories 18, 20, and 22
Plastic	17	21	#6 EXPANDED POLYSTYRENE CONTAINERS AND PACKAGING - (EPS)	EPS Bin	Includes #6 packaging and finished products made of expanded polystyrene. Includes EPS trays used for packaging and shelf display of meats and groceries as well as plates, bowls, and platters, but **excludes** Styrofoam cups.	X		Count & Moisture-Particulate Test for EPS clamshells
Plastic	18	22	#1-#7 OTHER RIGID CONTAINERS/PACKAGING	Rigid Plastics Bin	Other containers and packaging, including containers of all types, toothpaste tubes, and plastic spools, not elsewhere classified. Includes empty tubes of caulk.	X	X	
Plastic	19	23	FILM: RETAIL BAGS & SLEEVES	Other Film Bin	Plastic bags given to customers by any retail establishment for transporting purchased goods, including labeled grocery and merchandise, dry cleaner, and newspaper polyethylene film bags. Does not include garbage bags, baggies or Ziploc bags; or bags heavily soiled with food.	X	X	Count & Moisture-Particulate Test
Plastic	20	24	FILM: GARBAGE BAGS		Plastic bags designed and marketed to contain garbage or other materials for disposal			
Plastic	21	25	FILM: POUCHES		Drink pouches made of multi-layer film plastic and including foil.			
Plastic	N	26	FILM: OVERSIZE ITEMS		Any plastic film item larger than a garbage bag. Includes tarps, shower curtains, plastic tablecloths, visqueen, industrial films.		X	
Plastic	22	27	FILM: OTHER #2/#4 POLYETHYLENE	Other Film Bin	Other film bags not elsewhere classified or film products made of #2 HDPE, #4 LDPE or #4 LLDPE film.	X	X	
Plastic	23	28	FILM: OTHER NON-POLYETHYLENE/ CONTAMINATED		Other film bags or film products made of films other than #2 and #4. Film packaging not defined above, or: was contaminated with food, liquid or grit during use; is woven together (e.g., grain bags); contains multiple layers of film or other materials that have been fused together (e.g., potato chip bags); garbage bags, baggies or Ziploc bags, plastic wraps.			

Exhibit B-1 Material Category Definitions

Group	No. old		Category	Aggregation Method for Subsort	Description	Intermediate Subsort (2017)	Resin Subsort (2017)	Notes 2017
Plastic	N6	29	FILM: COMPOSTABLE PLASTIC BAGS		Compostable plastic bags intended for use in the Curbside Organics collection program			
Plastic	24	30	SINGLE-USE PLATES, CUTLERY	Rigid Plastics Bin	Plastic single use spoons, forks, knives, plates, cup lids, bowls, straws, and platters of various resins. Does **not** include EPS (styrofoam) plates, cups, and bowls, or EPS trays used for packaging and display.	X	X	
Plastic	25	31	APPLIANCES: PLASTIC		Small and large appliances made predominantly of plastic		X	
Plastic	26	32	BULK/RIGID: PLASTIC CRATES AND SODA BOTTLE CARRIERS	Bulky Plastics Bin	Plastic crates and soda bottle carriers	X	X	
Plastic	27	33	BULK/RIGID: PLASTIC TOYS/ HOUSEWARES		Bulky rigid plastic items from household use including plastic furniture and toys. Generally larger in size than a breadbox.	X	X	
Plastic	28	34	BULK/RIGID: OTHER DURABLE		Other bulky rigid plastic objects not elsewhere classified. Includes 5-gal buckets. Generally larger in size than a breadbox.	X	X	
Plastic	29	35	OTHER PLASTICS MATERIALS NOT ELSEWHERE CLASSIFIED	Rigid Plastics Bin	Items that are predominately plastic with other materials attached such as pens, lighters, and 3-ring binders. Finished plastic products made entirely of plastic such as toothbrushes, CD/DVDs, vinyl hose -- not including plastic crates and soda bottle carriers.	X	X	
Glass	30	36	CLEAR CONTAINER GLASS		Manually sortable, recyclable clear glass bottles and jars that are greater than 2" x 2"			
Glass	31	37	GREEN CONTAINER GLASS		Manually sortable, recyclable green glass bottles and jars that are greater than 2" x 2"			
Glass	32	38	BROWN CONTAINER GLASS		Manually sortable, recyclable brown glass bottles and jars that are greater than 2" x 2"			
Glass	33	39	OTHER COLOR CONTAINER GLASS		Manually sortable, recyclable blue, yellow, red and other color glass bottles and jars that are greater than 2" x 2"			
Glass	34	40	MIXED CULLET		Broken glass of any color not manually sortable (under 2" x 2"); glass shards			
Glass	35	41	OTHER GLASS		Window glass, mirrors, light bulbs (except fluorescent tubes), decorative glassware (e.g. vases), decorative glass bottles (e.g. perfume bottles), drinking glasses, other non-container glass.			
Metal	36	42	ALUMINUM CANS		Aluminum beverage and food cans and bi-metal cans made mostly of aluminum. Includes removed aluminum lids.			
Metal	37	43	ALUMINUM		Aluminum food containers, trays, and foil.			
Metal	38	44	OTHER ALUMINUM		Aluminum products and scrap that are 50% or more aluminum by weight, such as window frames, cookware.			
Metal	39	45	OTHER NONFERROUS		Non-aluminum metals not derived from iron, to which a magnet will not adhere, and which are not significantly contaminated with other metals or materials. Includes copper, brass, lead, stainless steel, zinc.			
Metal	40	46	STEEL/TIN FOOD CANS		Steel food containers, including bi-metal cans mostly of steel. Includes removed steel lids.			
Metal	41	47	EMPTY AEROSOL CANS		Empty, mixed material/metal aerosol cans. (Aerosols that still contain product are sorted according to that material-for instance, solvent-based paint.)			
Metal	42	48	OTHER FERROUS		Ferrous and alloyed ferrous scrap metals to which a magnet adheres and which are not significantly contaminated with other metals or materials. Includes ferrous metal caps/lids to containers of other material types.			
Metal	43	49	MIXED METALS		Items that are predominately metal with other materials attached such as motors, insulated wire, and finished products containing a mixture of metals, or metals and other materials, that are not classified in the "small appliances" section below. Includes pieces of white goods. Included certain non-computer insulated wiring such as holiday light strands if the wiring is half or more of the weight.			

Exhibit B-1 Material Category Definitions

Group	No. old		Category	Aggregation Method for Subsort	Description	Intermediate Subsort (2017)	Resin Subsort (2017)	Notes 2017
Metal	44	50	APPLIANCES: FERROUS		Large and small electric appliances made predominantly of ferrous metal (steel). Includes large appliances such as washers, dryers, stoves, refrigerators, dishwashers, etc. Includes small appliances such as toasters, microwave ovens, power tools, curling irons, and light fixtures.			
Metal	45	51	APPLIANCES: NON-FERROUS		Small and large appliances made predominantly of stainless steel			
Organic	46	52	YARD WASTE		Any plant materials from a yard or garden area, including grass clippings, leaves, weeds, garden wastes, prunings, trimmings, limbs, stumps, etc. Includes cut flowers and house plants.			
Organic	47	53	FOOD		Vegetative and non-vegetative food wastes and scraps. Includes vegetative food wastes as well as bones, shells, husks, rinds, etc. Excludes food containers, except when container weight is not appreciable compared to the food inside and separation is not practical. Includes vitamins and supplements.			
Organic	48	54	NON-C&D WOOD		Wood products not associated with C&D activities, such as furniture, popsicle sticks, chopsticks, wooden spoons, and other miscellaneous household wood products. Includes clean, stained, painted and composite woods, wicker, and box springs.			
Organic	49	55	TEXTILES: NON-CLOTHING		Non-clothing fabrics made of rag stock fabric materials including natural and synthetic textiles such as cotton, wool, silk, woven nylon, rayon, and polyester. Includes handbags, linens, draperies, tablecloths, nylon rope.			
Organic	50	56	TEXTILES: CLOTHING		Clothing textiles			
Organic	51	57	CARPET/UPHOLSTERY		General category of flooring applications and non-rag stock textiles consisting of various natural or synthetic fibers bonded to some type of backing material. Includes traditional mattresses made of a combination of foam and metal coil construction with upholstered exterior.			
Organic	52	58	DISPOSABLE DIAPERS & SANITARY PRODUCTS		Diapers and sanitary products made from a combination of fibers, synthetic, and/or natural, and made for the purpose of single use. This includes disposable baby diapers, adult protective undergarments, and feminine hygiene products.			
Organic	53	59	ANIMAL BY-PRODUCTS		Animal carcasses not resulting from food storage or preparation, animal wastes, and kitty litter.			
Organic	54	60	SHOES/ RUBBER/ LEATHER		Finished products and scrap materials made of natural and synthetic rubber, such as bath mats, inner tubes, rubber hoses, foam rubber, tire pieces, latex gloves. Leather jackets, belts, bags, purses. Shoes, sneakers, sandals, and boots.			
Organic	N	61	GARDEN HOSES		Self explanatory. Plastic hoses like vacuum hoses will continue to be sorted in Other Plastic. Aggregates to Shoes/Rubber/Leather.			
Organic	55	62	FINES		Fines smaller than 1/2 inch screen			
Organic	56	63	MISCELLANEOUS ORGANICS		Wax, bar soap, cigarette butts, briquettes, and fireplace, burn barrel and fire pit ash, vacuum cleaner bags and contents, sponges, and other organic materials not classified above. Includes pet food and hair. Includes mattresses and cushions made of urethane foam with upholstered exterior.			
Electronics	57	64	AUDIO/ VISUAL EQUIPMENT (TV PERIPHERALS - COVERED)		VCRs, digital video recorders, DVD players, digital converter boxes, cable or satellite receivers, electronic or video game consoles			
Electronics	58	65	AUDIO/VISUAL EQUIPMENT (NON-COVERED)		Radios, Stereos, Tape Decks, Cameras, GPS devices, Cell phones, Calculators			
Electronics	59	66	COMPUTER MONITORS		Items other than televisions containing a cathode ray tube (CRT) such as computer monitors and laptops. Includes flat screen monitors			
Electronics	60	67	TELEVISIONS		Television sets containing a cathode ray tube (CRT) and flat screen TVs			

Exhibit B-1 Material Category Definitions

Group	No. old		Category	Aggregation Method for Subsort	Description	Intermediate Subsort (2017)	Resin Subsort (2017)	Notes 2017
Electronics	61	68	OTHER COMPUTER EQUIPMENT		Computer items not containing CRTs such as processors, mice and mouse pads, keyboards, and disk drives, cords and cables, portable devices (portable digital music player, tablet, e-readers etc.), printers, scanners, servers. Includes both computer cords and regular extension cords.			
Constr. Debris	62	69	UNTREATED DIMENSION LUMBER, PALLETS, CRATES		Untreated, milled lumber commonly used in construction for framing and related uses, including 2 x 4's, 2 x 6's.			
Constr. Debris	63	70	TREATED/CONTAMINATED/ COMPOSITE WOOD		Lumber and wood products that have been painted or treated so as to render them difficult to compost (with generally 50% or more of the surface area treated). This includes painted and chemically treated lumber, plywood, strandboard, and particleboard. Predominantly wood and lumber products that are mixed with other materials in such a way that they cannot easily be separated.			
Constr. Debris	64	71	OTHER C&D DEBRIS NOT ELSEWHERE CLASSIFIED		Construction debris (other than wood, plastic and metal) that cannot be classified elsewhere, and mixed fine building material scraps. Includes clean and painted gypsum drywall, fiberglass insulation, rock/concrete/bricks, asphaltic and other roofing, fixtures, etc.			
Misc.	65	72	MISCELLANEOUS INORGANICS		Other inorganic materials not classified elsewhere. Includes ceramics. Includes full or partially full containers of non-hazardous cleaning & hygiene products. Includes fabric softener sheets and Brita filters.			
HHW	66	73	OIL FILTERS		Metal oil filters used in cars and other automobiles.			
HHW	67	74	ANTIFREEZE		self explanatory			
HHW	68	75	WET-CELL BATTERIES		Wet-cell batteries of various sizes and types as commonly used in automobiles. Includes lead-acid batteries.			
HHW	69	76	WATER-BASED ADHESIVES/GLUES		Water or Oil/resin/volatile solvent-based glues and adhesives, including epoxy, rubber cement, two-part glues and sealers, and auto body fillers.			
HHW	70	77	LATEX PAINT		Latex paint			
HHW	71	78	OIL-BASED PAINT/SOLVENT		Solvent-based paints, varnishes, and similar products. Various solvents, including chlorinated and flammable solvents, paint strippers, solvents contaminated with other products such as paints, degreasers and some other cleaners if the primary ingredient			
HHW	72	79	PESTICIDES/HERBICIDES/ RODENTICIDES		Variety of poisons with the purpose of discouraging or killing insects, weeds, vermin, or microorganisms. Fungicides and wood preservatives, such as pentachlorophenol, are also included.			
HHW	73	80	DRY-CELL BATTERIES:		Dry-cell batteries of various sizes and types as commonly used in households. Includes cell phone and button cell batteries.			
HHW	74	81	FLUORESCENT TUBES/CFLs		Fluorescent light tubes and compact fluorescent light bulbs (CFL).			
HHW	75	82	MERCURY-LADEN WASTES		Thermostats, thermometers, and other items containing mercury.			
HHW	76	83	COMPRESSED GAS CYLINDERS, FIRE EXTINGUISHERS		Self explanatory			
HHW	77	84	HOME MEDICAL PRODUCTS		Syringes, IV Bags, medical tubing			
HHW	78	85	OTHER POTENTIALLY HARMFUL WASTES		Caustic acids and bases whose primary purpose is to clean surfaces, unclog drains, or perform other actions; photography chemicals, chemistry sets; household disinfectants and pool chemicals; gasoline/diesel fuels; motor oils and automotive fluids not elsewhere classified; smoke detectors, explosives.			

Exhibit B-2 Intermediate Subsort Material Definitions

AGGREGATE BIN	MATERIAL GROUP	Intermediate Subsort & Definition	Aggregates to	Sent to Resin Subsort?	NOTES
Paper Retail Bags	Paper	Kraft Grocery Bags (clean)	#2 Plain OCC/Kraft		Require Count & Moisture/Partculate Test
	Paper	Non-food retail bags (clean): Larger size paper bags, often with handles, used by merchandise retailers	#5 Mixed Low Grade Paper		Require Count & Moisture/Partculate Test
	Paper	Fast food bags (clean): Smaller bags typically used for fast food	#5 Mixed Low Grade Paper		
	Paper	Compostable/Soiled bags: Heavily soiled or moisture-contaminated bags of all types	#6 Compostable/Soiled Paper		
Cups - Paper and Plastic	Paper	Wax coated/Uncoated /unlined: Capable of being composted at a commercial facility	#6 Compostable/Soiled Paper		
	Paper	Lined/Coated: Not desireable at a compost facility. Includes most hot beverage cups.	#8 Other Nonrecyclable Paper		
	Plastics	Single Use Plastic Cups	#30 Single Use Plastics	Yes	
	Plastics	Durable Plastic Cups	#35 Other Plastic Not Elsewhere Classified	Yes	
K-Cups	Plastics	Predominantly Plastic K-cups	#35 Other Plastic Not Elsewhere Classified	Yes	
	Metals	Predominantly Metal K-cups	#49 Mixed Metals		
	Organics	Compostable K-cups	#63 Misc Organics		
Plastic Bottles	Plastics		#13-#17 Plastic Bottle Categories	Yes	Separate green & clear PET
Retail Bags/Sleeves	Plastics	Grocery/Merchandise Bags	#23 Film Retail Bags & Sleeves		Require Count & Moisture/Partculate Test
	Plastics	Produce bag	#23 Film Retail Bags & Sleeves		

Exhibit B-2 Intermediate Subsort Material Definitions

AGGREGATE BIN	MATERIAL GROUP	Intermediate Subsort & Definition	Aggregates to	Sent to Resin Subsort?	NOTES
	Plastics	Newspaper Sleeves and Drycleaner Bags	#23 Film Retail Bags & Sleeves		
Rigid Plastics	Plastics	#18 Thermoforms	#18 Thermoforms	Yes	
	Plastics	#20 Tubs and Lids exluding #6 PS	#20 Tubs and Lids exluding #6 PS	Yes	
	Plastics	#22 #1-7 Other Rigid Containers and Packaging	#16 #6 Rigid PS Containers and Packaging	Yes	
	Plastics	#30 Single-Use Plates, Cutlery	#30 Single-Use Plates, Cutlery	Yes	
	Plastics	#35 Other Plastics Materials not Elsewhere Classified	#35 Other Plastics Materials not Elsewhere Classified	Yes	
EPS	Plastics	Clamshells	#30 Single Use Plastics		Require Count & Moisture/Partculate Test
	Plastics	Single Use Cups	#30 Single Use Plastics		
	Plastics	Single Use Plates/Bowls	#30 Single Use Plastics		
	Plastics	Food Pkg EPS	#21 EPS Packaging		
	Plastics	Non-food Packaging EPS	#21 EPS Packaging		
Bulky Plastics	Plastics	#32 Plastic Crates and Soda Bottle Carriers	#32 Plastic Crates and Soda Bottle Carriers	Yes	
	Plastics	#33 Platic Toys/Housewares	#33 Platic Toys/Housewares	Yes	
	Plastics	#34 Other Durable Plastics	#34 Other Durable Plastics	Yes	

Exhibit B-3 Resin Subsort

Plastic Categories Requiring Resin Subsort

12 K-Cups
13-17 Plastic Bottles
18 Thermoforms
20 Tubs, Lids & Caps
21 EPS
22 Rigid Containers/Packaging
30 Single Use Plates/Cups/Cutlery/Straws
31 Plastic Appliances
32 Bulk/Rigid: Crates and Soda Bottle Carriers
33 Bulk/Rigid: Toys & Housewares
34 Bulk/Rigid: Other Durable Plastics
35 Other Plastics Not Elsewhere Classified

old			
1	1	#1 PET	Labeled
2	2	#2 HDPE Natural	Labeled
3	3	#2 HDPE Pigmented	Labeled
4	4	#3 PVC	Labeled/Unlabeled
5	5	#4 LDPE/LLDPE	Labeled
6	6	#5 PP Rigid	Labeled
7	7	#5 PP Expanded	Labeled/Unlabeled
8	8	#6 PS Rigid	Labeled/Unlabeled
9	9	#6 PS Expanded	Labeled/Unlabeled
10	10	#7 Other	Labeled
13	11	Polyethylene Film (HD/LD/LLD)	Labeled/Unlabeled
14	12	Non-PE Film	Labeled/Unlabeled
15	13	Compostable	Labeled Only
16	14	Other	Labeled/Unlabeled

APPENDIX C

SAMPLING FIELD FORMS

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Table 1

Collection Date: 4 / 18 /17

Sample Date: 4 / 19 /17

Borough: K

District: 0 5

Section: 1

Day: T

Route: 1

Stream: M

Truck #: 25DC707

Cart: 1 of 1

Moisture

Tonight's Sample # ___ of ___

Site: Bronx

Sampler: Emily

Bulky Wt: 44.08 lbs

Description: Ferrous Bed frame #48

Bulky Wt : _____ lbs

Description: _____

Bulky Wt: _____ lbs

Description: _____

Notes:

Route	Tip Location	Coll. Date	Samp Date	Truck #	Samp Quad.	Moist. Test	Arrival Time	Sample Weight	# of Carts	Notes
K062H1M	[redacted]	4/27	4/28	25DN-168	3		12:32	122	1	
K174H1P	[redacted]	4/27	4/28	25DP-103	3		1:58	114	1	
K174H3P	[redacted]	4/27	4/28	25CZ-428	1		2:34	111	1	
K175H3P	[redacted]	4/27	4/28	25CZ-613	3	KB	12:38	111	2	
M011H1P	[redacted]	4/27	4/28	25DN-101	2		12:53	117	2	
M023H1P	[redacted]	4/27	4/28	25DC-166	2		1:04	120	2	
M023H2P	[redacted]	4/27	4/28	25DD-708	3	KB	2:22	109	1	
M032H1P	[redacted]	4/27	4/28	25DD-816	1					Did not dump
M043H1P	[redacted]	4/27	4/28	25DD-722	2		1:28	112	1	
M061H3P	[redacted]	4/27	4/28	25DC-140	2		2:01	108	1	
M062H3P	[redacted]	4/27	4/28	25DK-201	3		2:33	112	1	
M062H4P	[redacted]	4/27	4/28	25DC-850	4		2:21	113	1	
M073H1M	[redacted]	4/27	4/28	25DF-106	2		1:43	118	1	
M073H3P	[redacted]	4/27	4/28	25DF-165	3		1:40	116	1	
M074H1M	[redacted]	4/27	4/28	25DF-008	4		1:33	115	1	
S012H1M	[redacted]	4/27	4/28	25CZ-312	4		1:47	108	1	bulk 6.46lbs normal rectangular fan #31
S014H5M	[redacted]	4/27	4/28	25CZ-589	3		2:16	109	1	
S023H3M	[redacted]	4/27	4/28	25DE-229	1		2:04	120	2	
S024H2M	[redacted]	4/27	4/28	25DP-030	3	E	3:20	109	1	
S034H4M	[redacted]	4/27	4/28	25DP-209	1		3:14	113	2	

Expected Samples = 20 **DSNY Contact =** **DSNY Contact P Site Contact =**

Sampler: Noah Neighbor

If found please call 206 443 1123

Supervisor Name: karyn

Arrival Time: 12:00

Notes: spoke with supervisor azorelli at 2:15. He said that they were unaware trucks 708 and 816 were part of the study so OCO/dispatch told them to turn around and dump at their primary site. We caught 708 but not 816.

Exhibit C-3 - Rizzo Sheet

Study Route Name	Tip	DSNY Collection Date	Dump/ Sampling Date	Truck Number (as per Boro Contact)	DSNY Borough Contact	MSW Consultant Contact (Confirmation of Truck Dump)	Time of dump	Remarks (note truck number if different)
X021H2SM	(Confidential)	5/4	5/5	25DP-224	DINAPOLI			
X051H4SM	(Confidential)	5/4	5/5	25CZ-115	DINAPOLI			
X071H6SM	(Confidential)	5/4	5/5	25DP-212	DINAPOLI			
X083H1O	(Confidential)	5/4	5/5	25DC-851	DINAPOLI			
X102H3O	(Confidential)	5/4	5/5	25DP-221	DINAPOLI			
K031H1SM	(Confidential)	5/4	5/5	25DP-706	LINDLEY			
K041H1SM	(Confidential)	5/4	5/5	25DP-477	LINDLEY			
K171HSSM	(Confidential)	5/4	5/5	25DP-103	LINDLEY			
K181HSSM	(Confidential)	5/4	5/5	25DE-117	CAROLAN			
Q016H1SM	(Confidential)	5/4	5/5	25DE-103	AZZARA			
Q081H1SM	(Confidential)	5/4	5/5	25DE-430	SALADINO			
Q101H4O	(Confidential)	5/4	5/5	25DP-008	SALADINO			
Q111H1O	(Confidential)	5/4	5/5	25DE-466	SALADINO			

APPENDIX D

WORK SITE LAYOUT

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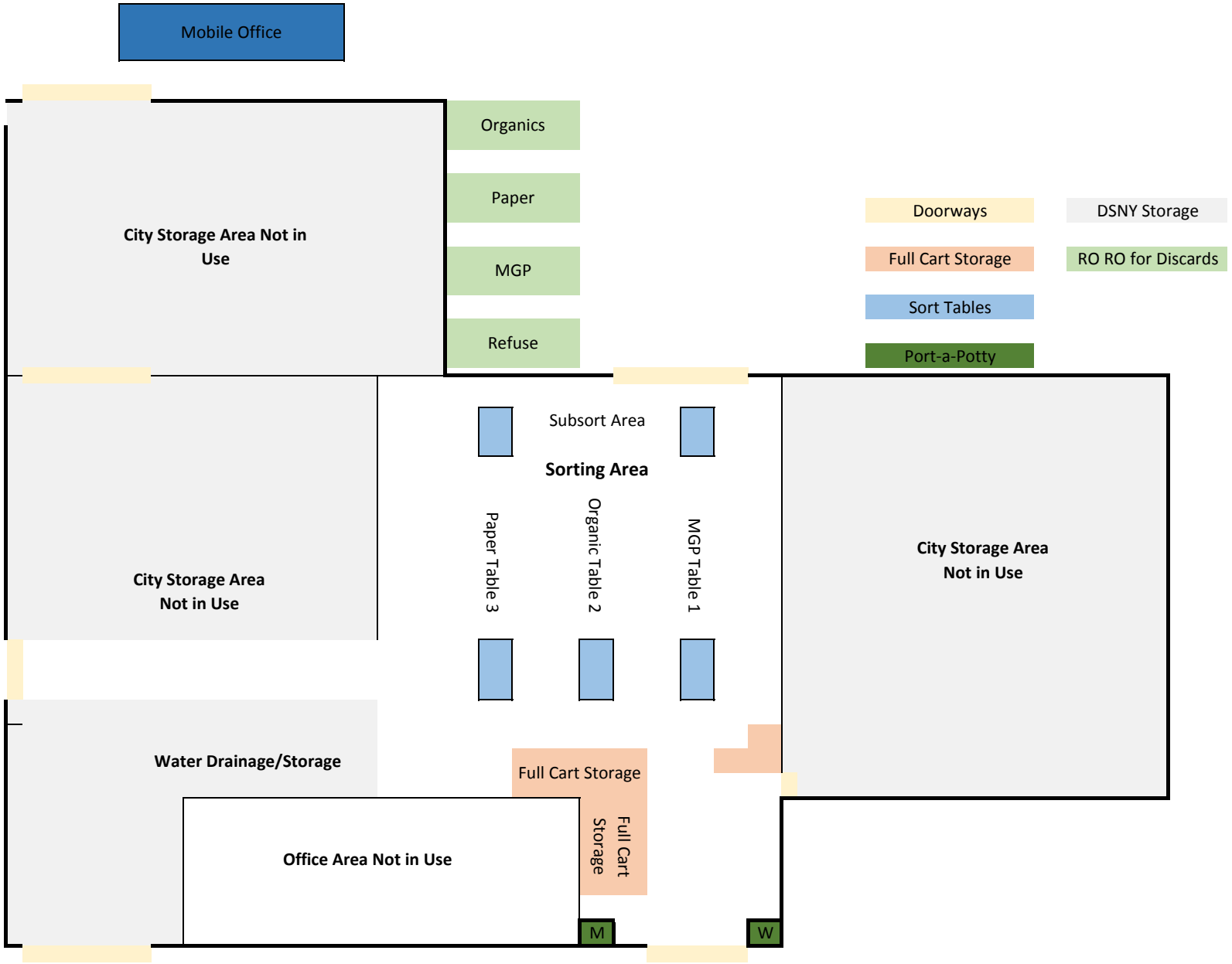
Exhibit D-1 Fresh Kills Landfill Plant 2



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APPENDIX E

HEALTH AND SAFETY PLAN

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SAFETY AND HEALTH PLAN FOR WASTE COMPOSITION ANALYSIS

Sims/DSNY 2017 Waste Characterization Study

March 2017

MSW CONSULTANTS

MSW CONSULTANTS
MidAtlantic Solid Waste Consultants
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Printed on 30% post-consumer recycled paper.

TABLE OF CONTENTS

TABLE OF CONTENTS

List of Figures

List of Tables

SAFETY AND HEALTH PLAN

1. INTRODUCTION

This Safety and Health Plan (SAHP) has been written for use by MSW Consultants, LLC, (MSW Consultants) personnel, their subcontractors, and any other individuals authorized access to areas where site control is established to conduct field work associated with the performance of a physical or visual composition study of municipal solid wastes.

MSW Consultants does not guarantee the health and safety of any person entering the designated work areas. Because of the nature of this work and the activity occurring therein, it is not possible to discover, evaluate, and provide protection for all possible hazards that may be encountered. Strict adherence to these health and safety guidelines will reduce, but not eliminate, the potential for injury or exposure to hazards on the site. The health and safety guidelines in this plan were prepared generally for this type of field activity. It may be necessary to refine this plan for each individual project, depending on local site characteristics and job requirements.

The following practices are included in this document:

- Safety and health framework at host municipal solid waste facilities;
- Sampling hazard evaluation and controls;
- Sorting hazard evaluation and controls;
- Fundamental safe work practices including site controls;
- Personnel protective equipment (PPE) applicable the field work; and
- Emergency response procedures.

A copy of this SAHP will be maintained by the MSW Consultants Field Supervisor at all times while field operations are in progress. A copy of the SAHP will be provided to the client, facility management, subcontractors, and other project stakeholders at their request. Each employee (MSW Consultants or subcontractor) is required to receive basic training on the safety and health principals and procedures contained herein at the outset of the project and sign a release documenting receipt of such training.

1.1. STATEMENT OF SAFETY AND HEALTH POLICY

It is the policy of MSW Consultants to conduct all work in a manner that minimizes the physical and chemical/biological hazards to which workers might be exposed in the course of their work. MSW consultants also will conduct emergency planning in such as way as to minimize the consequences of any accident or exposure for their employees and subcontractors. MSW Consultants will provide adequate training and supervision to all employees performing work on a given project and will be responsible for ensuring all employees and subcontractors follow the provisions of the Safety and Health Plan developed for that project.

Safety is basic or inherent to the work performed by MSW Consultants. Each employee (MSW Consultants or subcontractor) is held accountable and responsible for working safely, including following the procedures and guidance of this SAHP. All employees are required to comply with

applicable safety regulations. Individuals who do not follow the procedure and guidance of this SAHP are subject to removal from the site and project.

In addition to this policy, MSW Consultants will hold the project and corporate staff responsible for the safe conduct of work during this project, according to the role and responsibilities described herein. Any willful violation of the provisions of this plan are grounds for immediate discipline or dismissal.

2. PROGRAM MANAGEMENT

Safety is an essential part of field operations management function and responsibility. It is the responsibility of MSW Consultants designated field operations manager to see that each person under this project understands and complies with all safety rules and requirements. This section presents the general background and guidelines for implementing and complying with safety and health requirements for waste composition studies.

2.1. BACKGROUND INFORMATION

Contractor:	MSW Consultants, LLC
Contract Number:	Contract Dated May 18, 2012 (amended March 22, 2017)
Corporate Address:	11875 High Tech Avenue, Suite 150 Orlando, FL 32817
Phone:	(800) 679-9220
Designated Safety Office:	Mark Hart
Brief Project Name:	Waste and Recycling Composition Study
Brief Project Description:	This project entails the physical sampling and sorting of 200 to 225 pound samples of municipal solid waste and 100 to 125 Pound of MGP and Paper Recyclables into its component categories.

2.2. SAFETY AND HEALTH FRAMEWORK

Figure 2-1 summarizes the three layers of organizations/personnel that are typically involved safety and health plan compliance for waste composition projects. One unique aspect to the performance

of a waste composition study is that the project is typically hosted by a permitted solid waste management facility. Such facilities are required to have detailed safety and health plans, accident prevention plans, accident reporting plans, emergency response plans, and other procedures and policies in place to minimize risks associated with handling municipal solid waste in an operating environment with noise, dust, heavy machinery, and other risks. For this reason, it is MSW Consultants' policy first and foremost to obtain, review, and comply with the safety and health framework that exists at the facility hosting the project.

Figure 2-1 Safety and Health Plan Framework

Occasionally, procedural conflicts may arise between the host facility safety and health procedures and processes and MSW Consultants' site controls. In these instances, the requirement most protective of worker health and safety, the public, and property shall take precedence.

The remainder of this section identifies task organization and personnel responsibilities for the management and implementation of this SAHP. It also specifies the training and physical qualifications of employees performing the work. Accident reporting, recordkeeping, and emergency planning also are discussed in this section of the SAHP:

2.3. SUBCONTRACTORS

MSW Consultants does not subcontract for the performance of waste composition data collection, save for the use of temporary employment agencies to supply light industrial temporary laborers. Although these temporary staffing agencies may maintain corporate safety records and/or safety program statistics, such data is tracked only at the corporate level and is not considered in the pre-qualification of light industrial temporary staff to assist on waste composition data collection projects. MSW Consultants does not review safety training documents, safety programs or safety metrics from these agencies because MSW Consultants supplies this training and documentation, as described in the following section.

2.4. TRAINING REQUIREMENTS

2.4.1 MSW EMPLOYEES

MSW management and field supervisory personnel will be provided basic training on general health and safety, as well as receive first aid training provided by the U.S. Red Cross. Records pertaining to management and field supervisory personnel training will be kept as part of each employee's permanent employee records.

2.4.2 FACILITY-SPECIFIC TRAINING (EMPLOYEES AND SUBCONTRACTORS)

If required by the host facility, all MSW Consultant employees (and subcontractors) will participate in a training program provided by the host facility.

The following training will be provided by MSW Consultants Field Supervisor staff at the outset of the project and prior to conducting any field operations. This training is intended to be provided verbally in the form of tailgate meetings or roundtable discussions with the field employees.

- Understanding the SAHP;
- Personal protective equipment and use;
- Physical, chemical, and biological hazards and prevention;
- Site access and control;
- Roles and responsibilities;
- Accident prevention and reporting; and
- Emergency procedures.

Upon completion of the training program, all participants will be required to sign the Plan Approval and Sign-off Form (Appendix A). Plan Approval and Sign-off forms will be kept for a minimum of three years.

2.5. CLIENT PERSONNEL AND VISITORS

Client personnel other than those already working at the host facility and other visitors must obtain clearance from both the host facility management and from the MSW Consultants Field Supervisor before obtaining access to controlled work areas. Visitors will receive a job-specific safety briefing. Visitors in areas requiring PPE must have the equivalent training and PPE as the on-site worker to gain entry. MSW Consultants is not responsible for distributing or obtaining PPE for visitors, or training visitors or client personnel on proper use of PPE, unless otherwise agreed to prior to the project.

2.6. PHYSICAL QUALIFICATION OF EMPLOYEES

All personnel associated with the sampling and handling of the materials collected from the field for this project will be trained in their safe handling. All personnel involved in the performance of physical work will be physically fit and demonstrate their ability to perform their duties. The MSW Consultants Field Supervisor can prohibit any person from performing work at the site should there be a question as to their fitness for duty.

2.7. ROLES AND RESPONSIBILITIES

2.7.1 CORPORATE SAFETY AND HEALTH MANAGERS

MSW Consultants principals Walt Davenport and John Culbertson are responsible for the health and safety of all MSW Consultants employees. As officers of the company, their role entails:

- Oversee maintenance and implementation of the MSW Consultants Safety and Health Program;
- Provide project personnel with technical guidance for conducting field work in a safe and healthful manner;
- Assist with preparation, or review and approval of project health and safety documents;
- Assign adequate levels of support;
- Interact with contracts personnel to verify that subcontractors are informed and can meet MSW Consultants health and safety requirements for this work; and
- Conduct field audits, as necessary, in accordance with MSW Consultants policies and procedures, and to verify that action plans are developed to correct any deficiencies.
- Confirm adequate documentation of all of the above aspects of the safety program.

2.7.2 FIELD SUPERVISOR

The Field Supervisor will be assigned on a project by project basis and will be trained and knowledgeable in the MSW Consultants SAHP as well as the host facility health and safety requirements. This position will be required to:

- Administer the SAHP for the specific project and coordinate any amendments to the SAHP with the MSW Consultants Health and Safety Managers;
- Verify current certifications of individuals' fitness and training prior to authorizing access to areas where site control is established;
- Conduct emergency planning actions such as interfacing with emergency providers, assessing emergency supplies, assessing possible emergency needs;
- Verify availability of health and safety equipment on site in accordance with the SAHP;
- Verify that copies of plans and regulations are available at the site;
- Conduct employee health and safety orientations prior to the start of field activities;
- Monitor field activities;
- Establish and enforce site controls;
- Assist in independent health and safety site audits conducted by MSW Consultants Corporate Personnel, regulatory agencies, or the host solid waste management facility;
- Conduct accident investigations of injuries, illnesses, and near misses and to ensure the completion of associated documentation;
- Possess first aid training;

- Exercise "stop work authority" when an imminent hazard or potentially dangerous work practice exists; and
- Complete and submit recordkeeping forms mandated by the SAHP.

2.7.3 SUBCONTRACTORS

MSW Consultants has historically relied on temporary light-industrial staffing agencies to supply the sorting laborers needed to perform the physical sorting of solid wastes. These laborers are required to perform the following:

- Attend site-specific orientation and safety meetings when participating in field work;
- Read, understand, and sign the training verification form that states "I have read, understood, and agree to abide by these safety and health policies and procedures," before working on site;
- Evaluate tasks to be performed and site-specific hazards; develop appropriate controls and supplement this SAHP, as required;
- Follow safe work procedures for this work that will address the specific hazards associated with the task to be performed for this work;
- Ensure that all employees are trained in the safe and proper use of all tools they may use;
- Ensure that all employees receive a safety orientation before beginning to work;
- Assure that all employees use all necessary personal protective equipment (PPE); and
- Promptly correct any unsafe conditions.

2.7.4 COMMUNICATIONS

MSW Consultants strives to promote timely and accurate communication to all employees (MSW Consultants or subcontractor). Dynamic and open communication, from the top down and the bottom up, is vital to MSW Consultants' success.

MSW Consultants maintains an open-door policy and strongly encourages employees to communicate their ideas, concerns and suggestions through their supervisors. Because safety is of utmost importance to MSW Consultants, all employees can report safety hazards anonymously and without fear for reprimand or reprisal.

2.8. ACCIDENT REPORTING

As soon as possible following an incident or emergency, the Field Supervisor, or his designee is to directly notify the MSW Consultants Corporate Safety and Health Manager, the host facility manager, the subcontractor contact (if applicable) and the client. The Field Supervisor should be prepared to provide the following information:

- Field Supervisor's name;
- Task name and task number;
- Exact location of incident;
- Name and employer of victim(s);

- Nature and extent of injuries;
- If victim(s) was transported off site for medical treatment, then name and address of medical facility and name of treating physician; and
- Telephone number where the Field Supervisor can be contacted during next 24 hours.

2.9. EMERGENCY PLANNING

This section discusses the health and safety and emergency planning required for this project. If health and safety concerns arise during field activities, the following steps will be taken:

- Bring health and safety concerns to the attention of the host facility manager;
- If the hot facility manager are unable to satisfactorily address concerns, bring the concerns to the attention of the MSW Consultants Corporate Safety and Health Manager;
- In the event of an incident or emergency, notify responsible personnel listed in this plan; and
- Discuss "stop work authority" for imminent danger situations.

3. SANITATION

Waste composition field sorting events typically last for one or more weeks. Because they may be carried out in multiple locations—on the face of a landfill or within the confines of a transfer station or other waste management facility—, it may be necessary to consider providing specialty sanitary requirements at the job site.

3.1. DRINKING WATER

Drinking water for the field work will be brought to the site and stored outside of the work area. It will not be brought within the work area, nor will it be accessed by any worker in a non-emergency situation without the worker first undergoing the proper decontamination procedure, as described elsewhere in this plan.

3.2. TOILETS AND WASHING FACILITIES

If the host facility provides access to toilets, including washing facilities, within reasonable distance from the job site, such toilets will be used. If no such access if possible, portable toilet facilities, including washing capability, will be provided by MSW Consultants for field work. Portable toilet facilities will be located outside, but in close proximity to, the work area. Workers must first undergo decontamination before using portable toilet facilities.

MSW Consultants will also maintain anti-bacterial hand sanitizer for use outside the work area.

3.3. WASTE DISPOSAL

To the extent wastes are generated by field operations, this waste will be disposed in the same manner as the removal of sorted samples.

3.4. VERMIN CONTROL

MSW Consultants will comply with the vermin control measures in place at the host facility. This typically consists of maintaining daily site clean-up efforts, and requires that un-sorted samples be completely contained for overnight storage.

4. MEDICAL AND FIRST AID REQUIREMENTS

This section discusses the first aid and medical requirements that are applicable for this work. Prior to start of work, arrangements shall be made for medical facilities and personnel to provide prompt attention to the injured and for consultation on occupational safety and health matters. Medical considerations include:

- An effective means of communication (hard-wired or cellular telephone, two-way radio, etc.) with 911 access or other emergency response source and transportation to effectively care for injured workers shall be provided. Communication devices shall be tested in the area of use to assure functionality.
- The telephone numbers and locations of physicians, hospitals, or ambulances shall be carried by the Field Supervisor at all times.

4.1. FIRST AID KITS

First aid kits will be stored at locations where field work will be performed or in vehicles used to transport workers to the field. The kits will contain standard first aid supplies, including, but not limited to bandages and treatment for minor abrasions and strains and will comply with the criteria contained in American National Standards Institute (ANSI) Z308.1 in the ratio of one for every 25 persons or less. Distilled water or portable saline solution bottles will be taken to the field for emergency eye wash purposes.

First-aid kits shall be easily accessible to all workers, and each item maintained sterile. The contents of first-aid kits shall be checked by the employer prior to their use and at least weekly when work is in progress to ensure that expended items are replaced.

4.2. FIRST AID STATIONS AND INFIRMARIES

There are no first aid stations or infirmaries provided for this work, other than an eyewash station or a full supply of portable eye-wash bottles provided at by the Field Supervisor. Other than minor first aid procedures, all injuries or exposures will be treated by emergency personnel at off-site facilities.

If a medical emergency occurs, the Field Supervisor assumes charge until an ambulance arrives or until the injured person is admitted to the emergency room. Site personnel will prevent further injury by taking the following actions:

- If properly trained (including blood borne pathogen training) and properly equipped with appropriate PPE, initiate first aid and CPR, if needed.
- Call ambulance and hospital, as appropriate.

- Determine whether decontamination will make injury worse. If yes, seek medical treatment immediately.
- Make certain the injured person is accompanied to the emergency room by at least one field team member with the same employer.

5. PERSONAL PROTECTIVE EQUIPMENT (PPE)

The purpose of personal protective clothing and equipment is to shield or isolate individuals from the hazards that may be encountered when engineering and other controls are not feasible or cannot provide adequate protection. Adherence to all prescribed controls is vital to minimize exposures. If a hazard is encountered, MSW Consultants will immediately conduct a Hazard Assessment (Appendix C), take corrective action and record the incident.

PPE ensembles for site activities are defined by the EPA and OSHA. Either MSW Consultants or the subcontractor will supply appropriate PPE for their staff at no cost to individual employees or subcontractor staff, as agreed prior to the field operations. PPE must conform to the requirements of this SAHP; therefore, employee-owned equipment is not allowed. Those not supplied with the proper PPE will not be allowed to work at the site. PPE will be inspected, tested, and used as required.

Employees shall be physically able and medically determined qualified to use the personal protective and safety equipment that may be required in their job duties. Employers shall ensure users of personal protective and safety equipment are trained to know the following: when PPE, and what types of PPE are necessary; how to properly don, doff, adjust, and wear PPE; limitations of the PPE; and proper care, inspection, testing, maintenance, useful life, storage, and disposal of the PPE.

Each affected employee shall demonstrate an understanding of this training and the ability to use PPE properly before being allowed to perform work requiring the use of PPE. When the employer has reason to believe that any affected employee who has been trained does not have the understanding and skill required for the task, the employer shall assure the employee receives the necessary retraining to acquire the appropriate skills. Re-training will also be conducted when the site environment changes, or if the PPE is changed/upgraded.

Upon completion of the PPE training program, all participants will be required to sign the Plan Approval and Sign-off Form (Appendix A).

Personal protective and safety equipment shall be inspected and maintained in serviceable and sanitary condition as recommended by the manufacturer. Defective or damaged equipment shall not be used and shall be removed from the work site to prevent accidental use. Most PPE required for waste composition projects is single-use only, with the intent of being discarded at the end of the day. For re-usable PPE, before being stored or reissued to another person, equipment shall be cleaned, disinfected, inspected, and repaired.

In general, MSW Consultants will comply with the PPE requirements of the host solid waste management facility. Such requirements supersede those described in this SAHP. However, MSW Consultants will require the following minimum PPE regardless of the host facility requirements.

5.1. GLOVES

Gloves are required to be worn by every employee involved in the physical handling of waste, regardless of the requirements of the host facility. Municipal solid waste may contain materials that are sharp or chemically dangerous if contacted by skin. Appropriate gloves are critical to worker safety.

MSW Consultants has evaluated safety gloves available from the safety products industry. Based on extensive field and office testing, we have standardized on heavy duty neoprene gloves that are compliant with CFR 21 Parts 170-199. Our preferred glove is shown in Figure 5-1. While no glove will effectively prevent every puncture, this glove provides extremely high puncture resistance, as well as chemical protection for chemical processing, alkaline units at petroleum refineries, metal plating operations, haz-mat handling, haz-mat suits and for hazardous waste disposal. Although arguably overkill for handling municipal solid waste, we believe such precautions are appropriate.

Figure 5-1 MSW Consultants Preferred Glove

5.2. EYE PROTECTION

Eye protection will be worn by employees engaged in physical sorting of municipal solid waste. Eye protection equipment shall be distinctly marked to facilitate identification of the manufacturer. Every worker should know the location of the nearest eye wash station or the location of eye wash bottles prior to beginning work.

MSW Consultants has evaluated eye protection products available from the safety products industry. Based on extensive field and office testing, we have standardized our eye protection on the product shown in Figure 5-2. This product is compliant with ANSI Z87.1-1989, and features an optimal combination of protection, functionality, and comfort. The wraparound style has a hingeless frame system, a single lens design providing a continuous field of vision, and a dynamic shape that allows you to wear eyewear around your neck, on top of your head or over a hardhat. The gel temple sleeves and soft, secure gel nosepiece provide additional wearing comfort. A clip-on, breakaway retainer cord is included with every pair. The lens is constructed of impact-resistant polycarbonate lens filters out 99.9% of UV radiation, and includes a scratch-resistant coating.

Figure 5-2 MSW Consultants Preferred Eye Protection

5.3. RESPIRATORY PROTECTION

Due to the non-hazardous levels of contaminants anticipated in handling municipal solid waste, respiratory protection is not required but will be offered to all employees. MSW Consultants has evaluated respiratory protection products available from the safety products industry. Based on extensive field and office testing, we have standardized our respiratory protection on the product shown in Figure 5-3. This product is National Institute for Occupational Safety and Health (NIOSH) approved. It conforms to facial contours, and comes in individual packages for ease of distribution and sanitary storage.

Figure 5-3 MSW Consultants Preferred Respiratory Protection

5.4. FOOTWEAR

Heavy-duty work boots with leather uppers are the minimum foot protection required to perform waste composition analysis. Although steel toes are not required, they are preferred. Employees (or subcontractors) not wearing the minimum foot protection shall not be allowed to enter the work site.

5.5. PROTECTIVE SUITS

Although not required, MSW Consultants will provide and encourage that all workers wear aprons or coveralls for the duration of physical sorting of wastes. For warm weather sorts, aprons are generally preferable because they allow greater airflow and help keep workers from overheating. For cold weather sorts, coveralls are preferred because they add a layer of warmth as well as barrier protection. Figure 5-4 shows a standard Tyvek coverall that may be worn in colder weather sorting events. These coveralls are available in a wide range of sizes, and meet sizing requirements of ANSI/ISEA 101-1996.

Figure 5-4 Tyvek Coveralls

5.6. OTHER PPE

Although not required by MSW Consultants when performing waste composition analysis, many host solid waste management facilities may require the following PPE:

- Reflective vests;
- Hard hats; and
- Hearing protection.

MSW Consultants will conduct a Hazard Assessment (Appendix C) to further confirm all required PPE items and they will be provided by MSW Consultants (at no cost to the employee).

6. HAZARDOUS SUBSTANCES AND ENVIRONMENTS

The activities covered by this SAHP take place entirely at host facilities permitted to receive municipal solid wastes (MSW). MSW by definition does not contain hazardous or toxic substances in sufficient concentration to require extraordinary safety precautions. However, MSW does potentially contain trace quantities of chemical, biological, and physical hazards that may be encountered during the conduct of work. This SAHP is written to provide guidance on ways to eliminate or minimize exposure to these trace hazards, and the steps to take if an exposure occurs.

To ensure that the designated work areas are safe and hazard-free, MSW Consultants will work closely with the host facility. MSW Consultants will also perform an initial site inspection to establish a safe work area and may perform periodic inspections to evaluate workplace hazards (Appendix C). Each inspection will be signed by the designated inspector and kept for a minimum of three years.

6.1. HAZARDOUS SUBSTANCES

Municipal solid waste by definition may not contain hazardous waste, with the exception of Household Hazardous Wastes (HHW) from residential generators, or commercial generators that dispose of HHW-like products at the minimum levels. Nonetheless, employees performing waste composition analysis must have an awareness of the possibility of these materials, which may include:

- Medical wastes from residential generators (e.g., sharps), including wastes that may contain bloodborne pathogens;
- Household poisons;
- Flammable chemicals;
- Lead-based paints; and
- Reactive agents.

Radioactive, biologically active, explosive and other highly hazardous materials are prohibited from being disposed as municipal solid waste, and to the extent these items are found during a waste composition study all sorting activities will be immediately postponed and the host facility management notified for removal of these wastes and site remediation.

This SAHP covers a wide variety of hazards known or suspected to exist or that are inherent to the process of waste management activities; however, unforeseen hazards may be present in the performance of these tasks. Hazards not covered by this SAHP specifically will be assessed by the Field Supervisor for the appropriate control measures to maximize worker, environment, and public safety.

6.2. HARMFUL PLANTS, ANIMALS, AND INSECTS

Depending on the location of the waste composition analysis, it is possible that the potential exist to exposure to harmful plants, animals or insects. Poison ivy may be encountered on the periphery of some work areas, and could conceivably occur in the sample itself. It is identified as having dark green, somewhat shiny foliage with sets of three, pointed leaves. Protective clothing will be worn during the performance of field work. Outer garments can either be disposed or washed at the end of each day. Protective gloves will be worn. If encountered, do not touch or burn this plant. If exposure occurs, thoroughly wash the exposed area with soap and water within 10 minutes to remove the irritating oil.

Although a remote risk, outdoor work areas may be in areas where deer ticks live. Deer ticks can carry Lyme Disease. Evidence of exposure is the presence of a tic on the body or clothes. A small, red circular area will appear shortly after a bite. If exposed, contact a physician and save the offending tics, if possible, for analysis. Avoid dense woods and wear a hat and light-colored, protective clothing. Check body at the end of each field day for the presence of tics.

Mosquitoes are known carriers of the West Nile Virus and other diseases. For outdoor work areas, protective clothing, including long pants and shirts, will be worn to reduce the area of exposure.

There is a possibility for other harmful vermin to be present at the site, such as snakes. Level D Modified PPE requires that boots should be worn, as well as long pants, which will discourage exposure to snakes. Due caution should be exercised when performing field work.

6.3. INCLEMENT WEATHER AND ENVIRONMENTAL HAZARDS

Hazards presented by the natural work environment may include heat or cold stress, and inclement weather. When there are warnings or indications of impending severe weather (heavy rains, damaging winds, tornados, hurricanes, floods, lightning, etc.), weather conditions shall be monitored and appropriate precautions taken to protect personnel and property from the effects of the severe weather. Table 6-1 outlines exposure control methods for working in extreme temperatures and summarizes symptoms and treatment procedures for heat and cold stress.

Table 6-1 Symptoms and Treatment of Heat and Cold Stress

Conditions	Symptoms	Treatment
Heat stroke	Red, hot, dry skin; no perspiration; dizziness; confusion; rapid breathing and pulse; and high body temperature.	This is a MEDICAL EMERGENCY! Cool victim rapidly by soaking in cool (not cold) water. Loosen restrictive clothing. Get medical attention immediately!
Heat exhaustion	Pale, clammy, moist skin; shallow breathing; profuse sweating; weakness; normal temperature; headache; dizziness; and vomiting.	Move victim to a cool, air-conditioned area. Loosen clothing, place head in low position. Have victim drink cool (not cold) water.

Frostbite	Blanched, white, waxy skin, but resilient tissue; tissue cold and pale.	Move victim to a warm area. Warm area quickly in warm (not hot) water. Do not break any blisters. Elevate the injured area and get medical attention.
Hypothermia	Shivering, apathy, sleepiness; rapid drop in body temperature; glassy stare; slow pulse; and slow respiration.	Move victim to a warm area. Have victim drink warm fluids - not coffee or alcohol. Get medical attention.

In the event of adverse weather conditions, the Field Supervisor will evaluate whether work can continue without compromising the health and safety of site personnel. The Field Supervisor will direct the implementation of precautions necessary to ensure the health and safety of site personnel. A lightning watch will go into effect 30 minutes prior to thunderstorms being within a five nautical mile radius of an activity. During the watch, operations or activities may continue, however all personnel must be prepared to implement warning procedures without delay. Workers must be alert for any lightning activity, to include audible thunder, and advise supervisory personnel of any observations.

6.4. DECONTAMINATION

Decontamination protects workers, the public, and the environment by limiting exposure to harmful substances and by preventing the spread of contamination. The Field Supervisor will oversee personnel and equipment decontamination to determine its effectiveness, and take corrective actions to rectify any deficiencies. Table 6-2 presents the decontamination procedures that will be followed for personnel and equipment. Subcontractors are responsible for decontaminating their own equipment and personnel according to these procedures.

Table 6-2 Decontamination Procedures

Item	Decontamination Procedure
Sampling Table, Bins, and Tools	Pressure wash at the conclusion of the waste composition study in an area with leachate collection.
Personal – Mid day breaks	PPE shall be removed while the worker is in the work area. Employees shall wash hands and forearms in the washing facility supplied for the project.
Personal – End of Day	Hard hats, vests and eye protection shall be returned to the Field Supervisor for inspection and cleaning. Neoprene gloves shall be removed, inspected for tears and chemical damage, and if still in safe working condition, stored in the work area. Damaged gloves shall be replaced for subsequent work days. Tyvek suits, respirators, and ear plugs shall be discarded as solid waste. Employees shall wash hands and forearms in the washing facility supplied for the project.

6.5. PERSONNEL DECONTAMINATION

All personnel exiting the sampling area will follow decontamination procedures. Under no circumstances (except emergency evacuation) will personnel be allowed to leave the work area before decontamination. The Field Supervisor may approve simplification of the procedures in the field when a determination has been made that decontamination procedures are unnecessary.

7. MATERIAL HANDLING

Although waste composition project do not require extensive handling of heavy material, there is significant lifting and carrying that must be performed to complete the data collection. This section describes considerations in handling materials during the waste composition study.

7.1. LIFTING AND CARRYING

Employees shall be trained in and shall use safe lifting techniques. When lifting:

- Reaching out to lift an object fights against gravity, and increases strain on the lower back. Stand close to the load to be lifted and spread your feet for balance.
- Be certain the weight being lifted is within your capabilities. Ask for assistance if needed.
- Bend your knees and keep your spine straight. Grasp the object to be lifted and keep it close to your body.
- Using your leg muscles, straighten your knees and stand.

When carrying:

- Always keep the object you are carrying close to your body.
- When changing directions, shift your feet. Don't twist the upper body.
- Try to avoid changing your grip while carrying the load.
- After reaching your destination, keep the object close to your body, keep the spine straight, and slowly bend the knees as you lower the object to the floor.

7.2. MATERIAL AND EQUIPMENT STORAGE

To the extent it is necessary to store sampled wastes, the entire sample shall be contained by either temporary or permanent means. Permanent storage is preferred in containers with lids. In some instances, tarping of sampled material is acceptable, provided the tarp can fully contain the sampled waste and be weighted down to prevent removal by vermin of from winds.

Work site equipment shall be stacked, consolidated, and placed at ground level so that it is stable and secured against sliding or collapse.

7.3. HOUSEKEEPING

Scrap, trash, and other wastes shall be placed in designated containers. Work areas shall be cleaned up as the job progresses. Cords and hoses shall be routed in a manner that will present no tripping hazard - preferably overhead. At a minimum, all tools, and equipment shall be stored in a stable

position (tied, stacked, or chocked) to prevent rolling or falling. Tools and equipment will preferably be removed from the work site for secure storage in a vehicle overnight. A safe access way shall be maintained to all work areas and emergency exits.

7.4. MATERIAL DISPOSAL

Waste generated onsite from field activities includes the sorted waste samples, PPE discards, and field trash. These wastes will be managed as non-hazardous, solid waste, and will be placed in the same receptacle being used to remove sorted waste samples.

Any HHW that is found in the samples wastes shall be stored and disposed according to host facility HHW collection policies. If no such policies exist, the HHW will be disposed with the remaining solid wastes.

At the request of the host facility, recyclable materials may be set aside for recovery by the host facility.

8. SITE CONTROL

Effective site control procedures will reduce the potential safety and health risks to the workers on site. Site control includes the following safe work practices:

- Limiting work area access to essential personnel, both during work hours and off hours;
- Establishing work zones within the sampling and sorting areas, and restricting personnel entering work zones;
- Establishing decontamination procedures for personnel and equipment; and
- Assuring that personnel may be accurately and quickly located and evacuated during an emergency.

At no time will new substances, procedures or processes be introduced into the work site without prior evaluation and approval by MSW Consultants management.

As a general site control, alcoholic beverages, food, cigarettes, and other consumable products are prohibited in work areas at all times.

8.1. SAMPLING AREA CONTROLS

An area at the host facility will be set aside for the oversight of vehicle load tipping and sampling of the tipped load. The sampling work area shall be controlled by:

- Delineating boundaries for the tipping of targeted loads of waste;
- Prohibiting entry into these boundaries by non-targeted truckloads;
- Providing for the safe queuing of material transport hoppers out of the way of collection vehicles and waste handling mobile equipment such as loaders or compactors; and
- Providing a storage location for a loader or bobcat that may be needed to transport samples.

Only the Field Supervisor or a trained sampling manager may enter into the sampling work area during the course of the project.

8.2. SORTING AREA CONTROLS

An area at the host facility will be set aside for the performance of sorting and weighing sampled wastes. The sorting work area shall be controlled by:

- Setting aside a 20 foot by 20 foot space where the sort table and bins can be positioned;
- Providing additional space for queuing samples;
- Maintaining a consistent site configuration so that employees know the proper position of all equipment and materials; and
- Being established out of the way of any heavy machinery or equipment that may be in operation within the facility boundaries.

No personnel will enter or work in delineated work zones without proper training or an escort.

APPENDIX A – PLAN APPROVAL AND SIGN OFF

This Safety and Health Plan has been written for the exclusive use of MSW Consultants, its employees, and subcontractors. Although intended to be a generic plan that applies broadly to waste composition projects, it may require amendment for certain specific projects or facilities. Subcontractors are required to supplement this plan, as needed, to address specific tasks (and associated hazards) they may be performing.

The following signatures verify that the undersigned has either reviewed the written Plan or else has received training on relevant components of the Plan.

Project: Sims/DSNY 2017 Waste Characterization Study

Location: Site 2 Fresh Kills Landfill

Concurrence by: Mark Hart Date: _____

MSW Consultants Field Safety Office

Crew Signoff:

"I have read, understood, and agree to abide by relevant sections of this SAHP."

Signature:_____ Date: _____

Organization: _____

Signature:_____ Date: _____

Organization: _____

Signature:_____ Date: _____

Organization: _____

Signature:_____ Date: _____

Organization: _____

APPENDIX A - PLAN APPROVAL AND SIGN OFF

Project: _____ Location: _____

Signature:_____ Date: _____

Organization: _____

Signature:_____ Date: _____

Organization: _____

Signature:_____ Date: _____

Organization: _____

Signature:_____ Date: _____

Organization: _____

Signature:_____ Date: _____

Organization: _____

Signature:_____ Date: _____

Organization: _____

Signature:_____ Date: _____

Organization: _____

Signature:_____ Date: _____

Organization: _____

Signature:_____ Date: _____

Organization: _____

SAFETY AND HEALTH FOR WASTE COMPOSITION ANALYSIS
Safety Training Acknowledgement Form

Trainee:_____ _____ _____
Printed Name Signature Date

I have been trained on the following safety topics:

Personal Protective Equipment

PPE shall be removed while the worker is in the work area. Employees shall wash hands and forearms in the washing facility supplied for the project.

Always wear safety glasses during sorting and handling waste/recyclables

Voluntary use of Respiratory Protection

At the end of each day, hard hats, vests and eye protection shall be returned for inspection, rinsed with soap and water and allowed to air dry. Neoprene gloves shall be removed, inspected for tears and chemical damage, and if still in safe condition, stored in the work area. Damaged gloves shall be disposed of. Tyvek suits, respirators, and ear plugs shall be discarded as solid waste. Employees shall wash hands and forearms in the washing facility supplied for the project.

At the Sorting Table

Don't throw material more than 6 inches

Always wear PPE: glasses, gloves, tyvek

Never reach in to pile or bag

Never reach into a bag or container when you can't see the contents

Never touch sample without two gloves, liner and nitrile glove

Never lift bag or container (even seemingly rigid container) from the bottom.

Never rub table or other surface which may contain broken glass with hands

Proper lifting techniques

Avoid reaching out to lift an object which increases strain on the lower back.

Stand close to the load to be lifted and spread your feet for balance.

Be certain the weight being lifted is within your capabilities. Ask for assistance if needed.

Bend your knees and keep your spine straight. Grasp the object to be lifted and keep it close

Using your leg muscles, straighten your knees and stand.

When carrying:

- Always keep the object you are carrying close to your body, unless it is a bag of waste!
- When changing directions, shift your feet. Don't twist the upper body.
- Try to avoid changing your grip while carrying the load.
- After reaching your destination, keep the object close to your body, keep the spine straight, and slowly bend the knees as you lower the object to the floor.

Hydration starts before you leave for work

Avoid caffeine and salty foods

If you aren't hydrating, you are dehydrating!

Wash your hands before grabbing a drink from the cooler. Every Time!

Hand washing facilities provided at the portolets. Wash hands before and after using toilet.

Do not drink water from hand washing sink.

Men: use the mens portolet.

SEGURIDAD Y SALUD PARA EL ANÁLISIS DE RESIDUOS DE COMPOSICIÓN
Formulario de Reconocimiento de Formación de Seguridad

Trabajador: _____ _____ _____
Nombre impreso Firma Fecha

He sido entrenado en los siguientes temas de seguridad:

Equipo de Protección Personal

PPE no deberá ser removido mientras que el trabajador se encuentra en el área de trabajo. Los trabajadores deben lavarse las manos y los antebrazos en las instalaciones de lavado suministrada para el proyecto.Siempre use gafas de seguridad durante la clasificación y manejo de residuos reciclables/ uso voluntario de protección respiratoria

Al final de cada día, cascos, chalecos y protección para los ojos se devolverá para la inspección, se aclaró con agua y jabón y se dejó secar al aire. Guantes de neopreno deberán ser removidos, inspeccionados para las cortadas y daño químico, y si todavía en condición segura , almacenado en el área de trabajo. Guantes dañados deberán ser desechados. Trajes Tyvek, y respiradores serán descartados como residuos sólidos. Los trabajadores deben lavarse las manos y los antebrazos en las instalaciones de lavado suministrada para el proyecto.

En la mesa de selección

No tirar material de más de 6 pulgadas

Siempre use PPE: gafas, guantes, Tyvek

Nunca trate de alcanzar en apilar o bolsa

No tocar nunca una bolsa o recipiente cuando no se puede ver el contenido

Nunca toque la material sin dos guantes, trazador de líneas y el guante de nitrilo

Nunca levante bolsa o recipiente (aun recipiente aparentemente rígido) desde la parte inferior.

Nunca frote mesa u otra superficie que puede contener vidrios rotos con las manos

Técnicas de levantamiento apropiadas

Evitar llegar a levantar un objeto que aumenta la tensión en la espalda baja.

De pie cerca de la carga a elevar y extender los pies para mantener el equilibrio.

Asegúrese de que el peso se levante está dentro de sus capacidades. Pida ayuda si es necesario.

Doble las rodillas y mantener la columna recta. Agarre el objeto a ser levantado y mantenerlo cerca

Usando sus músculos de las piernas, estire las rodillas y de pie.

Cuando se lleva a:

- Mantenga siempre el objeto que se está llevando a cerca de su cuerpo, a menos que sea una bolsa de residuos! Al cambiar de dirección, cambiar sus pies. No gire la parte superior del cuerpo.
- Trate de evitar el cambio de su agarre mientras se transporta la carga.
- Después de llegar a su destino, mantenga el objeto cerca de su cuerpo, mantener la columna recta, y poco a poco doblar las rodillas a medida que baja el objeto al suelo.

La hidratación se inicia antes de salir para el trabajo

Evitar la cafeína y los alimentos salados

Lávese las manos antes de tomar una bebida de la nevera. Cada vez!

Instalaciones para lavarse las previstas en los portolets. Lavarse las manos antes y después de ir al baño.

No beba agua del lavamanos.

Hombres: utilizan el portolet hombre.

APPENDIX B
ACCIDENT OR INJURY REPORT: Confidential

Date/Time Report Initiated: _____

Information in this report is to be used for the prevention of accidents and is not intended as a basis for injury claims. In counting time lost, start with the first full day or shift lost after date of injury and do not include weekends and holidays.

GENERAL INFORMATION:

Type of Accident:
Location:
Weather Conditions: Sunny Clear Overcast Rain Snow Other:
Temperature: Below 32°F 32°-60° 60°-70° 70°-85° Over 85°F
Wind: Still Moderate High Stormy

INJURED PERSONNEL:

Name:
Age: Title: Occupation:
Employer if Different from MSW Consultants:
How Long Employed: Remarks:

NATURE AND PLACE OF INJURY:

Date and Time of injury:
Exact place where injury occurred:
If lost time/restricted duty resulted, date employee started losing time/restricted duty:
Did injury result in death or probable permanent disability?
Return to work date/full duty: (Estimated)
Date of death:
Calendar days lost time (Estimated):
Describe accident/ injury:

IF INJURED PERSON IS EMPLOYED BY ANOTHER FIRM:

Date and Time injured personnel's employer was contacted:
Name of employer contact person:

Supervisor Signature: _____ Date: _____

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APPENDIX F

HEALTH AND SAFETY PRESENTATION

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HEALTH AND SAFETY TRAINING FOR WASTE COMPOSITION ANALYSES

Overview

- Introduction
- Program Management
- Sanitation
- Medical and First Aid Requirements
- Personal Protective Equipment (PPE)
- Hazardous Substances and Environments
- Material Handling
- Site Control

The following practices are included in this presentation:

- Safety and health framework at host municipal solid waste facilities;
- Sampling hazard evaluation and controls;
- Sorting hazard evaluation and controls;
- Fundamental safe work practices including site controls;
- Personnel protective equipment (PPE) applicable the field work; and
- Emergency response procedures

Safety and Health Plan Framework

TRAINING REQUIREMENTS

- Understanding the SAHP
- Personal protective equipment and use;
- Physical, chemical, and biological hazards and prevention;
- Site access and control;
- Roles and responsibilities;
- Accident prevention and reporting; and
- Emergency procedures.

Expected Hazards

- Sharps
- Syringes
- Hazardous wastes
- Noxious odors
- Dehydration
- Strains
- Slips, Trips and Falls

At the sorting table:

- Don’t throw material more than 6 inches
- Always wear PPE: glasses, gloves, tyvek
- Never reach in to pile or bag

Physical Qualifications/Ergonomics

- Proper lifting techiques
- Regular stretching
- Know your limits

LIFTING AND CARRYING

Reaching out to lift an object fights against gravity, and increases strain on the lower back.

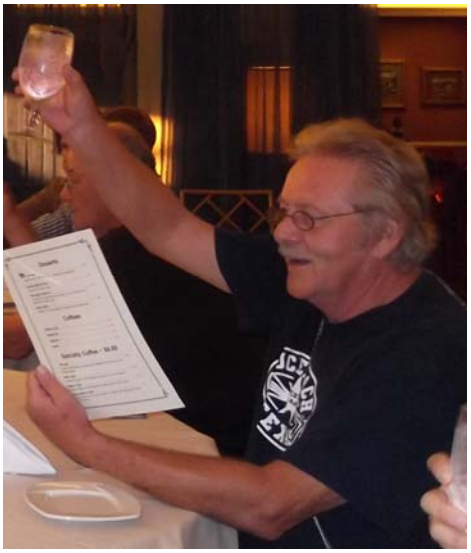
- Stand close to the load to be lifted and spread your feet for balance.
- Be certain the weight being lifted is within your capabilities. Ask for assistance if needed.
- Bend your knees and keep your spine straight. Grasp the object to be lifted and keep it close to your body.
- Using your leg muscles, straighten your knees and stand.

When carrying:

- Always keep the object you are carrying close to your body, unless it is a bag of waste!
- When changing directions, shift your feet. Don't twist the upper body.
- Try to avoid changing your grip while carrying the load.
- After reaching your destination, keep the object close to your body, keep the spine straight, and slowly bend the knees as you lower the object to the floor.

Hydration!

- Hydration starts before you leave for work
- Avoid caffeine and salty foods
- If you aren't hydrating, you are dehydrating!
- Wash your hands before grabbing a drink from the cooler. Every Time!



Sanitation

- Hand washing facilities provided at the portolets. Wash hands before and after using toilet.
- Do not drink water from hand washing sink.
- Men: use the mens portolet.

First Aid

- Report to Crew Chief, Mark or Supervisor.

Gloves

Hand Safety: Nevers

- Never reach into a bag or container when you can't see the contents
- Never touch sample without two gloves, liner and vitrile glove
- Never lift bag or container (even seemingly rigid container) from the bottom.
- Never rub table or other surface which may contain broken glass with hands

Decontamination

Personal – Mid-day breaks

- PPE shall be removed while the worker is in the work area. Employees shall wash hands and forearms in the washing facility supplied for the project.

Decontamination

Personal – End of Day

- Hard hats, vests and eye protection shall be returned to the Field Supervisor for inspection and cleaning.
- Neoprene gloves shall be removed, inspected for tears and chemical damage, and if still in safe working condition, stored in the work area. Damaged gloves shall be replaced for subsequent work days.
- Tyvek suits, respirators, and ear plugs shall be discarded as solid waste.
- Employees shall wash hands and forearms in the washing facility supplied for the project.

Eye Protection

- Always wear safety glasses during sorting and handling waste/recyclables
- Rinse with soap and water if necessary and allow to air dry

Respiratory Protection

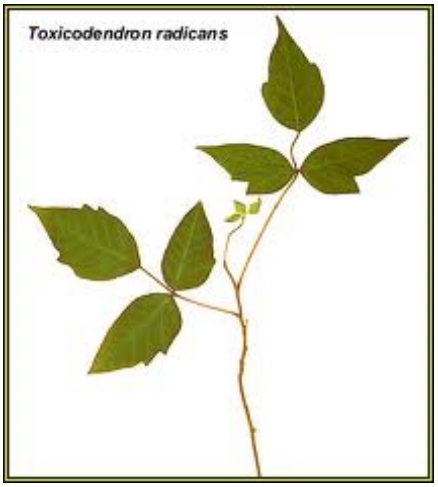
- Voluntary use
- See Mark for more information.

PROTECTIVE SUITS

- Suits or aprons required at sorting table
- If you're wearing a suit, increase hydration

HARMFUL PLANTS, ANIMALS, AND INSECTS

- Poison Ivy, Oak
- Rats
- Cats
- Snakes



Questions?

Just Ask!

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APPENDIX G

SORTING PROCEDURES

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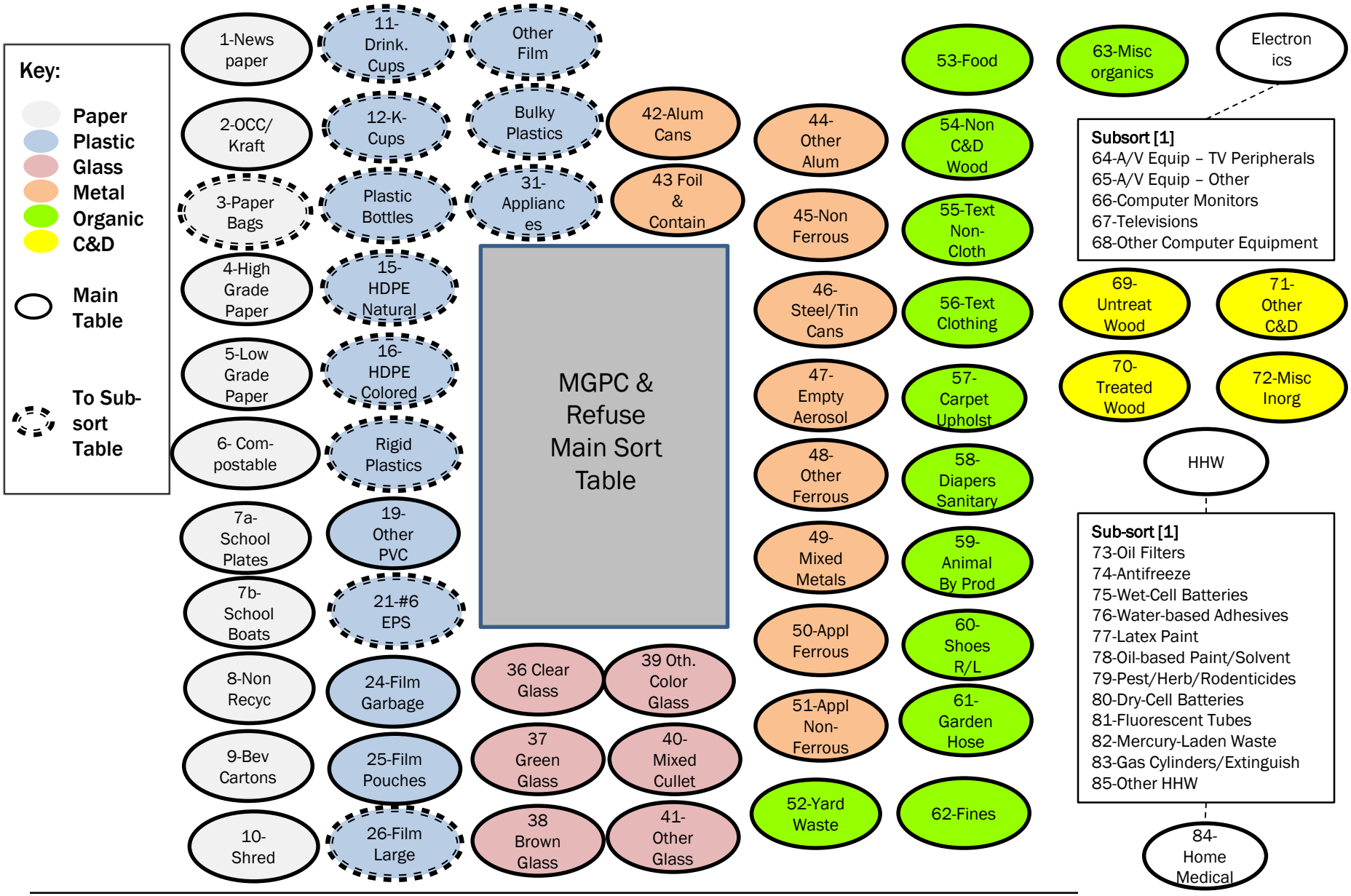
Exhibit G1a - Sorting Procedures Main Sort Table (Refuse)



Notes:

[1] Sub-sorts to be performed as part of weigh-out procedure by assigned sorting staff.

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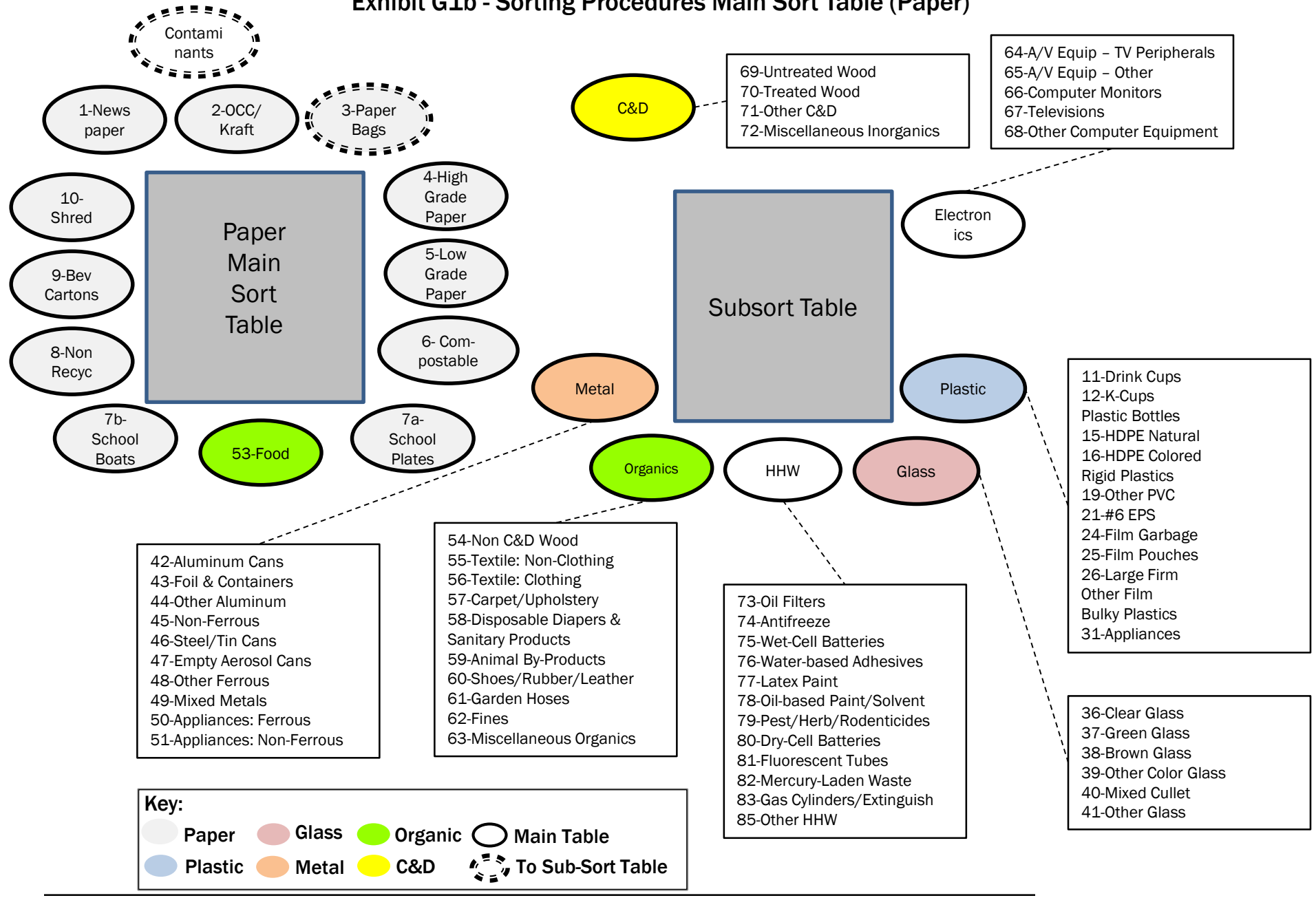
Exhibit G1b - Sorting Procedures Main Sort Table (Paper)



Notes:

[1] Sub-sorts to be performed as part of weigh-out procedure by assigned sorting staff.

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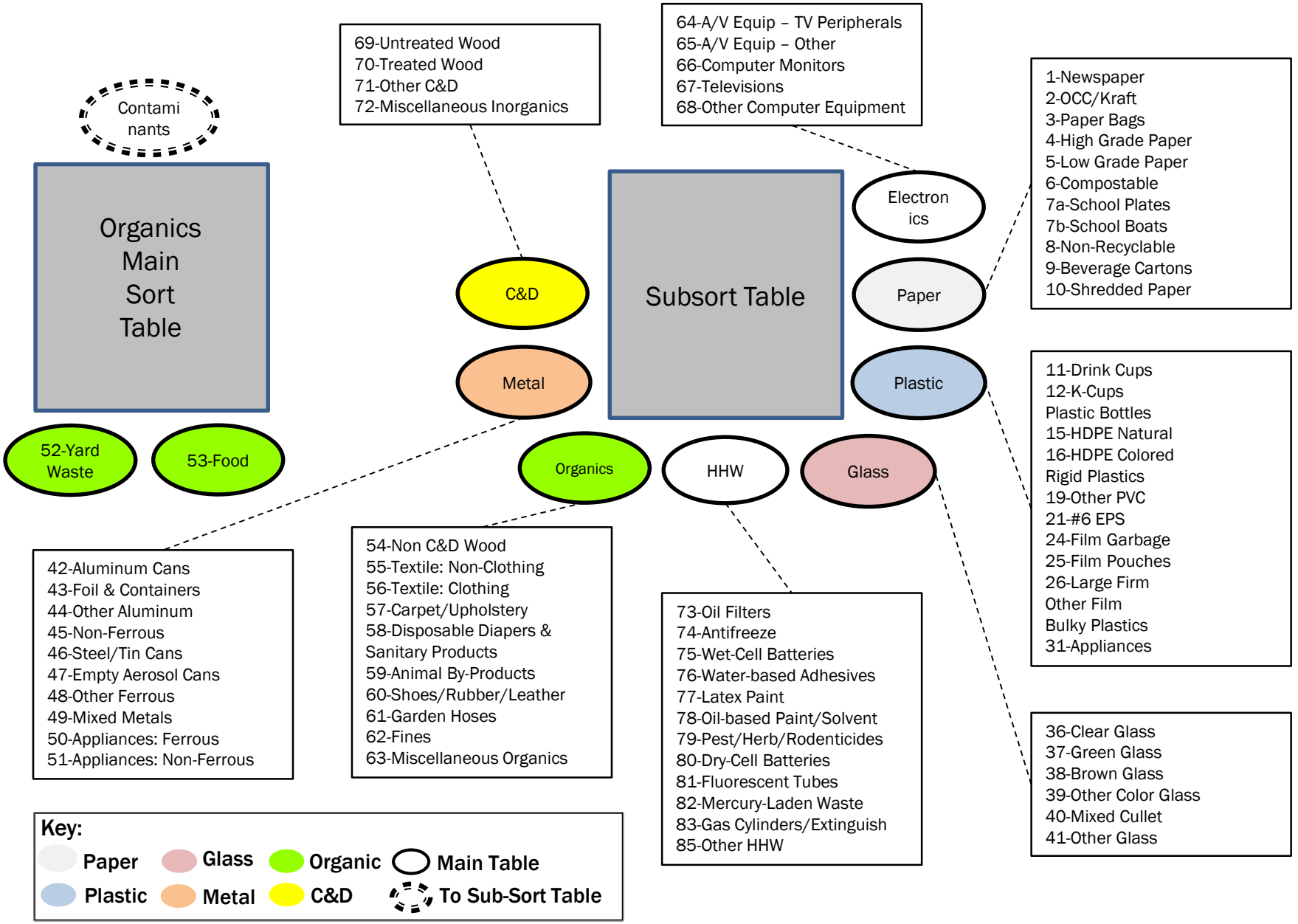
Exhibit G1c - Sorting Procedures Main Sort Table (Organics)



Notes:

[1] Sub-sorts to be performed as part of weigh-out procedure by assigned sorting staff.

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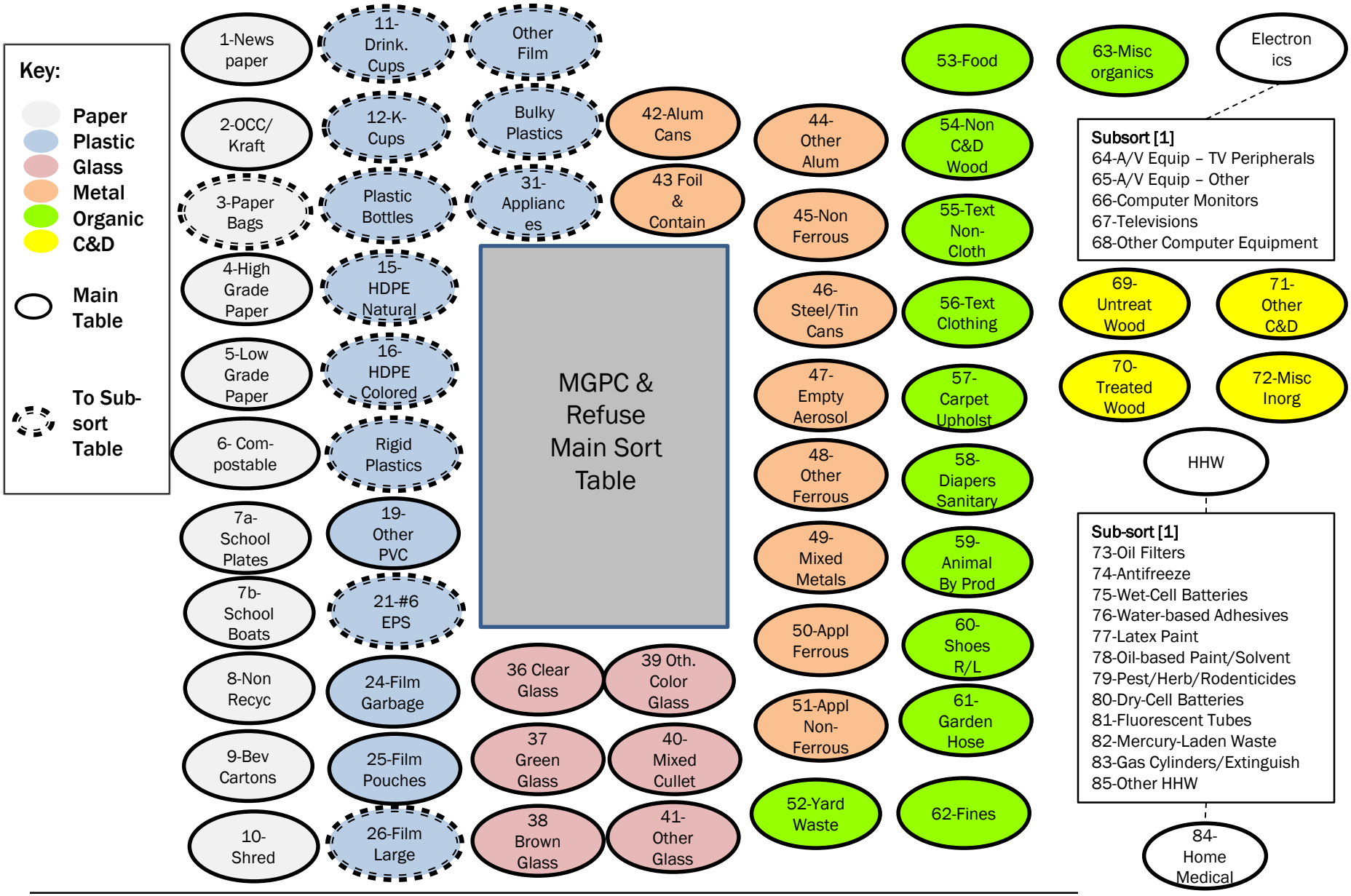
Exhibit G1d - Sorting Procedures Main Sort Table (MGP)



Notes:

[1] Sub-sorts to be performed as part of weigh-out procedure by assigned sorting staff.

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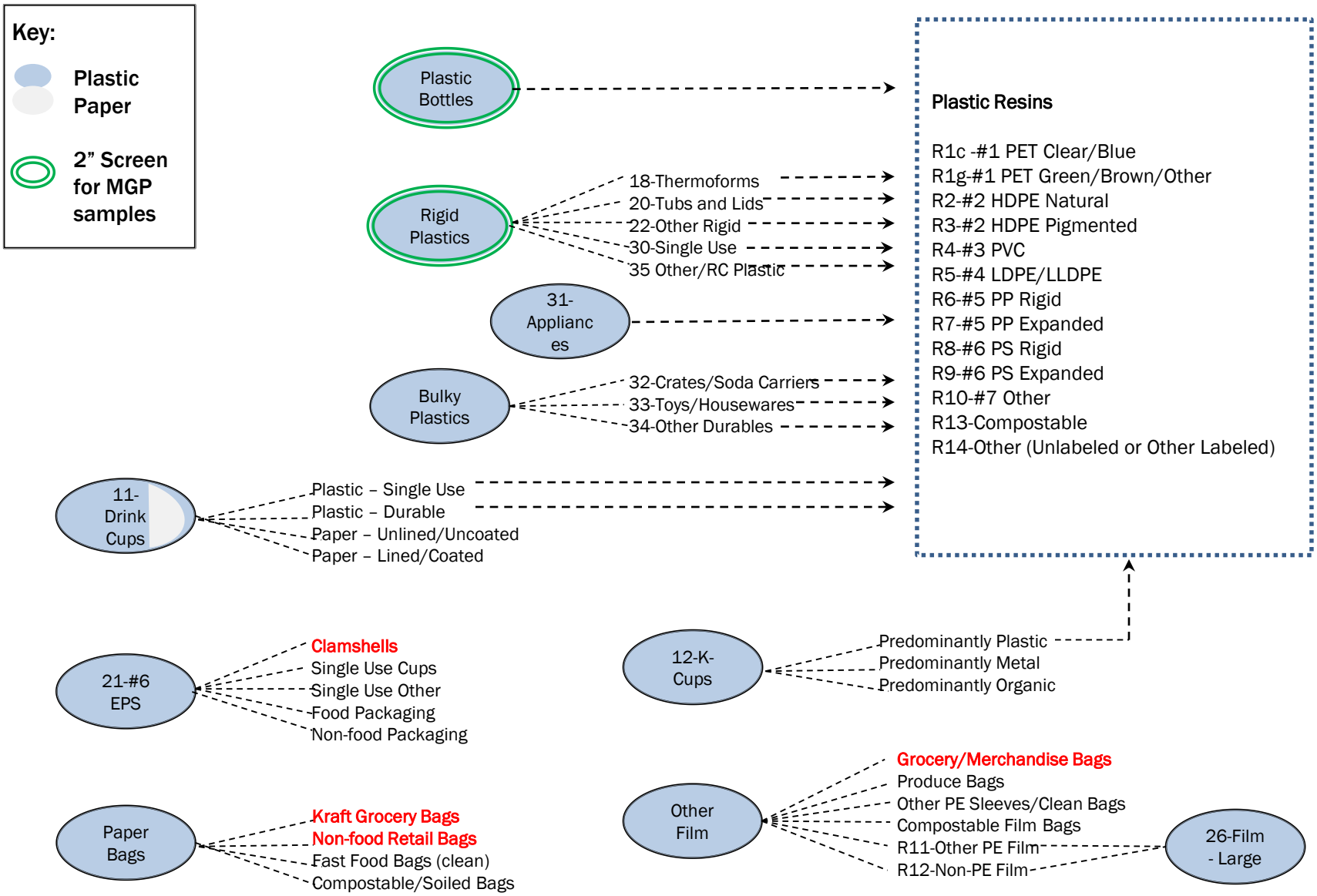
Exhibit G2 – Refuse and MGP Subsort Table
Intermediate and Resin Subsorts



Denotes moisture/particulate contamination testing

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PLASTIC BOTTLE SUBSORT (2” Screen)

Plastic bottles and jars (i.e., narrow neck) must be sorted into the following color and resin types:

R1a	#1 PET Clear
R1b	#1 PET Green
R1c	#1 PET Other Colors
R2	#2 HDPE Natural
R3	#2 HDPE Pigmented
R4	#3 PVC
R5	#4 LDPE/LLDPE
R6	#5 PP Rigid
R7	#5 PP Expanded
R8	#6 PS Rigid
R9	#6 PS Expanded
R10	#7 Other
R13	Compostable
R14	Other (Labeled or Unlabeled)

RIGID PLASTIC SUBSORT (2” Screen)

18 THERMOFORMS	Thermoform trays, clamshells, and other packaging of all resin types, typically used for grocery items. Examples include produce trays and clamshells, plastic pie plates and covers, and food product (and other) packaging made by press-molding a flat sheet of plastic.	S
20 TUBS AND LIDS	Injection molded wide mouth tubs without a neck, such as cottage cheese and margarine, of any resin type. Includes lids to the tubs. Includes plastic bottle caps. Includes pill bottles.	S
22 OTHER RIGID PLASTIC PACKAGING	Other containers and packaging, including containers of all types, toothpaste tubes, and plastic spools, not elsewhere classified. Includes empty tubes of caulk.	S
30 SINGLE USE PLATES/CUTLERY	Plastic single use spoons, forks, knives, plates, cup lids, bowls, straws, and platters of various resins. Does **not** include EPS (styrofoam) plates, cups, and bowls, or EPS trays used for packaging and display.	S
35 OTHER PLASTIC MATERIALS NOT ELSEWHERE CLASSIFIED	Items that are predominately plastic with other materials attached: pens, lighters, and 3-ring binders. Finished plastic products made entirely of plastic such as toothbrushes, CD/DVDs, vinyl hose -- not including plastic crates and soda bottle carriers.	S

S = MUST BE SUBSORTED BY RESIN TYPE

BULKY PLASTIC SUBSORT

32 CRATES AND SODA BOTTLE CARRIERS	Items that are predominately plastic with other materials attached such as pens, lighters, and 3-ring binders. Finished plastic products made entirely of plastic such as toothbrushes, CD/DVDs, vinyl hose -- not including plastic crates and soda bottle carriers.	S
32 TOYS AND HOUSEWARES	Bulky rigid plastic items from household use including plastic furniture and toys. Generally larger in size than a breadbox.	S
33 OTHER DURABLES	Other bulky rigid plastic objects not elsewhere classified. Includes 5-gal buckets. Generally larger in size than a breadbox.	S

DRINKING CUP SUBSORT

PAPER: UNLINED/ UNCOATED	Paper cups that are compostable at a commercial composting facility (i.e., do not have any lining or coating).	
PAPER: LINED/ COATED	Paper cups that have a film plastic or other lining or coating (for providing a liquid barrier) and are **not** compostable at a commercial composting facility.	
PLASTIC: SINGLE USE	Single-use plastic drinking cups from restaurants, convenience stores, for single use events (e.g. picnics), etc.	S
PLASTIC: DURABLE	Plastic drinking cups that are designed for multiple uses.	S

S = MUST BE SUBSORTED BY RESIN TYPE

NOTE: EPS DRINKING CUPS SHOULD BE SORTED WITH OTHER EPS AND SHOULD NOT BE IN THIS SUBSORT (PLEASE CORRECT IF FOUND)

EXPANDED POLYSTYRENE SUBSORT

CLAMSHELLS	Expanded polystyrene clamshells use for temporary packaging of food for immediate consumption (single use clamshells).	M
SINGLE USE CUPS	Single-use plastic drinking cups from restaurants, convenience stores, for single use events (e.g. picnics), etc.	
OTHER SINGLE USE ITEMS	Plates, bowls, lids or other EPS single use food service items (excludes cups, which have their own category).	
FOOD PACKAGING	Meat and produce trays and other EPS items used for shelf storage and display at grocery and food service establishments.	
NON-FOOD PACKAGING	Formed EPS packaging typically used for protecting a variety of retail goods and electronics. Includes “peanuts.”	

M = SUBJECT TO INTERMITTENT SAMPLING TO BE TESTED FOR MOISTURE AND PARTICULATE CONTAMINATION. DOUBLE BAG 1.5 TO 2 GALLONS AND FOLLOW LABELING CONVENTION

PAPER BAG SUBSORT

KRAFT GROCERY BAGS	Kraft grocery bags (brown and bleached). Grocery bags are a heavier Kraft.	M
OTHER LARGE RETAIL BAGS	Larger size paper bags, sometimes with handles, use by retailers of other merchandise	M
FAST FOOD BAGS	Smaller bags typically used at fast food and convenience stores for transporting food or smaller items. Can be a lower grade brown bag that looks like Kraft but is not as thick or durable as a grocery bag.	
SOILED OR MOISTURE-CONTAMINATED BAGS	Heavily soiled or moisture-contaminated bags of all types, including bag fragments. The reason for separating these bags is because the weight of the moisture and/or contamination will exceed the weight of the paper.	

M = SUBJECT TO INTERMITTENT SAMPLING TO BE TESTED FOR MOISTURE AND PARTICULATE CONTAMINATION. DOUBLE BAG 1 TO 1.5 GALLONS AND FOLLOW LABELING CONVENTION

K-CUP SUBSORT

PREDOMINANTLY PLASTIC	K-cups that are made of plastic. May have other material used as the lid.	S
PREDOMINANTLY METAL	K-cups that are made of metal. Usually will have a foil (metal) lid.	
PREDOMINANTLY PAPER/ COMPOSTABLE	K-cups that are labeled as being compostable or molded from pulp/fiber.	

S = MUST BE SUBSORTED BY RESIN TYPE

26 LARGE FILM ITEM SUBSORT

R11 OTHER POLYETHYLENE FILM (#2 OR #4)	Non-bag films labeled as #2 or #4; or clearly discernible as polyethylene such as industrial shrink wrap, Ziploc baggies, and some larger film tarps and bags used in packaging applications.	
R12 NON-POLY-ETHYLENE FILM	Other film bags or film products made of films other than #2 and #4. Film packaging not defined above, or: was contaminated with food, liquid or grit during use; is woven together (e.g., grain bags); contains multiple layers of film or other materials that have been fused together (e.g., potato chip bags), plastic label wraps.	

S = MUST BE SUBSORTED BY RESIN TYPE

PLASTIC FILM BAGS/SLEEVES/OTHER SUBSORT

GROCERY/ MERCHANDISE BAGS	Plastic bags given to customers by any retail establishment for transporting purchased goods, including labeled grocery and merchandise. Typically labeled #2 or #4. Does not include garbage bags, baggies or Ziploc bags; or bags heavily soiled with food.	M
PRODUCE BAGS	Clear or translucent bags used in grocery stores for customers to gather and weigh produce or other food items while shopping. Usually labeled #2 or #4.	
OTHER CLEAN SLEEVES AND BAGS	Other clean bags or sleeves. Examples include dry cleaner bags and newspaper sleeves. May or may not be labeled #2 or #4.	
COMPOSTABLE BAGS	Plastic bags labeled compostable. Includes the compostable plastic bags distributed by the City for the curbside organics program as well as other brands with compostable labeling.	
R11 OTHER POLY-ETHYLENE FILM (#2 OR #4)	Non-bag films labeled as #2 or #4; or clearly discernible as polyethylene such as industrial shrink wrap, Ziploc baggies, and some larger film tarps and bags used in packaging applications.	
R12 NON-POLY-ETHYLENE FILM	Other film bags or film products made of films other than #2 and #4. Film packaging not defined above, or: was contaminated with food, liquid or grit during use; is woven together (e.g., grain bags); contains multiple layers of film or other materials that have been fused together (e.g., potato chip bags), plastic label wraps.	

M = SUBJECT TO INTERMITTENT SAMPLING TO BE TESTED FOR MOISTURE AND PARTICULATE CONTAMINATION. DOUBLE BAG 1 TO 1.5 GALLONS AND FOLLOW LABELING CONVENTION

NOTE: Garbage Bags and Drink Pouches (e.g. Capri Sun) should not appear in this stream. If found, weigh separately so the weights can be recorded in the appropriate category.

Moisture/Particulate Sampling Targets by Season

Total

Subcategory	Refuse	MGP	Paper	Organics	Total
Kraft Grocery Bags	7		18		25
Other Paper Retail Bags	10		5		15
Plastic Retail Bags	10	10		5	25
EPS Clamshells	15	8		2	25
Total	**42**	**18**	**23**	**7**	**90**

Spring Season

Subcategory	Refuse	MGP	Paper	Organics	Total
Kraft Grocery Bags			18		18
Other Paper Retail Bags			5		5
Plastic Retail Bags		5		3	8
EPS Clamshells		4		1	5
Total	**0**	**9**	**23**	**4**	**36**

Fall Season

Subcategory	Refuse	MGP	Paper	Organics	Total
Kraft Grocery Bags	7				7
Other Paper Retail Bags	10				10
Plastic Retail Bags	10	5		2	17
EPS Clamshells	15	4		1	20
Total	**42**	**9**	**0**	**3**	**54**

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APPENDIX H

SORTING FIELD FORMS

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Sims/NYC 2017 Waste Characterization Study

MAIN TABLE #___

Sample Date: _____ **Sort Manager:** _____

Sort Date: _____ **Crew Chief:** _____ Paper _____

MGP _____

Borough: ____ **District:** ____ **Section:** ____ **Day of Wk:** ____ **Route:** ____ Organics _____

School: ____

Truck Number: _____ **# of Carts:** _____ **Bulky?** Yes No

No.	Category	Enter Weight (Circle if Net)	Sub
1	Newspaper		
2	Plain OCC		
3	Paper Bags		Yes
4	High Grade Paper		
5	Mixed Low Grade Recyc Paper		
6	Compostable/Soiled/Waxed OCC		
7a	Compostable School Plates/Trays		
7b	Compostable School Boats		
8	Other/Non-recyclable Paper		
9	Cartons & Aseptic Containers		
10	Shredded Paper		
11	Drinking Cups - Paper and Plastic		Yes
12	K-cups		Yes
M	Plastic Bottles		Yes
M	#1 PET Bottles		Yes
15	#2 HDPE Natural Bottles		
16	#2 HDPE Colored Bottles		
17	#3-#7 and Unlabeled Bottles		Yes
19	PVC (Non-bottle)		
M	Rigid Plastics		
M	Expanded PS Containers/Pkg		Yes
24	Film: Garbage Bags		
25	Film: Pouches		
26	Film: Oversize		Yes
M	Other Plastic Bags & Film		Yes
31	Appliances: Plastic		Yes
M	Bulk/Rigid Plastics		Yes

Notes: _____

_____

_____

Main Table #_____

Main Table Page 2 of 2

Borough: **District:** **Section:** **Day of Wk:** **Route:** **Circle:** Paper MGP Org

36	Clear Container Glass				
37	Green Container Glass				
38	Brown Container Glass				
39	Other Container Glass				
40	Mixed Cullet				
41	Other Non-container Glass				
42	Aluminum Cans				
43	Aluminum Foil/Containers				
44	Other Aluminum				
45	Other Nonferrous				
46	Steel/Tin Food Cans				
47	Empty Aerosol Cans				
48	Other Ferrous Metal				
49	Mixed Metals				
50	Appliances: Ferrous		51	Appliances: Nonferrous	
52	Yard Waste				
53	Food				
54	Non-C&D Wood				
55	Textiles: Non-Clothing				
56	Textiles: Clothing				
57	Carpet/Upholstery				
58	Diapers/Sanitary Products				
59	Animal By-Products				
60	Shoes/ Rubber/ Leather				
61	Garden Hoses				
62	Fines				
63	Miscellaneous Organics				
64	A/V Equip - TV Peripherals		67	Televisions	
65	A/V Equip - Other		68	Other Computer Equipment	
66	Computer Monitors				
69	Untreated Wood/Pallets/Crates		71	Other C&D Debris	
70	Treated/Contaminated Wood		72	Miscellaneous Inorganics	
73	Oil Filters		80	Dry-Cell Batteries:	
74	Antifreeze		81	Fluorescent Tubes/CFLs	
75	Wet-Cell Batteries		82	Mercury-Laden Wastes	
76	Water-Based Adhesives/Glues		83	Gas Cylinders/Extinguishers	
77	Latex Paint		84	Home Medical Products	
78	Oil-Based Paint/Solvent		85	Other HHW	
79	Pest/Herb/ Rodenticides				

Sims/NYC 2017 Waste Characterization Study

Intermediate #___

Borough: ____ District: ____ Section: _____ Day of Wk: _____ Route: _____ Circle: Paper MGP Org Date: _____ Crew Chief _____

	Paper Bags	Weight	Count
#2	Kraft Grocery		
#5	Non-food Retail		
#5	Fast Food Bags		
#6	Compostable/Soiled		

☐ Sampled for Moisture Testing

☐ Sampled for Moisture Testing

	11) Drinking Cups	Weight
#6	Paper - Compostable	
#8	Paper - Non-Compostable	
#30	Plastic - Single Use	
#35	Plastic - Durable	

	21) #6 EPS	Weight	Count
#30	Clamshells		
#30	Single Use Cups		
#30	Single Use Other		
#21	Food Packaging		
#21	Non-food Packaging		

☐ Sampled for Moisture Testing

	12) K-Cups	Weight
#35	Predominanty Plastic	
#49	Predominantly Metal	
#63	Predominantly Organic	

	Other Film	Weight	Count
#23	Grocery/Merch Bags		
#23	Produce Bags		
#23	Other Sleeves/Clean Bags		
#29	Compostable Bags		
#27	R11) Other PE Film		
#28	R12) Non-PE Film		

☐ Sampled for Moisture Testing

	26) Large Film	Weight
#27	R11) Other PE Film	
#28	R12) Non-PE Film	

Notes

_____

_____

_____

_____

Note: Material categories in **RED** to be subsorted by Resin

Sims/NYC 2017 Waste Characterization Study

RESIN # ___

Borough: ____ District: ____ Section: _____ Day of Wk: _____ Route: _____ Circle: Paper MGP Org Date: _____ Crew Chief _____

No.	Category	12) K-Cups	Plastic Bottles	18) Thermo-forms	20) Tubs/Lids Caps	22) Rigid Contnr/Pkg	30) Single Use	31) Appl-iance	32) Crates/ Soda Carrier BULKY	33) Toys/ Housewares BULKY	34) Other Durable BULKY	35) Other Plastics
R1a	#1 PET - Clear											
R1b	#1 PET - Green											
R1C	#1 PET - Other											
R1	#1 PET All											
R2	#2 HDPE Natural											
R3	#2 HDPE Pig.											
R4	#3 PVC											
R5	#4 LDPE/LLDPE											
R6	#5 PP Rigid											
R7	#5 PP Expanded											
R8	#6 PS Rigid											
R10	#7 Other											
R13	Compostable											
R14	Other & Unlabeled											

2" Overs		
2" Unders		

Sims/NYC 2017 Waste Characterization Study

RESIN # ___

No.	Category	11) #30 Plastic - Single Use (Drinking Cups)	11) #35 Plastic - Durable (Drinking Cups)
R1a	#1 PET - Clear		
R1b	#1 PET - Green		
R1C	#1 PET - Other		
R1	#1 PET All		
R2	#2 HDPE Natural		
R3	#2 HDPE Pig.		
R4	#3 PVC		
R5	#4 LDPE/LLDPE		
R6	#5 PP Rigid		
R7	#5 PP Expanded		
R8	#6 PS Rigid		
R10	#7 Other		
R13	Compostable		
R14	Other & Unlabeled		

Date: _____

Crew Chief _____

Borough: ____

District: ____

Section: ____

Day of Wk: ____

Route: ____

Circle: Paper MGP Org

_____

_____

_____

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APPENDIX I

CHAIN OF CUSTODY

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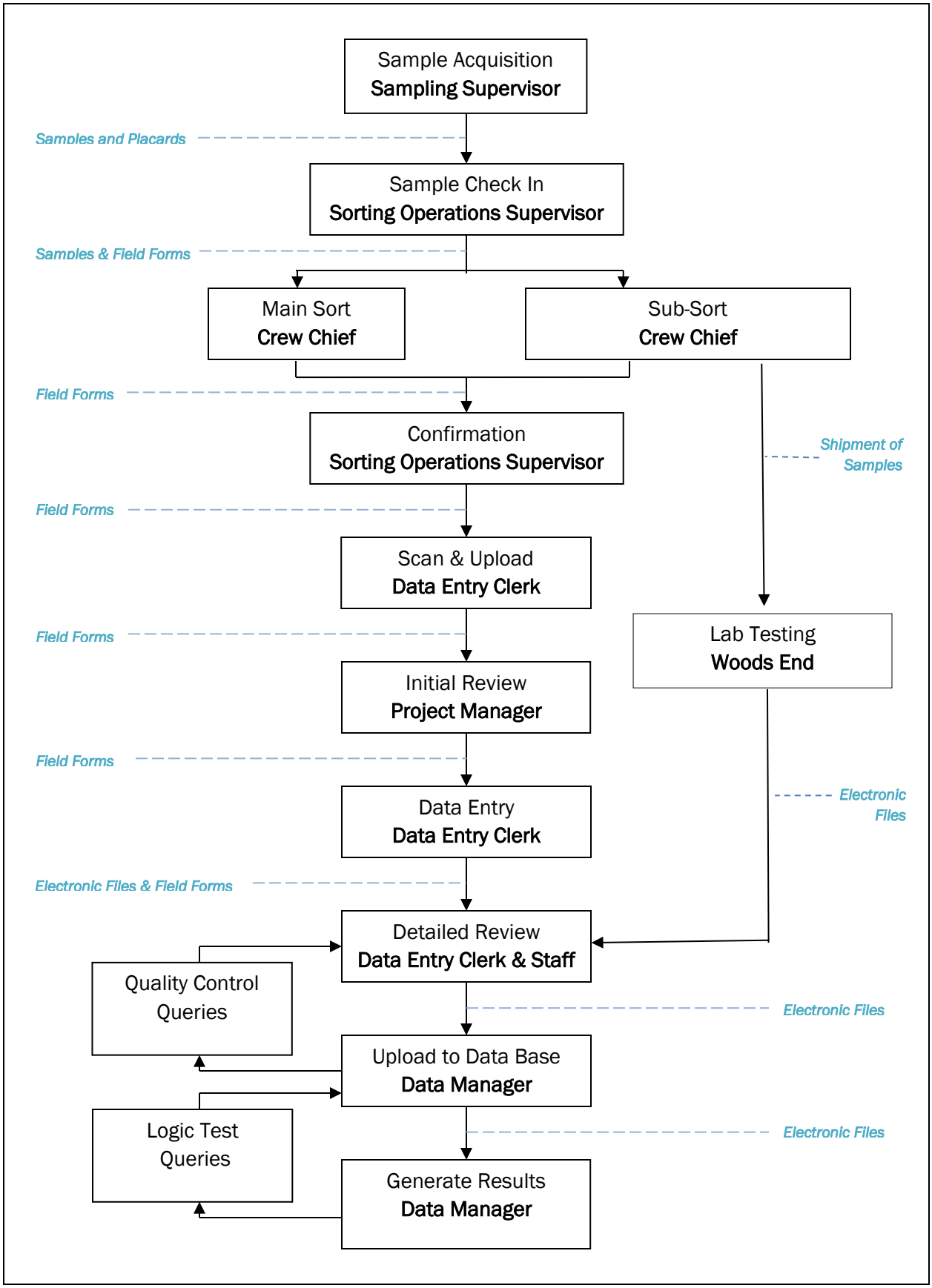
Exhibit I – 1 Sorting Field Form Chain of Custody



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