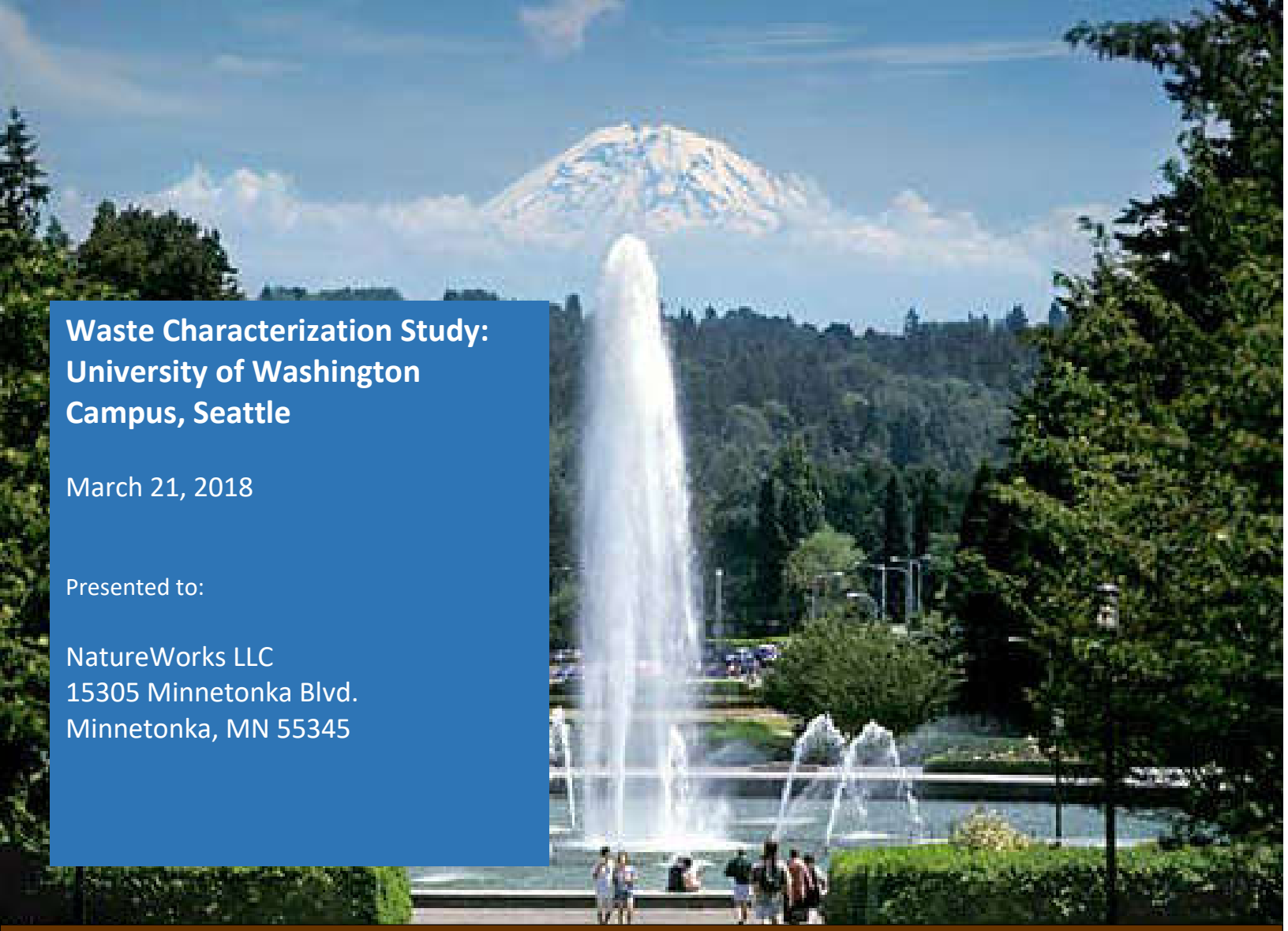

Waste Characterization Study: University of Washington Campus, Seattle

March 21, 2018

Presented to:

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Acknowledgements

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Cedar Grove Composting, Maple Valley, Washington
Cedar Grove Organics LLC
LaborWorks Industrial Support Services
Olympic Peninsula Personnel
Natural Connections, LLC dba Michele Riggs
New Day Recycling
Olympic Organics
University of Washington – Recycling Staff

The facilities management and staff of:

The Husky Den at the "Hub"
McMahon Hall
Lander Hall

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Scope of Work

This proposal was designed to provide NatureWorks with data from a large representative sample from multiple commercial solid waste characterization audits within a sizable closed loop system employing the use of compostable packaging as part of an overall food scrap collection program. The goal was to quantify the percentage of food service products (FSP) in the organics and landfill (garbage) streams. CMA also took measurements for comparative use for potential future studies where compost collection exists and compostable food service packaging is not employed. After conducting six audits and consolidating material from four organic waste stream audits and two landfill waste audits, information was analyzed, characterized, and observations made to address the questions to the right.

Measurement Targets

The study was designed to provide data and observations in the following areas.

- ✓ Overall measurement of foodservice packaging within organic waste stream (as compostable feedstock or contamination)
- ✓ Amount of food waste collected that can be assumed to be directly correlated with FSP usage in commercial food service operations
- ✓ Amount and type of FSP packaging, and the amount of food waste in the landfill streams

QUESTIONS

What types and how many compostable products are in the landfill stream and the organic stream?

Does the characterization data and observations show a trend to support that the use of compostable products in increases the amount of food collected in organics recycling programs?

Study Components

This study was originally designed to facilitate a 4-week collection cycle of waste audits, while this timeline was ultimately extended to 12 weeks (see *Challenges and Lessons*, section, p. 23). Study preparation began in October of 2017, with audits initiated in December 2017 and final audits concluded in early March of 2018.

There were several primary phases of this project:

- Participant recruitment
- Study design
- Solid waste permissions
- Sample site logistic design and set up
- Hauler set ups
- Audit site area establishment
- Labor procurement
- Audits
- Data review and reporting

Participant Recruitment

After several options were considered, and various solid waste experts and CMA network contacts were approached, the Compost Manufacturing Alliance secured the University of Washington's main campus in Seattle, Washington as the target site for sample collection. The University of Washington (UW) campus is the largest state university in Washington state, and serves approximately 46,000 graduates and undergraduates at its Seattle campus. Engagement with UW included multiple communications and meetings with various stakeholders on and off campus to set up and execute the waste characterization study.

The following list of stakeholders were contacted for this in this project:

- University of Washington Facilities and Food Services Division
- University of Washington Transportation Services Division
- University of Washington Recycling and Solid Waste Management Division
- On-campus food service and janitorial staff
- Cedar Grove Organics (privately owned organics recycling hauler)

- Cedar Grove Composting, Maple Valley, Washington (food load sorting)
- New Day Recycling (tote rental, hauling services)
- Olympic Organics, Bremerton, Washington (garbage load sorting)

Study Design

The study encompassed multiple food service dine-in locations on the University of Washington's Seattle campus where compost collection is in place and a full suite of compostable products are in use. The dine-in locations included:

- Husky Den in the "The Hub" (Central Campus Commons)
- "The 8" Food Service Area at McMahon Hall (Dormitory Food Service #1)
- The Local Point at Lander Hall (Dormitory Food Service #2)

Food service policies on campus require that all items be compostable within food service operations. This practice is supported by a Seattle ordinance[1] requiring that all dine-in establishments provide only recyclable or compostable food service items. For this study, organics and garbage was collected and audited separately and consolidated from multiple sources. The following sections support the specific components making up the originally proposed study design, along with the elements and engagement required to execute the study.

Solid Waste Permissions

Commercial garbage collection in the greater Seattle area (and within the city itself) is managed through municipal contracts with waste haulers. They are granted exclusive collection rights on behalf of the City to collect for the commercial entities within their contracted jurisdiction. To elicit support for the study and gain access to the garbage stream for collection, it was necessary to work with the on-campus facilities and recycling team to obtain access to garbage samples managed under contract with the City. CMA leveraged long-standing relationships with these entities to get support in qualifying potential study samples and to gain access to sample material.

[1] See Seattle Public Utilities' Director's Rule SW-500.1 link in Appendix

Logistics and Set Up

Initial contact with the University of Washington was with the recycling services director. The director provided various options to consider as potential collection areas meeting the project criteria. A list of campus contacts was also provided to assist in setting up the logistics for the project. Individual meetings were held with the respective food service and facility managers to discuss participation and waste collection protocols, assess collection areas, viable sample collection options and scheduling.

The collection areas selected as sample generation sources (see Table 1) were chosen for their potential to accumulate significant sample sizes of both the organics residual and landfill audit samples throughout the project. The choice of multiple source generation sites proved practical, as two of the three intended generation site samples were compromised on various days (see *Unforeseen Challenges* section). Having multiple sites designated for each collection cycle provided a consistent volume of material and ample sample volume to perform full day audits on each day's samples that were collected.

Loading Dock Assessments

All three facilities had loading dock areas where collection containers are housed, and all used compactors for the landfill waste. The HUB and Lander Hall also utilized compactors for organic residuals. McMahon Hall collects organic residuals in multiple 64-gallon totes (see Table 1).

Table 1

Food Service Sample Site Containers and Sample Size			
# of sub samples	**Food service sample sites**	**Organics (O) (FOH+BOH)**	**Landfill (G) (FOH+BOH)**
2	Central campus commons (Husky Den in "the Hub")	Compactor	6 x 64 gal totes
2	Dormitory food service #1 ("The 8" food service area at McMahon Hall	24 64 gal totes	6 x 64 gal totes
2	Dormitory food service #2 (The Local Point food service area within Lander Hall)	Compactor	6 x 64 gal totes

None of the food service areas had exclusive collection areas, and the loading docks served as the overall collection and pick up area for the overall buildings in which the food service operations are located. Lander Hall and McMahon Hall are student housing units, and the Husky Den is a food service area housed in the Housing Union Building itself (the Hub) that serves as a central student building surrounded by offices. For this reason, landfill material from foodservice operations was set up to be segregated from the overall food service facility area waste streams within each of the three loading dock areas.

Organic residuals were the easiest to obtain and divert to auditing as no changes were required by staff for the collection, loading dock set up, hauling systems or scheduling of loads.

Hauler Set Ups

To perform off-campus auditing, permitted haulers with the appropriate collection equipment compatible with campus containers were contracted for the audit. Samples for the audit were collected in both large compactors and in 64- gallon totes. Totes for landfill waste were picked up by a lift truck and shipped to landfill audit site (see Table 3). Organic residual loads required trucks designed to haul compactors to the audit site for compactors, while a route truck was rented for picking up the organics waste on a dedicated load that was then delivered to the audit site. CMA secured the support to design and execute the appropriate collection program for each collection area using relationships with the existing organics residual hauler, as well as a local solid waste hauler (see Table 2).

Table 2 Hauling Entities for Respective Collection Areas

Hauling Entities	Collection Areas
Cedar Grove Organics	Husky Den (Hub) “compactor” samples, organic residuals
Cedar Grove Organics	McMahon and Lander Hall organic residuals
New Day Recycling	Lander and McMahon landfill loads

Landfill samples were collected by segregating the food service area garbage from the rest of the building. Totes were delivered the night before the collection days, and then picked up the following evening for delivery to the audit location.

Collection Area Set Up

Once the sample retrieval areas were established, a hauling and offload plan was developed for each respective pick up site.

Organic residual loads from the Husky Den and Lander Hall were picked up on customary collection days in compactors and then directed to be offloaded within a designated audit area at the Cedar Grove Composting facility. Totes from McMahon Hall were collected on a dedicated route truck and brought directly into Cedar Grove for sorting.

Landfill materials from the two housing areas are normally consolidated within a larger campus area compactor. Because of this, landfill loads from both the Lander and McMahon hall foodservice operation areas were separated for collection into designated containers procured by CMA and labelled for the audit. Once filled, the totes were picked up at the end of the business day and shipped directly to the Olympic Organics' site for sorting.

Audit Site Area Establishment

The organic residual sorting area was established by utilizing the existing relationships among CMA partners, Cedar Grove Composting and Olympic Organics. Cedar Grove has a sort line area that was rented for the food waste audits. Landfill audits were performed within an enclosed area associated with CMA partner Olympic Organics in Bremerton, Washington. Locations for auditing are listed on Table 3.

Table 3 Audit Site Locations

Audit Site	For
Cedar Grove Composting 17825 Cedar Grove Road S.E. Maple Valley, Washington *(Approximately 27.4 miles from campus)*	Organic waste residuals in totes and compactors (collected once per week on normal collection schedule)
Olympic Organics 6068 State Hwy 303 NE Bremerton, Washington *(Approximately 89.7 miles from campus by road; 37.4 miles by ferry)*	Landfill totes from McMahon and Lander Hall (where totes were used to segregate landfill material from the food service area)

Sort List

Audits were conducted to employ designated source identifiers for each collection bin retrieved on campus. In addition to measuring food scraps, sort lists were developed for the specific components listed in Tables 4 and 5 for both organic feedstock and landfill streams.

Table 4

Landfill Stream Primary Sorting Categories, Excluding Food	
Categories	**Constituents**
Cardboard	Boxes - Coffee Sleeves
CG Compostable FSP	Compostable products that are on the CG/CMA list of accepted products
Compostable FSP non-CG/CMA	Products that have met compostability standards that are not listed on the CMA/CG website
Film Plastic non-compostable	Packaging - Gloves - Garbage Bags - Bread Bags - Soda Syrup Dispensers
Hard Plastic non-compostable	Bottles - Containers - Lids - Cups - Jugs - Bread Bag Ties
Metal	Aluminum Cans - Aluminum Tins - Tinfoil
Food Related Paper	Napkins - Deli Wraps - Cheese Slice Partitions
Glass Bottles	Soda Bottles - Condiment Bottles
Plastic Bottles	Water Bottles - Soda Bottles - Other Drinking Bottles
Other Garbage	Utensils - Portion Cups - Bottle Caps - Straws - Broccoli Ties
Recyclables	Cold Cups - Plastic Lined Paper Cups, Cartons, Boxes - Plastic Containers

Table 5

Category by Description Organics Stream, Non- Food Components	
Category	**Constituents**
Cardboard	Boxes - Coffee Sleeves
CG Compostable FSP	Compostable Products that are not on the CG/CMA list of accepted products
Compostable FSP non-CG/CMA	Products that have met compostability standards that are not listed on the CG/CMA website
Film Plastic	Compostable bags
Hard Plastic	Utensils - Lids - Containers
Metal	Utensils - Lids - Tinfoil
Food Related Paper	Napkins - Deli Wraps - Deli Bags
Glass Bottles	Soda Bottles
Plastic Bottles	Water Bottles - Soda Bottles - Other Drinking Bottles
Other Garbage	Chip Bags - Candy Wrappers - OPV Cartons
Recyclables	Water Bottles - Microwaveable Plastic Containers

Labor Procurement

Each audit required a varied number of industrial solid waste sorters to execute the meticulous picking, segregating, weighing and recording of materials from both organic residual and landfill loads.

In addition to oversight by the lead technical specialist at all audits, compactor organic residual loads required four industrial level trained sorters for each full day (8 hours) of sorting, or over 32 labor hours per audit. Landfill residual loads (which consisted of smaller sample sizes) required two to three industrial level trained sorters, or 16 to 24 labor hours per sort. Personal protective gear, gloves, and other supplies were provided at the sort site for all outsourced labor support.

Scheduling and Audit Coordination

Once the project sites were selected, the audit team coordinated with site staff, site haulers, and the composting facility to schedule the cycles. On each audit day, material was picked up from the site on or close to their normal pick up day, and delivered to each respective sorting location.

Material was then meticulously sorted into categories of material type, as listed in Table 4 and Table 5. Food service packaging was segregated and measured by weight and total items. Food, garbage, paper, and cardboard were weighed separately. All relevant data was collected and recorded for later analysis, and periodic photos were taken to memorialize the process.

Weight per Sorted Sample

Table 6 lists the collection and audit dates, the category of the materials collected, the size of each sample collected, and the on-campus source(s) for each audit sample retrieved from the campus.

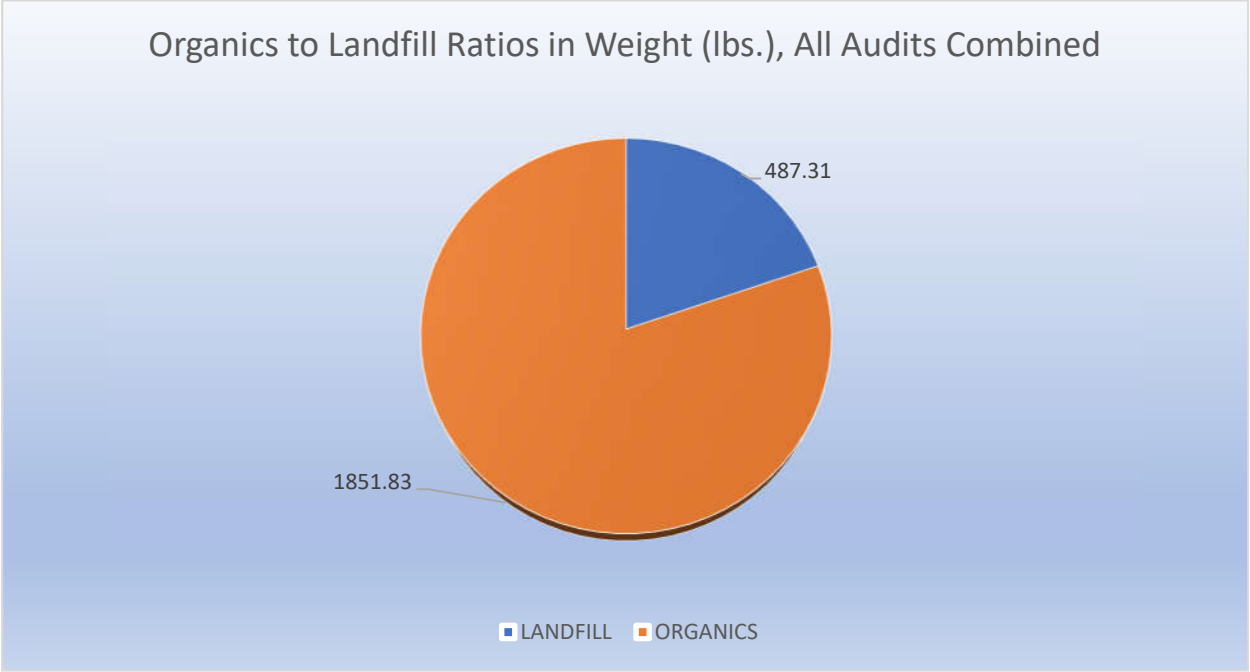
Table 6 Audits by Type, Category, Sample Size and Origination Points

Site Sources	Sample Retrieved	Audit Dates/Sites	Wt. of Material Sorted
Audit #1- Organics *The Hub*	December 1, 2017	December 1, 2017	589.56
Audit #2- Landfill *Lander and McMahon Halls*	December 6, 2017	December 7, 2017	245.9
Audit #3- Organics *McMahon Hall*	January 10, 2017	January 10, 2017	516.37
Audit #4 – Organics *Lander Hall*	January 12, 2018	January 12, 2018	561.58
Audit #5 – Landfill *The Hub, Lander Hall*	February 28, 2018	March 1, 2018	241.41
Audit #6 – Organics *The Hub*	March 2, 2018	March 2, 2018	184.32
		TOTAL WEIGHT:	**2339.14 lbs.**

Results- Total Organics to Landfill Collection Totals, All Samples Combined.

For all combined samples, the percentage of what was collected as organics and what was collected as landfill material is shown below or 79% collected as organic material (1852 lbs.) to 21% collected as landfill waste (487 lbs.).

Chart 1



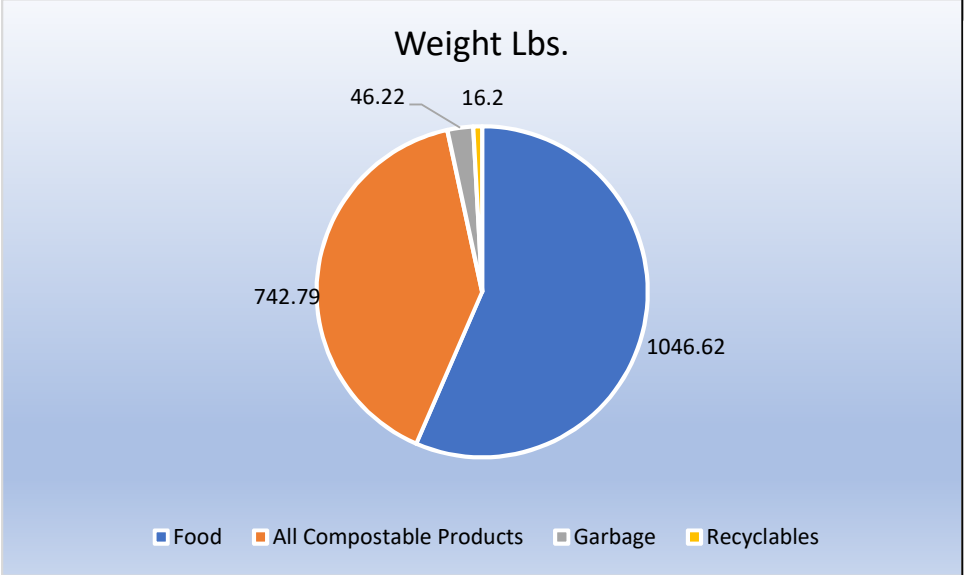
Results -Organics Stream

The organics stream was totaled and the percentage of food to compostables, recyclables, and "other" was calculated.

Table 7

Organics Stream Percentage of Food to Compostables and "Garbage" Categories		
Item Description	**Weight Lbs.**	**Percentage of Material**
Food	1046.62	57%
All Compostable Products	742.79	40%
Garbage	46.22	2%
Recyclables	16.2	1%
	1851.83	100%

Chart 2



Observations: the use of all compostable products appears to support less contamination and cross contamination, as garbage and recycling is shown as < 3% by weight in total. Although the goal in any program should be zero contamination, the employment and policies instituted for "all compostables" seem to reduce cross contamination issues significantly in the organics stream.

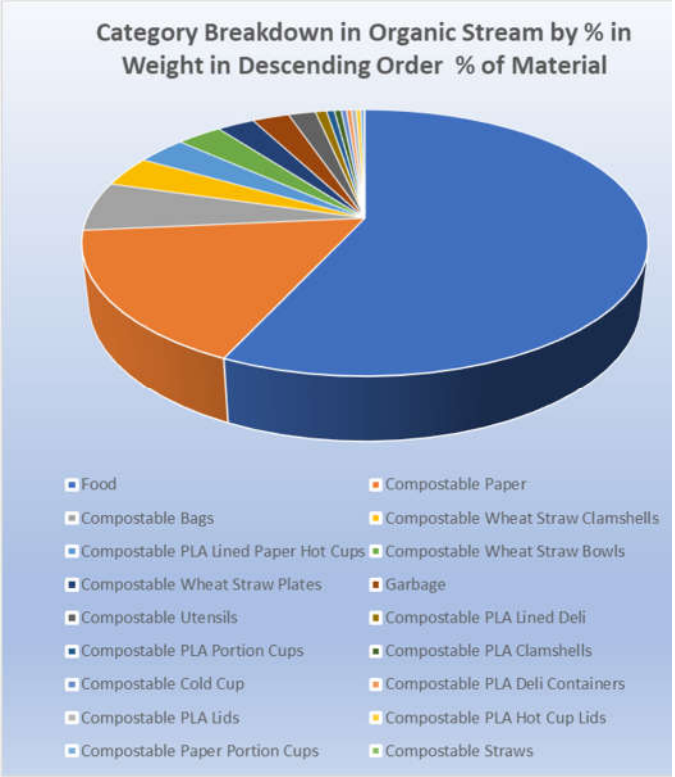
Breakdown of Organics Stream

The total for each primary category within the waste stream is listed on the table below.

Table 8

Consolidated Organics Sample Percentage (By Weight) for Each Primary Sort Category		
Item Description	**Weight Lbs.**	**%of Material**
Food	1046.62	56.52%
Compostable Paper	305.22	16.48%
Compostable Bags	106.9	5.77%
Compostable Wheat Straw Clamshells	68.5	3.70%
Compostable PLA Lined Paper Hot Cups	61.99	3.35%
Compostable Wheat Straw Bowls	56.89	3.07%
Compostable Wheat Straw Plates	46.94	2.53%
Garbage	46.22	2.50%
Compostable Utensils	34.04	1.84%
Compostable PLA Lined Deli	13.97	0.75%
Compostable PLA Portion Cups	9.96	0.54%
Compostable PLA Clamshells	8.47	0.46%
Compostable Cold Cup	6.78	0.37%
Compostable PLA Deli Containers	6.32	0.34%
Compostable PLA Lids	6.04	0.33%
Compostable PLA Hot Cup Lids	5.46	0.29%
Compostable Paper Portion Cups	4.27	0.23%
Compostable Straws	1.04	0.06%
Recyclables	16.2	0.87%
	1851.83	**100%**

Chart 3



The largest percentage of material is from food scraps collected both front and back of house (56%), with compostable packaging the next highest fraction (40%+), garbage at 2.5% garbage and recyclables at < 1%. Sorting compostables from recyclables appears to be well executed on the campus.

Specific Compostable Items by Quantity and Type

The following represents the total piece count on a per item basis for all compostable foodservice items found within the overall organics audit sample.

Table 9

Organics Stream List of Compostable Items by Type

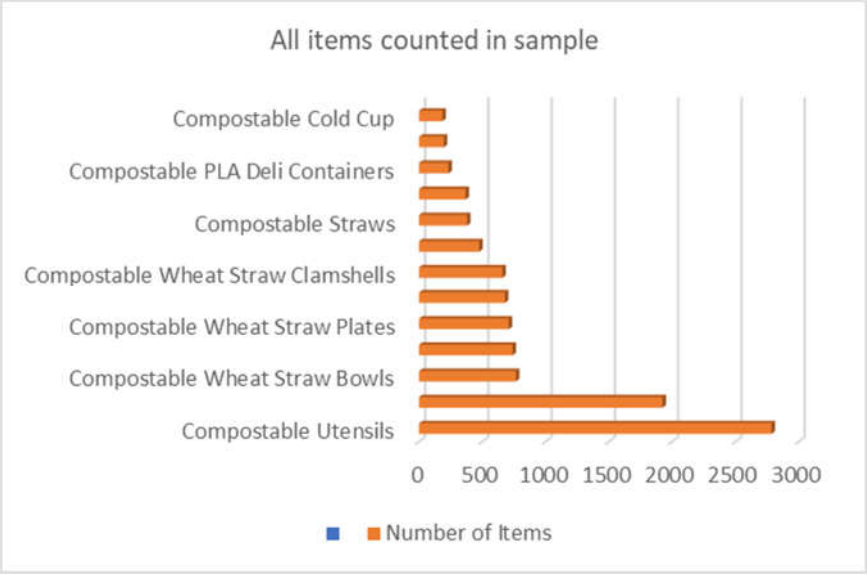
Item Description	Number of Items
Compostable Utensils	2786
Compostable Hot Cups	1924
Compostable Wheat Straw Bowls	766
Compostable PLA Portion Cups	740
Compostable Wheat Straw Plates	709
Compostable PLA Lids	679
Compostable Wheat Straw Clamshells	659
Compostable Hot Cup Lids	476
Compostable Straws	380
Compostable PLA Lined Deli	369
Compostable PLA Deli Containers	233
Compostable PLA Clamshells	197
Compostable Cold Cup	185

Observations:
The highest number of compostable FSP in the stream were utensils, with PLA lined hot cups, portion cups, lids, straws, deli containers, and PLA clamshells and cold cups making up many of the items on a piece by piece count.

Wheat straw fiber containers made up the remaining containers in the count.

Chart 4

Graphical List of Compostable Items by Type



Non-Food Portion of Organics Stream

Below is a list of all non-food components of the organics stream.

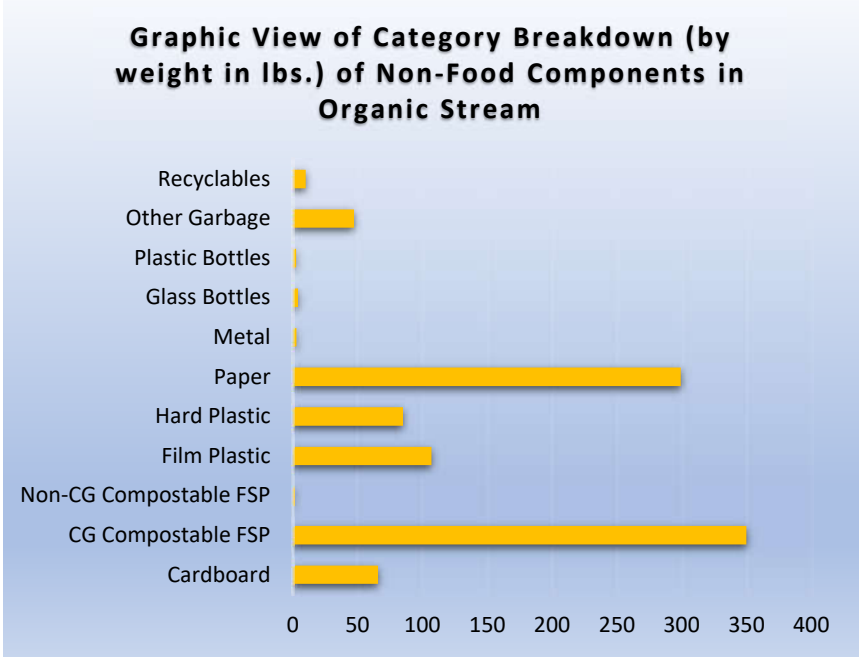
Table 10

Breakdown By Weight of Non-Food Components in Organic Stream											
Facility	Cardboard	CG Compostable FSP	Non-CG Compostable FSP	Film Plastic	Hard Plastic	Paper	Metal	Glass Bottles	Plastic Bottles	Other Garbage	Recyclables
The HUB	0	160.67	0	25.4	35.47	92	0.57	0	0.91	16.2	0.23
McMahon	0	62.63	0	33	15.91	80.8	0.18	0	0.81	14.8	1.47
Lander	62	56.63	0	40.9	12.73	104.9	0.61	2.97	0.19	12.95	1.74
The HUB	3.6	69.82	1.52	7.6	20.91	21.4	1.51	0.99	0.63	3.25	6.56
Total in lbs.	**65.6**	**349.75**	**1.52**	**106.9**	**85.02**	**299.1**	**2.87**	**3.96**	**2.54**	**47.2**	**10**

Table 11

Category by Description Organics Stream, Non Food Components	
Category	**Constituents**
Cardboard	Boxes - Coffee Sleeves
CG Compostable FSP	Compostable Products that are not on the CMA list of accepted products
Compostable FSP non CG	Products that have met compostability standards that are not listed on the CMA website
Film Plastic	Compostable Bags
Hard Plastic	Utensils - Lids - Caontainers
Metal	Utensils - Lids - Tinfoil
Food Related Paper	Napkins - Deli Wraps - Deli Bags
Glass Bottles	Soda Bottles
Plastic Bottles	Water Bottles - Soda Bottles - Other Drinking Bottles
Other Garbage	Chip Bags - Candy Wrappers - OPV Cartons
Recyclables	Water Bottles - Microwaveable Plastic Containers

Chart 5



Observations:
Paper and compostable food service items made up a majority of the non-food portion of the organics stream. Contaminants consisted of hard plastic and film plastic, as well as some cardboard.

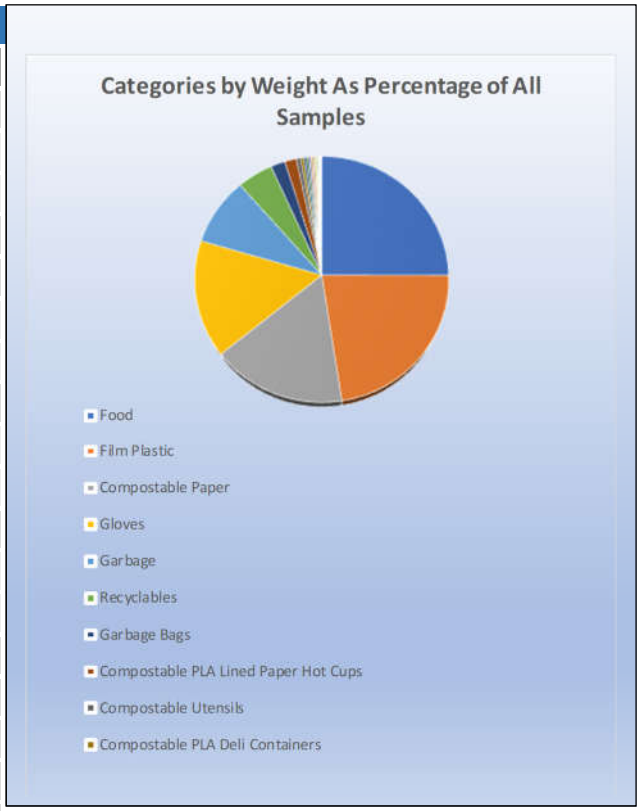
Results- Landfill Stream

The following table represents the breakdown of all landfill material by weight from all consolidated landfill samples by weight and percentage of the total waste stream.

Table 12

Landfill Material Breakdown By % for Each Primary Category	
Item Description	**% of Sample**
Food	25.01%
Film Plastic	22.53%
Compostable Paper	16.61%
Gloves	15.37%
Garbage	9.01%
Recyclables	4.70%
Garbage Bags	1.89%
Compostable PLA Lined Paper Hot Cups	1.53%
Compostable Utensils	0.58%
Compostable PLA Deli Containers	0.39%
Plastic Lined Paper Cups	0.33%
Non-Compostable Clear Plastic Containers	0.29%
Compostable Paper Portion Cups	0.28%
Compostable Cold Cup	0.27%
Compostable PLA Lids	0.26%
Compostable Wheat Straw Bowls	0.20%
Compostable PLA Lined Deli	0.14%
Compostable PLA Clamshells	0.14%
Compostable Wheat Straw Plates	0.11%
Compostable PLA Hot Cup Lids	0.10%
Compostable PLA Portion Cups	0.09%
Compostable Wheat Straw Clamshells	0.07%
Compostable Straws	0.06%
Bread Ties	0.03%
	100.0%

Chart 6



Observations:

Food continues to make up the largest component of the landfill stream while non-specified film plastic makes up the next highest component (at 22%), and other compostable papers and gloves combine to make up over 30% of material being sorted for landfilling.

Landfill Category Breakdown by Location

Below is the breakdown of all components of the landfill waste stream sample by location and then totaled for all three samples. Data chart lists the total weight from each individual generation site, along with the total weight for the sub-categories listed. Below data table is the graphic breakdown for each category by percentage of the total non-food component.

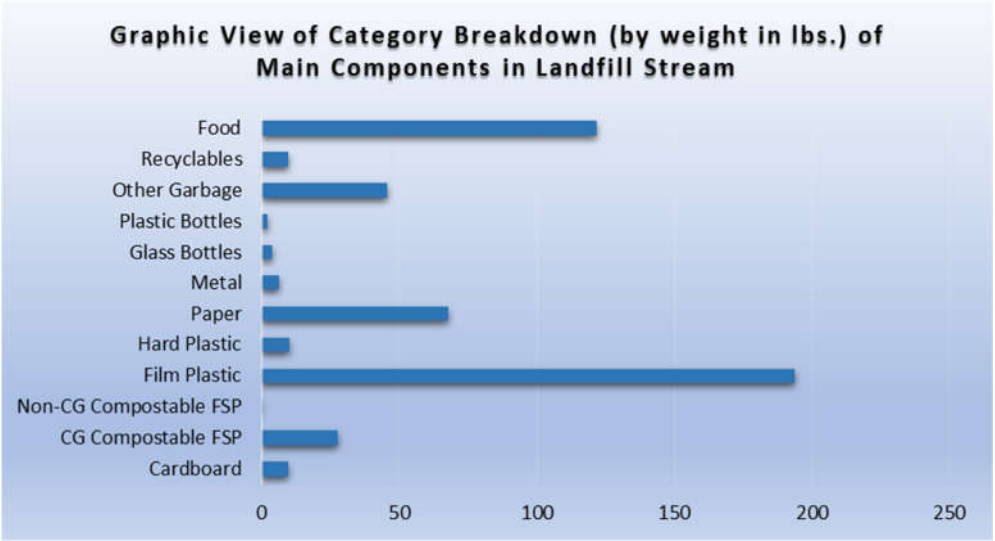
Table 13

Category Description Landfill Stream	
Categories	**Constituents**
Cardboard	Boxes - Coffee Sleeves
CG Compostable FSP	Compostable Products that are not on the CMA list of accepted products
Compostable FSP non CG	Products that have met compostability standards that are not listed on the CMA website
Film Plastic non Compostable	Packaging - Gloves - Garbage Bags - Bread Bags - Soda Syrup Dispensers
Hard Plastic non Compostable	Bottles - Containers - Lids - Cups - Jugs - Bread Bag Ties
Metal	Aluminum Cans - Aluminum Tins - Tinfoil
Food Related Paper	Napkins - Deli Wraps - Cheese Slice Partitions
Glass Bottles	Soda Bottles - Condiment Bottles
Plastic Bottles	Water Bottles - Soda Bottles - Other Drinking Bottles
Other Garbage	Utensils - Portion Cups - Bottle Caps - Straws - Broccoli Ties
Recyclables	Cold Cups - Plastic Lined Paper Cups, Cartons, Boxes - Plastic Containers

Table 14

Landfill Stream												
Facility	Cardboard	CG Compostable FSP	Non-CG Compostable FSP	Film Plastic	Hard Plastic	Paper	Metal	Glass Bottles	Plastic Bottles	Other Garbage	Recyclables	Food
Lander	1.8	6.47	0	63.8	2.92	24.6	2.45	1.07	0.21	6.4	2.03	38.4
McMahon	2.4	5.24	0	38.6	2.36	16.4	0.17	0	0.33	6	1.67	27
McMahon	3.32	8.93	0.09	28.3	1.91	15.2	2.55	0.99	0.18	8.13	2.26	24.9
Lander	2.18	6.92	0	63.12	2.93	11.4	1.11	1.87	1.19	24.92	3.49	31.6
Totals	**9.7**	**27.56**	**0.09**	**193.82**	**10.12**	**67.6**	**6.28**	**3.93**	**1.91**	**45.45**	**9.45**	**121.9**

Chart 7



Other Observations and Conclusions

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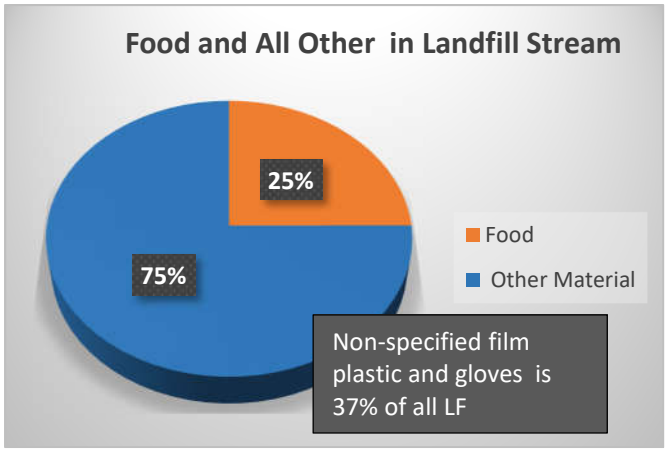
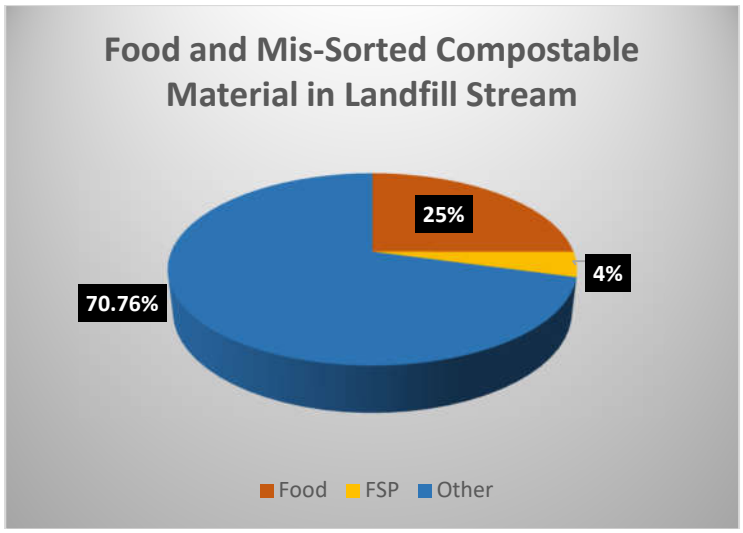
Chart 8



Non-specified film plastic and gloves make up 37% of "other material" being landfilled.

Chart 9



29% of landfilled material consists of food and improperly sorted compostable packaging.

Additional opportunities to increase food waste diversion from landfill stream with compostable options

Non-specified film plastic and gloves make up 37% of what is in the landfill stream, the largest non-food component. Some heavy food items, like pizza dough, contained plastic sheets separating each crust. In addition, most food residuals left in non-compostable packaging consisted of condiments, such as salad dressing contained in jugs and dispenser bags. It would be worthwhile to consider increasing compost diversion by employing compostable films to capture both the film tons and any wrapped food that is thrown in the garbage.

Approximately 45.8% of sorted items from the trash were compostables with approximately 25% being food, 16.6% compostable paper and 4.2% as compostable FSP.

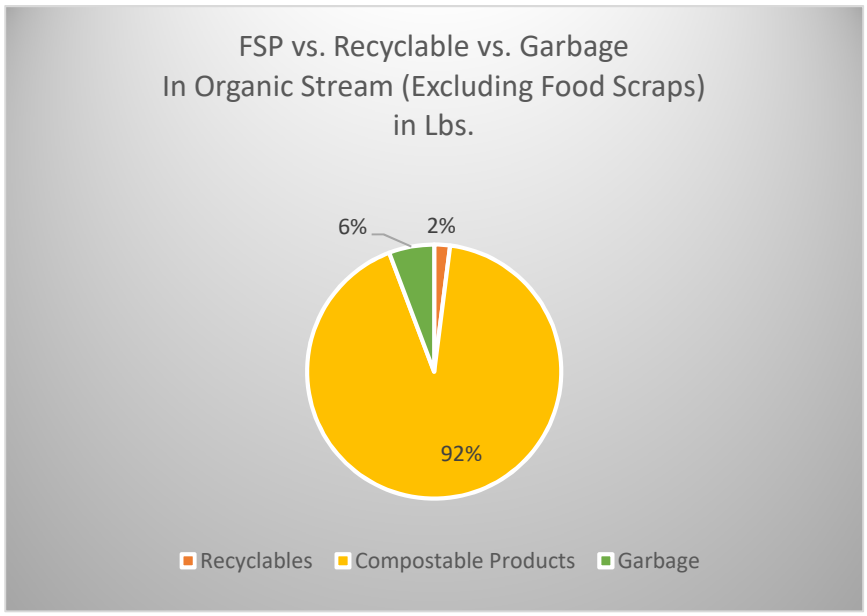
By replacing the percentage of non-compostable film plastic and gloves (37%) with compostable options, proper sorting of compostable FSP (4%), and recovery the food fraction (25%), a total of 66% of the current landfill waste could potentially be diverted to composting.

If optimal diversion was realized through these considerations, as much as 60,000 lbs. (30 tons) of additional material could be diverted from just these three sites annually.

Compostable food service packaging appears to divert a significant amount of compostable landfill tonnage to composting.

Compostable food service packaging almost doubles the weight of material to composting when employed in food service operations based on this study. FSP makes up as much as 40.11% of the total organics stream, while it is 92% of the non-food portion. FSP was also weight impacted by the presence of moisture and residuals, which takes a significant amount of weight from landfill tonnage. It also carried in food residuals that could not be easily separated from the package and could not be counted directly as food, but was observed to be a less obvious level of food waste diversion coming from the employment of FSP.

Chart 10



Gloves as largest non-food fraction of landfill stream

The largest fraction of the film plastic was gloves. Gloves are commonly used in food service areas by most of the staff for food preparation. If facilities purchase and use compostable gloves, *then almost half of what is currently going into the landfill could be diverted to composting.*

It was also observed that recyclables appear to be properly sorted and are not cross contaminating the stream at significant levels, with only a small amount found in the landfill stream. However, those that were found were covered in food residuals, which seems to indicate that compostable options for those items might be a viable consideration and would prevent cross contamination of food that may be present in the mixed recycling stream. That said, it would be interesting to encourage further studies (outside of this one) that look at all three streams collected with Seattle's recycling and "food+compostables"[2] program.

Chart 11

Challenges and Lessons

Challenges and lessons were learned in executing multiple levels of coordination between the haulers, facilities, campus sites, labor providers and seasonal timing of audits. Invariably, there were some set-backs, but they were dealt with through team meetings, communication, and thoughtful "regrouping". Here are a few of the variables worth noting regarding this project.

- Once auditing could be coordinated and scheduled, the campus was two weeks ahead of the Christmas and New Year's holiday, so auditing was spilt from before the holiday to after, which extended the project timeline by 3-4 weeks.
- One of the audits scheduled was cancelled by the receiving facility due to an operational issue that came up where access to the sorting area was denied, despite it being scheduled.
- One audit sample was compromised when the sample was delivered to the audit facility, then inadvertently moved by a loader operator to the main tipping area by mistake
- One of the audits had to be cancelled due to a "no show" of the sorters from a scheduling oversight by the labor contractor.
- The HUB was consistently unable to collect its landfill waste into the totes provided, yet having other sites as collection points provided more than an adequate sample for the characterization.
- Audits of these type take significant labor hours to separate the level of individual items being segregated, weighed and logged. The organic fraction took less time than the landfill stream as there were fewer categories to be segregated. In addition, time constraints at the solid waste facilities required audits to conclude by a specific time each day, as most are required to process or dispose of the materials within a 24-hour period. This makes timing and logistics extremely important, as well as choice of labor support.

[2] Seattle Public Utilities' commercial food waste program

Sources

p.5., Seattle Director's Rule SW-5001, updated on June 16, 2017.
http://www.seattle.gov/util/cs/groups/public/@spuweb/@policy/documents/webcontent/1_064356.pdf

p.6, From the University of Washington Office of Admissions website listing autumn 2017 enrollment.
http://admit.washington.edu/why-uw/about-uw-university-of-washington/

p.9
Husky Den and Food Court,
http://depts.washington.edu/thehub/home/in-the-hub/husky-den-food-court/
Lander Hall, https://hfs.uw.edu/Live/Housing-Locations/Lander-Hall
McMahon Hall, https://hfs.uw.edu/Live/Housing-Locations/McMahon-Hall

p.22, SPU's Food + Compostables
http://www.seattle.gov/util/ForBusinesses/GreenYourBusiness/ReduceWaste/index.htm