

Report



**Organic Materials from
Commercial Establishments:
A Supply Assessment**

Appendices A through P

Project I.D.: 10R001

**Ramsey/Washington County Resource Recovery
Project Board
Maplewood, MN**

June 2010



Appendix A
Database of Commercial Establishments
in Ramsey and Washington Counties
From Dun & Bradstreet (D&B)

[NOTE:

**INCORPORATED BY REFERENCE INTO THIS REPORT.
AVAILABLE UPON REQUEST.]**

Appendix B
Comparisons of Literature -
Reported Food Waste Disposal Rates

Foth conducted a comparison of several previous studies' food waste generation and disposal rates including:

- ◆ CIWMB by Cascadia (2000)¹
- ◆ Massachusetts by Draper/Lennon (2002)
- ◆ CIWMB by Cascadia (2006)
- ◆ Cornell University (2010)
- ◆ U.S. EPA (2009) from the Foodwaste Calculator

Foth assumed that the Massachusetts study used the definition of "generation" to include food materials both "disposed" and "recovered" (although there were no estimates included in the study of current food scraps recovery).

A goal of the Massachusetts project was to develop quantitative estimates of organic waste generation as a function of facility size, sales, number of employees, or other readily available metrics. Researches based their data on literature reviews and survey information acquired directly from Massachusetts SSOM generators. The following eight categories of establishments were analyzed resulting in food waste generation rate estimates:

- ◆ Hospitals
- ◆ Nursing homes
- ◆ Colleges and universities
- ◆ Independent preparatory schools
- ◆ Correctional facilities
- ◆ Resort and conference facilities
- ◆ Restaurants
- ◆ Supermarkets

Source: Massachusetts Department of Environmental Protection, Bureau of Waste Prevention, "Identification, Characterization, and Mapping of Food Waste and Food Waste Generators in Massachusetts" conducted by Draper/Lennon, Inc. (September 19, 2002).

It was concluded in this report that "the majority of wholesalers and distributors generate very little recyclable organic waste. Most of these establishments warehouse and redistribute pre-packaged items, with little organic waste generated. Some amount is generated in a stream of damaged or returned products, but most are returned in their original packaging (and therefore difficult to separate for composting or organics diversion), and much is ultimately returned to the manufacturers for credit, eliminating the possibility of composting or organics diversion from the wholesale or distribution establishment." This report used annual sales to rate these facilities in size rather than the food waste generated.

¹ CIWMB (February 2000) study by Cascadia.

Table B-1
Comparison of CIWMB Food Waste Disposal Rates
and Massachusetts Food Waste Generation Rates

CIWMB Food Waste Generation Rates from CIWMB (February 2000)

Primary SIC Code	Industry	Food Disposed (tons/employee/year)
20	Food and Kindred Products	0.41
51	Wholesale Trade - non-durable Goods	0.4
54	Food Stores	1.25
58	Eating and Drinking Places	1.1
70	Hotels, Rooming Houses, Camps, and Other Lodging Places	0.18
80	Health Services	0.04
82	Educational Services	0.13
Varies	Public Administration	0.05

**Identification, Characterization, and Mapping of Food Waste and Food Waste Generators in
Massachusetts (September 2002)**

Generator Category	Food Disposed (tons/year)	Food Disposed (tons/year)
Food Manufacturers/Processors	Not possible to determine ¹	
Food Wholesalers/Distributors	Not possible to determine ²	
→ Supermarkets	1.5 per employee	
→ Restaurants	1.5 per employee	
→ Resorts/Conference Properties (high use and low use)	0.05-0.11 per seat	
↘ Hospitals	0.62 per bed	↘ Average = 0.48 per bed
↘ Nursing Home	0.33 per bed	
↘ Colleges, Universities, and Indept. Prep. Schools - residential	0.07 per student	↘ Average = 0.05 per student
↘ Colleges - non-residential	0.02 per student	
Correctional Facilities	0.18 per inmate	

(Secondary Source: CIWMB "Innovations" Case Studies: Food Waste Recovery
<http://www.calrecycle.ca.gov/LGCentral/Library/innovations/FoodWaste/Program.htm#Overview>
(Primary Source: Business Group Waste Compositions, Solid Waste Characterization Database, CIWMB; February 2000).

(Primary Source: Massachusetts Department of Environmental Protection Bureau of Waste Prevention, Identification, Characterization, and Mapping of Food Waste and Food Waste generators in Massachusetts, Sept. 2002)

Table B-2

Massachusetts Commercial Food Waste Study:
Alternative Generate Rates by Generator Category

<p>Hospitals Food waste (lbs/yr) = N of beds * 5.7 meals/bed/day * 0.6 lbs food waste/meal * 365 days/yr</p>
<p>Nursing Homes and Similar Facilities Food waste (lbs/yr) = N of beds * 3.0 meals/bed/day * 0.6 lbs food waste/meal * 365 days/yr</p>
<p>Colleges, Universities, and Independent Preparatory Schools <i>Residential Institutions</i> Food waste (lbs/yr) = 0.35 lbs/meal * N of students * 405 meals/student/yr <i>Non-Residential Institutions (e.g., community colleges)</i> Food waste (lbs/yr) = 0.35 lbs/meal * N of students * 108 meals/student/yr</p>
<p>Correctional Facilities Food waste (lbs/yr) = 1.0 lb/inmate/day * N of inmates * 365 days/yr</p>
<p>Resorts/Conference Properties Food waste (lbs/yr) = 1.0 lbs/meal * N of meals/set/day¹ * N of seats * 365 days/yr</p>
<p>Supermarkets Food waste (lbs/year) = N of employees * 3,000 lbs/employee/yr</p>
<p>Restaurants Food waste (lbs/year) = N of employees * 3,000 lbs/employee/yr</p>
<p>Notes: ¹Resort and conference facilities were divided into two classes, depending on how intensively they use their banquet/dining facilities. One has been given a value of 0.6 meals/day/seat of conference capacity, the other a value of 0.25 meals/day/seat of conference capacity.</p>

Source: Massachusetts Department of Environmental Protection, Bureau of Waste Prevention, "Identification, Characterization, and Mapping of Food Waste and Food Waste Generators in Massachusetts" conducted by Draper/Lennon, Inc. (September 19, 2002).

Table B-3
 CIWMB 2006 Study by Cascadia:
 Alternative Disposal Rates by Generator Category

Table 21: Annual Tons Disposed, by Industry Group

	Annual Tons per Employee		Annual Tons per Seat		Annual Tons per Room		Annual Pounds per Sq. Ft.		Annual Pounds per Visitor	
	Mean	StDv	Mean	StDv	Mean	StDv	Mean	StDv	Mean	StDv
Fast Food Restaurants	2.13	1.24	0.99	0.83						
Full Service Restaurants	2.20	1.47	0.41	0.33						
Food Stores	2.38	1.69								
Durable Wholesale Goods Distributors	1.23	1.24								
Non-Durable Wholesale Goods Distributors	1.43	1.22								
Large Hotels	1.95	1.55			0.92	0.95				
Building Material & Garden, Big Box Stores	3.17	1.74								
Building Material & Garden, Other Stores	1.74	1.34								
Retail, Big Box Stores	1.43	1.00								
Retail, Other Stores	0.86	0.59								
Shopping Malls							2.03	1.31		
Anchor Stores at Shopping Malls *							2.10	1.09		
Public Venues & Events									1.72	2.58
Large Office Buildings							1.87	1.56		

*Based on only 4 samples. See Table 1 for sample numbers for each industry group.

Source: CIWMB, Cascadia/SCS et. al. (2006)

Appendix C
Survey Instrument/Script

Ramsey/Washington County Resource Recovery Project

Suggested Script and Survey Questions for Commercial Generators of Organic Waste

Introduction:

Ramsey and Washington Counties are examining how to better manage discarded food waste. We need your help to make sure our information is accurate about current food waste handling systems.

Foth Infrastructure & Environment, LLC, has been working under direction of County staff to survey larger generators of organic waste such as food waste. The objective of this task was to characterize the amount and quality of potential commercial food waste that may be available for future recovery technologies.

Your company was one of the few selected for a phone survey to find willing participants to share information about your food waste management methods. The Counties are trying to better understand the current marketplace of alternative food waste collection and recovery (or disposal) services.

Foth would like to conduct an informal site visit to your facility. This would not be a sales call or an official inspection. Rather, we need to view real food waste handling and disposal operations in practice today.

Prior to our site visit, Foth can send you the type of questions centering on current and past food waste management practices. We do not intend to report the company – specific data gathered from the phone surveys and site visits. Instead, we will report generic and anecdotal data (without naming individual sources).

The site visit should be able to be conducted within one hour. Benefits to your company participating in the site visit could include:

1. Helping Ramsey and Washington County determine if there is enough demand from commercial establishments for new food waste collection and recovery services.
2. Helping the Counties develop new recovery programs. Hopefully, these new programs, if implemented, would give you more choices and increase competition for your food waste. We hope that such new services could lead to lower waste removal costs (but there are no guarantees this will be the case).
3. Improved public relations value for your company by increasing the recognition of your existing and future recovery efforts.
4. Learning more about current food waste recovery options in your County.

Thank you for your time and consideration of this request.

Initial Phone Survey Questions:

1. What do you currently do with your organization's food waste? (Please note your top two handling methods.)
 - Regular, mixed garbage via traditional trash hauler
 - Food to pigs
 - Food for manufacture of animal feed (e.g., "Endres")
 - Compost
 - Food to people
 - Dispose down drain

2. Do you know how much regular garbage is generated from your establishment? If so, please estimate: _____ tons per month.

If not, what is your best guess of how much of your food waste is managed separately from regular trash? _____% of total

3. It would be very helpful to Ramsey and Washington Counties if you would be willing to allow us to visit your company and tour your food waste handling operations, for the purpose of viewing actual programs in the field. This would not be a regulatory visit. Are you willing to schedule a site visit?

4. What food waste reduction or recovery options have your organization considered or want to know more about?

Site Visit Questions:

1. What does your company do? Products? Feedstocks?

2. What other type of waste streams does your company produce?
 - Mixed waste paper
 - Other mixed solid waste
 - Fats, oils, grease
 - Recyclables (cans, bottles, plastics, paper)

3. Who is your hauler? Level of service? Type of containers (e.g., leak-proof compactor boxes, etc.)?

4. What are your current waste disposal charges?

5. What materials do you recycle?
 - Cardboard
 - Mixed paper
 - Food and beverage containers (such as glass, cans, or plastic)
 - Scrap metal
 - Various plastics
 - Yard waste
 - Food waste

_____ Fats, oil, grease

6. What are the barriers to increased recovery?
7. What is your experience with potential ways to dispose of your food waste? What incentives are needed to increase recovery? What is the basis for deciding what to do with your organic waste?
8. Can you tell us more about your non recyclable paper waste stream? E.g., How is it currently managed? Amount generated in 2008?
9. If you sewer a portion of organic wastes, is there any form of grinding (e.g., garbage disposal) or separation? Please describe.
10. What type of records does your company maintain pertaining to your waste streams?
11. Is there seasonal variation in your organic waste streams? If so, please describe.
12. What do you want to know more about?
13. What would be particularly helpful to you, in terms of managing your food waste?
14. How might your local government or hauler help you with managing your food waste?

Appendix D
R/W RRP Letter to Request a Survey



RAMSEY/WASHINGTON COUNTY
RESOURCE RECOVERY PROJECT

2785 White Bear Avenue • Suite 350 • Maplewood, Minnesota 55109 • 651.266.1194 • 651.266.1177

Date

Contact

Org. name

Address

City, State, Zip

Dear (contact name):

Recently you received a phone call about the Ramsey/Washington County Resource Recovery Project (R/W RRP) anaerobic digestion feasibility study. We are inquiring on behalf of the R/W RRP about the food/organic portion of your garbage.

We are asking you and other business leaders in Ramsey and Washington Counties to help us by completing a short food/organic waste survey. This survey should not take more than 15 minutes of your time. The results of the survey will allow us to assess the feasibility of anaerobic digestion as another technology to be used to manage food/organic waste. We are interested in your feedback even if your food/organic waste is being recycled. The food/organic waste data you provide us will be reported as sum totals by county, not on a company-specific basis.

Why should this interest you? Recycling costs are exempt from state and local waste management charges, which appear on your garbage bill. As a result of this survey, it is possible that more options for management of food/organic waste will develop, increasing the opportunity for businesses to save on waste management.

We appreciate your participation in this study and thank you in advance for your response. If you have any questions regarding the survey, please contact Dan Krivit at 651-288-8509 (dkrivit@foth.com) or Norm Schiferl at 651-266-1164 or (norm.schiferl@co.ramsey.mn.us).

Thanks again for your valuable contribution.

Sincerely,

Judy Hunter
Senior Program Manager
Washington County

Zack Hansen
Environmental Health Director
Ramsey County

Appendix E
Cascadia Consulting Group Memo on
Waste Characterization Methodology
At Commercial Establishments



Memorandum

To: Dan Krivit
Foth Infrastructure & Environment

From: Kurt Hulse
Cascadia Consulting Group, Inc.

Date: February 12, 2010

Re: Recommended approaches for researching targetable food waste

This memo outlines suggested research approaches for quantifying the amount of food waste that is present in the disposed waste streams of selected businesses and institutions, as well as estimating the amount of food waste that is discarded by certain classes of business and institution on a countywide basis. The memo also suggests additional ways Cascadia might assist your firm in making the data collection process efficient and free of likely pitfalls.

Approach for individual businesses and institutions

This approach is intended to quantify the amount of food waste that may be recovered from individual locations that are selected on the basis of being large waste generators and being easily targetable. Examples of such locations may include large restaurants, grocery stores, hospital cafeterias, food manufacturers, and college campuses.

Once you have identified a location that is to be studied, the elements of this recommended approach are as follows:

1. Identify and describe all of the waste streams that may be present at the location.
2. Quantify the waste streams at the location, using site-visits.
3. Apply previously established disposal composition profiles to the waste streams at the location.

As you will note in the explanations and examples below, the process of estimating waste quantity and composition is highly customized to individual locations. There is no single method, but there are general guidelines.

1. Identify and describe the waste streams

Many large generators will have multiple waste streams, which may be identified by the fact that material from each waste stream ends up in a different container or exits the location through a different collection/disposal process. The way to identify a distinct waste stream is to ask whether it consistently finds its way into a specific container or set of containers, and also whether the contents of those containers are expected to be different from the contents of containers placed elsewhere at the site.

Some hypothetical examples of locations with single or multiple waste streams are described below.

A hypothetical restaurant might have just one waste stream:

- Mixed food and dry waste placed in dumpster for disposal

A hypothetical grocery store might have multiple waste streams:

- Waste from receiving & stocking functions (mostly dry waste)
- Waste from the deli and food preparation areas, which might always be taken to a specific dumpster and mixed with other dry waste for disposal.
- Food waste that is diverted to a dedicated container for eventual composting.
- Various recycling streams

A hypothetical university campus might have numerous waste streams:

- Mixed food and dry waste from cafeteria – kitchen side
- Mixed food and dry waste from cafeteria – dining room side
- Waste from classroom buildings
- Waste from laboratory buildings
- Waste from public venues such as theaters
- Waste from dormitories
- Diverted food waste (if any)
- Grounds-keeping waste
- Various recycling streams

2. Quantify the waste streams

For each location, it is important to quantify the waste stream(s) that contain food waste that might reasonably be targeted by programs. If possible, it is also beneficial to develop rough quantity estimates of other waste streams that direct material to disposal.

In every case, it is vital to quantify any food that is currently being diverted.

The annual volume for any individual waste stream may be estimated through either of the following calculations:

$$\frac{\text{Cumulative volume of dumpsters} \times \% \text{ fullness of observed dumpsters}}{\text{number of "waste-generating hours" that led to the accumulated waste observed}} \times \text{number of "waste-generating hours" in a typical week (don't count nighttime unless it's relevant)} \times 50 \text{ weeks per year (accounting for holidays)}$$

or alternately:

$$\text{Cumulative volume of dumpsters} \times \% \text{ fullness of observed dumpsters just prior to pick-up} \times \text{number of collections per week} \times 50 \text{ weeks per year (accounting for holidays)}$$

The annual volume estimate for a waste stream may then be multiplied by the appropriate density factor for waste associated with the particular industry or institutional group, or with a density factor appropriate to the specific waste stream.

A third approach to quantifying a waste stream is to examine receipts or records of pick-up records for compactors or drop-boxes, for which a net weight might have been recorded.

The question of whether to sum the quantity results for all waste streams at a location depends on whether better composition profile are believed to exist for the individual waste streams or for the location as a whole. This is discussed in the next section.

3. Apply composition profiles appropriately

Since the primary objective of the research is to quantify the amount of easily-targeted food waste, it is important to be aware that in some cases the answer is straightforward. For example, if a university cafeteria directs "wet" waste to a specific container, and it is believed that the majority of food from the cafeteria finds its way to that container, then it may be unnecessary to quantify or characterize the other waste streams on the campus. The annual volume estimate for the food dumpster, multiplied by a density factor associated with food, may provide a sufficient answer. Some correction may be necessary if small amounts of other contaminants find their way into the same waste stream.

Even if the waste stream originating from a food-handling area does not consist purely of food, it may be worthwhile to examine whether the individual waste stream is similar

to the profile for "restaurants." If so, then the food portion of the waste can be estimated as being the same as for restaurants, and again it becomes unnecessary to calculate quantities or composition for other waste streams that may exist at the location.

On the other hand, if it is believed that the composition profile for the industry group as a whole is better than anything that can be found for individual waste streams and activities at the location, then it becomes necessary to calculate a summed total quantity of all waste streams at the location. (For example, in a campus environment, this would include cafeterias, classrooms, dormitories, etc.) The industry-level composition profile can then be applied to the total quantity, to estimate the amount of food present in the campus-wide waste stream. It can be assumed that the majority of the food revealed in the calculation comes from the cafeterias or other food-service areas.

The estimate of food quantity must be compared against the information that is known about the specific location. If the food that is produced on location is unusually wet or dense, then some correction must be made to the density factor or the tonnage estimate. If it is known that some food is already being diverted, then the previously-existing disposal composition profile may have to be adjusted.

Approach for countywide estimates for entire industry groups

Our recommended approach for using available data to extrapolate the amount of food in disposed waste is similar to what you have already undertaken. The basic approach is to use a previous estimate of annual tons of waste per employee, and to multiply it by the number of employees that exist in for the industry group countywide. The resulting quantity estimate is then combined with the relevant disposal composition profile to estimate the amount of each specific material that is disposed countywide.

If you believe that the quantity estimates you develop for the individual locations, as described earlier, are representative of other locations for an industry group countywide, then it may be preferable to use those quantity estimates in place of figures that were developed in previous studies.

Additional assistance

If you wish, Cascadia could lead a two- or three-hour training session covering all the "ins and outs" of arranging site visits for the purpose of quantifying waste. For large institutions, it can be surprisingly complex. We also could assist in thinking through the approach for individual businesses and institutions.

Appendix F
Tally of Contacts by SIC Code Category

2-Digit SIC Code Category	Connected via Phone Call or Site Visit	Conducted Site Visit	R/W Letter
20 Food and Kindred Products	6	4	0
51 Wholesale Trade - non-durable Goods	11	4	1
54 Food Stores	6	6	1
58 Eating and Drinking Places	8	8	3
70 Hotels, Rooming Houses, Camps, and Other Lodging Places	2	2	0
80 Health Services	1	1	1
82 Educational Services	3	2	1
91 Executive, Legislative, and General Government, Except Finance	2	1	0
95 Administration of Environmental Quality and Housing Programs	1	1	0
TOTAL	40	29	7

Appendix G
Questions Asked of Haulers
About Current SSOM Collection Programs

1. What is happening with the commercial/institutional market with food wastes in R/W Counties? (food from groceries, food processors, restaurants, hospitals, colleges, etc.)?
2. Are you hauling any customers with separated food wastes?
3. Are you marketing any source separation of food wastes for customers to avoid the CEC?
4. If so, what can you say about quantities, delivery locations, and disposal prices?
5. What are the general collection requirements (separation requirements, special equipment, route frequency, etc.)?
6. Do you provide training or assistance for customers on proper separation in their facilities and processes? What are the challenges?
7. Are there seasonal variations in quantities or types?
8. Does the added weight of food waste create any motivation to try to keep it out of Newport tipping fees?
9. If an anaerobic digester capable of accepting food wastes and non-recyclable paper was built in the St Paul area, what would tipping fees need to be at to cause separation and delivery?
10. What are the barriers to increased commercial food waste recovery?
11. Are you interested in doing anything with SSO as a company?
12. There is going to be a big push from the State to increase recycling from 50% to as much as 60% or more. The Counties thought that the CEC combined with the Solid Waste Management Tax would have a greater impact. Do you think the CEC has had an impact on recycling? What will it take to get more recycling?

(As developed by Foth with R/W RRP staff input, February 2010)

Appendix H
Questions Asked of Other County Staff
About SSOM Recovery Programs

“.....R/W Counties are interested in anaerobic digestion of source separated organics.
.....”

1. What is happening with the commercial/institutional market with food wastes in your county? (food from groceries, food processors, restaurants, hospitals, colleges, etc.)?
2. What are your thoughts about the St Paul Port Authority efforts for anaerobic digestion?
3. Where does AD fit relative to composting?
4. Hennepin County – What is the role of the County versus City of Minneapolis for residential organics?
5. What can you say about quantities, delivery locations, and disposal prices?
6. What are the general collection requirements (targeted materials, separation requirements, special equipment, route frequency, etc.)?
7. Are there seasonal variations in quantities or types?
8. If an anaerobic digester capable of accepting food wastes and non-recyclable paper was built in the St Paul area, what would tipping fees need to be at to cause separation and delivery?
9. What are the barriers to increased commercial food waste recovery?

(As developed by Foth, March 2010)

Appendix I
Summary of 3-Digit SIC Code Categories and
Desktop Assessment of Commercial Food Waste Disposal
in Ramsey and Washington Counties

[NOTE:

**INCORPORATED BY REFERENCE INTO THIS REPORT.
AVAILABLE UPON REQUEST.]**

Appendix J
Annotated Results of Phone Interviews and Surveys

2-Digit SIC Code	Connected via Phone Call or Site Visit	Conducted Site Visit	R/W Letter	Comments
20	Food and Kindred Products			
	13	Yes	No	FW (estimated at less than 1% of production) is sewered & disposed with mixed MSW.
	1	Yes	No	FS + packaging to AFM
	39	Yes	Yes	FS recovered via AFM.
	40	Yes	Yes	FS recovered via AFM.
	44	Yes	Yes	FS recovered via AFM.
	42	Yes	Yes	FS recovered, including brewer's gold.
51	Wholesale Trade - non-durable Goods			
	20.a	Yes	No	FS recovered via hog farmer for at least five years. 25 barrels per week.
	36	Yes	Yes	FW disposed with mixed MSW.
	2	Yes	No	FS + packaging to AFM; Free service.
	5	Yes	Yes	Yes Very clean, large volumes of FS to hog farmers.
	7	Yes		FS recovered via hog farmer. No charge, except trucking.
	15	Yes	No	Distribution only. Very little FW (e.g., from employee lunchroom waste).
	16	Pending	No	Call back pending.
	17	Yes	No	FS to FOG recovery & rendering.
	18	Yes		Call back pending.
	27	Yes	Yes	Very clean, large volumes of FS to hog farmers.
	43	Yes	Yes	No longer recycling FS. Disposed with mixed MSW. Used to use hog farmer.
	14	Yes	No	Distribution facility only, so very little food production waste. Manufacturing at another, rural location.
54	Food Stores			
	28	Yes	Yes	Yes FS recovered via AFM.
	30	Yes	Yes	No longer recycling FS. Disposed with mixed MSW.
	33	Yes	Yes	No longer recycling FS. Disposed with mixed MSW.
	41	Yes	Yes	FW disposed with mixed MSW.
	31	Yes	Yes	FS recovered by hog farmers. 83 tons last fiscal year.
	32	Yes	Yes	FS recovered via AFM. 9 tons last fiscal year.
58	Eating and Drinking Places			
	21.a	Yes	Yes	Yes FS (+ mixed MSW) recovered via AFM. Approximately 2 tons per month.
	21.b	Yes	Yes	Yes FW disposed with mixed MSW.
	29	Yes	Yes	Yes FS recovered by hog farmers.
	34	Yes	Yes	No longer recycling FS. Disposed with mixed MSW. Used to use hog farmer.
	35	Yes	Yes	No longer recycling FS. Disposed with mixed MSW. Used to use hog farmer.
	37	Yes	Yes	No longer recycling FS. Disposed with mixed MSW. Used to use hog farmer.
	38	Yes	Yes	FW disposed with mixed MSW.
	47	Yes	Yes	FW disposed with mixed MSW.
70	Hotels, Rooming Houses, Camps, and Other Lodging Places			
	45	Yes	Yes	FS recovered by hog farmers.
	46	Yes	Yes	FS recovered by hog farmers.

Annotated Results of Phone Interviews and Surveys (continued)

80 Health Services	11	Yes	Yes	Yes	FW pulped to reduce moisture & trash costs. No recovery.
82 Educational Services	23	Yes	Yes		St. Paul Public Schools - FS recovered via hog farmer at selected buildings. See Appendix L for details.
	19	Yes	No	Yes	FW currently disposed with mixed MSW. Food service vendor very willing to consider SSOM recovery.
	26	Yes	Yes		U of M - FS recovered for composting. See Appendix K for details.
91 Executive, Legislative, and General Government, Except Finance	22.a	Yes	Yes		State of Minnesota Buildings - FS recovered via hog farmer at selected buildings. See Appendix O for
	25	Yes			Ramsey County Buildings - FS recovered via hog farmer at selected buildings. See Appendix M for
95 Administration of Environmental Quality and Housing Programs	24	Yes	Yes		MPCA / DNR Building - FS recovered for composting. See Appendix N for details.

Source: Personal communications via phone interviews and site visits.

Abbreviations:

AFM = Animal feed manufacturers

FS = Food scraps

FW = Food waste

MSW = Total mixed municipal solid waste

Appendix K
University of Minnesota:
Food Scraps Recovery Program Summary

The University of Minnesota (U of M) began an organics collection program in 2007. Currently the program is operating in residential dining halls, some retail dining locations, and research animal resource (RAR) locations. The information provided in this summary is from a phone conversation with Dana Donatucci, the program administrator for waste abatement services for the University of Minnesota, and from the University's website. Dana estimated there are currently 20 organic waste collection stops on Campus, half of the stops are only for collecting small animal bedding.

Program Overview

Organic materials are collected from residential dining halls and some retail food locations. Materials collected include: post-consumer plate waste, pre-consumer kitchen trim waste, and biodegradable silverware. Only some of the retail dining locations use biodegradable silverware. Specially marked organic collection containers are placed in the dining halls and retail food locations for student use. The containers are 32 gallon, BRUTE™ containers with wheels. These containers are lined with a compostable bag. The organics collected from campus are transferred by the University hauler to the Hennepin County transfer station in Brooklyn Park. From the transfer station, the organics are taken to a compost site.

Tonnage Data

Some data was available on the University's website pertaining to tonnage information.

Table K-1
University of Minnesota – Tonnage Data

Year	2007	2008
Total MSW (tons)	9,251.9	8,696.95
Compostable Organics (tons)	104.2	563.1

Source: U of M web site *Recycling Program: Current Recovery Rates:*
<http://www1.umn.edu/recycle/statistics.html>

Total MSW tons includes recyclable (organics, glass, plastic, etc.) quantities. MSW materials that cannot be recycled are disposed of at the Hennepin Energy Recovery Center.

For more information about the U of M organics recycling program, see their web page at: <http://www1.umn.edu/dining/awareness.html>

Capture Rate Estimates

The campus is represented by the broader generic SIC Code category of 82 – Educational Services. The CIWMB Study estimated the food waste disposal rate for these types of facilities to be 0.13 tons per employee per year.

Appendix L
Saint Paul Public Schools:
Food Scraps Recovery Program Summary

Saint Paul Public Schools (SPPS) partnered with Ramsey/Washington County Resource Recovery Project and piloted a food scraps collection program at five sites in 2005 including:

- ◆ District Kitchen
- ◆ Galtier Elementary
- ◆ Hancock Hamline Elementary
- ◆ Maxfield Elementary
- ◆ International Academy Leap

During the 2006-2007 school year, the remaining elementary schools were added to the program (50 total). During the 2008-2009 school year, voluntary secondary schools were added to the program. Earlier this school year (2009 – 2010), one high school was added to the program. The program has grown significantly since it began in 2005. Currently, 77 SPPS schools are participating in food scraps collection programs. (See Appendix P for additional discussion of the SPPS and other schools food scraps recovery programs.)

Program Overview

SPPS have a contract with Barthold Farms for collection of the food scraps from their cafeterias. SPPS utilizes the same master, State of Minnesota contract with Barthold for food scraps collection at their facilities. This is part of the State's cooperative purchasing program allowing other units of government to buy off of such State master contracts. Ramsey County also purchases Barthold's food scrap recycling services off of this same State master contract.

The food scraps collected at the majority of the SPPS schools includes pre-consumer kitchen trim waste as well as post-consumer student plate waste (including beverages). The high school that joined the program this school year only collects pre-consumer kitchen waste, not post-consumer student plate waste.

Barthold collects the food scraps containers from the schools several times each week. Barthold is required to provide clean containers that are lined with a new bag to replace the containers that are collected. A food scraps/compostable waste study was completed in March 2010 at one of the junior high schools that is participating in the collection program. The data for this study was not provided to Foth.

Food scraps Collection Barrels

Barthold provides the schools with 32 gallon, durable plastic barrels that have lids and wheels. The schools are billed for each barrel that is serviced. SPPS provided Foth with the barrel count data as collected by Barthold for each school during past school years.

Population Data

To understand capture rates for food scraps, Foth also requested student population data for each of the schools for the represented school years.

Capture Rate Estimates

All of the SPPS schools are represented by the SIC Code category 82-Educational Services. The CIWMB Study estimated the food waste disposal rate for these types of facilities to be 0.13 tons per employee per year.

Using the data provided by the SPPS, Foth determined the capture rate for these schools to be 0.002 to 0.174 tons per student per school year, averaging 0.071 tons per student per school year. The annual tonnage of food scraps collected from each school was determined using an estimated “full” barrel weight of 185 lbs.

Cost Data

The State pays \$3.90 for each container serviced. In 2007, SPPS reported a 40% reduction in trash volume and a 15% reduction in trash weight, contributing to cost savings in trash collection and disposal. The SPPS contract provides for separate, pass-through billing of mixed MSW disposal vs. collection service charges. A density assumption is used to make the conversion based on volume of mixed MSW removal service.

Appendix M
Ramsey County Buildings:
Food Scraps Recovery Program Summary

County staff provided Foth with data about the current state of food scraps recycling at selected County buildings.

Below is a list of buildings owned by Ramsey County that currently have food scraps recovery programs:

- ♦ Landmark Center in downtown St. Paul – This facility is managed by Minnesota Landmarks, a not-for-profit organization. Food scraps collected from this facility are primarily from catering companies working at events taking place within the building. A small portion of the food scraps collected is from a café located in the building.
- ♦ Family Service Center in Maplewood (transitional housing for homeless families)
- ♦ Care Center in Maplewood (nursing home)
- ♦ Law Enforcement Center near downtown St. Paul (includes the short term jail facilities, including County Sheriff’s and County Attorney’s administrative offices)
- ♦ Correctional Facility on the east side of St. Paul (also known as the “workhouse”) – This facility recently assumed responsibility for food service management at two County juvenile facilities (Juvenile / Family Justice Center and Boys Totem Town). These two other facilities previously had food scraps recycling services of their own. The food scraps recycling programs for all three of these facilities is now consolidated with centralized food preparation at the County Correctional Facility. Thus, the monthly barrel counts for these facilities are now combined.

Program Overview

All of the County facilities listed above are served by Barthold Farms for collection and recovery of their food scraps (food direct to livestock). The County utilizes the State master contract with Barthold under a cooperative purchasing arrangement similar to the SPPS contract.

The majority of the facilities began a food scraps collection program during the middle to the end of April 2009. The exception is the Correctional Facility which has been collecting food scraps for over two of years. County staff did not have historical data readily available for the Correctional Facility.

JLT & Associates provided food scraps collection program training at each facility. The County also provided posters with instructions to some of the locations that requested additional training tools. The majority of the facilities collect only kitchen (“pre-consumer”) waste. Some of the facilities also collect plate (“post-consumer”) waste. For

Personal communication from Dan Donkers, Ramsey County staff to Jessie Graveen, Foth.

example, the Law Enforcement Center started collecting plate waste in February of 2010 at the officers' dining hall and also at the Correctional Facility.

Barthold collects the food scraps containers in barrels three times per week from each of the facilities. Barthold is required to provide clean containers to replace the containers that are collected.

Food scraps Collection Barrels

Barthold provides each facility with 32 gallon, durable plastic barrels that have lids and wheels. The approximate number of barrels at each facility is listed below (with the estimated number of full barrels collected per pickup).

- Family Service Center – 6 barrels total (normally collect 2 to 3 barrels per pickup).
- Care Center– 7 barrels total (normally collect 4 to 5 barrels per pickup).
- Law Enforcement Center – 6 barrels total (normally collect 2 to 4 barrels per pickup).
- Landmark Center – 7 barrels total (normally collect 3 to 4 barrels per pickup).
- Correctional Facility – 9 barrels total (normally collect 2 to 4 barrels per pickup).
 - Juvenile and Family Justice Center – Formerly, 5 barrels total (normally collect 2 to 4 barrels per pickup). Now, this material is transferred to the Correctional Facility kitchen.
 - Boys Totem Town – Formerly, 5 barrels total (normally this material was collected from 2 to 3 barrels per pickup). Now, this material is transferred to the Correctional Facility kitchen.

The County is billed for each barrel that is serviced. The invoices separate the barrel counts for each month by facility. The County provided Foth with the barrels counts as invoiced by Barthold for each facility starting in the middle to the end of April 2009 through January 2010.

Population Data

To understand capture rates for food scraps, Foth requested population data for each of the facilities from the County. The County provided actual and estimated monthly population data for each of the facilities for the same time frame as the barrel counts (mid April 2009 through January 2010). The population numbers only include residents. Including employees in the population can be problematic because not all employees eat the meals prepared by the kitchens. Some employees bring lunch from home and some eat off-site. Using the resident population data in these cases provides a more accurate estimate of the capture rate for food scraps in this government cafeteria type of setting.

Meal Count Data

The County also provided meal counts for Boys Totem Town and the Family Service Center. The meal counts for Boys Totem Town account for meals prepared for both employees and the residents at the facility. This data was not used at this time.

Capture Rate Estimates

Five of the Ramsey County facilities represent the SIC Code group 92 - Justice, Public Order, and Safety. This SIC code falls under the broader generic category of Public Administration facilities. The CIWMB Study estimated the food waste disposal rate for these types of facilities to be 0.05 tons per employee per year. The sixth facility represents the SIC Code group 80 – Health Services. The CIWMB Study estimated the food waste disposal rate for these types of facilities to be 0.04 tons per employee per year.

Using the data provided by the County, Foth determined the capture rate for these facilities to be between 0.12 and 0.97 tons per resident per year. Please refer to Table F-1 below that summarizes the data for each facility.

Table M-1
Estimated Food scraps Capture Rates for County Owned
Facilities

County Owned Facility	Primary SIC Code	Average Monthly FW Collected ¹ (tons)	Average Monthly No. of Residents ²	Average Monthly FW Capture Rate (tons/resident/mo)	Average Annual FW Capture Rate (tons/resident/year)
Family Service Center ³	92	2.82	54	0.06	0.67
Care Center	80	3.14	169	0.02	0.24
Law Enforcement Center	92	3.35	397	0.01	0.13
Correctional Facility	92	4.06	416	0.01	0.12
Juvenile & Family Justice Center	92	2.18	30	0.08	0.97
Boys Totem Town	92	2.05	54	0.04	0.52

Notes:

¹ These values represent the average monthly tonnage of food scraps collected from each facility between the end of April 2009 through January 2010 (@ 150 lbs/barrel). Note that half way through January 2010, Boys Totem Town and the Juvenile Family Justice Center barrels were consolidated with the Correctional Facility barrel count.

² The average monthly number of residents at each facility is over same time frame as the food scraps tonnage data, the end of April 2009 through January 2010. These population values do not include employees.

³ The County noted that the Family Service Center receives a significant amount of donated food that is not able to be served and is recycled. This skews the capture rate per resident value.

Cost Data

The County pays \$4.00 for each food scraps container collected at all of the facilities.

The Law Enforcement Center and the Care Center both have compactors for their MSW. These facilities pay a flat rate for transferring the compacted MSW to Newport (\$127.50 and \$130.00, respectively). In addition to the transport fee, the facilities are charged a pass through tip-fee per ton (\$52 per ton, 2010 tip fee at Newport).

All of the other locations have dumpsters for their MSW. The MSW collected from these other facilities is also taken to Newport for processing. These facilities are charged a tip fee and a collection fee by their hauler, Allied. The collection fee covers costs associated with container use, truck operation and maintenance, labor, and fuel.

Appendix N
MPCA-DNR Building:
Organics Program Summary

The Minnesota Pollution Control Agency (MPCA) and the Department of Natural Resources (DNR) complex near downtown St. Paul currently participates in an organics collection program.

Program Overview

The MPCA and the DNR buildings are not owned by the State. However, organics collection services are required as part of the leasing contract with the building owner (Meritex). The current hauler contracted to provide waste disposal and recycling for the complex is Aspen. Organic materials are collected from the shared cafeteria (post-consumer plate waste, pre-consumer kitchen trim waste, and biodegradable silverware) and bathrooms (paper towels). Specially marked organic collection containers are placed in the shared cafeteria and bathrooms as well as on several floors of the MPCA offices. Cleaning staff collect and consolidate the organic materials in one location for the hauler to collect and take to RRT. The hauler collects materials from the complex once per week. The organics collected from the complex are trucked by Aspen directly to a compost facility located south of St. Paul where they are composted.

Tonnage Data

The hauling company provides MPCA with actual weights of compostable material. Prior to 2007, volume to weight conversions were used to quantify compostable materials collected from the MPCA-DNR complex.

The MPCA has an internal staff team that assists with implementing the food scraps collection program. This group completed a waste sort of the overall waste generated at the complex and the trash stream in 2009. The waste sort found 30% of the total waste generated at the MPCA has the potential to be composted. Of the material that is currently disposed of in the trash, 48% could be composted.

Population Data

To understand capture rates for food scraps, Foth used employee population data provided by the MPCA.

Capture Rate Estimates

The MPCA-DNR buildings represent the broader generic SIC Code category of Public Administration. The CIWMB Study estimated the food waste disposal rate for these types of facilities to be 0.05 tons per employee per year.

Using the data provided by the MPCA, Foth determined the average capture rate from 2005-2008 to be 0.012 tons per employee per year. The capture rate includes capturing other types of organic compostable materials other than food scraps (e.g. paper towels). Please refer to Table G-1 below that summarizes the data for the complex. Based on information from the waste sort conducted in 2009, the MPCA believes they are capturing approximately 35% of the total compostable materials with the organics collection program.

Table N-1
 Estimated Organics Capture Rate from the MPCA-DNR
 Complex

Year	2005	2006	2007	2008	Average
Compostable Organics (lbs)	24,000	20,840	25,020	16,300	21,540
Compostable Organics (tons)	12	10.42	12.51	8.15	10.77
MPCA FTEs	814.10	806.30	835.40	918.20	843.5
BWSR FTEs = DNR	<u>35.00</u>	<u>36.00</u>	<u>36.00</u>	<u>39.00</u>	<u>36.5</u>
Total FTEs	849.1	842.3	871.4	957.2	880
Estimated Capture Rate (tons/employee/year)	0.014	0.012	0.014	0.009	0.012

Cost Data

The MPCA provided some rough cost estimates for the organics disposal. Prior to Aspen servicing the building, Veolia was the waste hauler. Veolia charged \$143/month (or \$1,716/year) to transfer the organics to the RRT facility in Empire Township. From 2005-2008 an average of 10.77 tons of organics were collected from the complex. Using this information, organics collection cost approximately \$159 per ton.

Appendix O
State of Minnesota Buildings:
Food Scraps Recovery Program Summary

Staff from the Minnesota Department of Administration, Resource Recovery Program, provided data about the current state of food scraps recycling at selected State buildings.

Below is a list of State owned facilities within the capital complex near downtown St. Paul that currently have food scraps collection programs operating in their cafeterias:

- ◆ Harold E. Stassen Building
- ◆ Centennial Office Building
- ◆ Transportation Building
- ◆ Elmer L. Andersen Human Services Building
- ◆ Minnesota History Center
- ◆ Capital Building (seasonal) *
(*Recently added as of April 12, 2010. Service to be provided at times when the legislature is in session.)

Two State correctional facilities also have food scraps collection programs: Lino Lakes and Bayport. The State also helps coordinate food scraps collection at the Minnesota State Fair. Data was not provided for these two facilities and the State Fair.

Program Overview

All of the State facilities listed above utilize the food scraps collection and recovery services of Barthold Farms for food to hogs. Barthold collects the food scraps from the State building cafeterias. Ramsey County and SPPS also purchased Barthold's services under the same State contract for food scraps collection at the selected buildings. (For more information, see Appendices E and F, respectively.)

Barthold collects the food scraps containers (i.e., lined, blue barrels) from the capital complex buildings between one and three times per week. Barthold is required to provide clean containers that are lined with a new bag to replace the containers that are collected.

Food Scraps Collection Barrels

Barthold provides each facility with 32 gallon, durable plastic barrels that have lids and wheels. The approximate number of barrels at each facility is listed below (along with the estimated number of "full" barrels collected per pickup).

- ◆ Harold E. Stassen Building – 5 barrels total (normally collect 2 to 3 barrels per pickup; and collection is two times per week).
- ◆ Centennial Office Building – 6 barrels total (normally collect 1 to 2 barrels per pickup; and collection is two times per week).
- ◆ Transportation Building – 6 barrels total (normally collect 2 to 3 barrels per pickup; and collection is once per week).
- ◆ Elmer L. Andersen Human Services Building – 5 barrels total (normally collect 2 to 3 barrels per pickup; and collection is two times per week).
- ◆ Minnesota History Center – 8 barrels total (normally collect 3 to 4 barrels per pickup; and collection is three times per week).

Personal communication from Jeff Anderson, MN Department of Administration to Jessie Graveen, Foth.

The State is billed for each barrel that is serviced. The invoices separate the barrel counts for each month by building. The State provided Foth the barrel count data as invoiced by Barthold for each building starting in May 2008 to December 2009.

Population Data

To understand capture rates for food scraps, Foth also requested employee population data for each of the buildings from the State.

Capture Rate Estimates

All of the State buildings represent the broader generic SIC Code category of Public Administration. The CIWMB Study estimated the food scraps disposal rate for these types of facilities to be 0.05 tons per employee per year.

Using the data provided by the State, Foth determined the capture rate for these facilities to be between 0.007 and 0.036 tons per employee per year. Please refer to Table H-1 below that summarizes the data for each facility.

Table O-1
Estimated Food Scraps Capture Rates
from State Building Cafeterias

State Owned Facility	Primary SIC Code	Average Monthly FW Collected ¹ (tons)	Employee Population	Average Monthly FW Capture Rate (tons/employee/mo)	Average Annual FW Capture Rate (tons/employee/year)
Stassen Building	93	0.66	1,139	0.001	0.007
Centennial Office Building	83, 91, 93, 96	1.92	735	0.002	0.020
Transportation Building	96	1.69	835	0.001	0.018
Elmer L. Andersen Human Services Building	??	0.63	1,195	0.001	0.007
Minnesota History Center	86	3.45	318	0.003	0.036

Notes:

¹ These values represent the average monthly tonnage of food scraps collected from each facility from May 2008 through December 2009 (@ 150 lbs/barrel).

Cost Data

The State pays \$4.00 for each container serviced.

Appendix P
Summary of R/W RRP's
Recent Organics Materials Management Projects

(Source: R/W RRP Annual Report
Produced by County Staff, April 2009)

For the past six years the Project (R/W RRP) has coordinated work on organic waste management, including food waste (recovery), on behalf of the two Counties. Much of this (recovery) work has been coordinated through the Project's consultant, J.L. Taitt & Associates.

K-12 Schools (Food Scraps Recovery)

The Project continued to work with K-12 schools in both Counties, providing technical assistance and liaison services for the implementation of food waste recovery and recycling systems. During 2008, 23 additional schools began food waste recycling, in addition to the 54 schools that started implementing the program between 2005 and 2007, for a total of 77 schools by the end of 2008 (with more being added during early 2009).

Highlights include:

Best Practices Guide - Based on previous work, completed a Best Practices Guide to implement food waste recycling through livestock feeding at public and private K-12 schools. This is an important tool that streamlines the development of food waste programs in schools.

North St. Paul – Maplewood - Oakdale School District - Established a pilot food waste recycling program at Castle Elementary School in Oakdale.

Roseville Area Schools - Established food waste recycling at Brimhall Elementary School. Developed a pilot comprehensive recycling program with Parkview Center School, and planned for implementation of food waste recycling that began in January 2009.

Saint Paul Public Schools (SPPS) - Established food waste recycling at six secondary schools (middle/junior high schools: Battle Creek, Humboldt, Hazel Park Academy, Ramsey; high schools: Arlington, Humboldt). (SPPS plans) for implementation at additional secondary schools in 2009. These programs build on the implementation of food waste recycling at all SPPS elementary schools, begun during 2005-2007. During 2008 a total of about 1,675 tons of food waste were diverted throughout the district, an increase of about 335 tons over the 1,340 tons diverted during 2007.

Stillwater Area Public Schools - Established food waste recycling at Rutherford and Oak Park Elementary Schools. Began planning at Lake Elmo Elementary and Stillwater Junior High for implementation in early 2009.

White Bear Lake Area Schools - Following successful pilot food waste recycling programs at Lakeaires and Willow Lane elementary schools, established food waste recycling at all other elementary schools (Birch Lake, Centerpoint, Lincoln, Oneka, Otter Lake, Parkview, Vadnais Heights), plus food preparation waste only at WBLAHS South campus.

Private and Charter Schools - Established food waste recycling at St. Croix Catholic School (K-8) in Stillwater, and at New Spirit charter school, primary and middle schools, in Saint Paul.

Colleges - Provided technical assistance to Macalester College to continue to explore potential implementation of food waste recovery.

Food Rescue through Second Harvest Heartland

The Project and Second Harvest Heartland (SHH) entered into a pilot agreement through 2009 through which SHH is providing and expanding food rescue services within Ramsey and Washington Counties. The primary focus of these services is on significantly increasing the quantity of perishable foods collected from deli, dairy, meat, produce, and bakery departments in major grocery stores.

Since the pilot program began in May 2008 with SHH expanding its food rescue efforts in grocery stores, SHH has rescued about 434 tons of food in the two counties, meaning substantially more food was rescued in eight months (May through December, 2008), than during all of 2007 (334 tons).