

**Report**

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

**Report Text, Tables and Figures**

**Project I.D.: 10R001**

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

**June 2010**





June 8, 2010

Mr. Zachary Hansen  
Ms. Judy Hunter  
Ramsey/Washington County Resource Recovery Project (R/W RRP) Board  
2785 White Bear Avenue, Suite 350  
Maplewood, MN 55109-1320

Dear Zack & Judy:

RE: Final Report on Organic Materials from Commercial Establishments:  
A Supply Assessment

This letter transmits the final report on Organic Materials from Commercial Establishments: A Supply Assessment.

This study examines the amount of source separated organic materials (SSOM) from commercial, industrial and institutional (CII) waste generators that may potentially be available for the anaerobic digestion (AD) facility that is under ongoing planning and development. Two basic sources of data were used. First, a desktop analysis was conducted based on available literature and other public data. Second, phone interviews and site visits were conducted to document current SSOM recovery rates.

This assessment:

- ♦ Defines the feedstock quality that could be used as an initial material supply specification for an AD facility.
- ♦ Describes the quantity and quality of SSOM that are currently being recovered from commercial establishments in the two Counties.
- ♦ Estimates the additional volumes of organic wastes that are currently disposed within the mixed municipal solid waste (MSW) stream.
- ♦ Characterizes the various categories of CII organic waste generators in the two Counties.
- ♦ Identifies the likely types of commercial establishments that could potentially supply SSOM to a new AD facility.
- ♦ Includes summaries of several institutional food scraps and organics recovery programs in place today (including at Ramsey County buildings).

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Mr. Zachary Hansen  
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Ramsey/Washington County Resource Recovery Project Board  
June 8, 2010  
Page 2

One of the key conclusions is that there is already a significant amount of food scraps recovery that is taking place in Ramsey and Washington Counties. Many of the commercial establishments already have separate food scraps collection services, in some cases for many years. This existing infrastructure provides R/W RRP with an opportunity to base planning for future recovery on well established systems.

Thank you for the opportunity to provide this study. We look forward to working with you on the next steps to advance this exciting technology.

Please feel free to contact us if you have any questions.

Sincerely,

Foth Infrastructure & Environment, LLC



Warren A Shuros  
*Senior Project Manager*



Dan Krivit  
*Senior Project Manager*

Organic Materials from  
Commercial Establishments:  
A Supply Assessment

Distribution

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Board  
2785 White Bear Avenue, Suite 350  
Maplewood, MN 55109-1320

# Organic Materials from Commercial Establishments: A Supply Assessment

Project ID: 10R001

Prepared for  
Ramsey/Washington County Resource Recovery Project Board  
2785 White Bear Avenue, Suite 350  
Maplewood, Minnesota 55109

Prepared by  
Foth Infrastructure & Environment, LLC

June 2010

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# Organic Materials from Commercial Establishments: A Supply Assessment

## Contents

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	Page
Executive Summary .....	vi
List of Abbreviations, Acronyms, and Symbols .....	xii
Definitions as Used in this Report .....	xiii
Acknowledgements .....	xvi
1 Introduction .....	1
1.1 Purpose .....	1
1.2 Scope of Work .....	2
2 Background Information .....	4
2.1 Prior Research .....	4
2.1.1 Foth Feasibility Study (June 2009) .....	4
2.1.2 Support of Other Food Rescue and SSOM Recovery Options .....	4
2.1.3 Waste Composition Studies .....	5
2.2 Chronology of this Project .....	5
3 Methods .....	6
3.1 Preliminary Feedstock Supply Specification .....	6
3.2 Review of SCORE Data as Reported by Counties to MPCA .....	6
3.3 Characterizing Food Waste from Commercial Establishments .....	6
3.3.1 SIC Code Classifications .....	6
3.3.2 Food Waste Generation and Disposal Rates from Literature Sources .....	8
3.3.3 Additional Sources from Minnesota State/Regional Agencies .....	9
3.3.4 Waste Composition Studies .....	9
3.4 Phone Interviews and Site Visits with Commercial Establishments .....	9
3.5 Interviews with Haulers, Other Counties, and Other SSOM Recovery Service Providers .....	11
4 Feedstock Supply Quality Specifications .....	12
4.1 Preliminary AD Supply Specification .....	12
4.2 Comparison to Supply Specifications of Other Organics Recovery Systems .....	13
5 Tonnage and Composition Data from Minnesota Sources .....	16
5.1 SCORE Data .....	16
5.2 Composition Data .....	21
6 Disposal Estimates .....	23
6.1 Summary of Disposal Estimates by SIC Code .....	23
6.2 Extrapolation to R/W Counties .....	23
6.3 Food and Kindred Products (SIC Code 20) .....	27
6.4 Wholesale Trade – Non-Durable Goods (SIC Code 51) .....	28
6.5 Food Stores (SIC Code 54) .....	29
6.6 Eating and Drinking Places (SIC Code 58) .....	31
6.7 Hotels, Rooming Houses, Camps and Other Lodging Places (SIC Code 70) .....	33

## Contents (continued)

---

	Page
6.8 Health Services (SIC Code 80).....	33
6.9 Educational Services (SIC Code 82).....	34
6.10 Public administration (SIC Codes: 83, 91, 92, 93, 94, 95, 96, 97 and “Other”).....	36
7 Existing Recovery by Grade of Food or SSOM.....	38
7.1 Food Rescue (Food to People).....	38
7.2 Food to Hogs or Cattle (Direct) .....	38
7.3 SSOM to Compost .....	39
7.4 Food to Dried Animal Feed Manufacturers .....	40
7.5 Fats, Oils, Grease (FOG) .....	40
8 Market Conditions .....	42
8.1 Dried Animal Feed Manufacturers .....	43
8.2 Food to Hogs and Cattle (Direct).....	43
8.3 SSOM to Compost .....	44
8.4 Non-Recyclable Paper .....	45
8.5 FOG Recovery Systems.....	45
9 Discussion.....	47
9.1 Supply Specification .....	47
9.2 Current Recovery .....	47
9.3 Material Still Disposed into Mixed MSW .....	48
9.4 Barriers to Increased Recovery.....	48
9.5 Contamination and Feedstock Quality Specifications .....	49
9.6 Economics.....	50
9.6.1 Opportunities for Rightsizing Trash Service .....	50
9.6.2 Commingling of Food Scraps and Non-Recyclable Paper .....	50
9.6.3 Pricing of Alternative Organics Recycling Services .....	51
9.6.4 Avoiding the CEC + SWMT .....	52
9.6.5 Relationship to the Broader Market Conditions of the Integrated Waste Management System.....	52
9.6.6 Overall Economics.....	53
9.7 Seasonal Variations.....	53
9.8 Regulatory, Legislative and Other Policy Issues .....	54
9.9 Education and Outreach.....	54
9.10 Limitations of the Data .....	55
10 Conclusions .....	57
11 References .....	62

## Contents (continued)

Page

### Tables

Table 3-1	List of Types of Commercial Establishments: Two Digit SIC Code Categories ....	7
Table 4-1	Preliminary Organic Supply Quality Specification for the Anaerobic Digestion Facility .....	12
Table 4-2	Other Organic Material Recovery Systems: Feedstock Supply Specifications .....	13
Table 4-3	Acceptable and Unacceptable Materials from Each End-Use Option (From JLT & Associates, December 2003).....	14
Table 5-1	Commercial Organics Discards and Potential Capture Rates.....	16
Table 5-2	SWMCB Organics Recovery Tonnages (2004 - 2009) (County Data Used for SCORE Report Summaries) .....	18
Table 5-3	Comparison of Mixed MSW Composition Studies .....	21
Table 6-1	Benchmark Food Waste Disposal Rates .....	23
Table 6-2	Summary of Food Waste Disposal By SIC Category .....	25
Table 6-3	Ramsey and Washington Counties: Estimation of Food Waste Disposal by SIC Code Classifications.....	27
Table 6-4	Food and Kindred Products (Subcategories within SIC Code 20) .....	28
Table 6-5	Wholesale Trade – Non-Durable Goods (Subcategories within SIC Code 51).....	29
Table 6-6(a)	Food Stores (Subcategories within SIC Code 54) .....	30
Table 6-6(b)	Food Waste Disposed from Grocery Store Departments (From JLT & Associates, December 2003).....	29
Table 6-7	Eating and Drinking Places (Subcategories within SIC Code 58).....	30
Table 6-8	Hotels, Rooming Houses, Camps, and Other Lodging Places (Subcategories within SIC Code 70) .....	33
Table 6-9	Health Services (Subcategories within SIC Code 80) .....	34
Table 6-10	Educational Services (Subcategories within SIC Code 82).....	35
Table 6-11	Public Administrative Offices (Subcategories within SIC Codes: 83, 87, 91, 92, 93, 94, 95, 96, and 97) .....	36

### Figures

Figure 5-1	History of Organic Materials Rescue and Recovery Data Including Totals for Minnesota, SWMCB Region, & R + W Counties (From SCORE Reports).....	19
Figure 5-2	Organics Materials Rescue and Recovery Data For the SWMCB Region Only (From SCORE Reports) .....	20
Figure 5-4	Summary of Current Organics Discards in Ramsey + Washington Counties.....	22
Figure 6-1	Summary of Food Waste Disposal By SIC Category .....	26

## Contents (*continued*)

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### Appendices

(To be published as a separate document)

Appendix A	Database of Commercial Establishments in Ramsey and Washington Counties From Dun & Bradstreet (D&B)
Appendix B	Comparisons of Literature – Reported Food Waste Generation and Disposal Rates
Appendix C	Survey Instrument/Script
Appendix D	R/W RRP Letter Used to Request A Survey
Appendix E	Cascadia Consulting Group Memo on Waste Characterization Methodology for Commercial Site Visits
Appendix F	Tally of Contacts by SIC Code Category
Appendix G	Questions Asked of Haulers About Current SSOM Collection Programs
Appendix H	Questions Asked of Other County Staff About SSOM Collection Programs
Appendix I	Summary of 3-Digit SIC Code Categories and Desktop Assessment of Commercial Food Waste Disposal in Ramsey and Washington Counties
Appendix J	Annotated Results of Phone Interviews and Site Visits
Appendix K	University of Minnesota: Food Scraps Recovery Program Summary
Appendix L	Saint Paul Public Schools: Food Scraps Recovery Program Summary
Appendix M	Ramsey County Buildings: Food Scraps Recovery Program Summary
Appendix N	MPCA-DNR Building: Organics Program Summary
Appendix O	State of Minnesota Buildings: Food Scraps Recovery Program Summary
Appendix P	Summary of R/W RRP Recent Organics Materials Management Activities



# Organic Materials from Commercial Establishments: A Supply Assessment

## Executive Summary

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This assessment contains preliminary estimates of quantities of commercial organic materials that may be available as a potential feedstock supply for an anaerobic digester (AD) facility. This assessment also characterizes the types of commercial establishments that may be most likely sources for larger volumes of the targeted organic materials such as food scraps and non-recyclable paper. A preliminary supply specification was developed focused on these types of materials. Finally, this assessment highlights some of the potential issues that should be considered while securing a new supply of commercial, source separated organic materials (SSOM).

This primary focus of this assessment was on characterizing food waste and other organic materials that are currently not recovered by other programs. The initial intent was to examine opportunities for further recovery of organics that are currently disposed in mixed municipal solid waste (MSW). Existing food rescue and recovery are described to help characterize the food scraps that are already treated as reusable or recyclable commodities.

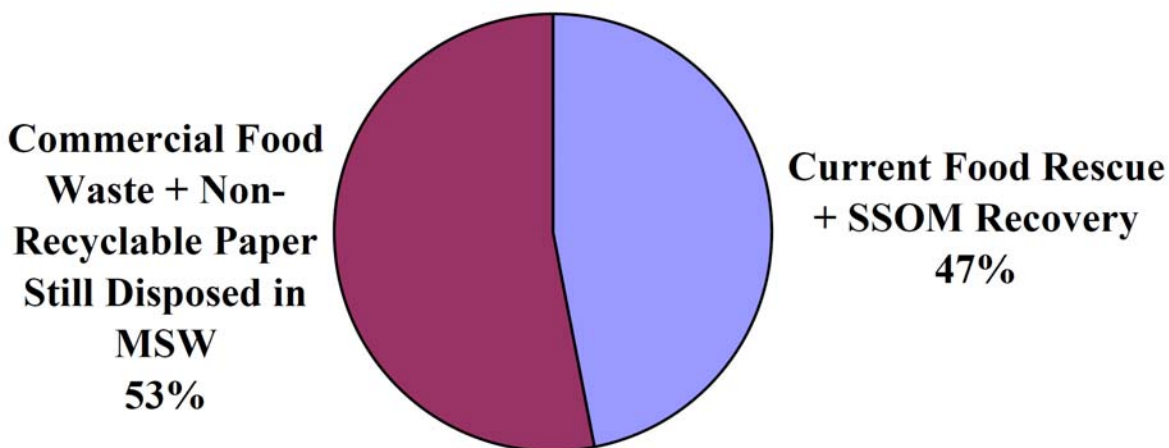
Table ES-1 displays a summary of the estimates of organic discards in 2009 from both Ramsey and Washington Counties compared to the six-county SWMCB region as a whole. The first line indicates the estimates of current food rescue and SSOM recovery rates based on county SCORE reports to MPCA. The second line itemizes Foth’s estimate of the amount of SSOM currently discarded in mixed MSW. These SSOM discard estimates are based on SCORE – reported MSW disposal data, composition data (including food waste and non-recyclable paper), and the assumption that commercial waste makes up about 48 percent of the total MSW. The third line simply is a 25 percent additional recovery scenario based on results of other ongoing programs in the region.

Table ES-1      Commercial Organics Discards and Potential Capture Rates  
(Tons per year – 2009 estimates. Rounded to nearest thousand tons.)

	<u>R + W</u>	<u>SWMCB TOTAL</u>
Total Food Rescued + SSOM Recovered (excluding YW) =	39,000	102,000
Commercial SSOM Currently Discarded in Mixed MSW =	43,000	168,000
Additional Commercial SSOM that could be captured (at a 25 percent capture rate) =	11,000	42,000

Figure ES – 1 is a simplified graphic display of the first two items in Table ES-1 for Ramsey and Washington Counties. The current food rescue + organics recovery rate totals about 47 percent of the total discards (rescued + recovered + disposed in mixed MSW).

Figure ES-1 Summary of Current Organics Discards in Ramsey and Washington Counties



The total amount of food rescued and recovered from Ramsey and Washington Counties in 2009 was about 38,640 tons estimated as follows:

Rescued (i.e., food to people):	810 tons
Recovered via:	
Food to hogs (direct)	22,380 tons
Food to animal feed manufacturers	15,410 ton
<u>SSOM to compost</u>	<u>40 tons</u>
TOTAL =	38,640 tons

There are no residential SSOM recovery programs yet in Ramsey or Washington Counties. Therefore, all food and SSOM comes from the commercial sector. The potential for residential SSOM is significant but beyond the scope of this commercial assessment.

As a comparison, the total amount of residential yard waste and brush collected from Ramsey County alone in 2008 was estimated at 58,400 tons. This is comprised of about 68 percent grass and leaves, and about 32 percent brush (e.g., less than 4-inches in diameter).

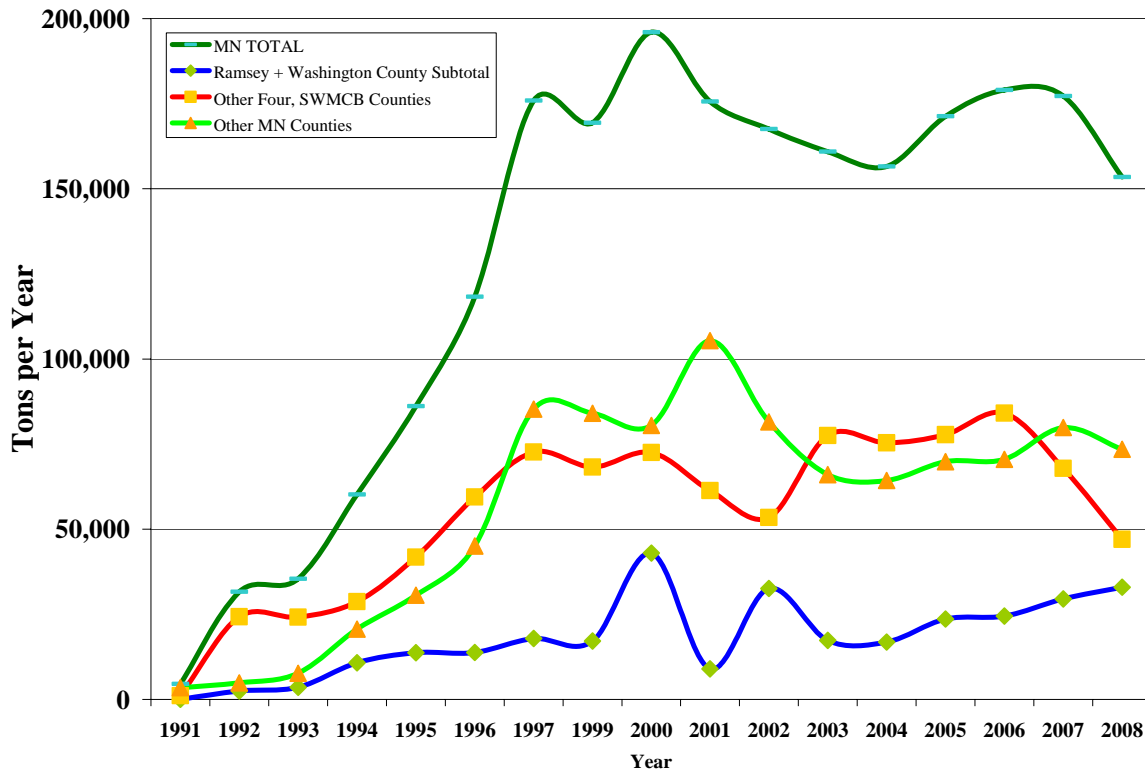
The preliminary specification, however, does not target yard waste or brush as a priority feedstock for the proposed AD facility because of low biogas yield, significant seasonal fluctuations, and very mature yard waste collection and composting infrastructure. While

combining SSOM with yard waste may be feasible, this option was out of the scope of work for this assessment.

There are mature, public and private systems for recovering SSOM in the Twin Cities Metropolitan Area. Private for-profit companies have developed competitive systems, including sourcing programs, for securing food waste supplies. Figure ES-2 displays the Minnesota organic materials rescue and recovery data from County SCORE reports as published by MPCA. The trend lines indicate the long history of private food rescue and organics recovery and the growth, in part due to increased awareness, during the initial years since county SCORE reports first started recording organics recovery in 1991.

Figure ES-2 History of Organic Materials Rescue and Recovery Data

(From SCORE Reports)



Another means of assessing the priority organic discards is to base estimates on disposal rates of food scraps as reported in relevant literature and apply them to employee counts. Foth developed a database of selected commercial establishments in Ramsey and Washington Counties based on the searchable Dun and Bradstreet (D&B) publication. The D&B database was sorted by Standard Industrial Classification (SIC) code categories and employee counts. Using this alternative method, this assessment estimates about 45,000 tons of food waste is disposed each year from commercial establishments. Table ES-2 display the summary results of these food waste disposal estimates by SIC category.

Table ES-2 Summary of Food Waste Disposed \*  
 By SIC Category  
 (\* As disposed in mixed MSW)

Primary SIC Code	Category	Number of R/W Total Establishments	R/W Food Waste as Disposed (tons/year)	Percent of Total Tons
20	Food and Kindred Products	90	941	2%
51	Wholesale Trade - non-durable Goods	578	3,236	7%
54	Food Stores	549	9,105	20%
58	Eating and Drinking Places	982	22,774	51%
70	Hotels, Rooming Houses, Camps, and Other Lodging Places	156	672	2%
79	Amusement and Recreation Services	22	13	0.03%
80	Health Services	2,135	1,636	4%
82	Educational Services	602	3,925	9%
	Public Administration	502	2,408	5%
	<b>TOTALS</b>	<b>5,616</b>	<b>44,711</b>	<b>100%</b>

Eighty percent of the total tons are disposed from three categories as highlighted: food stores such as grocery stores (SIC code 54); eating and drinking places (SIC code 58) such as restaurants; and educational services (SIC code 82). Most grocery stores and restaurants are not recovering their organic discards. The desktop analysis estimates that about 51 percent of the total food waste disposal is from restaurants and 20 percent is disposed by grocery stores (see Table ES-2). Therefore, these two specific categories of businesses should be likely targets for additional SSOM recovery. While most restaurants and grocery stores do not have SSOM recovery programs, there are notable exceptions and “early adopters”. Colleges, universities and other educational institutions should continue to be a priority as examples of large kitchen facilities with higher volumes of available food scraps. There are many urban retail establishments that have made the investment in food scraps recovery programs in part because of customer demand for the additional recycling services.

Many of the commercial establishments with larger-volumes of clean food scraps (e.g., wholesale produce companies; bakeries) that were surveyed as a part of this assessment are already serviced by the existing food waste recovery operations.

Several notable government agencies (e.g., Ramsey County and MPCA) and educational institutions (e.g., elementary schools, U of M) have also adopted SSOM recovery programs. There are a significant number of such institutions that do not yet have food scraps collection programs and therefore could be targeted for new recovery systems. Educational institutions dispose about 9 percent of the total available food waste and public administration agencies (i.e., government agencies) dispose only about 5 percent of the total food waste.

Existing service fees for SSOM collection and recovery are priced to compete with the comparable mixed MSW removal charges. Some of the larger commercial establishments with the highest value food by-products (e.g., from bakeries, wholesale produce processors) enjoy SSOM collections services at very low prices, even down to “free” removal. Planners of new SSOM programs and facilities should assume that these types of larger commercial establishments will not be available without a substantial discount for the product.

It is important to note that SSOM service is normally an added cost and does not totally replace the need for MSW services. The largest economic savings from instituting a new SSOM program should come from downsizing trash service levels (e.g., size of dumpster, frequency of pulls). However, this downsizing relationship is not always direct, especially if the establishment has different collection service providers for SSOM and trash. Effort by the establishment must be expended to monitor recycling and trash needs and try to adjust the service levels accordingly to optimize cost savings opportunities.

Restaurants as a category are the largest potential suppliers of SSOM. This is a significant challenge given the wide diversity of establishments, decentralized ownerships/management structure, and high staff turnover rates. There is risk of contamination of the SSOM with prohibited materials (e.g., glass, metal, non-biodegradable plastic, etc.) that must be anticipated. Also, small, frequent loads from multiple generators must be serviced on a very regular schedule. The downsizing/rightsizing adjustments to recycling and trash services are not part of normal restaurant operations. The market for this type of recycling service to restaurants is in the initial stages of development. Thus, route densities are not yet economical for most haulers to consider getting into the business of serving restaurants with SSOM recycling. Despite these challenges, given the significant volume of eligible organic material disposed, restaurants should be carefully considered in any new SSOM recovery initiative. Also, a different supply quality specification (e.g., mixed loads of organics and other materials) may result in different collection economics and market dynamics.

The quality and consistency of SSOM from the pre-consumer (i.e., “back of the store”) will be significantly higher and more reliable than post-consumer (i.e., “front of the store”) material from customers. In general, fruits and vegetables comprise the majority of pre-consumer SSOM from full service restaurants. Additional materials of significance include bakery, dairy and sugar-based / starch-based products.

The data used in this assessment are primarily derived from desktop analysis, SCORE reports by Counties to MPCA, phone interviews, and anecdotal field observations. No independent waste sampling or weighing study was conducted.

## List of Abbreviations, Acronyms, and Symbols

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AD	Anaerobic Digestion
AFM	Animal feed manufacturer
CEC	County Environmental Charge
CII	Commercial, industrial, and institutional
CIWMB	California Integrated Waste Management Board
DNR	Minnesota Department of Natural Resources
D&B	Dun and Bradstreet
FOG	Fats, cooking oils, grease from kitchen prep and other food services
Foth	Foth Infrastructure & Environment, LLC
FS	Food scraps
FW	Food waste
HCMC	Hennepin County Medical Center
HERC	Hennepin County Energy Recovery Center
HMO	Health Maintenance Organization
MCAR	Minnesota Code of Agency Regulations
MCES	Metropolitan Council Environmental Services
MGA	Minnesota Grocers Association
MnTAP	Minnesota Technical Assistance Project
MPCA	Minnesota Pollution Control Agency
MS	Minnesota Statutes
MSW	Municipal solid waste
MWTS	Metropolitan Wastewater Treatment System
NAICS	North American Industry Classification System
R/W RRP	Ramsey/Washington Counties Resource Recovery Project
SAC	Sewer availability charge
SIC	Standard Industrial Classification
SSCM	Source-separated compostable materials
SSOM	Source-separated organic materials
SPPA	Saint Paul Port Authority
SPPS	Saint Paul Public Schools
Subd.	Subdivision
SWMT	State solid waste management tax
SWMCB	Solid Waste Management Coordinating Board
U of M	University of Minnesota
USEPA	United States Environmental Protection Agency
Whol	Wholesale

# Organic Materials from Commercial Establishments: A Supply Assessment

## Definitions as Used in this Report

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**Animal feed manufacturer** – Food byproducts recycling system whereby food scraps are converted into dried animal feed products. (See also “Food scraps to animal feed manufacturers”.)

**Brown grease** – Fats, oil and grease collected from grease traps located in the wastewater sewer lines from commercial establishments.

**Desktop analysis** – Estimating SSOM recovery and disposal rates by generator type using existing, benchmark data from previous studies and other similar research; Does not include collecting original field or interview data from sorts, weights, interviews or site visits.

**Disposed (or disposal)** – The amount of a waste material disposed in a landfill or mixed MSW resource recovery facility, after any recycling or waste reduction activities.

**Food byproducts** – Recyclable food materials from commercial and industrial establishments as secondary products (e.g., off-spec and dated bakery product discards, grain discards, etc.) that, if not recovered, would otherwise be discarded and potentially be disposed within mixed MSW.

**Food byproducts to animal feed manufacturers** – A specific system of food byproducts recovery operated by private, for-profit corporations producing dried animal feed supplements for livestock, pet food, zoo food and other animal feed markets.

**Food rescue** (Also known as “food to people”) - Generic category of edible food reuse to people including donations to food banks, rescue of unserved meals (e.g., Twelve Baskets – type of collections), and other food reuse systems.

**Food scraps** – Source separated food scraps from food preparation and consumption discards. The material is generally putrescible and readily decomposable or degradable. (Note: This definition is intended to distinguish between source separated food “scraps” as a potential commodity with positive value when recovered and food “waste” which has a negative value when disposed in mixed MSW.)

**Food scraps to animal feed manufacturers** – Systems for recycling food byproducts into animal feed through sorting and processing (e.g., heating, pelletizing) to produce a dried bakery product or bakery meal product to be sold as an animal feed or supplement for consumption by poultry, swine, cattle and as a pet food ingredient.

**Food to compost** – A specific system of food scraps recovery where food scraps and other specified organics are transported to composting facilities approved or permitted to process these and other compostable materials.

**Food to hogs (direct)** – A method of SSOM recovery institutionalized by certain hog farmers and permitted by the Minnesota Department of Agriculture.

**Food to livestock** – Generic term used by State of Minnesota (e.g., in SCORE reports) to reflect both “food to hogs” (direct) and “food to animal feed manufacturers”.

**Food to people** – (See “food rescue”).

**Food waste** - Food scraps and other organics from food preparation discarded into mixed MSW for disposal.

**Generation (or generated)** – The total amount of a waste that is discarded before recovery (i.e., recovered + disposed).

**Pre-consumer trim waste** – SSOM generated during food preparation in the kitchen or other pre-processing locations and not yet served to the customer. Also known as “**Back of the store organic material**” for restaurants and other eating or drinking establishments.

**Post-consumer plate waste** – SSOM generated during on-site consumption of food by the customer. Also known as “**Front of the store organic material**” for restaurants and other eating or drinking establishments.

**Primary SIC codes** – Two digit level of classification within the SIC system.

**Non recyclable paper** - Low grade paper that is deemed as a contaminant to the higher grades of recyclable paper such that there is no market demand from the local recycling infrastructure. Examples usually include: poly or wax coated cardboard (e.g., packaging for cold food storage; tissue paper (e.g., napkins, paper towels, coffee filters, tea bags, etc.); paper contaminated with moisture, other liquids, food, paint; and other paper reused in a manner that renders it a contaminant to local recycling processes. The definition of non-recyclable paper may fluctuate in practice with changing markets and prices.

**Recovered (or recovery)** – The amount of material recycled through an end use market (e.g., food to hogs), excluding materials rescued or otherwise avoided through source reduction.

**Rescued** – The amount of material that is reused in its original form (e.g., edible food to people), excluding materials recovered.

**Rightsizing** Changing the level of trash or recycling services (e.g., dumpster size, frequency of dumpster “pulls” per week) to better reflect actual trash or recycling removal needs of a commercial establishment.

**Source-separated compostable materials (SSCM)** – Defined as per Minnesota Statutes (M.S. 115A.03, Subd. 32a): as “materials that ....(1) are separated at the source by waste generators for the purpose of preparing them for use as compost; (2) are collected separately from mixed municipal solid waste....; (3) are comprised of food wastes, fish and animal waste, plant materials, diapers, sanitary products, and paper that is not recyclable .....; (4) are delivered to a facility to undergo controlled microbial degradation to yield a humus-like product .....; and (5) may be delivered to a transfer station, mixed municipal solid waste processing facility, or recycling facility only for the purposes of composting or transfer to a composting facility..... .” (See Section 4.2 for the full text of the statutory definition.)

**Source-separated organic material (SSOM)** – Organic solid waste separated at the source (i.e., not mixed in with the other solid wastes). Often comes from municipal curbside recycling programs or commercial SSOM collection programs in which items such as, kitchen food scraps, non recyclable paper and other organic materials are collected separately from the rest of the MSW stream. The precise composition of SSOM can change significantly depending on the generator collection scheme used. SSOM as used in this report excludes yard waste, wood waste and agricultural wastes (e.g., crop residues).

**Sourcing SSOM** – The process of securing a supply of SSOM for a specific facility or program (e.g., contracts, purchase orders for collection/recovery services, etc.).

**SSOM to composting** – (See “food to compost”)

**Yellow grease** – The fats, oil and grease (FOG) material directly removed from kitchen fryers and other grease production operations.

# Organic Materials from Commercial Establishments: A Supply Assessment

## Acknowledgements

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Foth wishes to acknowledge and thank the following organizations and individuals that helped provide direction or information and data for this organics assessment project:

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Kurt Hulse  
Charlie Scott

Also, Foth wishes to thank all of the other public agencies and private companies that helped provide information about current food rescue, food scraps recovery and other organics recovery program. There are too many to list under this acknowledgement and the private companies were promised they would not be mentioned in this report.

# 1 Introduction

Ramsey/Washington County Resource Recovery Project (R/W RRP) has continued to work with the Saint Paul Port Authority (SPPA) on the planning of a proposed anaerobic digestion (AD) facility that could utilize source separated organic materials (SSOM). Foth Infrastructure & Environment, LLC (Foth), under its ongoing general consulting contract with R/W RRP, was directed to complete this assessment of potential supplies of organic materials from commercial, institutional and industrial (CII) sources from Ramsey and Washington Counties. The feasibility of any new AD facility is dependent on a thorough understanding of its feedstock supply in terms of quantities, quality and seasonal variations.

Today, there are a variety of strategies for diverting food discards to beneficial uses. Currently, edible food can be donated to charities (i.e., food “rescue”); usable food scraps can be converted into animal feed or composted; and fats, oils, grease and other animal by-products can be rendered into soap or other products, or converted into bio-diesel fuel. Food waste can also be avoided through a variety of prevention strategies. Commercial establishments can rescue edible food or divert their food discards to one or more of these end uses.

## 1.1 Purpose

This assessment describes the quantity and quality of SSOM that are currently being recovered from commercial establishments in the two Counties and estimates the additional volumes of organic wastes that are currently disposed within the mixed municipal solid waste (MSW) stream. This assessment characterizes the various categories of CII organic waste generators in the two Counties and makes recommendations as to the likely types of commercial establishments that could potentially supply SSOM to a new AD facility. A feedstock supply quality specification is suggested as part of a conceptual framework for a potential, future sourcing strategy.

There are general estimates of the amounts of currently recovered SSOM, such as food scraps, and organics in mixed MSW. These estimates can be used for broad program planning purposes. But there are no reliable, readily available measurements of actual organic wastes as disposed. A more detailed composition (i.e., sorting) and weighting study may need to be employed to more thoroughly assess these volumes as currently recovered and disposed.

This assessment is intended to begin to address the available data for organic materials from CII establishments (i.e., the “commercial” sector). This assessment is not intended to provide estimates from the residential sector (including the population residing in multi-family buildings).

This assessment was designed to:

- ◆ Develop an initial supply quality specification to further describe the proposed types of feedstock that may be used by the proposed AD facility.
- ◆ Characterize the major categories of commercial establishments that dispose this type of organic waste. This characterization includes both Standard Industrial Code (SIC) definitions and numbers of establishments as well as qualitative descriptions of current SSOM recovery systems.

- ◆ Describe the current SSOM recovery programs and services that exist in the region and in Ramsey and Washington Counties in particular. This description includes estimates of the amounts of commercial SSOM currently recovered and provides anecdotal information about current pricing.
- ◆ Develop recommendations for potential next steps that could take this preliminary information to the next level of actual field measurements.

It should be noted that this assessment is preliminary. It is intended to identify gross quantities of commercial SSOM and to highlight potential issues that should be considered while securing a new supply of commercial SSOM for an AD facility. A more in-depth composition and weighing study may be necessary.

## 1.2 Scope of Work

Foth was directed by R/W RRP staff to refine available estimates of commercial SSOM volumes as recovered and disposed in the two Counties. This assessment addresses only commercial SSOM and organics as disposed – not residential. The work plan called for several tasks to be completed, including:

- ◆ Review existing reports, documents and literature from other studies.
- ◆ Using “desk top” analysis, characterize the commercial establishments that currently recover SSOM and dispose other organic waste in mixed MSW.
- ◆ Contact selected CII generators via phone interviews to assess current SSOM recovery and disposal.
- ◆ Conduct select site visits to observe SSOM collection systems and material quality.
- ◆ Write this report including recommendations for next steps.

The data in this report were provided by government and private sources but were not independently verified. Therefore, the data in this assessment is for planning and discussion purposes and is not appropriate for engineering / facility design needs.

R/W RRP staff directed Foth to remain neutral as to County policies related to SSOM recovery programs and systems. There are existing, private food scraps recovery systems that have, in some cases, been established for over 20 years. R/W RRP staff directed Foth to be clear with survey respondents that the Counties do not have any technology preference for food scraps and other SSOM recovery. Rather, R/W RRP is most interested in learning how much food and other organic waste is currently still disposed in the mixed MSW and therefore available for additional recovery.

In general, the governmental agencies were much more willing to share information and time to communicate. Additional “desktop analysis” was conducted to help fill in some of these data gaps.

This assessment for R/W RRP was conducted independent of ongoing, addition supply assessments being conducted by the Saint Paul Port Authority (SPPA). One of the recommendations in this report is to formalize a coordinated approach to future supply assessments.

## 2 Background Information

### 2.1 Prior Research

#### 2.1.1 Foth Feasibility Study (June 2009)

Foth completed a report in June 2009 for R/W RRP and the SPPA “Source Separated Organic Materials Anaerobic Digestion Feasibility Study”.<sup>1</sup> R/W RRP has continued to collaborate with SPPA in further planning on a potential AD facility.

This assessment is a direct continuation of the June 2009 feasibility study and is intended to augment the supply estimates and characterization.

#### 2.1.2 Support of Other Food Rescue and SSOM Recovery Options

Ramsey County, Washington County, other member counties of the Solid Waste Management Coordinating Board (SWMCB), the State of Minnesota, together with many municipalities, have produced many other studies and ongoing programs related to food and SSOM. These include:

- ◆ Support of food rescue and other organic waste reduction initiatives (e.g., encouraging increased donations to food banks, etc.).
- ◆ Residential collections (both on a pilot basis and permanent services).
- ◆ Technical assistance to commercial establishments (e.g., elementary schools, government agencies).
- ◆ Grant and loans for research, development and demonstrations for both collection and composting systems.
- ◆ Technical assistance and coordination to help expand market demand for the compost end products.

These past studies and programs supported by the government, plus significant private sector initiatives, have helped develop the food rescue and SSOM recovery infrastructure, especially in the Twin Cities Metropolitan Area. These public and private investments have resulted in a comprehensive array of options for food rescue and SSOM recovery, including:

- ◆ Food to people (also known as “rescue” of edible food for human consumption);
- ◆ Food scraps to livestock (i.e., direct to hog farmers);
- ◆ SSOM to compost (including non-recyclable paper and other eligible organics; with and without yard waste);
- ◆ Food scraps to animal feed manufacturers; and
- ◆ Other organic materials (e.g., fats, oils, grease) for rendering or alternative fuels (e.g., biodiesel).

### **2.1.3 Waste Composition Studies**

A series of waste composition studies have been conducted by the counties, State of Minnesota and United States Environmental Protection Agency (U.S. EPA) whereby the waste materials as disposed are sorted and weighed by specified material categories. Results of these waste composition studies, and its relevance to food waste and other organics disposal estimates, are presented in Section 5.2.

## **2.2 Chronology of this Project**

This commercial SSOM supply assessment project continued directly from tasks recommended in the June 2009 feasibility study. Foth first helped facilitate a meeting between R/W RRP and Metropolitan Wastewater Treatment System (MCES) staff on July 23, 2009 to explore opportunities for data sharing and inter-agency cooperation. Next, County staff directed Foth to begin the CII assessment and survey work to further refine the estimates of commercial SSOM from Ramsey and Washington Counties only. To communicate ongoing progress on these supply assessment tasks, Foth then produced a series of background memos that provided the framework and scope refinement for this report.<sup>2</sup>

Foth continued to conduct phone surveys and site visits during the first quarter of 2010. On February 2, 2010, a project team meeting was held in Foth offices with County staff and Jodi Taitt (& Associates) to discuss project strategy, methods and tasks. County staff provided strategic direction to Foth and coordination between Foth's assessment work and the parallel but separate work of JLT & Associates on the costs to generators of up-front supply.

## 3 Methods

The four basic methods for this assessment included:

1. Developing a feedstock supply quality specification.
2. Summarizing current food scraps recovery rates from SCORE data.
3. Conducting a series of “desktop analysis” including use of food waste disposal rates from literature sources as categorized by specific types of commercial establishments.
4. Collecting and analyzing original “field data” from phone interviews and sites visits to selected commercial establishments.

### 3.1 Preliminary Feedstock Supply Specification

Foth drafted a preliminary supply specification to help further define the exact types of organic materials that may be accepted at the proposed anaerobic digestion facility<sup>3</sup>. A simplified version of this supply specification was subsequently produced by County staff.<sup>4</sup> Section 4.1 in this report contains the final version of the supply specification used in this assessment.

### 3.2 Review of SCORE Data as Reported by Counties to MPCA

Foth tallied all data on “organics” waste streams as reported by Counties and published by MPCA.<sup>5</sup> These annual MPCA recycling surveys, known as SCORE reports, provide a historical trend of food scraps and other SSOM recovery programs by county. County staff supplemented the MPCA – published data with preliminary food rescue and food scraps recovery data for 2009. Section 5.1 in this report contains SCORE data results.

The value of the SCORE data is limited, however, because not all SSOM is reported. Also, the data is aggregated by County and, as a general rule, the details by individual generator or organization providing recovery services is not publicly available. To collect the annual data, County staff use reports from their cities and haulers plus conduct additional phone surveys of other recycling service providers. There is no requirement or any ongoing program for commercial generators to report their recycling rates. Therefore, all commercial recycling SCORE data is provided to County staff on a voluntary basis and is generally not independently verified.

### 3.3 Characterizing Food Waste from Commercial Establishments

Foth identified the potential CII (i.e., “commercial”) businesses that are significant food waste generators. After determining the types of higher-volume businesses, Foth also estimated the amount of food waste from these establishments that may be available for recovery to help supply a new AD facility.

#### 3.3.1 SIC Code Classifications

Foth used the SIC codes to characterize the distribution of commercial establishments as reported in Section 6 of this report. The SIC code system was the federal government’s previous standard for classifying industries by a four-digit code. Established in 1937, the SIC system was scheduled to be supplanted by the six-digit North American Industry Classification System (NAICS) in 2003.<sup>6</sup> However certain government departments, agencies and private researchers

still use the SIC codes. Also, some of the earlier waste disposal rates studies exclusively used the SIC code system and not NAICS.

A commercial establishment is typically defined by the SIC and NAICS systems as a single physical location. However, some businesses with multiple operations at a single location that have separate administration or management may be treated as distinct establishments. Each establishment is classified to an industry according to the primary business activity taking place there. NAICS does not offer guidance on the classification of enterprises (companies) which are composed of multiple establishments and therefore are considered as separate food waste generators for this assessment.

To begin this process, Foth determined the types of business, defined by primary (i.e., 2-digit) SIC codes, which could potentially have a food waste stream. The following primary SIC codes were selected:

Table 3-1  
List of Types of Commercial Establishments:  
Two Digit SIC Code Categories

<b>SIC Code</b>	<b>SIC Code Category</b>
20	Food and Kindred Products
51	Wholesale Trade-non-durable Goods
54	Food Stores
58	Eating and Drinking Places
70	Hotels, Rooming Houses, Camps, and Other Lodging Places
79	Amusement and Recreation Services
80	Health Services
82	Education Services
<b>Public Administration (SIC code varies) including:</b>	
83	Social Services
87	Engineering, Accounting, Research, Management, and Related Services
91	Executive, Legislative, and General Government, Except Finances
92	Justice, Public Order, and Safety
93	Public Finance, Taxation, and Monetary Policy
94	Administration of Human Resource Programs
95	Administration of Environmental Quality and Housing Programs
96	Administration of Economic Programs
97	National Security and International Affairs

Next, Foth developed a list of all the CII establishments characterized by one of the previously defined primary SIC codes in Ramsey and Washington Counties. The source utilized for

commercial population and other census type of data in developing this list of CII establishments was the Dun and Bradstreet (D&B) database.

The D&B database is a searchable, public resource that contains information about commercial businesses and government institutions. Foth queried the D&B database for business with the chosen primary SIC codes within Ramsey and Washington Counties. The results of these queries provided the following information about each facility:

- ◆ Company name
- ◆ Address
- ◆ Location type (single location or branch)
- ◆ Facility size (square footage)
- ◆ Estimated annual sales at this site
- ◆ Estimated annual corporate sales (if applicable)
- ◆ Employee count for all sites (if applicable)
- ◆ Employee count for this site
- ◆ Business description
- ◆ Primary SIC code
- ◆ Secondary SIC code
- ◆ Primary NAICS code
- ◆ Secondary NAICS code

Foth produced two D&B database lists: one each for Ramsey County and Washington County. These lists are included by reference into this report as Appendix A (Database of Commercial Establishments in Ramsey and Washington Counties from D&B), but attached as a separate Excel document. Within each County's list, the establishments are grouped by primary SIC code category. Within each SIC code category, establishments are then sorted by the number of employees at each facility to help display relative size. Thus, Foth was able to focus on the most important categories and largest establishments as estimated by the volume of food waste disposed.

### **3.3.2 Food Waste Generation and Disposal Rates from Literature Sources**

Foth, together with its subcontractor, Cascadia Consulting Group, reviewed the available literature with data on food waste disposal rates. The primary reference selected was an earlier study completed for the California Integrated Waste Management Board (CIWMB) in February 2000 (conducted by Cascadia) that estimated the amount of food disposed at commercial food generator sites.<sup>7</sup> The data is based on actual field weights and composition sorting and is still in use by the successor agency to the CIWMB, *CalRecycle*.<sup>8</sup>

Additional literature sources were also reviewed for relevant food waste generation rates, disposal rates and composition data.<sup>9, 10, 11, 12, 13, 14</sup>. These additional studies provided some helpful background information for purposes of comparing literature - reported food waste generation and disposal rates. Additional details of these studies are provided in Appendix B (Comparisons of Literature – Reported Food Waste Generation and Disposal Rates). However, these additional studies provided food waste generation and disposal rates based on data that was not readily available for the list of potential food generators that was developed for Ramsey and Washington Counties. These generation and disposal rates often used alternative population

units such as pounds of food waste disposed per: hospital/nursing home bed, seat, student, or prison inmate. Therefore, the CIWMB 2000 study which provides tons of food waste disposed per employee, was used to generate a preliminary calculation of the relative amounts of food waste disposed by the commercial establishments in Ramsey and Washington Counties.

See Appendix B, Subsection B.2 for Foth's comparison of the CIWMB 2000 study to the Massachusetts 2002 study food waste generation rates.

### **3.3.3 Additional Sources from Minnesota State/Regional Agencies**

The following two additional sources were considered when searching for potential food generator establishments within the two counties:

- ◆ Metropolitan Council of Environmental Services
- ◆ Minnesota Department of Agriculture

Because of the limited number of establishments and data within the last two sources, Foth focused on the information retrieved from the D&B database.

### **3.3.4 Waste Composition Studies**

Foth analyzed available data from County and State waste composition studies to evaluate the amount and type of food waste and other organic wastes that are still being disposed as part of mixed MSW. Results of these analyses are described in Section 5.2.

## **3.4 Phone Interviews and Site Visits with Commercial Establishments**

The initial field approach used in this assessment was primarily qualitative while gathering as much specific, detailed data from commercial establishments as possible. The selection of CII generators for phone interviews and site visits was intended to be descriptive of general commercial categories and SSOM recovery systems, but not statistically representative.

R/W RRP staff directed Foth to conduct initial "fact finding" interviews and site visits only. Technical assistance or site specific recommendations (e.g., how to start a SSOM program or increase recovery) were not included in the communications with the commercial establishments. The assessment was for data gathering purposes only and not a part a formal "sourcing" program to secure a supply of SSOM.

Appendix C contains the suggested script and survey questions that were used as part of initial phone interviews and during site visit meetings. This script and survey instrument was developed under the guidance of R/W RRP staff. The questions provided a framework for the discussions with individual establishments. The actual approach and conversation was customized to each commercial establishment based on their needs and unique circumstances.

In February 2010, the extended project team, including R/W RRP staff, JLT & Associates, and Foth staff, decided to use a cover letter from the R/W RRP Board staff as a means to give the interview process more credibility coming from County authorities. Appendix D contains the generic template of the R/W RRP Board cover letter.

Foth retained the services of Cascadia Consulting Group, a consulting firm with expertise in the related specialties waste stream characterizations and food scraps recovery. Cascadia advised Foth about the lessons learned from previous similar studies conducted by Cascadia on source separated organics and food waste characterization studies. As a result of Cascadia's recommendations, Foth elected to use a combination of two methods within this assessment: (1) desktop analysis of waste stream characterization by SIC codes using employee counts as the preliminary indicator of waste disposal volumes; and (2) Phone interviews and field site visits to get preliminary reconnaissance on actual food scraps capture rates and remaining food waste disposal rates. See Appendix E for the technical memo from Cascadia to Foth about these recommended methods.

Appendix F contains a summary of the number and type of commercial establishments that were surveyed. Confidential data is not reported in this assessment. Foth stated that individual company data would not be included in this report as another means to help encourage private companies to respond with waste and recycling information.

Foth focused on gathering information from commercial establishments as food waste generators. The existing infrastructure of organic materials collection and recovery service providers (e.g., food to livestock farmers and composting companies) is well known to R/W RRP and other county staff in the region. Therefore, this assessment did not focus on interviews with these private companies within the food waste recycling industry.

Over 40 commercial establishments were contacted with phone interviews and/or sites visits. These contacts with waste generators were essential to gain additional perspective on their real-world needs and the barriers to SSOM recovery.

Many of the contacts with commercial establishments were chefs, sanitation managers and front-line food service preparation staff. Waste management and recycling are not their top priority. Plus, these are demanding job occupations and a government food scraps recycling survey was considered by some to be irrelevant or, worse, a nuisance. Therefore, multiple tactics were used to improve response rates and data quality. These tactics included:

- ◆ Multiple contacts. Persistence in follow-up calls and e-mails.
- ◆ Impromptu, unannounced site visits at slower times (i.e., not meal rush hours).
- ◆ Short list of questions.
- ◆ Once connected, emphasis on the potential cost savings and environmental / public relations benefits.
- ◆ Follow-up e-mails, including attached form letter from R/W RRP introducing the study and Foth.
- ◆ Tendency to select more willing respondents, including government and institutional agencies that have sustainability as part of their larger mission.

### 3.5 Interviews with Haulers, Other Counties, and Other SSOM Recovery Service Providers

Foth conducted interviews with seven different trash hauling companies that provide services in Ramsey and Washington Counties. Foth asked questions about current organics recovery services and challenges to expand programs. The questions asked of haulers are listed in Appendix G.

Several of the haulers have current SSOM collection routes, but nearly all of the SSOM to compost routes are in Hennepin County. One of the haulers provides roll-off service from a wholesale produce company and trucks the food scraps to a hog farmer. Another hauler provides SSOM collection service from the MPCA building and hauls it to a SSOM composting facility in Empire.

Foth conducted interviews with county staff from three of the neighboring counties: Anoka, Dakota and Hennepin. The questions asked of these other County staff are listed in Appendix H.

Foth conducted two interviews with SSOM recovery service providers. Results of these interviews are presented in Section 8 – Market Conditions. These were instructive, but largely out of scope. Most of the data about existing organics recovery service providers came from County staff.

## 4 Feedstock Supply Quality Specifications

### 4.1 Preliminary AD Supply Specification

The preliminary AD supply specification below was drafted for planning and research purposes with the intent of helping focus this commercial organics waste supply assessment. The supply specification is generic to both residential and commercial waste generators even though this assessment is focused on commercial establishments only.

Table 4-1 below constitutes the current, proposed supply specification and itemizes the “acceptable” and “unacceptable” items.

Table 4-1  
Preliminary Organic Supply Quality Specification for the  
Anaerobic Digestion Facility \*

Acceptable Materials	Unacceptable Materials
Food scraps and other kitchen waste of all types including: <ul style="list-style-type: none"><li>◆ Produce</li><li>◆ Meats</li><li>◆ Deli</li><li>◆ Seafood</li><li>◆ Dairy</li><li>◆ Bakery</li><li>◆ Frozen goods</li><li>◆ Dry goods</li><li>◆ Brewer’s wastes</li><li>◆ Fats, cooking oils, grease (FOG)</li></ul>	<ul style="list-style-type: none"><li>◆ Plastic</li><li>◆ Glass</li><li>◆ Cans</li><li>◆ Other metals</li><li>◆ Other recyclable materials (e.g., clothing, housewares, etc.)</li><li>◆ All trash and hazardous wastes</li></ul>
Non-recyclable paper including: <ul style="list-style-type: none"><li>◆ Food packaging made of paper or other fiber (e.g., plastic coated boxboard, food contaminated corrugated cardboard)</li></ul>	
Plant waste including: <ul style="list-style-type: none"><li>◆ Floral trimmings and indoor plants</li></ul>	

\* Note: This preliminary specification is based on the assumption that all organic items targeted for recovery will be separated at the source (e.g., by the waste generator) and kept segregated from the mixed MSW. This is to help assure that quality of the feedstock is maintained (e.g., to avoid cross-contamination by prohibited items).

Foth and County staff have intentionally suggested a shorter list of eligible acceptable materials in this preliminary specification to help keep the focus on the potential, clean supplies of food waste; non-recyclable paper; and FOG. At a later stage, secondary materials of other digestible items may be considered if incidental to those primary targeted organic waste items and allowable by the selected AD technology.

The intent of this preliminary specification was to provide adequate specificity for Foth to use in estimating amounts and compositional quality of the organic feedstock supply. This preliminary specification is relatively stringent to help maximize biogas production during the digestion process and limiting contamination of the end compost products. If the supply stream is

relatively clean and rich with readily digestible organic items (e.g., food waste) the overall AD facility will be more efficient (e.g., biogas yield). Also, odor controls will be easier to manage if the organic waste feedstock is more thoroughly digested. Finally, when developing a new commodity and recovery technology, it is recommended that system designers purposely plan for a more stringent supply quality specification with the concept that it is easier to loosen the quality requirements later rather than vice versa.

This preliminary specification is more accurately described as an internal set of guidelines for materials that could be targeted for recovery via the new AD facility. Foth believes that a final version of such a specification may be driven more by the specific AD technology and vendor ultimately selected for any AD facility. This "vendor driven" approach based on the technology selected is more consistent with how other cities are developing such supply specifications (e.g., San Jose, CA).<sup>15</sup>

#### 4.2 Comparison to Supply Specifications of Other Organics Recovery Systems

Table 4-2 below outlines the key feedstock supply requirements as specified by other organic material recovery systems in the region. These provide a meaningful benchmark for comparison of the preliminary AD specification as discussed in Section 4.1 above.

Table 4-2  
Other Organic Material Recovery Systems:  
Feedstock Supply Specifications

<b>System</b>	<b>Technology</b>	<b>Feedstock Specification</b>
<b>Food to livestock</b> (e.g., food scraps directly to hogs)	Separate collection hauled direct to permitted farms, with and without heat treatment to pasteurize the food scraps before feeding to the hogs	<ul style="list-style-type: none"> <li>◆ Most types of food scraps (without meat if no heat treatment)</li> <li>◆ Some beverage waste allowed (depending on vendor)</li> <li>◆ FOG may be included</li> <li>◆ Some limits on fiber content</li> </ul>
<b>SSOM to compost</b>	Separate collection hauled direct or transferred to approved SSOM composting facilities	<ul style="list-style-type: none"> <li>◆ All types of food scraps</li> <li>◆ Non-recyclable paper</li> <li>◆ Biodegradable plastic</li> <li>◆ Does not include yard waste in this definition of SSOM</li> </ul>
<b>Food by-products to animal feed manufacturers</b>	Separate collection hauled direct to approved facilities that recycle the byproducts into a dried animal feed for consumption by livestock, pets or zoo animals	<ul style="list-style-type: none"> <li>◆ Clean, commercial food byproducts and packaging (e.g., off-spec or dated bakery material, cookies, candy, dough, bread, flour, pasta, etc.)</li> <li>◆ Specifications details vary depending on individual manufacturer</li> </ul>

Sources: (1) Educational brochures and material sorting instructions as posted on the web pages of local organics recovery service providers. (2) Personal communications with commercial establishments serviced by organics recovery providers, haulers, and JLT & Associates.

Table 4-3  
Acceptable and Unacceptable Materials  
from Each End-Use Option

End-Use Market Options	Types of Organic Waste Managed	Acceptable Materials	Unacceptable Materials
Food Rescue	Edible Surplus Food	Prepared & Perishable, Un-served Food	Inedible & Dated Food  <b>Food Packaging</b>  All Other Trash
Rendering	Food Waste	Meats, Fat, Bones  Cooking Oil & Grease	All Other Food Waste  <b>Food Packaging</b>  All Other Trash
Hog Feeding	Food Waste	Produce Meats & Seafood Dairy Products Bakery & Dry Goods Deli & Frozen Foods Fat & Bones Cooking Oil & Grease	<b>Food Packaging</b>  All Other Trash
Cattle Feeding	Food Waste	Produce	All Other Food Waste  <b>Food Packaging</b>  All Other Trash
Manufacturing Livestock Feed	Food Waste  Fiber Waste (paper & cardboard)	Produce Dairy Products Bakery & Dry Goods Deli & Frozen Foods  <b>Food Packaging</b> (paper, cardboard, plastic, cans)	Meats & Seafood Fat & Bones Cooking Oil & Grease  <b>Food Packaging</b> (glass & wood)  All Other Trash
Composting	Food Waste  Fiber Waste (paper & cardboard)  Plant Waste	Produce Meats & Seafood Dairy Products Bakery & Dry Goods Deli & Frozen Foods Fat & Bones Cooking Oil & Grease  <b>Food Packaging</b> (paper, cardboard & wood)	<b>Food Packaging</b> (plastic, glass & cans)  All Other Trash

Source: "An Integrated Organic Waste Management System: From the Perspective of Commercial Waste Generators" (May 10, 2010) by JLT & Associates.<sup>16</sup>

Minnesota Statutes, (M.S. 115A.03 – Definitions) contain a detailed definition of source separated compostable materials as follows:

***“Subd. 32a. Source-separated compostable materials.***

*‘Source-separated compostable materials’ means materials that:*

- (1) are separated at the source by waste generators for the purpose of preparing them for use as compost;*
- (2) are collected separately from mixed municipal solid waste, and are governed by the licensing provisions of section 115A.93;*
- (3) are comprised of food wastes, fish and animal waste, plant materials, diapers, sanitary products, and paper that is not recyclable because the commissioner (of MPCA) has determined that no other person is willing to accept the paper for recycling;*
- (4) are delivered to a facility to undergo controlled microbial degradation to yield a humus-like product meeting the agency's class I or class II, or equivalent, compost standards and where process residues do not exceed 15 percent by weight of the total material delivered to the facility; and*
- (5) may be delivered to a transfer station, mixed municipal solid waste processing facility, or recycling facility only for the purposes of composting or transfer to a composting facility, unless the commissioner determines that no other person is willing to accept the materials.”*

MPCA rules (MCAR 9215.0510 - Definitions; Subd. 21a references the same statutory definition of “source separated compostable materials” (MS 115A.03, Subd 32A). But MPCA rules (MCAR 9215.0510 - Definitions; Subd. 21b also provide for an additional definition of “source separated organics” as follows:

***“Subp. 21b. Source-separated organic materials.***

*‘Source-separated organic materials’ has the same meaning as source-separated compostable materials.”*

In summary, these other forms of food rescue and SSOM recovery have well established end markets including feedstock supply specifications and pricing schedules (see Section 8 and Subsection 9.6 for more discussion on the market conditions and economics). In general, the preliminary AD specification recommended as part of this assessment may provide for slightly more commingling of additional organic materials compared to existing rescue and recovery programs. However, the economics of these existing services may be based on higher value end uses such that a new AD program may be challenged in head-to-head competition if the same supply sources are targeted.

One alternative is to broaden the supply specification to allow mixed MSW from organics rich commercial establishments and design the AD facility with more extensive front–end sorting capacity. This alternative strategy would allow the planners of the AD system to compete for more commercial accounts on the basis of providing a more full-service alternative to mixed MSW collection. This strategy would require more capital investment and operating cost to sort mixed loads into a clean, digestible feedstock.

## 5 Tonnage and Composition Data from Minnesota Sources

### 5.1 SCORE Data

Table 5-1 displays a summary of the estimates of organic discards in 2009 from both Ramsey and Washington Counties compared to the six-county SWMCB region as a whole. The first line indicates the estimates of current food rescue and SSOM recovery rates based on county SCORE reports to MPCA. The second line itemizes Foth's estimate of the amount of SSOM currently discarded in with mixed MSW. These SSOM discard estimates are based on SCORE – reported MSW disposal data, composition data (including food waste and non-recyclable paper), and the assumption that commercial waste makes up about 48 percent of the total MSW. The third line simply is a 25 percent recovery scenario based on results of other ongoing programs in the region.

Table 5-1  
Commercial Organics Discards and  
Potential Capture Rates  
(Tons per year – 2009 estimates)

	<u>R + W</u>	<u>SWMCB TOTAL</u>
Total Food Rescued + SSOM Recovered (excluding YW) =	39,000	102,000
Commercial SSOM Currently Discarded in Mixed MSW =	43,000	168,000
Additional Commercial SSOM that could be captured (at a 25 percent capture rate) =	11,000	42,000

This data implies that commercial SSOM from Ramsey and Washington Counties alone may not satisfy the demand for an AD facility designed for 25,000 to 50,000 tons per year. It will be important for R/W RRP, SPPA and other organizations to look towards neighboring counties and cities for additional commercial and residential supplies.

Foth analyzed available SCORE data for organics rescue and recovery as summarized in Figures 5-1 and 5-2. Figure 5-1 is the “total” of food rescue and food scraps recovery as reported. The historical data chart presented in Figure 5-1 indicates the long history of organics recovery in Minnesota, especially in the greater Metro Area. The data indicates that counties have become more aware of existing private recovery systems as they began to include this data in the annual SCORE reports to MPCA starting in about 1991. The complementary ups and downs during the years 2000 through 2002 imply that the total statewide tonnage for Minnesota may be more accurate than the individual county tonnages of organics reported. In general, there has been a relatively level recovery rate of organic materials over the past few years.

Figure 5-2 helps further describe recent trends in the subsets of food to livestock by splitting out the food to hogs (direct) vs. the food to animal feed manufacturers in the six-County, SWMCB Region. This data does NOT include yard waste in the organics subtotal. Foth postulates that the notable drop in food to hogs (direct) in 2008 and 2009 is in part due to the lack of complete reporting by the hog farmers.

It is important to note that the “total” in Figure 5-1 was defined by MPCA as food waste recycling only from 1991 through 2005. From 2006 thru the most recent reports (i.e., data year 2009), "Organics" included line items for "Food to livestock", "Food to people", and "Source separated organics". It is safe to assume that some of the increases in the early years (2006 and 2007) were due to first time reporting of food rescue and food scraps recovery that was already taking place in previous years (i.e., part of these trends is due to improved reporting).

The total amount of food rescued and recovered from Ramsey and Washington Counties in 2009 was about 38,640 tons estimated as follows:

Rescued (i.e., food to people):	810 tons
Recovered via:	
Food to hogs (direct)	22,380 tons
Food to animal feed manufacturers	15,410 tons
<u>SSOM to compost</u>	<u>40 tons</u>
TOTAL =	38,640 tons

All of this food and SSOM is from the commercial sector. There are no residential SSOM recovery programs yet in Ramsey or Washington Counties. The potential for residential SSOM is significant but beyond the scope of this commercial assessment.

As a comparison, the total amount of yard waste and brush collected from Ramsey County alone in 2008 was estimated at

Yard waste (e.g., grass + leaves):	39,900 tons
<u>Brush (less than 4-inches in diameter)</u>	<u>18,500 tons</u>
TOTAL =	58,400 tons

Source: Personal communication with Ramsey County staff.<sup>17</sup>

These yard waste and estimates are for volumes delivered to city compost sites sponsored by Ramsey County and are primarily residential self-haul loads only. Other commercial loads (e.g., landscapers, grounds crews, etc.) are hauled directly to private composting facilities and may not be reflected in the above estimates.

Table 5-2 displays the raw source data used to generate graph in Figure 5-2

Table 5-2  
SWMCB Organics Recovery Tonnages (2004 - 2009)

	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>
Food to livestock (direct to hogs)	37,182	44,621	47,501	38,836	26,270	28,893
Food to people	617	617	901	334	963	811
Source-separated organics (to compost)	1,841	677	419	642	2,058	5,785
Food to animal feed manufacturers	<u>55,040</u>	<u>56,787</u>	<u>60,537</u>	<u>57,498</u>	<u>51,410</u>	<u>66,106</u>
<b>SWMCB Total</b>	<b>139,679</b>	<b>147,665</b>	<b>154,586</b>	<b>161,959</b>	<b>132,870</b>	<b>101,595</b>

Source: County data, including SCORE reports to MPCA.

Figure 5-1 History of Organic Materials Rescue and Recovery Data Including Totals for Minnesota, SWMCB Region, & R + W Counties (From SCORE Reports)

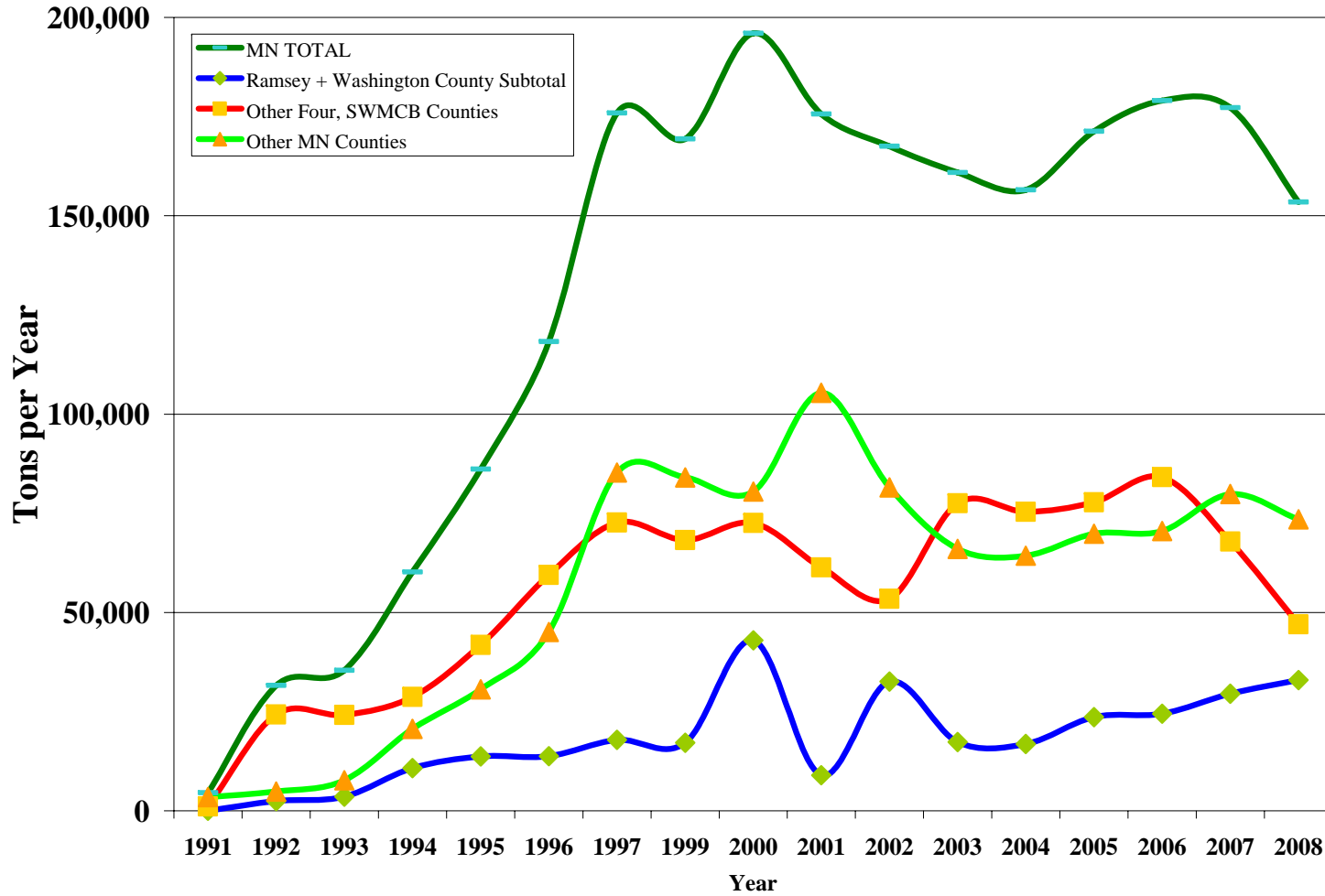
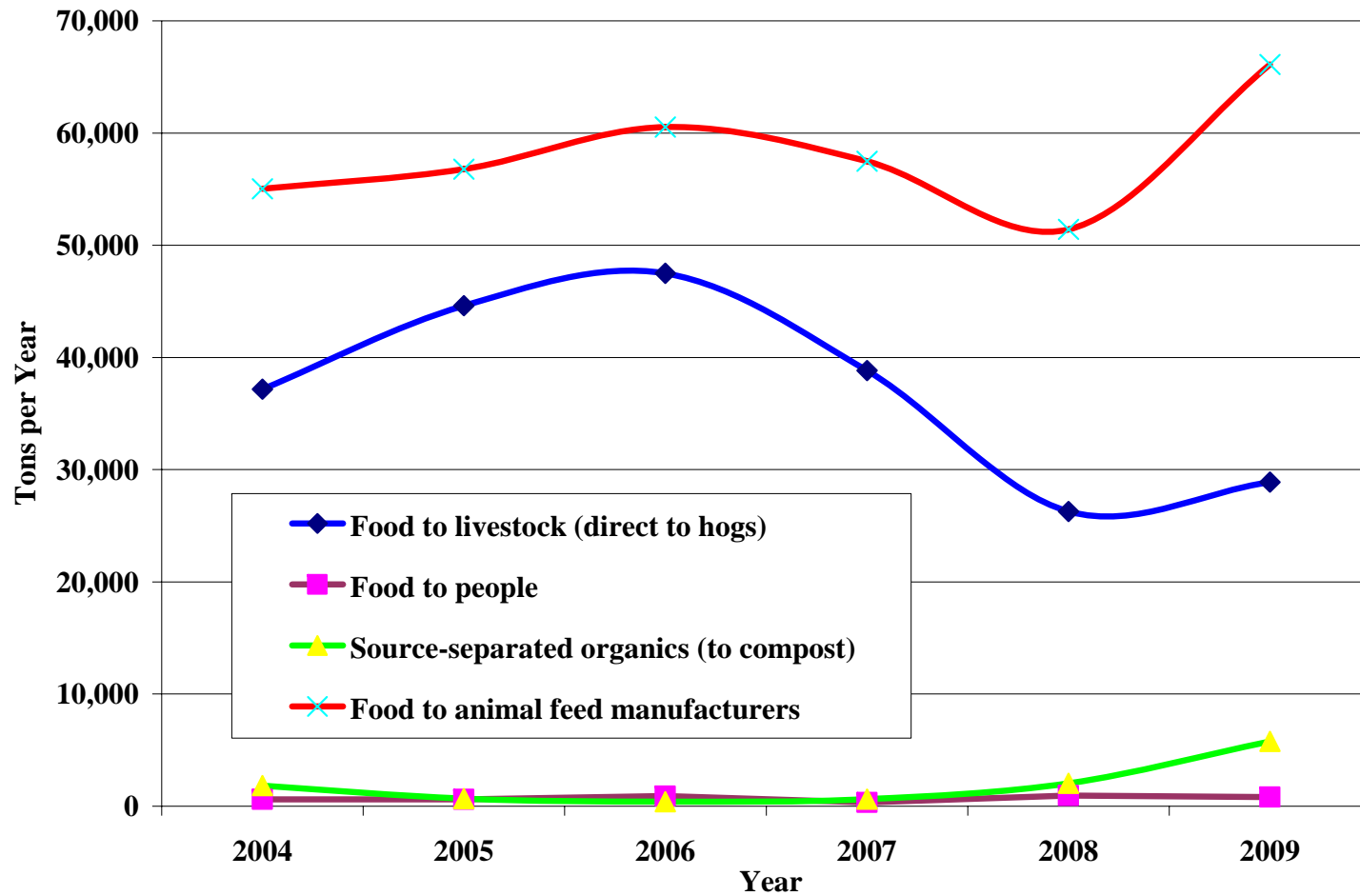


Figure 5-2 Organics Materials Rescue and Recovery Data For the SWMCB Region Only (From SCORE Reports)



## 5.2 Composition Data

Table 5-3 displays a summary of the composition data most relevant to SSOM recovery, including food waste and non recyclable paper.

Table 5-3  
Comparison of Mixed MSW Composition Studies

RRT Category	As Disposed							As Generated
	RRT - Elk River <sup>1</sup>	RRT - Newport <sup>1</sup>	Hennepin <sup>1,2</sup>	Metro Area (R.W. Beck 2000 <sup>3</sup> )				EPA <sup>1,4</sup>
				Residential	ICI	Mixed	TOTAL	
<b>Tons Sorted</b>	<b>3.28</b>	<b>3.26</b>	<b>9.94</b>				<b>47.27</b>	<b>254,000,000</b>
<b>PAPER</b>	<b>18.6%</b>	<b>14.6%</b>	<b>22.0%</b>				<b>34.2%</b>	<b>32.7%</b>
Newsprint	4.1%	2.8%	4.1%					
Magazines	1.9%	1.6%	3.1%					
High Grade Office	1.9%	1.3%	2.7%					
OCC & Kraft Bags	3.5%	3.7%	3.6%					
Mixed Recyclable Paper	7.2%	5.2%	8.5%					
OCC Uncoated - Non Recyclable				0.6%	0.4%	0.4%	0.5%	
Mixed Paper - Non Recyclable	13.0%	8.4%	6.6%	8.6%	7.3%	9.9%	8.3%	
<b>PLASTIC</b>	<b>17.8%</b>	<b>14.9%</b>	<b>14.0%</b>				<b>11.0%</b>	<b>12.1%</b>
<b>METAL</b>	<b>5.3%</b>	<b>6.4%</b>	<b>5.8%</b>				<b>4.4%</b>	<b>8.2%</b>
<b>GLASS</b>	<b>3.4%</b>	<b>1.5%</b>	<b>4.4%</b>				<b>2.7%</b>	<b>5.3%</b>
<b>YARD WASTE</b>	<b>0.9%</b>	<b>3.3%</b>						<b>12.8%</b>
Grass and Leaves				3.6%	1.3%	2.9%	2.5%	
Woody Material				0.7%	0.0%	0.6%	0.4%	
<b>FOOD WASTE</b>	<b>11.7%</b>	<b>16.0%</b>		<b>11.5%</b>	<b>10.8%</b>	<b>10.6%</b>	<b>11.0%</b>	<b>12.5%</b>
<b>WOOD WASTE</b>								<b>5.6%</b>
Non-treated Wood	0.6%	3.0%		1.0%	3.5%	2.1%	2.3%	
Treated Wood	2.6%	5.6%		3.4%	4.1%	4.0%	3.8%	
Pallets				0.0%	7.9%	1.3%	3.6%	
<b>DIAPERS</b>	<b>2.7%</b>	<b>2.5%</b>					<b>1.9%</b>	
<b>CONSTRUCTION DEMO/RENOVATION/DEBRIS</b>	<b>7.4%</b>	<b>3.7%</b>						
<b>PROBLEM MATERIALS</b>	<b>1.4%</b>	<b>3.1%</b>	<b>1.8%</b>	<b>1.8%</b>				
<b>HHW</b>	<b>0.3%</b>	<b>0.8%</b>	<b>0.2%</b>	<b>0.3%</b>				
<b>MISCELLANEOUS</b>	<b>14.0%</b>	<b>16.0%</b>		<b>18.3%</b>				<b>3.2%</b>
Other Organics	2.4%	0.9%	28.4%	2.4%	1.5%	1.1%	1.7%	
<b>TOTAL PERCENT</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>	<b>52.2%</b>				<b>100.0%</b>
<b>SSOM Subtotal</b>				<b>23.1%</b>	<b>20.0%</b>	<b>22.0%</b>	<b>21.5%</b>	<b>12.5%</b>
<b>Yard Waste Subtotal</b>				<b>4.3%</b>	<b>1.3%</b>	<b>3.5%</b>	<b>2.9%</b>	<b>0.0%</b>

### Sources:

<sup>1</sup> Data from 2007 resource recovery facility composition studies

<sup>2</sup> HERC data was sorted into RRT categories for comparison purposes. Data from Solid Waste Composition Study (<http://www.co.hennepin.mn.us/images/HCInternet/EPandT/Environment/Solid%20Waste%20Planning%20&%20Haulers/WCSFinalReport2007webversion.pdf>)

<sup>3</sup> *Statewide MSW Composition Study: A Study of Discards in the State of Minnesota*; for SWMCB and MPCA by R.W. Beck (March 2000) (As accessed via the MPCA web page: <http://www.pca.state.mn.us/oea/publications/wastesort2000.pdf> [report body] and <http://www.pca.state.mn.us/oea/publications/waste-appB.pdf> [Appendix B])

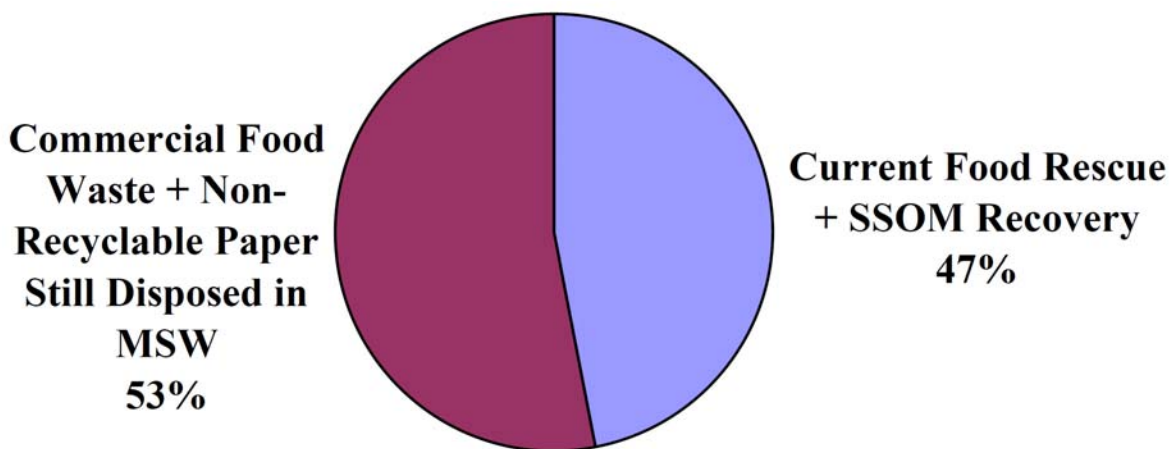
<sup>4</sup> Data from Municipal Solid Waste in the United States:2007 Facts and Figures (<http://www.epa.gov/epawaste/nonhaz/municipal/pubs/msw07-rpt.pdf>)

Notes: This data includes both residential and commercial (ICI) tonnages,

The composition data displayed in Table 5-3 above is from the following sources:

- ◆ For the Metro Area, the *Statewide MSW Composition Study* conducted for SWMCB and MPCA by R.W. Beck (March 2000).
- ◆ For the RRT facilities at Elk River and Newport, the 2007 resource recovery facility composition studies completed as part of permit reporting requirements.
- ◆ For the Hennepin County Energy Recovery Center (HERC), the 2007 resource recovery facility composition study completed as part of permit reporting requirements.
- ◆ For U.S., national data, the *Municipal Solid Waste Characterization Study: 2007 Facts and Figures*.

Figure 5-3 Summary of Current Organics Discards in Ramsey + Washington Counties



## 6 Disposal Estimates

Applying the food disposal rates from the CIWMB (February 2000) study yields an estimated amount of food waste disposed by the facilities in Ramsey and Washington Counties from the D&B database on an annual basis. A summary of the amount of food waste disposed by each SIC code by County is included in Table 6-1.

### 6.1 Summary of Disposal Estimates by SIC Code

The data in Table 6-1 is reported in terms of tons of food waste per employee per year. The summary data is then categorized based on the SIC code for each facility type. Table 6-1 displays the results of this CIWMB study.

Table 6-1  
Benchmark Food Waste Disposal Rates

<b>Primary SIC Code</b>	<b>Industry</b>	<b>Food Waste (% of Total Waste Disposed)</b>	<b>Food Disposed (tons/employee/year)</b>
20	Food and Kindred Products	23.0%	0.41
51	Wholesale Trade - non-durable Goods	29.6%	0.40
54	Food Stores	45.1%	1.25
58	Eating and Drinking Places	43.9%	1.10
70	Hotels, Rooming Houses, Camps, and Other Lodging Places	15.3%	0.18
80	Health Services	7.0%	0.04
82	Educational Services	24.2%	0.13
Varies	Public Administration	11.4%	0.05

Primary Source: Business Group Waste Compositions, Solid Waste Characterization Database, CIWMB; February 2000.<sup>18</sup>

It is important to note that this CIWMB study was based on sorting garbage samples from individual businesses in Southern California as disposed in the mixed MSW. Material that was recycled was not included in the total waste tonnages.

### 6.2 Extrapolation to R/W Counties

The disposal rates determined in this study provide a means to determine estimates of the quantities of food waste disposed at similar facilities in Ramsey and Washington Counties.

Further analysis is warranted to further refine benchmark disposal and recovery data as reported in the literature. This assessment assumes these literature – reported disposal rates can reasonably reflect current, local conditions for planning (not design) purposes.

The following discussion is based on literature reviews, desktop analysis of SIC codes from the D&B database, phone interviews and site visits. The amount and type of organic waste disposed

varies significantly by type of industry establishment. In general terms, the traditional recyclable materials (e.g., old corrugated cardboard) are currently recycled. The level of recovery of organic material is dependent on the particular situation of the individual establishment including:

- ◆ Volumes of organic materials;
- ◆ Quality of any separated organic streams; and
- ◆ Value of organic materials relative to the existing companies providing recovery services.

The total amount of food waste disposed using SIC codes and benchmark disposal rate data from the literature is approximately 45,000 tons per year (TPY). Not all of this material will be recovered in any given collection program depending on number of establishments that participate and the percent of eligible SSOM captured.

Only the major generators of food waste are summarized in this section of the report (i.e., categories of establishments with over one percent of the total amount of food waste disposed). All details are included in Appendix I (Summary of 3-Digit SIC Code Categories and Desktop Assessment of Commercial Food Waste Disposed in Ramsey and Washington Counties). Refer to Table 6-2 for the Ramsey and Washington County combined totals and Table 6-3 for the two, individual County's disposal rate estimates by SIC code.

Appendix J displays a summary of the tabulated results from phone interviews and sites visits. The tabulation is intentionally generic without specifying companies by name as a means to protect information that Foth stated would remain as confidential. Additional surveys and site visits may help refine these estimates of disposal rates, but a more accurate means of measurement (e.g., weighing and composition studies; pilot projects) may be necessary depending on the AD facility's stage of planning and design.

Table 6-2

Summary of Food Waste Disposed By SIC Category

(Total of Ramsey and Washington Counties. The top three major categories are highlighted in green.)

Primary SIC Code	Category	Number of R/W Total Establishments	R/W Food Waste as Disposed (tons/year)	Percent of Total Tons
20	Food and Kindred Products	90	941	2%
51	Wholesale Trade - non-durable Goods	578	3,236	7%
54	Food Stores	549	9,105	20%
58	Eating and Drinking Places	982	22,774	51%
70	Hotels, Rooming Houses, Camps, and Other Lodging Places	156	672	2%
79	Amusement and Recreation Services	22	13	0.03%
80	Health Services	2,135	1,636	4%
82	Educational Services	602	3,925	9%
	Public Administration	502	2,408	5%
	<b>TOTALS</b>	<b>5,616</b>	<b>44,711</b>	<b>100%</b>

Figure 6-1

### Summary of Food Waste Disposal By SIC Category

(Total of Ramsey and Washington Counties)

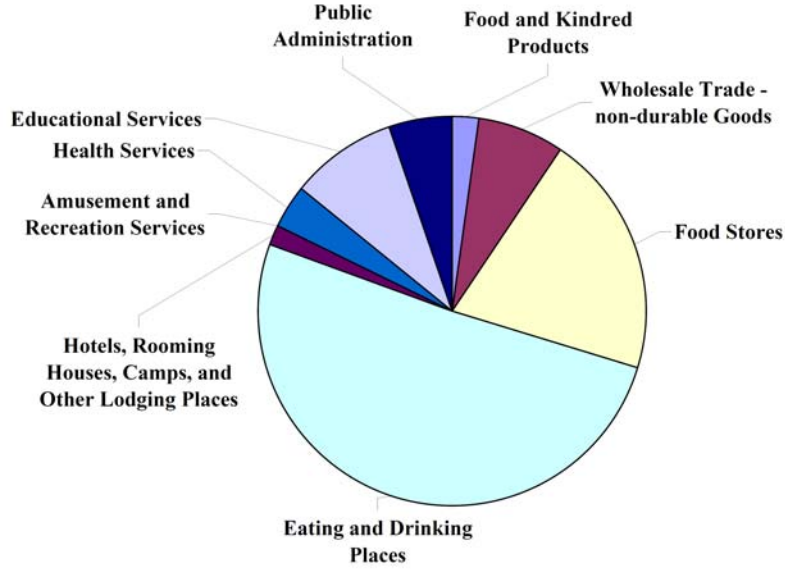


Table 6-3  
 Estimation of Food Waste Disposed  
 by SIC Code Classifications  
 (Individual Totals for Ramsey County and Washington County.  
 The top three major categories are highlighted in green)

Primary SIC Code	Category	RAMSEY COUNTY			WASHINGTON COUNTY		
		Number of Establishments	Number of Employees	Estimated Food Waste as Disposed (tons/year)	Number of Establishments	Number of Employees	Estimated Food Waste as Disposed (tons/year)
20	Food and Kindred Products	68	2,137	876	22	158	65
51	Wholesale Trade - non-durable Goods	406	6,329	2,532	172	1,761	704
54	Food Stores	416	5,257	6,571	133	2,027	2,534
58	Eating and Drinking Places	717	15,464	17,010	265	5,240	5,764
70	Hotels, Rooming Houses, Camps, and Other Lodging Places	94	2,504	451	62	1,230	221
79	Amusement and Recreation Services	18	205	10	4	48	2
80	Health Services	1,586	33,847	1,354	549	7,057	282
82	Educational Services	478	25,000	3,250	124	5,193	675
<b>Public Administration</b>							
83	Social Services	7	6,486	324	1	9	0.5
87	Engineering, Accounting, Research, Management, and Related Services	7	1,929	96	0	0	0
91	Executive, Legislative, and General Government, Except Finance	83	4,188	209	40	1,357	68
92	Justice, Public Order, and Safety	89	3,909	195	29	1,761	88
93	Public Finance, Taxation, and Monetary Policy	15	2,577	129	0	0	0
94	Administration of Human Resource Programs	51	5,561	278	0	0	0
95	Administration of Environmental Quality and Housing Programs	54	4,166	208	10	45	2
96	Administration of Economic Programs	66	9,392	470	8	86	4
97	National Security and International Affairs	15	748	37	0	0	0
Varies	Other Public Administration <sup>(a)</sup>	24	1,132	57	3	4,823	241
<b>TOTALS</b>		<b>4,194</b>	<b>130,831</b>	<b>34,059</b>	<b>1,422</b>	<b>30,795</b>	<b>10,652</b>

Notes:

(a) "Other Public Administration" includes: Federal, state and local government agencies (if not listed above in other SIC code categories).

### 6.3 Food and Kindred Products (SIC Code 20)

This is a diverse group of human food and beverage manufacturers and processors. The D&B database and desktop assessment indicates this category of businesses may dispose about 2 percent (about 900 tons per year) of the total food waste within the population of commercial establishments analyzed. Table 6-4 summarizes the types and total number of establishments in

Ramsey and Washington Counties within this category by 3-digit SIC codes. The waste types and composition can be predicted to a limited extent by the subcategory title (e.g., "...meat products", "dairy products", "bakery products", etc.).

Table 6-4  
Food and Kindred Products  
(Subcategories within SIC Code 20)

Primary SIC Code	3 Digit SIC Code	Category	Total Number of R + W Establishments
<b>20</b>		<b>Food and Kindred Products</b>	<b>90</b>
	201	Meat Products	4
	202	Dairy Products	14
	203	Canned, Frozen, and Preserved Fruits, Vegetables, and Food Specialties	6
	204	Grain Mill Products	8
	205	Bakery Products	20
	206	Sugar and Confectionery Products	10
	207	Fats and Oils	0
	208	Beverages	12
	209	Miscellaneous Food Preparations and Kindred	16

Food product manufacturers may have a mixture of meat, fruit, vegetable and bakery by-products that are discarded. For example, manufacturers of convenience foods that are pre-packaged for "heat and serve" meals may involve a variety of bakery, meat, vegetable and other food ingredients that will be discarded.

#### 6.4 Wholesale Trade – Non-Durable Goods (SIC Code 51)

This is also a diverse group of businesses primarily engaged in the wholesale distribution of non-durable goods. The D&B database and desktop assessment indicates this category of businesses may dispose of about 7 percent (about 3,200 tons) of the total food waste within the population of commercial establishments analyzed. Table 6-5 summarizes the types and total number of establishments in Ramsey and Washington Counties within this category by 3-digit SIC codes.

Table 6-5  
Wholesale Trade – Non-Durable Goods  
(Subcategories within SIC Code 51)

Primary SIC Code	3 Digit SIC Code	Category	Total Number of R + W Establishments
<b>51</b>		<b>Wholesale Trade - non-durable Goods</b>	<b>578</b>
	511	Paper and Paper Products	52
	512	Drugs, Drug Proprietaries, and Druggists' Sundries	25
	513	Apparel, Piece goods, and Notions	38
	514	Groceries and Related Products	123
	515	Farm-product Raw Materials	22
	516	Chemicals and Allied Products	48
	517	Petroleum and Petroleum Products	27
	518	Beer, Wine, and Distilled Alcoholic Beverages	27
	519	Miscellaneous Non-durable Goods	216

The majority of food wholesalers and distributors dispose very little recoverable organic waste. Most of these establishments warehouse and/or redistribute pre-packaged items, with little or no organic waste disposal. Some minor amount of waste is disposed in a stream of damaged or returned products, but most of these are returned in their original packaging to the manufacturer or donated to local food bank programs. Therefore, the amount of organic discards available for recovery in this category is very minor, with the possible exception of 514. Plus, not all subcategories within this group are food-related industries and therefore will not dispose significant amounts of food by-products. Rather, food wastes will be more related to normal lunch room and corporate cafeteria waste depending on the specifics of each establishment.

## 6.5 Food Stores (SIC Code 54)

This major group of businesses includes retail stores primarily engaged in selling food for home preparation and consumption. Note that restaurants, bars (see SIC code 58 – Eating and Drinking Places) and liquor stores are not included in this “Food Stores” category. The D&B database and desktop assessment indicates this category of businesses may dispose about 20 percent (about 9,100 tons) of the total food waste within the population of commercial establishments analyzed. Table 6-6(a) summarizes the types and total number of establishments in Ramsey and Washington Counties within this category by 3 digit SIC codes.

Table 6-6(a)  
Food Stores  
(Subcategories within SIC Code 54)

Primary SIC Code	3 Digit SIC Code	Category	Total Number of R + W Establishments
<b>54</b>		<b>Food Stores</b>	<b>549</b>
	541	Grocery Stores	339
	542	Meat and Fish (seafood) Markets	28
	543	Fruit and Vegetable Markets	6
	544	Candy, Nut, and Confectionery Stores	21
	545	Dairy Products Stores	8
	546	Retail Bakeries	68
	549	Miscellaneous Food Stores	79

Supermarket organic wastes are dominated by produce. One composition study<sup>19</sup> reports the following waste composition from supermarkets

- ◆ Fruits and vegetables 90 percent
- ◆ Bakery wastes 5 to 6 percent
- ◆ Seafood 3 percent
- ◆ Deli wastes (primarily meat scraps) 1 percent

Another composition study indicated that 40 percent of a typical food retailer's waste is food waste.<sup>20</sup>

Meat scraps are often directed to rendering facilities and are rarely cited in composition studies that are studying compostable and other potentially recoverable organic wastes.

The MPCA, together with the Minnesota Grocers Association (MGA), conducted a survey of grocery stores in 2008.<sup>21</sup> The response rate to the MPCA and MGA survey request was only 6 percent (or 78 usable responses) out of a total of 1,300 grocers targeted (including convenience stores). This survey reported the following forms of organic waste reduction or recovery were utilized by Minnesota grocers:

- ◆ Rescue food (send to a local food bank) 55 percent of respondents
- ◆ Recycle cooking oil 45 percent of respondents
- ◆ Recover meat, bones and fat via a renderer 40 percent of respondents
- ◆ Recycle food scraps to livestock 33 percent of respondents
- ◆ Recover SSOM via composting 22 percent of respondents

Note that many Minnesota grocers use more than one of these reduction / recovery options.

Table 6-6(b) is data that was reported by JLT & Associates to the SWMCB as part of the 2003 *Grocery Store* study and report. This data helps further characterize the types of food waste and documents the relative amounts from the various grocery store departments.

Table 6-6(b)  
Food Waste Generated from Grocery Store Departments

Department	Average Daily Volume of Waste Generated (Gallons)
Bakery	185
Dairy & Frozen Food	35
Deli	200
Floral	80
Grocery	60
Meat & Seafood	205
Produce	215

Source: "Washington County Organic Waste Management Strategies in Grocery Stores: Final Report for the Solid Waste Management Coordinating Board" (December 2003) by JLT & Associates.<sup>22</sup>

Food stores are largely concentrated into larger corporations or chain stores. Also, supermarkets are predictably located within city urban and suburban population centers. Also, grocery stores have a relatively consistent and predictable composition of organic discards. For all of these reasons, grocery stores (including supermarkets) are a logical target for additional SSOM recovery.

## 6.6 Eating and Drinking Places (SIC Code 58)

This major group of businesses includes retail establishments selling prepared foods and drinks for consumption on the premises; and also lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption. Restaurants and cafés operating as part of a hotel complex are included in SIC code 70 – Hotels, etc.

The D&B database and desktop assessment indicates this category of businesses may dispose about 51 percent (about 22,800 tons) of the total food waste within the population of commercial establishments analyzed. Table 6-7 summarizes the types and total number of establishments in Ramsey and Washington Counties within this category by 4-digit SIC codes.

Table 6-7  
Eating and Drinking Places  
(4 Digit SIC Subcategories within SIC Code 58)

Primary SIC Code	3 Digit SIC Code	Category	Total Number of R + W Establishments
<b>58</b>		<b>Eating and Drinking Places</b>	<b>982</b>
	5812	Eating Places	855
	5813	Drinking Places (alcoholic beverages)	127

There is a wide variability in the composition of food waste from restaurants. It is often helpful to further categorize the food waste from restaurants as follows:

- ◆ Fast food restaurants (use pre-proportioned ingredients)
- ◆ Full service restaurants (prepare meals on demand)

It is more likely that full service restaurants will be willing and able to add an additional SSOM recovery program. Also, the staffing and management of these types of restaurants is generally more stable and will help minimize ongoing education and training. All restaurants could and should have FOG recovery systems in place.

Another means of targeting the SSOM from restaurants is to distinguish between:

- ◆ “Back of the store” (i.e., pre-consumer) SSOM, including food preparation scraps in the kitchen), and
- ◆ “Front of the store” (i.e., post-consumer) SSOM, including discarded plate waste not consumed by customers).

The quality and consistency of SSOM from pre-consumer material disposed in kitchens, etc. during food preparation will be significantly higher and more reliable than post-consumer material from customers. In general, fruits and vegetables comprise the majority of pre-consumer SSOM from full service restaurants. Additional materials of significance include bakery, dairy and sugar-based / starch-based products.

Restaurants as a category are the largest potential suppliers of SSOM from the analyzed commercial generators. Although they appear to be a good candidate for SSOM supply, they also provide a significant challenge given the wide diversity and decentralized ownership / management structure. There is risk of contamination of the SSOM with prohibited materials that must be anticipated. Also, small, frequent loads from multiple generators must be serviced on a very regular schedule. Yet, given the significant volume of eligible organic material disposed, this sector should be carefully considered in any new SSOM recovery initiative.

## 6.7 Hotels, Rooming Houses, Camps and Other Lodging Places (SIC Code 70)

This major group of businesses includes commercial and noncommercial establishments engaged in furnishing lodging or camping. This category includes appurtenant operations such as restaurants and cafés operating as part of a hotel complex.

The D&B database and desktop assessment indicates this category of businesses may dispose about 2 percent (about 700 tons) of the total food waste within the population of commercial establishments analyzed. Table 6-8 summarizes the types and total number of establishments in Ramsey and Washington Counties within this category by 3-digit SIC codes.

Table 6-8  
Hotels, Rooming Houses, Camps, and Other Lodging Places  
(Subcategories within SIC Code 70)

Primary SIC Code	3 Digit SIC Code	Category	Total Number of R + W Establishments
<b>70</b>		<b>Hotels, Rooming Houses, Camps, and Other Lodging Places</b>	<b>156</b>
	701	Hotels and Motels	120
	702	Rooming and Boarding Houses	2
	703	Camps and Recreational Vehicle Parks	25
	704	Organization Hotels and Lodging Houses, on Membership Basis	9

Food waste from this commercial category consists of:

- ◆ Fruits and vegetables
- ◆ Meat, fish and poultry wastes
- ◆ Bakery products.

Several of the hotels surveyed and visited already had existing SSOM recovery programs, mostly food to pigs.

## 6.8 Health Services (SIC Code 80)

This major group of businesses includes establishments engaged in furnishing medical, surgical, and other health services to persons. This category includes hospice establishments and smaller community clinics. Administrative establishments such as health maintenance organizations (HMO's) that limit their services to insurance are not included and instead are classified as insurance (SIC code 63)

The D&B database and desktop assessment indicates this category of businesses may dispose about 4 percent (about 1,600 tons) of the total food waste within the population of commercial

establishments analyzed. Table 6-9 summarizes the types and total number of establishments in Ramsey and Washington Counties within this category by 3-digit SIC codes.

Table 6-9  
Health Services  
(Subcategories within SIC Code 80)

Primary SIC Code	3 Digit SIC Code	Category	Total Number of R + W Establishments
<b>80</b>		<b>Health Services</b>	<b>2,135</b>
	801	Offices and Clinics of Doctors and Medicine	615
	802	Offices and Clinics of Dentists	362
	803	Offices and Clinics of Doctors of Osteopathy	16
	804	Offices and Clinics of Other Health Practitioners	618
	805	Nursing and Personal Care Facilities	101
	806	Hospitals	26
	807	Medical and Dental Laboratories	70
	808	Home Health Care Services	67
	809	Miscellaneous Health and Allied Services	260

Organic materials from institutional kitchens at health services establishments typically include:

- ◆ Fruits and vegetables (50 percent or more<sup>23</sup>)
- ◆ Meat (including fish and poultry)
- ◆ Bakery products

There is little dairy waste due to single-serving packages or bulk dispensers.

Some of the larger hospitals utilize food service contractors to outsource these functions not related to direct contact care with patients. Therefore, the implementation of any new SSOM recovery program may have to work through the on-site contractor.

## 6.9 Educational Services (SIC Code 82)

This major group of businesses includes establishments providing academic or technical instruction. Also included are establishments providing educational services such as libraries, student exchange programs, and curriculum development.

The D&B database and desktop assessment indicates this category of establishments may dispose about 9 percent (about 3,900 tons) of the total food waste within the population of

commercial establishments analyzed. Table 6-10 summarizes the types and total number of establishments in Ramsey and Washington Counties within this category by 3-digit SIC codes.

Table 6-10  
Educational Services  
(Subcategories within SIC Code 82)

Primary SIC Code	3 Digit SIC Code	Category	Total Number of R + W Establishments
<b>82</b>		<b>Educational Services</b>	<b>602</b>
	821	Elementary and Secondary Schools	288
	822	Colleges, Universities, Professional Schools	88
	823	Libraries	46
	824	Vocational Schools	27
	829	Schools and Educational Services, not Elsewhere Classified	153

The composition of organic materials disposed from educational institutions is similar to that from health care services.

There is considerable diversity of educational institutions in the two Counties. The larger college and university campuses represent an opportunity to capture relatively large volumes of food waste currently discarded into mixed MSW. One current example of a food scraps recovery program is the University of Minnesota (U of M), St. Paul Campus (see Appendix K for a summary of this program).

Like hospitals, some of the larger educational institutions utilize food service contractors to outsource these functions not related to direct education of students. Therefore, the implementation of any new SSOM recovery program may have to work through the on-site contractor.

Many elementary and secondary schools have implemented various types of SSOM recovery programs. Ramsey and Washington County have supported these initiatives through grant support and in-kind technical assistance, including the professional consulting services of Jodi Taitt (JLT & Associates). Within Ramsey and Washington Counties, over 95 schools currently have some type of SSOM recovery program on-line today.

See Appendix L for the program summary of the Saint Paul Public Schools (SPPS) food scraps recovery program.

6.10 Public administration (SIC Codes: 83, 91, 92, 93, 94, 95, 96, 97 and "Other")

This group of categories includes all federal, state and local government administrative offices if not included as part of health or educational services. It can be assumed these public agencies have similar building and staff operations, and therefore waste disposal, as compared to many private commercial / administrative offices.

The D&B database and desktop assessment indicates this category of establishments may dispose about 5 percent (about 2,400 tons) of the total food waste within the population of commercial establishments analyzed. Table 6-11 summarizes the types and total number of establishments in Ramsey and Washington Counties within this category by 2-digit SIC codes.

Table 6-11  
Public Administrative Offices  
(Subcategories within SIC Codes:  
83, 87, 91, 92, 93, 94, 95, 96, and 97)

Primary SIC Code	Category	Total Number of R + W Establishments
<b>PUBLIC ADMINISTRATION:</b>		<b>502</b>
<b>83</b>	<b>Social Services</b>	<b>8</b>
<b>87</b>	<b>Engineering, Accounting, Research, Management, and Related Services</b>	<b>7</b>
<b>91</b>	<b>Executive, Legislative, and General Government, Except Finance</b>	<b>123</b>
<b>92</b>	<b>Justice, Public Order, and Safety</b>	<b>118</b>
<b>93</b>	<b>Public Finance, Taxation, and Monetary Policy</b>	<b>15</b>
<b>94</b>	<b>Administration of Human Resource Programs</b>	<b>51</b>
<b>95</b>	<b>Administration of Environmental Quality and Housing Programs</b>	<b>64</b>
<b>96</b>	<b>Administration of Economic Programs</b>	<b>74</b>
<b>97</b>	<b>National Security and International Affairs</b>	<b>15</b>
<b>Varies</b>		<b>27</b>

The following government agencies have ongoing SSOM recovery programs in their own buildings:

- ♦ Ramsey County (See Appendix M for program summary)
- ♦ MPCA (See Appendix N for program summary)
- ♦ State of Minnesota (See Appendix O for program summary)  
(various agency buildings)

These summaries describe selected examples of food scraps recovery programs from government buildings and correctional facilities (e.g., jails, prisons and other law enforcement / justice detention centers). The State of Minnesota maintains a single contract with a hog farmer that provides both the food scraps collection and recycling service. This is the same contract utilized by Ramsey County and SPPS.

Hennepin County also has a program for collecting and composting organic materials from several of its own buildings including:

- ◆ Adult Correctional Facility
- ◆ Environmental Services
- ◆ Hennepin County Medical Center (HCMC)
- ◆ Home School
- ◆ Public Safety Detention Center

## 7 Existing Recovery by Grade of Food or SSOM

### 7.1 Food Rescue (Food to People)

Unspoiled, edible food can go to food banks. Local and national food bank programs frequently offer free pickup and provide reusable containers to donors. This form of waste reduction has benefits from both a solid waste management and a social services perspective. Both Ramsey and Washington Counties actively support food rescue programs such as Second Harvest. In 2009, a total 811 tons of edible food was rescued in Ramsey and Washington Counties according to SCORE report data.<sup>24</sup> It is likely these types of food rescue programs will continue but not significantly impact the availability of food scraps for recovery.

### 7.2 Food to Hogs or Cattle (Direct)

A large number of commercial establishments are currently recovering their food scraps utilizing “food to hogs” or “food to cattle” collection and recycling services provided by area farmers. A few of these hog and cattle farmers are part of family businesses and their food scraps recovery services have been established for decades. These food scraps facilities are permitted by the Minnesota Department of Agriculture, Board of Animal Health.

In 2009, the SWMCB, six-county region SCORE reports estimate that about 29,000 tons of food scraps were recovered directly by farmers. The Ramsey and Washington Counties subtotal is estimated at 22,000 tons for 2009.<sup>25</sup>

Food scraps recovery services that collect food scraps to feed livestock must obtain the appropriate permits from the Minnesota Board of Animal Health. “Exempt Materials Permit Holders” can only accept non-meat food by-products. Exempt farmers typically serve industries such as snack food manufacturers, dairies and cereal manufacturers.

“Garbage Feeder Permit Holders” can accept food scraps containing meat. These farmers are licensed to accept food scraps that contain meat or have had contact with meat. These permitted food scraps recyclers typically accept food scraps from grocers, hospitals, restaurants and cafeterias and then are required to heat treat the material before feeding to livestock.

The SWMCB web information service, *Rethink Recycling*, currently lists six food to hogs recycling services available in the region.<sup>26</sup> The University of Minnesota, Technical Assistance Program (MnTAP), also publishes a how-to fact sheet and list of providers of food to hogs recycling services.<sup>27</sup> Although slightly out of date, this MnTAP list identified 13 exempt materials permit holders and 7 garbage feeder permit holders (as of April 2008).

Foth encountered several commercial establishments (e.g., restaurants) that had food to hogs recovery service in the past but discontinued the program. Many of these establishments said that the service just did not work out for them (e.g., collections of the food scraps was not frequent and convenient enough).

It was reported that hog farmers can accept FOG in with the food scraps material.<sup>28</sup> Thus, it is possible for commercial establishments that normally have a separate FOG container to commingle these liquids with food scraps. Foth was not able to document the extent of this

commingling strategy as a means to improve convenience and quality of service to commercial establishments.

It was reported by one large wholesale produce establishment that the hog farmers should not accept fiber-rich fruit and vegetable scraps from such food preparation operations (e.g., pineapple) because of the livestock's difficulty in digesting the material.<sup>29</sup> Foth was not able to independently verify this specification with hog farmers or other wholesale produce establishments.

Beer breweries generate spent grain as a byproduct of their brewing establishments. Local cattle farmers will often take their spent grain waste for free. The brewing grain still has enough feed value that it can be fed directly to cattle without further processing. The spent grains, such as barley malt, hops and yeast, can be fed directly to cattle, used for fertilizer, or composted. Other, larger brewers around the country have also provided their spent brewing grains for ethanol production.

### 7.3 SSOM to Compost

The SWMCB web information service, *Rethink Recycling*, currently lists one facility that is known to accept SSOM for composting on a regular basis.<sup>30</sup> Yard waste composting operations must obtain MPCA and county approvals before accepting food scraps for co-composting. There have been recent SSOM co-composting operations that have started and shut down due to odor problems.

Hennepin County continues to provide support for residential and commercial SSOM collection services for communities and establishments within the County through its subsidization of the tipping fee at its Brooklyn Park transfer station. The County recently re-affirmed this program and charges \$15 per ton for eligible SSOM. Hennepin County reports that nine haulers use the Brooklyn Park transfer station on a regular basis.<sup>31</sup>

Only one commercial establishment in Ramsey or Washington County was found to use the food to composting method for SSOM collections, the MPCA/DNR building. See Appendix N for a summary of this case study recovery program.

In 2009, the SWMCB, six-county region SCORE reports estimate that about 8,000 tons of SSOM were recovered by composting. The Ramsey and Washington Counties subtotal is estimated at 40 tons for 2009.<sup>32</sup>

“Source separated compostable materials” (SSCM) is defined in Minnesota Statutes (see Section 4.2 of this report for full text and additional discussion). This statutory definition not only provides for an operational feedstock quality specification, but outlines the regulatory process for defining non-recyclable paper, defines the required end product quality standard for the resulting compost, and enables the MPCA to determine the marketability of SSCM for composting. This statutory definition of SSCM, together with any proposed legislation related to food waste and food scraps, has relevance to the future of commercial SSOM recovery operations and sourcing strategies. For example, it raises larger questions about the appropriate level of commingling

various organic streams. It also raises several other policy and operational issues. However, these policy and operational discussions are beyond the scope of this supply assessment project.

#### 7.4 Food to Dried Animal Feed Manufacturers

The SWMCB *Rethink Recycling* web site currently lists two companies in the region that are known to collect and accept food by-products for recycling into dried animal feed.<sup>33</sup> In the past, these animal feed manufacturers were reported as not accepting fish or meat scraps. In 2009, the SWMCB, six-county region SCORE reports estimate that about 66,000 tons of food scraps were recovered by dried animal feed manufacturers. The Ramsey and Washington Counties subtotal is estimated at 15,000 tons for 2009.<sup>34</sup>

#### 7.5 Fats, Oils, Grease (FOG)

FOG comes from vegetable and animal fats used in homes, restaurants, commercial, and industrial establishments. There are two categories of FOG. Yellow grease is primarily made up of relatively pure used vegetable oil. This type of grease is a valuable resource collected from restaurants and food processing establishments by rendering companies for reprocessing.<sup>35</sup>

Liquid fats and solid meat products can be used as raw materials in the rendering industry. Many renderers will provide storage barrels and free pickup service.

The same SWMCB web information service, *Rethink Recycling*, lists three companies that recover FOG. These FOG recyclers can produce a variety of products including tallow, protein and biofuel.

Brown FOG is the material collected in grease traps or interceptors. Animal fat and other wastewater solids give it a brown color. Although it is usually viewed as a waste product, brown FOG contains a significant amount of energy. Because brown FOG is essentially biomass, it can be considered a renewable energy resource. Currently, there is no market for brown FOG; facilities generating this material must pay to have it removed and disposed.<sup>36</sup>

MCES has a source control program that requires FOG-generating restaurants and food processing establishments to install grease traps to prevent the material from causing blockages in sewer collection pipes. Brown FOG is collected by private haulers; with the disposal sites scattered throughout the Metropolitan Area.

While traps and interceptors can be effective at limiting discharges to sanitary sewers, the effectiveness is largely dependent on regular maintenance and cleaning. Some FOG will enter the sewage collection system from commercial and residential sources and is processed at the MCES wastewater treatment system together with other municipal wastewater. However, the concentration of FOG in the influent sewage is currently not measured.

The total brown FOG-generating potential from the Ramsey and Washington Counties was estimated based on published data in the literature. It was assumed that some FOG would inadvertently continue to be discharged to the sewer and would be processed through the wastewater treatment and digestion processes. Only a portion of the total FOG generated can

assumed to be collected in interceptors and grease traps, making it available as a feedstock for a biomass-to-energy process.

Typical grease trap pumped waste contains only about 10 to 50 percent grease content. Thus, grease trap waste often has high water content, on the order of 50 to 90 percent. Even with this high water content, it may be acceptable for using such grease as a feedstock for an anaerobic digestion facility. Anaerobic digestion of grease trap waste presents an opportunity to generate revenue from tipping fees as well as the power generated from digester biogas. To the extent that a geographically proximate grease-trap waste disposal option reduces the amount of FOG discharge to the sewer collection system, grease-trap waste digestion may also reduce the cost associated with wastewater collection system blockages.

Depending on market conditions (number of waste generators, proximity of disposal sites, demand for FOG), some processing facilities accept FOG at no cost to the hauler, while other charge haulers tipping fees for disposal.

## 8 Market Conditions

There is a limited amount of economic data on the current pricing of collection and recovery services for various streams of organic materials. This information was obtained through public agency contracts, phone interviews, site visits, hauler interviews and other national resources.

In general, traditional trash haulers are in the very early stages of developing their SSOM collection systems. Most will readily state that they are willing and able to establish separate routes for collection of SSOM materials from commercial businesses. However, the organics capacity and route densities (i.e., sufficient concentration of SSOM accounts) are not yet adequate to make this a competitive, regular service from the smaller retail establishments.

There are several notable exceptions to the above generalization. A smaller group of haulers and organic recycling service providers have developed organics recovery as a specialty, niche service. Results of the phone surveys and site visits clearly indicate that some commercial establishments are either currently recovering organics or are willing to do so if quality collection services are provided. Therefore, a handful of haulers and recovery service providers have very active operations. Although, in general, these operations represent a minority market share of SSOM accounts compared to the total list of eligible food waste generators. Findings by method of recovery are presented in more detail in Subsections 8.1 through 8.3 below, presented in order of significance of market share.

There is moderate to strong competition for SSOM accounts depending on the type of commercial establishment, quality/quantity of organic material generated and recovery method. Quality of organic material is critical to sustaining the recycling system regardless of recovery method and the recycler often provides regular feedback communications about contaminants. Reliability and quality of the food scraps collection service is also critical to sustaining existing recycling systems.

Competition between private companies exists mostly within recovery methods (e.g., hog farmer vs. hog farmer; animal feed manufacturer vs. animal feed manufacturer) because the type of generator and SSOM targeted is similar. However, there is some limited competition between recovery methods (e.g., hog farmers vs. animal feed manufacturers vs. SSOM composting).

The larger the generator, the more direct savings are realized from avoided mixed MSW removal charges. The avoided County Environmental Charges (CEC) and State solid waste management tax (SWMT) is a significant incentive, but minor in comparison to the larger avoided mixed MSW service and disposal charges.

Existing service fees for SSOM collection and recovery are competitively priced compared to mixed MSW disposal charges. For example, some SSOM recycling service costs are 50% to 75% of total mixed MSW removal services, after consideration of all taxes and service charges. Some of the larger commercial establishments with the highest value food by-products (e.g., from bakeries, produce processors, spent grain from breweries) enjoy SSOM collections services at very low prices, even down to “free” removal. Planners of new SSOM programs and facilities should assume that these types of larger commercial customers will not be available without a substantial discount, if not payment, for the product.

## 8.1 Dried Animal Feed Manufacturers

In the bakery goods category of industries (SIC code 205) and retail food stores (SIC code 546), nearly all establishments have recycling programs in place. One of the food scraps to animal feed manufacturers has been established for over 20 years and has developed a large network of bakery goods suppliers. Refer to Figure 5-2 for the recent historical trend of tonnage recovered by animal feed manufacturers.

With the recent entry into the Twin Cities marketplace of a second such dried animal feed manufacturer, there is healthy competition for the premium bakery goods accounts and other establishments that generate grains as a byproduct. The largest of these bakery goods generators are likely not to be available to any new service provider without substantial investment and aggressive competition for accounts. For example, given the current market for secondary bakery material (based on the alternative price of traditional feeds such as corn), a new SSOM provider may actually have to pay the larger bakery goods generators to win these accounts as suppliers for a new AD facility.

The larger bakery industries (SIC code 205) most often dedicate a separate compactor box or enclosed roll-off box for the recyclable organic material. As a general rule, retail bakery good establishments need to place an additional dumpster for the recyclable bakery materials. These are additional costs of recycling that must, in general, be offset by reduced mixed MSW service and costs. The dried animal feed manufacturers have developed sophisticated sourcing programs that involve capital and technical assistance in installing and maintaining the new hardware. In the end, these recovery programs are full recycling systems customized to the needs of each individual business including components such as: separate compactors, hydraulic lifting devices, training and ongoing education.

## 8.2 Food to Hogs and Cattle (Direct)

There is also healthy competition for the clean, separated organic materials from the largest of the wholesale fruit and vegetable preparation establishments such as produce chopping companies (SIC codes 203, 209 and 519). The hog farmers have been established (and formally recognized and permitted by the government agencies) for almost 20 years. Also, some of the food scraps go direct to cattle feeding. See Figures 5-1 and 5-2 for historical trends of overall organics recovery and food to livestock (direct), respectively. The largest produce wholesalers have a high quality, readily recyclable, organic material that is valuable to hog farmers as a direct feed supplement for their livestock. Also, much of the spent grain from beer breweries is also recovered (e.g., direct to cattle farms). Thus, these types of generators have not disposed of their food scraps for years and the systems for recovery are well established.

There has been moderate competition for these types of larger produce wholesalers between alternative hog farm operations. As a general rule, the hog farmers operate their own fleet of trucks and provide the collection services directly to the commercial establishments. One of the larger hog farmers, as a general rule, have adopted a “blue barrel” program brand. Commercial grade, 35-gallon barrels, on industrial caster wheels, are equipped with tight-fitting lids and supplied to customers. “Food Scraps” or “Food Waste Only” instructions are sometimes

stenciled on the barrels. Most hog farmers use barrel liners as an integral part of their program. Often, their collection trucks are modified tandem dump trucks with sealed truck bodies and semi-automatic barrel lifting devices. Also, the trucks have on-board barrel washing hoses to rinse the barrels after emptied. The overall collection program is part of an integrated recycling system.

The prices of food to hogs and food to cattle recycling services have been kept relatively low in comparison to mixed MSW removal prices. Similar to the larger bakery industries, the produce wholesalers/preparation companies most often dedicate a separate compactor box or enclosed roll-off box for the recyclable organic material.

Some retail food stores (e.g., restaurants, grocery stores) are also served by the hog farmers, but the relative market share of these types of establishments recycling their food scraps is much lower compared to wholesale produce operations.

Management of liquids from fruits and vegetables is a regular and ongoing concern that is monitored by the local regulatory sewer agency. Thus, containment and liquids handling/disposal is a critical component of the overall recycling system. In general, the hog farmers are well equipped to handle the high-moisture content fruit and vegetable items.

Food scraps collection services from some hog farmers has not always been regular or responsive enough for some restaurants and grocery stores. Site visits revealed several notable examples of establishments that had a food scraps to hogs recycling program many years ago that has since been discontinued. The most common reason for stopping the recycling program was lack of regular collection and threat of (or actual) odor problems as a result. This is a valuable lesson for any SSOM recovery program that the service levels (e.g., container size, frequency of pick-up, and container washing) must be customized to the individual needs of each establishment and continuously monitored to adjust to changing food scrap volumes.

### 8.3 SSOM to Compost

The development of SSOM composting operations in the Twin Cities Metropolitan Area over the past 15 years has been relatively slow, marked with notable failures. There currently is only minimal amount of commercial collections of SSOM to compost in Ramsey and Washington Counties, and no ongoing residential SSOM collections. The relative market share of SSOM to compost operation is relatively low compared to food to livestock (direct) and food to animal feed manufacturers. Refer to Figure 5-2 for a graphical illustration of the recent trends for each organics recovery method.

Today, there is one dominant composting operation located in the south metro area. Hennepin County has continued to transfer SSOM to this composting facility via the County's Brooklyn Park Transfer Station. A few haulers serving retail restaurants and grocery stores in Minneapolis are taking advantage of the County's subsidized tipping fee at the Brooklyn Park Transfer Station (\$15 per ton of eligible SSOM).

SSOM from outside of Hennepin County are not eligible according to County policy and transfer station operations. Thus, only establishments in Hennepin County (primarily Minneapolis) are

being served by providers of SSOM to compost recycling services. Selected haulers/recyclers interviewed that are providing such services in Minneapolis indicate they would like to provide similar services in St. Paul but they have no convenient, economical outlet to tip the SSOM once collected.

#### 8.4 Non-Recyclable Paper

The composition studies analyzed (see Table 5-3) indicate that about 9 percent of the total MSW (and therefore also commercial MSW) is comprised of non-recyclable paper. This is made up of paper and paperboard packaging products that are not targeted or recycled as source separated commodities. By definition and field observations, much of the non-recyclable paper could be recycled if commercial establishments improved their on-site separation and recycling systems.

The following are examples of the eligible non-recyclable paper included as part of the preliminary organic supply quality specification for the AD facility (see Table 4-1):

- ◆ Plastic coated boxboard,
- ◆ Food contaminated corrugated cardboard

Other non-recyclable paper may include mixed paper and other paper packaging that is either coated, contaminated, or not sorted adequately from mixed MSW or other recyclables to be marketable.

The competing uses for non-recyclable paper include: fiber recycling as a low-value, mixed paper grade; bulking agent for compost; or as one of several components in recycled composite products. Therefore, the market demand from these competing uses will be cyclical and related to the price swings of other recyclable paper commodities (e.g., newspapers, corrugate cardboard, etc.).

#### 8.5 FOG Recovery Systems

Rendering and other recovery of cooking oils and grease (plus other animal by-products), is one of the oldest recycling industries. Generally, renderers have been in existence for decades such that the current recycling systems are modernized versions of much older technologies. In addition, with the advent of recent FOG to biodiesel technologies, there is a new, value-added product resulting from these organic materials.

There are multiple FOG recovery service providers serving the Twin Cities Metropolitan Area. It is relatively easy to drive urban alleys along commercial strips and scan for outside FOG containers at the back of restaurants. (Note: Some establishments have indoor storage containers and therefore may not have outside indications of such FOG recovery systems that are visible from the alley.) One FOG recovery service provider stated that at least 95% of eligible restaurants and other establishments with kitchens have FOG collection systems.

The FOG collection and recovery technology has been largely driven by regulations of local sewer agencies prohibiting larger volumes of this material from entering into the municipal wastewater treatment systems. The regional sewer agency in the Twin Cities, Metropolitan

Council Environmental Services (MCES), has strict standards for how much FOG can be discharged into the Metropolitan Wastewater Treatment System (MWTS). Also, the MCES imposes sewer availability charges (SAC) based on strength and volume of wastewater discharges such that commercial establishments have strong economic incentive to avoid sewerage their FOG materials.

FOG collection and recovery companies have developed into full service operations. Containers are provided and collection schedules developed that are customized to the individual needs of each commercial establishment. “Yellow grease” has a higher value and is collected separate from “brown grease”.

Recent developments in small and medium – scale FOG to biodiesel options have allowed FOG recovery service providers to generate additional revenue from fuel sales.

## 9 Discussion

The literature review, desktop analysis, phone interviews and site visits indicate that a substantial portion of food waste and other targeted organic material still remains within the mixed MSW stream. This commercial food waste, plus a limited amount of other non-paper organics, is estimated at 26,000 tons per year from the two Counties. About 22,000 tons per year non-recyclable paper is also disposed and disposed as mixed MSW.

From the selected commercial generators evaluated (i.e., establishments expected to have mixed MSW rich in food wastes), most of the organic wastes are disposed from retail grocery stores (20 percent) and restaurants (51 percent) categories.

### 9.1 Supply Specification

It is important to note that, as a new commodity, definitions and specifications for food scraps and SSOM will vary throughout the industry. The definition of recoverable SSOM and “food scraps” is different between:

- ◆ Method of recovery technology (e.g., food to hogs vs. food to animal feed manufactures).
- ◆ Companies within the same recovery technology category (e.g., each hauler may produce a slightly different list of acceptable vs. unacceptable organic items.)
- ◆ Route drivers within the same hauling company (e.g., enforcement standards for levels of allowable contaminants.)

The preliminary AD supply specification developed for this assessment (see Section 4.1) should be a helpful framework for continued planning and development work. A final version of such a specification may best be driven more by the specific AD technology and vendor ultimately selected for any AD facility. For more information about supply specification differences in technology options, refer to Foth June 2009 feasibility study conducted for R/W RRP and SPPA.

The preliminary AD specification recommended for this assessment (see Section 4.1) has relatively strict limits of the number and types of materials that may be accepted. The specification was proposed in part to be suitable for more AD technologies and vendors. On the other hand, the strict list of materials in the preliminary specification also has the effect of significantly reducing the quantity of potential digester supplies. Further discussion is warranted to decide on the optimum balance between quantity vs. quality of the feedstock supply as part of continuing planning and design of the proposed AD facility.

### 9.2 Current Recovery

There are mature, public and private systems for recovering food scraps and other forms of SSOM in the Twin Cities Metropolitan Area. Private companies have developed competitive systems, including extensive sourcing programs, for securing food scraps supplies, especially larger suppliers of pre-consumer material. County staff monitor these alternative reuse and recovery programs. The SCORE-reported totals for the six-county, SWMCB region was over 130,000 tons in 2008.

The food to hogs and food to animal feed manufacturers have a very well established foothold into the SSOM marketplace. For example, this assessment estimates that over 90 percent of the available organic material from bakeries, baked goods manufacturers, and other grain-related industries is currently recovered through food to animal feed manufacturers. Also, many of the largest generators of produce food scrap are already recovered by hog farmers. Therefore, these market segment are largely not available for new SSOM recovery without a substantial investment to undercut current market-based service prices.

Food rescue (i.e., “food-to-people”) programs are actively supported by Ramsey and Washington Counties. The food-to-people charities (e.g., Second Harvest Heartland) provide a wide range of resource reduction and rescue services. This rescued food helps these charities provide another important source of edible food for people in need. County staff estimate that about 811 tons per year of edible food was rescued in 2009 through these food banks and other services. This is material that would otherwise be discarded and potentially disposed as mixed MSW.

### 9.3 Material Still Disposed into Mixed MSW

Restaurants as a category are the largest potential suppliers of SSOM. This is a significant challenge given the wide diversity and decentralized ownership / management structure. There is risk of contamination of the SSOM with prohibited materials that must be anticipated. Also, small, frequent loads from multiple generators must be serviced on a very regular schedule. Yet, given the significant volume of eligible organic material disposed, this sector should be carefully considered in any new SSOM recovery initiative.

### 9.4 Barriers to Increased Recovery

The following barriers to increase organics recovery were identified throughout the process of this assessment. These are not placed in any significant order. The group most directly affected by each barrier is identified in parenthesis.

- ◆ Price of any new organics collection service (to the commercial establishments).
- ◆ Lack route density. Not enough commercial SSOM collection stops (to the haulers).
- ◆ Overall, net costs vs. benefits of any new collection system. For example, there may not be a direct relationship to reduction in trash removal costs (to the commercial establishments).
- ◆ Capital costs of additional dumpsters, trucks, fleet space, etc. (to the haulers) .
- ◆ Capital costs of additional SSOM processing capacity (to the recovery system managers, developers and vendors).
- ◆ Perception that food scraps will smell more than when mixed in with MSW (to the commercial establishments, their customers, and the haulers).

- ◆ Space for added container for SSOM (to the commercial establishments and the haulers).
- ◆ Local screening ordinances regulating screening enclosures for recycling and trash dumpsters (to the commercial establishments and the haulers).
- ◆ Costs of education and training for staff to learn how to separate SSOM. High turnover in kitchen staff (to the commercial establishments and the haulers).
- ◆ Contamination: both perceived and real (to the commercial establishments, the haulers and the recovery service providers).
- ◆ Processing capacity. Not enough locations to take/tip SSOM (to the haulers).
- ◆ Lack of adequate competition for SSOM collection service (to the commercial establishments).
- ◆ No standardized method of collection. Question of commingling with other organics is still partially unanswered (to the commercial establishments).
- ◆ Lack of upper management support (at commercial establishments).
- ◆ Lack of awareness of options for collection equipment, such as bins, containers, wheeled carts, etc. (to the commercial establishments).
- ◆ Lack of awareness of options for recovery systems (to the system managers/developers and regulators).
- ◆ Perceived lack of good, easy to use information for sorting instructions (to the haulers and commercial establishments).
- ◆ Lack of clear, enforceable, uniform mandates. Voluntary initiatives alone won't be adequate to generate sufficient volumes and critical mass of stops (to all parties.)
- ◆ Unequitable subsidies, both perceived and real (to unsubsidized recovery service providers).

## 9.5 Contamination and Feedstock Quality Specifications

Contamination can be a serious issue for all parties. The difficulty of this constant challenge will depend in part on the final feedstock supply specification. When deciding on a final feedstock quality specification, there will be a trade-off between two competing objectives:

1. Maximizing the throughput of a facility and maximizing compost product output (i.e., achieving economies of scale by pushing as many tons as possible through the plant).
2. Maximizing the biogas yield and assuring consistent feedstock and final compost product quality control.

In the end, the new AD facility planners, developers and technology vendors will need to balance these two competing objectives to achieve the optimum receiving rate and feedstock quality specification.

It is likely that the front end of any AD system will include substantial amounts of mechanical and manual sorting before size reduction. The level of investment in this pre-processing component of any facility will be a major determinant in the allowable feedstock quality.

Post-consumer SSOM collection systems (e.g., collections from plate waste, special events, etc.) will need to anticipate significant contamination, especially over the long-term. These programs must plan to invest a portion of their operating budgets on customer education utilizing a comprehensive set of outreach and instructional tools (e.g., posters, signs, labels, color coded bins/containers, etc.). Even with the best of education programs, a certain amount of contamination will still occur with most post-consumer SSOM programs.

## 9.6 Economics

### 9.6.1 Opportunities for Rightsizing Trash Service

One of the primary economic incentives for increased recycling such as SSOM is the opportunity to save money on trash removal costs by rightsizing (e.g., downsizing) levels of trash service. This opportunity is not always an explicit aspect of commercial trash hauling contracts, especially when recycling and trash service are provided by two separate companies.

Commercial establishments do not always take advantage of rightsizing opportunities. This requires a conscious effort to monitor (e.g., recorded data) actual trash disposal amounts. Such a trash log could include regular observations of cubic yards of trash set out (e.g., number of bags of trash set into the dumpster); dumpster fullness levels just before being emptied by the hauler; and frequency of actual collections or “pulls” by the hauler. This data can then be used to order changes in level of trash (or recycling) service.

This extra effort to monitor trash amounts is not a high priority for most commercial establishments. This concept of downsizing trash service to reflect the increased volumes of recycling is great in theory as a financial incentive. However, only a fraction of commercial establishments will likely take advantage of this downsizing cost savings opportunity.

### 9.6.2 Commingling of Food Scraps and Non-Recyclable Paper

The preliminary AD supply specification was purposefully restrictive to focus on the more valuable, higher biogas-yielding materials (i.e., food scraps) at this stage of planning and research. The inclusion of non-recyclable paper, however, is proposed to promote commingled collection with food scraps. This commingling strategy will help increase the volume per stop, improve economies of scale during collection and processing, and, therefore, help improve overall program economics. In addition, commingling of these two materials will help with odor control during: storage at the commercial establishment; collection; and tipping/stockpiling before processing at any recovery operation. The paper can help absorb some of the moisture and odor from the food scraps.

These two major categories together comprise about 20 percent of mixed MSW. Some commercial establishments that capture a substantial amount of SSOM have been able to implement a corresponding downsizing in trash collection service levels (i.e., frequency of collection, dumpster size, or both). One establishment was able to totally eliminate trash service, but this appears to be an anomaly and not the norm.

### **9.6.3 Pricing of Alternative Organics Recycling Services**

The phone interviews and site visits revealed a variety of prices for recycling services. The food to hogs programs generally charge on a “price per barrel” unit basis. The government agencies served under the State of Minnesota cooperative purchase contract pay \$4 per barrel.

Many commercial bakery goods establishments receive regular “dumpster” collection service from food to animal feed manufacturers. These bakery food scraps recycling collection service standards are similar to collection of trash. Limited, anecdotal data indicate that such commercial establishments are charged on a “per pull” basis (i.e., based on the frequency of collections per week). Animal feed manufacturers may also charge a flat recycling fee. Fuel surcharges are also common, just as they are with regular trash and recycling hauling service contracts. One small retail bakery establishment reported recent, total monthly charges of about \$166 per month including all fees, for an 8 – yard dumpster service collected 7 to 9 times per month. (No county environmental charge or state solid waste management tax is applied because this is a recycling service exempt from such charges or taxes.) This is a very competitive rate compared to normal trash service, in part because of the required local charges and state tax on mixed MSW service.

The economics of the two largest recovery alternatives (food to hogs and food to animal feed manufacturers) is based in part on the competing costs of traditional livestock feed. For example, the food to animal feed manufacturers base the price of their dried animal feed product on the competing cost of traditional feed (e.g., corn). The most important barrier to expansion of their recovery system is lack of a readily available supply of clean food scraps. Their end product produces enough revenue that they can offer significant recycling collection service discounts to compete for this supply. In some cases of large bakery goods generators, they can offer “free” recycling service.

Their ability to source bakery food scraps is partially dependent on the swings in the corn feed prices as an agricultural commodity. It is likely that animal feed manufacturing may be the “highest and best use” of bakery food scraps as indicated by these significant collection price discounts compared to use of such bakery scraps for compost or future anaerobic digestion. Therefore, the least risk strategy for planning purposes at this stage may be to assume these higher value bakery food scraps are already committed to animal feed manufacturers and not economically available for any new or increased recovery program such as AD.

Animal feed manufacturers, as a general rule, have their own fleet of front-end loader and roll-off trucks to provide collection services directly to their supplier customers. However, these manufacturers may also accept merchant loads of eligible bakery scraps from other private haulers. The economics of this recovery option are also reflected in the tipping fees charged to

such merchant haulers by the animal feed manufacturing companies at their plants. Tipping fees are private, business-to-business price transactions and therefore are not generally reported. However, it is known that these prices are as high as \$39 per ton for lower value, “mixed” loads and as low as “free” for higher value, large volume loads of straight bakery good scraps. Tipping fees at SSOM composting operations in the region have been reported at \$40 to \$45 per ton.

#### **9.6.4 Avoiding the CEC + SWMT**

Like other forms of recycling, food scraps recycling services benefit from being exempted from the County Environmental Charge (CEC) and state solid waste management tax (SWMT). These CEC and SWMT policies are intended to provide an additional financial incentive to help increase recycling.

The CEC and SWMT are both based on the total price for mixed waste management services charged by the hauler to their customer. The CEC is currently set by County policy at a flat 37.5 percent in Washington County and 53 percent in Ramsey County for commercial establishments. The SWMT is at 17 percent. Thus the total of the CEC plus SWMT in Ramsey County is 70 percent and in Washington County is 54.5 percent, significant economic incentives to help encourage recycling.

Foth staff interviewed seven private haulers. One of the questions asked was about the avoided CEC and SWMT as a financial incentive to encourage more SSOM recycling. Most haulers said that it was of minor importance as an additional financial incentive. A few noted that when the new CEC / SWMT systems were first imposed by the Counties, there was a lot more attention paid to these avoided costs. But now, the CEC + SWMT are routinely accepted as a cost of business and are charged as a direct pass through to customers. Most regular trash haulers do not “sell” new or proposed recycling services based on the avoided CEC + SWMT. These savings are incidental to other financial incentives and customer motivations to get commercial establishments to start a new recycling program such as SSOM recovery.

#### **9.6.5 Relationship to the Broader Market Conditions of the Integrated Waste Management System**

Discussion of alternative AD facility ownership, operations, and supply contracts is beyond the scope of this supply assessment. Nonetheless, it is safe to assume that the mixed MSW tipping fees in the region can serve as a marketplace benchmark for other competitive recovery systems. That is, the mixed MSW tipping fees at regional landfills, transfer stations and resource recovery facilities provide a basis for discussion about the current market conditions for SSOM recovery and any new AD facility.

Current tipping fees for mixed MSW disposal facilities in the region ranges from the low \$40's to mid \$60's per ton. In its simplest form of analysis (i.e., without other financial incentives or options), the SSOM tipping fees for any new AD facility should be planned to be no more than the comparative tipping fees at these mixed MSW facilities. Other forms of financial incentives can be explored to attract more SSOM to a future AD facility, but the posted tip fee will still be the primary indicator of free market competitiveness of this option, at least from the merchant hauler's perspective.

### **9.6.6 Overall Economics**

The overall system economics for any new SSOM recovery service must be economically stable in the long-term. Temporary subsidies may not provide enough long-term stability. One threat is the anticipated price swings of agricultural feed commodities (e.g., corn).

Some of the existing SSOM recovery programs here in the Twin Cities region and around the country are intentionally discounted between 25 to 75 percent of the competing price of mixed MSW removal. These discounts may reflect recycling services to the more desirable food scraps accounts and may not be representative of the lower-value, food scraps generators (restaurants, retail grocery stores).

One of the haulers interviewed contended discount at new AD facility would have to be significant (e.g., "\$20 per ton instead of \$60 at Newport"). This is just one opinion from a vested interest. Also, during the planning of any new recovery facility, the overall system economics (e.g., revenue from sale of energy; capital; operating / maintenance costs) must be considered as schedules are developed for collection service prices and tipping fees. While tipping fees at "competing" facilities must be considered, this factor alone should not drive recycling pricing decisions.

## **9.7 Seasonal Variations**

The Foth June 2009 feasibility study for R/W RRP addressed the season fluctuation of in SSOM from the residential sector and from yard waste. This subsection addresses additional sources of seasonal variations in SSOM from commercial establishments.

In general, most of the commercial establishments do not experience significant season variation in generation of food waste and non-recyclable paper. Some respondents to this question contend that the economic recession has had a more significant influence on organic waste volumes than seasonal differences.

One notable exception to this generalization is the significant drop in overall waste generation during summer break from the educational institutions. Most colleges, universities, secondary and elementary schools still have summer breaks as part of their regular annual curriculum calendar. However, Summer school and 12-month formats are more common today than in the past. But these year round schedules are still the exceptions to the approximately 9 – month format used by most schools (Labor Day through Memorial Day). On the positive side, these summer breaks are great opportunities for new program planning, equipment installation / rollout, and staff training. Thus, the summer vacations can actually help provide the down time needed for new program planning and implementation.

Other sources of seasonal fluctuation in organic waste will come from locally grown produce. The sustainable and community agriculture movement continues to gain market share, but is still a relatively small fraction of total produce sales in Minnesota.

## 9.8 Regulatory, Legislative and Other Policy Issues

There are several regulatory, legislative and other policy issues that may at least indirectly affect the ability of any new AD facility to economically source adequate supplies of commercial SSOM. Analysis of such policy issues were out of scope for this assessment. Therefore, the key regulatory and policy questions are framed as briefly as possible below, without any attempt to analyze or further discuss these issues. The focus is on issues that may affect AD facilities in general and supplies of commercial SSOM in particular.

- ◆ When will MPCA adopt new compost rules addressing the technical aspects of composting food scraps and co-composting with yard waste? What will the technical content of these rules be? How will these rules impact the related composting and SSOM handling requirements for AD facilities? (E.g., how will odor control and management be addressed in the new MPCA rules?)
- ◆ What processes will MPCA choose to permit any proposed AD facility? (MPCA does not have explicit solid waste rules that specifically address AD of food scraps and other SSOM.) What timeframe for MPCA permitting can be anticipated?
- ◆ Will the ongoing legislative discussions about the relative position of food waste recovery in the waste management hierarchy have any implications for current and future SSOM recovery programs?
- ◆ What forms of financial and regulatory incentives will R/W RRP consider to encourage implementation of new SSOM recovery programs? How will these incentives affect other, existing food scraps and SSOM recovery investments? What policy options are available to equitably raise the level of all recovery options without favoring one method over another? Should Ramsey and Washington Counties consider policy options such as:
  - ▶ Tipping fee subsidies? Other forms of financial support for AD?
  - ▶ Mandated SSOM collection service requirements?
  - ▶ Mandatory source separation requirements for designated organic materials?
  - ▶ Prohibiting disposal of specified types of SSOM into mixed MSW?

## 9.9 Education and Outreach

R/W RRP has and long history of education and outreach programs to promote food rescue and food scraps recovery. See Appendix P for a summary of recent activities as excerpted from the most recent R/W RRP annual report by staff.

R/W RRP also have an existing set of public education, awareness and training tools to help promote new food scraps recovery programs.<sup>37</sup> SWMCB also has a series of informational resources.<sup>38</sup> Hennepin County has also continued to expand its own food waste/SSOM public education and technical assistance programs.<sup>39</sup>

In the near future (e.g., the next one to three years), the counties will likely continue to have an increasing role in developing and disseminating this type of public education information. Ramsey and Washington Counties may also elect to provide direct technical assistance to commercial establishment about SSOM recovery similar to the services provided in the past by JLT & Associates.

A basic, minimum role for the Ramsey and Washington Counties may be assumed for this type of public education regardless of any future policy decisions about AD facility ownership, operations and supply structure. However, the level of this county – provided public education effort will be affected by the larger context of any new public – private relationships established in developing a new AD system and SSOM sourcing program. R/W RRP could begin to plan for increased education and awareness investments without specific commitments or task assignments.

#### 9.10 Limitations of the Data

Obtaining reliable organics waste generation and recovery data is challenging. Private companies especially are reluctant to spend the time to provide the data requested. Food and organics recovery rates are easier to obtain than comparable tonnage data on mixed MSW as disposed. This is because there may be separate providers providing the different services and even different dock locations for the organics dumpster vs. trash dumpster or compactor. This assessment indicates that alternative methods will be needed to improve data quality and response rates if further accuracy is needed to help manage risks in future AD facility planning and design steps.

This assessment attempted to correlate food waste discards with employment statistics based on published benchmark disposal rates. This assessment thus provides a crude estimate of the total amount of food waste disposal for planning and discussion purposes. These numbers are not yet suitable for facility design or engineering purposes.

There is no accurate means to predict food waste disposal on the basis of sales, employment or other readily measurable statistic. This assessment used employee counts only as published by D&B, in part because the benchmark disposal rates from CIWMB were readily available. A more sophisticated approach could also be developed using customized units of population for each type of establishment by category or subcategory. For example, food waste disposal could also be estimated using the following types benchmark disposal rates from other literature sources:

<u>Category</u>	<u>Alternative Units</u>
♦ In-patient hospitals, nursing homes and similar facilities	Bed counts
♦ Correctional facilities	Inmates
♦ Restaurants	Sales
♦ Educational institutions	Number of meals served

While this level of analysis may be possible, without field verification the accuracy compared to actual disposal rates and SSOM capture rates may still be uncertain.

Foth did not interview the existing, key SSOM recovery providers with collection operations in Ramsey and Washington Counties. These companies may be willing to be interviewed by Foth if they are not threatened by a potential new AD recovery program and their data can remain confidential.

Foth and County staff should continue to refine the organic waste (and especially food waste) disposal rates from continued survey work and other studies.

## 10 Conclusions

Organic materials that are targeted for potential recovery by a new AD facility include:

- ◆ Food scraps;
- ◆ Non-recyclable paper; and
- ◆ FOG.

These items are the primary categories of materials targeted for AD recovery during this planning stage and for purposes of this supply assessment. Other materials may be included later and can be added as part of any future technology and vendor selection process.

There is an estimated 43,000 tons of organics still disposed in commercial MSW from Ramsey and Washington Counties that are available for recovery based on regional MSW tons disposed and composition data. About 168,000 tons are available for recovery from the entire six-county SWMCB region based on similar MSW tonnage estimates and the same composition data.

Current food rescue and organics materials recovery programs have existed for many years. Food scraps, SSOM and FOG have been recovered by at least four types of systems:

- ◆ Food to hogs and cattle (direct)
- ◆ SSOM to compost
- ◆ Food to animal feed manufacturers
- ◆ FOG to rendering or other recovery (e.g., biodiesel)

Current food rescue and food scraps/SSOM recovery programs are estimated to collect 39,000 tons in Ramsey and Washington Counties in 2009. About 102,000 tons were collected from within the six-county SWMCB region as a whole in 2009. Higher volume generators with higher-value food scraps are, for the most part, already recycling their materials. For example, most industrial bakeries and produce wholesalers have had separate collection systems in place for many years. Unless the tipping fees and collection costs are subsidized on a long – term basis, it is unlikely that a new SSOM recovery program will be able to economically compete for these larger accounts on avoided mixed MSW costs alone. The existing food scraps and SSOM service providers are able to price their organics removal services differently and often lower when compared to prices for mixed MSW services.

It may be easier to attract supplies from commercial establishments and their haulers if feedstock sorting, storage, collection and hauling elements of any new system can be compatible with existing recovery programs. The exception to this general rule may be to offer more commingling of materials. For example, new organics sourcing systems may have more success if food waste can be commingled with non-recyclable paper and/or FOG.

Another means of assessing the priority organic discards is to base estimates on disposal rates of food scraps as reported in relevant literature. Using this alternative method, this assessment estimates about 45,000 tons of food waste is disposed each year from commercial establishments. The top six SIC categories of food waste generators in Ramsey and Washington Counties are (in order of volume disposed):

◆ Restaurants and bars	51%	22,800 tons per year
◆ Grocery and other food stores	20%	9,100 tons per year
◆ Educational services	9%	3,900 tons per year
◆ Wholesale trade – non-durable goods	7%	3,200 tons per year
◆ Public administration (including jails, etc.)	5%	2,400 tons per year
◆ <u>Health services</u>	4%	1,600 tons per year
<b>Subtotal from top six categories</b>	<b>96%</b>	<b>43,000 tons per year</b>

If a new or expanded recovery initiative is targeted at commercial SSOM for purposes of supplying an AD facility, restaurants, bars and grocery stores should be considered. Such retail establishments are where most of the higher-value food scraps can still be secured as a new supply of SSOM.

If such retail establishments are targeted, as a starting point, pre-consumer trim waste handled by in-house staff from the “back of the store” could lead the implementation because it will be easier to keep the SSOM clean and free of objectionable contaminants (e.g., metal, glass, non-biodegradable plastic, etc.). Post-consumer, customer plate waste from the “front of the store” can be added later if an establishment is prepared to provide continuous and high-quality educational information as part of an integrated SSOM collection system.

Many of the large government agencies and educational institutions are currently recovering their food scraps. Such establishments with large kitchens and cafeterias that are not currently recovering their food scraps could be a secondary target for additional SSOM recovery.

## 11 References

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<sup>1</sup> Foth report to R/W RRP and SPPA Source Separated Organic Material Anaerobic Digester Feasibility Study (June 2009).

<sup>2</sup> Foth project memos to County staff submitted in the second half of 2009 included:

“CII Food Waste Generators List: Status Report of Findings To-Date and Recommended Next Steps” (September 21, 2009)

“CII Food Waste Generators Survey” (October 20, 2009)

“Results To-Date: CII Food Waste Generators Survey / Site Visits” (December 2, 2009)

<sup>3</sup> Foth memo to County staff “Preliminary Working Draft of the AD Organics Waste Supply Specification” (February 24, 2010).

<sup>4</sup> County staff e-mail to Foth and JL Taitt Associates (March 4, 2010).

<sup>5</sup> SCORE data as reported by Counties to MPCA as assembled, published and downloaded (data entered) from MPCA’s web page: <http://www.pca.state.mn.us/oea/lc/score07.cfm#data>

<sup>6</sup> NAICS codes: The official 2007 U.S. NAICS Manual, includes definitions for each industry, background information, tables showing changes between 2002 and 2007, and a comprehensive index. The official 2007 U.S. NAICS Manual is available in print and on CD\_ROM from the National Technical Information Service (NTIS) at (800) 553-6847 or (703) 605-6000, or through the [NTIS](#) Web site. Previous versions of the NAICS Manual are available.”<sup>6</sup>

<sup>7</sup> California Integrated Waste Management Board (CIWMB) “California Statewide Waste Characterization Study” conducted by Cascadia Consulting Group, et. al., published originally in December 1999. Later this commercial food waste disposal rates were again published by CIWMB through its Solid Waste Characterization Database under the title of Business Group Waste Compositions (February 2000).

<sup>8</sup> The same food waste disposal rates are still reported today by CIWMB, and its predecessor program, “CalRecycle” as posted on the web page ““Innovations” Case Studies: Food Waste Recovery: <http://www.calrecycle.ca.gov/LGCentral/Library/innovations/FoodWaste/Program.htm> (as last updated on December 23, 2009). Therefore, this CIWMB commercial food waste disposal rate data will henceforth be referred to in this assessment as the “CIWMB 2000” study.

<sup>9</sup> 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).

<sup>10</sup> Cornell University, Biological & Environmental Engineering web page tool: “Turning Waste Into Energy” at links:

Summary of the Cornell University “Food Waste Estimator”:  
[http://wastetoenergy.bee.cornell.edu/HTML/SDSS\\_2.htm](http://wastetoenergy.bee.cornell.edu/HTML/SDSS_2.htm)

Food Waste Estimator calculator:  
<http://wastetoenergy.bee.cornell.edu/estimator/calculator.aspx>

<sup>11</sup> U.S. EPA ““Food Waste Management Cost Calculator” (version 1.0; September 2009):  
<http://www.epa.gov/epawaste/conserves/materials/organics/food/tools/index.htm> produced by Industrial Economics, Inc.

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- <sup>12</sup> Luboff, C. and May, K. .Measuring Generation of Food Residuals.. *Biocycle*. Vol. 36, No. 7. July 1995. p. 66-68.
- <sup>13</sup> Newell, T., et.al. .Commercial Food Waste From Restaurants and Grocery Stores.. *Resource Recycling*, February 1993. p.56-61
- <sup>14</sup> Cascadia Consulting Group for SCS Engineers “Waste Characterization Study for Los Angeles County Department of Public Works” (2007)
- <sup>15</sup> City of San Jose request for proposals (January 2010) [for biofuel vendors DFK TO INSERT MORE PRECISE CITATION]
- <sup>16</sup> Report by JLT and Associates, (May 10, 2010) “An Integrated Organic Waste Management System: From the Perspective of Commercial Waste Generators”. This chart of “Organic Waste Management End Use Market Options” is an updated version of an earlier report by JLT and Associates, “Washington County Organic Waste Management Strategies in Grocery Stores: Final Report for the Solid Waste Management Coordinating Board” (December 2003); Table 2, Page 5.  
[http://www.co.ramsey.mn.us/NR/rdonlyres/DA317036-71C1-42BC-909E-3F56FD19D1D3/6555/Grocery\\_Report\\_2003.pdf](http://www.co.ramsey.mn.us/NR/rdonlyres/DA317036-71C1-42BC-909E-3F56FD19D1D3/6555/Grocery_Report_2003.pdf)
- <sup>17</sup> Ramsey County’s yard waste and brush tonnage estimates as produced by John Springman, Ramsey County Public Health (May 11, 2009).
- <sup>18</sup> CIWMB (2000) op. cit.
- <sup>19</sup> Jacob, Mark (1993). “Classifying the Supermarket Food Waste Stream”, *BioCycle*, February 1993. 46.
- <sup>20</sup> Cascadia’s CIWMB “California Statewide Waste Characterization Study” (December 1999).
- <sup>21</sup> MPCA and MGA, “2009 Survey of Minnesota Grocers” as part of a larger environmental practices inventory (August 2009).
- <sup>22</sup> Report by JLT and Associates (December 2003), Table 1, Page 13.
- <sup>23</sup> Massachusetts DEP study by Draper/Lennon, *ibid.* (September 19, 2002)
- <sup>24</sup> Ramsey County staff, personal communication with Foth staff.
- <sup>25</sup> Ramsey County staff, personal communication with Foth staff.
- <sup>26</sup> *Rethink Recycling* web page produced by the SWMCB: “Food Waste Recovery” including the “Recovery and Disposal Sites” tab: [http://www.rethinkrecycling.com/businesses/waste-management-guide/materials-name/food#tab2\\_content](http://www.rethinkrecycling.com/businesses/waste-management-guide/materials-name/food#tab2_content)
- <sup>27</sup> MnTAP fact sheet #25: “Livestock Producers Accepting Food By-Products” (revised April 2008): <http://www.mntap.umn.edu/FOOD/25RL.LivestockProducers.pdf> and the general how-to fact sheet: “Feeding Food Processing By-Products to Livestock”: <http://www.mntap.umn.edu/FOOD/67-FeedingFood.htm>
- <sup>28</sup> Jodi Taitt (JLT Associates), personal communications with Foth staff.
- <sup>29</sup> Produce wholesaler, personal communication with Foth staff.
- <sup>30</sup> SWMCB *Rethink Recycling*, op. cit.
- <sup>31</sup> Hennepin County staff, personal communication with Foth staff.

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<sup>32</sup> Ramsey County staff, personal communication with Foth staff.

<sup>33</sup> SWMCB *Rethink Recycling*, op. cit.

<sup>34</sup> Ramsey County staff, personal communication with Foth staff.

<sup>35</sup> CH2M Hill, “*Biomass-To-Energy Technology Evaluation*” for the City of San Jose Environmental Services Department (December 2007).

<sup>36</sup> CH2M Hill, “*Biomass-To-Energy Technology Evaluation*” for the City of San Jose Environmental Services Department (December 2007).

<sup>37</sup> Ramsey County has produced a series of food rescue and food scraps recovery fact sheets as published on the R/W RRP web sites:

Food waste to “Livestock Feeding” - [http://www.co.ramsey.mn.us/recovery/livestock\\_feeding.htm](http://www.co.ramsey.mn.us/recovery/livestock_feeding.htm)

“Food Donation” - [http://www.co.ramsey.mn.us/recovery/food\\_donation.htm](http://www.co.ramsey.mn.us/recovery/food_donation.htm)

Food waste “Composting” - [http://www.co.ramsey.mn.us/recovery/other\\_options.htm](http://www.co.ramsey.mn.us/recovery/other_options.htm)

“Anaerobic Digestions” (including various elements of the Foth June 2009 feasibility study) - [http://www.co.ramsey.mn.us/recovery/anaerobic\\_digestion.htm](http://www.co.ramsey.mn.us/recovery/anaerobic_digestion.htm)

“Food Waste Management Resources” series of fact sheets:  
[http://www.co.ramsey.mn.us/recovery/resources\\_for\\_managing\\_food\\_waste.htm](http://www.co.ramsey.mn.us/recovery/resources_for_managing_food_waste.htm):

“Food Waste Management Options in the Twin Cities Metropolitan Area” - [http://www.co.ramsey.mn.us/NR/rdonlyres/DA317036-71C1-42BC-909E-3F56FD19D1D3/12452/food\\_waste\\_mgmt\\_options\\_in\\_the\\_twin\\_cities\\_metro\\_a.pdf](http://www.co.ramsey.mn.us/NR/rdonlyres/DA317036-71C1-42BC-909E-3F56FD19D1D3/12452/food_waste_mgmt_options_in_the_twin_cities_metro_a.pdf)

“How to Manage Food Waste Separately from Garbage” - [http://www.co.ramsey.mn.us/NR/rdonlyres/DA317036-71C1-42BC-909E-3F56FD19D1D3/10037/How\\_To\\_Manage\\_Food\\_Waste\\_2006.pdf](http://www.co.ramsey.mn.us/NR/rdonlyres/DA317036-71C1-42BC-909E-3F56FD19D1D3/10037/How_To_Manage_Food_Waste_2006.pdf)

“Washington County Organic Waste Management Strategies in Grocery Stores: Final Report for the Solid Waste Management Coordinating Board” (December 2003) by JLT and Associates - [http://www.co.ramsey.mn.us/NR/rdonlyres/DA317036-71C1-42BC-909E-3F56FD19D1D3/6555/Grocery\\_Report\\_2003.pdf](http://www.co.ramsey.mn.us/NR/rdonlyres/DA317036-71C1-42BC-909E-3F56FD19D1D3/6555/Grocery_Report_2003.pdf)

“Businesses Save Money by Managing Food Waste Through Livestock Feeding”:  
[http://www.co.ramsey.mn.us/NR/rdonlyres/DA317036-71C1-42BC-909E-3F56FD19D1D3/6556/Businesses\\_Save\\_Money\\_Livestock1.pdf](http://www.co.ramsey.mn.us/NR/rdonlyres/DA317036-71C1-42BC-909E-3F56FD19D1D3/6556/Businesses_Save_Money_Livestock1.pdf)

<sup>38</sup> SWMCB *Rethink Recycling* informational campaign, including fact sheets and *Recycling Guides*: as published on the SWMCB web sites:

“Food Waste” - <http://www.rethinkrecycling.com/residents/throw-buy/materials-name/food-waste>

“Food” - <http://www.rethinkrecycling.com/businesses/waste-management-guide/materials-name/food>

Food rescue and food scraps “Recycling and Disposal Sites” (20 facilities/programs listed) - [http://www.rethinkrecycling.com/businesses/waste-management-guide/materials-name/food#tab2\\_content](http://www.rethinkrecycling.com/businesses/waste-management-guide/materials-name/food#tab2_content)

“Grease and Cooking Oil” - <http://www.rethinkrecycling.com/businesses/waste-management-guide/materials-name/grease-cooking-oil>

Grease and Cooking Oil: “Recycling and Disposal Sites (3 facilities listed) – [http://www.rethinkrecycling.com/businesses/waste-management-guide/materials-name/grease-cooking-oil#tab2\\_content](http://www.rethinkrecycling.com/businesses/waste-management-guide/materials-name/grease-cooking-oil#tab2_content)

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<sup>39</sup> Hennepin County’s organics recycling public education web pages:

“Organics Recycling” general information and introduction to SSOM collection for composting:  
<http://hennepin.us/portal/site/HennepinUS/menuitem.b1ab75471750e40fa01dfb47ccf06498/?vgnextoid=de d9c90a4eab4210VgnVCM10000049114689RCRD>

“Organics Recycling Program Resources”:  
<http://hennepin.us/portal/site/HennepinUS/menuitem.b1ab75471750e40fa01dfb47ccf06498/?vgnextoid=41 68f58e166b4210VgnVCM10000049114689RCRD>

“Business Organics”:  
<http://hennepin.us/portal/site/HennepinUS/menuitem.b1ab75471750e40fa01dfb47ccf06498/?vgnextoid=b4 42d36c74274210VgnVCM10000049114689RCRD>

“Organics Recycling for Schools”:  
<http://hennepin.us/portal/site/HennepinUS/menuitem.b1ab75471750e40fa01dfb47ccf06498/?vgnextoid=0a 225ca02bad4210VgnVCM10000049114689RCRD>

“Compostable Bags and Food Service Ware”:  
<http://hennepin.us/portal/site/HennepinUS/menuitem.b1ab75471750e40fa01dfb47ccf06498/?vgnextoid=5e 85780226995210VgnVCM20000048114689RCRD>