FINAL REPORT

STATEWIDE MSW COMPOSITION STUDY

A STUDY OF DISCARDS IN THE STATE OF MINNESOTA

SOLID WASTE MANAGEMENT COORDINATING BOARD

Minnesota Pollution Control Agency

Minnesota Office of Environmental Assistance

March 2000

R·W·BECK

SOLID WASTE MANAGEMENT COORDINATING BOARD

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MSW COMPOSITION STUDY

TABLE OF CONTENTS

SECTION 3 - STUDY DESIGN

SECTION 4 – STUDY RESULTS

R. W. Beck wishes to recognize the facilities and their staff that participated in the Study and made special contributions to the successful completion of this project. The participating facilities included:

- Brooklyn Park Transfer Station;
- Waste Management/United Waste Transfer Station (St. Paul);
- HERC WTE;
- NRG Newport Refuse-Derived Fuel Production Facility;
- Burnsville MSW Landfill;
- St. Louis County MSW Landfill;
- Polk County WTE; and
- Prairieland MSW Compost Facility.

Staff members of the facilities were accommodating in providing data and clarifying procedures at the facilities as well as assisting with field sort logistics.

In addition, appreciation goes to the solid waste haulers serving these facilities for their consistent cooperation.

The Project Team of R. W. Beck, Inc. and GRG Analysis was retained by the Solid Waste Management Coordinating Board (SWMCB), the Minnesota Pollution Control Agency (MPCA) and the Office of Environmental Assistance (OEA) to develop a representative, statistically defensible estimate of the composition of Minnesota's municipal solid waste (MSW) stream. The composition study (Study) included field sorting events between September 27 and November 20, 1999.

STUDY OBJECTIVES

Objectives of the Study include the following:

- Establish a baseline for measuring future success in achieving waste management objectives;
- Assist the partners in setting future policy direction and management priorities; and
- Assess progress in reduction and recycling since the 1991/1992 MPCA Study.

PARTICIPATING FACILITIES AND STUDY AREA

In order to accomplish these objectives, a total of eight solid waste facilities were identified for participation in the Study. The participating facilities included:

- Brooklyn Park Transfer Station;
- Waste Management/United Waste Transfer Station (St. Paul);
- HERC WTE;
- NRG Newport Refuse-Derived Fuel Production Facility;
- Burnsville MSW Landfill;
- St. Louis County MSW Landfill;
- Polk County WTE; and
- Prairieland MSW Compost Facility.

These facilities were selected to participate because they are considered representative of the waste generated within the following geographical study areas:

- **Metropolitan Region**, which includes the six counties comprising the Solid Waste Management Coordinating Board (Ramsey, Washington, Anoka, Hennepin, Dakota, and Carver); and
- **Greater Minnesota**, which includes counties in Minnesota that are not members of the Solid Waste Management Coordinating Board.
- **Statewide,** which is an aggregate category that includes the Metropolitan Region and Greater Minnesota counties.

STUDY RESULTS

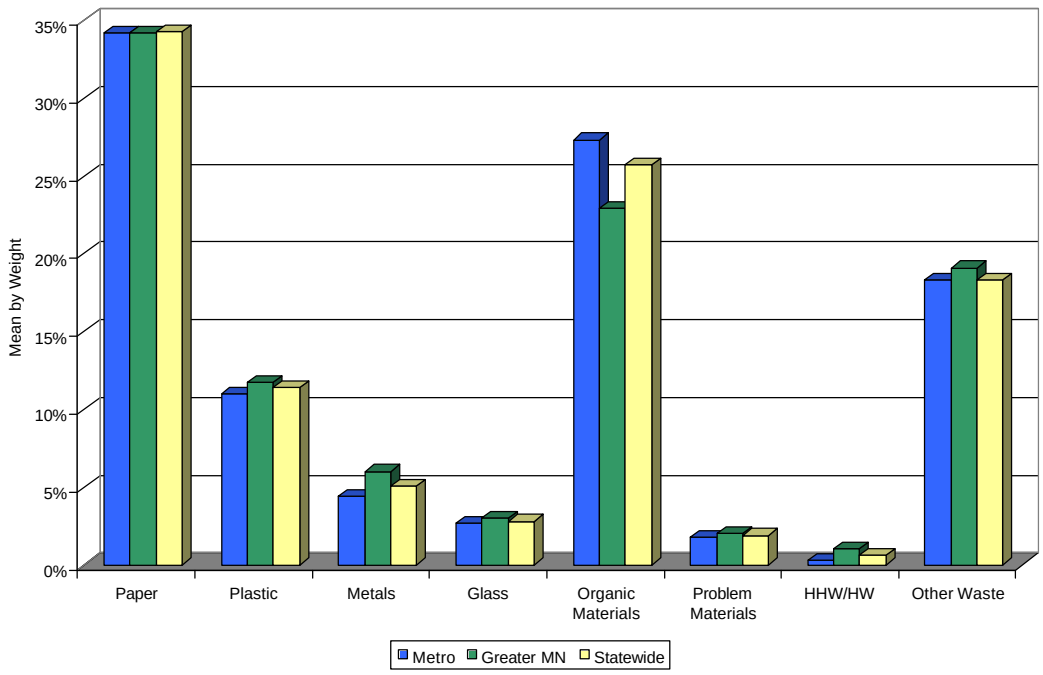
One-week field sorting events were conducted at each participating facility. A total of 390 samples, or 94,541 pounds, of MSW were sorted during the Study. Depicted below are the results by region.

TABLE 1
AGGREGATE COMPOSITION
BY PRIMARY MATERIAL CATEGORY
(MEAN COMPOSITION BY WEIGHT)

PRIMARY MATERIAL CATEGORY	METROPOLITAN REGION	GREATER METRO	STATEWIDE
Paper	34.2%	34.2%	34.3%
Plastic	11.0%	11.7%	11.4%
Metals	4.4%	6.0%	5.1%
Glass	2.7%	3.0%	2.8%
Organic Materials	27.3%	22.9%	25.7%
Problem Materials	1.8%	2.0%	1.9%
HHW/HW	0.3%	1.0%	0.6%
Other Waste	18.3%	19.1%	18.3%
TOTAL	100%	100%	100%

Note:
The total/subtotals may not equal the sum of the material categories due to rounding.

Figure 1
AGGREGATE COMPOSITION - BY MAJOR MATERIAL CATEGORY



Statistically, the Metropolitan Region results can be considered "representative" because the participating facilities manage approximately 72% of the Metropolitan Region's tonnage. In addition, the Metropolitan Region's samples were well distributed between the residential and ICI sectors, with a relatively small number of mixed waste samples.

However, "representativeness" becomes a concern in assessing the Greater Minnesota results. The facilities that participated in the study manage less than 9% of the MSW waste in the Greater Minnesota area. Further, approximately 60% of the samples were from mixed waste loads. Thus, residential and ICI samples were underrepresented.

The full report contains detailed statistical Study results, including confidence intervals for each material category. Confidence intervals should be reviewed in conjunction with the "means" when evaluating the results.

The results by major material category for each geographical study area are shown on the following pie charts.

Figure 2
Metropolitan Region Results

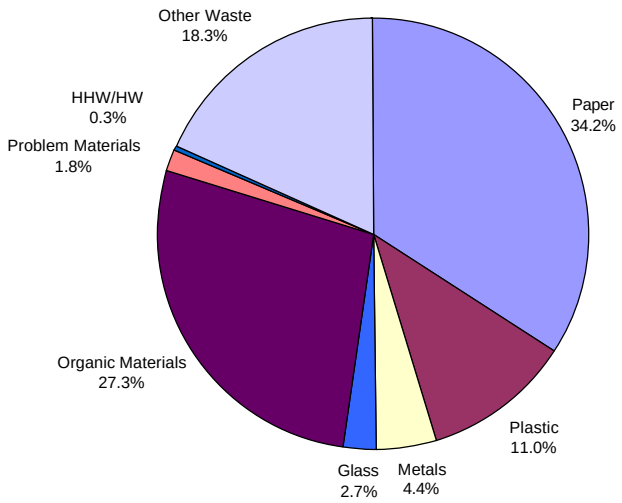


Figure 3
Greater Minnesota Results

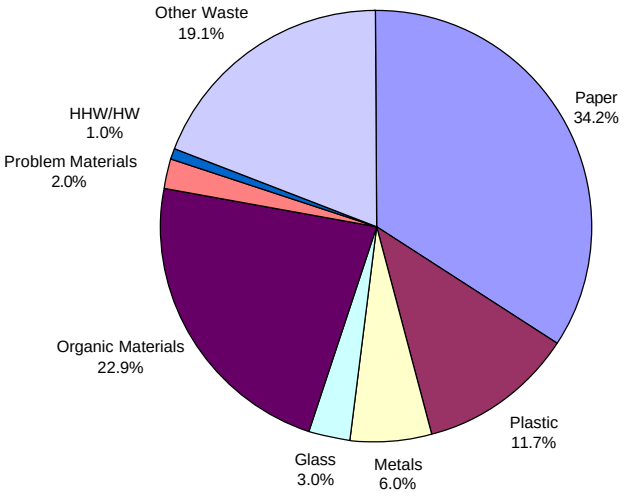
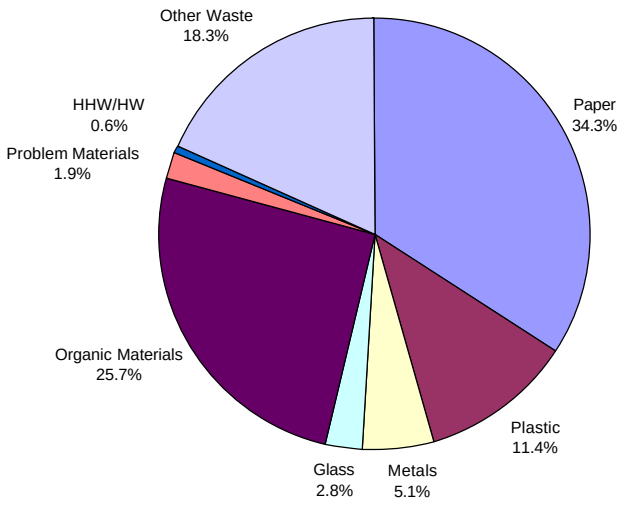


Figure 4
Statewide Results



As is evident above, the results did not vary substantially between regions.

PROGRAM IMPLICATIONS

One of the primary objectives of the Study was to establish a baseline for measuring the impacts of future program activities. The results of the Study are to be used in conjunction with the SWMCB's Master Plan and the OEA's Policy Report.

A review of the 20 largest material categories by weight reflects the following:

- Source reduction opportunities exist for a number materials, including food waste, OCC, wood pallets, mixed paper and office paper. For household bulky items like furniture and mattresses, reuse options are available in some areas.
- At least 8 of these material categories can be considered readily recyclable: OCC, wood pallets, recyclable mixed paper, office paper and boxboard.
- Opportunities exist to compost several of these categories, including food waste, non-recyclable mixed paper and diapers.
- Two of the 20 categories, which in fact are the same material but from both residential and ICI sources, are considered as a problem material: treated wood.

Overall, the SWMCB's Master Plan focus on promoting source reduction and recycling of food waste and packaging materials (commercial and transport) is consistent with opportunities identified in the Study.

RECOMMENDATIONS

As the SWMCB, MPCA, and OEA consider moving forward, we recommend the following activities:

- Conducting generator-based waste studies to identify reduction and recycling opportunities at the point of generation;
- Promoting additional residential waste abatement efforts as at least half the remaining MSW is from residential sources; and
- Conducting additional field sorts of MSW facilities in Greater Minnesota.

SECTION 1
EXECUTIVE SUMMARY

BACKGROUND

This section provides an overview of the municipal solid waste (MSW) composition study (Study).

STUDY OBJECTIVES

The primary objective of the Study was to develop a representative, statistically defensible estimate of the composition of Minnesota's MSW stream. The Solid Waste Management Coordinating Board (SWMCB), the Minnesota Office of Environmental Assistance (OEA) and Minnesota Pollution Control Agency (MPCA) were the primary partners for the Study. Through developing this MSW composition estimate, the project partners plan to use the study outcomes to:

- establish a baseline for measuring future success in achieving waste management objectives;
- assess progress in reduction and recycling since the 1991/1992 MPCA Solid Waste Composition Studies (MPCA Study); and
- assist the partners in setting future policy direction and management priorities.

STUDY AREA

Two geographical areas were identified for participation in the study. The areas include:

- Metropolitan Region, which includes the six counties composing the Solid Waste Management Coordinating Board (Ramsey, Washington, Anoka, Hennepin, Dakota and Carver); and
- Greater Minnesota, which includes counties in Minnesota that are not members of the Solid Waste Management Coordinating Board.

PARTICIPATING FACILITIES

To accomplish the objectives described above, a total of eight solid waste facilities (five in the metropolitan area and three in Greater Minnesota) were identified by the Study partners for participation in the Study. The selected participating facilities included two municipal solid waste landfills, two transfer stations, two

WTE facilities, one MSW composting facility, and one refuse-derived fuel production facility.

The specific solid waste management facilities participating in the study (Participating Facilities) included the following:

- Brooklyn Park Transfer Station;
- Waste Management/United Waste Transfer Station (St. Paul);
- HERC WTE;
- NRG Newport Refuse-Derived Fuel Production Facility;
- Burnsville MSW Landfill;
- St. Louis County MSW Landfill;
- Polk County WTE; and
- Prairieland MSW Compost Facility.

The partners selected these facilities because, overall, they were considered representative of the Twin City Metropolitan Area (Metropolitan Region) and Greater Minnesota. In addition, each of the identified facilities' representatives expressed an interest in participating in the Study through accommodating individual field sorts.

STUDY DESIGN

The study design included the following critical steps:

- select the material categories;
- conduct pre-sort site assessments;
- define the waste sort protocol;
- conduct the sampling and sorting events;
- review and compile the collected data; and
- use a statistical model to develop the results.

A more detailed discussion on the study design is included in Section 3.

MATERIAL CATEGORIES

A set of 59 categories were selected for the Study. The eight primary material categories included the following:

- Paper
- Plastic
- Metals
- Glass
- Organic Materials
- Problem Materials
- HHW/HW
- Other

The complete list of material categories and their definitions are included in the Appendix for reference.

PRE-SORT SITE ASSESSMENT

The Project Team conducted pre-sort site assessments at each of the Participating Facilities. Upon conducting the site assessments, Project Team representatives made a formal request for facility transaction data from each facility operator.

The information and data gathered through the site assessments and facility transaction data requests were used to finalize the sorting and sampling approach at each of the sites. Hours of operation, scope of vehicle traffic and facility staffing were critical to designing the sampling approach.

WASTE SORT PROTOCOL

Upon completing the pre-sort site assessments, development of waste sort protocol was essential to obtaining consistent and representative waste characterization data. The specific waste sort protocol issues discussed included the following:

- **Seasonality.** The Study partners concluded that seasonal differences in the MSW stream are not statistically substantial.
- **Generator Types.** The Study partners requested that data be collected for the residential sector (including both single-family and multi-family residences) and for the industrial/commercial/institutional (ICI) sector.
- **Frequency of Sampling.** The approach selected included one week sorting events during a "typical" week at each Participating Facility. The total number of samples selected was approximately 50 for each event.

SAMPLING AND SORTING EVENTS

One week, MSW field sorting events were initiated at each of the eight participating facilities between September 27 and November 20.

A total of 390 samples or 94,541 lbs. of MSW were sorted during the one season sorting events. The table below summarizes the resulting sampling mix and quantities sorted during each of the sorting events at the various Participating Facility sites.

TABLE 1-1
SAMPLING SUMMARY

PARTICIPATING FACILITY	# OF SAMPLES			LBS. SORTED
	RES	ICI	MIX	
NRG Newport	18	19	13	11,871
Polk County WTE	9	4	37	11,643
Brooklyn Park T.S.	12	30	8	12,551
St. Louis County Landfill	11	9	30	11,950
Waste Management T. S.	9	31	10	12,471
Burnsville Landfill	20	20	10	12,295
Prairieland Compost Facility	7	15	19	10,013
HERC	21	19	9	11,747
TOTALS	**107**	**147**	**136**	**94,541**

MSW hauling vehicles were randomly selected from within the three generator types - residential, ICI, and mixed. This approach assures sort data from each of these generator types for use to develop results by generator type and for the overall MSW (combined generator types). As is reflected above, the mix of materials entering the various Participating Facilities varied considerably.

STATISTICAL MODELING

The data from the sorting events were entered into R. W. Beck's specially designed waste composition statistical model (Model). In a few instances, upon review of the field sorts, samples were not incorporated into the results because it represented either non-region MSW or non-MSW. The Model statistically manipulates the data to calculate the mean, 90% confidence intervals, and standard deviation for individual material categories by site and generator type. When comparing the MSW composition results, the confidence intervals should be considered along with the mean percentages.

RESULTS

Results of the statistical modeling for both the Metropolitan Region and Greater Minnesota, as well as Statewide were developed. In general, statistical principles dictate that roughly 15 to 20 representative samples be obtained from the residential waste stream and 25 to 30 samples from the ICI waste stream to adequately characterize the waste stream for these individual generators. At some of the facilities, the one season sort did not result in sampling above these

thresholds because the samples sorted were from mixed waste loads rather than the residential or ICI sectors. Tables depicting the results may not sum due to rounding.

METROPOLITAN REGION

Five of the eight facilities included in the Study represent the Metropolitan Region. The field sort data for 240 samples originating from Residential, ICI, and Mixed loads from these Metropolitan Region facilities were used in calculating the results.

AGGREGATE

Table 1-2 presents the mean composition (by weight) in the Metropolitan Region for each of the eight primary material categories.

SUMMARY TABLE 1-2
METROPOLITAN REGION AGGREGATE COMPOSITION
BY PRIMARY MATERIAL CATEGORY
(BY WEIGHT)

PRIMARY MATERIAL CATEGORY	MEAN COMPOSITION	90% CONFIDENCE INTERVAL	
		LOWER	UPPER
Paper	34.2%	31.5%	37.3%
Plastic	11.0%	9.9%	12.2%
Metals	4.4%	3.9%	5.2%
Glass	2.7%	2.3%	3.3%
Organic Materials	27.3%	25.1%	30.2%
Problem Materials	1.8%	1.4%	2.4%
HHW/HW	0.3%	0.2%	0.5%
Other Waste	18.3%	16.2%	21.0%
TOTAL	100%	NA	NA

Note:
The total/subtotal may not equal the sum of the material categories due to rounding.

Table 1-3 presents the detailed mean composition of the Metropolitan Region's MSW stream for all 59 material subcategories.

DETAILED TABLE 1-3
METROPOLITAN REGION AGGREGATE COMPOSITION
BY MATERIAL SUBCATEGORY
(BY WEIGHT)

MATERIAL CATEGORIES	MEAN	MATERIAL CATEGORIES	MEAN
PAPER		**ORGANIC MATERIALS**	
Newsprint (ONP)	4.1%	Yard Waste - Grass and Leaves	2.5%
High Grade Office	3.0%	Yard Waste - woody material	0.4%
Magazines/Catalogs	2.4%	Food Waste	11.0%
Uncoated OCC - recyclable	6.8%	Wood Pallets	3.6%
Uncoated OCC – nonrecyclable	0.5%	Treated Wood	3.8%
Coated OCC	0.1%	Untreated Wood	2.3%
Boxboard	2.5%	Diapers	1.9%
Mixed Paper - recyclable	6.5%	Other Organic Material	1.7%
Mixed Paper - nonrecyclable	8.3%	***Subtotal Organic Materials***	***27.3%***
Subtotal Paper	***34.2%***		
PLASTIC		**PROBLEM MATERIALS**	
PET Bottles/Jars - clear	0.4%	Televisions	<0.1%
PET Bottles/Jars - colored	0.1%	Computer Monitors	<0.1%
Other PET	0.1%	Computer Equipment/Peripherals	0.2%
HDPE Bottles – natural	0.3%	Electric and Electronic Products	1.5%
HDPE Bottles - colored	0.2%	Batteries	0.1%
PVC	0.1%	Other	0.1%
Polystyrene	0.7%	***Subtotal Problem Materials***	***1.8%***
Film – transport packaging	0.3%	**HHW/HW**	
Other Film	3.0%	Latex Paint	<0.1%
Other Containers	0.6%	Oil Paint	<0.1%
Other non-containers	5.2%	Unused Pesti/Fungi/Herbi-cides	<0.1%
Subtotal Plastic	***11.0%***	Unused Cleaners and Solvents	<0.1%
METALS		Compressed Fuel Containers	<0.1%
Aluminum Bev. Containers	0.6%	Automotive - Antifreeze	<0.1%
Other Aluminum	0.5%	Automotive - Used oil filters	<0.1%
Ferrous Containers	0.7%	Other	0.2%
Other Ferrous	2.6%	***Subtotal HHW/HW***	***0.3%***
Other Non-Ferrous	<0.1%		
Subtotal Metals	***4.4%***		

DETAILED TABLE 1-3
METROPOLITAN REGION AGGREGATE COMPOSITION
BY MATERIAL SUBCATEGORY
(BY WEIGHT)

MATERIAL CATEGORIES	MEAN	MATERIAL CATEGORIES	MEAN
GLASS		**OTHER WASTE**	
Clear Containers	1.1%	Textiles	2.4%
Green Containers	0.3%	Carpet	3.0%
Brown Containers	0.4%	Sharps and Infectious Waste	<0.1%
Other Glass	0.8%	Rubber	0.8%
Subtotal Glass	***2.7%***	Construction & Demo. Debris	2.7%
		Household Bulky Items	3.8%
		Empty HHW/HW Containers	0.3%
		Miscellaneous	5.4%
		Subtotal Other Waste	***18.3%***
GRAND TOTAL			**100%**

Note:
The total/subtotal may not equal the sum of the material categories due to rounding.

GENERATOR TYPE

Table 1-4 compares the composition of Residential and ICI waste by major material categories.

Note that the confidence intervals for Residential waste in Table 1-4 are generally narrower when compared to the confidence intervals for ICI waste.

TABLE 1-4
COMPARISON OF METROPOLITAN REGION RESIDENTIAL AND ICI COMPOSITION

	Residential			ICI		
		90% Confidence Interval			90% Confidence Interval	
Material Category	Mean	Lower	Upper	Mean	Lower	Upper
Paper	31.8%	28.3%	35.3%	35.1%	30.2%	40.8%
Plastic	9.5%	8.4%	10.5%	12.3%	10.3%	14.8%
Metals	3.9%	3.3%	4.6%	4.4%	3.5%	6.1%
Glass	2.5%	2.1%	3.1%	2.7%	2.0%	3.9%
Organic Materials	26.4%	24.2%	29.6%	29.5%	25.1%	35.0%
Problem Materials	2.3%	1.6%	3.8%	1.7%	0.9%	2.1%
HHW/HW	0.4%	0.2%	0.7%	0.1%	0.1%	0.2%
Other Waste	23.1%	19.2%	27.9%	14.2%	11.0%	18.2%
TOTAL	100%	NA	NA	100%	NA	NA

Note:
The total/subtotal may not equal the sum of the material categories due to rounding.

GREATER MINNESOTA

A total of three facilities were selected to represent Greater Minnesota. The field sort data for 140 samples originating from Residential, ICI, and Mixed loads from the Participating Facilities were used in calculating the results.

Table 1-5 summarizes Greater Minnesota MSW composition and confidence intervals at a 90 percent level.

SUMMARY TABLE 1-5
GREATER MINNESOTA AGGREGATE COMPOSITION
BY PRIMARY MATERIAL CATEGORY
(BY WEIGHT)

PRIMARY MATERIAL CATEGORY	MEAN COMPOSITION	90% CONFIDENCE INTERVAL	
		LOWER	UPPER
Paper	34.2%	32.1%	36.5%
Plastic	11.7%	10.8%	12.9%
Metals	6.0%	5.1%	7.3%
Glass	3.0%	2.5%	3.6%
Organic Materials	22.9%	20.9%	25.1%
Problem Materials	2.0%	1.4%	3.1%
HHW/HW	1.0%	0.7%	1.4%
Other Waste	19.1%	17.0%	21.5%
TOTAL	100%	NA	NA

Note:
The total/subtotal may not equal the sum of the material categories due to rounding.

To ensure representativeness of the data, sorting and sampling at additional Greater Minnesota sites is recommended to enhance the overall Greater Minnesota results.

STATEWIDE

Statewide results were aggregated using the same methodology as was used in the regional aggregations. Data from a total of 380 samples were used to calculate the results.

AGGREGATE

Table 1-6 summarizes the mean composition and confidence intervals of Minnesota's statewide MSW.

SUMMARY TABLE 1-6
MINNESOTA STATEWIDE RESULTS
AGGREGATE COMPOSITION BY PRIMARY MATERIAL CATEGORY
(BY WEIGHT)

MATERIAL CATEGORIES	MEAN	90% CONFIDENCE INTERVAL	
		LOWER	UPPER
Paper	34.3%	32.4%	36.5%
Plastic	11.4%	10.6%	12.3%
Metals	5.1%	4.6%	5.8%
Glass	2.8%	2.5%	3.2%
Organic Materials	25.7%	24.1%	27.8%
Problem Materials	1.9%	1.5%	2.4%
HHW/HW	0.6%	0.5%	0.8%
Other Waste	18.3%	16.8%	20.2%
TOTAL	100%	NA	NA

Note:
The total/subtotal may not equal the sum of the material categories due to rounding.

Note the very narrow confidence intervals shown in Table 1-6. This is due to the large number of samples (380) that were used in calculating the results. The Statewide results depicted narrower confidence intervals than the results for either of the individual regions - Metropolitan Region and Greater Minnesota.

Table 1-7 depicts the detailed Statewide MSW composition.

DETAILED TABLE 1-7
MINNESOTA STATEWIDE AGGREGATE COMPOSITION
(BY WEIGHT)

MATERIAL CATEGORIES	MEAN	MATERIAL CATEGORIES	MEAN
PAPER		**ORGANIC MATERIALS**	
Newsprint (ONP)	4.1%	Yard Waste – Grass and Leaves	2.1%
High Grade Office	3.1%	Yard Waste – woody material	0.2%
Magazines/Catalogs	2.5%	Food Waste	12.4%
Uncoated OCC - recyclable	6.2%	Wood Pallets	2.6%
Uncoated OCC – nonrecyclable	0.5%	Treated Wood	3.0%
Coated OCC	0.2%	Untreated Wood	1.9%
Boxboard	2.5%	Diapers	2.1%
Mixed Paper - recyclable	6.0%	Other Organic Material	1.4%
Mixed Paper - nonrecyclable	9.2%	***Subtotal Organic Materials***	***25.7%***
Subtotal Paper	***34.3%***		
PLASTIC		**PROBLEM MATERIALS**	
PET Bottles/Jars - clear	0.4%	Televisions	<0.1%
PET Bottles/Jars - colored	0.2%	Computer Monitors	<0.1%
Other PET	0.1%	Computer Equipment/Peripherals	0.2%
HDPE Bottles – natural	0.3%	Electric and Electronic Products	1.6%
HDPE Bottles - colored	0.2%	Batteries	0.1%
PVC	0.1%	Other	<0.1%
Polystyrene	0.8%	***Subtotal Problem Materials***	***1.9%***
Film – transport packaging	0.3%		
Other Film	3.5%	**HHW/HW**	
Other Containers	0.5%	Latex Paint	<0.1%
Other non-containers	4.9%	Oil Paint	<0.1%
Subtotal Plastic	***11.4%***	Unused Pesti/Fungi/Herbi-cides	<0.1%
		Unused Cleaners and Solvents	<0.1%
METALS		Compressed Fuel Containers	<0.1%
Aluminum Bev. Containers	0.7%	Automotive - Antifreeze	<0.1%
Other Aluminum	0.5%	Automotive - Used oil filters	0.1%
Ferrous Containers	0.9%	Other	0.4%
Other Ferrous	2.9%	***Subtotal HHW/HW***	***0.6%***
Other Non-Ferrous	0.1%		
Subtotal Metals	***5.1%***		

DETAILED TABLE 1-7
MINNESOTA STATEWIDE AGGREGATE COMPOSITION
(BY WEIGHT)

MATERIAL CATEGORIES	MEAN	MATERIAL CATEGORIES	MEAN
GLASS		**OTHER WASTE**	
Clear Containers	1.3%	Textiles	2.7%
Green Containers	0.3%	Carpet	2.4%
Brown Containers	0.4%	Sharps and Infectious Waste	<0.1%
Other Glass	0.7%	Rubber	0.8%
Subtotal Glass	***2.8%***	Construction & Demo. Debris	2.8%
		Household Bulky Items	3.4%
		Empty HHW/HW Containers	0.4%
		Miscellaneous	5.8%
		Subtotal Other Waste	***18.3%***
GRAND TOTAL			**100%**

Note:
The total/subtotal may not equal the sum of the material categories due to rounding.

GENERATOR TYPE

Table 1-8 compares Minnesota Statewide Residential waste composition with ICI composition.

TABLE 1-8
COMPARISON OF MINNESOTA RESIDENTIAL AND ICI COMPOSITION BY MAJOR MATERIAL GROUP

	RESIDENTIAL			ICI		
		90% CONFIDENCE INTERVAL			90% CONFIDENCE INTERVAL	
MATERIAL CATEGORY	MEAN	LOWER	UPPER	MEAN	LOWER	UPPER
Paper	30.8%	28.0%	33.6%	34.7%	30.6%	39.5%
Plastic	10.4%	9.4%	11.4%	12.4%	10.7%	14.6%
Metals	5.0%	4.2%	5.9%	5.2%	4.1%	7.0%
Glass	2.8%	2.3%	3.4%	2.5%	1.9%	3.6%
Organic Materials	25.4%	23.3%	28.2%	28.9%	25.1%	33.6%
Problem Materials	2.7%	1.9%	4.3%	1.4%	0.8%	1.8%
HHW/HW	0.5%	0.3%	0.7%	0.4%	0.2%	0.9%
Other Waste	22.5%	19.4%	26.3%	14.4%	11.7%	17.8%
TOTAL	100%	NA	NA	100%	NA	NA

Note:
The total/subtotal may not equal the sum of the material categories due to rounding.

CONCLUSIONS

Given that a total of 380 samples from eight different Minnesota solid waste facilities were ultimately factored into the Statewide analysis, it is the Project Team's opinion that the estimated Statewide MSW composition presented above is statistically sound and representative.

The 240 samples from the five Metropolitan Region facilities should also be considered representative of that specific wasteshed. Metropolitan Region samples were well-distributed between the residential and ICI sectors, with a relatively small number of mixed waste samples.

"Representativeness" becomes a concern in assessing the Greater Minnesota results. Eighty of the 140 total samples (almost 60%) were from mixed waste truckloads, thus residential and ICI samples were underrepresented. The Project Team would recommend the collection of additional data in Greater Minnesota to enhance the "representativeness" of the data.

Similarly, the number of samples taken at each individual facility limits the Project Team's ability to draw conclusions about the differences between Residential, ICI and Mixed waste at a facility-specific level.

A more detailed discussion on the results is included in Section 4.

FINDINGS

COMPARISON TO MPCA 1991/1992 RESULTS

We compared the statistical means for each material category from the 1991/1992 MPCA Solid Waste Study (MPCA Study) to the confidence intervals from the 1999 Study data. Where the mean from the MPCA Study is outside the 1999 confidence interval, we are inferring a statistically significant difference for that material category. Comparison of the confidence intervals from each of the two studies would be considered a more rigorous statistical approach, but confidence intervals from the 1991/1992 Study were not available.

For this part of the analysis, we reviewed the statewide aggregated data and the Metropolitan Region aggregated data. Aggregated data for Greater Minnesota was not included due to the small number of sites participating and high variability of the results between sites.

STATEWIDE

Table 1-9 contains the statewide composition data from the 1992 MPCA Study and the 1999 Study results. The categories have been ordered to allow for ease of comparison.

TABLE 1-9
COMPARISON OF STATEWIDE RESULTS
MSW COMPOSITION
1992 TO 1999

MATERIAL CATEGORY - 1992	1992 MEAN	1999 CONFIDENCE INTERVALS	1999 MEAN	MATERIAL CATEGORY - 1999
PAPER				**PAPER**
Newsprint	4.0	3.7 - 4.5	4.1	Newsprint
Office Paper	4.4	2.6 - 3.8	3.1	Office Paper
Corrugated/Kraft Paper	8.8	5.5 - 7.2	6.2	OCC -- uncoated, recycl.
		0.4 - 0.6	0.5	OCC -- uncoated, non-recycl.
		0.1 - 0.4	0.2	OCC -- coated
		(6.0 - 8.2)	*(6.9)*	
Magazines	2.6	2.1 - 3.0	2.5	Magazines/Catalogs
Other Paper	20.0	8.5 - 10.1	9.2	Mixed Paper --non- recyclable
		2.3 - 3.3	2.5	Boxboard
		5.5 - 6.6	6.0	Mixed Paper -- recyclable
		(16.3 - 20.0)	*(17.7)*	
Total Paper	***40.1***	***32.4 - 36.5***	***34.3***	***Total Paper***

TABLE 1-9
COMPARISON OF STATEWIDE RESULTS
MSW COMPOSITION
1992 TO 1999

MATERIAL CATEGORY - 1992	1992 MEAN	1999 CONFIDENCE INTERVALS	1999 MEAN	MATERIAL CATEGORY - 1999
PLASTIC				**PLASTIC**
PET	0.3	0.4 - 0.5	0.4	PET Bottles/Jars - clear
		0.2 - 0.3	0.2	PET Bottles/Jars - colored
		0.1 - 0.1	0.1	Other PET
		(0.7 - 0.9)	*(0.7)*	
HDPE	0.7	0.3 - 0.4	0.3	HDPE Bottles - natural
		0.2 - 0.3	0.2	HDPE Bottles - colored
		(0.5 - 0.7)	*(0.5)*	
Polystyrene	1.1	0.7 - 0.9	0.8	Polystyrene
Plastic Film	4.7	0.2 - 0.4	0.3	Film - transport packaging
		3.3 - 3.9	3.5	Other Film
		(3.5 - 4.3)	*(3.8)*	
Other Plastic	4.6	4.4 - 5.6	4.9	Other non-containers
		0.1 - 0.1	0.1	PVC
		0.4 - 0.6	0.5	Other containers
		(4.9 - 6.3)	*(5.5)*	
Total Plastic	***11.4***	***10.6 - 12.3***	***11.4***	***Total Plastic***
METAL				**METAL**
Aluminum beverage cans	0.5	0.6 - 0.8	0.7	Aluminum beverage containers
Other aluminum	0.4	0.4 - 0.6	0.5	Other aluminum
Ferrous cans	0.9	0.8 - 1.1	0.9	Ferrous cans
Other ferrous	2.8	2.4 - 3.6	2.9	Other ferrous
Other non-ferrous	0.5	0.1 - 0.1	0.1	Other non-ferrous
Total Metal	***5.0***	***4.6 - 5.8***	***5.1***	***Total Metal***
GLASS				**GLASS**
Glass containers	2.0	1.2 - 1.5	1.3	Clear Glass containers
		0.3 - 0.4	0.3	Green Glass containers
		0.4 - 0.5	0.4	Brown Glass containers
		(1.9 - 2.4)	*(2.0)*	
Other Glass	1.1	0.5 - 1.0	0.7	Other Glass
Total Glass	***3.1***	***2.5 - 3.2***	***2.8***	***Total Glass***

TABLE 1-9
COMPARISON OF STATEWIDE RESULTS
MSW COMPOSITION
1992 TO 1999

MATERIAL CATEGORY - 1992	1992 MEAN	1999 CONFIDENCE INTERVALS	1999 MEAN	MATERIAL CATEGORY - 1999
Small yard waste	2.8	1.8 - 2.8	2.1	Yard Waste -- grass & leaves
Large yard waste	0.1	0.1 - 0.3	0.2	Yard Waste -- woody material
Food waste	13.3	11.3 - 13.7	12.4	Food waste
Wood waste	6.5	1.9 - 3.7	2.6	Wood Pallets
		2.5 - 4.0	3.0	Treated Wood
		1.5 - 2.6	1.9	Untreated Wood
		(5.9 - 10.3)	*(7.5)*	
		2.6 - 4.5	3.4	Household bulky items
Textiles	3.1	2.4 - 3.1	2.7	Textiles
		1.9 - 3.2	2.4	Carpet
		(4.1 - 6.3)	*(5.1)*	
Construction/Demolition	2.9	2.3 - 3.9	2.8	Construction/Demolition
Diapers	2.4	1.9 - 2.4	2.1	Diapers
Tires	0.1	0.6 - 1.0	0.8	Rubber
Other Organic	3.7	1.2 - 1.7	1.4	Other Organic
Other Inorganic	3.8	5.3 - 6.6	5.8	Miscellaneous
		0.0 - <0.1	<0.1%	Sharps/Infectious Waste
PROBLEM MATERIALS				**PROBLEM MATERIALS**
Small Electric Appliances	0.8	0.0 - <0.1	<0.1	Televisions
		0.0 - 0.1	<0.1	Computer monitors
		0.1 - 0.2	0.2	Computer equipment/peripherals
		1.3 - 2.1	1.6	Electric & Electronic Products
		(1.4 - 2.4)	*(1.8)*	
Major Appliances	0.0	0.0 - 0.1	<0.1	Other problem materials
Total Problem Materials	***0.8***	***1.5 - 2.4***	***1.9***	***Total Problem Materials***
HHW/HW				**HHW/HW**
Hazardous Waste	0.8	0.0 - 0.1	<0.1	Latex Paint
		0.0 - 0.1	<0.1	Oil Paint
		0.0 - <0.1	<0.1	Unused Pest./Fung./Herb.
		0.0 - 0.1	<0.1	Unused Cleaners/Solvents
		0.0 - <0.1	<0.1	Compressed Fuel Containers
		0.0 - <0.1	<0.1	Automotive - Antifreeze
		0.3 - 0.5	0.4	Other HHW/HW
		0.4 - 0.6	0.4	Empty HHW/HW Containers
		0.1 - 0.1	0.1	Batteries
		(0.8 - 1.5)	*(0.9)*	
Oil Filters	0.1	0.0 - 0.1	0.1	Automotive - Used Oil/Filters
Total HHW/HW	***0.9***	***0.8 - 1.6***	***1.0***	***Total HHW/HW***

Note:
The total/subtotal may not equal the sum of the material categories due to rounding.

METROPOLITAN REGION

Table 1-10 contains the comparison of results for the Metropolitan Region. In general, the Metropolitan Region comparison of results for the 1992 MPCA Study to the 1999 data are similar to the statewide comparison. The most notable difference was a statistically significant increase in wood waste for the Metropolitan Region, with none evident in Statewide results.

TABLE 1-10
COMPARISON OF METROPOLITAN REGION RESULTS
MSW COMPOSITION
1992 TO 1999

MATERIAL CATEGORY - 1992	1992 MEAN	1999 CONFIDENCE INTERVALS	1999 MEAN	MATERIAL CATEGORY - 1999
PAPER				**PAPER**
Newsprint	4.0	3.6 - 4.7	4.1	Newsprint
Office Paper	4.5	2.3 - 3.9	3.0	Office Paper
Corrugated/Kraft Paper	8.7	5.8 - 8.3	6.8	OCC -- uncoated, recycl.
		0.4 - 0.6	0.5	OCC -- uncoated, non-recycl.
		0.1 - 0.3	0.1	OCC -- coated
		(6.3 - 9.2)	*(7.4)*	
Magazines	2.9	1.9 - 3.1	2.4	Magazines/Catalogs
Other Paper	20.0	7.4 - 9.4	8.3	Mixed Paper --non- recyclable
		2.2 - 3.8	2.5	Boxboard
		5.7 - 7.5	6.5	Mixed Paper -- recyclable
		(15.3 - 20.7)	*(17.3)*	
Total Paper	***40.1***	***31.5 - 37.3***	***34.2***	***Total Paper***
PLASTIC				**PLASTIC**
PET	0.3	0.4 - 0.5	0.4	PET Bottles/Jars - clear
		0.1 - 0.2	0.1	PET Bottles/Jars - colored
		0.1 - 0.1	0.1	Other PET
		(0.6 - 0.8)	*(0.6)*	
HDPE	0.7	0.2 - 0.3	0.3	HDPE Bottles - natural
		0.2 - 0.2	0.2	HDPE Bottles - colored
		(0.4 - 0.5)	*(0.5)*	
Polystyrene	1.1	0.6 - 0.8	0.7	Polystyrene
Plastic Film	4.7	0.2 - 0.5	0.3	Film - transport packaging
		2.7 - 3.4	3.0	Other Film
		(2.9 - 3.9)	*(3.3)*	
Other Plastic	4.8	4.5 - 6.0	5.2	Other non-containers
		0.1 - 0.2	0.1	PVC
		0.4 - 0.7	0.6	Other containers
		(5.0 - 6.9)	*(5.9)*	
Total Plastic	***11.6***	***9.9 - 12.3***	***10.9***	***Total Plastic***

TABLE 1-10
COMPARISON OF METROPOLITAN REGION RESULTS
MSW COMPOSITION
1992 TO 1999

MATERIAL CATEGORY - 1992	1992 MEAN	1999 CONFIDENCE INTERVALS	1999 MEAN	MATERIAL CATEGORY - 1999
METAL				**METAL**
Aluminum beverage cans	0.5	0.5 - 0.7	0.6	Aluminum beverage containers
Other aluminum	0.4	0.4 - 0.6	0.5	Other aluminum
Ferrous cans	0.9	0.6 - 1.0	0.7	Ferrous cans
Other ferrous	2.8	2.2 - 3.3	2.6	Other ferrous
Other non-ferrous	0.5	0.0 - 0.1	<0.1	Other non-ferrous
Total Metal	***5.0***	***3.9 - 5.2***	***4.4***	***Total Metal***
GLASS				**GLASS**
Glass containers	2.0	1.0 - 1.4	1.1	Clear Glass containers
		0.3 - 0.4	0.3	Green Glass containers
		0.3 - 0.5	0.4	Brown Glass containers
		(1.6 - 2.3)	*(1.8)*	
Other Glass	1.1	0.5 - 1.2	0.8	Other Glass
Total Glass	***3.1***	***2.3 - 3.3***	***2.7***	***Total Glass***
Small yard waste	2.7	2.0 - 3.6	2.5	Yard Waste -- grass & leaves
Large yard waste	0.1	0.2 - 0.5	0.4	Yard Waste -- woody material
Food waste	13.2	9.7 - 12.7	11.0	Food waste
Wood waste	6.6	2.5 - 5.2	3.6	Wood Pallets
		3.1 - 5.4	3.8	Treated Wood
		1.7 - 3.2	2.3	Untreated Wood
		(7.3 - 13.8)	*(9.7)*	
		2.8 - 5.5	3.8	Household bulky items
Textiles	3.0	2.0 - 2.8	2.4	Textiles
		2.2 - 4.2	3.0	Carpet
		(4.2 - 7.0)	*(5.4)*	
Construction/Demolition	2.8	2.1 - 4.3	2.7	Construction/Demolition
Diapers	2.4	1.6 - 2.3	1.9	Diapers
Tires	0.1	0.5 - 1.2	0.8	Rubber
Other Organic	3.8	1.4 - 2.2	1.7	Other Organic
Other Inorganic	3.8	4.7 - 6.4	5.4	Miscellaneous
		0.0 - <0.1	<0.1	Sharps/Infectious Waste
PROBLEM MATERIALS				**PROBLEM MATERIALS**
Small Electric Appliances	0.8	0.0 - <0.1	<0.1	Televisions
		0.0 - 0.1	<0.1	Computer monitors
		0.1 - 0.4	0.2	Computer equipment/peripherals
		1.1 - 2.1	1.5	Electric & Electronic Products
		(1.2 - 2.6)	*(1.7)*	
Major Appliances	0.0	0.0 - 0.1	0.1	Other problem materials
Total Problem Materials	***0.8***	***1.4 - 2.4***	***1.8***	***Total Problem Materials***

TABLE 1-10
COMPARISON OF METROPOLITAN REGION RESULTS
MSW COMPOSITION
1992 TO 1999

MATERIAL CATEGORY - 1992	1992 MEAN	1999 CONFIDENCE INTERVALS	1999 MEAN	MATERIAL CATEGORY - 1999
HHW/HW				**HHW/HW**
Hazardous Waste	0.8	0.0 - 0.1	<0.1	Latex Paint
		0.0 - <0.1	<0.1	Oil Paint
		0.0 - <0.1	<0.1	Unused Pest./Fung./Herb.
		0.0 - 0.1	<0.1	Unused Cleaners/Solvents
		0.0 - <0.1	<0.1	Compressed Fuel Containers
		0.0 - <0.1	<0.1	Automotive - Antifreeze
		0.1 - 0.3	0.2	Other HHW/HW
		0.0 - 0.1	0.1	Batteries
		0.2 - 0.5	0.3	Empty HHW/HW Containers
		(0.3 - 1.1)	*(0.6)*	
Oil Filters	0.1	0.0 - 0.1	<0.1	Automotive - Used Oil/Filters
Total HHW/HW	***0.9***	***0.3 - 1.2***	***0.6***	***Total HHW/HW***

Note:
The total/subtotal may not equal the sum of the material categories due to rounding.

PROGRAM IMPLICATIONS

One of the primary objectives of the Study was to establish a baseline for measuring the impacts of future program activities. The results of the Study are to be used in conjunction with the SWMCB's Master Plan and the OEA's Policy Report.

A review of the 20 largest material categories by weight reflects the following:

- Source reduction opportunities exist for a number of materials, including food waste, OCC, wood pallets, mixed paper and office paper. For household bulky items like furniture and mattresses, reuse options are available in some areas.
- At least 8 of these material categories can be considered readily recyclable: OCC, wood pallets, recyclable mixed paper, office paper and boxboard.
- Opportunities exist to compost several of these categories, including food waste, non-recyclable mixed paper and diapers.
- Two of the 20 categories, which in fact are the same material but from both residential and ICI sources, are considered as a problem material: treated wood.

Overall, the SWMCB's Master Plan focus on promoting source reduction and recycling of food waste and packaging materials (commercial and transport) is consistent with opportunities identified in the Study. A more detailed discussion on program implications is included in Section 5.

RECOMMENDATIONS

As the SWMCB, MPCA, and OEA consider moving forward, we recommend the following activities:

- Conducting generator-based waste studies to identify reduction and recycling opportunities at the point of generation;
- Promoting additional residential waste abatement efforts as at least half the remaining MSW is from residential sources; and
- Conducting additional field sorts of MSW facilities in Greater Minnesota.

SECTION 2
BACKGROUND

INTRODUCTION

This section describes the overall municipal solid waste (MSW) composition study (Study) objectives, identifies the Study partners, and lists the participating facilities (Participating Facilities).

STUDY OBJECTIVES

The Solid Waste Management Coordinating Board (SWMCB), the Minnesota Office of Environmental Assistance (OEA) and Minnesota Pollution Control Agency (MPCA) were the primary partners for the Study. The primary objective of the Study was to develop a representative, statistically defensible estimate of the composition of Minnesota's MSW stream. Through developing this MSW composition estimate, the project partners plan to use the study outcomes to:

- establish a baseline for measuring future success in achieving waste management objectives;
- assess progress in reduction and recycling since the 1991/1992 MPCA Solid Waste Composition Studies (MPCA Study); and
- assist the partners in setting future policy direction and management priorities.

STUDY AREA

Two geographical areas were identified for participation in the study. The areas include:

- Metropolitan Region, which includes the six counties composing the Solid Waste Management Coordinating Board (Ramsey, Washington, Anoka, Hennepin, Dakota, and Carver); and
- Greater Minnesota, which includes counties in Minnesota that are not members of the Solid Waste Management Coordinating Board.

PARTICIPATING FACILITIES

To accomplish the objectives described above, a total of eight solid waste facilities (five in the metropolitan area and three in Greater Minnesota) were identified by

the Study partners for participation in the Study. The selected participating facilities included two municipal solid waste landfills, two transfer stations, two WTE facilities, one MSW composting facility, and one refuse-derived fuel production facility. Because Minnesota's integrated MSW management system includes promoting the processing of MSW prior to landfilling, the participating facilities included a combination of landfilling, transfer, and processing facilities throughout the state of Minnesota.

The specific solid waste management facilities participating in the Study included the following:

- Brooklyn Park Transfer Station;
- Waste Management/United Waste Transfer Station (St. Paul);
- HERC WTE;
- NRG Newport Refuse-Derived Fuel Production Facility;
- Burnsville MSW Landfill;
- St. Louis County MSW Landfill;
- Polk County WTE; and
- Prairieland MSW Compost Facility.

The partners selected these facilities because, overall, they were considered representative of the Twin City Metropolitan Area (Metropolitan Area) and Greater Minnesota. In addition, each of the identified facilities' representatives expressed an interest in participating in the Study through accommodating individual field sorts.

SECTION 3
STUDY DESIGN

INTRODUCTION

This section outlines the Study design used by the R. W. Beck, Inc. and GRG Analysis project team (Project Team) to complete the Study. The Study design included the following critical steps:

- select the material categories;
- conduct pre-sort site assessments;
- define the waste sort protocol;
- conduct the sampling and sorting events;
- review and compile the collected data; and
- use a statistical model to develop the results.

Provided below is a discussion of each of these steps.

MATERIAL CATEGORIES

The selection of material categories was the first critical step in the Study design. The material categories and subcategories that were used in conducting the Study needed to be consistent with the overall objectives. The final selection of the categories was consistent with two critical objectives. First, the categories selected should be consistent with those used in the 1991/1992 MPCA Study. Second, the categories should allow for analyzing the results in the context of the SWMCB and State of Minnesota strategies for improving reduction, recycling, and landfill abatement. Overall, the categories selected needed to balance the objectives of providing comprehensive information on the MSW stream with categories that are consistent with existing program efforts.

A set of 59 categories were selected for the Study. The eight primary material categories included the following:

- Paper
- Plastic
- Metals
- Glass
- Organic Materials
- Problem Materials
- HHW/HW
- Other

The complete list of material categories and their definitions are included in the Appendix for reference.

Based upon the Study objectives the following was critical to selecting the subcategories composing each of the eight primary categories.

- **Paper.** The paper subcategories selected were consistent with present specifications for most recycling programs in Minnesota. Newsprint, high grade, and magazines were each included as separate subcategories and, in addition, the subcategories of boxboard and mixed recyclable paper were added. The old corrugated containers (OCC) were subdivided into uncoated recyclable and nonrecyclable, and coated OCC to further analyze the type of OCC being disposed. A "catch all" category for nonrecyclable mixed paper was also included.
- **Plastic.** For both polyethylene terephthalate (PET) and high density polyethylene (HDPE), distinguishing uncolored from colored grades was necessary to be consistent with the sensitivity of these plastic resins to existing recycling markets. Thus, PET was subdivided into "bottles/jars clear" and "bottles/jars colored", and "other PET". HDPE was subdivided into "HDPE natural" and "HDPE colored". Film was also subdivided into two subcategories - "film-transport packaging" and "other film" to distinguish pallet wrap from other film.
- **Metals.** The selection of the subcategories for this primary category was relatively straightforward. Aluminum and ferrous were each subdivided into "containers" and "non-containers" with an additional separate category for "other non-ferrous".
- **Glass.** Again the selection of the subcategories for this primary category was relatively straightforward. Categories for containers and non-containers were included. Because of the varying markets for colored glass containers, this category was divided into clear, brown, and green glass.
- **Organic Materials.** Yard waste was divided into "woody material" and "grass and leaves" because of different material handling and processing needs. Wood was subdivided into wood pallets, treated wood, and untreated wood. Wood pallets are generally perceived as materials with primarily a commercial origin that compose a measurable portion of the organic materials in the MSW stream. Recovery of wood is generally limited to untreated materials because of toxicity concerns in the treated wood.
- **Problem Materials.** The selection of problem materials subcategories hinges on identifiable materials that are likely sources of trace metals such as lead, cadmium, and mercury, yet may provide potential materials recovery opportunities. As a result, batteries were selected as a subcategory. Televisions and computers were identified as separate subcategories. These products were included as separate subcategories from "electric and electronic products" because of their potential recovery opportunities and toxicity

concerns. Computers were subdivided into the additional subcategories of monitors and non-monitors because of the different handling and recovery requirements associated with each of these components.

- **Household Hazardous Waste/Hazardous Waste (HHW/HW).** With HHW/HW, the challenge was to identify a range of subcategories that is comprehensive in reflecting the various types of HHW/HW but consistent with specific programs. Second, the issue of empty vs. non-empty containers also raises both safety and material categorization issues. To distinguish "empty" from "non-empty" HHW/HW, the HHW/HW subcategories included only HHW/HW containers with product. A separate category for empty HHW/HW containers was created, but was included in the primary category of "Other Waste". Please note the HHW/HW category distinguishes between latex and oil paints as well as automotive used oil/filters and other automotive products such as anti-freeze. A "catch all" subcategory for other HHW/HW was also included. A total of eight HHW/HW subcategories were selected.
- **Other Waste.** The remaining primary category was composed of a miscellaneous set of subcategories that include more prominent items such as the subcategories of textiles, carpet, rubber, and sharps and infectious wastes. In addition, separate categories for construction and demolition debris (excluding wood) and household bulky items (furniture and mattresses) were included. As previously mentioned, a category for empty HHW/HW containers was included in this primary material category. A "catch all" subcategory termed "miscellaneous" was also included.

Overall, the Study design included 59 categories as compared to 32 in the 1991/1992 MPCA Study. However, the Study categories are compatible with the MPCA Study material categories, but included more detailed subcategories for some of the various primary categories such as paper, plastic, glass, problem materials, HHW/HW, and wood waste.

PRE-SORT SITE ASSESSMENT

Prior to initiating the actual sorting events, it was critical to conduct site assessments at each of the Participating Facilities. The purpose of the site assessments were two-fold — promote staff support and cooperation for the sorting events and to initiate the gathering of data to develop the sampling and sorting plan for each facility.

The Project Team conducted pre-sort site assessments at each of the eight participating facilities. Prior to completing the site assessments, letters were sent to the designated representative for each site addressing the following:

- thanking the facility and its staff for participation in the Study;
- introducing the Project Team;
- outlining the general study methodology;

- discussing the need to conduct a pre-sort site assessment;
- identifying the logistical needs of the sorting crew during the sorting event;
- description of facility data needs; and
- request for feedback concerning preferred weeks to conduct sorting events.

Upon conducting the site assessments, Project Team representatives made a formal request for facility transaction data from each facility operator. Specifically individual transaction data were requested including vehicle types, customer names, MSW quantities delivered by vehicle, and time and date of MSW deliveries. This information was requested for two different weeks in 1999 - one week within the last 30 days and one week of data more than 90 days prior to the proposed sorting events. The data were used to identify any potential trends in MSW delivered and to develop a reasonable estimate of the number of vehicles and quantity of materials received at each facility for a "typical" week at the various facilities. All the Participating Facilities and their designated representatives were very cooperative and forwarded the needed data subsequent to the scheduled sorting events.

The information and data gathered through the site assessments and facility transaction data requests were used to finalize the sorting and sampling approach at each of the sites. Hours of operation, scope of vehicle traffic, and facility staffing were critical to designing an approach compatible with each facility's standard operations and ensuring a representative sampling approach.

WASTE SORT PROTOCOL

Upon completing the pre-sort site assessments, development of waste sort protocol was essential to obtaining consistent and representative waste characterization data. The overall sampling plan, detailing the proposed sampling approach, is included in the Appendix. However, the critical aspects of the sampling and sorting plan relating to the waste sort protocol are discussed below. The specific waste sort protocol issues discussed include the following:

- seasonality;
- generator types; and
- frequency of sampling.

SEASONALITY

The Study partners concluded that seasonal differences in the MSW stream are not statistically substantial. The rationale for this conclusion was based on the minimal differences between seasonal results in the 1991/1992 MPCA Study. Historically the most seasonably variable material in the MSW stream is yard waste, however the landfill disposal ban on this material has minimized this variability. As a result, the Study sponsors requested that all of the field data be collected in the fall of 1999.

GENERATOR TYPES

The project partners requested that data be collected for the residential sector (including both single-family and multi-family residences) and for the industrial/commercial/institutional (ICI) sector. Per our discussions with the SWMCB Project Team and our Minnesota solid waste consulting experience, we determined that currently only limited data is available on the proportion of residential vs. ICI waste received at Minnesota solid waste facilities. Through our site assessments, the lack of this data was confirmed for the participating facilities.

To gather data by residential, ICI, and mixed generator type, the Project Team relied on the sampling randomization inherent in the Nth truck approach. The Nth truck approach is based on the number of vehicles expected each day and the number of samples required for the study to yield statistically sound results. Due to limited data regarding the breakdown of residential vs. ICI in incoming waste at each participating facility, R. W. Beck selected for sampling every Nth truck entering the facility. Based on an interview with the driver, the contents of the truck were assigned to the residential, ICI or mixed sector. The random selection of the vehicle loads dictate the ultimate mix of generator type samples actually sorted. Provided below is a discussion of the issues associated with each of the generator types that was considered when establishing the waste sort protocol.

Residential Waste. Public or private haulers typically serve residents with large compactor trucks that collect waste from multiple households. The waste from these households is thoroughly mixed during the collection and tipping process. The Project Team's opinion is that, as long as trucks are captured from all geographical and demographic areas of the study jurisdiction, it is fairly straightforward to obtain representative samples of residential waste. This conclusion is based on our overall opinion that:

- Residential waste composition does not differ materially based on the time of day it is collected; and
- Residential waste composition does not differ materially based on the day of the week it is collected.

The only significant difference in residential waste commonly observed by the Project Team was that waste delivered by large compactor vehicles did differ from the waste delivered by individual residents. The quantity of resident delivered waste was evaluated per facility transaction data prior to conducting the sort to determine how many (if any) resident delivered samples should be taken. If it was determined that sufficient incoming material was being delivered by residents to warrant inclusion in the composition study, **aggregated samples** of resident delivered wastes were sampled and sorted.

An aggregated sample was taken from six to ten resident delivered loads that were tipped together in a single pile and mixed. Mixing multiple resident-delivered loads together before taking a sample provided a more representative

snapshot of this component of the single-family waste stream. In the absence of mixing, significant risk exists that waste from any individual resident delivered load would not be representative.

The identification of multi-family residential waste can be a challenge. Multi-family generated waste materials are usually collected through front-end loading vehicles and thus may be mixed with ICI wastes. The Project Team utilized the driver interview process in conjunction with visual observation of the sample loads to discern loads that should be classified as residential, as opposed to ICI.

ICI Waste. The ICI sector had the greatest variation in waste composition from sample to sample. Restaurants, retail establishments, offices, institutions, manufacturing establishments, warehouses, general contractors, and other waste types typically are delivered separately in individual truckloads, rather than all mixed together.

When dealing with any particular fraction of ICI waste, some of the same assumptions hold true as for residential waste. In other words, for example, waste generated at a restaurant will not differ materially based on the day of the week it is generated, nor on the time of day it is collected. The same holds true for offices, retail, etc.

Yet, because the composition of ICI loads arriving at a facility for disposal is so variable during the course of a single day, it is vital during any waste composition study to obtain samples from most of the subcategories that contribute to the ICI stream. This can best be performed by sampling from a variety of vehicles delivering ICI waste. The Nth Truck approach was designed to capture the wide range of subcategories within an individual substream. This was the approach used in the Study.

Mixed Waste. The mixed waste sector was composed of waste delivered to the designated solid waste facility originating from both the residential and ICI sectors. This waste was delivered in a range of vehicle types including front-end loaders, rear loading packer trucks, transfer trailers, or all-purpose vehicles. When sampled loads were identified as a mix of residential and ICI waste, data was collected similarly to the sampling of residential and ICI samples. The Project Team utilized both the information gathered from the sampled vehicle drivers and from observations of the sample loads to classify the materials.

Because the focus of the Study was on the MSW stream, the sampling protocol excluded loads that could be clearly identified as composed of non-MSW, such as C&D, special wastes (i.e. ash, grit, etc.) or other industrial processed wastes. Again, because of the lack of data by generator type, the approach taken was to assume all selected loads were MSW unless through visual observation the selected load contained exclusively non-MSW. The Project Team observed some mixed loads containing non-MSW, but very few were composed exclusively of non-MSW. At a few of the participating facilities, the facility transaction data did identify loads periodically delivered that were composed exclusively of C&D. In

these instances, the vehicles hauling primarily C&D were excluded from the vehicle count and sampling scheme.

FREQUENCY OF SAMPLING

The sampling approach taken should result in an adequate number of representative samples being sorted that provide statistically meaningful results. In addition, this objective had to be balanced with the Study's budget constraints and expedited schedule. The approach selected included one week sorting events during a "typical" week at each Participating Facility. Therefore, no sorting events were scheduled during a week that included a holiday. The total number of samples that were selected and sorted at each sorting event was approximately 50.

SAMPLING AND SORTING EVENTS

One week, MSW field sorting events were initiated at each of the eight participating facilities between September 27 and November 20. No sorting events were conducted during the weeks of October 25 and November 22. The week of November 22 represented an atypical week for MSW hauler patterns because of the Thanksgiving holiday.

The table below lists the participating facilities, locations, and designated weeks of each sorting event. Generally, each sorting event took place during a Monday through Saturday timeframe, except when the participating facility did not accept MSW on Saturday.

PARTICIPATING FACILITY	LOCATION	WEEK OF SORT
NRG Refuse-Derived Fuel Production Facility	Newport	9/27
Polk County WTE	Fosston	10/4
Brooklyn Park Transfer Station	Brooklyn Park	10/11
St. Louis County Landfill	Virginia	10/18
HERC	Minneapolis	11/1
Waste Management Transfer Station	St. Paul	11/8
Burnsville Landfill	Burnsville	11/15
Prairieland Compost Facility	Truman	11/29

As previously mentioned, five of the participating facilities are located in the Twin City Metropolitan Area and three are located in Greater Minnesota. A total of 390 samples or 94,541 lbs. of MSW were sorted during the one season sorting events.

The table below summarizes the resulting sampling mix during each of the sorting events at the various participating facility sites.

PARTICIPATING FACILITY	# OF SAMPLES			LBS. SORTED
	RES	ICI	MIX	
NRG Newport	18	19	13	11,871
Polk County WTE	9	4	37	11,643
Brooklyn Park T.S.	12	30	8	12,551
St. Louis County Landfill	11	9	30	11,950
Waste Management T. S.	9	31	10	12,471
Burnsville Landfill	20	20	10	12,295
Prairieland Compost Facility	7	15	19	10,013
HERC	21	19	9	11,747
TOTALS	**107**	**147**	**136**	**94,541**

The selection of vehicles to secure waste materials for sampling was based upon the evaluation of the data from the pre-sort site assessment at each participating facility. MSW hauling vehicles were randomly selected from within the three generator types - residential, ICI, and mixed. This approach assures sort data from each of these generator types that can be used to develop results by generator type and for the overall MSW (combined generator types). As is reflected above, the mix of materials entering the various participating facilities varied considerably. With the Greater Minnesota facilities, more mixed loads were sampled than either the residential or ICI generator types.

From each of the randomly selected loads, a minimum of 200 lb. samples were selected for sorting. The individual samples were selected using the "mix, cone, and quarter" method which promotes both random selection and appropriate mixing of the materials. Two to three hundred pound samples are considered the optimal size to provide representative results. This overall sampling approach is consistent with ASTM MSW composition protocol as specified in "Standard Test Method for Determination of Unprocessed Municipal Solid Waste," ASTM D5-231-92, 1992.

Once each sample was selected, the materials were pre-sorted for any hazardous or infectious wastes. The materials were then sorted by the Project Team sorting crew into the various 59 material categories. Then, each container was weighed to determine the quantity of materials by material type in each sample. These weights were recorded on individual data sheets documenting the results of sorting each individual sample. The sort crew supervisor then forwarded the data to the Project Manager.

To ensure the sorting and sampling process was conducted safely, a health and safety plan for the waste sort crew was developed and implemented. The detailed plan is included in the appendices for reference. No health related concerns were reported throughout the eight sorting events.

DATA REVIEW AND ENTRY

Upon completing the sampling and sorting of the materials, the data sheets were reviewed to ensure the following:

- individual entries were legible;
- generator type was clearly identified, including a breakdown of the mixed loads between residential and ICI;
- specific comments on unusual aspects of a sample were comprehensible;
- generator types were clearly identified and consistent with the types of materials recorded on the data form;
- description of likely individual ICI generators was included where appropriate;
- a minimum of 200 lbs. of materials were sampled and sorted for each sample;
- multi-family materials were appropriately identified as residential materials; and
- non-MSW loads were not included.

The tare weight of the container, and the weight of the individual materials plus the tare weight, were recorded on the actual data sheets by the sort crew supervisor. These two pieces of data were then entered into a statistical spreadsheet. The statistical spreadsheet is designed to calculate the actual weight of the materials sorted by material type.

STATISTICAL MODELING

All of the data from the sorting events were entered into R. W. Beck's specially designed waste composition statistical model (Model). This Model has been developed in Microsoft Excel for easy accessibility and use. The Model statistically manipulates the data to calculate the mean, 90% confidence intervals, and standard deviation for individual material categories by site and generator type. In addition, the Model is structured to identify where specific samples could be considered statistical outliers.

The mean represents the mathematical average or average percent of material composing the MSW stream. The confidence interval is an expression of accuracy. It provides the upper and lower limits of the "actual" mean for all the MSW received at the participating facility based upon the sorting and sampling observations of the sampled materials. For example, the 90% confidence interval represents that there is a 90% level of confidence that the true population mean

falls within the upper and lower bounds of the confidence interval. The 90% confidence interval is the generally accepted standard by the industry for solid waste composition studies. In general, the more samples that are sorted, the narrower the confidence interval becomes for a given level of confidence. The narrower the intervals the less variability in the data.

Overall, the outputs of the Model provide multiple measures for evaluating the results. It is critical when comparing the MSW composition results that the confidence intervals are considered along with the mean percentages.

SECTION 4
STUDY RESULTS

INTRODUCTION

This section presents the results of the statistical modeling for both the Metropolitan and Greater Minnesota Regions, as well as Statewide. Additionally, selected results for each of the Participating Facilities are depicted at the end of this section.

The Project Team used a "bottom up" approach in conducting the statistical analysis. In other words, results were calculated individually for the smallest subsets of data, and then aggregated to estimate facility-wide, regional and statewide results. The specific steps of the analysis are summarized below:

- **Step 1—Individual Facility, Generator Type**: For each of the Participating Facilities, the Project Team calculated the composition of the Residential waste stream based solely on the Residential samples obtained at that facility. ICI and Mixed waste composition were calculated in the same manner. These 24 data sets (three generator types at each of the eight Participating Facilities) serve as the basic building blocks for performing the remainder of the analysis.
- **Step 2— Individual Facility, Aggregate**: For each Participating Facility, the Project Team developed a weighted-average aggregate composition of the MSW entering that facility. The Residential, ICI, and Mixed waste results from Step 1 were weighted by the number of Residential, ICI, and Mixed waste samples, respectively, obtained using the "Nth" truck approach during the sort.
- **Step 3— All Facilities in Region, Generator Type**: Individual facility results developed in Step 1 were also used to develop the Metropolitan Region and Greater Minnesota Area composition by generator type. For example, the Metropolitan Region Residential waste composition was calculated by aggregating the Residential composition from each of the five Metropolitan Region Participating Facilities developed in Step 1. Individual results from each facility were weighted based on the total estimated 1999 incoming tonnage received at that Participating Facility.
- **Step 4— All Facilities in Region, Aggregate**: Within each region, the aggregate Residential, aggregate ICI, and aggregate Mixed waste composition developed in Step 2 were aggregated to develop a regional composition. The Project Team factored in the aggregate number of Residential, ICI, and Mixed

waste samples for each generator type in developing an appropriate weighting factor.

- **Steps 5—Statewide, Generator Type:** Statewide results were calculated for each generator type based on aggregating the regional results in Step 3 for that generator type. Regional results were weighted based on the total annual waste received by solid waste facilities within the entire region in 1998.
- **Step 6—Statewide, Aggregate:** The Statewide results by generator type in Step 5 were aggregated to determine the Aggregate Statewide results. Once again, the number of samples of each generator type were factored in to the weighted calculations.

It is important to note that the same statistical principles were applied in performing the composition calculations in all of the above steps. In general, statistical principles dictate that roughly 15 to 20 representative samples be obtained from the residential waste stream and 25 to 30 samples from the ICI waste stream to adequately characterize the waste stream for these individual generators. At some of the facilities, the one season sort did not result in sampling above these thresholds (see Tables 4-6 and 4-11). As a result, the variability of the results of any single generator type at these Participating Facilities may be larger than preferred.

However, in aggregating results across generator types or across facilities, the number of samples in the analysis increased and was adequate to characterize the regional and statewide residential and ICI waste streams. The increase in sample size decreases the variability of regional and statewide results (i.e., the confidence intervals narrow). Consequently, it is possible to obtain representative, reliable regional and statewide results.

In a few instances, upon review of the field results, samples were not incorporated into the results because they represented either non-region MSW or non-MSW.

Because of the implications described above, the remainder of this section focuses primarily on the Metropolitan Region and Statewide results (although some Greater Minnesota Area and Facility-specific results are shown). The Project Team believes that the data depicted here provides a reasonable snapshot of the composition of MSW in the State. In all the tables included in this section, the totals may not sum due to rounding. Comprehensive results for all of the Steps described above are provided in the Appendices.

METROPOLITAN REGION

Five of the eight facilities included in the Study represent the Metropolitan Region. The field sort data for 240 samples originating from Residential, ICI, and Mixed waste loads from these five Metropolitan Region facilities were used in calculating the results.

AGGREGATE

Table 4-1 presents the mean composition (by weight) for each of the eight primary material categories in the Metropolitan Region. Additionally, Table 4-1 shows the lower and upper bounds of the mean composition for each primary material group, at a 90 percent level of confidence ("confidence interval"). Note that the upper and lower confidence intervals are not necessarily equidistant from the mean composition. Rather, the upper confidence interval may be larger than the lower interval to ensure no confidence intervals are less than 0.

SUMMARY TABLE 4-1
METROPOLITAN REGION AGGREGATE COMPOSITION
BY PRIMARY MATERIAL CATEGORY
(BY WEIGHT)

Primary Material Category	Mean Composition	90% Confidence Interval	
		Lower	Upper
Paper	34.2%	31.5%	37.3%
Plastic	11.0%	9.9%	12.2%
Metals	4.4%	3.9%	5.2%
Glass	2.7%	2.3%	3.3%
Organic Materials	27.3%	25.1%	30.2%
Problem Materials	1.8%	1.4%	2.4%
HHW/HW	0.3%	0.2%	0.5%
Other Waste	18.3%	16.2%	21.0%
TOTAL	100%	NA	NA

Note:
The total/subtotal may not equal the sum of the material categories due to rounding.

It is important to understand that the mean composition should not be evaluated without also evaluating the corresponding confidence intervals. To illustrate, consider the **Paper** material group in Table 4-1 as an example. At a glance, Table 4-1 indicates that the Metropolitan Region's MSW stream is composed of 34.2 percent paper. However, there is some level of variability associated with this calculation, and confidence intervals define this variability. In layman's terms, we can be 90 percent confident that paper comprises between 31.5 percent and 37.3 percent of the Metropolitan Region's waste stream. Confidence intervals are likely to be narrowed by taking additional samples.

The measure of confidence intervals is important when developing assumptions for any new programs that may be based on the results of this analysis. Either the lower or upper interval may be more appropriate in certain instances. For example, in considering the likely quantity of material to be recovered in an

expanded metal recycling program, it would be more conservative to assume that the Metropolitan Region's MSW stream contains only 3.9 percent metal (lower bound). Conversely, in assessing the quantity of potential HHW/HW in the waste stream, it would be more conservative to assume 0.5 percent (upper bound).

Table 4-2 presents the mean composition of the Metropolitan Region's waste stream for all 59 material subcategories. Because there are so many subcategories, Table 4-2 is quite large, so to make the results more comprehensible the confidence intervals have been omitted. However, complete results including, standard deviation and confidence intervals for each material subcategory, are included in the Appendices.

DETAILED TABLE 4-2
METROPOLITAN REGION AGGREGATE COMPOSITION
BY MATERIAL SUBCATEGORY
(BY WEIGHT)

MATERIAL CATEGORIES	MEAN	MATERIAL CATEGORIES	MEAN
PAPER		**ORGANIC MATERIALS**	
Newsprint (ONP)	4.1%	Yard Waste - Grass and Leaves	2.5%
High Grade Office	3.0%	Yard Waste - woody material	0.4%
Magazines/Catalogs	2.4%	Food Waste	11.0%
Uncoated OCC - recyclable	6.8%	Wood Pallets	3.6%
Uncoated OCC – nonrecyclable	0.5%	Treated Wood	3.8%
Coated OCC	0.1%	Untreated Wood	2.3%
Boxboard	2.5%	Diapers	1.9%
Mixed Paper - recyclable	6.5%	Other Organic Material	1.7%
Mixed Paper - nonrecyclable	8.3%	***Subtotal Organic Materials***	***27.3%***
Subtotal Paper	***34.2%***		
PLASTIC		**PROBLEM MATERIALS**	
PET Bottles/Jars - clear	0.4%	Televisions	<0.1%
PET Bottles/Jars - colored	0.1%	Computer Monitors	<0.1%
Other PET	0.1%	Computer Equipment/Peripherals	0.2%
HDPE Bottles – natural	0.3%	Electric and Electronic Products	1.5%
HDPE Bottles - colored	0.2%	Batteries	0.1%
PVC	0.1%	Other	0.1%
Polystyrene	0.7%	***Subtotal Problem Materials***	***1.8%***
Film – transport packaging	0.3%	**HHW/HW**	
Other Film	3.0%	Latex Paint	<0.1%
Other Containers	0.6%	Oil Paint	<0.1%
Other non-containers	5.2%	Unused Pesti/Fungi/Herbi-cides	<0.1%
Subtotal Plastic	***11.0%***	Unused Cleaners and Solvents	<0.1%
METALS		Compressed Fuel Containers	<0.1%
Aluminum Bev. Containers	0.6%	Automotive - Antifreeze	<0.1%
Other Aluminum	0.5%	Automotive - Used oil filters	<0.1%

DETAILED TABLE 4-2
METROPOLITAN REGION AGGREGATE COMPOSITION
BY MATERIAL SUBCATEGORY
(BY WEIGHT)

MATERIAL CATEGORIES	MEAN	MATERIAL CATEGORIES	MEAN
Ferrous Containers	0.7%	Other	0.2%
Other Ferrous	2.6%	***Subtotal HHW/HW***	***0.3%***
Other Non-Ferrous	<0.1%		
Subtotal Metals	***4.4%***		
GLASS		**OTHER WASTE**	
Clear Containers	1.1%	Textiles	2.4%
Green Containers	0.3%	Carpet	3.0%
Brown Containers	0.4%	Sharps and Infectious Waste	<0.1%
Other Glass	0.8%	Rubber	0.8%
Subtotal Glass	***2.7%***	Construction & Demo. Debris	2.7%
		Household Bulky Items	3.8%
		Empty HHW/HW Containers	0.3%
		Miscellaneous	5.4%
		Subtotal Other Waste	***18.3%***
GRAND TOTAL			100%

Note:
The total/subtotal may not equal the sum of the material categories due to rounding.

GENERATOR TYPE

This subsection provides separate results for both the Residential and ICI generator types[1]. Table 4-3 compares the composition of Residential and ICI waste by primary material categories.

Note that the confidence intervals for Residential waste in Table 4-3 are generally narrower when compared to the confidence intervals for ICI waste. As an example, consider the Organic Materials category. Metropolitan Region Residential waste contains 24.2 percent to 29.6 percent organic materials, a range of roughly 5.4 percent. ICI waste contains from 25.1 to 35.0 percent Organic Materials, or a range of nearly 10 percent. This indicates that the variability of the Residential results is less than that of the ICI results for Organic Materials. In

[1] The "Mixed Waste" generator type—which is simply a combination of Residential and ICI generators—has been included in this study to assure that sorting at each facility captured representative samples from all incoming truckloads, including the significant number that contain BOTH residential and ICI waste. Although the identification and sorting of Mixed Waste was critical to conducting our analysis and developing aggregate results, no separate results are shown in the report for this generator type (although full results are depicted in the Appendices).

other words, we can more precisely estimate the quantity of Organic Material in the Residential generating sector.

TABLE 4-3
COMPARISON OF METROPOLITAN REGION RESIDENTIAL AND ICI COMPOSITION

	RESIDENTIAL			ICI		
		90% CONFIDENCE INTERVAL			90% CONFIDENCE INTERVAL	
MATERIAL CATEGORY	MEAN	LOWER	UPPER	MEAN	LOWER	UPPER
Paper	31.8%	28.3%	35.3%	35.1%	30.2%	40.8%
Plastic	9.5%	8.4%	10.5%	12.3%	10.3%	14.8%
Metals	3.9%	3.3%	4.6%	4.4%	3.5%	6.1%
Glass	2.5%	2.1%	3.1%	2.7%	2.0%	3.9%
Organic Materials	26.4%	24.2%	29.6%	29.5%	25.1%	35.0%
Problem Materials	2.3%	1.6%	3.8%	1.7%	0.9%	2.1%
HHW/HW	0.4%	0.2%	0.7%	0.1%	0.1%	0.2%
Other Waste	23.1%	19.2%	27.9%	14.2%	11.0%	18.2%
TOTAL	100%	NA	NA	100%	NA	NA

Note:
The total/subtotal may not equal the sum of the material categories due to rounding.

The difference in the width of the confidence intervals around Residential and ICI Organic Materials stems from differences in the homogeneity of the residential and ICI waste streams, respectively. Residential waste is relatively homogenous. Once residential waste is collected from several hundred households, compacted on a collection vehicle, tipped at the disposal facility, and selected for sorting, the Residential waste is fairly well mixed. Although there are some differences in waste generation depending on demographic and other local characteristics, most households dispose of essentially similar types of waste. Variation occurs based upon the extent of source reduction and recycling activities.

In contrast, the contents of ICI waste truckloads are highly variable. One truckload may have collected almost entirely from restaurants, another truckload from offices, and yet a third truckload from a warehouse. Each of these generators produces a very different waste stream. The restaurant load will likely be high in food waste and contaminated paper; the office load will contain much more recyclable paper; and the warehouse load may contain a variety of plastic, metal and wood items.

The narrower Residential confidence intervals shown in Table 4-3 result from the heterogeneity of Residential waste relative to ICI waste.

Tables 4-4 and 4-5 show the detailed composition of the Metropolitan Region Residential and ICI streams, respectively. Comprehensive results, including confidence intervals and standard deviation, are included in the Appendices.

DETAILED TABLE 4-4
METROPOLITAN REGION RESIDENTIAL COMPOSITION
(BY WEIGHT)

MATERIAL CATEGORIES	MEAN	MATERIAL CATEGORIES	MEAN
PAPER		**ORGANIC MATERIALS**	
Newsprint (ONP)	5.3%	Yard Waste - Grass and Leaves	3.6%
High Grade Office	1.5%	Yard Waste - woody material	0.7%
Magazines/Catalogs	2.7%	Food Waste	11.5%
Uncoated OCC - recyclable	3.5%	Wood Pallets	<0.1%
Uncoated OCC – nonrecyclable	0.6%	Treated Wood	3.4%
Coated OCC	<0.1%	Untreated Wood	1.0%
Boxboard	3.2%	Diapers	3.9%
Mixed Paper - recyclable	6.4%	Other Organic Material	2.4%
Mixed Paper - nonrecyclable	8.6%	***Subtotal Organic Materials***	***26.4%***
Subtotal Paper	***31.8%***		
PLASTIC		**PROBLEM MATERIALS**	
PET Bottles/Jars - clear	0.5%	Televisions	<0.1%
PET Bottles/Jars - colored	0.2%	Computer Monitors	<0.1%
Other PET	0.2%	Computer Equipment/Peripherals	0.2%
HDPE Bottles – natural	0.2%	Electric and Electronic Products	2.1%
HDPE Bottles - colored	0.3%	Batteries	0.1%
PVC	<0.1%	Other	<0.1%
Polystyrene	0.6%	***Subtotal Problem Materials***	***2.4%***
Film – transport packaging	0.1%		
Other Film	2.9%	**HHW/HW**	
Other Containers	0.4%	Latex Paint	0.1%
Other non-containers	4.0%	Oil Paint	<0.1%
Subtotal Plastic	***9.5%***	Unused Pesti/Fungi/Herbi-cides	<0.1%
		Unused Cleaners and Solvents	<0.1%
METALS		Compressed Fuel Containers	<0.1%
Aluminum Bev. Containers	0.7%	Automotive - Antifreeze	<0.1%
Other Aluminum	0.4%	Automotive - Used oil filters	<0.1%
Ferrous Containers	0.8%	Other	0.2%
Other Ferrous	2.1%	***Subtotal HHW/HW***	***0.4%***
Other Non-Ferrous	<0.1%		
Subtotal Metals	***4.0%***		

DETAILED TABLE 4-4
METROPOLITAN REGION RESIDENTIAL COMPOSITION
(BY WEIGHT)

MATERIAL CATEGORIES	MEAN	MATERIAL CATEGORIES	MEAN
GLASS		**OTHER WASTE**	
Clear Containers	1.3%	Textiles	3.3%
Green Containers	0.3%	Carpet	2.4%
Brown Containers	0.5%	Sharps and Infectious Waste	<0.1%
Other Glass	0.4%	Rubber	0.5%
Subtotal Glass	***2.5%***	Construction & Demo. Debris	3.3%
		Household Bulky Items	6.4%
		Empty HHW Containers	0.5%
		Miscellaneous	6.7%
		Subtotal Other Waste	***23.1%***
GRAND TOTAL			100%

Note:
The total/subtotal may not equal the sum of the material categories due to rounding.

DETAILED TABLE 4-5
METROPOLITAN REGION ICI COMPOSITION
(BY WEIGHT)

MATERIAL CATEGORIES	MEAN	MATERIAL CATEGORIES	MEAN
PAPER		**ORGANIC MATERIALS**	
Newsprint (ONP)	2.6%	Yard Waste - Grass and Leaves	1.3%
High Grade Office	4.2%	Yard Waste - woody material	<0.1%
Magazines/Catalogs	2.7%	Food Waste	10.8%
Uncoated OCC - recyclable	10.2%	Wood Pallets	7.9%
Uncoated OCC – nonrecyclable	0.4%	Treated Wood	4.1%
Coated OCC	0.2%	Untreated Wood	3.5%
Boxboard	1.5%	Diapers	0.3%
Mixed Paper - recyclable	6.1%	Other Organic Material	1.5%
Mixed Paper - nonrecyclable	7.3%	***Subtotal Organic Materials***	***29.5%***
Subtotal Paper	***35.1%***		
PLASTIC		**PROBLEM MATERIALS**	
PET Bottles/Jars - clear	0.3%	Televisions	<0.1%
PET Bottles/Jars - colored	0.1%	Computer Monitors	<0.1%
Other PET	<0.1%	Computer Equipment/Peripherals	0.4%
HDPE Bottles – natural	0.3%	Electric and Electronic Products	1.1%
HDPE Bottles - colored	0.1%	Batteries	<0.1%
PVC	<0.1%	Other	0.1%
Polystyrene	0.8%	***Subtotal Problem Materials***	***1.7%***
Film – transport packaging	0.6%		
Other Film	3.0%	**HHW/HW**	
Other Containers	0.3%	Latex Paint	<0.1%
Other non-containers	6.7%	Oil Paint	<0.1%
Subtotal Plastic	***12.3%***	Unused Pesti/Fungi/Herbi-cides	<0.1%
		Unused Cleaners and Solvents	0.1%
METALS		Compressed Fuel Containers	<0.1%
Aluminum Bev. Containers	0.4%	Automotive - Antifreeze	<0.1%
Other Aluminum	0.6%	Automotive - Used oil filters	<0.1%
Ferrous Containers	0.7%	Other	<0.1%
Other Ferrous	2.6%	***Subtotal HHW/HW***	***0.1%***
Other Non-Ferrous	<0.1%		
Subtotal Metals	***4.3%***		

DETAILED TABLE 4-5
METROPOLITAN REGION ICI COMPOSITION
(BY WEIGHT)

MATERIAL CATEGORIES	MEAN	MATERIAL CATEGORIES	MEAN
GLASS		**OTHER WASTE**	
Clear Containers	0.9%	Textiles	1.5%
Green Containers	0.4%	Carpet	2.8%
Brown Containers	0.4%	Sharps and Infectious Waste	<0.1%
Other Glass	1.1%	Rubber	0.8%
Subtotal Glass	***2.7%***	Construction & Demo. Debris	2.1%
		Household Bulky Items	2.7%
		Empty HHW/HW Containers	0.1%
		Miscellaneous	4.2%
		Subtotal Other Waste	***14.2%***
GRAND TOTAL			100%

Note:
The total/subtotal may not equal the sum of the material categories due to rounding.

STATISTICAL LIMITATIONS

There are a set of issues that impact the Metropolitan Region results. A brief discussion of how these issues impact the statistical results is provided below.

- **Aggregating Residential, ICI and Mixed Waste Results**

  As described previously, Residential, ICI and Mixed waste samples were sorted at each of the five facilities in the Metropolitan Region. Table 4-6 depicts the breakdown of samples by generator type and by facility. The number of samples shown in Table 4-6 were used in developing the weighting factors for aggregating all three generator types into facility-wide and Metropolitan Region composition totals.

TABLE 4-6
METROPOLITAN REGION SAMPLING RESULTS

FACILITY	RESIDENTIAL SAMPLES	ICI SAMPLES	MIXED WASTE SAMPLES	TOTAL SAMPLES
Brooklyn Park T.S.	12	30	8	50
Burnsville Landfill	19	16	7	42
HERC	21	19	9	49
NRG Newport	18	19	13	50
Waste Management T.S.	9	30	10	49
METROPOLITAN TOTAL	79	114	47	240

Table 4-6 depicts the Metropolitan Region aggregate results (shown in Tables 4-1 and 4-2). The results were based on a weighting of 33 percent (79/240) Residential samples, 47 percent ICI samples (114/240), and 20 percent Mixed samples (47/240). (Facility aggregate results were weighted using the same technique.)

- **Aggregating Individual Facility Results**

  Table 4-7 summarizes the annual incoming waste quantities for each of the participating facilities. The estimated annual quantities for each facility was calculated using the first 11 months of actual tonnage received in 1999 and projected tonnages for December. In developing Metropolitan Region aggregate results, facility-specific results were weighted according to the percentages shown in the far right column of the table.

SUMMARY TABLE 4-7 METROPOLITAN REGION WEIGHTING FACTORS BY FACILITY		
FACILITY	ESTIMATED TONS (1999)	PERCENT OF TOTAL
Brooklyn Park T.S.	152,800	11.4%
Burnsville Landfill	299,600	22.4%
HERC	367,000	27.5%
NRG Newport	427,500	32.0%
Waste Management T.S.	89,000	6.7%
TOTAL	1,335,900	100.0%

Note:
The total/subtotal may not equal the sum of the material categories due to rounding.

- **Representativeness of Selected Samples**

  A guiding premise of this Study is that it is possible to obtain representative samples of the Metropolitan Region's overall MSW stream based on sampling and sorting at a subset of facilities in the Area. As a means of evaluating this assumption, the Project Team looked at the proportion of total Metropolitan Region MSW that is disposed at the five participating facilities. These five facilities are estimated to have received a total of 1,335,900 tons of material in 1999. This represents 72.5 percent of the 1,841,585 total tons disposed in the Metropolitan Region in 1998. The Project Team's opinion is that it is likely that these five facilities provide a representative snapshot of the Metropolitan Region waste stream.

- **Seasonal differences in waste stream**

  Sorting events were performed exclusively during the Fall of 1999 at each Participating Facility. Although the results from the Participating Facilities provide representative results, it is possible that some bias may exist with respect to select material categories that may fluctuate by season (e.g., yard waste, beverage containers, etc.).

- **Fraction of Incoming Truckloads with Mixed Waste**

  The Project Team used driver interviews and observations of tipped loads to assess the contents of mixed waste loads in the Metropolitan Region during each sort. Table 4-8 summarizes the reported residential/ICI split of the mixed waste loads obtained during the sort. Note that the breakdown of mixed loads is very near 50/50 at three of the facilities, but closer to 40/60 for two of the facilities with an average of approximately 46%/54%. At first glance, this suggests that Mixed loads in the Metropolitan Region contain slightly more

ICI than residential waste, although additional analysis is necessary to gather more comprehensive data.

TABLE 4-8
METROPOLITAN REGION
REPORTED COMPOSITION OF MIXED LOADS

	AVERAGE COMPOSITION	
FACILITY	RESIDENTIAL	ICI
Brooklyn Park	53.8%	46.3%
Burnsville Landfill	37.5%	62.5%
HERC	51.1%	48.9%
NRG Newport	50.0%	50.0%
Waste Management	38.5%	61.5%
AVERAGE (not weighted)	46.1%	53.9%

RESIDENTIAL/ICI WASTE STREAM SPLIT

In conjunction with this Study, project partners chose to complete a further analysis that would provide an additional reference point used to estimate the residential and ICI waste stream split within the Metropolitan Region. Because it is believed that the NRG Newport RDF Facility receives materials that are representative of the Region's overall waste stream, project team members agreed to conduct the study at the NRG Facility for one week. Once data was complied from NRG, the information could be extrapolated to determine the Region's residential-ICI waste stream split.

In order to complete the analysis, a survey was developed and designed for administration to all licensed haulers that deposit materials generated within the Region at the NRG Newport Facility. Drivers of each vehicle were interviewed and loads were visually inspected as they were deposited on the tipping floor. The survey required each driver to estimate the percentage of residential and ICI generated materials within each load. The surveys were administered during the week of January 24th during all facility receiving hours.

After the surveys were administered, each survey was matched to the corresponding scale house ticket in order to determine the net weight in each vehicle load. The survey data and load tonnages were entered into an Excel spreadsheet to apportion the tonnages between generating sectors. The residential and ICI tonnages were then tallied by day and by week.

A total of 1230 surveys were completed during the weeklong survey event. The results reflected the NRG Newport Facility waste stream to be 49% residential

waste and 51% ICI. The 49/51 split can be extrapolated to the Metropolitan Region assuming the NRG Newport Facility is considered representative.

GREATER MINNESOTA

A total of three facilities were selected to represent Greater Minnesota. The field sort data for 140 samples originating from Residential, ICI, and Mixed waste loads from the Participating Facilities were used in calculating the results. The Project Team's analysis of Greater Minnesota was performed using the same aggregation methodology as with the Metropolitan Region.

Table 4-9 summarizes the Greater Minnesota MSW composition and confidence intervals at a 90 percent level.

SUMMARY TABLE 4-9
GREATER MINNESOTA AGGREGATE COMPOSITION
BY PRIMARY MATERIAL CATEGORY
(BY WEIGHT)

PRIMARY MATERIAL CATEGORY	MEAN COMPOSITION	90% CONFIDENCE INTERVAL	
		LOWER	UPPER
Paper	34.2%	32.1%	36.5%
Plastic	11.7%	10.8%	12.9%
Metals	6.0%	5.1%	7.3%
Glass	3.0%	2.5%	3.6%
Organic Materials	22.9%	20.9%	25.1%
Problem Materials	2.0%	1.4%	3.1%
HHW/HW	1.0%	0.7%	1.4%
Other Waste	19.1%	17.0%	21.5%
TOTAL	100%	NA	NA

Note:
The total/subtotal may not equal the sum of the material categories due to rounding.

Interestingly, although there were fewer samples taken from the Greater Minnesota Facilities, the confidence intervals are as narrow as the Metropolitan Region results. The large number of mixed samples may have impacted the overall results. The wider confidence intervals typically associated with the ICI stream may have been minimized statistically. Additional sorting and sampling is recommended to evaluate the overall Greater Minnesota results.

Table 4-10 presents the detailed results for each subcategory for Greater Minnesota. Complete results, including confidence intervals and standard deviations, are included in the Appendices.

DETAILED TABLE 4-10
GREATER MINNESOTA AGGREGATE COMPOSITION SUMMARY
(BY WEIGHT)

MATERIAL CATEGORIES	MEAN	MATERIAL CATEGORIES	MEAN
PAPER		**ORGANIC MATERIALS**	
Newsprint (ONP)	4.3%	Yard Waste - Grass and Leaves	1.7%
High Grade Office	3.1%	Yard Waste - woody material	0.1%
Magazines/Catalogs	2.7%	Food Waste	14.5%
Uncoated OCC - recyclable	4.6%	Wood Pallets	0.4%
Uncoated OCC – nonrecyclable	0.5%	Treated Wood	1.6%
Coated OCC	0.3%	Untreated Wood	1.1%
Boxboard	2.8%	Diapers	2.7%
Mixed Paper - recyclable	5.3%	Other Organic Material	0.9%
Mixed Paper - nonrecyclable	10.8%	***Subtotal Organic Materials***	***22.9%***
Subtotal Paper	***34.2%***		
PLASTIC		**PROBLEM MATERIALS**	
PET Bottles/Jars - clear	0.5%	Televisions	<0.1%
PET Bottles/Jars - colored	0.4%	Computer Monitors	<0.1%
Other PET	<0.1%	Computer Equipment/Peripherals	<0.1%
HDPE Bottles – natural	0.3%	Electric and Electronic Products	1.9%
HDPE Bottles - colored	0.3%	Batteries	0.1%
PVC	0.1%	Other	<0.1%
Polystyrene	0.9%	***Subtotal Problem Materials***	***2.0%***
Film – transport packaging	0.2%		
Other Film	4.4%	**HHW/HW**	
Other Containers	0.5%	Latex Paint	<0.1%
Other non-containers	4.2%	Oil Paint	0.1%
Subtotal Plastic	***11.7%***	Unused Pesti/Fungi/Herbi-cides	<0.1%
		Unused Cleaners and Solvents	<0.1%
METALS		Compressed Fuel Containers	0.0%
Aluminum Bev. Containers	0.9%	Automotive - Antifreeze	<0.1%
Other Aluminum	0.5%	Automotive - Used oil filters	0.1%
Ferrous Containers	1.3%	Other	0.6%
Other Ferrous	3.3%	***Subtotal HHW/HW***	***1.0%***
Other Non-Ferrous	0.1%		
Subtotal Metals	***6.0%***		

DETAILED TABLE 4-10
GREATER MINNESOTA AGGREGATE COMPOSITION SUMMARY
(BY WEIGHT)

MATERIAL CATEGORIES	MEAN	MATERIAL CATEGORIES	MEAN
GLASS		**OTHER WASTE**	
Clear Containers	1.6%	Textiles	3.4%
Green Containers	0.4%	Carpet	1.5%
Brown Containers	0.5%	Sharps and Infectious Waste	<0.1%
Other Glass	0.5%	Rubber	0.7%
Subtotal Glass	***3.0%***	Construction & Demo. Debris	3.2%
		Household Bulky Items	2.9%
		Empty HHW/HW Containers	0.7%
		Miscellaneous	6.7%
		Subtotal Other Waste	***19.1%***
GRAND TOTAL			100%

Note:
The total/subtotal may not equal the sum of the material categories due to rounding.

STATISTICAL LIMITATIONS

Many of the same issues identified with the Metropolitan Region results impact the results for Greater Minnesota. A brief discussion of how these issues impact the results is provided below.

- **Representativeness of Residential and ICI Results**

  Note that no individual Residential and ICI results are depicted in the study for Greater Minnesota (the appendices do contain results by generator types). This is due to the low number of exclusively Residential and ICI samples obtained at the Greater Minnesota Participating Facilities. In other words, most of the loads delivered to these facilities tended to be identified as Mixed waste and thus the number of Residential and ICI samples is lower than anticipated.

  Table 4-11 summarizes the number of samples obtained at each facility by generator type. As previously stated, 15 to 20 residential samples and 25 to 30 ICI samples are recommended for statistically meaningful results. None of the three facilities individually achieved these thresholds.

TABLE 4-11
GREATER MINNESOTA SAMPLING SUMMARY

FACILITY	RESIDENTIAL SAMPLES	ICI SAMPLES	MIXED WASTE SAMPLES	TOTAL SAMPLES
Polk County WTE	9	4	37	50
Prairieland MSW Composting	7	14	19	40[1]
St. Louis County Landfill	11	9	30	50
TOTAL	27	27	86	140

Note:
(1) Represents one sample from each MSW Commercial hauling vehicle using the facility during the sorting event.

- **Aggregating Residential, ICI and Mixed Waste Results**

  The number of samples shown in Table 4-11 were also used in developing the weighting factors to aggregate all three generator types into facility-wide and Greater Minnesota composition totals. Despite the lack of Residential and ICI samples, the total number of samples by generator type did achieve the recommended Residential and ICI thresholds and result in statistically meaningful results.

- **Aggregating Individual Facility Results**

  Table 4-12 summarizes the annual incoming waste quantities for each of the Participating Facilities in Greater Minnesota. The estimated annual quantities for each facility was calculated using the first 11 months of actual data for 1999 and projected tonnages for the month of December. In developing aggregate results, facility-specific results were weighted according to the percentages shown in the far right column of the table.

SUMMARY TABLE 4-12 GREATER MINNESOTA WEIGHTING FACTORS BY FACILITY		
FACILITY	ESTIMATED TONS DISPOSED (1999)	WEIGHTING FACTOR
Polk County WTE	30,400	31.4%
Prairieland MSW Composting	16,900	17.5%
St. Louis County Landfill	49,500	51.1%
TOTAL	96,800	100%

- **Representativeness of Selected Samples**

  The three facilities targeted for inclusion in Greater Minnesota receive a total of 96,800 tons of material per year. In contrast to the Metropolitan Region, where the targeted facilities received more than 72 percent of the annual waste disposed in 1998, 96,800 tons represents less than 9 percent of the 1,155,865 total tons disposed in Greater Minnesota. The Project Team cautions against relying exclusively on results from facilities with only a limited level of Representativeness of the overall region. It is recommended that a larger subset of facilities be targeted to enhance the data collected.

- **Fraction of Incoming Truckloads with Mixed Waste**

  The Project Team also attempted to tabulate the breakdown of residential to ICI waste in mixed loads in Greater Minnesota. Table 4-13 shows the reported Residential/ICI split based upon hauler interviews and review of the tipped materials.

  At two of the three facilities, the breakdown was proportionally in favor of residential waste, with one facility at approximately 50/50. The overall (unweighted) split suggests that mixed loads in Greater Minnesota contain slightly more residential waste than ICI, although additional analysis is necessary to gather more comprehensive data.

TABLE 4-13
GREATER MINNESOTA
REPORTED COMPOSITION OF MIXED LOADS

	AVERAGE COMPOSITION	
FACILITY	RESIDENTIAL	ICI
Polk County WTE	55.8%	44.2%
Prairieland MSW	48.1%	51.9%
St. Louis County Landfill	67.4%	32.6%
AVERAGE (not weighted)	57.4%	42.6%

Note:
The total/subtotal may not equal the sum of the material categories due to rounding.

STATEWIDE

Statewide results were aggregated using the same methodology as was used in the regional aggregation. Data from a total of 380 samples were used to calculate the results.

AGGREGATE

Table 4-14 summarizes the mean composition and confidence intervals of Minnesota's Statewide MSW.

SUMMARY TABLE 4-14
MINNESOTA STATEWIDE RESULTS
AGGREGATE COMPOSITION BY PRIMARY MATERIAL CATEGORY
(BY WEIGHT)

MATERIAL CATEGORIES	MEAN	90% CONFIDENCE INTERVAL	
		LOWER	UPPER
Paper	34.3%	32.4%	36.5%
Plastic	11.4%	10.6%	12.3%
Metals	5.1%	4.6%	5.8%
Glass	2.8%	2.5%	3.2%
Organic Materials	25.7%	24.1%	27.8%
Problem Materials	1.9%	1.5%	2.4%
HHW/HW	0.6%	0.5%	0.8%
Other Waste	18.3%	16.8%	20.2%
TOTAL	100%	NA	NA

Note:
The total/subtotal may not equal the sum of the material categories due to rounding.

Note the very narrow confidence intervals shown in Table 4-14. This is due to the large number of samples (380) that were used in calculating the results. It is expected that the Statewide results would depict narrower confidence intervals than the results for either of the individual regions - Metropolitan Region and Greater Minnesota.

Table 4-15 depicts the detailed Statewide mean MSW composition. Complete results, including confidence intervals and standard deviation, are included in the Appendices.

DETAILED TABLE 4-15
MINNESOTA STATEWIDE AGGREGATE COMPOSITION
(BY WEIGHT)

MATERIAL CATEGORIES	MEAN	MATERIAL CATEGORIES	MEAN
PAPER		**ORGANIC MATERIALS**	
Newsprint (ONP)	4.1%	Yard Waste – Grass and Leaves	2.1%
High Grade Office	3.1%	Yard Waste – woody material	0.2%
Magazines/Catalogs	2.5%	Food Waste	12.4%
Uncoated OCC - recyclable	6.2%	Wood Pallets	2.6%
Uncoated OCC – nonrecyclable	0.5%	Treated Wood	3.0%
Coated OCC	0.2%	Untreated Wood	1.9%
Boxboard	2.5%	Diapers	2.1%
Mixed Paper - recyclable	6.0%	Other Organic Material	1.4%
Mixed Paper - nonrecyclable	9.2%	***Subtotal Organic Materials***	***25.7%***
Subtotal Paper	***34.3%***		
PLASTIC		**PROBLEM MATERIALS**	
PET Bottles/Jars - clear	0.4%	Televisions	<0.1%
PET Bottles/Jars - colored	0.2%	Computer Monitors	<0.1%
Other PET	0.1%	Computer Equipment/Peripherals	0.2%
HDPE Bottles – natural	0.3%	Electric and Electronic Products	1.6%
HDPE Bottles - colored	0.2%	Batteries	0.1%
PVC	0.1%	Other	<0.1%
Polystyrene	0.8%	***Subtotal Problem Materials***	***1.9%***
Film – transport packaging	0.3%		
Other Film	3.5%	**HHW/HW**	
Other Containers	0.5%	Latex Paint	<0.1%
Other non-containers	4.9%	Oil Paint	<0.1%
Subtotal Plastic	***11.4%***	Unused Pesti/Fungi/Herbi-cides	<0.1%
		Unused Cleaners and Solvents	<0.1%
METALS		Compressed Fuel Containers	<0.1%
Aluminum Bev. Containers	0.7%	Automotive - Antifreeze	<0.1%
Other Aluminum	0.5%	Automotive - Used oil filters	0.1%
Ferrous Containers	0.9%	Other	0.4%
Other Ferrous	2.9%	***Subtotal HHW/HW***	***0.6%***
Other Non-Ferrous	0.1%		
Subtotal Metals	***5.1%***		

DETAILED TABLE 4-15
MINNESOTA STATEWIDE AGGREGATE COMPOSITION
(BY WEIGHT)

MATERIAL CATEGORIES	MEAN	MATERIAL CATEGORIES	MEAN
GLASS		**OTHER WASTE**	
Clear Containers	1.3%	Textiles	2.7%
Green Containers	0.3%	Carpet	2.4%
Brown Containers	0.4%	Sharps and Infectious Waste	<0.1%
Other Glass	0.7%	Rubber	0.8%
Subtotal Glass	***2.8%***	Construction & Demo. Debris	2.8%
		Household Bulky Items	3.4%
		Empty HHW/HW Containers	0.4%
		Miscellaneous	5.8%
		Subtotal Other Waste	***18.3%***
GRAND TOTAL			100%

Note:
The total/subtotal may not equal the sum of the material categories due to rounding.

GENERATOR TYPE

Table 4-16 compares Minnesota Statewide Residential waste composition with ICI composition. Note once again that the confidence intervals for the ICI waste are wider than for residential waste. This is due to the homogeneity of residential sample loads.

TABLE 4-16
COMPARISON OF MINNESOTA STATEWIDE RESIDENTIAL AND ICI COMPOSITION BY PRIMARY MATERIAL GROUP

	RESIDENTIAL			ICI		
		90% CONFIDENCE INTERVAL			90% CONFIDENCE INTERVAL	
MATERIAL CATEGORY	MEAN	LOWER	UPPER	MEAN	LOWER	UPPER
Paper	30.8%	28.0%	33.6%	34.7%	30.6%	39.5%
Plastic	10.4%	9.4%	11.4%	12.4%	10.7%	14.6%
Metals	5.0%	4.2%	5.9%	5.2%	4.1%	7.0%
Glass	2.8%	2.3%	3.4%	2.5%	1.9%	3.6%
Organic Materials	25.4%	23.3%	28.2%	28.9%	25.1%	33.6%
Problem Materials	2.7%	1.9%	4.3%	1.4%	0.8%	1.8%
HHW/HW	0.5%	0.3%	0.7%	0.4%	0.2%	0.9%
Other Waste	22.5%	19.4%	26.3%	14.4%	11.7%	17.8%
TOTAL	100%	NA	NA	100%	NA	NA

Note:
The total/subtotal may not equal the sum of the material categories due to rounding.

Tables 4-17 and 4-18 present the detailed composition for all subcategories for Statewide residential and ICI waste, respectively.

DETAILED TABLE 4-17
MINNESOTA STATEWIDE RESIDENTIAL COMPOSITION
(BY WEIGHT)

MATERIAL CATEGORIES	MEAN	MATERIAL CATEGORIES	MEAN
PAPER		**ORGANIC MATERIALS**	
Newsprint (ONP)	5.0%	Yard Waste - Grass and Leaves	2.9%
High Grade Office	1.4%	Yard Waste - woody material	0.6%
Magazines/Catalogs	2.4%	Food Waste	12.0%
Uncoated OCC - recyclable	3.2%	Wood Pallets	<0.1%
Uncoated OCC – nonrecyclable	0.6%	Treated Wood	3.3%
Coated OCC	<0.1%	Untreated Wood	0.9%
Boxboard	3.1%	Diapers	3.8%
Mixed Paper - recyclable	6.2%	Other Organic Material	2.1%
Mixed Paper - nonrecyclable	8.8%	***Subtotal Organic Materials***	***25.4%***
Subtotal Paper	***30.8%***		
PLASTIC		**PROBLEM MATERIALS**	
PET Bottles/Jars - clear	0.5%	Televisions	<0.1%
PET Bottles/Jars - colored	0.2%	Computer Monitors	<0.1%
Other PET	0.2%	Computer Equipment/Peripherals	0.1%
HDPE Bottles – natural	0.3%	Electric and Electronic Products	2.5%
HDPE Bottles - colored	0.3%	Batteries	0.1%
PVC	<0.1%	Other	<0.1%
Polystyrene	0.7%	***Subtotal Problem Materials***	***2.7%***
Film – transport packaging	0.1%		
Other Film	3.2%	**HHW/HW**	
Other Containers	0.6%	Latex Paint	0.1%
Other non-containers	4.4%	Oil Paint	<0.1%
Subtotal Plastic	***10.4%***	Unused Pesti/Fungi/Herbi-cides	<0.1%
		Unused Cleaners and Solvents	<0.1%
METALS		Compressed Fuel Containers	<0.1%
Aluminum Bev. Containers	0.7%	Automotive - Antifreeze	<0.1%
Other Aluminum	0.4%	Automotive - Used oil filters	0.1%
Ferrous Containers	0.9%	Other	0.3%
Other Ferrous	2.8%	***Subtotal HHW/HW***	***0.5%***
Other Non-Ferrous	0.1%		
Subtotal Metals	***5.0%***		

DETAILED TABLE 4-17
MINNESOTA STATEWIDE RESIDENTIAL COMPOSITION
(BY WEIGHT)

MATERIAL CATEGORIES	MEAN	MATERIAL CATEGORIES	MEAN
GLASS		**OTHER WASTE**	
Clear Containers	1.5%	Textiles	3.5%
Green Containers	0.4%	Carpet	2.7%
Brown Containers	0.5%	Sharps and Infectious Waste	<0.1%
Other Glass	0.4%	Rubber	0.5%
Subtotal Glass	***2.8%***	Construction & Demo. Debris	2.9%
		Household Bulky Items	5.8%
		Empty HHW/HW Containers	0.6%
		Miscellaneous	6.5%
		Subtotal Other Waste	***22.5%***
GRAND TOTAL			100%

Note:
The total/subtotal may not equal the sum of the material categories due to rounding.

TABLE 4-18
MINNESOTA STATEWIDE ICI COMPOSITION SUMMARY
(BY WEIGHT)

MATERIAL CATEGORIES	MEAN	MATERIAL CATEGORIES	MEAN
PAPER		**ORGANIC MATERIALS**	
Newsprint (ONP)	2.4%	Yard Waste - Grass and Leaves	1.5%
High Grade Office	4.3%	Yard Waste - woody material	<0.1%
Magazines/Catalogs	2.5%	Food Waste	11.8%
Uncoated OCC - recyclable	9.9%	Wood Pallets	6.6%
Uncoated OCC – nonrecyclable	0.4%	Treated Wood	3.7%
Coated OCC	0.5%	Untreated Wood	3.7%
Boxboard	1.5%	Diapers	0.4%
Mixed Paper - recyclable	5.4%	Other Organic Material	1.3%
Mixed Paper - nonrecyclable	7.7%	***Subtotal Organic Materials***	***28.9%***
Subtotal Paper	***34.7%***		
PLASTIC		**PROBLEM MATERIALS**	
PET Bottles/Jars - clear	0.3%	Televisions	<0.1%
PET Bottles/Jars - colored	0.2%	Computer Monitors	<0.1%
Other PET	<0.1%	Computer Equipment/Peripherals	0.3%
HDPE Bottles – natural	0.3%	Electric and Electronic Products	1.0%
HDPE Bottles - colored	0.1%	Batteries	<0.1%
PVC	0.1%	Other	0.1%
Polystyrene	0.8%	***Subtotal Problem Materials***	***1.4%***
Film – transport packaging	0.6%		
Other Film	3.4%	**HHW/HW**	
Other Containers	0.3%	Latex Paint	0.1%
Other non-containers	6.4%	Oil Paint	<0.1%
Subtotal Plastic	***12.4%***	Unused Pesti/Fungi/Herbi-cides	<0.1%
		Unused Cleaners and Solvents	<0.1%
METALS		Compressed Fuel Containers	<0.1%
Aluminum Bev. Containers	0.5%	Automotive - Antifreeze	<0.1%
Other Aluminum	0.5%	Automotive - Used oil filters	<0.1%
Ferrous Containers	0.6%	Other	0.3%
Other Ferrous	3.4%	***Subtotal HHW/HW***	***0.4%***
Other Non-Ferrous	<0.1%		
Subtotal Metals	***5.2%***		

TABLE 4-18
MINNESOTA STATEWIDE ICI COMPOSITION SUMMARY
(BY WEIGHT)

MATERIAL CATEGORIES	MEAN	MATERIAL CATEGORIES	MEAN
GLASS		**OTHER WASTE**	
Clear Containers	0.9%	Textiles	1.5%
Green Containers	0.3%	Carpet	2.5%
Brown Containers	0.3%	Sharps and Infectious Waste	<0.1%
Other Glass	1.0%	Rubber	0.7%
Subtotal Glass	***2.5%***	Construction & Demo. Debris	2.5%
		Household Bulky Items	2.4%
		Empty HHW/HW Containers	0.3%
		Miscellaneous	4.5%
		Subtotal Other Waste	***14.4%***
GRAND TOTAL			100%

Note:
The total/subtotal may not equal the sum of the material categories due to rounding.

STATISTICAL LIMITATIONS

Statewide results are impacted by many of the same issues as the Metropolitan Region and Greater Minnesota results. A brief discussion of how these issues impact the results is provided below.

- **Aggregating Regional Residential, ICI and Mixed Waste Results**

  Table 4-19 summarizes the number of samples used as weighting factors to aggregate all three generator types to calculate the Statewide results. Note that residential samples composed 28 percent (106/380), 37 percent (141/380) ICI samples, and 35 percent (133/380) mixed samples.

SUMMARY TABLE 4-19
STATEWIDE SAMPLING RESULTS

FACILITY	RESIDENTIAL SAMPLES	ICI SAMPLES	MIXED WASTE SAMPLES	TOTAL SAMPLES
Metropolitan Region	79	114	47	240
Greater Minnesota	27	27	86	140
TOTAL	106	141	133	380

- **Aggregating Regional Results**

  Table 4-20 summarizes the annual waste quantities received at processing and disposal facilities in each region of Minnesota in 1998. The data was provided by the Minnesota Office of Environmental Assistance (OEA) per 1998 local government and facility reports. To date, 1999 data was not available. Regional results were weighted according to the percentage shown in the far right column of the table.

SUMMARY TABLE 4-20
STATEWIDE WEIGHTING FACTORS BY REGION

FACILITY	TOTAL ESTIMATED TONS (1998)	WEIGHTING FACTOR
Metropolitan Region	1,841,600	61.4%
Greater Minnesota	1,155,900	38.6%
TOTAL	2,997,500	100.0%

- **Regional Representativeness**

  The Project Team once again cautions relying on results with only a limited level of representativeness. The Greater Minnesota facilities included in the Study received less than 9 percent of that region's disposed waste. Yet, as shown in Table 4-20, the composition derived from these three facilities composes over 38 percent of the statewide MSW composition. It is recommended that additional sorting events occur in Greater Minnesota to enhance the reliability of the results.

INDIVIDUAL SITES

As a final consideration, this section presents summary results by primary material category for each of the individual facilities. Summary results are shown only in the aggregate, and not by generator type. Complete results for each facility are included in the Appendices.

METROPOLITAN REGION

Table 4-21 presents the facility-by-facility results for all five Participating Facilities in the Metropolitan Region.

Similarities between facilities can be identified in instances where the mean composition of a material group at one facility falls within the confidence intervals for the same material group at another facility, and vice versa. For example, consider **Paper** at the Brooklyn Park Transfer Station compared to the Burnsville Landfill. At Brooklyn Park, the mean composition of paper is 31.0

percent. This falls between the confidence intervals for paper at Burnsville (25.6%-38.4%). The same holds true for Burnsville. The mean composition for paper at Burnsville falls between the confidence intervals of Brooklyn Park. From a statistical perspective, we can be 90 percent confident that the composition of paper at both facilities is similar.

Differences between facilities can be determined in instances where the mean composition for a material at one facility falls *outside* the confidence intervals at another. For example, consider the mean composition of **Metals** at HERC and NRG. The mean composition (2.5 percent) at HERC is less than the lower confidence interval for Metals at NRG. The same holds true for NRG's Metals composition, which is above the upper confidence interval of HERC. We can be 90 percent confident that the quantity of metals delivered to HERC is statistically less than NRG.

TABLE 4-21
METROPOLITAN REGION FACILITY-BY-FACILITY COMPARISON
BY PRIMARY MATERIAL CATEGORY

	Brooklyn Park T.S.			Burnsville Landfill		
		90% Confidence Interval			90% Confidence Interval	
Material Category	Mean	Lower	Upper	Mean	Lower	Upper
Paper	31.0%	22.6%	40.3%	31.7%	25.6%	38.4%
Plastic	11.9%	8.2%	16.3%	10.1%	7.5%	13.4%
Metals	6.5%	4.1%	9.5%	4.1%	2.8%	5.6%
Glass	4.3%	1.9%	8.0%	1.9%	1.2%	2.9%
Organic Materials	29.8%	21.2%	39.4%	28.6%	22.1%	35.6%
Problem Materials	1.5%	0.8%	2.6%	2.5%	1.3%	4.3%
HHW/HW	<0.1%	<0.1%	<0.1%	0.5%	0.2%	1.0%
Other Waste	15.0%	9.5%	22.0%	20.6%	14.6%	28.0%
TOTAL	100%	NA	NA	100	NA	NA

Note:
The total/subtotal may not equal the sum of the material categories due to rounding.

	HERC			NRG		
		90% CONFIDENCE INTERVAL			90% CONFIDENCE INTERVAL	
MATERIAL CATEGORY	MEAN	LOWER	UPPER	MEAN	LOWER	UPPER
Paper	36.5%	29.2%	44.2%	35.1%	29.1%	41.5%
Plastic	10.9%	8.1%	14.3%	11.6%	9.4%	14.0%
Metals	2.5%	1.9%	3.1%	5.2%	3.7%	7.1%
Glass	3.1%	1.9%	4.7%	2.3%	1.8%	3.0%
Organic Materials	26.3%	20.9%	32.4%	26.1%	22.3%	30.1%
Problem Materials	1.1%	0.5%	2.1%	2.1%	0.8%	4.0%
HHW/HW	0.2%	0.1%	0.3%	0.5%	0.1%	1.2%
Other Waste	19.4%	14.1%	25.5%	17.2%	12.5%	22.9%
TOTAL	100%	NA	NA	100%	NA	NA

Note:
The total/subtotal may not equal the sum of the material categories due to rounding.

	WMI T.S.		
		90% CONFIDENCE INTERVAL	
MATERIAL CATEGORY	MEAN	LOWER	UPPER
Paper	34.2%	26.2%	42.7%
Plastic	9.4%	7.1%	12.0%
Metals	6.3%	3.7%	9.6%
Glass	2.1%	1.2%	3.3%
Organic Materials	28.7%	21.4%	36.8%
Problem Materials	1.6%	0.8%	3.0%
HHW/HW	0.4%	0.2%	0.7%
Other Waste	17.4%	11.9%	23.9%
TOTAL	100%	NA	NA

Note:
The total/subtotal may not equal the sum of the material categories due to rounding.

Upon preliminary review, the following appear to be statistically significant differences between the Participating Facilities' results:

- Metals received at HERC are significantly less than quantities received at each of the other four facilities; and
- HHW/HW received at the Brooklyn Park Transfer Station are less than the quantities received at each of the other four facilities. The <0.1% mean does not represent that no HHW/HW was found at the Brooklyn Park Transfer Station, it means only demininus quantities were sorted.

Additional review of the data is recommended to evaluate the statistical differences between facilities.

GREATER MINNESOTA

The same comparison is depicted below for the Greater Minnesota Participating Facilities.

TABLE 4-22
GREATER MINNESOTA FACILITY-BY-FACILITY COMPARISON
BY PRIMARY MATERIAL GROUP

	ST. LOUIS COUNTY			POLK		
		90% CONFIDENCE INTERVAL			90% CONFIDENCE INTERVAL	
MATERIAL CATEGORY	MEAN	LOWER	UPPER	MEAN	LOWER	UPPER
Paper	29.0%	24.9%	33.3%	42.3%	39.5%	45.1%
Plastic	11.5%	9.6%	13.9%	12.4%	11.2%	13.7%
Metals	7.6%	5.4%	10.5%	5.0%	4.4%	5.8%
Glass	2.7%	1.9%	3.8%	4.0%	3.0%	5.7%
Organic Materials	20.0%	16.5%	24.0%	24.3%	22.0%	26.6%
Problem Materials	3.3%	1.7%	5.7%	0.4%	0.2%	0.5%
HHW/HW	1.1%	0.6%	2.1%	0.6%	0.3%	1.0%
Other Waste	24.8%	20.0%	29.9%	11.1%	9.4%	12.9%
TOTAL	100%	NA	NA	100	NA	NA

Note:
The total/subtotal may not equal the sum of the material categories due to rounding.

	PRAIRIELAND		
		90% CONFIDENCE INTERVAL	
MATERIAL CATEGORY	MEAN	LOWER	UPPER
Paper	35.1%	27.7%	43.3%
Plastic	11.1%	9.1%	13.5%
Metals	3.3%	2.6%	4.1%
Glass	2.0%	1.3%	2.9%
Organic Materials	28.8%	20.7%	37.9%
Problem Materials	1.5%	0.7%	3.0%
HHW/HW	1.3%	0.5%	2.5%
Other Waste	17.0%	12.2%	22.9%
TOTAL	100%	NA	NA

Note:
The total/subtotal may not equal the sum of the material categories due to rounding.

The statistical differences between Participating Facility results by material category exists in most all categories including paper, metals, glass, organic materials, problem materials, and other waste. This underscores the concerns raised about using the aggregate results from these three facilities as representative of Greater Minnesota.

SUMMARY

Given that a total of 380 samples from eight different Minnesota solid waste facilities were ultimately factored into the Statewide analysis, it is the Project Team's opinion that the estimated Statewide MSW composition presented above is statistically sound and representative. However, it is also prudent to recognize that there are some limitations to the results for certain subsets of the Statewide data.

The 240 samples from the five Metropolitan Region facilities should also be considered representative of that specific wasteshed. Metropolitan Region samples were well-distributed between the residential and ICI sectors, with a relatively small number of mixed waste samples.

Representativeness becomes a concern in assessing the Greater Minnesota results. Eighty of the 140 total samples (almost 60%) were from mixed waste truckloads, thus residential and ICI samples were underrepresented. The Project Team would recommend the collection of additional data in Greater Minnesota to enhance the "representativeness" of the data.

Similarly, the number of samples taken at each individual facility limits the Project Team's ability to draw conclusions about the differences between Residential, ICI and Mixed waste at a facility-specific level.

COMPARISON TO MPCA 1991/1992 RESULTS

One important objective in the Study design phase of the project was to establish material categories that would allow for comparison to the waste composition results from the MPCA 1991/1992 Study. As discussed in Section 3, the material categories have been crafted to allow for comparison. In making this comparison, we compared the statistical means for each material category from the 1991/1992 Study to the confidence intervals from the 1999 Study data. Where the mean from the 1991/1992 Study is outside the 1999 confidence interval, we are inferring a statistically significant difference for that material category. Comparison of the confidence intervals between this Study and the 1991/1992 Study would represent a more rigorous statistical approach, but confidence intervals from the earlier study were not available for use in this comparison.

For this part of the analysis, we reviewed the statewide aggregated data and the Metropolitan Region aggregated data. Aggregated data for Greater Minnesota was not included due to the small number of sites participating and high variability of the results between sites.

STATEWIDE

Table 4-23 contains the statewide composition data from the 1991/1992 Study and the 1999 Study results. The categories have been ordered to allow for ease of comparison.

PAPER

Three statistically significant differences can be identified among the various paper categories. First, the amount of office paper appears to have decreased, from a mean of 4.4 percent in 1992 to between 2.6 and 3.8 percent for 1999. (This range represents the 90 percent confidence interval for the true mean.) Second, the total amount of all types of corrugated cardboard appears to have declined, from a mean of 8.8 percent in 1992 to between 6.0 and 8.2 percent for 1999. In addition, the total paper category results show a significant decrease as well. The previous mean was 40.1 percent, while the 1999 confidence interval was 32.4 to 36.5 percent. Based on these results, we can infer an overall reduction in total paper discards since 1992. The magnitude of this decrease is indicative of reductions in other paper categories as well, though no other categories were identified as having statistically significant changes.

TABLE 4-23
COMPARISON OF STATEWIDE RESULTS
MSW COMPOSITION
1992 TO 1999

MATERIAL CATEGORY - 1992	1992 MEAN	1999 CONFIDENCE INTERVALS	1999 MEAN	MATERIAL CATEGORY - 1999
PAPER				**PAPER**
Newsprint	4.0	3.7 - 4.5	4.1	Newsprint
Office Paper	4.4	2.6 - 3.8	3.1	Office Paper
Corrugated/Kraft Paper	8.8	5.5 - 7.2	6.2	OCC -- uncoated, recycl.
		0.4 - 0.6	0.5	OCC -- uncoated, non-recycl.
		0.1 - 0.4	0.2	OCC -- coated
		(6.0 - 8.2)	*(6.9)*	
Magazines	2.6	2.1 - 3.0	2.5	Magazines/Catalogs
Other Paper	20.0	8.5 - 10.1	9.2	Mixed Paper --non- recyclable
		2.3 - 3.3	2.5	Boxboard
		5.5 - 6.6	6.0	Mixed Paper -- recyclable
		(16.3 - 20.0)	*(17.7)*	
Total Paper	***40.1***	***32.4 - 36.5***	***34.3***	***Total Paper***
PLASTIC				**PLASTIC**
PET	0.3	0.4 - 0.5	0.4	PET Bottles/Jars - clear
		0.2 - 0.3	0.2	PET Bottles/Jars - colored
		0.1 - 0.1	0.1	Other PET
		(0.7 - 0.9)	*(0.7)*	
HDPE	0.7	0.3 - 0.4	0.3	HDPE Bottles - natural
		0.2 - 0.3	0.2	HDPE Bottles - colored
		(0.5 - 0.7)	*(0.5)*	
Polystyrene	1.1	0.7 - 0.9	0.8	Polystyrene
Plastic Film	4.7	0.2 - 0.4	0.3	Film - transport packaging
		3.3 - 3.9	3.5	Other Film
		(3.5 - 4.3)	*(3.8)*	
Other Plastic	4.6	4.4 - 5.6	4.9	Other non-containers
		0.1 - 0.1	0.1	PVC
		0.4 - 0.6	0.5	Other containers
		(4.9 - 6.3)	*(5.5)*	
Total Plastic	***11.4***	***10.6 - 12.3***	***11.4***	***Total Plastic***
METAL				**METAL**
Aluminum beverage cans	0.5	0.6 - 0.8	0.7	Aluminum beverage containers
Other aluminum	0.4	0.4 - 0.6	0.5	Other aluminum
Ferrous cans	0.9	0.8 - 1.1	0.9	Ferrous cans
Other ferrous	2.8	2.4 - 3.6	2.9	Other ferrous
Other non-ferrous	0.5	0.1 - 0.1	0.1	Other non-ferrous
Total Metal	***5.0***	***4.6 - 5.8***	***5.1***	***Total Metal***

TABLE 4-23
COMPARISON OF STATEWIDE RESULTS
MSW COMPOSITION
1992 TO 1999

MATERIAL CATEGORY - 1992	1992 MEAN	1999 CONFIDENCE INTERVALS	1999 MEAN	MATERIAL CATEGORY - 1999
GLASS				**GLASS**
Glass containers	2.0	1.2 - 1.5	1.3	Clear Glass containers
		0.3 - 0.4	0.3	Green Glass containers
		0.4 - 0.5	0.4	Brown Glass containers
		(1.9 - 2.4)	*(2.0)*	
Other Glass	1.1	0.5 - 1.0	0.7	Other Glass
Total Glass	***3.1***	***2.5 - 3.2***	***2.8***	***Total Glass***
Small yard waste	2.8	1.8 - 2.8	2.1	Yard Waste -- grass & leaves
Large yard waste	0.1	0.1 - 0.3	0.2	Yard Waste -- woody material
Food waste	13.3	11.3 - 13.7	12.4	Food waste
Wood waste	6.5	1.9 - 3.7	2.6	Wood Pallets
		2.5 - 4.0	3.0	Treated Wood
		1.5 - 2.6	1.9	Untreated Wood
		(5.9 - 10.3)	*(7.5)*	
		2.6 - 4.5	3.4	Household bulky items
Textiles	3.1	2.4 - 3.1	2.7	Textiles
		1.9 - 3.2	2.4	Carpet
		(4.1 - 6.3)	*(5.1)*	
Construction/Demolition	2.9	2.3 - 3.9	2.8	Construction/Demolition
Diapers	2.4	1.9 - 2.4	2.1	Diapers
Tires	0.1	0.6 - 1.0	0.8	Rubber
Other Organic	3.7	1.2 - 1.7	1.4	Other Organic
Other Inorganic	3.8	5.3 - 6.6	5.8	Miscellaneous
		0.0 - <0.1	<0.1%	Sharps/Infectious Waste
PROBLEM MATERIALS				**PROBLEM MATERIALS**
Small Electric Appliances	0.8	0.0 - <0.1	<0.1	Televisions
		0.0 - 0.1	<0.1	Computer monitors
		0.1 - 0.2	0.2	Computer equipment/peripherals
		1.3 - 2.1	1.6	Electric & Electronic Products
		(1.4 - 2.4)	*(1.8)*	
Major Appliances	0.0	0.0 - 0.1	<0.1	Other problem materials
Total Problem Materials	***0.8***	***1.5 - 2.4***	***1.9***	***Total Problem Materials***

TABLE 4-23
COMPARISON OF STATEWIDE RESULTS
MSW COMPOSITION
1992 TO 1999

MATERIAL CATEGORY - 1992	1992 MEAN	1999 CONFIDENCE INTERVALS	1999 MEAN	MATERIAL CATEGORY - 1999
HHW/HW				**HHW/HW**
Hazardous Waste	0.8	0.0 - 0.1	<0.1	Latex Paint
		0.0 - 0.1	<0.1	Oil Paint
		0.0 - <0.1	<0.1	Unused Pest./Fung./Herb.
		0.0 - 0.1	<0.1	Unused Cleaners/Solvents
		0.0 - <0.1	<0.1	Compressed Fuel Containers
		0.0 - <0.1	<0.1	Automotive - Antifreeze
		0.3 - 0.5	0.4	Other HHW/HW
		0.4 - 0.6	0.4	Empty HHW/HW Containers
		0.1 - 0.1	0.1	Batteries
		(0.8 - 1.5)	*(0.9)*	
Oil Filters	0.1	0.0 - 0.1	0.1	Automotive - Used Oil/Filters
Total HHW/HW	***0.9***	***0.8 - 1.6***	***1.0***	***Total HHW/HW***

Note:
The total/subtotal may not equal the sum of the material categories due to rounding.

PLASTIC

For plastics, the results show virtually no change in the total percentage of plastic discards in the waste stream, but changes can be found among some of the individual plastic categories.

PET – An increase from a mean of 0.3 percent to between 0.7 and 0.9 percent in the 1999 data, more than a doubling of the percentage.

Polystyrene – A decrease from 1.1 percent to between 0.7 and 0.9 percent.

Plastic film – A decrease from a mean of 4.7 percent to a range of 3.5 to 4.3 percent.

All other plastics – When combining the other plastic categories from the 1999 data, the results show an increase from 4.6 percent to between 4.9 and 6.3 percent.

These results are somewhat surprising. While we would expect PET to have increased and polystyrene to have decreased, reflecting their changing stature as packaging materials, the decrease in plastic film was not anticipated. The plastic film category was expected to be higher, due to increasing use of film as pallet wrap and the perceived lack of progress in film recycling. As noted earlier, a more rigorous statistical comparison is recommended to confirm a statistically significant difference.

METAL

In the metals category, one change was identified. Aluminum beverage cans increased, from a mean of 0.5 percent to between 0.6 and 0.8 percent. This change seems somewhat surprising, given the traditional strength of aluminum can recycling and the growing use of plastic for single use beverage containers. As with the comparison of plastics categories, confirmation of this result is recommended.

In addition to this change, the 1999 data reflects a decrease in the other non-ferrous category, from 0.5 percent to 0.1 percent.

ELECTRIC AND ELECTRONIC PRODUCTS

Not surprisingly, the 1999 data shows an increase in electric and electronic products. [The 1991/1992 sorts had one catch-all category, compared to four for 1999, but the category definitions are compatible to each other.] In 1992, the mean was 0.8 percent for the entire category. For 1999, the four categories combined to produce a confidence interval of 1.4 to 2.4 percent.

The Minnesota Electronics Recycling Project, a joint project between the Minnesota Office of Environmental Assistance, Waste Management- Asset Recovery Group, Sony, Panasonic and the American Plastics Council, was conducted between August and October 1999. Collection events occurred at 65 sites throughout Minnesota with 32 counties participating in the project. The project collected approximately 600 tons of electronic equipment with televisions constituting the majority of the tonnage collected. While no definitive data exists as to whether this material would have entered the waste stream during the timeframe of the waste composition study, the electronics collection project may have affected a number of the problem materials categories.

The growth in electric and electronic products, which may be understated due to the collection project, drives the total problem materials category results. The mean from 1992 was 0.8 (essentially comprised of electric and electronic products) and the 1999 results show a range of 1.4 to 2.4 percent, with small contributions from batteries and other problem materials categories.

OTHER CATEGORIES

In a few instances, some changes were found in categories that can be considered "catch-all", meaning they include several minor or small material streams. The 1999 data show a decrease in other organic material, from a mean of 3.7 percent to between 1.2 and 1.7 percent. Conversely, the results show an increase in other inorganic material, from 3.8 percent to between 5.3 and 6.6 percent. By their nature, these categories are difficult to describe precisely, so the specific changes in materials within these categories is difficult to identify.

METROPOLITAN REGION

Table 4-24 contains the comparison of results for the Metropolitan Region. In general, the comparison of Metropolitan Region results for the 1991/1992 Study to the 1999 Study data is similar to the statewide comparison, though a few differences exist.

PAPER

As with the statewide comparison, the results show a decrease in office paper discards, from a mean of 4.5 percent to between 2.3 and 3.9 percent. Unlike the statewide results, no statistically significant change was found for corrugated cardboard. For the total paper discards category, the results show a decrease from 40.1 percent to between 31.5 and 37.3 percent.

PLASTIC

The results of the comparison for the plastics categories is similar to the statewide results as well. The total plastics estimate remained unchanged, while PET and other plastics increased as a share of the total and HDPE, polystyrene and film decreased. The specific comparisons are listed below.

PET – An increase from a mean of 0.3 percent to between 0.6 and 0.8 percent.

HDPE – A decrease from 0.7 percent to between 0.4 and 0.5 percent.

Polystyrene – A decrease from 1.1 percent to between 0.6 and 0.8 percent.

Plastic film – A decrease from 4.7 percent to a range of 2.9 to 3.9 percent.

All other plastics – By combining the other plastic categories for 1999, the data shows an increase from the 1992 mean of 4.8 percent to between 5.0 and 6.9 percent for the 1999 data.

Again, a more rigorous statistical comparison is recommended to confirm the results.

TABLE 4-24
COMPARISON OF METROPOLITAN REGION RESULTS
MSW COMPOSITION
1992 TO 1999

MATERIAL CATEGORY - 1992	1992 MEAN	1999 CONFIDENCE INTERVALS	1999 MEAN	MATERIAL CATEGORY - 1999
PAPER				**PAPER**
Newsprint	4.0	3.6 - 4.7	4.1	Newsprint
Office Paper	4.5	2.3 - 3.9	3.0	Office Paper
Corrugated/Kraft Paper	8.7	5.8 - 8.3	6.8	OCC -- uncoated, recycl.
		0.4 - 0.6	0.5	OCC -- uncoated, non-recycl.
		0.1 - 0.3	0.1	OCC -- coated
		(6.3 - 9.2)	*(7.4)*	
Magazines	2.9	1.9 - 3.1	2.4	Magazines/Catalogs
Other Paper	20.0	7.4 - 9.4	8.3	Mixed Paper --non- recyclable
		2.2 - 3.8	2.5	Boxboard
		5.7 - 7.5	6.5	Mixed Paper -- recyclable
		(15.3 - 20.7)	*(17.3)*	
Total Paper	***40.1***	***31.5 - 37.3***	***34.2***	***Total Paper***
PLASTIC				**PLASTIC**
PET	0.3	0.4 - 0.5	0.4	PET Bottles/Jars - clear
		0.1 - 0.2	0.1	PET Bottles/Jars - colored
		0.1 - 0.1	0.1	Other PET
		(0.6 - 0.8)	*(0.6)*	
HDPE	0.7	0.2 - 0.3	0.3	HDPE Bottles - natural
		0.2 - 0.2	0.2	HDPE Bottles - colored
		(0.4 - 0.5)	*(0.5)*	
Polystyrene	1.1	0.6 - 0.8	0.7	Polystyrene
Plastic Film	4.7	0.2 - 0.5	0.3	Film - transport packaging
		2.7 - 3.4	3.0	Other Film
		(2.9 - 3.9)	*(3.3)*	
Other Plastic	4.8	4.5 - 6.0	5.2	Other non-containers
		0.1 - 0.2	0.1	PVC
		0.4 - 0.7	0.6	Other containers
		(5.0 - 6.9)	*(5.9)*	
Total Plastic	***11.6***	***9.9 - 12.3***	***10.9***	***Total Plastic***
METAL				**METAL**
Aluminum beverage cans	0.5	0.5 - 0.7	0.6	Aluminum beverage containers
Other aluminum	0.4	0.4 - 0.6	0.5	Other aluminum
Ferrous cans	0.9	0.6 - 1.0	0.7	Ferrous cans
Other ferrous	2.8	2.2 - 3.3	2.6	Other ferrous
Other non-ferrous	0.5	0.0 - 0.1	<0.1	Other non-ferrous
Total Metal	***5.0***	***3.9 - 5.2***	***4.4***	***Total Metal***

TABLE 4-24
COMPARISON OF METROPOLITAN REGION RESULTS
MSW COMPOSITION
1992 TO 1999

MATERIAL CATEGORY - 1992	1992 MEAN	1999 CONFIDENCE INTERVALS	1999 MEAN	MATERIAL CATEGORY - 1999
GLASS				**GLASS**
Glass containers	2.0	1.0 - 1.4	1.1	Clear Glass containers
		0.3 - 0.4	0.3	Green Glass containers
		0.3 - 0.5	0.4	Brown Glass containers
		(1.6 - 2.3)	*(1.8)*	
Other Glass	1.1	0.5 - 1.2	0.8	Other Glass
Total Glass	***3.1***	***2.3 - 3.3***	***2.7***	***Total Glass***
Small yard waste	2.7	2.0 - 3.6	2.5	Yard Waste -- grass & leaves
Large yard waste	0.1	0.2 - 0.5	0.4	Yard Waste -- woody material
Food waste	13.2	9.7 - 12.7	11.0	Food waste
Wood waste	6.6	2.5 - 5.2	3.6	Wood Pallets
		3.1 - 5.4	3.8	Treated Wood
		1.7 - 3.2	2.3	Untreated Wood
		(7.3 - 13.8)	*(9.7)*	
		2.8 - 5.5	3.8	Household bulky items
Textiles	3.0	2.0 - 2.8	2.4	Textiles
		2.2 - 4.2	3.0	Carpet
		(4.2 - 7.0)	*(5.4)*	
Construction/Demolition	2.8	2.1 - 4.3	2.7	Construction/Demolition
Diapers	2.4	1.6 - 2.3	1.9	Diapers
Tires	0.1	0.5 - 1.2	0.8	Rubber
Other Organic	3.8	1.4 - 2.2	1.7	Other Organic
Other Inorganic	3.8	4.7 - 6.4	5.4	Miscellaneous
		0.0 - <0.1	<0.1	Sharps/Infectious Waste
PROBLEM MATERIALS				**PROBLEM MATERIALS**
Small Electric Appliances	0.8	0.0 - <0.1	<0.1	Televisions
		0.0 - 0.1	<0.1	Computer monitors
		0.1 - 0.4	0.2	Computer equipment/peripherals
		1.1 - 2.1	1.5	Electric & Electronic Products
		(1.2 - 2.6)	*(1.7)*	
Major Appliances	0.0	0.0 - 0.1	0.1	Other problem materials
Total Problem Materials	***0.8***	***1.4 - 2.4***	***1.8***	***Total Problem Materials***

TABLE 4-24
COMPARISON OF METROPOLITAN REGION RESULTS
MSW COMPOSITION
1992 TO 1999

MATERIAL CATEGORY - 1992	1992 MEAN	1999 CONFIDENCE INTERVALS	1999 MEAN	MATERIAL CATEGORY - 1999
HHW/HW				**HHW/HW**
Hazardous Waste	0.8	0.0 - 0.1	<0.1	Latex Paint
		0.0 - <0.1	<0.1	Oil Paint
		0.0 - <0.1	<0.1	Unused Pest./Fung./Herb.
		0.0 - 0.1	<0.1	Unused Cleaners/Solvents
		0.0 - <0.1	<0.1	Compressed Fuel Containers
		0.0 - <0.1	<0.1	Automotive - Antifreeze
		0.1 - 0.3	0.2	Other HHW/HW
		0.0 - 0.1	0.1	Batteries
		0.2 - 0.5	0.3	Empty HHW/HW Containers
		(0.3 - 1.1)	*(0.6)*	
Oil Filters	0.1	0.0 - 0.1	<0.1	Automotive - Used Oil/Filters
Total HHW/HW	***0.9***	***0.3 - 1.2***	***0.6***	***Total HHW/HW***

Note:
The total/subtotal may not equal the sum of the material categories due to rounding.

METAL

Unlike the statewide comparison, the Metropolitan Region comparison did not reflect an increase in aluminum beverage cans. The other non-ferrous category did show a decrease consistent with the statewide comparison, from 0.5 to a confidence interval of 0.0 and 0.1 percent.

WOOD WASTE

In the 1992 results, the mean for wood waste was 6.6 percent. The 1999 data reflects a confidence interval of 7.3 to 13.8 percent. This comparison suggests a growth in wood waste discards. Wood pallets and treated wood are the largest portions of total wood waste in the 1999 data.

YARD WASTE

Yard waste – woody material increased, from a mean of 0.1 percent to between 0.2 and 0.5 percent, however this category is small compared to the yard waste – grass and leaves category.

ELECTRIC AND ELECTRONIC PRODUCTS

The Metropolitan Region comparison is virtually identical to the statewide comparison, with an increase from 0.8 percent to between 1.2 and 2.6 percent for

the four categories combined. Also, the total for problem materials increased, from a mean of 0.8 to between 1.4 and 2.4 percent.

OTHER CATEGORIES

The Metropolitan Region comparison for the other organic material and other inorganic material is similar to the statewide comparison, with other organic material decreasing and other inorganic material increasing.

POTENTIAL INFLUENCING FACTORS

Upon reviewing the initial comparison results, the Study partners expressed some surprise at the overall similarity of the MSW composition between the two studies. While some changes were identified, and a few appeared to be statistically significant, the review of the findings revealed an expectation among staff that the changes would be more pronounced. Consequently, provided below is a list of some other factors that may influence the results.

These factors include:

- MSW disposal tip fees;
- MSW abatement efforts (source reduction, recycling, HHW) that target specific types of materials;
- Market conditions for recyclable materials; and
- Economic conditions.

After identifying some of these factors, we gathered some limited data to confirm if the expectations were reasonable. This section describes those factors and, to the extent practical, their apparent relationship to the composition results.

MSW DISPOSAL TIP FEES

Changes in market conditions for MSW disposal have led to significant decreases in the tip fees, or "prices," at MSW processing facilities and landfills in Minnesota. These changes came after a series of legal opinions characterizing that flow control ordinances could not be used to direct MSW to specific facilities.

The lower tip fees send a different price signal to waste generators. While lower tip fees do not appear to have resulted in substantial decreases for individual households, lower visible disposal "prices" have had some influence on ICI waste generators. The higher the disposal price, the more the ICI waste generator is likely to identify ways to reduce disposal costs through abatement efforts such as source reduction, reuse and recycling. If higher prices had been maintained, potentially greater abatement may have taken place over the past several years.

ABATEMENT PROGRAM VARIABLES

Changes in abatement programs have taken place during the last decade. In 1992, the recycling rate for the State and Metropolitan Region were 39 and 46 percent, respectively. In 1998 those rates had grown to 46 and 49 percent, respectively. Most of the improvements in recycling collection levels occurred just before or during the sorts for the 1991/1992 Study. The most significant change we could identify was the move toward increased commingling of recyclable materials. For example, many curbside programs put paper and/or containers together, and any sorting is done at a processing facility. This shift appeared to be driven by two factors: increased convenience for the generator and greater efficiency in collection. Upon review, we are uncertain about the extent this change may have influenced abatement efforts, and the remaining mixed MSW composition. Data on recycling participation rates and set-out rates (i.e., the amount of material set out at each stop) would help to further evaluate the degree to which this programmatic change has affected MSW composition.

Another program variable identified was the level of on-going public education for reduction and recycling. Education and promotion efforts tend to be given greater attention and resources during the early stages of a program's implementation. As the programs mature, education and outreach tend to evolve toward a maintenance level. That trend appears to be true for reduction and recycling efforts in Minnesota and the Metropolitan Region. In the past year, a significant public education campaign on source reduction has been developed by the OEA. This effort reflects an awareness that strong education and outreach efforts are needed in order to continue making progress toward abatement objectives.

Finally, it should be noted that the Minnesota Legislature has not enacted significant policy initiatives relating to MSW abatement since the passage of the 1989 Solid Waste Reduction and Recycling Act (the "SCORE Bill"). Any significant new policies enacted between 1992 and 1999 may have influenced the waste composition results.

MARKETS FOR RECYCLABLE MATERIALS

Over the past decade, market conditions for recyclable materials have been highly volatile. Some commodities have seen record high and low prices, and collection programs experienced difficulty trying to balance revenues and costs. The table below identifies market prices for selected recyclable materials at the time the two composition studies were undertaken.

TABLE 4-25 RECYCLABLE MATERIALS MARKET PRICES (PER TON)		
	1992[1]	1999[2]
Newspaper (#6)	$0.49	$21.63
OCC	$13.00	$40.00
Aluminum Cans	$613.50	$1,040.00
Tin/Steel Cans	$23.57	$36.61
Glass (weighted)	$36.13	$31.85

[1] Prices for January 1992.
[2] Prices for Fall 1999.

Source: SuperCycle and Ramsey County.

GENERAL ECONOMIC CONDITIONS

Since 1992 the U.S. has experienced the longest peacetime economic expansion in history. The conventional wisdom has asserted that recycling market conditions tend to have an inverse relationship with the general economic conditions. That is, when the economy is strong, demand for recyclable materials has been relatively weak, and when the economy is in recession, the demand for recyclable materials is strong. The logic underlying this relationship is that businesses seek lower cost materials (i.e., recyclable materials) during times of recession.

We have not had the opportunity to see how market conditions respond to a new period of economic recession since the 1991/1992 Study. Given that the period from 1990 to 1992 was one of tremendous growth in both recycling collection and end-market capacity, spurred by government investments and incentives to promote recycling, our current system has yet to experience a full economic cycle (growth, recession, recovery).

SECTION 5

PROGRAM IMPLICATIONS AND RECOMMENDATIONS

This section identifies program implications arising from the MSW composition results and provides recommendations on how to incorporate this information into State and Region solid waste management system planning. The scope of this section was developed in consultation with the Project Team and the SWMCB's Lead Staff committee.

ROLE OF WASTE COMPOSITION STUDY

The primary use of the Study results is to help establish a baseline for measuring the impacts of future program activities. In 1998, the SWMCB adopted a 20-year regional Master Plan for solid waste management. This plan establishes goals and outcomes, for both the region and its member counties, and specifies strategies to be pursued to meet those outcomes. The composition data will be a valuable element of the measurement system used to evaluate progress in implementing the Master Plan.

In addition, the Minnesota Office of Environmental Assistance recently completed its *Solid Waste Policy Report* (January 2000), which identifies a number of policy recommendations and program strategies to further improve solid waste management in the State. The composition results from this Study can help to inform the actions taken to support the policy recommendations developed in the *Solid Waste Policy Report*.

DISCARDS BY GENERATOR TYPE

Beyond determining the material composition percentages of the MSW stream, this project involved the additional step of estimating the tons of each material for the different generator classes, residential and ICI. This step was limited to the Metropolitan Region, due to available data and applicability of the results.

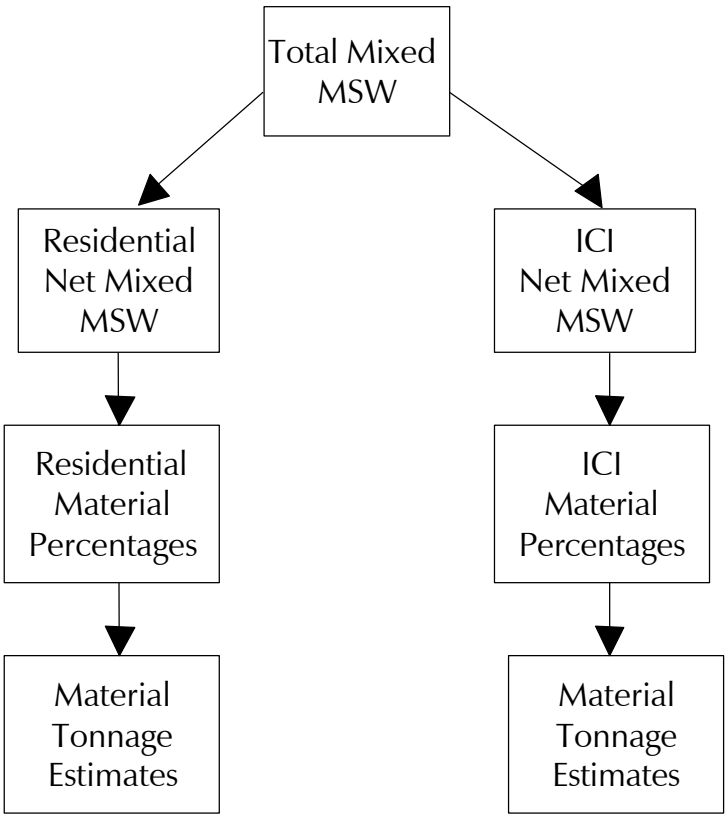
In order to complete this task, additional information was needed to discern the relative proportions of the remaining MSW stream (about 1.85 million tons in the Region) from residential and ICI sources. The Region has been using an estimate of 45 percent residential and 55 percent ICI, but that estimate is for total MSW generation, including recycling, not the discarded share of MSW. A more precise split of the discarded MSW stream was needed before estimating tons of each material for each generator class.

Additional data came from two primary sources. The first was from a week-long survey at an MSW facility to identify the generator class for each load. The NRG-Newport facility was selected by the Project Team as representative of MSW

facilities in the Metropolitan Region, in terms of generator type. The specific details of how this survey was administered and the results are included in Section 4. The second source of data was from a number of cities in the Region that had detailed data on residential MSW generation, as a result of organized or municipal collection systems for households.

When considered together, the Project Team agreed that the data supported characterizing the residential share of the discarded MSW stream as between 50 and 55 percent, with the remainder being the ICI share. This result is consistent with the supposition that a greater share of ICI waste is recycled than residential waste, meaning the discard share of ICI is going to be smaller than the generation share (which is estimated at 55 percent). Figure 5-1 illustrates the steps taken to produce the tonnage estimates by material types.

Figure 5-1
Material Tonnage Estimates



Using this range, we calculated estimates for each material for both residential and ICI generator classes. Table 5-1 shows the 20 largest categories by generator type. Tables 5-2 and 5-3 split these categories into their respective generator types, residential and ICI lists. For reference, Table 5-2 includes estimates of pounds per household for each material.

TABLE 5-1
MATERIALS IN MSW - BY WEIGHT
METROPOLITAN REGION

MATERIAL	QUANTITY (IN TONS)	
	LOW[1]	HIGH[1]
Food Waste – Residential	105,900	116,000
Food Waste – ICI	89,500	99,400
Uncoated OCC-recyclable – ICI	84,500	93,900
Mixed Paper-nonrecyclable – Residential	79,200	87,100
Wood Pallets – ICI	65,500	72,700
Miscellaneous – Residential [2]	61,700	67,900
Mixed Paper-nonrecyclable – ICI	60,500	67,200
Mixed Paper-recyclable – Residential	58,900	64,800
Household Bulky Items – Residential	58,900	64,800
Other Plastics-noncontainers – ICI	55,500	61,700
Mixed Paper-recyclable - ICI	50,600	56,200
ONP - Residential	48,800	53,700
Other Plastics-noncontainers - Residential	36,800	40,500
Diapers - Residential	35,900	39,500
High-grade Office Paper - ICI	34,800	38,700
Miscellaneous - ICI[2]	34,800	38,700
Treated Wood - ICI	34,000	37,800
Uncoated OCC-recyclable - Residential	32,200	35,500
Treated Wood - Residential	31,300	34,400
Boxboard - Residential	29,500	32,400
Total	1,088,800	1,202,900

Note:
[1] Quantities calculated using residential MSW proportion of 50-55 percent, and ICI proportion of 45-50 percent.
[2] Miscellaneous category includes only those materials that could not be classified into one of the other categories. Examples of materials include rock, dirt, other inorganics.

TABLE 5-2
RESIDENTIAL MATERIALS IN MSW - BY WEIGHT
METROPOLITAN REGION

MATERIAL	QUANTITY (IN TONS)		POUNDS PER HOUSEHOLD	
	LOW	HIGH	LOW	HIGH
Food Waste	105,900	116,000	221	243
Mixed Paper-nonrecyclable	79,200	87,100	165	182
Miscellaneous	61,700	67,900	129	141
Mixed Paper-recyclable	58,900	64,800	123	135
Household Bulky Items	58,900	64,800	123	135
ONP	48,800	53,700	102	111
Other Plastics-noncontainers	36,800	40,500	77	84
Diapers	35,900	39,500	75	82
Uncoated OCC-recyclable	32,200	35,500	67	74
Treated Wood	31,300	34,400	65	72
Boxboard	29,500	32,400	61	68
Total	579,100	636,600	1,208	1,327

Note:
Quantities calculated using a residential MSW proportion of 50% to 55%.

TABLE 5-3 ICI MATERIALS IN MSW - BY WEIGHT METROPOLITAN REGION		
MATERIAL	QUANTITY (IN TONS)	
	LOW	HIGH
Food Waste	89,500	99,400
Uncoated OCC-recyclable	84,500	93,900
Wood Pallets	65,500	72,700
Mixed Paper-nonrecyclable	60,500	67,200
Other Plastics-noncontainers	55,500	61,700
Mixed Paper-recyclable	50,600	56,200
High-grade Office Paper	34,800	38,700
Miscellaneous	34,800	38,700
Treated Wood	34,000	37,800
Total	509,700	566,300

Note:
Quantities calculated using an ICI MSW proportion of 45% to 50%.

PROGRAM IMPLICATIONS

A review of this list reflects a number of observations.

- Source reduction opportunities have been identified for a number of these materials, including food waste, OCC, wood pallets, mixed paper and office paper. For household bulky items like furniture and mattresses, reuse options are available in some areas.
- At least 8 of these material categories can be considered readily recyclable: OCC, wood pallets, recyclable mixed paper, office paper and boxboard.
- Opportunities exist to compost several of these categories, including food waste, non-recyclable mixed paper and diapers.
- Two of the 20 categories, which in fact are the same material, are considered as a problem material: treated wood.

In its Master Plan, the SWMCB identified source reduction potential for specific materials, totaling 235,000 tons. Those materials include commercial packaging waste, office paper, food waste and residential third-class mail. All of these materials are represented in the top 20 categories. With the estimated tons for these material categories, the SWMCB may choose to review the targets established in the Master Plan, and to make adjustments if the data suggests the potential is either greater or less than previously estimated.

For instance, the SWMCB identified a reduction potential of 75,000 tons for commercial packaging waste, wood pallets and OCC. Based on the estimated tons remaining in MSW, there are between 150,000 and 165,000 tons of those materials being discarded. The SWMCB identified a similar 75,000-ton reduction potential for food waste. Based on the composition results, between 195,000 and 215,000 tons of food waste are discarded as MSW.

With regard to recycling, the SWMCB had developed a goal of maintaining the current recycling rate. As total generation was projected to grow, recycling would have to grow to keep pace. As with source reduction, specific materials were identified as priorities. Those materials include office paper, food waste and transport packaging (i.e., OCC, wood pallets and plastic film). Based on the composition results, the SWMCB may want to give additional consideration to opportunities to improve recycling levels during the planning period. In particular, while office paper is one of the 20 largest categories in MSW discards, other materials are present in larger quantities and also can be recycled. The SWMCB may choose to expand its targets for increased recycling of selected materials, to include some residential sources such as mixed paper (recyclable), OCC and boxboard.

RECOMMENDATIONS

As the State and the SWMCB consider how to proceed based on the results of this composition study, we recommend the following activities:

- Conducting generator-based waste studies;
- Promoting residential waste abatement efforts; and
- Conducting additional field sorts of MSW facilities in Greater Minnesota to refine the results for this area and on a statewide basis.

GENERATOR-BASED WASTE STUDIES

For material categories of particular importance, generator-based waste studies can help to improve the depth of understanding of how those materials ultimately end up in the MSW stream. Such studies can identify where reduction, reuse and recycling opportunities exist, and what incentives or operational changes are needed for generators to take advantage of these opportunities. These studies would seem to be helpful for ICI generators, particularly for those that produce large quantities of food waste and transport packaging.

RESIDENTIAL WASTE ABATEMENT

Much of the focus for source reduction and recycling improvements in the SWMCB's Master Plan is on ICI materials and generators. Given that at least half of the remaining MSW in the Region is residential, some additional analysis of

options for increasing abatement of residential materials should be considered. Options may include additional policy and program initiatives.

ADDITIONAL FIELD SORTS IN GREATER MINNESOTA

For this Study, we obtained MSW composition data from three facilities in Greater Minnesota. These three facilities combined manage less than 10 percent of the Greater Minnesota's mixed MSW. Additional waste composition sorts at other Greater Minnesota facilities would enhance the quality of the composition data for Greater Minnesota and the State as a whole.

- municipal solid waste (MSW) – garbage, refuse and other solid waste from residential, commercial, industrial and community activities that the generator of the waste aggregates for collection; except MSW does not include auto hulks, street sweepings, ash, construction debris, mining waste, sludges, tree and agricultural wastes, tires, lead acid batteries, motor and vehicle fluids and filters, and other materials collected, processed and disposed of as separate waste streams, but does include source-separated compostable materials. (Minn. Stat. §115A.03, subd. 21).
- solid waste – garbage, refuse, sludge from a water supply treatment plant or air contaminants treatment facilities, and other discarded waste materials and sludges, in solid, semisolid, liquid, or contained gaseous form, resulting from industrial, commercial, mining, and agricultural operations, and from community activities, but does not include hazardous waste; animal waste used as fertilizer; earthen fill, boulders, rock; sewage sludge; solid or dissolved materials in domestic sewage or other common pollutants in water sources, such as silt, dissolved or suspended solids in industrial wastewater effluents or discharges which are point sources subject to permits under section 402 of the federal Water Pollution Control Act; as amended, dissolved materials in irrigation return flows; or source, special nuclear, or by-product materials as defined by The Atomic Energy Act of 1954, as amended. (Minn. Stat. §116.06, subd. 22).
- residential - single-family or multi-family dwelling units.
- industrial/commercial/institutional (ICI) - non-residential waste generators.
- mixed - residential and non-residential waste generators.
- mean percentage - mathematical average by weight (see more detailed discussion in “Statistical Measures,” Appendix F).
- confidence interval - the upper and lower limits of the "actual" mean for the overall population based upon the mean and variance of the observed sample data (see more detailed discussion in “Statistical Measures,” Appendix F).
- 90% confidence interval - level of confidence that the true mean for the overall population is within the stated confidence interval (i.e. industry standard) [see more detail discussion in “Statistical Measures,” Appendix F].
- Metropolitan Region – the six counties composing the Solid Waste Management Coordinating Board (Ramsey, Washington, Anoka, Hennepin, Dakota and Carver).

- Greater Minnesota – Minnesota counties that are not members of the Solid Waste Management Coordinating Board.
- Statewide – an aggregate category, which includes the Metropolitan Region and the Greater Minnesota counties.
- generator type – major waste generating categories, including residential, industrial/commercial/institutional (ICI) and mixed.
- waste-to-energy (WTE) – combustion of solid waste with energy recovery.
- refuse-derived fuel (RDF) – the fraction of processed mixed municipal solid waste that is shredded and used as fuel in a boiler, consisting of lighter weight materials such as plastic and paper products, with most metals, glass and other non-combustible materials removed.
- municipal solid waste (MSW) composting – the controlled microbial degradation of organic waste to yield a humus-like product.

PAPER

Newsprint (ONP) – printed groundwood newsprint, including glossy advertisements and inserts typically found in newspapers

High Grade Office Paper – high grade continuous form computer paper, white paper including bond, photocopy and notebook paper, and colored ledger paper primarily found in offices

Key points:

- Kraft envelopes go into Other Paper – recyclable
- If high grade paper is wet, it should still go into this category because it is assumed to have become wet after being discarded

Examples:

- Bond computer paper, index cards, computer cards, notebook paper, xerographic and typing paper, tablets (yellow and with clear glue binding), manila file folders, white register receipts, non-glossy fax paper

Magazines/Catalogs – magazines, catalogs, promotional materials printed on glossy paper; does not include telephone directories or books

Uncoated OCC – recyclable – uncoated cardboard with a wavy core and not contaminated with other materials such as wax or plastic coating

Key points:

- OCC with styrofoam attached to it that cannot be removed belongs in nonrecyclable category

Uncoated OCC – nonrecyclable – uncoated cardboard with a wavy core that is contaminated with oil, paint, blood or other organic material, or with permanently attached packing material

Examples:

- OCC boxes that are significantly dirty, paint-coated, covered with large amounts of sealing tape or mailing labels, pizza boxes

Coated OCC – cardboard coated with wax or plastic

Boxboard – chipboard boxes not coated with wax, plastic or metal

Examples:

- Cereal boxes, other chipboard food containers, shirt boxes

Mixed Paper – recyclable – paper that would be included in residential "mixed mail" or commercial "office pack" recycling programs, not including the grades identified above

Examples:

- Paper bags (including kraft), envelopes, egg cartons, tissue roll cores, telephone directories, books, brightly colored paper, calendars, "junk" mail, tablets with colored glue bindings

Mixed Paper – nonrecyclable – all paper that doesn't fit into the categories specified above

Key points:

- If the sorter is 99% sure that the generator intended to reuse the paper in such a way that it became contaminated for recycling, put that paper into this category (e.g., paper used to dispose of chewing gum, paper sprayed with paint)
- If it would take an effort to make the paper recyclable, put it into this category

Examples:

- Paper or boxboard coated with wax, plastic or metal, tissue papers, napkins, dishware, frozen food packaging

PLASTIC

PET Bottles/Jars – clear – clear plastic bottles and necked jars composed of polyethylene terephthalate

Key points:

- Look for the label "1" on the bottom
- PET and PVC can be differentiated because PET containers have a nub or 'belly button' while PVC containers have a seam or 'smile'
- Items not clearly identified as PET go into Other Containers

Examples:

- Beverage bottles, some bottles for detergent, liquor, toiletries and honey, jars for peanut butter and mayonnaise

PET Bottles/Jars – colored – colored plastic bottles and necked jars composed of polyethylene terephthalate

Key points:

- Look for the label "1" on the bottom
- PET and PVC can be differentiated because PET containers have a nub or 'belly button' while PVC containers have a seam or 'smile'
- Items not clearly identified as PET go into Other Containers

Examples:

- Beverage bottles, some bottles for detergent, liquor,

Other PET – non-bottle PET, including deli trays & shells, tennis ball containers

HDPE Bottles – natural – natural, or unpigmented, high-density polyethylene bottles with necks

Key points:

- Look for the label "2" on the bottom
- Opaque or translucent matte finish
- Must narrow down to a neck, otherwise it goes in Other Containers

Examples:

- Clear or uncolored bottles for dairy products, detergent, windshield fluid, eye drops, rubbing alcohol, vinegar, motor oil, and some shampoo, fabric softener, antifreeze, bleach

HDPE Bottles –colored – colored high-density polyethylene bottles with necks

Key points:

- Look for the label "2" on the bottom
- Must narrow down to a neck, otherwise it goes in Other Containers

Examples:

- Colored bottles for orange juice, detergent, windshield fluid, motor oil, and some shampoo, fabric softener, antifreeze, bleach

PVC – all polyvinyl chloride containers for cosmetics, non-HHW products, tubs & jars, and durable products such as piping, edging

Key points:

- Look for the label "3" on the bottom of containers

Examples:

- Automotive fluid bottles, shampoo bottles, household cleaning fluid bottles, food and non-food tubs/jars, rigid plastic pipe

Film – transport packaging – film plastic used for 'stretch' wrapping pallets of products

Other Film – all other flexible plastic film regardless of resin type, including plastic bags labeled as HDPE

Examples:

- Garbage bags, bread bags, snack bags, plastic grocery bags, food wrappings, sheet film

Other Containers – all plastic containers not included the categories specified above

Key points:

- Containers other than "1" and "3", or "2" bottles with necks
- Look for the label "4" or "5" or "6" or "7" on the container

Examples:

- Margarine tubs, yogurt cups, cottage cheese containers, pharmaceutical bottles, mustard bottles, some beverage containers

Other Non-containers – anything plastic that is not identifiable as one of the categories above

Examples:

- Molded toys, clothes hangers, cleaning tools, plastic hoses, drinking straws, individual condiment containers, plastic cards, pens

METALS

Aluminum Beverage Containers – aluminum beverage containers

Other Aluminum – All aluminum except beverage containers

Key points:

- If the material is not recognizable as aluminum and it as not attracted to a magnet, it belongs in Other Non-Ferrous

Examples:

- Aluminum foil, aluminum pie plates, aluminum siding, aluminum lawn chairs

Ferrous Containers – steel food and beverage containers, including steel soft drink, beer and other beverage containers, and steel pet food cans

Other Ferrous – Ferrous and alloyed ferrous scrap to which a magnet is attracted, includes household, commercial and industrial materials

Examples:

- Clothes hangers, sheet metal products, pipes, metal scraps

Other Non-Ferrous – all other non-magnetic metal, such as brass, copper, that are not recognized as aluminum

GLASS

Clear Containers – clear glass food and beverage containers

Green Containers – green glass food and beverage containers

Brown Containers – brown glass food and beverage containers

Other Glass – all glass that was not originally a food or beverage container, including plate glass, drinking glasses, cooking utensils, ash trays, mirrors, fragments; any glass containers not clear, green or brown

Key points:

- If the glass is broken and not 100% identifiable as food or beverage glass, it belongs in Other Glass

ORGANIC MATERIALS

Yard Waste – Grass and Leaves – non-woody plant material

Examples:

- Grass, leaves, weeds, cut flowers, twigs less than ¼" in diameter

Yard Waste – Woody Material – woody plant material from garden, park or lawn maintenance

Examples:

- Twigs, brush and branches more than ¼" in diameter, pine cones

Food Waste – Material capable of being decomposed by micro-organisms with sufficient rapidity as to cause nuisances from odors and gases; putrescibles

Examples:

- Food preparation waste, food scraps, spoiled food, kitchen wastes, waste parts from butchered animals, dead animals

Wood Pallets – wood pallets and crates, typically of a commercial origin

Treated Wood – lumber that is green or brown treated, railroad ties

Untreated Wood – lumber that is not treated

Diapers –infant and adult disposable diapers

Other Organic Material – any organic material not classified by category, including cotton balls, feminine hygiene products, hair, small organic fragments passing through the sort screen

PROBLEM MATERIALS

Televisions – televisions, video monitors

Computer Monitors – computer monitors

Computer equipment/peripherals – computer processing units, keyboards, modems, printers

Electric and Electronic Products – small product or appliance with electric cord or battery power source, including small kitchen and bathroom appliances (toasters, hair dryers, etc.), radios, audio or video equipment, handheld video games, lamps, vacuum cleaners

Batteries – all batteries, including automotive, household (rechargeable and non-rechargeable), button

Other – other problem materials, including major appliances, fluorescent light bulbs, thermostats, mercury switches, garage door openers, dried latex paint

HOUSEHOLD HAZARDOUS WASTE

Latex Paint – latex paint that is not dried

Oil Paint – oil base paint, wet and dry

Unused Pesticides/Fungicides/Herbicides – household and commercial products used to destroy or control organisms/pests

Unused Cleaners and Solvents – household and commercial products used for cleaning purposes that are labeled "toxic", "corrosive", "flammable", "ignitable", "radioactive", "poisonous", "reactive"

Key points:

- Includes anything labeled acid, base, solvent, oxidizer, organic peroxide
- All non-empty aerosols regardless of contents

Compressed Fuel Containers – propane cylinders, CO2 cartridges, other compressed gas containers

Automotive – Antifreeze – automotive antifreeze

Automotive – Used Oil/Filters – automotive oil and oil filters

Other – other products or materials characterized as "toxic", "corrosive", "flammable", "ignitable", "radioactive", "poisonous", "reactive"

OTHER WASTE

Textiles – clothing, bedding, curtains, blankets, other cloth material, leather goods

Carpet -- carpet

Sharps and Infectious Waste – hypodermic needles and any "red bag" material

Examples:

- Laboratory waste, items covered in blood, research animal waste, regulated human body fluids, syringes with needles, scalpel blades, pipettes

Rubber – rubber hoses, tubes, tires

Construction and Demolition Debris – material from construction or demolition, including wallboard, concrete and other debris

Household Bulky Items – furniture, mattresses

Empty HHW Containers – empty containers of HHW category products

Miscellaneous – other materials not fitting category classification

Examples:

- Rocks, dirt, ceramics, porcelain, kitty litter, small fragments of inorganic material passing through the sort screen

1.0 INTRODUCTION

R. W. Beck has been retained by the Solid Waste Management Coordinating Board to conduct a statewide waste characterization study (Study) during the fall of 1999.

The waste sorts will be conducted under the direction of R. W. Beck at up to 8 different solid waste facilities around the state. The purpose of the Study is to characterize the MSW received at each facility and estimate the characterization on a statewide basis and for the Metropolitan Twin Cities Area.

OBJECTIVE OF THIS PLAN

The objective of this plan is to identify the critical health and safety issues related to the sorting activities and the method used to train staff concerning these issues as well as accurate sorting procedures.

The personal safety and health of each staff person is the first consideration of R. W. Beck. The prevention of occupationally-induced injuries and illnesses is of such importance it will be given priority over all considerations during the performance of sorting activities. To the greatest degree possible, R. W. Beck will provide all equipment, training, and physical facilities necessary for maintaining the personal safety and health of all staff members. Along with this commitment, it is the responsibility of each and every staff person to contribute to his or her own and fellow worker's health and safety by learning and exercising safe work practices and complying with all requirements of t his site safety plan.

APPLICABILITY

This site safety plan outlines and explains the various equipment, procedures and rules which have been designed to keep sorters safe and healthy during this study. Failure of a sorter to follow anyone of the rules set forth in this site safety plan will be grounds for immediate dismissal. Unsafe practices or behavior will not be tolerated.

STANDARD OPERATING PROCEDURES

This basic procedure for sorters will be to identify different materials in an MSW sample that has been placed on a waist-high sorting table and to place the materials in nearby appropriately labeled containers. Before receiving the waste on the table it will have been examined by the site supervisor (or an appropriately trained assistant) for household hazardous, hazardous, and infectious waste. After the material is sorted into the containers, the supervisor or an assistant will weigh the containers. After the containers are emptied, the next sample will be brought to the table and the sorting will begin again.

LOCATION OF SAFETY EQUIPMENT

The following items will be located near the sorting tables for immediate access:

- One 10# ABC Dry Chemical Fire Extinguishers
- Spill Containment Kit
- Protective Clothing
- First Aid Kit
- Portable Eyewash Unit
- Potable Water Supply

COMMUNICATIONS

During the sort, sorters will be wearing dust masks that will inhibit communication by voice. Additionally, sorters will be wearing unfamiliar and uniform clothing that will make identification difficult. Because of these factors, extra care should be taken in moving about and in moving the garbage and containers, in walking behind someone, stepping over objects, etc. Names should be written boldly on the Tyvek units. Greater effort will be required to communicate and sorters should consider it important to take the time to walk over to someone to speak to them or to use hand signals in order to keep the work area safe.

2.0 EMPLOYEES AND PERSONAL PROTECTIVE EQUIPMENT

SORTERS AND WORK ZONES

Based upon the amount of hazardous safety training and responsibility assumed for the study, various tasks have been assigned to workers.

SITE SUPERVISOR

The site supervisor is the site safety officer and the emergency coordinator. The site supervisor will be overseeing the entire work area and will be responsible for presorting the waste samples for hazards before the sample is categorized by the sorters. The sorters may not approach the areas where unexamined waste samples are being stored or examined. In the event of a spill of hazardous material from a sample, the supervisor is responsible for cleanup of the spill or for calling the appropriate authorities. In the event of a medical emergency, the supervisor will accompany the victim to the hospital. The supervisor is also responsible for dismissing those individuals whose conduct is considered to be unsafe.

ASSISTANT SUPERVISOR

The assistant supervisor will assist the site supervisor as necessary. The focus of the Assistance Supervisor's role is to facilitate the sorting process for the sorting crew.

SORTERS

Sorters are employees of R. W. Beck and will sort and categorize the waste being sampled. In order to make the job as comfortable and safe as possible, a number of procedures and work locations have been defined. Sorters will be required to wear an organic vapor dust mask rather than a respirator because the waste will have been presorted to remove the hazardous, household hazardous, and infectious waste, and they will be limited to working only in the vicinity of the sort tables and taking breaks in a predetermined area.

NEED FOR PERSONAL PROTECTIVE CLOTHING

Municipal solid waste is not considered to be a hazardous material for definition. Nevertheless, it certainly may contain items and substances that may be encountered in close range, picked up by hand, or may have leaked from a broken container and mixed with other waste materials. These conditions could result in situations which could be hazardous to the health of the sorters conducting the study. For these reasons, it will be necessary for each sorter to wear the personal protective clothing that will be provided. This protective clothing is listed below. Again, not wearing any of these items while working at the sort table will be grounds for immediate dismissal.

- Hard hats (liners will be provided in winter)
- Safety glasses or goggles (or prescription safety glasses)
- Organic vapor dust mask
- White Tyvek full-piece suit (the suit's sleeves should be tucked inside the gloves so the ends of the sleeves don't drag in the waste)

- Nitrile gloves (cotton liners will be provided, optional)
- Steel-toed boots

ROUTES OF ENTRY IN CONTAMINATION

Personal protective clothing guards the "routes of entry" from materials hazardous to human health. The ways that hazardous materials can enter the body are by ingesting them, breathing them in. Contacting them with the skin, eyes, or mucous membranes, or by injecting them (by contact with broken glass, nails, syringes, etc.). The two most common routes of exposure which will be encountered during the sort are through the skin (particularly through a cut or abrasion), including the mucous membranes in the eyes, nose and mouth, and through inhalation. Hands and arms will be covered by Tyvek suits and nitrile gloves; eyes and nose will be shielded by glasses and a mask. The mask will also shield against the inhalation of any airborne material. The mask and protective clothing will help to keep one safe from any hazardous materials which may be encountered; however, caution and safe work practices will have to be given priority during the entire time of the sort.

PRESORTING PROTECTION

Different levels of protection are required for different study activities, depending on the potential for exposure. In addition to the personal protective clothing listed previously for sorters, presorting the waste samples for hazardous, household hazardous, and infectious waste requires the wearing of a half-faced respirator fitted with organic vapor and acid gas cartridges and a dust filter pad. The person presorting the waste must receive additional safety training and be capable of wearing the additional respiratory protection.

SPILLS

In the unlikely event of a spill or a release of a hazardous substance in a quantity still manageable by on-site personnel, the site supervisor will wear a poly-coated Tyvek suite (yellow) with duct tape to seal the wrists and ankles, double gloves (nitrile gloves with inner vinyl gloves), and disposable vinyl overboots to protect against liquids. The site supervisor will also switch to a full-faced respirator fitted with dual organic vapor/acid gas and high efficiency particulate (HEPA) cartridges.

LIKELIHOOD OF HEAT AND COLD STRESS

Because the study will be taking place inside a minimally heated area or outside, environmental factors are an important consideration in worker health and safety. Additionally, the personal protective clothing required for the study can aggravate situations caused by uncomfortable weather. All sorters conducting the sort must wear long sleeves and pants under their Tyvek coveralls. A large

Tyvek suit will be worn over warm layers of clothing. Frequent breaks will be encouraged in the event of extremely hot or cold weather. A work/rest schedule will be adapted to weather conditions. Also, water coolers and beverages will be provided throughout the sort.

FIRST AID FOR HEAT AND COLD STRESS

The following are First Aid procedures for conditions caused by hot and cold temperature extremes that may be aggravated by required personal protective equipment:

HEAT EXHAUSTION

Caused by: Prolonged hot spell, excessive exposure, physical exertion.

Symptoms: Profuse sweating, weakness, dizziness, and sometimes heat cramps; skin is cold and pale, clammy with sweat; pulse is thready and blood pressure is low. Body temperature is normal or subnormal. Vomiting may occur. Unconsciousness is rare.

First Aid: Move to a cooler environment immediately. Provide rest and a cool drink of water or beverage like Gatorade. Seek medical attention if the symptoms are severe.

HEAT STROKE (HEAT COLLAPSE)
WARNING: CAN BE FATAL

Caused by: Failure of the body to regulate its temperature because excessively ward weather and physical exertion has depleted it of fluids needed to perspire.

Symptoms:

1. Weakness, dizziness, nausea, headache, heat cramps, heat exhaustion, excessive sweating; skin flushed and pink.

2. Sweating stops (usually) and body temperature rises sharply. Delirium or coma is common; skin changes from pink to ashen or purplish.

First Aid: Immediate medical care is needed; heat stroke is very serious. The body must be cooled soon. Move the victim to a cooler place, remove protective clothing, and bathe in cold water. Use extreme care and frequently check ABCs (airway, breathing, and circulation) if the person is unconscious.

FROST NIP/BITE

Caused by: Cold air temperatures (especially if there is a wind) freezing the skin. Most often the exposed skin on the face, nose and ears is affected but prolonged cold may affect the hands and feet also.

Symptoms:

1. A reddening of the skin.

2. The area will blanch, or whiten, and there will be a stinging sensation. Frostbite should not be allowed to proceed beyond this stage. Seek a warm location immediately.

3. The area will become white, with a waxy appearance at this point, and will go numb. Tissue damage can occur at this point and, if ignored, gangrene may set in.

First Aid: Get indoors or to a warmer place immediately. Treat the frostbitten area with lukewarm water (103 to 107 degrees F); don't use hot water and absolutely do not rub the area with snow. If warm water isn't available, wrap the affected area in a warm, dry cloth. Drink a warm liquid. Do not smoke or drink because both act to constrict blood vessels and will inhibit circulation in the area. If the frostbitten area blisters do not break them; see a doctor soon to check for infection.

ROUTINE DECONTAMINATION

"Decontamination" is a procedure for removing, or "doffing," the personal protective equipment in a specified order to prevent the spread of contaminants. During breaks and at lunch it is important to remove the equipment so as not to inhale or consume contaminants on the gear. The following is the proper sequence which should be used for removing the protective clothing;

1. Scrape or brush off any dirt from steel-toed boots. In winter, store in a warm room or take them home to dry overnight; if liners are worn, be sure they dry overnight.

2. Remove nitrile gloves while keeping the inner cotton gloves on. This is a good time to examine the nitrile gloves for any holes or tears. Through the gloves away and use a new pair if any holes or tears are found. If the gloves are sound, but very dirty they can be washed with soap and water and dried before taking them off.

3. Carefully remove the Tyvek suit, keeping the outside of the suit away from the skin and from the inside of the suit. (You may need to take your boots off to do this.) If the suit is extremely dirty or torn, replace it with a new suit. Turn the dirty Tyvek suit inside out so no one else is exposed to the contamination and discard it. Make sure the clean suit has been marked with your name before returning to work.

4. Remove hard hat. Brush off any dirt or dust. Store in box.

5. Remove safety glasses/goggles. Inspect, clean if necessary, and store.

6. Remove dust mask. Place the dust mask in a labeled plastic bag during lunchtime or at the end of the day so the carbon is not further depleted by continuing to absorb water vapor from the air. Take care not to deform the mask or to introduce contaminants to the inside of the mask.

7. Remove cotton inner gloves.

8. Wash hands and face with soap and water before eating, drinking, chewing gum or smoking. No eating, drinking, gum chewing, or smoking will be allowed in the sort area. Shower as soon as possible upon reaching home.

3.0 RESPIRATORY PROTECTION

INTRODUCTION

During the waste composition study, sorters may be exposed to a variety of airborne health hazards. Again, municipal solid waste is not defined as a hazardous waste, but there is always the chance that a dangerous item could have been discarded indiscriminately and could show up on a worktable. Protecting against this small chance is absolutely necessary. To protect the health and safety of staff, the proper use of masks is necessary. Those staff assigned to wear masks must receive training and fit-testing prior to use. The following policy sets forth a respiratory protection program that is designed to help insure the greatest possible protection for staff.

GENERAL LIMITATIONS FOR WEARING MASKS

You will notice that there is increased resistance when wearing the mask; that it will take a little more effort for you to breathe through the mask than it takes to breathe normally. Therefore, individuals with pre-existing medical disorders/conditions which include, but are not limited to, asthma, emphysema, chronic pulmonary function, coronary artery disease, severe or progressive hypertension, epilepsy (grand or petit mal), diabetes (insipidus or mellitus), breathing difficulty, and claustrophobia or anxiety will not be allowed to work in any position which required respiratory protection. Individuals will not be allowed to work as sorters unless they are physically able to perform the work while wearing the proper safety equipment.

WARNING PROPERTIES

Gases or vapors usually have warning properties which include odor, eye irritation, or respiratory irritation. When these properties are detected while wearing a well-fitted mask, the condition is known as "breakthrough" and the mask should be replaced. The masks selected for the study also filter dust and particulates from the air. If breathing through the mask becomes inordinately difficult, the dust filter has become clogged and a new mask should be selected and fit-tested.

FIT-TESTING

Fit-testing is the process of fitting a particular mask to an individual's face and checking to be sure inhalations are being pulled through the mask and not from gaps around the edges of the mask. Pulling air from gaps around the edges of the mask would not provide proper respiratory protection and could result in the individual breathing in some contaminants.

MASK MAINTENANCE AND STORAGE

Mask maintenance includes inspecting and storing masks. Masks should be inspected for dirt, tears, holes, and worn headbands. If the mask is dirty or becoming difficult to breathe through, it should be discarded and the staff person should be fit-tested for a new mask. Storage of the masks is important. If the mask is in good condition it should be placed in a tightly-sealed plastic bag to keep air from the charcoal insert. Care should be taken to not deform the mask as this will ruin its fit to the individual. If they are stored in a box at the end of the day, be sure the masks are placed in a single layer, face up.

4.0 HAZARD MONITORING

Monitoring of the air quality may be conducted by the supervisor periodically during the sorts using a HNU monitoring device to detect organic vapors. This information would be useful in determining the quality of the air around selected garbage samples and would show if levels of protection are adequate.

5.0 GENERAL SAFETY PROCEDURES

SITE CONTROL

It is important to remember that personnel involved in conducting the waste composition study are guests of the facility. While the waste composition study is being conducted, sorters and the supervisor must abide by the rules outlined in this site safety plan, no matter how familiar the site or other drivers or operators are.

Parking areas, work areas, and designated paths to water outlets, break areas, outhouses, etc., will be identified and all sorters must remain in these areas. Keep in mind that the operators of the large trucks and machinery at the facility are not accustomed to a group of people working on the ground at the facility. Vehicles are often moving very quickly. Heavy machinery operators often move in reverse with limited vision. Noise levels around these machines may be high. It is imperative you remain in designated areas and do not wander, scavenge, or explore, no matter how tempting or harmless the action may seem. You must also be alert to machines entering areas designated for your use whose operators may not see you.

Areas will be designated where protective equipment may be partially or completely doffed, sorters may wash up and where food and beverages may be consumed. A smoking area will also be designated. Absolutely no consumption of food or drinks, gum-chewing, or smoking will be allowed in the sorting area.

Always inform the site coordinator of any condition or activity you find unsafe.

PRESORTING

Sorters hired to sort and categorize the waste samples will be wearing a level of protective clothing and respiratory equipment which will not allow them to work with an unexamined sample of solid waste. The site supervisor or another adequately-trained staff member will presort the waste sample, looking for hazardous, household hazardous, or infectious waste before it may be shoveled onto the sort table. If unsorted waste samples are brought into the sorting building, sorters should stay near the sort tables and not sort the waste until told that it is ready.

SORTING MSW

Sorting and categorizing waste requires that it be picked up with the hands. Nitrile gloves with optional cotton liners are being provided to protect the skin from dirt and potential hazards, but they will not protect against sharp materials, which will certainly be in the waste. To avoid being cut or receiving a puncture wound, always pick items from the surface of the piled garbage. Never plunge your hands into the pile; never use your hands to push or pull a large amount of waste around. Do not pick up garbage that you cannot fully see. Pick up items like you were playing a game of pick-up-sticks, picking up one item at a time while trying not to disturb the others. Take your time. Keep in mind your safety and the safety of those working near you.

Moving the waste to the containers used for categorizing and weighing the garbage should be done with care. Sorters should station themselves at a single position near a table and sort for the family of materials identified on the barrels nearest their location. Don't grab a handful of like materials and run around the table to the barrels behind other workers. One could easily trip, be knocked down, hit with an item, or at the very least startle a fellow worker by being behind them when unexpected. Materials in other categories should be passed to fellow workers nearer those barrels. Do not throw the garbage. Restrain yourself from tossing or throwing materials, which will be tempting when you are tired or bored.

Prior to initiating the sorting event, the site supervisor will provide each sorter with a list of the various material categories and their definitions. The site supervisor will review the materials to be sorted and address any questions about the various categories. A copy of the specific material categories is attached for reference.

LIFTING

It is likely that heavy barrels will need to be moved from the sort tables to the scale and then to a disposal area and that garbage will need to be shoveled onto the tables. Sorters are required to be able to lift 25 pounds to apply for the position. Every effort has been taken to lessen the likelihood of a back injury because of the nature of the work, but every individual will need to keep their own health in mind. If you have a previous back injury or if a barrel is too heavy for you to roll or slide, use a dolly, ask for help, or let someone else do it. When shoveling garbage onto the tabletop, don't load the shovel with more weight than you can comfortably lift. Take your time.

Remember the following tips when lifting:

- Maintain the three natural curves of your spine by keeping your head high, chin tucked in, and your back arched.
- Bend your hips and knees.
- Use the diagonal lift (one foot ahead, one foot behind) to get the weight in close and maintain a wide, balanced base of support.
- Keep your abdominal muscles tight when you lift to help support your back.
- Keep the load close to your body and stand up straight. Keep your head up.
- Avoid twisting as you lift. Pivot after you lift if you need to change direction.
- Avoid lifting anything heavy above your shoulders. Get up higher on a stool or other sturdy item and don't lift as high.

HYGIENE

As stated previously, when eating, drinking or smoking, contaminated protective clothing should be removed and hands and face washed with soap and water. As soon as possible after arriving at home at the end of the day a shower should be taken.

GUESTS

It is likely that the waste composition study will draw a number of visitors to the site. They are welcome to view the study, but will be escorted and requested to keep a safe distance from activities. If guests stay more than a few minutes, they may be inclined to help out or poke around on the table or in the sort barrels. Please politely ask them to refrain for their own safety. If they don't abide by your request, please walk over to the site supervisor or assistant coordinator and inform him or her. In the unlikely event that a guest would cause you to be in an unsafe working situation, stop working and leave the sorting area until the situation is corrected.

6.0 PROCEDURE FOR HANDLING HAZARDOUS WASTES

The waste composition study procedure has been designed so that sorters are not exposed to mixed municipal solid waste that has not first been screened for hazardous, household hazardous, or infectious waste. These materials are briefly defined and appropriate actions outlined for each in the following:

HAZARDOUS:

Materials that were improperly disposed of in municipal waste; e.g., radioactive waste, toxic chemicals, explosives.

Action: If the presorters should miss a hazardous item in a waste sample and it is brought to the waste table and found, work should immediately stop and the area should be cleared. The entire waste sample will be rejected and removed and, depending upon the nature of the hazardous item, the site coordinator will see to the proper disposal action or will call the appropriate emergency agency.

HOUSEHOLD HAZARDOUS:

Materials commonly found in the home or work place which can be toxic, especially when discarded; e.g., paints, solvents, strong cleaners, pesticides.

Action: If you are aware something is spilled in the waste and hazardous--e.g., you smell a solvent or chemical odor--stop working, step away, notify the others at your table to stop work, and call the supervisor. If an unidentified chemical has apparently spilled on the mixed waste, the sample will be rejected, the table cleaned, and a new sample brought in. Sorters should set aside items considered HHW per the material category definitions. The site supervisor is responsible for working with the facility staff to designate a location to place the HHW upon sorting the material for each sample.

INFECTIOUS WASTE:

Solid waste that might be able to transfer disease or infection to another person; e.g., extremely bloody medical items, syringes, or an indiscriminately discarded biomedical bag. These biomedical bags are often red in color and they have "infectious waste" or the biomedical symbol printed on them.

Action: If a hospital or veterinary bag or a similar medical waste is found, work should be stopped and the coordinator notified to remove the waste from the table. Single syringes are quite common in mixed municipal waste and one of the major reasons hands should not be plunged blindly into garbage. If a syringe is found, the sorter finding it should announce to other workers at the table "Syringe." When you have the attention of those working near you take care in moving the syringe to the "Other Plastic" container in order not to accidentally poke yourself, a worker standing near you, or someone who may be coming up behind you.

7.0 EMERGENCY CONTINGENCY PLAN

Emergency Coordinator: The site supervisor is the emergency coordinator. The assistant coordinator will be the emergency coordinator in the event that the supervisor is not available. The following information will be posted at the site at all times.

COORDINATION WITH EMERGENCY AGENCIES

The emergency coordinator evaluates all emergency situations and seeks assistance from emergency agencies as needed to manage emergency response. The following agencies must be notified of the study activities and may be called upon for assistance depending on the nature of the emergency:

Emergency Services
Fire and Rescue
Sheriff and Police
Ambulance/paramedics
Bomb
Poison Control Center:
Spills Unit

EMERGENCY PROCEDURES

Appropriate action will be taken by the study personnel in the event of an emergency described in this section. Before responding to any emergency, personnel will immediately evaluate the danger of the situation. If remaining in the area could be dangerous, all personnel will immediately leave the area. If the situations appears to pose no immediate threat, personnel will first attempt to bring the situation under control. If deemed necessary, the appropriate emergency response agency will be summoned. The following action will be undertaken in the event of an emergency.

EVACUATION

All unauthorized persons not wearing appropriate protective equipment and clothing shall immediately leave the area of spills, fires, or explosions until the cleanup has been completed.

SPILLS

MINOR-SOLID

A release of less than one pound of a solid hazardous waste will be cleaned up by the site supervisor by sweeping the substance into a container with the use of a dust pan. For fine powders that easily become airborne, add absorbent clay to keep down the power. Clean-up the material using a dust pan, containerize,

label and package using the same categorization system used for the other wastes.

MINOR-LIQUID

In the event of an unplanned release of less than one quart of a liquid hazardous material, the site supervisor should attempt to contain the spill through the use of absorbent. Cleanup commences by spreading absorbent material (pillows or pads) around the perimeter of the spill. This material is cautiously placed on the spill until absorption is complete. Every precaution should be taken to avoid contact with the material. Once the liquid has been absorbed, lift the material using a dust pan. Containerize, label, and package using the same categorization system as for other wastes.

MAJOR

In the very unlikely event of a major spill or release of hazardous material that is unmanageable by the supervisor, work will cease, the area will be evacuated, and the appropriate emergency agency will be contacted immediately.

EMERGENCY DECONTAMINATION

In the event of a member of the study personnel needs emergency medical attention while they are fully suited for work, it is likely that their protective gear will have to be removed before the Emergency Room will accept them for treatment. If the person can walk or may be moved to a clean area, do so, then follow the general procedure for routing decontamination, removing the victim's suit and gloves, etc., so as not to contaminate him or her with the outer surfaces of the gear.

Greater care must be taken if the reason for the medical emergency is contamination with a hazardous chemical. If the victim's personal protective clothing has become saturated with the hazardous chemical, the saturated clothing should be removed and the exposed skin should be flushed with copious amounts of water for at least 15 minutes, or until medical personnel arrive. If the victim's clothing cannot be removed without causing the victim additional harm, the contained clothing should be left on and the victim should be wrapped in plastic sheeting to prevent possible contamination of the rescue vehicle. The hospital should be alerted as to the need for decontaminating the victim when he or she arrives and what the possible contaminant is.

Be certain the people administering First Aid are protected from the hazardous material while carefully and quickly decontaminating the victim.

FIRE

In the event of a small fire in the study area, the supervisor will quickly attempt to bring the situation under control using the dry chemical fire extinguisher on

site. Those not involved in firefighting should evacuate the area immediately. Following this initial attempt to control the fire, the local fire department and the supervisor will be alerted and additional instructions requested. After a fire has been contained and mitigated, cleanup operations will commence under the supervision of the supervisor. If burned materials are nonhazardous they may be disposed of at the landfill; if hazardous in nature the supervisor will dispose of the material in the same manner as hazardous waste and spill contaminant materials. All equipment and surfaces that cam into contact with the hazardous materials will be thoroughly decontaminated. If a fire is spreading beyond the control of the supervisor, the supervisor will make the decision to abandon firefighting efforts and all involved personnel will evacuate to an upwind side and allow the local fire department to handle the emergency. Work will cease until further notice.

EMERGENCY EYEWASH UNIT

The emergency eyewash unit will be located near the sort area. In the event that someone gets a foreign object in his or her eye, the victim's eyes should be slushed with water from the eyewash unit , or another source of clean water, for at least 15 minutes. The victim may not want to open the affected eye while the attempt is being made to flush it. Someone may have to assist the victim by gently holding onto the skin above the victim's eyebrow and below the cheekbone to help open the eye. However, do not struggle with the victim and forcibly open his or her eye; this could exacerbate the injury.

8.0 SUMMARY

The site supervisor will follow the health, safety, and training procedures specified in this plan. Any variance from these procedures must be pre-approved by the R. W. Beck project manager. All sorters will be familiar with the policy and procedures specified in the plan prior to initiating the sorting events.

APPENDIX A: STUDY DESIGN & SUPPORTING DOCUMENTATION
MINNESOTA WASTE CHARACTERIZATION STUDY: SAMPLING PLAN

INTRODUCTION

In the course of planning and conducting more than 100 waste characterization studies over the past decade, R. W. Beck, Inc. (Beck) has developed proven techniques for characterizing the residential, commercial, industrial, and institutional waste streams. The purpose of this discussion is to provide an overview and example of Beck's approach for developing a sampling plan that will provide a representative snapshot of the waste stream, while taking into consideration the practical obstacles and data limitations that often arise in completing these projects.

PROJECT UNDERSTANDING

In performing a state-wide waste composition study, the SWMCB's primary objective is to develop a representative, statistically defensible estimate of the composition of the Minnesota waste stream on a statewide-basis. In general, this will be accomplished by obtaining a statistically sufficient number of samples of waste received from a representative set of solid waste facilities located throughout the state. A total of eight sites (five in the metropolitan area, and three out-state) have been targeted for inclusion in the study. The selected facilities include two municipal solid waste landfills, two transfer stations, two WTE facilities, one MSW composting facility, and one refuse-derived fuel production facility.

The SWMCB has indicated that seasonal differences in the waste stream are not considered significant and all field data will be collected during the fall of 1999.

The SWMCB has further specified that separate composition estimates must be developed for the residential sector (including both single-family and multi-family residences) and for the industrial/commercial/institutional (ICI) sector. This differs from the 1991-1992 MPCA statewide composition study that focused solely on MSW and did not attempt to develop results for the residential and ICI sectors. Accordingly, Beck's approach considers these as two separate material streams in the overall analysis. Although SWMCB is interested in the composition of both streams separately and the overall combined MSW stream, Beck understands that there is currently limited data available on the quantities of residential vs. ICI waste received at the targeted facilities.

PROPOSED APPROACH

Significant study has been devoted on how to develop an optimal sampling plan. Based on Beck's understanding of the project, there are several key issues that must be considered to obtain a representative snapshot of the State's waste composition.

The following sections summarize the issues that must be considered, as well as the approach Beck is recommending to address these issues. The resulting approach, which requires samples to be obtained from a randomly selected fraction of incoming truckloads entering the targeted facilities ("Nth Truck approach"), draws from a number of industry sources, and constitute Beck's "Best Practices" for performing waste composition studies. (Beck's Best Practices have been drawn from a variety of oft-cited sources describing how to conduct waste composition studies[1].)

NUMBER OF RESIDENTIAL AND ICI SAMPLES

For each waste stream included in the analysis, a minimum of 15 to 20 (and a maximum of 30[2]) samples is recommended to develop meaningful, statistically defensible estimates of the composition of the specific waste stream. Completing a composition analysis with a minimum of 15 to 20 samples and a 90% confidence interval will generally provide a low variance and reasonable confidence intervals needed for solid waste system planning purposes. The desired number of samples depends on the availability of incoming waste data and the homogeneity of the material in an average incoming truckload.

DATA AVAILABILITY

In many jurisdictions and facilities, incoming solid waste is tracked by generating sector. However, because of the collection scheme for the various service areas for the targeted facilities, only very limited data is available as to the breakdown of residential vs. ICI incoming waste. As such, R. W. Beck will rely on the sampling randomization inherent in the Nth Truck approach to dictate the number of residential and ICI samples taken at each facility. The actual estimated breakdown of residential vs. ICI commercial waste quantities for the Twin Cities metropolitan area will be determined through both a comprehensive survey of all haulers using a selected representative facility and an analysis of data from organized collection systems in the metropolitan area.

[1] See "Methodology for Conducting Composition Study for Discarded Waste," State University System of Florida, Florida Center for Solid and Hazardous Waste Management, January 1996; "Standard Test Method for Determination of Unprocessed Municipal Solid Waste," ASTM D5231-92, 1992; PROTOCOL, A Computerized Solid Waste Quantity and Composition Estimation System," A.J. Klee, EPA/600/2-91/005A, RREL, February 1991.

[2] Although it is not possible to take too many samples, taking more than 30 is usually not recommended, as confidence intervals and variances improve only marginally once the number of samples increases above 30.

As stated above, for each targeted waste stream it is preferable to obtain samples from a minimum of 15 and a maximum of 30 incoming truckloads. Because the residential/ICI breakdown will not be known prior to the field sorts, R. W. Beck will select for sampling every Nth Truck entering the facility. Based on driver interview, the contents of the truck will be assigned to the residential or commercial sector. Some trucks will contain both residential and commercial material (i.e., front-end loaders that serve dumpsters at both multi-family dwellings and also at businesses). These loads will be labeled as a mixed.

As specified in Beck's scope of work, a minimum of 50 samples will be taken at each targeted site. Because it is assumed that the eight sites were selected based on the representativeness of the incoming material at each site, it is likely that the Nth Truck approach will provide the minimum of 15 samples for both the residential and ICI waste delivered to the site. As long as at least 30 percent of the incoming waste is verified to be residential (15 out of 50 samples), the minimum target for residential will be achieved. The same holds true for the ICI truckloads. Table 1 shows several example breakdowns that may be observed at any of the target facilities using this approach.

TABLE 1
SAMPLING SCENARIOS USING THE Nth TRUCK APPROACH

Likely Scenarios	Residential Samples	Commercial Samples	Mixed Samples	Minimum # of Samples Achieved
Similar Number of Residential and ICI Loads	20	20	10	Yes
Primarily ICI Loads	15	30	5	Yes
Primarily Residential Loads	30	15	5	Yes
Significant Number of Unclassifiable Loads	15	15	20	Yes

As shown, it is highly likely that a sufficient number of samples from each waste generating sector can be obtained at each targeted site via the Nth Truck approach to develop a defensible estimate of the composition of both generating sectors at that site. Note that in the event the random distributions fall outside of those shown in the table above, it will still be possible to develop an estimate of the composition for individual sites, although statistical variances and confidence intervals may be larger than desired. **Should this occur, SWMCB's primary objective of developing Twin Cities Metropolitan Area and state-wide composition estimates will still be accomplished, as aggregating the results from the various sites should normalize the distribution of the generator results.**

WASTE STREAM HOMOGENEITY

The homogeneity of the waste stream also dictates how many samples should be targeted. The more homogenous the waste stream, the fewer samples typically needed to be taken to obtain defensible results with reasonable confidence intervals. The streams targeted in the SWMCB study are described below.

- **Residential Waste**: This waste stream is usually collected at the curbside by packer trucks (single-family) or from dumpsters by front-end loading vehicles (multi-family), and it is Beck's opinion that residential waste is fairly homogeneous. Homogeneity is based on the similarity in the types of waste disposed by various residential generators. As such, Beck recommends 15 to 25 samples per sort event for residential waste.
- **ICI Waste**: In contrast to residential waste, commercial waste truckloads can vary substantially. One truckload may be primarily from the business district, and will contain mostly paper, cardboard, and some cafeteria waste. The next truckload may be a roll-off compactor from a grocery store, and will have mostly cardboard and food waste. The next truckload may be an open top roll-off with construction waste, containing mostly wood, metal, and other large items. Because of the variation in composition from truckload to truckload, Beck recommends 20 to 30 samples be taken from the ICI stream. If commercial demographic data is available, Beck also recommends attempting to capture truckloads from each ICI generating sub-sector in proportion to the quantity of waste delivered from that sub-sector.

OBSTACLES

As described above, the main obstacle to determining the best number of samples for each targeted waste stream is the availability of historical data. Because historical data by generator type is limited, the Nth Truck approach will be used as a mechanism for selecting the samples by generator type to represent the typical mix of materials received at each of the various facilities.

WEEKLY SAMPLING DAYS

To get a representative snapshot of incoming waste, sampling should occur each day of the week in which the targeted facility receives waste. For example, at a facility that accepts incoming waste Monday through Saturday, sampling should occur across all six days.

OBSTACLES

While this is approach is generally not problematic, sampling may not be performed each day because:

- Facility operations may be abbreviated on certain days and prevent sampling from taking place;

- It may not be cost-effective to use an entire sort crew on shortened operating days;
- Limited budgets require sampling and sorting to be completed in less than a full operating week.

DAILY SAMPLING DISTRIBUTION

Ideally, the number of samples taken each day for each targeted waste stream should be in proportion to the incoming quantity of material received that day of the week. For example, if Monday and Tuesday are the busiest days of the week in terms of tonnage received, and Saturday is the least busiest, then more samples should theoretically be taken on Monday and Tuesday, and fewer on Saturday.

Table 2 reflects an example of the percentage of all weekly incoming material that is delivered each day to a typical facility. Ideally, the proportion of samples taken each day should correspond to the proportion of incoming waste disposed on that day.

TABLE 2
AVERAGE DAILY INCOMING MATERIAL SUMMARY

	Mon	Tue	Wed	Thu	Fri	Sat	Total
Residential	25%	20%	15%	15%	20%	5%	**100%**
Commercial	20%	20%	15%	15%	15%	15%	**100%**

OBSTACLES

A variety of practical obstacles prevent samples from being taken each day in exact proportion to incoming waste. These obstacles include:

- Insufficient space to stage samples awaiting sorting (i.e., additional samples cannot be taken until the sorters complete prior samples).
- Facility requirements preventing samples to stay on the ground overnight.
- Limited operating hours at the facility causes sampling and sorting to start and stop at set times each day (insufficient time to sort).
- Equipment and operators needed to take samples are unavailable certain times of the day when samples should ideally be taken.

HOURLY SAMPLING DISTRIBUTION

Ideally, samples should be taken during a given day in proportion to the arrival of incoming truckloads throughout the day. For example, there is usually a backlog of arrivals in the morning when the facility opens, and another rush

from 11:00 to 2:00. The Nth Truck approach inherently captures incoming trucks at random and in proportion to their time of arrival at the facility.

Another factor that must be considered is the quantity of waste delivered by different sources within each generating sector. In addition to the large compacting or roll-off garbage trucks that deliver waste, many smaller vehicles, owned by homeowners, general contractors, and other entities that do not specifically collect MSW on a regular basis, also deliver waste.

Because most solid waste facilities allow residents and general contractors to deposit waste directly via their own cargo van, stake truck, pick-up truck, minivan, or other passenger vehicle, Beck also recommends quantifying this component of incoming waste to evaluate if any samples should be taken from these small (low volume) vehicle loads.

OBSTACLES

A variety of practical obstacles often prevent samples from being taken at the optimal times:

- First and foremost, the busiest times of day are often when bucket loaders (and other sample taking equipment) are least available for taking samples, as managing the incoming waste is their top priority.
- Non-operational equipment can prevent samples from being taken at the prescribed time;
- Targeted truckloads do not necessarily show up at the busy times.

OVERCOMING OBSTACLES

Despite the obstacles mentioned above, it is Beck's opinion that in most cases it is still possible to obtain sufficient samples that are **representative of each waste stream**. The concept of "**representativeness**" is vital to understanding why our proposed approach is both effective and resource prudent.

When reviewing the Beck methodology, the critical question is "Will the selected samples be representative of the overall waste stream?" To answer this question, the characteristics of each of the targeted generating sectors should be revisited.

Residential Waste: Public or private haulers typically serve residents with large compactor trucks that collect waste from multiple households. The waste from these households is thoroughly mixed during the collection and tipping process. R. W. Beck believes that, as long as trucks are captured from all geographical and demographic areas of the study jurisdiction, it is fairly straightforward to obtain representative samples of residential waste. This conclusion is based on Beck's opinion that overall:

- Residential waste composition does not differ materially based on the time of day it is collected; and

- Residential waste composition does not differ materially based on the day of the week it is collected.

The only significant difference in residential waste commonly observed by Beck is that the waste delivered by large compactor vehicles does differ from the waste delivered by individual residents. If possible, the quantity of resident delivered waste should be evaluated prior to conducting the sort to determine how many (if any) resident delivered samples should be taken. If it is determined that sufficient incoming material is being delivered by residents to warrant inclusion in the composition study, Beck recommends taking **aggregated samples** of resident delivered wastes.

An aggregated sample is taken from six to ten resident delivered loads that have been tipped together in a single pile and mixed. Beck believes that mixing multiple resident-delivered loads together before taking a sample will provide a more representative snapshot of this component of the single-family waste stream. In the absence of mixing, it is Beck's opinion that significant risk exists that waste from any individual resident delivered load will not be representative of the range of waste disposed by resident delivered generators.

The identification of multi-family residential waste can be a challenge. Multi-family generated waste materials are usually collected through front-end loading vehicles and thus may be mixed with ICI wastes. Beck will utilize the driver interview process and our visual observation of the sample loads to discern loads that should be classified as residential, as opposed to ICI.

ICI Waste: The ICI sector has the greatest variation in waste composition from truckload to truckload. If possible, it will be important to obtain samples from different commercial sectors in the same proportion those sectors generate waste. Restaurants, retail establishments, offices, institutions, manufacturing establishments, warehouses, general contractors, and other waste types will typically be delivered separately in individual truckloads, rather than all mixed together.

When dealing with any particular fraction of ICI waste, Beck believes that the same assumptions hold true as for residential waste. In other words, waste generated at a restaurant will not differ materially based on the day of the week it is generated, nor on the time of day it is collected. The same holds true for offices, retail, etc.

However, because the composition of ICI loads arriving at a facility for disposal is so variable during the course of a single day, it will be vital during any waste composition study to obtain samples from most of the subcategories that contribute to the ICI stream. This can best be performed by sampling from a variety of vehicles delivering ICI waste. The Nth Truck approach is designed to capture the wide range of subcategories within an individual substream.

Mixed Waste: The mixed waste sector is composed of waste delivered to the designated solid waste facility originating from both the residential and ICI sectors. This waste may be delivered in a range of vehicle types including front-

end loaders, rear loading packer trucks or all-purpose vehicles. When sampled loads are identified as a mix of residential and ICI waste, data will be collected similarly to the sampling of residential and ICI samples. Beck will utilize both the information gathered from the sampled vehicle drivers and observing the sample loads to classify the materials.

In the ICI sector, the majority of solid waste will be delivered by large compacting and roll-off trucks which exclusively haul solid waste. However, there are also a significant number of smaller, all-purpose vehicles (cargo vans, stake trucks, pickups, etc.) that are used to deliver ICI waste. If possible, the quantity delivered by these smaller truckloads should be evaluated prior to the sort to determine if there is sufficient incoming quantity to warrant targeting several samples from these generators. If so, Beck again recommends using aggregated samples to obtain a representative quantity of this ICI material. That is, three to six small commercial truckloads may be tipped into a pile and mixed together before taking a sample. Without mixing, Beck believes that there is a greater risk of taking a non-representative sample from this generator type.

Table 3 shows a hypothetical example of a weekly sampling plan. Upon receiving and analyzing data from each of the targeted solid waste facilities, a similar sampling plan will be developed for each sorting event.

TABLE 3
WEEKLY SAMPLING PLAN

	Mon	Tue	Wed	Thu	Fri	Sat	Total
Residential[1]	4	4	3	4	3	2	20
Commercial[2]	4	4	3	3	3	3	20
Mixed	2	2	2	2	1	1	10
Grand Total	10	10	8	9	7	6	50

[1] One aggregated sample will be taken on Saturday from resident delivered loads

[2] Two aggregate samples will be taken from general contractors and other small commercial vehicles

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Metro Region Aggregate - weighting by facility

Metro Results--Residential, ICI and Mixed

Stratified Weighting

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Paper	1	Newsprint (ONP)	4.1%	5.1%	3.6%	4.7%	
	2	High Grade Office	3.0%	8.4%	2.3%	3.9%	Yes
	3	Magazines/Catalogs	2.4%	8.6%	1.9%	3.1%	Yes
	4	Uncoated OCC - recyclable	6.8%	9.5%	5.8%	8.3%	
	5	Uncoated OCC - nonrecyclable	0.5%	0.7%	0.4%	0.6%	
	6	Coated OCC	0.1%	1.8%	0.1%	0.3%	Yes
	7	Boxboard	2.5%	4.2%	2.2%	3.8%	
	8	Mixed Paper - recyclable	6.5%	9.7%	5.7%	7.5%	
	9	Mixed Paper - nonrecyclable	8.3%	14.0%	7.4%	9.4%	
		TOTAL PAPER	34.2%	18.8%	31.5%	37.3%	
Plastic	10	PET Bottles/Jars - clear	0.4%	0.6%	0.4%	0.5%	
	11	PET Bottles/Jars - colored	0.1%	0.8%	0.1%	0.2%	Yes
	12	Other PET	0.1%	0.2%	0.1%	0.1%	
	13	HDPE Bottles - natural	0.3%	0.5%	0.2%	0.3%	
	14	HDPE Bottles - colored	0.2%	0.2%	0.2%	0.2%	
	15	PVC	0.1%	0.9%	0.1%	0.2%	Yes
	16	Polystyrene	0.7%	0.9%	0.6%	0.8%	
	17	Film - transport packaging	0.3%	2.3%	0.2%	0.5%	Yes
	18	Other Film	3.0%	2.4%	2.7%	3.4%	
	19	Other Containers	0.6%	5.6%	0.4%	0.7%	Yes
	20	Other non-containers	5.2%	9.1%	4.5%	6.0%	
		TOTAL PLASTIC	11.0%	9.6%	9.9%	12.2%	
Metals	21	Aluminum Beverage Containers	0.6%	0.8%	0.5%	0.7%	
	22	Other Aluminum	0.5%	1.4%	0.4%	0.6%	Yes
	23	Ferrrous Containers	0.7%	4.0%	0.6%	1.0%	Yes
	24	Other Ferrous	2.6%	5.2%	2.2%	3.3%	
	25	Other Non-Ferrous	0.0%	3.8%	0.0%	0.1%	Yes
		TOTAL METALS	4.4%	5.7%	3.9%	5.2%	
Glass	26	Clear Containers	1.1%	1.5%	1.0%	1.4%	
	27	Green Containers	0.3%	1.7%	0.3%	0.4%	Yes
	28	Brown Containers	0.4%	2.2%	0.3%	0.5%	Yes
	29	Other Glass	0.8%	5.7%	0.5%	1.2%	Yes
		TOTAL GLASS	2.7%	5.4%	2.3%	3.3%	Yes

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Metro Region Aggregate - weighting by facility

Metro Results--Residential, ICI and Mixed

Stratified Weighting

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Organic Materials	30	Yard Waste - Grass and Leaves	2.5%	4.5%	2.0%	3.6%	
	31	Yard Waste - woody material	0.4%	5.7%	0.2%	0.5%	Yes
	32	Food Waste	11.0%	12.1%	9.7%	12.7%	
	33	Wood Pallets	3.6%	12.2%	2.5%	5.2%	Yes
	34	Treated Wood	3.8%	7.5%	3.1%	5.4%	
	35	Untreated Wood	2.3%	9.3%	1.7%	3.2%	Yes
	36	Diapers	1.9%	3.5%	1.6%	2.3%	
	37	Other Organic Material	1.7%	9.9%	1.4%	2.2%	Yes
		TOTAL ORGANIC MATERIALS	27.3%	16.2%	25.1%	30.2%	
Problem Materials	38	Televisions	0.0%	0.0%	0.0%	0.0%	
	39	Computer Monitors	0.0%	0.8%	0.0%	0.1%	Yes
	40	Computer Equipment/Peripherals	0.2%	4.4%	0.1%	0.4%	Yes
	41	Electric and Electronic Products	1.5%	4.0%	1.1%	2.1%	Yes
	42	Batteries	0.1%	0.5%	0.0%	0.1%	Yes
	43	Other	0.1%	3.8%	0.0%	0.1%	Yes
		TOTAL PROBLEM MATERIALS	1.8%	4.6%	1.4%	2.4%	Yes
HHW	44	Latex Paint	0.0%	0.2%	0.0%	0.1%	Yes
	45	Oil Paint	0.0%	0.1%	0.0%	0.0%	Yes
	46	Unused Pesti/Fungi/Herbi-cides	0.0%	0.2%	0.0%	0.0%	Yes
	47	Unused Cleaners and Solvents	0.0%	0.2%	0.0%	0.1%	Yes
	48	Compressed Fuel Containers	0.0%	0.1%	0.0%	0.0%	Yes
	49	Automotive - Antifreeze	0.0%	0.1%	0.0%	0.0%	
	50	Automotive - Used oil.filters	0.0%	1.2%	0.0%	0.1%	Yes
	51	Other	0.2%	2.2%	0.1%	0.3%	Yes
		TOTAL HHW	0.3%	3.7%	0.2%	0.5%	Yes
Other Waste	52	Textiles	2.4%	4.6%	2.0%	2.8%	
	53	Carpet	3.0%	10.2%	2.2%	4.2%	Yes
	54	Sharps and Infectious Waste	0.0%	0.7%	0.0%	0.0%	Yes
	55	Rubber	0.8%	8.1%	0.5%	1.2%	Yes
	56	Construction & Demolition Debris	2.7%	15.2%	2.1%	4.3%	Yes
	57	Household Bulky Items	3.8%	4.8%	2.8%	5.5%	
	58	Empty HHW Containers	0.3%	4.5%	0.2%	0.5%	Yes
	59	Miscellaneous	5.4%	15.7%	4.7%	6.4%	Yes
		TOTAL OTHER WASTE	18.3%	15.0%	16.2%	21.0%	
TOTAL			100.0%				

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Metro Region Aggregate - weighting by facility

Metro Results--Residential Waste

Stratified Weighting

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Paper	1	Newsprint (ONP)	5.3%	4.2%	4.4%	6.5%	
	2	High Grade Office	1.5%	2.1%	1.2%	1.9%	
	3	Magazines/Catalogs	2.7%	2.6%	2.2%	3.3%	
	4	Uncoated OCC - recyclable	3.5%	6.4%	2.7%	4.7%	
	5	Uncoated OCC - nonrecyclable	0.6%	1.2%	0.5%	0.9%	
	6	Coated OCC	0.0%	0.3%	0.0%	0.0%	Yes
	7	Boxboard	3.2%	1.8%	2.7%	3.6%	
	8	Mixed Paper - recyclable	6.4%	4.3%	5.5%	7.5%	
	9	Mixed Paper - nonrecyclable	8.6%	5.8%	7.3%	9.7%	
		TOTAL PAPER	31.8%	14.5%	28.3%	35.3%	
Plastic	10	PET Bottles/Jars - clear	0.5%	0.6%	0.4%	0.6%	
	11	PET Bottles/Jars - colored	0.2%	0.4%	0.1%	0.2%	Yes
	12	Other PET	0.2%	1.1%	0.1%	0.2%	Yes
	13	HDPE Bottles - natural	0.2%	0.2%	0.2%	0.3%	
	14	HDPE Bottles - colored	0.3%	0.3%	0.3%	0.4%	
	15	PVC	0.0%	0.1%	0.0%	0.0%	Yes
	16	Polystyrene	0.6%	0.7%	0.5%	0.8%	
	17	Film - transport packaging	0.1%	0.4%	0.0%	0.1%	Yes
	18	Other Film	2.9%	1.7%	2.5%	3.4%	
	19	Other Containers	0.4%	1.0%	0.3%	0.4%	Yes
	20	Other non-containers	4.0%	2.7%	3.5%	4.5%	
		TOTAL PLASTIC	9.5%	5.1%	8.4%	10.5%	
Metals	21	Aluminum Beverage Containers	0.7%	0.9%	0.5%	0.8%	
	22	Other Aluminum	0.4%	0.3%	0.3%	0.6%	
	23	Ferrrous Containers	0.8%	0.8%	0.6%	0.9%	
	24	Other Ferrous	2.1%	4.2%	1.5%	2.8%	
	25	Other Non-Ferrous	0.0%	0.5%	0.0%	0.1%	Yes
		TOTAL METALS	3.9%	4.2%	3.3%	4.6%	
Glass	26	Clear Containers	1.3%	1.4%	1.1%	1.8%	
	27	Green Containers	0.3%	0.8%	0.2%	0.4%	Yes
	28	Brown Containers	0.5%	0.9%	0.3%	0.6%	
	29	Other Glass	0.4%	0.6%	0.3%	0.5%	
		TOTAL GLASS	2.5%	4.0%	2.1%	3.1%	

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Metro Region Aggregate - weighting by facility

Metro Results--Residential Waste

Stratified Weighting

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Organic Materials	30	Yard Waste - Grass and Leaves	3.6%	4.7%	2.7%	6.1%	
	31	Yard Waste - woody material	0.7%	4.4%	0.3%	1.0%	Yes
	32	Food Waste	11.5%	7.7%	9.8%	13.1%	
	33	Wood Pallets	0.0%	0.4%	0.0%	0.0%	
	34	Treated Wood	3.4%	7.6%	2.4%	6.5%	Yes
	35	Untreated Wood	1.0%	2.2%	0.7%	1.3%	Yes
	36	Diapers	3.9%	3.6%	3.1%	4.7%	
	37	Other Organic Material	2.4%	5.0%	1.8%	3.2%	Yes
		TOTAL ORGANIC MATERIALS	26.4%	10.4%	24.2%	29.6%	
Problem Materials	38	Televisions	0.0%	0.0%	0.0%	0.0%	
	39	Computer Monitors	0.0%	0.0%	0.0%	0.0%	
	40	Computer Equipment/Peripherals	0.2%	1.3%	0.1%	0.3%	Yes
	41	Electric and Electronic Products	2.1%	5.2%	1.4%	3.6%	Yes
	42	Batteries	0.1%	0.1%	0.1%	0.1%	
	43	Other	0.0%	0.8%	0.0%	0.0%	Yes
		TOTAL PROBLEM MATERIALS	2.3%	5.4%	1.6%	3.8%	Yes
HHW	44	Latex Paint	0.1%	0.5%	0.0%	0.2%	Yes
	45	Oil Paint	0.0%	0.1%	0.0%	0.0%	Yes
	46	Unused Pesti/Fungi/Herbi-cides	0.0%	0.0%	0.0%	0.0%	Yes
	47	Unused Cleaners and Solvents	0.0%	0.2%	0.0%	0.0%	Yes
	48	Compressed Fuel Containers	0.0%	0.0%	0.0%	0.0%	
	49	Automotive - Antifreeze	0.0%	0.0%	0.0%	0.0%	
	50	Automotive - Used oil.filters	0.0%	0.1%	0.0%	0.0%	Yes
	51	Other	0.2%	1.8%	0.1%	0.5%	Yes
		TOTAL HHW	0.4%	2.0%	0.2%	0.7%	Yes
Other Waste	52	Textiles	3.3%	4.7%	2.6%	4.2%	
	53	Carpet	2.4%	5.1%	1.7%	4.3%	Yes
	54	Sharps and Infectious Waste	0.0%	0.4%	0.0%	0.0%	
	55	Rubber	0.5%	0.7%	0.4%	0.7%	
	56	Construction & Demolition Debris	3.3%	10.5%	2.2%	7.2%	Yes
	57	Household Bulky Items	6.4%	19.4%	3.8%	10.2%	Yes
	58	Empty HHW Containers	0.5%	1.5%	0.3%	0.6%	Yes
	59	Miscellaneous	6.7%	6.7%	5.6%	8.2%	
		TOTAL OTHER WASTE	23.1%	20.6%	19.2%	27.9%	
TOTAL			100.0%				

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Metro Region Aggregate - weighting by facility

Metro Results--ICI Waste

Stratified Weighting

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Paper	1	Newsprint (ONP)	2.6%	6.2%	1.9%	3.5%	Yes
	2	High Grade Office	4.2%	13.1%	2.8%	6.3%	Yes
	3	Magazines/Catalogs	2.7%	12.2%	1.6%	4.2%	Yes
	4	Uncoated OCC - recyclable	10.2%	13.3%	8.2%	13.3%	
	5	Uncoated OCC - nonrecyclable	0.4%	0.9%	0.3%	0.5%	Yes
	6	Coated OCC	0.2%	2.1%	0.1%	0.5%	Yes
	7	Boxboard	1.5%	3.8%	1.2%	2.2%	Yes
	8	Mixed Paper - recyclable	6.1%	11.8%	4.6%	7.5%	
	9	Mixed Paper - nonrecyclable	7.3%	14.9%	5.8%	9.2%	Yes
		TOTAL PAPER	35.1%	25.5%	30.2%	40.8%	
Plastic	10	PET Bottles/Jars - clear	0.3%	0.8%	0.2%	0.4%	Yes
	11	PET Bottles/Jars - colored	0.1%	0.3%	0.1%	0.1%	Yes
	12	Other PET	0.0%	0.1%	0.0%	0.1%	Yes
	13	HDPE Bottles - natural	0.3%	0.8%	0.2%	0.5%	Yes
	14	HDPE Bottles - colored	0.1%	0.3%	0.1%	0.2%	Yes
	15	PVC	0.0%	0.4%	0.0%	0.1%	Yes
	16	Polystyrene	0.8%	1.3%	0.6%	1.0%	
	17	Film - transport packaging	0.6%	3.1%	0.4%	0.9%	Yes
	18	Other Film	3.0%	3.3%	2.5%	3.9%	
	19	Other Containers	0.3%	6.1%	0.2%	0.5%	Yes
	20	Other non-containers	6.7%	13.1%	5.2%	8.6%	
		TOTAL PLASTIC	12.3%	13.6%	10.3%	14.8%	
Metals	21	Aluminum Beverage Containers	0.4%	1.2%	0.4%	0.6%	Yes
	22	Other Aluminum	0.6%	2.2%	0.4%	0.8%	Yes
	23	Ferrrous Containers	0.7%	4.6%	0.5%	1.4%	Yes
	24	Other Ferrous	2.6%	5.2%	1.9%	3.8%	
	25	Other Non-Ferrous	0.0%	4.1%	0.0%	0.1%	Yes
		TOTAL METALS	4.4%	6.1%	3.5%	6.1%	
Glass	26	Clear Containers	0.9%	2.2%	0.7%	1.3%	Yes
	27	Green Containers	0.4%	2.5%	0.2%	0.6%	Yes
	28	Brown Containers	0.4%	0.5%	0.2%	0.6%	
	29	Other Glass	1.1%	7.5%	0.6%	1.8%	Yes
		TOTAL GLASS	2.7%	6.8%	2.0%	3.9%	Yes

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Metro Region Aggregate - weighting by facility

Metro Results--ICI Waste

Stratified Weighting

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Organic Materials	30	Yard Waste - Grass and Leaves	1.3%	2.4%	0.9%	2.1%	
	31	Yard Waste - woody material	0.0%	4.1%	0.0%	0.0%	Yes
	32	Food Waste	10.8%	19.1%	8.2%	14.2%	
	33	Wood Pallets	7.9%	18.0%	5.4%	11.6%	Yes
	34	Treated Wood	4.1%	10.3%	2.9%	6.5%	Yes
	35	Untreated Wood	3.5%	13.9%	2.2%	5.5%	Yes
	36	Diapers	0.3%	1.3%	0.2%	0.4%	Yes
	37	Other Organic Material	1.5%	11.5%	1.0%	2.1%	Yes
		TOTAL ORGANIC MATERIALS	29.5%	24.1%	25.1%	35.0%	
Problem Materials	38	Televisions	0.0%	0.0%	0.0%	0.0%	
	39	Computer Monitors	0.0%	0.0%	0.0%	0.0%	
	40	Computer Equipment/Peripherals	0.4%	4.5%	0.1%	0.5%	Yes
	41	Electric and Electronic Products	1.1%	6.0%	0.6%	1.5%	Yes
	42	Batteries	0.0%	0.1%	0.0%	0.1%	Yes
	43	Other	0.1%	2.5%	0.0%	0.3%	Yes
		TOTAL PROBLEM MATERIALS	1.7%	7.1%	0.9%	2.1%	Yes
HHW	44	Latex Paint	0.0%	0.0%	0.0%	0.0%	
	45	Oil Paint	0.0%	0.0%	0.0%	0.0%	
	46	Unused Pesti/Fungi/Herbi-cides	0.0%	0.0%	0.0%	0.0%	
	47	Unused Cleaners and Solvents	0.1%	0.4%	0.0%	0.2%	Yes
	48	Compressed Fuel Containers	0.0%	0.1%	0.0%	0.0%	Yes
	49	Automotive - Antifreeze	0.0%	0.0%	0.0%	0.0%	
	50	Automotive - Used oil.filters	0.0%	0.0%	0.0%	0.0%	
	51	Other	0.0%	0.3%	0.0%	0.1%	Yes
		TOTAL HHW	0.1%	1.8%	0.1%	0.2%	Yes
Other Waste	52	Textiles	1.5%	4.7%	1.0%	1.9%	Yes
	53	Carpet	2.8%	14.0%	1.7%	4.2%	Yes
	54	Sharps and Infectious Waste	0.0%	0.6%	0.0%	0.0%	
	55	Rubber	0.8%	5.1%	0.4%	1.4%	Yes
	56	Construction & Demolition Debris	2.1%	11.9%	1.2%	3.5%	Yes
	57	Household Bulky Items	2.7%	6.5%	1.9%	4.4%	Yes
	58	Empty HHW Containers	0.1%	1.9%	0.1%	0.2%	Yes
	59	Miscellaneous	4.2%	12.8%	3.0%	5.8%	Yes
		TOTAL OTHER WASTE	14.2%	21.0%	11.0%	18.2%	
TOTAL			100.0%				

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Metro Region Aggregate - weighting by facility

Metro Results--Mixed Waste

Stratified Weighting

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Paper	1	Newsprint (ONP)	5.0%	6.9%	3.8%	6.4%	
	2	High Grade Office	3.0%	3.5%	2.1%	4.4%	
	3	Magazines/Catalogs	1.3%	1.5%	1.0%	1.9%	
	4	Uncoated OCC - recyclable	5.8%	10.4%	3.8%	7.8%	
	5	Uncoated OCC - nonrecyclable	0.4%	0.9%	0.3%	0.7%	Yes
	6	Coated OCC	0.2%	0.8%	0.1%	0.3%	Yes
	7	Boxboard	3.3%	4.5%	2.4%	9.7%	
	8	Mixed Paper - recyclable	7.8%	11.6%	5.9%	10.5%	
	9	Mixed Paper - nonrecyclable	9.9%	10.3%	8.0%	12.7%	
		TOTAL PAPER	36.7%	22.7%	30.9%	43.6%	
Plastic	10	PET Bottles/Jars - clear	0.5%	0.6%	0.4%	0.7%	
	11	PET Bottles/Jars - colored	0.2%	0.4%	0.1%	0.3%	Yes
	12	Other PET	0.1%	0.1%	0.0%	0.1%	
	13	HDPE Bottles - natural	0.3%	0.3%	0.2%	0.3%	
	14	HDPE Bottles - colored	0.2%	0.3%	0.1%	0.2%	
	15	PVC	0.3%	1.5%	0.2%	0.7%	Yes
	16	Polystyrene	0.6%	0.4%	0.4%	0.7%	
	17	Film - transport packaging	0.3%	1.1%	0.1%	0.4%	Yes
	18	Other Film	2.9%	2.4%	2.3%	3.7%	
	19	Other Containers	1.5%	8.2%	0.5%	1.9%	Yes
	20	Other non-containers	4.0%	5.9%	2.9%	5.7%	
		TOTAL PLASTIC	10.7%	10.1%	8.7%	13.0%	
Metals	21	Aluminum Beverage Containers	0.6%	0.6%	0.5%	0.9%	
	22	Other Aluminum	0.4%	0.5%	0.2%	0.4%	
	23	Ferrrous Containers	0.6%	1.5%	0.5%	0.8%	Yes
	24	Other Ferrous	3.6%	9.0%	2.2%	5.4%	Yes
	25	Other Non-Ferrous	0.1%	1.5%	0.0%	0.2%	Yes
		TOTAL METALS	5.3%	9.3%	3.7%	7.0%	
Glass	26	Clear Containers	1.1%	0.9%	0.9%	1.5%	
	27	Green Containers	0.3%	0.7%	0.2%	0.5%	
	28	Brown Containers	0.3%	4.7%	0.2%	0.4%	Yes
	29	Other Glass	1.0%	4.6%	0.3%	2.3%	Yes
		TOTAL GLASS	2.7%	3.1%	2.0%	4.0%	

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Metro Region Aggregate - weighting by facility

Metro Results--Mixed Waste

Stratified Weighting

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Organic Materials	30	Yard Waste - Grass and Leaves	2.9%	6.9%	1.7%	5.4%	Yes
	31	Yard Waste - woody material	0.6%	2.4%	0.2%	0.9%	Yes
	32	Food Waste	10.6%	7.0%	8.9%	14.3%	
	33	Wood Pallets	1.3%	4.1%	0.6%	3.1%	Yes
	34	Treated Wood	4.0%	8.1%	2.5%	6.8%	Yes
	35	Untreated Wood	2.1%	6.2%	1.2%	3.8%	Yes
	36	Diapers	1.8%	2.3%	1.2%	2.6%	
	37	Other Organic Material	1.1%	3.3%	0.7%	1.8%	Yes
		TOTAL ORGANIC MATERIALS	24.4%	14.5%	20.8%	30.3%	
Problem Materials	38	Televisions	0.0%	0.0%	0.0%	0.0%	
	39	Computer Monitors	0.0%	0.3%	0.0%	0.5%	Yes
	40	Computer Equipment/Peripherals	0.0%	0.5%	0.0%	0.5%	Yes
	41	Electric and Electronic Products	1.1%	3.3%	0.6%	1.8%	Yes
	42	Batteries	0.1%	0.2%	0.0%	0.1%	Yes
	43	Other	0.0%	0.4%	0.0%	0.0%	Yes
		TOTAL PROBLEM MATERIALS	1.2%	3.4%	0.7%	2.3%	Yes
HHW	44	Latex Paint	0.0%	0.3%	0.0%	0.1%	Yes
	45	Oil Paint	0.0%	0.1%	0.0%	0.1%	Yes
	46	Unused Pesti/Fungi/Herbi-cides	0.0%	0.2%	0.0%	0.0%	Yes
	47	Unused Cleaners and Solvents	0.0%	0.1%	0.0%	0.0%	Yes
	48	Compressed Fuel Containers	0.0%	0.1%	0.0%	0.1%	Yes
	49	Automotive - Antifreeze	0.0%	0.0%	0.0%	0.0%	
	50	Automotive - Used oil.filters	0.0%	0.1%	0.0%	0.2%	Yes
	51	Other	0.6%	3.7%	0.2%	0.8%	Yes
		TOTAL HHW	0.8%	4.0%	0.3%	1.1%	Yes
Other Waste	52	Textiles	2.6%	3.2%	2.0%	3.9%	
	53	Carpet	4.2%	12.1%	1.9%	8.5%	Yes
	54	Sharps and Infectious Waste	0.1%	0.7%	0.0%	0.1%	Yes
	55	Rubber	1.2%	6.3%	0.4%	2.9%	Yes
	56	Construction & Demolition Debris	2.7%	9.0%	1.4%	5.0%	Yes
	57	Household Bulky Items	1.4%	5.3%	0.7%	3.8%	Yes
	58	Empty HHW Containers	0.4%	1.2%	0.3%	1.1%	Yes
	59	Miscellaneous	5.5%	5.1%	4.3%	7.5%	
		TOTAL OTHER WASTE	18.2%	16.6%	14.4%	23.6%	
TOTAL			100.0%				

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Rural Region - weighting by facility

Rural Results--Residential, ICI and Mixed

Stratified Weighting

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Paper	1	Newsprint (ONP)	4.3%	5.6%	3.8%	4.9%	
	2	High Grade Office	3.1%	6.5%	2.4%	4.0%	Yes
	3	Magazines/Catalogs	2.7%	5.3%	2.3%	3.1%	
	4	Uncoated OCC - recyclable	4.6%	5.8%	3.9%	5.5%	
	5	Uncoated OCC - nonrecyclable	0.5%	2.0%	0.4%	0.7%	Yes
	6	Coated OCC	0.3%	2.1%	0.2%	0.7%	Yes
	7	Boxboard	2.8%	5.3%	2.6%	3.1%	
	8	Mixed Paper - recyclable	5.3%	7.9%	4.7%	5.9%	
	9	Mixed Paper - nonrecyclable	10.8%	16.8%	9.8%	12.1%	
		TOTAL PAPER	34.2%	9.9%	32.1%	36.5%	
Plastic	10	PET Bottles/Jars - clear	0.5%	0.4%	0.4%	0.6%	
	11	PET Bottles/Jars - colored	0.4%	3.0%	0.3%	0.6%	Yes
	12	Other PET	0.0%	0.3%	0.0%	0.1%	Yes
	13	HDPE Bottles - natural	0.3%	0.5%	0.3%	0.4%	
	14	HDPE Bottles - colored	0.3%	0.3%	0.3%	0.4%	
	15	PVC	0.1%	0.6%	0.0%	0.1%	Yes
	16	Polystyrene	0.9%	1.3%	0.8%	1.0%	
	17	Film - transport packaging	0.2%	2.6%	0.1%	0.3%	Yes
	18	Other Film	4.4%	3.6%	3.9%	4.9%	
	19	Other Containers	0.5%	4.6%	0.4%	0.7%	Yes
	20	Other non-containers	4.2%	6.1%	3.6%	5.1%	
		TOTAL PLASTIC	11.7%	3.9%	10.8%	12.9%	
Metals	21	Aluminum Beverage Containers	0.9%	1.7%	0.7%	1.1%	
	22	Other Aluminum	0.5%	3.9%	0.4%	0.6%	Yes
	23	Ferrrous Containers	1.3%	5.3%	1.1%	1.4%	Yes
	24	Other Ferrous	3.3%	3.8%	2.3%	4.7%	
	25	Other Non-Ferrous	0.1%	5.9%	0.1%	0.2%	Yes
		TOTAL METALS	6.0%	2.8%	5.1%	7.3%	
Glass	26	Clear Containers	1.6%	2.2%	1.3%	1.9%	
	27	Green Containers	0.4%	0.5%	0.3%	0.5%	
	28	Brown Containers	0.5%	3.3%	0.4%	0.7%	Yes
	29	Other Glass	0.5%	3.7%	0.4%	0.9%	Yes
		TOTAL GLASS	3.0%	6.5%	2.5%	3.6%	Yes

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Rural Region - weighting by facility

Rural Results--Residential, ICI and Mixed

Stratified Weighting

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Organic Materials	30	Yard Waste - Grass and Leaves	1.7%	5.9%	1.2%	2.3%	Yes
	31	Yard Waste - woody material	0.1%	9.5%	0.0%	0.1%	Yes
	32	Food Waste	14.5%	8.8%	12.8%	16.6%	
	33	Wood Pallets	0.4%	3.4%	0.2%	0.8%	Yes
	34	Treated Wood	1.6%	3.1%	1.1%	2.4%	
	35	Untreated Wood	1.1%	4.9%	0.6%	2.0%	Yes
	36	Diapers	2.7%	5.9%	2.3%	3.3%	Yes
	37	Other Organic Material	0.9%	10.4%	0.8%	1.2%	Yes
		TOTAL ORGANIC MATERIALS	22.9%	9.2%	20.9%	25.1%	
Problem Materials	38	Televisions	0.0%	0.0%	0.0%	0.0%	
	39	Computer Monitors	0.0%	4.6%	0.0%	0.0%	
	40	Computer Equipment/Peripherals	0.0%	10.2%	0.0%	0.0%	Yes
	41	Electric and Electronic Products	1.9%	0.8%	1.3%	3.0%	
	42	Batteries	0.1%	4.6%	0.1%	0.1%	Yes
	43	Other	0.0%	10.2%	0.0%	0.0%	Yes
		TOTAL PROBLEM MATERIALS	2.0%	0.9%	1.4%	3.1%	
HHW	44	Latex Paint	0.0%	0.0%	0.0%	0.1%	
	45	Oil Paint	0.1%	1.8%	0.0%	0.2%	Yes
	46	Unused Pesti/Fungi/Herbi-cides	0.0%	0.1%	0.0%	0.0%	Yes
	47	Unused Cleaners and Solvents	0.0%	0.1%	0.0%	0.1%	Yes
	48	Compressed Fuel Containers	0.0%	0.3%	0.0%	0.0%	Yes
	49	Automotive - Antifreeze	0.0%	0.8%	0.0%	0.1%	Yes
	50	Automotive - Used oil.filters	0.1%	2.5%	0.1%	0.2%	Yes
	51	Other	0.6%	3.4%	0.4%	1.0%	Yes
		TOTAL HHW	1.0%	8.1%	0.7%	1.4%	Yes
Other Waste	52	Textiles	3.4%	6.0%	2.9%	4.1%	
	53	Carpet	1.5%	1.0%	1.0%	2.4%	
	54	Sharps and Infectious Waste	0.0%	2.1%	0.0%	0.0%	
	55	Rubber	0.7%	12.1%	0.6%	0.9%	Yes
	56	Construction & Demolition Debris	3.2%	22.2%	2.3%	4.5%	Yes
	57	Household Bulky Items	2.9%	1.8%	1.7%	4.8%	
	58	Empty HHW Containers	0.7%	10.3%	0.6%	0.9%	Yes
	59	Miscellaneous	6.7%	21.2%	5.8%	7.9%	Yes
		TOTAL OTHER WASTE	19.1%	8.7%	17.0%	21.5%	
TOTAL			100.0%				

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Rural Region - weighting by facility

Rural Results--Residential Waste

Stratified Weighting

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Paper	1	Newsprint (ONP)	4.2%	1.8%	3.3%	5.4%	
	2	High Grade Office	1.3%	2.4%	0.8%	1.9%	
	3	Magazines/Catalogs	1.7%	2.8%	1.2%	2.5%	
	4	Uncoated OCC - recyclable	2.1%	2.6%	1.3%	3.3%	
	5	Uncoated OCC - nonrecyclable	0.4%	0.3%	0.3%	0.6%	
	6	Coated OCC	0.0%	1.3%	0.0%	0.1%	Yes
	7	Boxboard	3.0%	2.8%	2.4%	3.9%	
	8	Mixed Paper - recyclable	5.7%	6.8%	4.5%	7.1%	
	9	Mixed Paper - nonrecyclable	9.4%	10.1%	6.8%	13.0%	
		TOTAL PAPER	27.9%	5.9%	23.9%	32.2%	
Plastic	10	PET Bottles/Jars - clear	0.5%	0.2%	0.4%	0.8%	
	11	PET Bottles/Jars - colored	0.1%	0.1%	0.1%	0.2%	
	12	Other PET	0.0%	0.3%	0.0%	0.1%	Yes
	13	HDPE Bottles - natural	0.3%	0.4%	0.2%	0.5%	
	14	HDPE Bottles - colored	0.4%	0.2%	0.2%	0.5%	
	15	PVC	0.0%	0.5%	0.0%	0.1%	Yes
	16	Polystyrene	0.7%	0.8%	0.5%	1.0%	
	17	Film - transport packaging	0.2%	2.9%	0.1%	0.5%	Yes
	18	Other Film	4.1%	1.2%	2.9%	5.6%	
	19	Other Containers	1.1%	9.0%	0.5%	2.0%	Yes
	20	Other non-containers	5.2%	8.0%	3.4%	7.8%	
		TOTAL PLASTIC	12.7%	3.4%	10.3%	15.6%	
Metals	21	Aluminum Beverage Containers	0.9%	0.4%	0.6%	1.5%	
	22	Other Aluminum	0.4%	0.9%	0.3%	0.6%	Yes
	23	Ferrrous Containers	1.4%	10.6%	1.0%	1.9%	Yes
	24	Other Ferrous	4.9%	2.1%	2.4%	8.5%	
	25	Other Non-Ferrous	0.2%	9.8%	0.1%	0.5%	Yes
		TOTAL METALS	7.8%	3.1%	5.4%	10.9%	
Glass	26	Clear Containers	2.0%	1.2%	1.2%	3.2%	
	27	Green Containers	0.6%	1.0%	0.3%	1.1%	
	28	Brown Containers	0.5%	0.6%	0.3%	0.9%	
	29	Other Glass	0.4%	3.7%	0.2%	0.6%	Yes
		TOTAL GLASS	3.5%	2.5%	2.2%	5.4%	

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Rural Region - weighting by facility

Rural Results--Residential Waste

Stratified Weighting

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Organic Materials	30	Yard Waste - Grass and Leaves	1.0%	0.5%	0.5%	1.8%	
	31	Yard Waste - woody material	0.1%	11.2%	0.0%	0.3%	Yes
	32	Food Waste	13.2%	2.7%	8.7%	19.2%	
	33	Wood Pallets	0.0%	6.8%	0.0%	0.0%	
	34	Treated Wood	3.0%	0.8%	1.1%	6.0%	
	35	Untreated Wood	0.5%	3.0%	0.2%	1.1%	Yes
	36	Diapers	3.5%	3.0%	2.3%	5.2%	
	37	Other Organic Material	1.5%	12.5%	0.9%	2.3%	Yes
		TOTAL ORGANIC MATERIALS	22.7%	4.1%	17.8%	28.4%	
Problem Materials	38	Televisions	0.0%	0.0%	0.0%	0.0%	
	39	Computer Monitors	0.0%	0.0%	0.0%	0.0%	
	40	Computer Equipment/Peripherals	0.0%	13.1%	0.0%	0.0%	Yes
	41	Electric and Electronic Products	3.7%	3.0%	1.3%	8.0%	
	42	Batteries	0.1%	0.1%	0.0%	0.1%	
	43	Other	0.0%	13.1%	0.0%	0.0%	Yes
		TOTAL PROBLEM MATERIALS	3.8%	3.0%	1.4%	8.0%	
HHW	44	Latex Paint	0.0%	0.0%	0.0%	0.0%	
	45	Oil Paint	0.0%	0.0%	0.0%	0.0%	Yes
	46	Unused Pesti/Fungi/Herbi-cides	0.0%	0.2%	0.0%	0.0%	
	47	Unused Cleaners and Solvents	0.1%	0.0%	0.0%	0.1%	
	48	Compressed Fuel Containers	0.0%	0.0%	0.0%	0.0%	
	49	Automotive - Antifreeze	0.0%	0.4%	0.0%	0.0%	
	50	Automotive - Used oil.filters	0.2%	1.2%	0.1%	0.4%	Yes
	51	Other	0.5%	1.4%	0.2%	0.9%	Yes
		TOTAL HHW	0.7%	3.7%	0.4%	1.3%	Yes
Other Waste	52	Textiles	4.1%	8.4%	2.8%	5.8%	Yes
	53	Carpet	3.5%	4.8%	1.4%	7.5%	
	54	Sharps and Infectious Waste	0.0%	0.3%	0.0%	0.0%	
	55	Rubber	0.5%	4.8%	0.3%	0.9%	Yes
	56	Construction & Demolition Debris	1.8%	11.2%	0.9%	3.5%	Yes
	57	Household Bulky Items	4.3%	1.6%	1.3%	9.3%	
	58	Empty HHW Containers	0.7%	4.6%	0.4%	1.1%	Yes
	59	Miscellaneous	5.9%	15.1%	4.3%	8.0%	Yes
		TOTAL OTHER WASTE	20.8%	5.0%	15.9%	26.4%	
TOTAL			100.0%				

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Rural Region - weighting by facility

Rural Results--ICI Waste

Stratified Weighting

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Paper	1	Newsprint (ONP)	1.9%	3.0%	1.1%	3.1%	
	2	High Grade Office	4.6%	12.7%	1.9%	9.1%	Yes
	3	Magazines/Catalogs	1.8%	9.5%	0.9%	3.2%	Yes
	4	Uncoated OCC - recyclable	8.9%	8.5%	5.7%	13.5%	
	5	Uncoated OCC - nonrecyclable	0.7%	1.7%	0.4%	1.7%	Yes
	6	Coated OCC	1.3%	3.5%	0.5%	3.6%	Yes
	7	Boxboard	1.7%	4.0%	1.2%	2.4%	Yes
	8	Mixed Paper - recyclable	3.1%	8.4%	1.9%	4.9%	Yes
	9	Mixed Paper - nonrecyclable	9.1%	13.8%	5.9%	13.8%	
		TOTAL PAPER	33.0%	14.2%	26.1%	40.7%	
Plastic	10	PET Bottles/Jars - clear	0.2%	0.1%	0.1%	0.4%	
	11	PET Bottles/Jars - colored	0.6%	2.6%	0.2%	1.3%	Yes
	12	Other PET	0.0%	0.1%	0.0%	0.1%	Yes
	13	HDPE Bottles - natural	0.1%	0.5%	0.1%	0.2%	Yes
	14	HDPE Bottles - colored	0.2%	0.4%	0.1%	0.4%	Yes
	15	PVC	0.2%	1.0%	0.1%	0.4%	Yes
	16	Polystyrene	1.0%	1.2%	0.7%	1.5%	
	17	Film - transport packaging	0.4%	4.9%	0.2%	0.9%	Yes
	18	Other Film	4.8%	2.2%	3.1%	7.1%	
	19	Other Containers	0.1%	8.3%	0.1%	0.2%	Yes
	20	Other non-containers	5.3%	12.0%	2.9%	8.7%	Yes
		TOTAL PLASTIC	12.9%	5.3%	9.3%	17.4%	
Metals	21	Aluminum Beverage Containers	0.8%	0.5%	0.3%	1.6%	
	22	Other Aluminum	0.3%	0.7%	0.1%	0.5%	Yes
	23	Ferrrous Containers	0.4%	14.6%	0.2%	0.8%	Yes
	24	Other Ferrous	6.7%	0.6%	2.3%	13.4%	
	25	Other Non-Ferrous	0.0%	13.9%	0.0%	0.1%	Yes
		TOTAL METALS	8.2%	1.3%	3.9%	14.1%	
Glass	26	Clear Containers	0.6%	1.0%	0.3%	1.0%	
	27	Green Containers	0.0%	0.3%	0.0%	0.1%	Yes
	28	Brown Containers	0.2%	0.6%	0.1%	0.4%	Yes
	29	Other Glass	0.9%	3.9%	0.4%	3.0%	Yes
		TOTAL GLASS	1.7%	6.5%	1.0%	3.8%	Yes

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Rural Region - weighting by facility

Rural Results--ICI Waste

Stratified Weighting

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Organic Materials	30	Yard Waste - Grass and Leaves	1.9%	0.3%	0.5%	4.4%	
	31	Yard Waste - woody material	0.0%	10.9%	0.0%	0.0%	
	32	Food Waste	15.4%	16.6%	9.3%	23.7%	
	33	Wood Pallets	1.5%	6.0%	0.5%	3.8%	Yes
	34	Treated Wood	2.2%	4.3%	0.8%	4.8%	
	35	Untreated Wood	4.5%	12.7%	1.8%	9.8%	Yes
	36	Diapers	0.8%	2.3%	0.4%	1.6%	Yes
	37	Other Organic Material	0.4%	12.4%	0.2%	0.8%	Yes
		TOTAL ORGANIC MATERIALS	26.9%	16.7%	19.3%	35.4%	
Problem Materials	38	Televisions	0.0%	0.0%	0.0%	0.0%	
	39	Computer Monitors	0.0%	0.0%	0.0%	0.0%	
	40	Computer Equipment/Peripherals	0.0%	1.0%	0.0%	0.1%	Yes
	41	Electric and Electronic Products	0.3%	0.3%	0.1%	0.7%	
	42	Batteries	0.0%	0.1%	0.0%	0.1%	
	43	Other	0.0%	0.9%	0.0%	0.0%	
		TOTAL PROBLEM MATERIALS	0.4%	1.1%	0.2%	0.8%	Yes
HHW	44	Latex Paint	0.2%	0.0%	0.0%	0.7%	
	45	Oil Paint	0.0%	0.0%	0.0%	0.0%	
	46	Unused Pesti/Fungi/Herbi-cides	0.0%	0.0%	0.0%	0.0%	
	47	Unused Cleaners and Solvents	0.0%	0.0%	0.0%	0.0%	Yes
	48	Compressed Fuel Containers	0.0%	0.8%	0.0%	0.0%	
	49	Automotive - Antifreeze	0.2%	0.0%	0.0%	0.5%	
	50	Automotive - Used oil.filters	0.1%	3.7%	0.0%	0.2%	Yes
	51	Other	1.3%	6.3%	0.5%	2.9%	Yes
		TOTAL HHW	1.8%	3.7%	0.7%	4.0%	Yes
Other Waste	52	Textiles	1.8%	5.1%	1.1%	3.0%	Yes
	53	Carpet	1.2%	0.1%	0.2%	3.2%	
	54	Sharps and Infectious Waste	0.0%	0.6%	0.0%	0.0%	
	55	Rubber	0.4%	11.6%	0.2%	0.7%	Yes
	56	Construction & Demolition Debris	3.7%	4.5%	0.9%	8.9%	
	57	Household Bulky Items	1.2%	0.3%	0.2%	3.2%	
	58	Empty HHW Containers	1.0%	10.1%	0.3%	2.1%	Yes
	59	Miscellaneous	5.8%	13.7%	3.1%	10.2%	Yes
		TOTAL OTHER WASTE	15.2%	9.2%	10.4%	21.2%	
TOTAL			100.0%				

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Rural Region - weighting by facility

Rural Results--Mixed Waste

Stratified Weighting

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Paper	1	Newsprint (ONP)	5.0%	3.9%	4.3%	5.8%	
	2	High Grade Office	3.2%	4.0%	2.6%	4.0%	
	3	Magazines/Catalogs	3.2%	3.3%	2.7%	3.8%	
	4	Uncoated OCC - recyclable	4.1%	3.8%	3.5%	4.9%	
	5	Uncoated OCC - nonrecyclable	0.5%	1.3%	0.4%	0.6%	Yes
	6	Coated OCC	0.1%	1.1%	0.1%	0.2%	Yes
	7	Boxboard	3.1%	3.3%	2.8%	3.3%	
	8	Mixed Paper - recyclable	5.8%	4.8%	5.1%	6.5%	
	9	Mixed Paper - nonrecyclable	11.7%	11.6%	10.6%	12.8%	
		TOTAL PAPER	36.6%	6.5%	34.1%	39.2%	
Plastic	10	PET Bottles/Jars - clear	0.5%	0.3%	0.5%	0.6%	
	11	PET Bottles/Jars - colored	0.4%	2.1%	0.3%	0.6%	Yes
	12	Other PET	0.1%	0.2%	0.0%	0.1%	Yes
	13	HDPE Bottles - natural	0.4%	0.3%	0.4%	0.5%	
	14	HDPE Bottles - colored	0.3%	0.2%	0.3%	0.4%	
	15	PVC	0.0%	0.3%	0.0%	0.1%	Yes
	16	Polystyrene	0.9%	0.6%	0.8%	1.0%	
	17	Film - transport packaging	0.1%	1.6%	0.1%	0.2%	Yes
	18	Other Film	4.3%	1.2%	3.9%	4.7%	
	19	Other Containers	0.4%	2.1%	0.3%	0.5%	Yes
	20	Other non-containers	3.6%	3.6%	3.2%	4.0%	
		TOTAL PLASTIC	11.1%	2.6%	10.3%	11.9%	
Metals	21	Aluminum Beverage Containers	0.9%	1.2%	0.8%	1.0%	
	22	Other Aluminum	0.6%	0.8%	0.5%	0.8%	
	23	Ferrrous Containers	1.5%	2.5%	1.3%	1.7%	
	24	Other Ferrous	1.8%	1.2%	1.3%	2.3%	
	25	Other Non-Ferrous	0.1%	3.2%	0.1%	0.2%	Yes
		TOTAL METALS	4.9%	1.9%	4.3%	5.5%	
Glass	26	Clear Containers	1.8%	1.5%	1.5%	2.1%	
	27	Green Containers	0.4%	0.3%	0.2%	0.5%	
	28	Brown Containers	0.6%	2.1%	0.4%	0.8%	Yes
	29	Other Glass	0.5%	2.4%	0.3%	0.7%	Yes
		TOTAL GLASS	3.2%	4.5%	2.6%	3.8%	

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Rural Region - weighting by facility

Rural Results--Mixed Waste

Stratified Weighting

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Organic Materials	30	Yard Waste - Grass and Leaves	1.8%	3.1%	1.3%	2.5%	
	31	Yard Waste - woody material	0.1%	6.4%	0.0%	0.1%	Yes
	32	Food Waste	14.6%	5.2%	13.1%	16.2%	
	33	Wood Pallets	0.1%	2.2%	0.1%	0.2%	Yes
	34	Treated Wood	0.9%	1.9%	0.6%	1.4%	Yes
	35	Untreated Wood	0.3%	2.5%	0.2%	0.4%	Yes
	36	Diapers	3.0%	2.9%	2.4%	3.7%	
	37	Other Organic Material	0.9%	6.9%	0.7%	1.2%	Yes
		TOTAL ORGANIC MATERIALS	21.8%	5.8%	20.1%	23.7%	
Problem Materials	38	Televisions	0.0%	0.0%	0.0%	0.0%	
	39	Computer Monitors	0.0%	0.0%	0.0%	0.0%	
	40	Computer Equipment/Peripherals	0.0%	7.2%	0.0%	0.0%	Yes
	41	Electric and Electronic Products	1.8%	0.6%	1.0%	2.9%	
	42	Batteries	0.1%	0.1%	0.1%	0.2%	
	43	Other	0.0%	7.2%	0.0%	0.0%	Yes
		TOTAL PROBLEM MATERIALS	2.0%	0.6%	1.2%	3.0%	
HHW	44	Latex Paint	0.0%	0.0%	0.0%	0.0%	
	45	Oil Paint	0.1%	1.3%	0.1%	0.3%	Yes
	46	Unused Pesti/Fungi/Herbi-cides	0.0%	0.1%	0.0%	0.0%	Yes
	47	Unused Cleaners and Solvents	0.0%	0.1%	0.0%	0.1%	
	48	Compressed Fuel Containers	0.0%	0.1%	0.0%	0.0%	Yes
	49	Automotive - Antifreeze	0.0%	0.5%	0.0%	0.0%	Yes
	50	Automotive - Used oil.filters	0.1%	1.6%	0.1%	0.2%	Yes
	51	Other	0.5%	1.9%	0.3%	0.8%	Yes
		TOTAL HHW	0.8%	5.3%	0.5%	1.2%	Yes
Other Waste	52	Textiles	3.6%	4.0%	2.9%	4.6%	
	53	Carpet	0.9%	0.7%	0.5%	1.5%	
	54	Sharps and Infectious Waste	0.0%	0.9%	0.0%	0.0%	
	55	Rubber	0.8%	7.8%	0.6%	1.1%	Yes
	56	Construction & Demolition Debris	3.4%	15.8%	2.3%	5.0%	Yes
	57	Household Bulky Items	3.0%	0.7%	1.2%	5.4%	
	58	Empty HHW Containers	0.6%	6.1%	0.5%	0.8%	Yes
	59	Miscellaneous	7.3%	14.8%	6.1%	8.6%	Yes
		TOTAL OTHER WASTE	19.7%	5.9%	16.9%	22.7%	
TOTAL			100.0%				

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study

Statewide Results--Residential, ICI and Mixed

Stratified Weighting

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Paper	1	Newsprint (ONP)	4.1%	7.5%	3.7%	4.5%	
	2	High Grade Office	3.1%	8.2%	2.6%	3.8%	Yes
	3	Magazines/Catalogs	2.5%	8.6%	2.1%	3.0%	Yes
	4	Uncoated OCC - recyclable	6.2%	3.1%	5.5%	7.2%	
	5	Uncoated OCC - nonrecyclable	0.5%	1.7%	0.4%	0.6%	Yes
	6	Coated OCC	0.2%	3.5%	0.1%	0.4%	Yes
	7	Boxboard	2.5%	8.3%	2.3%	3.3%	Yes
	8	Mixed Paper - recyclable	6.0%	11.7%	5.5%	6.6%	
	9	Mixed Paper - nonrecyclable	9.2%	17.2%	8.5%	10.1%	
		TOTAL PAPER	34.3%	5.1%	32.4%	36.5%	
Plastic	10	PET Bottles/Jars - clear	0.4%	0.6%	0.4%	0.5%	
	11	PET Bottles/Jars - colored	0.2%	1.3%	0.2%	0.3%	Yes
	12	Other PET	0.1%	0.5%	0.1%	0.1%	Yes
	13	HDPE Bottles - natural	0.3%	0.3%	0.3%	0.4%	
	14	HDPE Bottles - colored	0.2%	0.7%	0.2%	0.3%	Yes
	15	PVC	0.1%	0.8%	0.1%	0.1%	Yes
	16	Polystyrene	0.8%	2.1%	0.7%	0.9%	Yes
	17	Film - transport packaging	0.3%	2.5%	0.2%	0.4%	Yes
	18	Other Film	3.5%	5.2%	3.3%	3.9%	
	19	Other Containers	0.5%	8.3%	0.4%	0.6%	Yes
	20	Other non-containers	4.9%	8.9%	4.4%	5.6%	
		TOTAL PLASTIC	11.4%	2.1%	10.6%	12.3%	
Metals	21	Aluminum Beverage Containers	0.7%	1.4%	0.6%	0.8%	Yes
	22	Other Aluminum	0.5%	4.3%	0.4%	0.6%	Yes
	23	Ferrrous Containers	0.9%	6.0%	0.8%	1.1%	Yes
	24	Other Ferrous	2.9%	4.0%	2.4%	3.6%	
	25	Other Non-Ferrous	0.1%	6.3%	0.1%	0.1%	Yes
		TOTAL METALS	5.1%	1.7%	4.6%	5.8%	
Glass	26	Clear Containers	1.3%	1.7%	1.2%	1.5%	
	27	Green Containers	0.3%	1.7%	0.3%	0.4%	Yes
	28	Brown Containers	0.4%	4.9%	0.4%	0.5%	Yes
	29	Other Glass	0.7%	4.7%	0.5%	1.0%	Yes
		TOTAL GLASS	2.8%	4.4%	2.5%	3.2%	

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study

Statewide Results--Residential, ICI and Mixed

Stratified Weighting

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Organic Materials	30	Yard Waste - Grass and Leaves	2.1%	5.4%	1.8%	2.8%	Yes
	31	Yard Waste - woody material	0.2%	11.4%	0.1%	0.3%	Yes
	32	Food Waste	12.4%	11.7%	11.3%	13.7%	
	33	Wood Pallets	2.6%	6.5%	1.9%	3.7%	Yes
	34	Treated Wood	3.0%	8.1%	2.5%	4.0%	Yes
	35	Untreated Wood	1.9%	4.5%	1.5%	2.6%	Yes
	36	Diapers	2.1%	8.7%	1.9%	2.4%	Yes
	37	Other Organic Material	1.4%	14.7%	1.2%	1.7%	Yes
		TOTAL ORGANIC MATERIALS	25.7%	5.5%	24.1%	27.8%	
Problem Materials	38	Televisions	0.0%	0.6%	0.0%	0.0%	
	39	Computer Monitors	0.0%	4.9%	0.0%	0.1%	Yes
	40	Computer Equipment/Peripherals	0.2%	5.0%	0.1%	0.2%	Yes
	41	Electric and Electronic Products	1.6%	0.5%	1.3%	2.1%	
	42	Batteries	0.1%	4.6%	0.1%	0.1%	Yes
	43	Other	0.0%	5.4%	0.0%	0.1%	Yes
		TOTAL PROBLEM MATERIALS	1.9%	0.5%	1.5%	2.4%	
HHW	44	Latex Paint	0.0%	0.0%	0.0%	0.1%	
	45	Oil Paint	0.0%	0.6%	0.0%	0.1%	Yes
	46	Unused Pesti/Fungi/Herbi-cides	0.0%	0.2%	0.0%	0.0%	Yes
	47	Unused Cleaners and Solvents	0.0%	0.1%	0.0%	0.1%	Yes
	48	Compressed Fuel Containers	0.0%	0.3%	0.0%	0.0%	Yes
	49	Automotive - Antifreeze	0.0%	0.9%	0.0%	0.0%	Yes
	50	Automotive - Used oil.filters	0.1%	2.1%	0.0%	0.1%	Yes
	51	Other	0.4%	3.5%	0.3%	0.5%	Yes
		TOTAL HHW	0.6%	5.1%	0.5%	0.8%	Yes
Other Waste	52	Textiles	2.7%	9.0%	2.4%	3.1%	Yes
	53	Carpet	2.4%	0.6%	1.9%	3.2%	
	54	Sharps and Infectious Waste	0.0%	6.0%	0.0%	0.0%	Yes
	55	Rubber	0.8%	12.6%	0.6%	1.0%	Yes
	56	Construction & Demolition Debris	2.8%	8.9%	2.3%	3.9%	Yes
	57	Household Bulky Items	3.4%	3.4%	2.6%	4.5%	
	58	Empty HHW Containers	0.4%	13.0%	0.4%	0.6%	Yes
	59	Miscellaneous	5.8%	15.1%	5.3%	6.6%	Yes
		TOTAL OTHER WASTE	18.3%	3.9%	16.8%	20.2%	
TOTAL			100.0%				

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study

Statewide Results--Residential Waste

Stratified Weighting

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Paper	1	Newsprint (ONP)	5.0%	2.0%	4.3%	5.9%	
	2	High Grade Office	1.4%	2.6%	1.2%	1.8%	
	3	Magazines/Catalogs	2.4%	5.6%	2.1%	2.9%	Yes
	4	Uncoated OCC - recyclable	3.2%	1.7%	2.5%	4.0%	
	5	Uncoated OCC - nonrecyclable	0.6%	0.3%	0.4%	0.7%	
	6	Coated OCC	0.0%	1.7%	0.0%	0.0%	Yes
	7	Boxboard	3.1%	3.9%	2.8%	3.5%	
	8	Mixed Paper - recyclable	6.2%	6.1%	5.5%	7.1%	
	9	Mixed Paper - nonrecyclable	8.8%	13.4%	7.7%	10.1%	
		TOTAL PAPER	30.8%	3.2%	28.0%	33.6%	
Plastic	10	PET Bottles/Jars - clear	0.5%	0.4%	0.4%	0.6%	
	11	PET Bottles/Jars - colored	0.2%	1.0%	0.1%	0.2%	Yes
	12	Other PET	0.2%	0.3%	0.1%	0.2%	
	13	HDPE Bottles - natural	0.3%	0.3%	0.2%	0.3%	
	14	HDPE Bottles - colored	0.3%	0.1%	0.3%	0.4%	
	15	PVC	0.0%	0.7%	0.0%	0.0%	Yes
	16	Polystyrene	0.7%	0.5%	0.6%	0.8%	
	17	Film - transport packaging	0.1%	2.1%	0.1%	0.2%	Yes
	18	Other Film	3.2%	1.0%	2.8%	3.7%	
	19	Other Containers	0.6%	5.3%	0.4%	0.8%	Yes
	20	Other non-containers	4.4%	6.1%	3.7%	5.1%	
		TOTAL PLASTIC	10.4%	1.9%	9.4%	11.4%	
Metals	21	Aluminum Beverage Containers	0.7%	0.4%	0.6%	0.9%	
	22	Other Aluminum	0.4%	0.8%	0.3%	0.5%	Yes
	23	Ferrrous Containers	0.9%	6.7%	0.8%	1.1%	Yes
	24	Other Ferrous	2.8%	1.2%	2.1%	3.9%	
	25	Other Non-Ferrous	0.1%	6.3%	0.0%	0.2%	Yes
		TOTAL METALS	5.0%	2.0%	4.2%	5.9%	
Glass	26	Clear Containers	1.5%	0.9%	1.2%	2.0%	
	27	Green Containers	0.4%	0.9%	0.3%	0.6%	Yes
	28	Brown Containers	0.5%	0.6%	0.4%	0.6%	
	29	Other Glass	0.4%	4.0%	0.3%	0.5%	Yes
		TOTAL GLASS	2.8%	4.2%	2.3%	3.4%	

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study

Statewide Results--Residential Waste

Stratified Weighting

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Organic Materials	30	Yard Waste - Grass and Leaves	2.9%	3.7%	2.2%	4.7%	
	31	Yard Waste - woody material	0.6%	8.8%	0.3%	0.8%	Yes
	32	Food Waste	12.0%	1.5%	10.2%	13.9%	
	33	Wood Pallets	0.0%	7.4%	0.0%	0.0%	
	34	Treated Wood	3.3%	1.9%	2.4%	5.6%	
	35	Untreated Wood	0.9%	3.5%	0.6%	1.2%	Yes
	36	Diapers	3.8%	4.5%	3.1%	4.5%	
	37	Other Organic Material	2.1%	11.1%	1.7%	2.7%	Yes
		TOTAL ORGANIC MATERIALS	25.4%	2.2%	23.3%	28.2%	
Problem Materials	38	Televisions	0.0%	0.0%	0.0%	0.0%	
	39	Computer Monitors	0.0%	1.1%	0.0%	0.0%	
	40	Computer Equipment/Peripherals	0.1%	8.3%	0.1%	0.2%	Yes
	41	Electric and Electronic Products	2.5%	1.6%	1.7%	4.1%	
	42	Batteries	0.1%	0.7%	0.1%	0.1%	Yes
	43	Other	0.0%	8.3%	0.0%	0.0%	Yes
		TOTAL PROBLEM MATERIALS	2.7%	1.6%	1.9%	4.3%	
HHW	44	Latex Paint	0.1%	0.0%	0.0%	0.1%	
	45	Oil Paint	0.0%	0.0%	0.0%	0.0%	Yes
	46	Unused Pesti/Fungi/Herbi-cides	0.0%	0.2%	0.0%	0.0%	Yes
	47	Unused Cleaners and Solvents	0.0%	0.0%	0.0%	0.1%	
	48	Compressed Fuel Containers	0.0%	0.0%	0.0%	0.0%	
	49	Automotive - Antifreeze	0.0%	0.2%	0.0%	0.0%	
	50	Automotive - Used oil.filters	0.1%	1.7%	0.0%	0.1%	Yes
	51	Other	0.3%	1.8%	0.2%	0.5%	Yes
		TOTAL HHW	0.5%	4.5%	0.3%	0.7%	Yes
Other Waste	52	Textiles	3.5%	6.2%	2.9%	4.3%	
	53	Carpet	2.7%	2.6%	1.9%	4.4%	
	54	Sharps and Infectious Waste	0.0%	0.6%	0.0%	0.0%	
	55	Rubber	0.5%	9.2%	0.4%	0.7%	Yes
	56	Construction & Demolition Debris	2.9%	17.4%	2.0%	5.8%	Yes
	57	Household Bulky Items	5.8%	1.5%	3.8%	8.9%	
	58	Empty HHW Containers	0.6%	6.2%	0.4%	0.7%	Yes
	59	Miscellaneous	6.5%	19.2%	5.6%	7.7%	Yes
		TOTAL OTHER WASTE	22.5%	2.7%	19.4%	26.3%	
TOTAL			100.0%				

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study

Statewide Results--ICI Waste

Stratified Weighting

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Paper	1	Newsprint (ONP)	2.4%	11.7%	1.9%	3.2%	Yes
	2	High Grade Office	4.3%	12.3%	3.1%	6.1%	Yes
	3	Magazines/Catalogs	2.5%	12.6%	1.6%	3.7%	Yes
	4	Uncoated OCC - recyclable	9.9%	4.0%	8.2%	12.6%	
	5	Uncoated OCC - nonrecyclable	0.4%	2.1%	0.3%	0.7%	Yes
	6	Coated OCC	0.5%	3.8%	0.3%	0.9%	Yes
	7	Boxboard	1.5%	10.6%	1.2%	2.1%	Yes
	8	Mixed Paper - recyclable	5.4%	13.8%	4.3%	6.6%	Yes
	9	Mixed Paper - nonrecyclable	7.7%	23.5%	6.3%	9.5%	Yes
		TOTAL PAPER	34.7%	6.6%	30.6%	39.5%	
Plastic	10	PET Bottles/Jars - clear	0.3%	0.3%	0.2%	0.4%	
	11	PET Bottles/Jars - colored	0.2%	1.2%	0.1%	0.3%	Yes
	12	Other PET	0.0%	0.7%	0.0%	0.1%	Yes
	13	HDPE Bottles - natural	0.3%	0.4%	0.2%	0.4%	
	14	HDPE Bottles - colored	0.1%	0.4%	0.1%	0.2%	Yes
	15	PVC	0.1%	1.2%	0.0%	0.1%	Yes
	16	Polystyrene	0.8%	2.8%	0.7%	1.1%	Yes
	17	Film - transport packaging	0.6%	3.7%	0.4%	0.8%	Yes
	18	Other Film	3.4%	5.5%	2.8%	4.2%	
	19	Other Containers	0.3%	12.2%	0.2%	0.4%	Yes
	20	Other non-containers	6.4%	13.3%	5.1%	8.1%	Yes
		TOTAL PLASTIC	12.4%	2.7%	10.7%	14.6%	
Metals	21	Aluminum Beverage Containers	0.5%	1.9%	0.4%	0.7%	Yes
	22	Other Aluminum	0.5%	4.1%	0.4%	0.7%	Yes
	23	Ferrrous Containers	0.6%	8.2%	0.5%	1.2%	Yes
	24	Other Ferrous	3.4%	3.7%	2.4%	5.1%	
	25	Other Non-Ferrous	0.0%	8.4%	0.0%	0.1%	Yes
		TOTAL METALS	5.2%	2.1%	4.1%	7.0%	
Glass	26	Clear Containers	0.9%	2.3%	0.7%	1.2%	Yes
	27	Green Containers	0.3%	0.5%	0.2%	0.5%	
	28	Brown Containers	0.3%	6.7%	0.2%	0.6%	Yes
	29	Other Glass	1.0%	6.3%	0.6%	1.8%	Yes
		TOTAL GLASS	2.5%	3.7%	1.9%	3.6%	

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study

Statewide Results--ICI Waste

Stratified Weighting

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Organic Materials	30	Yard Waste - Grass and Leaves	1.5%	3.7%	1.0%	2.2%	Yes
	31	Yard Waste - woody material	0.0%	17.6%	0.0%	0.0%	Yes
	32	Food Waste	11.8%	17.7%	9.3%	14.9%	
	33	Wood Pallets	6.6%	9.5%	4.6%	9.6%	
	34	Treated Wood	3.7%	12.5%	2.7%	5.7%	Yes
	35	Untreated Wood	3.7%	6.0%	2.6%	5.6%	
	36	Diapers	0.4%	10.3%	0.3%	0.6%	Yes
	37	Other Organic Material	1.3%	22.2%	0.8%	1.8%	Yes
		TOTAL ORGANIC MATERIALS	28.9%	7.7%	25.1%	33.6%	
Problem Materials	38	Televisions	0.0%	0.0%	0.0%	0.0%	
	39	Computer Monitors	0.0%	4.0%	0.0%	0.0%	
	40	Computer Equipment/Peripherals	0.3%	5.3%	0.1%	0.4%	Yes
	41	Electric and Electronic Products	1.0%	0.2%	0.5%	1.2%	
	42	Batteries	0.0%	2.2%	0.0%	0.1%	Yes
	43	Other	0.1%	6.3%	0.0%	0.2%	Yes
		TOTAL PROBLEM MATERIALS	1.4%	0.5%	0.8%	1.8%	
HHW	44	Latex Paint	0.1%	0.0%	0.0%	0.1%	
	45	Oil Paint	0.0%	0.0%	0.0%	0.0%	
	46	Unused Pesti/Fungi/Herbi-cides	0.0%	0.3%	0.0%	0.0%	Yes
	47	Unused Cleaners and Solvents	0.0%	0.1%	0.0%	0.1%	Yes
	48	Compressed Fuel Containers	0.0%	0.4%	0.0%	0.0%	Yes
	49	Automotive - Antifreeze	0.0%	0.0%	0.0%	0.1%	
	50	Automotive - Used oil.filters	0.0%	1.7%	0.0%	0.0%	Yes
	51	Other	0.3%	3.3%	0.1%	0.6%	Yes
		TOTAL HHW	0.4%	4.5%	0.2%	0.9%	Yes
Other Waste	52	Textiles	1.5%	12.6%	1.1%	2.0%	Yes
	53	Carpet	2.5%	0.6%	1.6%	3.7%	
	54	Sharps and Infectious Waste	0.0%	4.5%	0.0%	0.0%	
	55	Rubber	0.7%	11.8%	0.4%	1.2%	Yes
	56	Construction & Demolition Debris	2.5%	6.1%	1.6%	3.9%	Yes
	57	Household Bulky Items	2.4%	1.7%	1.7%	3.8%	
	58	Empty HHW Containers	0.3%	12.3%	0.1%	0.5%	Yes
	59	Miscellaneous	4.5%	19.7%	3.5%	6.0%	Yes
		TOTAL OTHER WASTE	14.4%	4.3%	11.7%	17.8%	
TOTAL			100.0%				

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study

Statewide Results--Mixed Waste

Stratified Weighting

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Paper	1	Newsprint (ONP)	5.0%	3.8%	4.4%	5.7%	
	2	High Grade Office	3.1%	3.4%	2.6%	3.8%	
	3	Magazines/Catalogs	2.6%	6.5%	2.2%	3.0%	Yes
	4	Uncoated OCC - recyclable	4.7%	3.2%	3.9%	5.5%	
	5	Uncoated OCC - nonrecyclable	0.4%	1.2%	0.4%	0.6%	Yes
	6	Coated OCC	0.1%	2.7%	0.1%	0.2%	Yes
	7	Boxboard	3.1%	7.1%	2.8%	5.3%	Yes
	8	Mixed Paper - recyclable	6.5%	7.0%	5.7%	7.5%	
	9	Mixed Paper - nonrecyclable	11.1%	16.0%	10.1%	12.3%	
		TOTAL PAPER	36.6%	5.4%	34.1%	39.5%	
Plastic	10	PET Bottles/Jars - clear	0.5%	0.3%	0.5%	0.6%	
	11	PET Bottles/Jars - colored	0.4%	1.7%	0.3%	0.5%	Yes
	12	Other PET	0.1%	0.3%	0.0%	0.1%	Yes
	13	HDPE Bottles - natural	0.4%	0.3%	0.3%	0.4%	
	14	HDPE Bottles - colored	0.3%	0.8%	0.2%	0.3%	Yes
	15	PVC	0.1%	0.4%	0.1%	0.3%	Yes
	16	Polystyrene	0.8%	0.8%	0.7%	0.9%	
	17	Film - transport packaging	0.2%	1.9%	0.1%	0.3%	Yes
	18	Other Film	3.8%	4.8%	3.5%	4.2%	
	19	Other Containers	0.8%	3.7%	0.4%	0.9%	Yes
	20	Other non-containers	3.7%	6.5%	3.3%	4.3%	
		TOTAL PLASTIC	11.0%	2.1%	10.1%	11.9%	
Metals	21	Aluminum Beverage Containers	0.8%	1.0%	0.7%	0.9%	
	22	Other Aluminum	0.5%	1.1%	0.4%	0.7%	
	23	Ferrrous Containers	1.2%	5.5%	1.1%	1.3%	Yes
	24	Other Ferrous	2.4%	1.3%	1.8%	3.1%	
	25	Other Non-Ferrous	0.1%	5.9%	0.1%	0.2%	Yes
		TOTAL METALS	5.0%	1.7%	4.4%	5.7%	
Glass	26	Clear Containers	1.6%	1.3%	1.3%	1.8%	
	27	Green Containers	0.4%	2.7%	0.3%	0.5%	Yes
	28	Brown Containers	0.5%	3.1%	0.3%	0.6%	Yes
	29	Other Glass	0.6%	2.7%	0.4%	1.1%	Yes
		TOTAL GLASS	3.0%	5.4%	2.6%	3.6%	

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study

Statewide Results--Mixed Waste

Stratified Weighting

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Organic Materials	30	Yard Waste - Grass and Leaves	2.2%	2.9%	1.6%	3.1%	
	31	Yard Waste - woody material	0.2%	6.6%	0.1%	0.3%	Yes
	32	Food Waste	13.3%	4.9%	12.1%	14.9%	
	33	Wood Pallets	0.5%	4.9%	0.3%	1.1%	Yes
	34	Treated Wood	2.0%	3.8%	1.4%	3.0%	
	35	Untreated Wood	0.9%	2.4%	0.6%	1.5%	Yes
	36	Diapers	2.6%	3.0%	2.2%	3.1%	
	37	Other Organic Material	1.0%	10.0%	0.8%	1.3%	Yes
		TOTAL ORGANIC MATERIALS	22.7%	4.8%	21.0%	25.0%	
Problem Materials	38	Televisions	0.0%	0.2%	0.0%	0.0%	
	39	Computer Monitors	0.0%	0.3%	0.0%	0.2%	Yes
	40	Computer Equipment/Peripherals	0.0%	6.3%	0.0%	0.2%	Yes
	41	Electric and Electronic Products	1.6%	0.5%	1.0%	2.3%	
	42	Batteries	0.1%	0.2%	0.1%	0.1%	Yes
	43	Other	0.0%	6.2%	0.0%	0.0%	Yes
		TOTAL PROBLEM MATERIALS	1.7%	0.5%	1.2%	2.5%	
HHW	44	Latex Paint	0.0%	0.1%	0.0%	0.0%	Yes
	45	Oil Paint	0.1%	1.0%	0.0%	0.2%	Yes
	46	Unused Pesti/Fungi/Herbi-cides	0.0%	0.1%	0.0%	0.0%	Yes
	47	Unused Cleaners and Solvents	0.0%	0.1%	0.0%	0.0%	Yes
	48	Compressed Fuel Containers	0.0%	0.0%	0.0%	0.0%	Yes
	49	Automotive - Antifreeze	0.0%	0.4%	0.0%	0.0%	Yes
	50	Automotive - Used oil.filters	0.1%	2.5%	0.1%	0.2%	Yes
	51	Other	0.5%	2.7%	0.3%	0.7%	Yes
		TOTAL HHW	0.8%	4.8%	0.5%	1.1%	Yes
Other Waste	52	Textiles	3.3%	7.6%	2.7%	4.0%	Yes
	53	Carpet	2.0%	0.7%	1.2%	3.5%	
	54	Sharps and Infectious Waste	0.0%	3.7%	0.0%	0.0%	Yes
	55	Rubber	1.0%	8.2%	0.7%	1.5%	Yes
	56	Construction & Demolition Debris	3.2%	13.4%	2.3%	4.5%	Yes
	57	Household Bulky Items	2.4%	0.9%	1.2%	4.2%	
	58	Empty HHW Containers	0.5%	5.8%	0.5%	0.8%	Yes
	59	Miscellaneous	6.7%	15.4%	5.8%	7.8%	Yes
		TOTAL OTHER WASTE	19.2%	4.9%	16.9%	21.8%	
TOTAL			100.0%				

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Brooklyn Park Transfer Station

Aggregate Results

Stratified Weighting

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Paper	1	Newsprint (ONP)	2.6%	3.2%	1.7%	3.7%	
	2	High Grade Office	4.6%	11.3%	2.4%	7.9%	Yes
	3	Magazines/Catalogs	1.2%	1.6%	0.8%	1.6%	
	4	Uncoated OCC - recyclable	8.9%	16.3%	4.9%	13.8%	
	5	Uncoated OCC - nonrecyclable	0.4%	1.3%	0.2%	0.7%	Yes
	6	Coated OCC	0.1%	0.9%	0.0%	0.3%	Yes
	7	Boxboard	1.5%	1.7%	1.1%	2.0%	
	8	Mixed Paper - recyclable	5.2%	6.5%	3.5%	7.3%	
	9	Mixed Paper - nonrecyclable	6.5%	7.1%	4.7%	8.9%	
		TOTAL PAPER	31.0%	25.7%	22.6%	40.3%	
Plastic	10	PET Bottles/Jars - clear	0.2%	0.3%	0.1%	0.3%	
	11	PET Bottles/Jars - colored	0.1%	0.1%	0.0%	0.1%	
	12	Other PET	0.1%	0.3%	0.0%	0.1%	Yes
	13	HDPE Bottles - natural	0.1%	0.3%	0.1%	0.2%	Yes
	14	HDPE Bottles - colored	0.1%	0.2%	0.1%	0.2%	
	15	PVC	0.0%	0.2%	0.0%	0.1%	Yes
	16	Polystyrene	0.7%	1.0%	0.4%	1.0%	
	17	Film - transport packaging	0.2%	0.7%	0.1%	0.4%	Yes
	18	Other Film	3.4%	5.2%	2.3%	4.7%	
	19	Other Containers	0.4%	0.8%	0.2%	0.6%	Yes
	20	Other non-containers	6.6%	15.0%	3.5%	10.7%	Yes
		TOTAL PLASTIC	11.9%	15.5%	8.2%	16.3%	
Metals	21	Aluminum Beverage Containers	0.3%	0.4%	0.2%	0.5%	
	22	Other Aluminum	0.8%	2.4%	0.4%	1.3%	Yes
	23	Ferrrous Containers	0.4%	0.5%	0.2%	0.5%	
	24	Other Ferrous	4.9%	10.2%	2.7%	7.9%	Yes
	25	Other Non-Ferrous	0.1%	0.5%	0.0%	0.2%	Yes
		TOTAL METALS	6.5%	10.6%	4.1%	9.5%	
Glass	26	Clear Containers	1.2%	4.8%	0.6%	2.0%	Yes
	27	Green Containers	0.7%	3.0%	0.3%	1.3%	Yes
	28	Brown Containers	1.0%	5.8%	0.3%	2.0%	Yes
	29	Other Glass	1.4%	8.5%	0.1%	4.2%	Yes
		TOTAL GLASS	4.3%	15.9%	1.9%	8.0%	Yes

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Brooklyn Park Transfer Station

Aggregate Results

Stratified Weighting

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Organic Materials	30	Yard Waste - Grass and Leaves	6.4%	14.0%	3.5%	10.8%	Yes
	31	Yard Waste - woody material	0.4%	1.7%	0.0%	1.0%	Yes
	32	Food Waste	6.6%	10.5%	4.5%	9.3%	
	33	Wood Pallets	6.1%	17.8%	2.1%	11.6%	Yes
	34	Treated Wood	4.6%	12.8%	2.0%	8.2%	Yes
	35	Untreated Wood	3.2%	7.5%	1.6%	5.6%	Yes
	36	Diapers	2.0%	3.4%	1.1%	3.4%	
	37	Other Organic Material	0.5%	1.5%	0.2%	1.0%	Yes
		TOTAL ORGANIC MATERIALS	29.8%	26.4%	21.2%	39.4%	
Problem Materials	38	Televisions	0.0%	0.0%	0.0%	0.0%	
	39	Computer Monitors	0.0%	0.0%	0.0%	0.0%	
	40	Computer Equipment/Peripherals	0.0%	0.0%	0.0%	0.0%	
	41	Electric and Electronic Products	1.4%	5.8%	0.7%	2.5%	Yes
	42	Batteries	0.1%	0.3%	0.0%	0.2%	Yes
	43	Other	0.0%	0.0%	0.0%	0.0%	
		TOTAL PROBLEM MATERIALS	1.5%	5.8%	0.8%	2.6%	Yes
HHW	44	Latex Paint	0.0%	0.0%	0.0%	0.0%	
	45	Oil Paint	0.0%	0.0%	0.0%	0.0%	
	46	Unused Pesti/Fungi/Herbi-cides	0.0%	0.0%	0.0%	0.0%	Yes
	47	Unused Cleaners and Solvents	0.0%	0.0%	0.0%	0.0%	
	48	Compressed Fuel Containers	0.0%	0.0%	0.0%	0.0%	
	49	Automotive - Antifreeze	0.0%	0.0%	0.0%	0.0%	
	50	Automotive - Used oil.filters	0.0%	0.0%	0.0%	0.0%	
	51	Other	0.0%	0.1%	0.0%	0.0%	Yes
		TOTAL HHW	0.0%	0.1%	0.0%	0.0%	Yes
Other Waste	52	Textiles	1.6%	4.3%	1.0%	2.5%	Yes
	53	Carpet	2.0%	7.1%	1.0%	3.7%	Yes
	54	Sharps and Infectious Waste	0.0%	0.0%	0.0%	0.0%	
	55	Rubber	0.7%	1.9%	0.4%	1.2%	Yes
	56	Construction & Demolition Debris	0.6%	2.0%	0.3%	1.3%	Yes
	57	Household Bulky Items	5.2%	16.5%	2.0%	9.9%	Yes
	58	Empty HHW Containers	0.1%	0.2%	0.1%	0.2%	
	59	Miscellaneous	4.7%	5.5%	3.2%	6.5%	
		TOTAL OTHER WASTE	15.0%	21.9%	9.5%	22.0%	
TOTAL			100.0%				

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Brooklyn Park Transfer Station

Residential Results

Residential Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Paper	1	Newsprint (ONP)	5.3%	3.4%	3.0%	8.2%	
	2	High Grade Office	1.6%	1.4%	0.9%	2.5%	
	3	Magazines/Catalogs	2.5%	1.8%	1.5%	3.8%	
	4	Uncoated OCC - recyclable	2.3%	1.7%	1.4%	3.4%	
	5	Uncoated OCC - nonrecyclable	0.4%	0.4%	0.2%	0.6%	
	6	Coated OCC	0.0%	0.0%	0.0%	0.0%	
	7	Boxboard	2.7%	1.6%	1.8%	3.8%	
	8	Mixed Paper - recyclable	6.1%	3.1%	4.5%	7.9%	
	9	Mixed Paper - nonrecyclable	8.4%	3.9%	5.8%	11.5%	
		TOTAL PAPER	29.2%	12.5%	21.8%	37.2%	
Plastic	10	PET Bottles/Jars - clear	0.3%	0.3%	0.2%	0.5%	
	11	PET Bottles/Jars - colored	0.1%	0.1%	0.0%	0.1%	
	12	Other PET	0.0%	0.1%	0.0%	0.1%	
	13	HDPE Bottles - natural	0.2%	0.1%	0.1%	0.3%	
	14	HDPE Bottles - colored	0.3%	0.3%	0.2%	0.5%	
	15	PVC	0.1%	0.1%	0.0%	0.1%	
	16	Polystyrene	0.6%	0.4%	0.4%	0.8%	
	17	Film - transport packaging	0.0%	0.0%	0.0%	0.0%	
	18	Other Film	2.7%	1.3%	1.9%	3.6%	
	19	Other Containers	0.4%	0.3%	0.2%	0.6%	
	20	Other non-containers	3.4%	2.0%	2.1%	4.9%	
		TOTAL PLASTIC	7.9%	3.0%	6.3%	9.7%	
Metals	21	Aluminum Beverage Containers	0.4%	0.4%	0.2%	0.6%	
	22	Other Aluminum	0.8%	0.8%	0.5%	1.3%	
	23	Ferrrous Containers	0.7%	0.6%	0.4%	1.0%	
	24	Other Ferrous	2.3%	2.1%	1.3%	3.5%	
	25	Other Non-Ferrous	0.3%	1.0%	0.0%	0.8%	Yes
		TOTAL METALS	4.4%	2.6%	3.1%	6.0%	
Glass	26	Clear Containers	1.0%	0.7%	0.6%	1.6%	
	27	Green Containers	0.3%	0.5%	0.1%	0.7%	
	28	Brown Containers	0.2%	0.2%	0.1%	0.4%	
	29	Other Glass	0.4%	0.4%	0.1%	0.7%	
		TOTAL GLASS	1.8%	1.0%	1.3%	2.5%	

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Brooklyn Park Transfer Station

Residential Results

Residential Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Organic Materials	30	Yard Waste - Grass and Leaves	12.0%	17.9%	4.1%	23.2%	
	31	Yard Waste - woody material	1.5%	3.5%	0.2%	3.7%	Yes
	32	Food Waste	10.7%	4.5%	8.4%	13.2%	
	33	Wood Pallets	0.0%	0.0%	0.0%	0.0%	
	34	Treated Wood	2.5%	1.9%	1.6%	3.5%	
	35	Untreated Wood	0.9%	1.4%	0.2%	1.9%	
	36	Diapers	5.4%	5.2%	2.6%	9.0%	
	37	Other Organic Material	1.8%	3.0%	0.6%	3.5%	
		TOTAL ORGANIC MATERIALS	34.6%	19.9%	24.1%	46.0%	
Problem Materials	38	Televisions	0.0%	0.0%	0.0%	0.0%	
	39	Computer Monitors	0.0%	0.0%	0.0%	0.0%	
	40	Computer Equipment/Peripherals	0.0%	0.0%	0.0%	0.0%	
	41	Electric and Electronic Products	2.1%	4.1%	0.6%	4.4%	
	42	Batteries	0.3%	0.7%	0.1%	0.7%	Yes
	43	Other	0.0%	0.0%	0.0%	0.0%	
		TOTAL PROBLEM MATERIALS	2.4%	4.1%	0.8%	4.8%	
HHW	44	Latex Paint	0.0%	0.0%	0.0%	0.0%	
	45	Oil Paint	0.0%	0.0%	0.0%	0.0%	
	46	Unused Pesti/Fungi/Herbi-cides	0.0%	0.0%	0.0%	0.0%	
	47	Unused Cleaners and Solvents	0.0%	0.0%	0.0%	0.0%	
	48	Compressed Fuel Containers	0.0%	0.0%	0.0%	0.0%	
	49	Automotive - Antifreeze	0.0%	0.0%	0.0%	0.0%	
	50	Automotive - Used oil.filters	0.0%	0.0%	0.0%	0.0%	
	51	Other	0.0%	0.0%	0.0%	0.0%	Yes
		TOTAL HHW	0.0%	0.0%	0.0%	0.0%	Yes
Other Waste	52	Textiles	2.6%	2.1%	1.6%	3.9%	
	53	Carpet	2.7%	4.8%	0.7%	5.8%	
	54	Sharps and Infectious Waste	0.0%	0.0%	0.0%	0.0%	
	55	Rubber	1.1%	2.1%	0.3%	2.3%	Yes
	56	Construction & Demolition Debris	0.6%	1.1%	0.1%	1.3%	
	57	Household Bulky Items	5.1%	15.9%	0.6%	13.4%	Yes
	58	Empty HHW Containers	0.2%	0.2%	0.1%	0.3%	
	59	Miscellaneous	7.3%	4.9%	4.4%	10.9%	
		TOTAL OTHER WASTE	19.5%	15.4%	12.3%	28.0%	
TOTAL			100.0%				

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Brooklyn Park Transfer Station

ICI Results

ICI Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Paper	1	Newsprint (ONP)	1.3%	3.4%	0.7%	2.3%	Yes
	2	High Grade Office	4.5%	9.8%	2.2%	7.6%	Yes
	3	Magazines/Catalogs	0.4%	1.1%	0.2%	0.7%	Yes
	4	Uncoated OCC - recyclable	13.1%	21.0%	7.5%	19.9%	
	5	Uncoated OCC - nonrecyclable	0.5%	1.6%	0.2%	0.8%	Yes
	6	Coated OCC	0.2%	1.1%	0.1%	0.4%	Yes
	7	Boxboard	0.9%	1.7%	0.5%	1.4%	Yes
	8	Mixed Paper - recyclable	5.0%	8.1%	2.8%	7.8%	
	9	Mixed Paper - nonrecyclable	5.1%	8.5%	2.8%	8.2%	
		TOTAL PAPER	30.9%	30.6%	19.9%	43.2%	
Plastic	10	PET Bottles/Jars - clear	0.2%	0.3%	0.1%	0.3%	
	11	PET Bottles/Jars - colored	0.0%	0.1%	0.0%	0.1%	
	12	Other PET	0.1%	0.3%	0.0%	0.1%	Yes
	13	HDPE Bottles - natural	0.1%	0.3%	0.1%	0.2%	Yes
	14	HDPE Bottles - colored	0.0%	0.2%	0.0%	0.1%	Yes
	15	PVC	0.0%	0.0%	0.0%	0.0%	Yes
	16	Polystyrene	0.7%	1.3%	0.4%	1.1%	
	17	Film - transport packaging	0.3%	0.9%	0.1%	0.6%	Yes
	18	Other Film	3.9%	6.6%	2.4%	5.7%	
	19	Other Containers	0.2%	0.4%	0.1%	0.3%	Yes
	20	Other non-containers	8.7%	19.2%	4.4%	14.4%	Yes
		TOTAL PLASTIC	14.2%	19.8%	9.1%	20.2%	
Metals	21	Aluminum Beverage Containers	0.2%	0.4%	0.1%	0.4%	
	22	Other Aluminum	0.9%	3.1%	0.4%	1.6%	Yes
	23	Ferrrous Containers	0.2%	0.6%	0.1%	0.3%	Yes
	24	Other Ferrous	5.7%	12.6%	2.8%	9.5%	Yes
	25	Other Non-Ferrous	0.0%	0.0%	0.0%	0.0%	Yes
		TOTAL METALS	7.0%	13.1%	3.9%	10.9%	
Glass	26	Clear Containers	1.3%	6.2%	0.5%	2.5%	Yes
	27	Green Containers	0.9%	3.8%	0.3%	1.7%	Yes
	28	Brown Containers	1.5%	7.5%	0.5%	3.0%	Yes
	29	Other Glass	0.2%	0.7%	0.1%	0.3%	Yes
		TOTAL GLASS	3.9%	17.4%	1.3%	8.0%	Yes

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Brooklyn Park Transfer Station

ICI Results

ICI Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Organic Materials	30	Yard Waste - Grass and Leaves	4.1%	12.6%	1.7%	7.6%	Yes
	31	Yard Waste - woody material	0.0%	0.0%	0.0%	0.0%	
	32	Food Waste	5.0%	13.0%	2.3%	8.5%	Yes
	33	Wood Pallets	9.8%	22.9%	4.1%	17.4%	Yes
	34	Treated Wood	6.0%	16.4%	2.5%	10.9%	Yes
	35	Untreated Wood	4.3%	9.3%	2.0%	7.3%	Yes
	36	Diapers	0.1%	0.2%	0.0%	0.1%	Yes
	37	Other Organic Material	0.0%	0.1%	0.0%	0.1%	Yes
		TOTAL ORGANIC MATERIALS	29.2%	31.1%	18.0%	41.8%	
Problem Materials	38	Televisions	0.0%	0.0%	0.0%	0.0%	
	39	Computer Monitors	0.0%	0.0%	0.0%	0.0%	
	40	Computer Equipment/Peripherals	0.0%	0.0%	0.0%	0.0%	
	41	Electric and Electronic Products	1.3%	6.9%	0.5%	2.6%	Yes
	42	Batteries	0.0%	0.0%	0.0%	0.0%	Yes
	43	Other	0.0%	0.0%	0.0%	0.0%	
		TOTAL PROBLEM MATERIALS	1.3%	6.9%	0.5%	2.6%	Yes
HHW	44	Latex Paint	0.0%	0.0%	0.0%	0.0%	
	45	Oil Paint	0.0%	0.0%	0.0%	0.0%	
	46	Unused Pesti/Fungi/Herbi-cides	0.0%	0.0%	0.0%	0.0%	Yes
	47	Unused Cleaners and Solvents	0.0%	0.0%	0.0%	0.0%	
	48	Compressed Fuel Containers	0.0%	0.0%	0.0%	0.0%	
	49	Automotive - Antifreeze	0.0%	0.0%	0.0%	0.0%	
	50	Automotive - Used oil.filters	0.0%	0.0%	0.0%	0.0%	
	51	Other	0.0%	0.0%	0.0%	0.0%	
		TOTAL HHW	0.0%	0.0%	0.0%	0.0%	Yes
Other Waste	52	Textiles	1.2%	5.3%	0.5%	2.2%	Yes
	53	Carpet	1.8%	8.4%	0.6%	3.5%	Yes
	54	Sharps and Infectious Waste	0.0%	0.0%	0.0%	0.0%	
	55	Rubber	0.7%	2.0%	0.3%	1.2%	Yes
	56	Construction & Demolition Debris	0.3%	1.2%	0.1%	0.7%	Yes
	57	Household Bulky Items	6.6%	18.8%	2.5%	12.4%	Yes
	58	Empty HHW Containers	0.1%	0.1%	0.0%	0.1%	Yes
	59	Miscellaneous	2.7%	5.9%	1.3%	4.6%	Yes
		TOTAL OTHER WASTE	13.4%	25.9%	6.4%	22.5%	
TOTAL			100.0%				

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Brooklyn Park Transfer Station

Mixed Results

Mixed Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Paper	1	Newsprint (ONP)	3.1%	2.2%	1.5%	5.4%	
	2	High Grade Office	9.6%	20.8%	1.5%	23.7%	Yes
	3	Magazines/Catalogs	2.0%	2.7%	0.8%	3.8%	
	4	Uncoated OCC - recyclable	3.2%	3.0%	1.1%	6.2%	
	5	Uncoated OCC - nonrecyclable	0.1%	0.2%	0.0%	0.3%	
	6	Coated OCC	0.1%	0.3%	0.0%	0.4%	Yes
	7	Boxboard	2.2%	1.4%	1.3%	3.3%	
	8	Mixed Paper - recyclable	4.6%	1.8%	3.4%	6.1%	
	9	Mixed Paper - nonrecyclable	8.9%	4.6%	6.1%	12.2%	
		TOTAL PAPER	33.9%	19.2%	21.2%	47.9%	
Plastic	10	PET Bottles/Jars - clear	0.3%	0.2%	0.1%	0.5%	
	11	PET Bottles/Jars - colored	0.1%	0.1%	0.0%	0.2%	
	12	Other PET	0.0%	0.0%	0.0%	0.1%	
	13	HDPE Bottles - natural	0.2%	0.2%	0.1%	0.4%	
	14	HDPE Bottles - colored	0.1%	0.2%	0.0%	0.3%	
	15	PVC	0.2%	0.4%	0.0%	0.5%	Yes
	16	Polystyrene	0.8%	0.5%	0.5%	1.2%	
	17	Film - transport packaging	0.0%	0.0%	0.0%	0.0%	
	18	Other Film	2.7%	1.2%	1.9%	3.6%	
	19	Other Containers	1.1%	1.8%	0.3%	2.5%	
	20	Other non-containers	3.7%	2.7%	2.3%	5.4%	
		TOTAL PLASTIC	9.2%	4.4%	6.6%	12.3%	
Metals	21	Aluminum Beverage Containers	0.6%	0.4%	0.4%	0.9%	
	22	Other Aluminum	0.5%	0.4%	0.2%	0.9%	
	23	Ferrrous Containers	0.5%	0.3%	0.3%	0.7%	
	24	Other Ferrous	6.0%	6.4%	1.8%	12.3%	
	25	Other Non-Ferrous	0.1%	0.4%	0.0%	0.5%	Yes
		TOTAL METALS	7.7%	6.7%	3.6%	13.1%	
Glass	26	Clear Containers	0.8%	0.8%	0.3%	1.6%	
	27	Green Containers	0.3%	0.6%	0.0%	0.9%	
	28	Brown Containers	0.2%	0.3%	0.0%	0.5%	
	29	Other Glass	7.8%	21.2%	0.3%	24.2%	Yes
		TOTAL GLASS	9.2%	20.7%	1.2%	23.3%	Yes

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Brooklyn Park Transfer Station

Mixed Results

Mixed Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Organic Materials	30	Yard Waste - Grass and Leaves	6.7%	12.2%	0.7%	18.0%	
	31	Yard Waste - woody material	0.0%	0.0%	0.0%	0.0%	
	32	Food Waste	6.4%	4.7%	3.7%	10.0%	
	33	Wood Pallets	1.7%	4.9%	0.1%	5.6%	Yes
	34	Treated Wood	2.5%	2.5%	0.9%	4.9%	
	35	Untreated Wood	2.9%	5.3%	0.3%	8.1%	
	36	Diapers	4.3%	5.6%	0.9%	10.1%	
	37	Other Organic Material	0.3%	0.4%	0.1%	0.7%	
		TOTAL ORGANIC MATERIALS	24.9%	11.6%	17.1%	33.6%	
Problem Materials	38	Televisions	0.0%	0.0%	0.0%	0.0%	
	39	Computer Monitors	0.0%	0.0%	0.0%	0.0%	
	40	Computer Equipment/Peripherals	0.0%	0.0%	0.0%	0.0%	
	41	Electric and Electronic Products	0.8%	1.6%	0.1%	2.2%	Yes
	42	Batteries	0.0%	0.0%	0.0%	0.1%	
	43	Other	0.0%	0.0%	0.0%	0.0%	
		TOTAL PROBLEM MATERIALS	0.8%	1.6%	0.1%	2.2%	Yes
HHW	44	Latex Paint	0.0%	0.0%	0.0%	0.0%	
	45	Oil Paint	0.0%	0.0%	0.0%	0.0%	
	46	Unused Pesti/Fungi/Herbi-cides	0.0%	0.0%	0.0%	0.0%	
	47	Unused Cleaners and Solvents	0.0%	0.0%	0.0%	0.0%	
	48	Compressed Fuel Containers	0.0%	0.0%	0.0%	0.0%	
	49	Automotive - Antifreeze	0.0%	0.0%	0.0%	0.0%	
	50	Automotive - Used oil.filters	0.0%	0.0%	0.0%	0.0%	
	51	Other	0.0%	0.1%	0.0%	0.2%	Yes
		TOTAL HHW	0.0%	0.1%	0.0%	0.2%	Yes
Other Waste	52	Textiles	1.6%	1.8%	0.6%	3.2%	
	53	Carpet	2.0%	3.9%	0.2%	6.0%	
	54	Sharps and Infectious Waste	0.0%	0.0%	0.0%	0.0%	
	55	Rubber	0.5%	0.7%	0.1%	1.2%	
	56	Construction & Demolition Debris	1.8%	4.2%	0.1%	5.2%	Yes
	57	Household Bulky Items	0.0%	0.0%	0.0%	0.0%	
	58	Empty HHW Containers	0.3%	0.5%	0.1%	0.7%	
	59	Miscellaneous	7.9%	4.3%	4.0%	12.9%	
		TOTAL OTHER WASTE	14.2%	11.0%	7.1%	23.3%	
TOTAL			100.0%				

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Burnsville Landfill

Aggregate Results

Stratified Weighting

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Paper	1	Newsprint (ONP)	3.6%	3.3%	2.7%	4.8%	
	2	High Grade Office	1.3%	1.3%	0.9%	1.9%	
	3	Magazines/Catalogs	2.3%	2.3%	1.6%	3.1%	
	4	Uncoated OCC - recyclable	7.8%	12.0%	4.7%	11.8%	
	5	Uncoated OCC - nonrecyclabl	0.2%	0.3%	0.2%	0.4%	
	6	Coated OCC	0.0%	0.0%	0.0%	0.0%	
	7	Boxboard	2.5%	2.1%	1.9%	3.3%	
	8	Mixed Paper - recyclable	5.6%	5.0%	4.1%	7.5%	
	9	Mixed Paper - nonrecyclable	8.4%	11.0%	5.7%	12.1%	
		TOTAL PAPER	31.7%	17.2%	25.6%	38.4%	
Plastic	10	PET Bottles/Jars - clear	0.4%	0.6%	0.2%	0.6%	
	11	PET Bottles/Jars - colored	0.1%	0.2%	0.1%	0.2%	
	12	Other PET	0.0%	0.1%	0.0%	0.1%	
	13	HDPE Bottles - natural	0.2%	0.3%	0.1%	0.3%	
	14	HDPE Bottles - colored	0.2%	0.3%	0.2%	0.3%	
	15	PVC	0.2%	1.0%	0.0%	0.6%	Yes
	16	Polystyrene	0.5%	0.6%	0.3%	0.7%	
	17	Film - transport packaging	0.1%	0.3%	0.0%	0.2%	Yes
	18	Other Film	2.5%	2.4%	1.9%	3.3%	
	19	Other Containers	0.3%	0.8%	0.2%	0.5%	Yes
	20	Other non-containers	5.5%	7.4%	3.7%	8.1%	
		TOTAL PLASTIC	10.1%	9.8%	7.5%	13.4%	
Metals	21	Aluminum Beverage Container	0.5%	0.6%	0.4%	0.8%	
	22	Other Aluminum	0.5%	1.6%	0.2%	1.0%	Yes
	23	Ferrrous Containers	0.7%	1.6%	0.4%	1.2%	Yes
	24	Other Ferrous	2.3%	4.6%	1.2%	3.8%	Yes
	25	Other Non-Ferrous	0.0%	0.1%	0.0%	0.1%	Yes
		TOTAL METALS	4.1%	4.8%	2.8%	5.6%	
Glass	26	Clear Containers	0.8%	1.2%	0.5%	1.3%	
	27	Green Containers	0.2%	0.5%	0.1%	0.5%	Yes
	28	Brown Containers	0.2%	0.4%	0.1%	0.4%	
	29	Other Glass	0.7%	2.0%	0.2%	1.3%	Yes
		TOTAL GLASS	1.9%	2.6%	1.2%	2.9%	

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Burnsville Landfill

Aggregate Results

Stratified Weighting

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Organic Materials	30	Yard Waste - Grass and Leaves	2.3%	4.1%	1.3%	3.9%	
	31	Yard Waste - woody material	0.1%	0.5%	0.0%	0.3%	Yes
	32	Food Waste	6.7%	7.3%	4.7%	9.2%	
	33	Wood Pallets	7.3%	15.4%	2.6%	13.9%	Yes
	34	Treated Wood	4.3%	7.8%	2.3%	7.3%	
	35	Untreated Wood	3.2%	13.9%	0.8%	7.4%	Yes
	36	Diapers	2.0%	2.4%	1.3%	3.1%	
	37	Other Organic Material	2.6%	4.2%	1.6%	4.0%	
		TOTAL ORGANIC MATERIALS	28.6%	18.9%	22.1%	35.6%	
Problem Materials	38	Televisions	0.0%	0.0%	0.0%	0.0%	
	39	Computer Monitors	0.0%	0.0%	0.0%	0.0%	
	40	Computer Equipment/Peripher	0.2%	1.1%	0.0%	0.4%	Yes
	41	Electric and Electronic Products	2.1%	5.6%	0.9%	3.9%	Yes
	42	Batteries	0.0%	0.1%	0.0%	0.1%	Yes
	43	Other	0.2%	1.3%	0.0%	0.5%	Yes
		TOTAL PROBLEM MATERIALS	2.5%	5.7%	1.3%	4.3%	Yes
HHW	44	Latex Paint	0.0%	0.1%	0.0%	0.0%	Yes
	45	Oil Paint	0.0%	0.1%	0.0%	0.1%	Yes
	46	Unused Pesti/Fungi/Herbi-cide	0.0%	0.0%	0.0%	0.0%	
	47	Unused Cleaners and Solvents	0.0%	0.0%	0.0%	0.0%	Yes
	48	Compressed Fuel Containers	0.0%	0.2%	0.0%	0.1%	Yes
	49	Automotive - Antifreeze	0.0%	0.0%	0.0%	0.0%	
	50	Automotive - Used oil.filters	0.0%	0.1%	0.0%	0.0%	Yes
	51	Other	0.4%	2.3%	0.1%	0.9%	Yes
		TOTAL HHW	0.5%	2.3%	0.2%	1.0%	Yes
Other Waste	52	Textiles	2.5%	4.1%	1.6%	3.7%	
	53	Carpet	5.2%	14.5%	2.2%	10.6%	Yes
	54	Sharps and Infectious Waste	0.0%	0.0%	0.0%	0.0%	
	55	Rubber	1.2%	5.7%	0.3%	2.6%	Yes
	56	Construction & Demolition De	3.0%	8.6%	1.4%	5.6%	Yes
	57	Household Bulky Items	2.9%	7.6%	1.2%	5.6%	Yes
	58	Empty HHW Containers	0.2%	0.3%	0.1%	0.3%	
	59	Miscellaneous	5.6%	8.1%	3.5%	8.7%	
		TOTAL OTHER WASTE	20.6%	20.7%	14.6%	28.0%	
TOTAL			100.0%				

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Burnsville Landfill

Residential Results

Residential Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Paper	1	Newsprint (ONP)	5.9%	4.0%	4.3%	7.7%	
	2	High Grade Office	1.3%	1.1%	0.9%	1.9%	
	3	Magazines/Catalogs	4.0%	3.2%	2.8%	5.4%	
	4	Uncoated OCC - recyclable	3.9%	4.9%	2.2%	6.1%	
	5	Uncoated OCC - nonrecyclable	0.5%	0.4%	0.3%	0.6%	
	6	Coated OCC	0.0%	0.0%	0.0%	0.0%	
	7	Boxboard	3.7%	1.8%	2.8%	4.7%	
	8	Mixed Paper - recyclable	6.9%	4.2%	5.1%	8.9%	
	9	Mixed Paper - nonrecyclable	9.1%	5.4%	6.7%	12.0%	
		TOTAL PAPER	35.3%	13.5%	28.5%	42.5%	
Plastic	10	PET Bottles/Jars - clear	0.3%	0.2%	0.2%	0.4%	
	11	PET Bottles/Jars - colored	0.1%	0.1%	0.1%	0.1%	
	12	Other PET	0.1%	0.1%	0.0%	0.1%	
	13	HDPE Bottles - natural	0.2%	0.2%	0.1%	0.3%	
	14	HDPE Bottles - colored	0.3%	0.2%	0.2%	0.5%	
	15	PVC	0.0%	0.1%	0.0%	0.1%	Yes
	16	Polystyrene	0.5%	0.3%	0.4%	0.6%	
	17	Film - transport packaging	0.0%	0.0%	0.0%	0.0%	
	18	Other Film	3.0%	1.3%	2.4%	3.8%	
	19	Other Containers	0.2%	0.2%	0.2%	0.3%	
	20	Other non-containers	3.8%	1.5%	3.2%	4.4%	
		TOTAL PLASTIC	8.6%	2.5%	7.5%	9.7%	
Metals	21	Aluminum Beverage Containers	0.5%	0.4%	0.4%	0.7%	
	22	Other Aluminum	0.3%	0.2%	0.2%	0.4%	
	23	Ferrrous Containers	0.7%	0.5%	0.5%	1.0%	
	24	Other Ferrous	3.5%	6.3%	1.6%	6.1%	
	25	Other Non-Ferrous	0.0%	0.0%	0.0%	0.0%	Yes
		TOTAL METALS	5.1%	6.0%	3.3%	7.2%	
Glass	26	Clear Containers	1.0%	1.1%	0.6%	1.6%	
	27	Green Containers	0.4%	0.8%	0.2%	0.8%	
	28	Brown Containers	0.2%	0.3%	0.1%	0.4%	
	29	Other Glass	0.3%	0.3%	0.2%	0.4%	
		TOTAL GLASS	2.0%	1.4%	1.3%	2.8%	

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Burnsville Landfill

Residential Results

Residential Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Organic Materials	30	Yard Waste - Grass and Leaves	3.3%	5.1%	1.7%	5.6%	
	31	Yard Waste - woody material	0.0%	0.0%	0.0%	0.0%	
	32	Food Waste	10.1%	5.5%	7.2%	13.4%	
	33	Wood Pallets	0.0%	0.0%	0.0%	0.0%	
	34	Treated Wood	1.7%	5.3%	0.6%	3.4%	Yes
	35	Untreated Wood	1.0%	1.9%	0.4%	1.9%	
	36	Diapers	3.7%	3.1%	2.3%	5.3%	
	37	Other Organic Material	3.4%	3.9%	2.0%	5.2%	
		TOTAL ORGANIC MATERIALS	23.2%	8.8%	19.5%	27.2%	
Problem Materials	38	Televisions	0.0%	0.0%	0.0%	0.0%	
	39	Computer Monitors	0.0%	0.0%	0.0%	0.0%	
	40	Computer Equipment/Peripherals	0.4%	1.6%	0.1%	0.8%	Yes
	41	Electric and Electronic Products	3.8%	8.0%	1.6%	6.8%	Yes
	42	Batteries	0.1%	0.1%	0.0%	0.1%	
	43	Other	0.0%	0.0%	0.0%	0.0%	
		TOTAL PROBLEM MATERIALS	4.2%	8.0%	2.0%	7.2%	
HHW	44	Latex Paint	0.0%	0.1%	0.0%	0.1%	Yes
	45	Oil Paint	0.0%	0.0%	0.0%	0.0%	
	46	Unused Pesti/Fungi/Herbi-cides	0.0%	0.0%	0.0%	0.0%	
	47	Unused Cleaners and Solvents	0.0%	0.1%	0.0%	0.0%	Yes
	48	Compressed Fuel Containers	0.0%	0.0%	0.0%	0.0%	
	49	Automotive - Antifreeze	0.0%	0.0%	0.0%	0.0%	
	50	Automotive - Used oil.filters	0.0%	0.1%	0.0%	0.1%	Yes
	51	Other	0.8%	3.3%	0.2%	1.8%	Yes
		TOTAL HHW	0.9%	3.3%	0.2%	1.8%	Yes
Other Waste	52	Textiles	3.9%	5.6%	2.4%	5.7%	
	53	Carpet	2.4%	6.0%	0.7%	5.0%	Yes
	54	Sharps and Infectious Waste	0.0%	0.0%	0.0%	0.0%	
	55	Rubber	0.5%	0.6%	0.2%	0.8%	
	56	Construction & Demolition Debris	2.4%	5.6%	0.9%	4.5%	Yes
	57	Household Bulky Items	4.2%	10.1%	1.3%	8.7%	Yes
	58	Empty HHW Containers	0.2%	0.3%	0.1%	0.4%	
	59	Miscellaneous	7.1%	7.7%	4.5%	10.3%	
		TOTAL OTHER WASTE	20.7%	16.7%	14.5%	27.6%	
TOTAL			100.0%				

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Burnsville Landfill

ICI Results

ICI Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Paper	1	Newsprint (ONP)	1.4%	2.7%	0.5%	2.7%	
	2	High Grade Office	0.8%	1.2%	0.3%	1.5%	
	3	Magazines/Catalogs	0.8%	1.3%	0.3%	1.6%	
	4	Uncoated OCC - recyclable	13.5%	18.0%	7.0%	21.8%	
	5	Uncoated OCC - nonrecyclable	0.1%	0.1%	0.0%	0.1%	Yes
	6	Coated OCC	0.0%	0.0%	0.0%	0.0%	
	7	Boxboard	1.6%	2.7%	0.7%	2.9%	
	8	Mixed Paper - recyclable	3.6%	4.1%	1.8%	6.0%	
	9	Mixed Paper - nonrecyclable	7.3%	15.3%	2.5%	14.3%	Yes
		TOTAL PAPER	29.1%	21.5%	18.8%	40.6%	
Plastic	10	PET Bottles/Jars - clear	0.3%	0.7%	0.1%	0.7%	
	11	PET Bottles/Jars - colored	0.1%	0.3%	0.0%	0.3%	Yes
	12	Other PET	0.0%	0.1%	0.0%	0.1%	
	13	HDPE Bottles - natural	0.2%	0.5%	0.1%	0.4%	Yes
	14	HDPE Bottles - colored	0.2%	0.3%	0.0%	0.3%	Yes
	15	PVC	0.1%	0.2%	0.0%	0.1%	Yes
	16	Polystyrene	0.5%	0.9%	0.2%	0.9%	
	17	Film - transport packaging	0.1%	0.2%	0.0%	0.2%	Yes
	18	Other Film	1.7%	3.3%	0.7%	3.3%	
	19	Other Containers	0.4%	1.3%	0.1%	0.8%	Yes
	20	Other non-containers	6.4%	9.0%	3.2%	10.7%	
		TOTAL PLASTIC	10.0%	13.1%	5.3%	15.9%	
Metals	21	Aluminum Beverage Containers	0.4%	0.7%	0.2%	0.8%	
	22	Other Aluminum	0.9%	2.6%	0.3%	1.9%	Yes
	23	Ferrrous Containers	0.9%	2.5%	0.3%	1.9%	Yes
	24	Other Ferrous	1.3%	2.7%	0.4%	2.5%	Yes
	25	Other Non-Ferrous	0.0%	0.0%	0.0%	0.0%	Yes
		TOTAL METALS	3.5%	4.1%	1.7%	5.8%	
Glass	26	Clear Containers	0.6%	1.4%	0.2%	1.2%	Yes
	27	Green Containers	0.1%	0.1%	0.0%	0.2%	
	28	Brown Containers	0.1%	0.4%	0.0%	0.3%	Yes
	29	Other Glass	1.3%	3.3%	0.4%	2.8%	Yes
		TOTAL GLASS	2.1%	3.7%	0.7%	4.0%	

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Burnsville Landfill

ICI Results

ICI Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Organic Materials	30	Yard Waste - Grass and Leaves	1.1%	2.7%	0.3%	2.5%	Yes
	31	Yard Waste - woody material	0.0%	0.0%	0.0%	0.0%	Yes
	32	Food Waste	3.9%	10.1%	1.2%	8.1%	Yes
	33	Wood Pallets	17.2%	24.4%	6.5%	31.5%	
	34	Treated Wood	4.6%	8.1%	1.6%	9.1%	
	35	Untreated Wood	6.5%	22.2%	1.1%	15.9%	Yes
	36	Diapers	0.2%	0.6%	0.0%	0.4%	Yes
	37	Other Organic Material	1.7%	4.6%	0.4%	3.7%	Yes
		TOTAL ORGANIC MATERIALS	35.2%	28.4%	21.5%	50.2%	
Problem Materials	38	Televisions	0.0%	0.0%	0.0%	0.0%	
	39	Computer Monitors	0.0%	0.0%	0.0%	0.0%	
	40	Computer Equipment/Peripherals	0.0%	0.0%	0.0%	0.0%	
	41	Electric and Electronic Products	0.2%	0.6%	0.0%	0.4%	Yes
	42	Batteries	0.0%	0.1%	0.0%	0.1%	Yes
	43	Other	0.5%	2.1%	0.1%	1.3%	Yes
		TOTAL PROBLEM MATERIALS	0.7%	2.2%	0.2%	1.6%	Yes
HHW	44	Latex Paint	0.0%	0.0%	0.0%	0.0%	
	45	Oil Paint	0.0%	0.0%	0.0%	0.0%	
	46	Unused Pesti/Fungi/Herbi-cides	0.0%	0.0%	0.0%	0.0%	
	47	Unused Cleaners and Solvents	0.0%	0.0%	0.0%	0.0%	
	48	Compressed Fuel Containers	0.1%	0.2%	0.0%	0.1%	Yes
	49	Automotive - Antifreeze	0.0%	0.0%	0.0%	0.0%	
	50	Automotive - Used oil.filters	0.0%	0.0%	0.0%	0.0%	
	51	Other	0.1%	0.6%	0.0%	0.4%	Yes
		TOTAL HHW	0.2%	0.6%	0.0%	0.5%	Yes
Other Waste	52	Textiles	0.6%	1.6%	0.2%	1.2%	Yes
	53	Carpet	4.0%	15.9%	0.6%	10.0%	Yes
	54	Sharps and Infectious Waste	0.0%	0.0%	0.0%	0.0%	
	55	Rubber	2.5%	9.3%	0.6%	5.8%	Yes
	56	Construction & Demolition Debris	4.1%	12.3%	1.0%	9.2%	Yes
	57	Household Bulky Items	2.6%	5.3%	0.8%	5.6%	
	58	Empty HHW Containers	0.2%	0.4%	0.0%	0.3%	Yes
	59	Miscellaneous	5.3%	9.9%	1.7%	11.0%	
		TOTAL OTHER WASTE	19.3%	23.5%	9.3%	31.9%	
TOTAL			100.0%				

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Burnsville Landfill

Mixed Results

Mixed Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Paper	1	Newsprint (ONP)	2.7%	2.3%	#REF!	#REF!	
	2	High Grade Office	2.5%	1.9%	0.9%	4.9%	
	3	Magazines/Catalogs	0.9%	1.1%	0.1%	2.2%	
	4	Uncoated OCC - recyclable	5.3%	7.4%	1.3%	11.8%	
	5	Uncoated OCC - nonrecyclable	0.1%	0.1%	0.0%	0.3%	
	6	Coated OCC	0.0%	0.0%	0.0%	0.0%	
	7	Boxboard	1.2%	1.2%	0.4%	2.3%	
	8	Mixed Paper - recyclable	6.5%	8.0%	1.7%	14.0%	
	9	Mixed Paper - nonrecyclable	8.7%	10.8%	2.6%	17.8%	
		TOTAL PAPER	27.8%	15.4%	16.4%	41.0%	
Plastic	10	PET Bottles/Jars - clear	0.7%	1.0%	0.2%	1.6%	
	11	PET Bottles/Jars - colored	0.3%	0.3%	0.1%	0.6%	
	12	Other PET	0.0%	0.0%	0.0%	0.1%	
	13	HDPE Bottles - natural	0.1%	0.2%	0.0%	0.4%	
	14	HDPE Bottles - colored	0.1%	0.1%	0.0%	0.2%	
	15	PVC	1.0%	2.5%	0.0%	3.2%	Yes
	16	Polystyrene	0.5%	0.3%	0.3%	0.8%	
	17	Film - transport packaging	0.3%	0.8%	0.0%	1.1%	Yes
	18	Other Film	2.7%	2.1%	1.3%	4.5%	
	19	Other Containers	0.2%	0.2%	0.0%	0.4%	
	20	Other non-containers	8.5%	11.8%	2.1%	18.6%	
		TOTAL PLASTIC	14.3%	13.1%	5.9%	25.6%	
Metals	21	Aluminum Beverage Containers	0.8%	0.7%	0.3%	1.6%	
	22	Other Aluminum	0.2%	0.3%	0.0%	0.4%	
	23	Ferrrous Containers	0.4%	0.6%	0.1%	1.1%	
	24	Other Ferrous	1.2%	1.8%	0.2%	3.1%	
	25	Other Non-Ferrous	0.1%	0.2%	0.0%	0.3%	Yes
		TOTAL METALS	2.7%	2.1%	1.4%	4.5%	
Glass	26	Clear Containers	0.9%	0.9%	0.3%	1.8%	
	27	Green Containers	0.1%	0.2%	0.0%	0.3%	Yes
	28	Brown Containers	0.3%	0.5%	0.0%	0.9%	
	29	Other Glass	0.2%	0.4%	0.0%	0.7%	
		TOTAL GLASS	1.5%	1.3%	0.5%	3.1%	

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Burnsville Landfill

Mixed Results

Mixed Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Organic Materials	30	Yard Waste - Grass and Leaves	2.4%	4.1%	0.2%	7.1%	
	31	Yard Waste - woody material	0.5%	1.3%	0.0%	1.8%	Yes
	32	Food Waste	3.6%	2.3%	1.6%	6.4%	
	33	Wood Pallets	4.8%	8.1%	0.2%	14.5%	
	34	Treated Wood	10.7%	11.6%	2.9%	22.4%	
	35	Untreated Wood	1.6%	3.8%	0.1%	5.0%	Yes
	36	Diapers	1.9%	2.5%	0.2%	5.3%	
	37	Other Organic Material	2.3%	4.0%	0.3%	6.2%	
		TOTAL ORGANIC MATERIALS	27.8%	8.9%	21.2%	34.9%	
Problem Materials	38	Televisions	0.0%	0.0%	0.0%	0.0%	
	39	Computer Monitors	0.0%	0.0%	0.0%	0.0%	
	40	Computer Equipment/Peripherals	0.0%	0.0%	0.0%	0.0%	
	41	Electric and Electronic Products	2.1%	3.5%	0.2%	6.1%	
	42	Batteries	0.0%	0.0%	0.0%	0.0%	Yes
	43	Other	0.0%	0.0%	0.0%	0.0%	Yes
		TOTAL PROBLEM MATERIALS	2.1%	3.5%	0.2%	5.8%	
HHW	44	Latex Paint	0.0%	0.0%	0.0%	0.0%	
	45	Oil Paint	0.1%	0.3%	0.0%	0.3%	Yes
	46	Unused Pesti/Fungi/Herbi-cides	0.0%	0.0%	0.0%	0.0%	
	47	Unused Cleaners and Solvents	0.0%	0.0%	0.0%	0.0%	
	48	Compressed Fuel Containers	0.1%	0.3%	0.0%	0.4%	Yes
	49	Automotive - Antifreeze	0.0%	0.0%	0.0%	0.0%	
	50	Automotive - Used oil.filters	0.0%	0.0%	0.0%	0.0%	
	51	Other	0.1%	0.2%	0.0%	0.2%	Yes
		TOTAL HHW	0.3%	0.6%	0.0%	0.9%	Yes
Other Waste	52	Textiles	3.3%	3.5%	1.1%	6.8%	
	53	Carpet	15.5%	24.3%	1.2%	41.5%	
	54	Sharps and Infectious Waste	0.0%	0.0%	0.0%	0.0%	
	55	Rubber	0.2%	0.3%	0.0%	0.5%	
	56	Construction & Demolition Debris	2.0%	3.5%	0.2%	6.0%	
	57	Household Bulky Items	0.0%	0.0%	0.0%	0.0%	
	58	Empty HHW Containers	0.2%	0.2%	0.0%	0.4%	
	59	Miscellaneous	2.2%	2.6%	0.4%	5.6%	
		TOTAL OTHER WASTE	23.4%	23.7%	8.8%	42.4%	
TOTAL			100.0%				

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Hennepin Energy Resource Company

Aggregate Results

Stratified Weighting

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Paper	1	Newsprint (ONP)	4.1%	5.0%	3.0%	5.7%	
	2	High Grade Office	4.5%	12.7%	2.1%	7.9%	Yes
	3	Magazines/Catalogs	4.0%	10.0%	2.0%	6.8%	Yes
	4	Uncoated OCC - recyclable	5.2%	8.1%	3.5%	7.4%	
	5	Uncoated OCC - nonrecyclabl	0.7%	1.4%	0.4%	1.1%	
	6	Coated OCC	0.4%	2.1%	0.1%	0.9%	Yes
	7	Boxboard	2.0%	1.3%	1.5%	2.4%	
	8	Mixed Paper - recyclable	6.9%	10.1%	4.8%	9.8%	
	9	Mixed Paper - nonrecyclable	8.7%	6.8%	6.8%	11.0%	
		TOTAL PAPER	36.5%	21.9%	29.2%	44.2%	
Plastic	10	PET Bottles/Jars - clear	0.4%	0.8%	0.3%	0.6%	
	11	PET Bottles/Jars - colored	0.2%	0.4%	0.1%	0.3%	Yes
	12	Other PET	0.0%	0.1%	0.0%	0.1%	
	13	HDPE Bottles - natural	0.4%	0.6%	0.2%	0.6%	
	14	HDPE Bottles - colored	0.2%	0.2%	0.1%	0.3%	
	15	PVC	0.0%	0.0%	0.0%	0.0%	Yes
	16	Polystyrene	0.8%	0.9%	0.6%	1.1%	
	17	Film - transport packaging	0.2%	0.4%	0.1%	0.3%	Yes
	18	Other Film	3.4%	2.4%	2.7%	4.4%	
	19	Other Containers	0.2%	0.3%	0.1%	0.2%	
	20	Other non-containers	5.2%	9.8%	3.2%	7.8%	
		TOTAL PLASTIC	10.9%	10.8%	8.1%	14.3%	
Metals	21	Aluminum Beverage Container	0.6%	0.8%	0.5%	0.9%	
	22	Other Aluminum	0.3%	0.3%	0.2%	0.4%	
	23	Ferrrous Containers	0.6%	0.8%	0.5%	0.9%	
	24	Other Ferrous	0.9%	1.5%	0.6%	1.3%	
	25	Other Non-Ferrous	0.0%	0.1%	0.0%	0.1%	Yes
		TOTAL METALS	2.5%	2.1%	1.9%	3.1%	
Glass	26	Clear Containers	1.3%	1.9%	0.9%	1.9%	
	27	Green Containers	0.3%	0.8%	0.1%	0.5%	Yes
	28	Brown Containers	0.3%	0.5%	0.2%	0.5%	
	29	Other Glass	1.2%	4.8%	0.4%	2.5%	Yes
		TOTAL GLASS	3.1%	5.3%	1.9%	4.7%	

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Hennepin Energy Resource Company

Aggregate Results

Stratified Weighting

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Organic Materials	30	Yard Waste - Grass and Leaves	2.0%	5.5%	1.0%	3.8%	Yes
	31	Yard Waste - woody material	0.1%	0.2%	0.0%	0.1%	Yes
	32	Food Waste	13.1%	12.6%	9.5%	17.4%	
	33	Wood Pallets	1.6%	6.9%	0.4%	3.6%	Yes
	34	Treated Wood	3.9%	9.2%	2.1%	6.6%	Yes
	35	Untreated Wood	1.8%	5.0%	0.9%	3.3%	Yes
	36	Diapers	1.4%	2.0%	0.8%	2.3%	
	37	Other Organic Material	2.5%	4.0%	1.6%	3.8%	
		TOTAL ORGANIC MATERIALS	26.3%	17.3%	20.9%	32.4%	
Problem Materials	38	Televisions	0.0%	0.0%	0.0%	0.0%	
	39	Computer Monitors	0.0%	0.0%	0.0%	0.0%	
	40	Computer Equipment/Peripher	0.1%	0.5%	0.0%	0.2%	Yes
	41	Electric and Electronic Products	1.0%	2.8%	0.4%	1.9%	Yes
	42	Batteries	0.0%	0.1%	0.0%	0.1%	Yes
	43	Other	0.0%	0.0%	0.0%	0.0%	Yes
		TOTAL PROBLEM MATERIALS	1.1%	3.2%	0.5%	2.1%	Yes
HHW	44	Latex Paint	0.1%	0.5%	0.0%	0.2%	Yes
	45	Oil Paint	0.0%	0.1%	0.0%	0.0%	Yes
	46	Unused Pesti/Fungi/Herbi-cide	0.0%	0.0%	0.0%	0.0%	
	47	Unused Cleaners and Solvents	0.0%	0.1%	0.0%	0.0%	Yes
	48	Compressed Fuel Containers	0.0%	0.0%	0.0%	0.0%	
	49	Automotive - Antifreeze	0.0%	0.0%	0.0%	0.0%	
	50	Automotive - Used oil.filters	0.0%	0.1%	0.0%	0.0%	Yes
	51	Other	0.0%	0.1%	0.0%	0.1%	Yes
		TOTAL HHW	0.2%	0.6%	0.1%	0.3%	Yes
Other Waste	52	Textiles	2.5%	3.7%	1.7%	3.5%	
	53	Carpet	2.0%	5.5%	1.1%	3.5%	Yes
	54	Sharps and Infectious Waste	0.0%	0.0%	0.0%	0.0%	
	55	Rubber	1.0%	4.7%	0.3%	2.4%	Yes
	56	Construction & Demolition De	3.1%	10.7%	1.3%	6.0%	Yes
	57	Household Bulky Items	4.3%	15.0%	1.2%	9.3%	Yes
	58	Empty HHW Containers	0.4%	0.7%	0.2%	0.6%	
	59	Miscellaneous	6.1%	5.0%	4.6%	7.9%	
		TOTAL OTHER WASTE	19.4%	17.3%	14.1%	25.5%	
TOTAL			100.0%				

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Hennepin Energy Resource Company

Residential Results

Residential Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Paper	1	Newsprint (ONP)	3.8%	2.3%	2.8%	5.0%	
	2	High Grade Office	2.1%	3.1%	1.3%	3.2%	
	3	Magazines/Catalogs	2.5%	2.5%	1.6%	3.7%	
	4	Uncoated OCC - recyclable	4.8%	9.2%	2.5%	7.9%	
	5	Uncoated OCC - nonrecyclable	1.0%	1.9%	0.6%	1.6%	
	6	Coated OCC	0.1%	0.3%	0.0%	0.1%	Yes
	7	Boxboard	2.8%	1.3%	2.2%	3.5%	
	8	Mixed Paper - recyclable	6.0%	4.1%	4.4%	7.7%	
	9	Mixed Paper - nonrecyclable	8.4%	5.1%	6.3%	10.8%	
		TOTAL PAPER	31.6%	13.7%	25.3%	38.1%	
Plastic	10	PET Bottles/Jars - clear	0.4%	0.4%	0.3%	0.6%	
	11	PET Bottles/Jars - colored	0.1%	0.2%	0.1%	0.2%	
	12	Other PET	0.1%	0.1%	0.0%	0.1%	
	13	HDPE Bottles - natural	0.2%	0.2%	0.1%	0.3%	
	14	HDPE Bottles - colored	0.2%	0.3%	0.1%	0.4%	
	15	PVC	0.0%	0.1%	0.0%	0.0%	Yes
	16	Polystyrene	0.8%	0.9%	0.5%	1.1%	
	17	Film - transport packaging	0.1%	0.4%	0.0%	0.3%	Yes
	18	Other Film	3.1%	2.0%	2.3%	4.0%	
	19	Other Containers	0.2%	0.3%	0.1%	0.4%	
	20	Other non-containers	4.2%	2.5%	3.2%	5.3%	
		TOTAL PLASTIC	9.6%	4.9%	7.4%	11.9%	
Metals	21	Aluminum Beverage Containers	0.8%	1.0%	0.5%	1.1%	
	22	Other Aluminum	0.3%	0.3%	0.2%	0.5%	
	23	Ferrrous Containers	0.8%	0.6%	0.5%	1.0%	
	24	Other Ferrous	0.9%	1.7%	0.5%	1.5%	
	25	Other Non-Ferrous	0.0%	0.0%	0.0%	0.0%	Yes
		TOTAL METALS	2.8%	2.2%	2.0%	3.7%	
Glass	26	Clear Containers	1.6%	1.6%	1.0%	2.4%	
	27	Green Containers	0.2%	0.3%	0.1%	0.3%	Yes
	28	Brown Containers	0.5%	0.7%	0.3%	0.8%	
	29	Other Glass	0.4%	0.6%	0.2%	0.7%	
		TOTAL GLASS	2.7%	2.2%	1.8%	3.7%	

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Hennepin Energy Resource Company

Residential Results

Residential Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Organic Materials	30	Yard Waste - Grass and Leaves	1.9%	3.5%	0.9%	3.2%	
	31	Yard Waste - woody material	0.1%	0.3%	0.0%	0.3%	Yes
	32	Food Waste	12.0%	7.6%	9.1%	15.3%	
	33	Wood Pallets	0.0%	0.0%	0.0%	0.0%	
	34	Treated Wood	2.5%	2.9%	1.4%	3.9%	
	35	Untreated Wood	1.0%	1.9%	0.5%	1.7%	
	36	Diapers	2.9%	3.0%	1.6%	4.5%	
	37	Other Organic Material	3.4%	4.0%	2.0%	5.2%	
		TOTAL ORGANIC MATERIALS	23.8%	11.0%	18.9%	29.1%	
Problem Materials	38	Televisions	0.0%	0.0%	0.0%	0.0%	
	39	Computer Monitors	0.0%	0.0%	0.0%	0.0%	
	40	Computer Equipment/Peripherals	0.2%	0.8%	0.0%	0.4%	Yes
	41	Electric and Electronic Products	2.1%	4.2%	0.9%	3.9%	
	42	Batteries	0.1%	0.1%	0.0%	0.1%	
	43	Other	0.0%	0.0%	0.0%	0.0%	Yes
		TOTAL PROBLEM MATERIALS	2.4%	4.8%	1.1%	4.2%	Yes
HHW	44	Latex Paint	0.2%	0.8%	0.1%	0.5%	Yes
	45	Oil Paint	0.0%	0.1%	0.0%	0.1%	Yes
	46	Unused Pesti/Fungi/Herbi-cides	0.0%	0.0%	0.0%	0.0%	
	47	Unused Cleaners and Solvents	0.0%	0.0%	0.0%	0.0%	Yes
	48	Compressed Fuel Containers	0.0%	0.0%	0.0%	0.0%	
	49	Automotive - Antifreeze	0.0%	0.0%	0.0%	0.0%	
	50	Automotive - Used oil.filters	0.0%	0.1%	0.0%	0.0%	Yes
	51	Other	0.0%	0.0%	0.0%	0.0%	Yes
		TOTAL HHW	0.3%	0.8%	0.1%	0.6%	Yes
Other Waste	52	Textiles	3.5%	4.5%	2.3%	5.0%	
	53	Carpet	2.1%	4.1%	0.8%	3.8%	Yes
	54	Sharps and Infectious Waste	0.0%	0.0%	0.0%	0.0%	
	55	Rubber	0.5%	0.7%	0.2%	0.8%	
	56	Construction & Demolition Debris	4.5%	13.2%	1.6%	8.7%	Yes
	57	Household Bulky Items	8.0%	22.3%	1.9%	17.7%	Yes
	58	Empty HHW Containers	0.6%	1.0%	0.3%	1.0%	
	59	Miscellaneous	7.8%	5.0%	5.8%	10.0%	
		TOTAL OTHER WASTE	26.9%	22.2%	17.8%	37.2%	
TOTAL			100.0%				

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Hennepin Energy Resource Company

ICI Results

ICI Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Paper	1	Newsprint (ONP)	4.2%	7.1%	2.2%	6.9%	
	2	High Grade Office	8.5%	20.1%	3.2%	15.9%	Yes
	3	Magazines/Catalogs	7.0%	15.8%	2.7%	13.0%	Yes
	4	Uncoated OCC - recyclable	6.8%	8.6%	4.0%	10.2%	
	5	Uncoated OCC - nonrecyclable	0.5%	0.9%	0.2%	0.8%	
	6	Coated OCC	0.8%	3.4%	0.2%	1.8%	Yes
	7	Boxboard	1.2%	1.3%	0.8%	1.8%	
	8	Mixed Paper - recyclable	6.4%	9.7%	3.3%	10.3%	
	9	Mixed Paper - nonrecyclable	7.6%	5.9%	4.9%	10.8%	
		TOTAL PAPER	42.9%	26.8%	30.1%	56.1%	
Plastic	10	PET Bottles/Jars - clear	0.5%	1.1%	0.3%	0.9%	Yes
	11	PET Bottles/Jars - colored	0.1%	0.3%	0.1%	0.2%	Yes
	12	Other PET	0.0%	0.0%	0.0%	0.0%	Yes
	13	HDPE Bottles - natural	0.5%	1.0%	0.2%	0.9%	
	14	HDPE Bottles - colored	0.1%	0.2%	0.0%	0.2%	
	15	PVC	0.0%	0.0%	0.0%	0.0%	Yes
	16	Polystyrene	0.9%	1.0%	0.5%	1.4%	
	17	Film - transport packaging	0.3%	0.4%	0.1%	0.4%	
	18	Other Film	3.4%	2.6%	2.3%	4.8%	
	19	Other Containers	0.1%	0.2%	0.1%	0.2%	
	20	Other non-containers	8.0%	15.5%	3.7%	13.6%	
		TOTAL PLASTIC	13.9%	16.4%	8.3%	20.7%	
Metals	21	Aluminum Beverage Containers	0.6%	0.5%	0.4%	0.8%	
	22	Other Aluminum	0.2%	0.3%	0.1%	0.3%	
	23	Ferrrous Containers	0.6%	1.0%	0.3%	1.0%	
	24	Other Ferrous	0.6%	1.2%	0.3%	1.1%	
	25	Other Non-Ferrous	0.0%	0.2%	0.0%	0.1%	Yes
		TOTAL METALS	2.0%	1.9%	1.2%	2.9%	
Glass	26	Clear Containers	1.1%	2.4%	0.5%	1.9%	Yes
	27	Green Containers	0.4%	1.1%	0.1%	0.8%	Yes
	28	Brown Containers	0.1%	0.4%	0.1%	0.3%	Yes
	29	Other Glass	2.7%	7.7%	0.8%	5.5%	Yes
		TOTAL GLASS	4.3%	8.1%	1.9%	7.4%	

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Hennepin Energy Resource Company

ICI Results

ICI Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Organic Materials	30	Yard Waste - Grass and Leaves	0.8%	2.5%	0.2%	1.6%	Yes
	31	Yard Waste - woody material	0.0%	0.0%	0.0%	0.0%	
	32	Food Waste	15.7%	18.0%	8.9%	24.0%	
	33	Wood Pallets	3.8%	10.9%	1.1%	8.0%	Yes
	34	Treated Wood	4.6%	12.6%	1.4%	9.6%	Yes
	35	Untreated Wood	1.2%	3.6%	0.4%	2.5%	Yes
	36	Diapers	0.1%	0.4%	0.0%	0.3%	Yes
	37	Other Organic Material	2.0%	4.7%	0.8%	3.8%	Yes
		TOTAL ORGANIC MATERIALS	28.3%	21.3%	19.0%	38.6%	
Problem Materials	38	Televisions	0.0%	0.0%	0.0%	0.0%	
	39	Computer Monitors	0.0%	0.0%	0.0%	0.0%	
	40	Computer Equipment/Peripherals	0.0%	0.0%	0.0%	0.0%	
	41	Electric and Electronic Products	0.1%	0.3%	0.0%	0.3%	Yes
	42	Batteries	0.0%	0.0%	0.0%	0.0%	
	43	Other	0.0%	0.0%	0.0%	0.0%	
		TOTAL PROBLEM MATERIALS	0.1%	0.3%	0.1%	0.3%	Yes
HHW	44	Latex Paint	0.0%	0.0%	0.0%	0.0%	
	45	Oil Paint	0.0%	0.0%	0.0%	0.0%	
	46	Unused Pesti/Fungi/Herbi-cides	0.0%	0.0%	0.0%	0.0%	
	47	Unused Cleaners and Solvents	0.0%	0.1%	0.0%	0.1%	Yes
	48	Compressed Fuel Containers	0.0%	0.0%	0.0%	0.0%	
	49	Automotive - Antifreeze	0.0%	0.0%	0.0%	0.0%	
	50	Automotive - Used oil.filters	0.0%	0.0%	0.0%	0.0%	
	51	Other	0.0%	0.2%	0.0%	0.1%	Yes
		TOTAL HHW	0.1%	0.3%	0.0%	0.1%	Yes
Other Waste	52	Textiles	1.9%	3.7%	0.8%	3.3%	
	53	Carpet	1.8%	7.2%	0.5%	4.1%	Yes
	54	Sharps and Infectious Waste	0.0%	0.0%	0.0%	0.0%	
	55	Rubber	0.2%	0.3%	0.1%	0.3%	
	56	Construction & Demolition Debris	0.3%	0.7%	0.1%	0.5%	Yes
	57	Household Bulky Items	1.0%	3.3%	0.3%	2.1%	Yes
	58	Empty HHW Containers	0.1%	0.3%	0.0%	0.2%	Yes
	59	Miscellaneous	3.3%	4.6%	1.7%	5.3%	
		TOTAL OTHER WASTE	8.5%	9.1%	5.2%	12.4%	
TOTAL			100.0%				

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Hennepin Energy Resource Company

Mixed Results

Mixed Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Paper	1	Newsprint (ONP)	4.7%	4.4%	2.0%	8.6%	
	2	High Grade Office	1.7%	3.1%	0.5%	3.6%	
	3	Magazines/Catalogs	1.3%	1.6%	0.5%	2.3%	
	4	Uncoated OCC - recyclable	2.8%	1.8%	1.5%	4.4%	
	5	Uncoated OCC - nonrecyclable	0.5%	0.9%	0.1%	1.2%	
	6	Coated OCC	0.3%	1.0%	0.0%	1.1%	Yes
	7	Boxboard	1.5%	1.1%	0.7%	2.4%	
	8	Mixed Paper - recyclable	10.2%	17.9%	3.2%	20.6%	
	9	Mixed Paper - nonrecyclable	11.6%	10.8%	6.4%	18.1%	
		TOTAL PAPER	34.6%	25.4%	18.6%	52.6%	
Plastic	10	PET Bottles/Jars - clear	0.3%	0.4%	0.1%	0.7%	
	11	PET Bottles/Jars - colored	0.3%	0.7%	0.1%	0.8%	Yes
	12	Other PET	0.0%	0.1%	0.0%	0.1%	
	13	HDPE Bottles - natural	0.3%	0.3%	0.1%	0.6%	
	14	HDPE Bottles - colored	0.2%	0.2%	0.1%	0.4%	
	15	PVC	0.0%	0.1%	0.0%	0.1%	Yes
	16	Polystyrene	0.6%	0.4%	0.4%	0.9%	
	17	Film - transport packaging	0.0%	0.0%	0.0%	0.0%	
	18	Other Film	4.3%	2.8%	2.3%	6.7%	
	19	Other Containers	0.1%	0.1%	0.0%	0.2%	
	20	Other non-containers	1.7%	0.8%	1.2%	2.2%	
		TOTAL PLASTIC	7.8%	3.8%	5.3%	10.8%	
Metals	21	Aluminum Beverage Containers	0.5%	0.7%	0.2%	1.0%	
	22	Other Aluminum	0.3%	0.3%	0.1%	0.6%	
	23	Ferrrous Containers	0.5%	0.5%	0.2%	0.9%	
	24	Other Ferrous	1.3%	1.4%	0.5%	2.5%	
	25	Other Non-Ferrous	0.0%	0.1%	0.0%	0.1%	Yes
		TOTAL METALS	2.7%	1.9%	1.6%	4.1%	
Glass	26	Clear Containers	1.0%	1.2%	0.4%	1.9%	
	27	Green Containers	0.4%	0.6%	0.1%	0.9%	
	28	Brown Containers	0.2%	0.3%	0.1%	0.5%	
	29	Other Glass	0.0%	0.1%	0.0%	0.1%	Yes
		TOTAL GLASS	1.6%	1.8%	0.6%	3.1%	

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Hennepin Energy Resource Company

Mixed Results

Mixed Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Organic Materials	30	Yard Waste - Grass and Leaves	4.8%	11.2%	0.5%	13.2%	Yes
	31	Yard Waste - woody material	0.1%	0.2%	0.0%	0.2%	Yes
	32	Food Waste	10.0%	7.3%	5.1%	16.3%	
	33	Wood Pallets	0.8%	1.9%	0.1%	2.3%	Yes
	34	Treated Wood	5.4%	10.0%	1.2%	12.4%	
	35	Untreated Wood	4.6%	9.9%	0.8%	11.4%	Yes
	36	Diapers	0.7%	0.7%	0.2%	1.5%	
	37	Other Organic Material	1.6%	1.7%	0.6%	3.2%	
		TOTAL ORGANIC MATERIALS	28.0%	19.9%	15.7%	42.3%	
Problem Materials	38	Televisions	0.0%	0.0%	0.0%	0.0%	
	39	Computer Monitors	0.0%	0.0%	0.0%	0.0%	
	40	Computer Equipment/Peripherals	0.0%	0.0%	0.0%	0.0%	
	41	Electric and Electronic Products	0.2%	0.6%	0.0%	0.6%	Yes
	42	Batteries	0.1%	0.2%	0.0%	0.2%	Yes
	43	Other	0.0%	0.0%	0.0%	0.0%	
		TOTAL PROBLEM MATERIALS	0.3%	0.7%	0.0%	0.8%	Yes
HHW	44	Latex Paint	0.0%	0.0%	0.0%	0.0%	
	45	Oil Paint	0.0%	0.0%	0.0%	0.0%	
	46	Unused Pesti/Fungi/Herbi-cides	0.0%	0.0%	0.0%	0.0%	
	47	Unused Cleaners and Solvents	0.0%	0.0%	0.0%	0.0%	
	48	Compressed Fuel Containers	0.0%	0.0%	0.0%	0.0%	
	49	Automotive - Antifreeze	0.0%	0.0%	0.0%	0.0%	
	50	Automotive - Used oil.filters	0.0%	0.0%	0.0%	0.0%	
	51	Other	0.1%	0.1%	0.0%	0.2%	
		TOTAL HHW	0.1%	0.1%	0.0%	0.2%	
Other Waste	52	Textiles	1.7%	1.2%	1.0%	2.6%	
	53	Carpet	2.4%	4.0%	0.4%	5.8%	
	54	Sharps and Infectious Waste	0.0%	0.0%	0.0%	0.0%	
	55	Rubber	3.7%	11.0%	0.3%	10.9%	Yes
	56	Construction & Demolition Debris	5.8%	14.5%	0.7%	15.5%	Yes
	57	Household Bulky Items	2.8%	7.1%	0.2%	8.1%	Yes
	58	Empty HHW Containers	0.3%	0.3%	0.1%	0.6%	
	59	Miscellaneous	8.1%	6.1%	3.9%	13.6%	
		TOTAL OTHER WASTE	24.8%	17.5%	13.6%	38.0%	
TOTAL			100.0%				

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
NRG Newport

Aggregate Results

Stratified Weighting

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Paper	1	Newsprint (ONP)	5.0%	4.7%	3.6%	6.7%	
	2	High Grade Office	2.2%	3.9%	1.4%	3.3%	
	3	Magazines/Catalogs	1.8%	2.9%	1.1%	2.7%	
	4	Uncoated OCC - recyclable	6.3%	8.5%	4.2%	9.1%	
	5	Uncoated OCC - nonrecyclabl	0.4%	0.8%	0.3%	0.7%	
	6	Coated OCC	0.1%	0.4%	0.0%	0.1%	Yes
	7	Boxboard	2.6%	1.5%	2.1%	3.2%	
	8	Mixed Paper - recyclable	7.8%	9.0%	5.7%	10.5%	
	9	Mixed Paper - nonrecyclable	8.9%	7.3%	6.7%	11.5%	
		TOTAL PAPER	35.1%	18.5%	29.1%	41.5%	
Plastic	10	PET Bottles/Jars - clear	0.6%	0.6%	0.4%	0.8%	
	11	PET Bottles/Jars - colored	0.2%	0.4%	0.1%	0.3%	Yes
	12	Other PET	0.2%	1.1%	0.1%	0.5%	Yes
	13	HDPE Bottles - natural	0.3%	0.4%	0.2%	0.5%	
	14	HDPE Bottles - colored	0.2%	0.3%	0.2%	0.4%	
	15	PVC	0.1%	0.5%	0.0%	0.2%	Yes
	16	Polystyrene	0.6%	0.9%	0.4%	1.0%	
	17	Film - transport packaging	0.6%	2.1%	0.3%	1.2%	Yes
	18	Other Film	2.6%	2.1%	1.9%	3.4%	
	19	Other Containers	1.2%	5.4%	0.4%	2.5%	Yes
	20	Other non-containers	4.9%	4.1%	3.7%	6.2%	
		TOTAL PLASTIC	11.6%	7.8%	9.4%	14.0%	
Metals	21	Aluminum Beverage Container	0.6%	0.6%	0.4%	0.8%	
	22	Other Aluminum	0.5%	1.5%	0.3%	0.8%	Yes
	23	Ferrrous Containers	0.7%	0.7%	0.5%	0.9%	
	24	Other Ferrous	3.4%	7.2%	2.0%	5.3%	Yes
	25	Other Non-Ferrous	0.0%	0.1%	0.0%	0.1%	Yes
		TOTAL METALS	5.2%	7.3%	3.7%	7.1%	
Glass	26	Clear Containers	1.2%	1.0%	0.9%	1.6%	
	27	Green Containers	0.3%	0.8%	0.2%	0.6%	Yes
	28	Brown Containers	0.4%	0.8%	0.2%	0.7%	
	29	Other Glass	0.3%	0.6%	0.2%	0.5%	
		TOTAL GLASS	2.3%	1.8%	1.8%	3.0%	

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
NRG Newport

Aggregate Results

Stratified Weighting

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Organic Materials	30	Yard Waste - Grass and Leaves	1.5%	2.7%	0.8%	2.5%	
	31	Yard Waste - woody material	1.0%	4.2%	0.3%	2.0%	Yes
	32	Food Waste	13.8%	12.1%	10.2%	18.3%	
	33	Wood Pallets	1.7%	7.3%	0.3%	3.8%	Yes
	34	Treated Wood	2.6%	6.3%	1.3%	4.4%	Yes
	35	Untreated Wood	2.0%	6.0%	0.8%	3.7%	Yes
	36	Diapers	2.6%	2.9%	1.7%	3.7%	
	37	Other Organic Material	1.0%	4.0%	0.5%	1.8%	Yes
		TOTAL ORGANIC MATERIALS	26.1%	13.1%	22.3%	30.1%	
Problem Materials	38	Televisions	0.0%	0.0%	0.0%	0.0%	
	39	Computer Monitors	0.0%	0.0%	0.0%	0.0%	
	40	Computer Equipment/Peripher	0.5%	3.4%	0.1%	1.2%	Yes
	41	Electric and Electronic Products	1.5%	5.6%	0.5%	2.9%	Yes
	42	Batteries	0.1%	0.2%	0.0%	0.1%	Yes
	43	Other	0.0%	0.2%	0.0%	0.1%	Yes
		TOTAL PROBLEM MATERIALS	2.1%	6.4%	0.8%	4.0%	Yes
HHW	44	Latex Paint	0.0%	0.2%	0.0%	0.1%	Yes
	45	Oil Paint	0.0%	0.0%	0.0%	0.0%	Yes
	46	Unused Pesti/Fungi/Herbi-cide	0.0%	0.2%	0.0%	0.1%	Yes
	47	Unused Cleaners and Solvents	0.0%	0.2%	0.0%	0.1%	Yes
	48	Compressed Fuel Containers	0.0%	0.0%	0.0%	0.0%	
	49	Automotive - Antifreeze	0.0%	0.0%	0.0%	0.0%	
	50	Automotive - Used oil.filters	0.0%	0.0%	0.0%	0.0%	Yes
	51	Other	0.4%	2.4%	0.0%	1.0%	Yes
		TOTAL HHW	0.5%	2.6%	0.1%	1.2%	Yes
Other Waste	52	Textiles	2.6%	3.7%	1.7%	3.7%	
	53	Carpet	2.7%	9.3%	1.2%	5.2%	Yes
	54	Sharps and Infectious Waste	0.1%	0.4%	0.0%	0.2%	Yes
	55	Rubber	0.4%	1.0%	0.2%	0.7%	Yes
	56	Construction & Demolition De	2.6%	8.1%	1.3%	4.7%	Yes
	57	Household Bulky Items	3.4%	12.6%	1.2%	7.1%	Yes
	58	Empty HHW Containers	0.4%	1.0%	0.2%	0.7%	Yes
	59	Miscellaneous	5.0%	7.4%	3.5%	7.1%	
		TOTAL OTHER WASTE	17.2%	18.1%	12.5%	22.9%	
TOTAL			100.0%				

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
NRG Newport

Residential Results

Residential Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Paper	1	Newsprint (ONP)	6.2%	4.9%	3.9%	9.0%	
	2	High Grade Office	1.0%	1.1%	0.6%	1.6%	
	3	Magazines/Catalogs	1.9%	1.8%	1.2%	2.8%	
	4	Uncoated OCC - recyclable	2.4%	1.6%	1.7%	3.3%	
	5	Uncoated OCC - nonrecyclable	0.5%	0.6%	0.3%	0.8%	
	6	Coated OCC	0.0%	0.0%	0.0%	0.0%	
	7	Boxboard	3.3%	1.7%	2.3%	4.5%	
	8	Mixed Paper - recyclable	6.6%	3.7%	4.6%	8.9%	
	9	Mixed Paper - nonrecyclable	8.7%	4.7%	5.8%	12.0%	
		TOTAL PAPER	30.7%	14.2%	23.2%	38.7%	
Plastic	10	PET Bottles/Jars - clear	0.9%	0.9%	0.5%	1.3%	
	11	PET Bottles/Jars - colored	0.3%	0.6%	0.1%	0.5%	Yes
	12	Other PET	0.5%	1.8%	0.2%	1.1%	Yes
	13	HDPE Bottles - natural	0.3%	0.2%	0.2%	0.5%	
	14	HDPE Bottles - colored	0.4%	0.4%	0.2%	0.6%	
	15	PVC	0.0%	0.1%	0.0%	0.1%	
	16	Polystyrene	0.6%	0.7%	0.3%	1.0%	
	17	Film - transport packaging	0.0%	0.1%	0.0%	0.1%	Yes
	18	Other Film	2.8%	1.5%	2.0%	3.9%	
	19	Other Containers	0.7%	1.3%	0.3%	1.1%	Yes
	20	Other non-containers	4.5%	3.0%	3.3%	5.9%	
		TOTAL PLASTIC	11.2%	6.0%	8.3%	14.4%	
Metals	21	Aluminum Beverage Containers	0.8%	0.9%	0.4%	1.2%	
	22	Other Aluminum	0.3%	0.3%	0.2%	0.4%	
	23	Ferrrous Containers	0.9%	0.7%	0.5%	1.3%	
	24	Other Ferrous	2.1%	3.0%	1.1%	3.4%	
	25	Other Non-Ferrous	0.0%	0.1%	0.0%	0.0%	Yes
		TOTAL METALS	4.0%	3.2%	2.9%	5.3%	
Glass	26	Clear Containers	1.4%	1.2%	0.9%	2.0%	
	27	Green Containers	0.4%	0.9%	0.1%	0.9%	Yes
	28	Brown Containers	0.8%	1.2%	0.4%	1.5%	
	29	Other Glass	0.4%	0.6%	0.2%	0.7%	
		TOTAL GLASS	3.0%	2.4%	2.0%	4.2%	

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
NRG Newport

Residential Results

Residential Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Organic Materials	30	Yard Waste - Grass and Leaves	3.0%	4.1%	1.4%	5.1%	
	31	Yard Waste - woody material	1.8%	6.7%	0.4%	4.1%	Yes
	32	Food Waste	12.9%	8.2%	8.5%	18.1%	
	33	Wood Pallets	0.0%	0.0%	0.0%	0.0%	
	34	Treated Wood	5.1%	10.0%	2.2%	9.2%	
	35	Untreated Wood	1.0%	1.8%	0.4%	2.0%	
	36	Diapers	4.9%	3.9%	3.0%	7.3%	
	37	Other Organic Material	0.5%	0.4%	0.3%	0.8%	
		TOTAL ORGANIC MATERIALS	29.3%	9.4%	25.4%	33.4%	
Problem Materials	38	Televisions	0.0%	0.0%	0.0%	0.0%	
	39	Computer Monitors	0.0%	0.0%	0.0%	0.0%	
	40	Computer Equipment/Peripherals	0.0%	0.0%	0.0%	0.0%	
	41	Electric and Electronic Products	0.2%	0.6%	0.1%	0.5%	Yes
	42	Batteries	0.1%	0.1%	0.0%	0.1%	Yes
	43	Other	0.0%	0.0%	0.0%	0.0%	Yes
		TOTAL PROBLEM MATERIALS	0.3%	0.6%	0.1%	0.6%	Yes
HHW	44	Latex Paint	0.0%	0.2%	0.0%	0.1%	Yes
	45	Oil Paint	0.0%	0.0%	0.0%	0.0%	
	46	Unused Pesti/Fungi/Herbi-cides	0.0%	0.1%	0.0%	0.0%	Yes
	47	Unused Cleaners and Solvents	0.1%	0.3%	0.0%	0.2%	Yes
	48	Compressed Fuel Containers	0.0%	0.0%	0.0%	0.0%	
	49	Automotive - Antifreeze	0.0%	0.0%	0.0%	0.0%	
	50	Automotive - Used oil.filters	0.0%	0.1%	0.0%	0.0%	Yes
	51	Other	0.0%	0.1%	0.0%	0.1%	Yes
		TOTAL HHW	0.2%	0.6%	0.1%	0.4%	Yes
Other Waste	52	Textiles	2.7%	3.2%	1.6%	4.1%	
	53	Carpet	2.5%	4.3%	1.0%	4.7%	
	54	Sharps and Infectious Waste	0.0%	0.0%	0.0%	0.0%	
	55	Rubber	0.4%	0.5%	0.2%	0.7%	
	56	Construction & Demolition Debris	2.8%	6.8%	0.9%	5.6%	Yes
	57	Household Bulky Items	6.8%	19.4%	1.6%	15.1%	Yes
	58	Empty HHW Containers	0.7%	1.5%	0.3%	1.4%	Yes
	59	Miscellaneous	5.4%	4.5%	3.3%	7.8%	
		TOTAL OTHER WASTE	21.3%	18.9%	14.3%	29.1%	
TOTAL			100.0%				

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
NRG Newport

ICI Results

ICI Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Paper	1	Newsprint (ONP)	2.6%	3.6%	1.2%	4.4%	
	2	High Grade Office	3.1%	5.5%	1.5%	5.3%	
	3	Magazines/Catalogs	2.0%	4.3%	0.8%	3.9%	Yes
	4	Uncoated OCC - recyclable	8.5%	9.0%	5.1%	12.6%	
	5	Uncoated OCC - nonrecyclable	0.4%	0.9%	0.1%	0.7%	Yes
	6	Coated OCC	0.0%	0.0%	0.0%	0.0%	
	7	Boxboard	1.4%	1.2%	0.9%	2.1%	
	8	Mixed Paper - recyclable	8.6%	13.4%	4.5%	14.0%	
	9	Mixed Paper - nonrecyclable	8.5%	9.6%	4.9%	13.0%	
		TOTAL PAPER	35.1%	20.8%	25.8%	45.0%	
Plastic	10	PET Bottles/Jars - clear	0.3%	0.3%	0.2%	0.4%	
	11	PET Bottles/Jars - colored	0.1%	0.2%	0.0%	0.2%	
	12	Other PET	0.0%	0.1%	0.0%	0.1%	
	13	HDPE Bottles - natural	0.3%	0.4%	0.1%	0.5%	
	14	HDPE Bottles - colored	0.1%	0.2%	0.0%	0.2%	
	15	PVC	0.0%	0.1%	0.0%	0.1%	Yes
	16	Polystyrene	0.8%	1.2%	0.4%	1.4%	
	17	Film - transport packaging	1.3%	3.2%	0.5%	2.4%	Yes
	18	Other Film	2.6%	2.7%	1.5%	4.0%	
	19	Other Containers	0.3%	0.5%	0.1%	0.5%	
	20	Other non-containers	6.1%	5.7%	3.8%	8.8%	
		TOTAL PLASTIC	11.8%	7.8%	8.7%	15.4%	
Metals	21	Aluminum Beverage Containers	0.3%	0.3%	0.2%	0.5%	
	22	Other Aluminum	0.7%	2.4%	0.2%	1.4%	Yes
	23	Ferrrous Containers	0.4%	0.8%	0.2%	0.8%	
	24	Other Ferrous	3.3%	6.1%	1.5%	5.7%	
	25	Other Non-Ferrous	0.0%	0.0%	0.0%	0.0%	
		TOTAL METALS	4.7%	6.0%	2.9%	7.1%	
Glass	26	Clear Containers	0.8%	1.1%	0.4%	1.4%	
	27	Green Containers	0.1%	0.6%	0.0%	0.3%	Yes
	28	Brown Containers	0.1%	0.2%	0.0%	0.2%	Yes
	29	Other Glass	0.2%	0.5%	0.1%	0.4%	Yes
		TOTAL GLASS	1.3%	1.4%	0.7%	2.0%	

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
NRG Newport

ICI Results

ICI Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Organic Materials	30	Yard Waste - Grass and Leaves	0.4%	1.0%	0.1%	0.8%	Yes
	31	Yard Waste - woody material	0.0%	0.0%	0.0%	0.0%	
	32	Food Waste	14.1%	17.1%	7.4%	22.7%	
	33	Wood Pallets	4.4%	11.8%	1.3%	9.2%	Yes
	34	Treated Wood	1.4%	3.2%	0.5%	2.8%	Yes
	35	Untreated Wood	3.8%	9.4%	1.3%	7.4%	Yes
	36	Diapers	0.8%	1.7%	0.3%	1.5%	Yes
	37	Other Organic Material	1.8%	6.5%	0.6%	3.6%	Yes
		TOTAL ORGANIC MATERIALS	26.7%	17.5%	19.8%	34.3%	
Problem Materials	38	Televisions	0.0%	0.0%	0.0%	0.0%	
	39	Computer Monitors	0.0%	0.0%	0.0%	0.0%	
	40	Computer Equipment/Peripherals	1.3%	5.5%	0.3%	3.0%	Yes
	41	Electric and Electronic Products	2.7%	8.5%	0.8%	5.8%	Yes
	42	Batteries	0.1%	0.2%	0.0%	0.2%	Yes
	43	Other	0.1%	0.3%	0.0%	0.1%	Yes
		TOTAL PROBLEM MATERIALS	4.2%	10.0%	1.4%	8.4%	Yes
HHW	44	Latex Paint	0.0%	0.0%	0.0%	0.0%	
	45	Oil Paint	0.0%	0.0%	0.0%	0.0%	
	46	Unused Pesti/Fungi/Herbi-cides	0.0%	0.0%	0.0%	0.0%	
	47	Unused Cleaners and Solvents	0.0%	0.1%	0.0%	0.1%	Yes
	48	Compressed Fuel Containers	0.0%	0.0%	0.0%	0.0%	
	49	Automotive - Antifreeze	0.0%	0.0%	0.0%	0.0%	
	50	Automotive - Used oil.filters	0.0%	0.0%	0.0%	0.0%	
	51	Other	0.0%	0.0%	0.0%	0.0%	
		TOTAL HHW	0.0%	0.1%	0.0%	0.1%	Yes
Other Waste	52	Textiles	2.1%	4.4%	0.8%	4.0%	Yes
	53	Carpet	3.9%	14.2%	0.9%	8.8%	Yes
	54	Sharps and Infectious Waste	0.0%	0.0%	0.0%	0.0%	
	55	Rubber	0.5%	1.4%	0.2%	0.9%	Yes
	56	Construction & Demolition Debris	3.1%	11.0%	0.8%	6.8%	Yes
	57	Household Bulky Items	1.8%	6.9%	0.5%	4.1%	Yes
	58	Empty HHW Containers	0.1%	0.1%	0.0%	0.1%	
	59	Miscellaneous	4.6%	10.9%	2.0%	8.3%	Yes
		TOTAL OTHER WASTE	16.1%	21.7%	8.2%	26.0%	
TOTAL			100.0%				

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
NRG Newport

Mixed Results

Mixed Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Paper	1	Newsprint (ONP)	6.7%	5.5%	4.1%	9.9%	
	2	High Grade Office	2.5%	3.7%	1.2%	4.2%	
	3	Magazines/Catalogs	1.2%	1.0%	0.6%	1.9%	
	4	Uncoated OCC - recyclable	8.6%	12.5%	3.7%	15.4%	
	5	Uncoated OCC - nonrecyclable	0.5%	0.9%	0.2%	0.9%	
	6	Coated OCC	0.2%	0.7%	0.0%	0.5%	Yes
	7	Boxboard	3.4%	1.5%	2.8%	4.1%	
	8	Mixed Paper - recyclable	8.3%	5.1%	6.1%	10.9%	
	9	Mixed Paper - nonrecyclable	9.8%	6.2%	7.1%	12.8%	
		TOTAL PAPER	41.2%	20.0%	31.1%	51.8%	
Plastic	10	PET Bottles/Jars - clear	0.5%	0.3%	0.4%	0.7%	
	11	PET Bottles/Jars - colored	0.1%	0.1%	0.1%	0.2%	
	12	Other PET	0.1%	0.1%	0.0%	0.1%	
	13	HDPE Bottles - natural	0.3%	0.4%	0.2%	0.6%	
	14	HDPE Bottles - colored	0.3%	0.3%	0.1%	0.4%	
	15	PVC	0.3%	1.1%	0.1%	0.8%	Yes
	16	Polystyrene	0.4%	0.4%	0.2%	0.7%	
	17	Film - transport packaging	0.6%	1.3%	0.1%	1.4%	Yes
	18	Other Film	2.2%	1.7%	1.1%	3.6%	
	19	Other Containers	3.3%	10.5%	0.7%	7.8%	Yes
	20	Other non-containers	3.6%	1.7%	2.8%	4.4%	
		TOTAL PLASTIC	11.7%	9.7%	8.1%	15.9%	
Metals	21	Aluminum Beverage Containers	0.6%	0.4%	0.4%	0.9%	
	22	Other Aluminum	0.5%	0.5%	0.2%	0.8%	
	23	Ferrrous Containers	0.8%	0.5%	0.5%	1.1%	
	24	Other Ferrous	5.4%	11.4%	1.8%	10.6%	Yes
	25	Other Non-Ferrous	0.1%	0.3%	0.0%	0.2%	Yes
		TOTAL METALS	7.3%	11.6%	3.4%	12.5%	
Glass	26	Clear Containers	1.5%	0.5%	1.3%	1.7%	
	27	Green Containers	0.5%	0.7%	0.2%	0.9%	
	28	Brown Containers	0.4%	0.5%	0.1%	0.7%	
	29	Other Glass	0.5%	0.9%	0.2%	1.0%	
		TOTAL GLASS	2.8%	1.4%	2.2%	3.5%	

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
NRG Newport

Mixed Results

Mixed Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Organic Materials	30	Yard Waste - Grass and Leaves	1.1%	1.9%	0.3%	2.2%	
	31	Yard Waste - woody material	1.2%	2.7%	0.3%	2.8%	Yes
	32	Food Waste	14.5%	6.3%	11.6%	17.7%	
	33	Wood Pallets	0.0%	0.0%	0.0%	0.0%	
	34	Treated Wood	0.7%	0.9%	0.3%	1.3%	
	35	Untreated Wood	0.7%	1.6%	0.2%	1.5%	Yes
	36	Diapers	1.9%	2.5%	0.9%	3.4%	
	37	Other Organic Material	0.5%	0.6%	0.3%	0.8%	
		TOTAL ORGANIC MATERIALS	20.6%	9.4%	16.1%	25.6%	
Problem Materials	38	Televisions	0.0%	0.0%	0.0%	0.0%	
	39	Computer Monitors	0.0%	0.0%	0.0%	0.0%	
	40	Computer Equipment/Peripherals	0.0%	0.0%	0.0%	0.0%	
	41	Electric and Electronic Products	1.4%	3.7%	0.3%	3.1%	Yes
	42	Batteries	0.1%	0.2%	0.0%	0.2%	Yes
	43	Other	0.0%	0.0%	0.0%	0.0%	Yes
		TOTAL PROBLEM MATERIALS	1.4%	3.7%	0.4%	3.1%	Yes
HHW	44	Latex Paint	0.1%	0.4%	0.0%	0.3%	Yes
	45	Oil Paint	0.0%	0.0%	0.0%	0.0%	Yes
	46	Unused Pesti/Fungi/Herbi-cides	0.1%	0.3%	0.0%	0.2%	Yes
	47	Unused Cleaners and Solvents	0.0%	0.1%	0.0%	0.1%	Yes
	48	Compressed Fuel Containers	0.0%	0.0%	0.0%	0.0%	
	49	Automotive - Antifreeze	0.0%	0.0%	0.0%	0.0%	
	50	Automotive - Used oil.filters	0.0%	0.0%	0.0%	0.0%	
	51	Other	1.4%	4.8%	0.2%	3.5%	Yes
		TOTAL HHW	1.6%	5.1%	0.3%	3.8%	Yes
Other Waste	52	Textiles	3.0%	3.1%	1.7%	4.7%	
	53	Carpet	1.5%	3.3%	0.3%	3.4%	Yes
	54	Sharps and Infectious Waste	0.2%	0.8%	0.0%	0.6%	Yes
	55	Rubber	0.3%	0.5%	0.1%	0.7%	
	56	Construction & Demolition Debris	1.7%	3.9%	0.4%	3.7%	Yes
	57	Household Bulky Items	1.1%	3.9%	0.2%	2.9%	Yes
	58	Empty HHW Containers	0.3%	0.6%	0.1%	0.7%	
	59	Miscellaneous	5.2%	3.3%	3.4%	7.3%	
		TOTAL OTHER WASTE	13.3%	8.5%	9.4%	17.7%	
TOTAL			100.0%				

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Waste Management Transfer Station

Aggregate Results

Stratified Weighting

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Paper	1	Newsprint (ONP)	3.6%	4.8%	2.4%	5.3%	
	2	High Grade Office	2.8%	6.2%	1.7%	4.4%	Yes
	3	Magazines/Catalogs	1.5%	3.5%	0.9%	2.4%	Yes
	4	Uncoated OCC - recyclable	8.7%	16.4%	4.7%	13.8%	
	5	Uncoated OCC - nonrecyclabl	0.5%	1.3%	0.3%	0.9%	Yes
	6	Coated OCC	0.1%	0.4%	0.0%	0.2%	Yes
	7	Boxboard	5.4%	15.9%	2.3%	10.0%	Yes
	8	Mixed Paper - recyclable	4.6%	5.8%	3.1%	6.4%	
	9	Mixed Paper - nonrecyclable	6.9%	6.2%	5.0%	9.3%	
		TOTAL PAPER	34.2%	24.7%	26.2%	42.7%	
Plastic	10	PET Bottles/Jars - clear	0.3%	0.4%	0.2%	0.4%	
	11	PET Bottles/Jars - colored	0.1%	0.1%	0.0%	0.1%	
	12	Other PET	0.1%	0.3%	0.0%	0.1%	Yes
	13	HDPE Bottles - natural	0.3%	1.1%	0.2%	0.5%	Yes
	14	HDPE Bottles - colored	0.2%	0.6%	0.1%	0.3%	Yes
	15	PVC	0.0%	0.2%	0.0%	0.1%	Yes
	16	Polystyrene	0.9%	1.9%	0.6%	1.4%	Yes
	17	Film - transport packaging	0.6%	2.8%	0.2%	1.2%	Yes
	18	Other Film	3.7%	4.8%	2.5%	5.1%	
	19	Other Containers	0.5%	1.2%	0.2%	0.9%	Yes
	20	Other non-containers	2.7%	3.4%	1.9%	3.6%	
		TOTAL PLASTIC	9.4%	7.6%	7.1%	12.0%	
Metals	21	Aluminum Beverage Container	0.7%	1.6%	0.4%	1.1%	Yes
	22	Other Aluminum	0.4%	0.9%	0.2%	0.6%	Yes
	23	Ferrrous Containers	1.6%	7.2%	0.6%	2.9%	Yes
	24	Other Ferrous	3.5%	10.3%	1.8%	5.8%	Yes
	25	Other Non-Ferrous	0.1%	0.6%	0.1%	0.3%	Yes
		TOTAL METALS	6.3%	13.1%	3.7%	9.6%	Yes
Glass	26	Clear Containers	1.0%	2.2%	0.6%	1.6%	Yes
	27	Green Containers	0.4%	1.2%	0.2%	0.7%	Yes
	28	Brown Containers	0.3%	1.1%	0.1%	0.5%	Yes
	29	Other Glass	0.5%	1.5%	0.2%	0.8%	Yes
		TOTAL GLASS	2.1%	4.1%	1.2%	3.3%	

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Waste Management Transfer Station

Aggregate Results

Stratified Weighting

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Organic Materials	30	Yard Waste - Grass and Leaves	3.2%	7.6%	1.5%	5.8%	Yes
	31	Yard Waste - woody material	0.1%	0.6%	0.0%	0.3%	Yes
	32	Food Waste	11.7%	16.7%	7.3%	17.3%	
	33	Wood Pallets	4.3%	12.5%	1.6%	8.1%	Yes
	34	Treated Wood	6.4%	17.2%	3.2%	11.3%	Yes
	35	Untreated Wood	1.3%	3.7%	0.7%	2.2%	Yes
	36	Diapers	0.6%	1.2%	0.3%	1.2%	
	37	Other Organic Material	0.9%	2.7%	0.5%	1.6%	Yes
		TOTAL ORGANIC MATERIALS	28.7%	23.8%	21.4%	36.8%	
Problem Materials	38	Televisions	0.0%	0.0%	0.0%	0.0%	
	39	Computer Monitors	0.1%	0.9%	0.0%	0.4%	Yes
	40	Computer Equipment/Peripher	0.2%	1.1%	0.1%	0.5%	Yes
	41	Electric and Electronic Products	1.2%	4.2%	0.5%	2.4%	Yes
	42	Batteries	0.0%	0.1%	0.0%	0.1%	Yes
	43	Other	0.0%	0.1%	0.0%	0.0%	Yes
		TOTAL PROBLEM MATERIALS	1.6%	4.6%	0.8%	3.0%	Yes
HHW	44	Latex Paint	0.0%	0.0%	0.0%	0.0%	
	45	Oil Paint	0.0%	0.0%	0.0%	0.0%	
	46	Unused Pesti/Fungi/Herbi-cide	0.0%	0.0%	0.0%	0.0%	
	47	Unused Cleaners and Solvents	0.2%	1.6%	0.1%	0.5%	Yes
	48	Compressed Fuel Containers	0.0%	0.0%	0.0%	0.0%	
	49	Automotive - Antifreeze	0.0%	0.0%	0.0%	0.0%	
	50	Automotive - Used oil.filters	0.1%	0.4%	0.0%	0.2%	Yes
	51	Other	0.0%	0.2%	0.0%	0.1%	Yes
		TOTAL HHW	0.4%	1.6%	0.2%	0.7%	Yes
Other Waste	52	Textiles	1.6%	3.4%	1.0%	2.7%	Yes
	53	Carpet	1.8%	5.5%	0.7%	3.8%	Yes
	54	Sharps and Infectious Waste	0.0%	0.0%	0.0%	0.0%	
	55	Rubber	0.4%	0.9%	0.2%	0.8%	Yes
	56	Construction & Demolition De	3.9%	13.5%	1.6%	8.0%	Yes
	57	Household Bulky Items	4.2%	12.8%	2.0%	7.7%	Yes
	58	Empty HHW Containers	0.5%	1.8%	0.2%	1.0%	Yes
	59	Miscellaneous	4.9%	7.5%	3.1%	7.4%	
		TOTAL OTHER WASTE	17.4%	20.7%	11.9%	23.9%	
TOTAL			100.0%				

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Waste Management Transfer Station

Residential Results

Residential Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Paper	1	Newsprint (ONP)	5.7%	6.2%	2.0%	11.0%	
	2	High Grade Office	1.1%	1.0%	0.6%	1.9%	
	3	Magazines/Catalogs	1.5%	1.6%	0.6%	2.9%	
	4	Uncoated OCC - recyclable	1.2%	1.4%	0.5%	2.3%	
	5	Uncoated OCC - nonrecyclable	0.4%	0.8%	0.0%	1.0%	Yes
	6	Coated OCC	0.0%	0.0%	0.0%	0.0%	
	7	Boxboard	1.4%	1.2%	0.7%	2.5%	
	8	Mixed Paper - recyclable	5.4%	6.0%	2.4%	9.5%	
	9	Mixed Paper - nonrecyclable	4.8%	3.2%	2.8%	7.2%	
		TOTAL PAPER	21.5%	14.3%	12.4%	32.3%	
Plastic	10	PET Bottles/Jars - clear	0.3%	0.3%	0.1%	0.6%	
	11	PET Bottles/Jars - colored	0.1%	0.1%	0.0%	0.1%	
	12	Other PET	0.0%	0.0%	0.0%	0.1%	
	13	HDPE Bottles - natural	0.3%	0.2%	0.2%	0.5%	
	14	HDPE Bottles - colored	0.2%	0.2%	0.1%	0.4%	
	15	PVC	0.0%	0.0%	0.0%	0.0%	
	16	Polystyrene	0.5%	0.3%	0.2%	0.8%	
	17	Film - transport packaging	0.0%	0.0%	0.0%	0.0%	
	18	Other Film	2.0%	1.4%	1.1%	3.2%	
	19	Other Containers	0.1%	0.1%	0.0%	0.2%	
	20	Other non-containers	2.1%	1.1%	1.4%	2.9%	
		TOTAL PLASTIC	5.6%	3.0%	3.7%	7.9%	
Metals	21	Aluminum Beverage Containers	0.3%	0.3%	0.1%	0.6%	
	22	Other Aluminum	0.8%	1.5%	0.2%	1.7%	
	23	Ferrrous Containers	0.6%	0.5%	0.3%	1.0%	
	24	Other Ferrous	1.2%	1.3%	0.6%	2.1%	
	25	Other Non-Ferrous	0.0%	0.0%	0.0%	0.0%	Yes
		TOTAL METALS	2.9%	2.5%	1.7%	4.4%	
Glass	26	Clear Containers	1.5%	2.0%	0.4%	3.3%	
	27	Green Containers	0.1%	0.2%	0.0%	0.3%	
	28	Brown Containers	0.3%	0.4%	0.1%	0.7%	
	29	Other Glass	0.5%	0.9%	0.1%	1.2%	
		TOTAL GLASS	2.4%	2.6%	1.0%	4.4%	

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Waste Management Transfer Station

Residential Results

Residential Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Organic Materials	30	Yard Waste - Grass and Leaves	9.6%	15.4%	2.3%	21.3%	
	31	Yard Waste - woody material	0.5%	1.3%	0.1%	1.5%	Yes
	32	Food Waste	7.4%	4.4%	4.0%	11.7%	
	33	Wood Pallets	0.0%	0.0%	0.0%	0.0%	
	34	Treated Wood	11.1%	20.9%	1.9%	26.5%	
	35	Untreated Wood	0.4%	0.9%	0.0%	1.0%	Yes
	36	Diapers	1.9%	2.0%	0.6%	4.0%	
	37	Other Organic Material	2.1%	2.1%	0.8%	4.0%	
		TOTAL ORGANIC MATERIALS	33.0%	17.8%	21.8%	45.2%	
Problem Materials	38	Televisions	0.0%	0.0%	0.0%	0.0%	
	39	Computer Monitors	0.0%	0.0%	0.0%	0.0%	
	40	Computer Equipment/Peripherals	0.0%	0.0%	0.0%	0.0%	
	41	Electric and Electronic Products	4.0%	9.0%	0.7%	9.9%	Yes
	42	Batteries	0.0%	0.0%	0.0%	0.0%	
	43	Other	0.0%	0.0%	0.0%	0.0%	
		TOTAL PROBLEM MATERIALS	4.0%	9.0%	0.7%	9.8%	Yes
HHW	44	Latex Paint	0.0%	0.0%	0.0%	0.0%	
	45	Oil Paint	0.0%	0.0%	0.0%	0.0%	
	46	Unused Pesti/Fungi/Herbi-cides	0.0%	0.0%	0.0%	0.0%	
	47	Unused Cleaners and Solvents	0.0%	0.0%	0.0%	0.0%	
	48	Compressed Fuel Containers	0.0%	0.0%	0.0%	0.0%	
	49	Automotive - Antifreeze	0.0%	0.0%	0.0%	0.0%	
	50	Automotive - Used oil.filters	0.0%	0.0%	0.0%	0.0%	
	51	Other	0.2%	0.4%	0.0%	0.5%	Yes
		TOTAL HHW	0.2%	0.4%	0.0%	0.5%	Yes
Other Waste	52	Textiles	3.0%	4.6%	0.9%	6.1%	
	53	Carpet	4.9%	9.8%	0.5%	13.5%	
	54	Sharps and Infectious Waste	0.0%	0.0%	0.0%	0.0%	
	55	Rubber	0.4%	0.5%	0.1%	0.8%	
	56	Construction & Demolition Debris	10.1%	27.0%	0.6%	29.0%	Yes
	57	Household Bulky Items	6.5%	12.6%	0.8%	17.0%	
	58	Empty HHW Containers	0.4%	0.4%	0.1%	0.7%	
	59	Miscellaneous	5.2%	5.6%	1.7%	10.5%	
		TOTAL OTHER WASTE	30.5%	22.9%	16.7%	46.2%	
TOTAL			100.0%				

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Waste Management Transfer Station

ICI Results

ICI Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Paper	1	Newsprint (ONP)	2.8%	4.5%	1.7%	4.3%	
	2	High Grade Office	3.3%	7.8%	1.8%	5.4%	Yes
	3	Magazines/Catalogs	1.4%	4.2%	0.6%	2.4%	Yes
	4	Uncoated OCC - recyclable	12.1%	20.5%	6.7%	18.9%	
	5	Uncoated OCC - nonrecyclable	0.5%	1.4%	0.2%	0.9%	Yes
	6	Coated OCC	0.1%	0.5%	0.1%	0.3%	Yes
	7	Boxboard	2.9%	11.2%	1.4%	5.0%	Yes
	8	Mixed Paper - recyclable	4.5%	6.5%	2.7%	6.7%	
	9	Mixed Paper - nonrecyclable	6.9%	6.6%	4.6%	9.5%	
		TOTAL PAPER	34.5%	27.6%	24.8%	44.9%	
Plastic	10	PET Bottles/Jars - clear	0.2%	0.4%	0.1%	0.4%	
	11	PET Bottles/Jars - colored	0.1%	0.1%	0.0%	0.1%	
	12	Other PET	0.1%	0.4%	0.0%	0.2%	Yes
	13	HDPE Bottles - natural	0.4%	1.4%	0.2%	0.7%	Yes
	14	HDPE Bottles - colored	0.2%	0.8%	0.1%	0.4%	Yes
	15	PVC	0.1%	0.2%	0.0%	0.1%	Yes
	16	Polystyrene	1.1%	2.4%	0.6%	1.7%	Yes
	17	Film - transport packaging	1.0%	3.6%	0.4%	1.9%	Yes
	18	Other Film	4.4%	6.0%	2.8%	6.3%	
	19	Other Containers	0.8%	1.6%	0.4%	1.3%	Yes
	20	Other non-containers	2.8%	4.0%	1.8%	3.9%	
		TOTAL PLASTIC	11.1%	9.2%	8.2%	14.5%	
Metals	21	Aluminum Beverage Containers	0.8%	2.0%	0.5%	1.3%	Yes
	22	Other Aluminum	0.3%	0.7%	0.2%	0.5%	Yes
	23	Ferrrous Containers	2.2%	9.2%	0.9%	4.1%	Yes
	24	Other Ferrous	3.7%	12.4%	1.6%	6.5%	Yes
	25	Other Non-Ferrous	0.2%	0.7%	0.1%	0.3%	Yes
		TOTAL METALS	7.2%	16.2%	3.9%	11.5%	Yes
Glass	26	Clear Containers	0.9%	2.6%	0.4%	1.6%	Yes
	27	Green Containers	0.5%	1.5%	0.2%	1.0%	Yes
	28	Brown Containers	0.3%	1.4%	0.1%	0.6%	Yes
	29	Other Glass	0.6%	1.8%	0.3%	1.1%	Yes
		TOTAL GLASS	2.4%	5.0%	1.3%	3.9%	Yes

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Waste Management Transfer Station

ICI Results

ICI Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Organic Materials	30	Yard Waste - Grass and Leaves	1.5%	3.8%	0.7%	2.6%	Yes
	31	Yard Waste - woody material	0.0%	0.0%	0.0%	0.0%	
	32	Food Waste	12.5%	19.2%	7.0%	19.4%	
	33	Wood Pallets	6.7%	15.9%	2.9%	11.8%	Yes
	34	Treated Wood	6.1%	18.5%	2.5%	11.1%	Yes
	35	Untreated Wood	1.3%	4.6%	0.6%	2.4%	Yes
	36	Diapers	0.2%	0.7%	0.1%	0.3%	Yes
	37	Other Organic Material	0.9%	3.3%	0.4%	1.6%	Yes
		TOTAL ORGANIC MATERIALS	29.2%	25.6%	20.4%	38.8%	
Problem Materials	38	Televisions	0.0%	0.0%	0.0%	0.0%	
	39	Computer Monitors	0.0%	0.0%	0.0%	0.0%	
	40	Computer Equipment/Peripherals	0.1%	0.7%	0.0%	0.2%	Yes
	41	Electric and Electronic Products	0.6%	1.9%	0.3%	1.1%	Yes
	42	Batteries	0.0%	0.1%	0.0%	0.1%	Yes
	43	Other	0.0%	0.1%	0.0%	0.0%	Yes
		TOTAL PROBLEM MATERIALS	0.8%	2.1%	0.4%	1.4%	Yes
HHW	44	Latex Paint	0.0%	0.0%	0.0%	0.0%	
	45	Oil Paint	0.0%	0.0%	0.0%	0.0%	
	46	Unused Pesti/Fungi/Herbi-cides	0.0%	0.0%	0.0%	0.0%	
	47	Unused Cleaners and Solvents	0.4%	2.0%	0.1%	0.7%	Yes
	48	Compressed Fuel Containers	0.0%	0.0%	0.0%	0.0%	
	49	Automotive - Antifreeze	0.0%	0.0%	0.0%	0.0%	
	50	Automotive - Used oil.filters	0.0%	0.0%	0.0%	0.0%	
	51	Other	0.0%	0.0%	0.0%	0.0%	Yes
		TOTAL HHW	0.4%	2.0%	0.1%	0.7%	Yes
Other Waste	52	Textiles	0.7%	1.8%	0.3%	1.2%	Yes
	53	Carpet	1.5%	4.4%	0.6%	2.8%	Yes
	54	Sharps and Infectious Waste	0.0%	0.0%	0.0%	0.0%	
	55	Rubber	0.2%	0.5%	0.1%	0.4%	Yes
	56	Construction & Demolition Debris	3.1%	8.8%	1.3%	5.5%	Yes
	57	Household Bulky Items	3.7%	13.5%	1.4%	7.2%	Yes
	58	Empty HHW Containers	0.1%	0.3%	0.0%	0.2%	Yes
	59	Miscellaneous	5.0%	8.5%	2.8%	7.8%	
		TOTAL OTHER WASTE	14.4%	22.1%	8.3%	21.7%	
TOTAL			100.0%				

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Waste Management Transfer Station

Mixed Results

Mixed Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Paper	1	Newsprint (ONP)	4.3%	4.0%	2.0%	7.6%	
	2	High Grade Office	2.9%	3.0%	1.4%	5.0%	
	3	Magazines/Catalogs	1.9%	2.2%	0.7%	3.7%	
	4	Uncoated OCC - recyclable	5.3%	7.9%	2.2%	9.8%	
	5	Uncoated OCC - nonrecyclable	0.6%	1.4%	0.1%	1.4%	Yes
	6	Coated OCC	0.0%	0.0%	0.0%	0.0%	
	7	Boxboard	16.6%	29.5%	3.8%	35.9%	
	8	Mixed Paper - recyclable	4.0%	2.5%	2.5%	5.8%	
	9	Mixed Paper - nonrecyclable	8.9%	6.9%	4.7%	14.4%	
		TOTAL PAPER	44.6%	22.5%	29.9%	59.7%	
Plastic	10	PET Bottles/Jars - clear	0.4%	0.4%	0.2%	0.7%	
	11	PET Bottles/Jars - colored	0.1%	0.2%	0.0%	0.3%	
	12	Other PET	0.0%	0.1%	0.0%	0.1%	
	13	HDPE Bottles - natural	0.2%	0.2%	0.1%	0.3%	
	14	HDPE Bottles - colored	0.0%	0.1%	0.0%	0.1%	
	15	PVC	0.0%	0.0%	0.0%	0.0%	Yes
	16	Polystyrene	0.7%	0.9%	0.4%	1.3%	
	17	Film - transport packaging	0.0%	0.1%	0.0%	0.1%	Yes
	18	Other Film	3.1%	2.1%	1.8%	4.7%	
	19	Other Containers	0.2%	0.2%	0.1%	0.3%	
	20	Other non-containers	2.8%	2.7%	1.4%	4.7%	
		TOTAL PLASTIC	7.7%	4.5%	4.8%	11.2%	
Metals	21	Aluminum Beverage Containers	0.8%	0.8%	0.4%	1.4%	
	22	Other Aluminum	0.1%	0.2%	0.0%	0.2%	
	23	Ferrrous Containers	0.4%	0.5%	0.2%	0.8%	
	24	Other Ferrous	5.0%	7.6%	1.8%	9.8%	
	25	Other Non-Ferrous	0.2%	0.3%	0.0%	0.4%	
		TOTAL METALS	6.5%	7.5%	3.0%	11.1%	
Glass	26	Clear Containers	0.8%	0.7%	0.3%	1.3%	
	27	Green Containers	0.2%	0.3%	0.0%	0.4%	
	28	Brown Containers	0.1%	0.2%	0.0%	0.3%	
	29	Other Glass	0.0%	0.1%	0.0%	0.1%	Yes
		TOTAL GLASS	1.1%	0.9%	0.5%	1.8%	

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Waste Management Transfer Station

Mixed Results

Mixed Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Organic Materials	30	Yard Waste - Grass and Leaves	2.6%	5.4%	0.4%	6.5%	Yes
	31	Yard Waste - woody material	0.2%	0.6%	0.0%	0.5%	Yes
	32	Food Waste	13.2%	15.7%	5.5%	23.5%	
	33	Wood Pallets	1.1%	3.6%	0.1%	3.4%	Yes
	34	Treated Wood	3.2%	6.2%	0.7%	7.2%	
	35	Untreated Wood	2.0%	1.7%	1.1%	3.3%	
	36	Diapers	0.9%	1.4%	0.2%	2.1%	
	37	Other Organic Material	0.1%	0.2%	0.0%	0.3%	
		TOTAL ORGANIC MATERIALS	23.3%	23.2%	11.3%	38.0%	
Problem Materials	38	Televisions	0.0%	0.0%	0.0%	0.0%	
	39	Computer Monitors	0.7%	2.1%	0.1%	1.9%	Yes
	40	Computer Equipment/Peripherals	0.7%	2.2%	0.1%	2.0%	Yes
	41	Electric and Electronic Products	0.4%	1.0%	0.1%	1.0%	Yes
	42	Batteries	0.0%	0.1%	0.0%	0.1%	Yes
	43	Other	0.0%	0.0%	0.0%	0.0%	
		TOTAL PROBLEM MATERIALS	1.8%	4.3%	0.3%	4.4%	Yes
HHW	44	Latex Paint	0.0%	0.0%	0.0%	0.0%	
	45	Oil Paint	0.0%	0.0%	0.0%	0.0%	
	46	Unused Pesti/Fungi/Herbi-cides	0.0%	0.0%	0.0%	0.0%	
	47	Unused Cleaners and Solvents	0.1%	0.1%	0.0%	0.1%	Yes
	48	Compressed Fuel Containers	0.0%	0.0%	0.0%	0.0%	
	49	Automotive - Antifreeze	0.0%	0.0%	0.0%	0.0%	
	50	Automotive - Used oil.filters	0.3%	1.0%	0.0%	1.0%	Yes
	51	Other	0.1%	0.2%	0.0%	0.2%	Yes
		TOTAL HHW	0.5%	1.0%	0.1%	1.2%	Yes
Other Waste	52	Textiles	3.2%	5.2%	1.0%	6.6%	
	53	Carpet	0.0%	0.0%	0.0%	0.0%	
	54	Sharps and Infectious Waste	0.0%	0.0%	0.0%	0.0%	
	55	Rubber	1.1%	1.8%	0.2%	2.5%	
	56	Construction & Demolition Debris	0.7%	1.3%	0.1%	1.7%	
	57	Household Bulky Items	3.3%	10.5%	0.2%	9.8%	Yes
	58	Empty HHW Containers	1.9%	3.9%	0.5%	4.1%	Yes
	59	Miscellaneous	4.4%	5.3%	1.6%	8.5%	
		TOTAL OTHER WASTE	14.6%	12.6%	7.1%	24.3%	
TOTAL			100.0%				

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Polk County WTE

Aggregate Results

Stratified Weighting

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Paper	1	Newsprint (ONP)	5.3%	3.1%	4.5%	6.3%	
	2	High Grade Office	3.9%	5.5%	2.7%	5.3%	
	3	Magazines/Catalogs	3.4%	3.3%	2.5%	4.5%	
	4	Uncoated OCC - recyclable	6.4%	8.8%	4.5%	9.0%	
	5	Uncoated OCC - nonrecyclabl	0.6%	1.2%	0.4%	1.2%	
	6	Coated OCC	0.7%	2.6%	0.2%	2.2%	Yes
	7	Boxboard	3.7%	1.3%	3.3%	4.1%	
	8	Mixed Paper - recyclable	5.7%	2.2%	5.1%	6.4%	
	9	Mixed Paper - nonrecyclable	12.5%	5.0%	11.2%	14.0%	
		TOTAL PAPER	42.3%	9.7%	39.5%	45.1%	
Plastic	10	PET Bottles/Jars - clear	0.6%	0.3%	0.5%	0.7%	
	11	PET Bottles/Jars - colored	0.7%	3.2%	0.4%	1.1%	Yes
	12	Other PET	0.0%	0.1%	0.0%	0.1%	Yes
	13	HDPE Bottles - natural	0.5%	0.4%	0.4%	0.6%	
	14	HDPE Bottles - colored	0.4%	0.3%	0.3%	0.5%	
	15	PVC	0.0%	0.0%	0.0%	0.0%	
	16	Polystyrene	1.0%	0.7%	0.9%	1.2%	
	17	Film - transport packaging	0.2%	0.6%	0.1%	0.5%	Yes
	18	Other Film	4.9%	1.9%	4.5%	5.5%	
	19	Other Containers	0.7%	2.7%	0.3%	1.4%	Yes
	20	Other non-containers	3.2%	1.6%	2.8%	3.7%	
		TOTAL PLASTIC	12.4%	4.5%	11.2%	13.7%	
Metals	21	Aluminum Beverage Container	1.0%	0.6%	0.9%	1.2%	
	22	Other Aluminum	0.6%	0.7%	0.4%	0.8%	
	23	Ferrrous Containers	1.9%	1.1%	1.6%	2.3%	
	24	Other Ferrous	1.4%	2.2%	0.9%	2.1%	
	25	Other Non-Ferrous	0.1%	0.3%	0.0%	0.1%	Yes
		TOTAL METALS	5.0%	2.7%	4.4%	5.8%	
Glass	26	Clear Containers	2.0%	2.0%	1.4%	2.6%	
	27	Green Containers	0.3%	0.6%	0.2%	0.6%	
	28	Brown Containers	1.0%	2.5%	0.6%	1.6%	Yes
	29	Other Glass	0.7%	3.0%	0.4%	2.2%	Yes
		TOTAL GLASS	4.0%	5.2%	3.0%	5.7%	

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Polk County WTE

Aggregate Results

Stratified Weighting

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Organic Materials	30	Yard Waste - Grass and Leaves	2.1%	4.7%	1.1%	3.3%	Yes
	31	Yard Waste - woody material	0.1%	0.5%	0.0%	0.2%	Yes
	32	Food Waste	16.2%	6.9%	14.3%	18.2%	
	33	Wood Pallets	0.2%	0.9%	0.1%	0.6%	Yes
	34	Treated Wood	0.9%	2.8%	0.5%	1.4%	Yes
	35	Untreated Wood	0.5%	1.2%	0.2%	0.9%	Yes
	36	Diapers	3.8%	3.6%	2.8%	5.1%	
	37	Other Organic Material	0.6%	0.5%	0.5%	0.7%	
		TOTAL ORGANIC MATERIALS	24.3%	7.9%	22.0%	26.6%	
Problem Materials	38	Televisions	0.0%	0.0%	0.0%	0.0%	
	39	Computer Monitors	0.0%	0.0%	0.0%	0.0%	
	40	Computer Equipment/Peripher	0.0%	0.0%	0.0%	0.0%	
	41	Electric and Electronic Products	0.3%	0.5%	0.1%	0.4%	Yes
	42	Batteries	0.1%	0.2%	0.1%	0.2%	
	43	Other	0.0%	0.0%	0.0%	0.0%	Yes
		TOTAL PROBLEM MATERIALS	0.4%	0.6%	0.2%	0.5%	
HHW	44	Latex Paint	0.0%	0.0%	0.0%	0.0%	
	45	Oil Paint	0.3%	1.9%	0.1%	0.5%	Yes
	46	Unused Pesti/Fungi/Herbi-cide	0.0%	0.0%	0.0%	0.0%	
	47	Unused Cleaners and Solvents	0.0%	0.1%	0.0%	0.0%	Yes
	48	Compressed Fuel Containers	0.0%	0.0%	0.0%	0.0%	
	49	Automotive - Antifreeze	0.0%	0.0%	0.0%	0.0%	Yes
	50	Automotive - Used oil.filters	0.1%	0.4%	0.1%	0.2%	Yes
	51	Other	0.1%	0.7%	0.0%	0.4%	Yes
		TOTAL HHW	0.6%	2.1%	0.3%	1.0%	Yes
Other Waste	52	Textiles	2.6%	2.5%	2.0%	3.4%	
	53	Carpet	0.3%	0.9%	0.1%	0.5%	Yes
	54	Sharps and Infectious Waste	0.0%	0.0%	0.0%	0.0%	
	55	Rubber	0.7%	1.1%	0.5%	1.1%	
	56	Construction & Demolition De	1.4%	3.5%	0.8%	2.3%	Yes
	57	Household Bulky Items	0.0%	0.0%	0.0%	0.0%	
	58	Empty HHW Containers	0.5%	0.4%	0.4%	0.6%	
	59	Miscellaneous	5.5%	3.3%	4.6%	6.7%	
		TOTAL OTHER WASTE	11.1%	5.7%	9.4%	12.9%	
TOTAL			100.0%				

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Polk County WTE

Residential Results

Residential Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Paper	1	Newsprint (ONP)	5.6%	2.7%	4.0%	7.3%	
	2	High Grade Office	2.7%	3.9%	1.1%	4.9%	
	3	Magazines/Catalogs	2.4%	1.3%	1.7%	3.3%	
	4	Uncoated OCC - recyclable	4.2%	5.3%	1.8%	7.4%	
	5	Uncoated OCC - nonrecyclable	0.5%	0.6%	0.1%	0.9%	
	6	Coated OCC	0.1%	0.3%	0.0%	0.3%	Yes
	7	Boxboard	4.8%	1.8%	3.8%	6.1%	
	8	Mixed Paper - recyclable	8.3%	2.4%	6.8%	10.0%	
	9	Mixed Paper - nonrecyclable	11.0%	3.6%	8.9%	13.3%	
		TOTAL PAPER	39.5%	8.3%	34.4%	44.8%	
Plastic	10	PET Bottles/Jars - clear	0.9%	0.3%	0.7%	1.1%	
	11	PET Bottles/Jars - colored	0.3%	0.1%	0.2%	0.4%	
	12	Other PET	0.0%	0.0%	0.0%	0.0%	
	13	HDPE Bottles - natural	0.5%	0.3%	0.3%	0.7%	
	14	HDPE Bottles - colored	0.5%	0.3%	0.3%	0.8%	
	15	PVC	0.0%	0.0%	0.0%	0.0%	Yes
	16	Polystyrene	0.8%	0.3%	0.6%	1.0%	
	17	Film - transport packaging	0.2%	0.5%	0.0%	0.5%	Yes
	18	Other Film	4.7%	1.5%	3.8%	5.6%	
	19	Other Containers	2.6%	6.3%	0.6%	6.0%	Yes
	20	Other non-containers	3.9%	1.7%	2.9%	5.0%	
		TOTAL PLASTIC	14.3%	5.7%	11.2%	17.8%	
Metals	21	Aluminum Beverage Containers	1.1%	0.6%	0.8%	1.6%	
	22	Other Aluminum	0.5%	0.3%	0.4%	0.7%	
	23	Ferrrous Containers	2.0%	1.0%	1.5%	2.6%	
	24	Other Ferrous	3.0%	3.7%	1.1%	5.9%	
	25	Other Non-Ferrous	0.1%	0.3%	0.0%	0.3%	Yes
		TOTAL METALS	6.8%	4.2%	4.5%	9.5%	
Glass	26	Clear Containers	1.8%	1.3%	1.1%	2.7%	
	27	Green Containers	0.7%	1.2%	0.1%	1.6%	
	28	Brown Containers	0.6%	0.7%	0.1%	1.3%	
	29	Other Glass	0.4%	0.7%	0.1%	0.8%	
		TOTAL GLASS	3.4%	2.2%	2.3%	4.9%	

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Polk County WTE

Residential Results

Residential Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Organic Materials	30	Yard Waste - Grass and Leaves	0.5%	0.7%	0.1%	1.0%	
	31	Yard Waste - woody material	0.4%	1.2%	0.0%	1.2%	Yes
	32	Food Waste	12.3%	3.9%	9.9%	14.9%	
	33	Wood Pallets	0.0%	0.0%	0.0%	0.0%	
	34	Treated Wood	0.8%	1.1%	0.2%	1.7%	
	35	Untreated Wood	1.4%	2.4%	0.2%	3.6%	
	36	Diapers	4.7%	3.4%	2.4%	7.7%	
	37	Other Organic Material	0.6%	0.5%	0.4%	0.9%	
		TOTAL ORGANIC MATERIALS	20.7%	5.1%	17.5%	24.1%	
Problem Materials	38	Televisions	0.0%	0.0%	0.0%	0.0%	
	39	Computer Monitors	0.0%	0.0%	0.0%	0.0%	
	40	Computer Equipment/Peripherals	0.0%	0.0%	0.0%	0.0%	
	41	Electric and Electronic Products	0.4%	0.5%	0.1%	1.0%	
	42	Batteries	0.1%	0.1%	0.0%	0.2%	
	43	Other	0.0%	0.0%	0.0%	0.0%	
		TOTAL PROBLEM MATERIALS	0.5%	0.5%	0.2%	1.0%	
HHW	44	Latex Paint	0.0%	0.0%	0.0%	0.0%	
	45	Oil Paint	0.0%	0.0%	0.0%	0.0%	
	46	Unused Pesti/Fungi/Herbi-cides	0.0%	0.0%	0.0%	0.0%	
	47	Unused Cleaners and Solvents	0.0%	0.0%	0.0%	0.0%	Yes
	48	Compressed Fuel Containers	0.0%	0.0%	0.0%	0.0%	
	49	Automotive - Antifreeze	0.0%	0.0%	0.0%	0.0%	
	50	Automotive - Used oil.filters	0.2%	0.6%	0.0%	0.6%	Yes
	51	Other	0.6%	1.7%	0.1%	1.8%	Yes
		TOTAL HHW	0.8%	2.3%	0.1%	2.3%	Yes
Other Waste	52	Textiles	3.9%	2.8%	2.3%	6.0%	
	53	Carpet	0.3%	0.8%	0.0%	1.0%	Yes
	54	Sharps and Infectious Waste	0.0%	0.0%	0.0%	0.0%	
	55	Rubber	1.1%	1.3%	0.4%	2.2%	
	56	Construction & Demolition Debris	2.8%	2.8%	1.0%	5.4%	
	57	Household Bulky Items	0.0%	0.0%	0.0%	0.0%	
	58	Empty HHW Containers	0.4%	0.3%	0.2%	0.7%	
	59	Miscellaneous	5.3%	2.1%	4.1%	6.6%	
		TOTAL OTHER WASTE	13.9%	4.4%	11.2%	16.7%	
TOTAL			100.0%				

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Polk County WTE

ICI Results

ICI Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Paper	1	Newsprint (ONP)	2.0%	0.8%	1.1%	3.1%	
	2	High Grade Office	4.8%	4.2%	0.7%	12.5%	
	3	Magazines/Catalogs	1.1%	1.1%	0.0%	3.5%	
	4	Uncoated OCC - recyclable	25.4%	22.8%	3.5%	58.3%	
	5	Uncoated OCC - nonrecyclable	2.1%	3.9%	0.1%	10.0%	
	6	Coated OCC	7.7%	9.2%	0.0%	29.9%	
	7	Boxboard	1.3%	0.7%	0.7%	2.2%	
	8	Mixed Paper - recyclable	3.3%	2.2%	1.3%	6.1%	
	9	Mixed Paper - nonrecyclable	11.2%	8.0%	2.7%	24.5%	
		TOTAL PAPER	58.8%	15.2%	40.1%	76.3%	
Plastic	10	PET Bottles/Jars - clear	0.2%	0.2%	0.0%	0.6%	
	11	PET Bottles/Jars - colored	0.0%	0.0%	0.0%	0.1%	
	12	Other PET	0.1%	0.2%	0.0%	0.6%	
	13	HDPE Bottles - natural	0.2%	0.2%	0.0%	0.8%	
	14	HDPE Bottles - colored	0.2%	0.4%	0.0%	1.0%	
	15	PVC	0.0%	0.0%	0.0%	0.2%	
	16	Polystyrene	1.8%	1.4%	0.6%	3.5%	
	17	Film - transport packaging	1.6%	2.0%	0.0%	6.1%	
	18	Other Film	6.1%	4.3%	2.2%	11.8%	
	19	Other Containers	0.1%	0.1%	0.0%	0.5%	
	20	Other non-containers	2.6%	2.6%	0.3%	7.0%	
		TOTAL PLASTIC	13.0%	6.4%	6.5%	21.5%	
Metals	21	Aluminum Beverage Containers	0.7%	0.6%	0.1%	1.8%	
	22	Other Aluminum	0.2%	0.2%	0.0%	0.5%	
	23	Ferrrous Containers	1.1%	1.7%	0.0%	4.2%	
	24	Other Ferrous	0.2%	0.3%	0.0%	0.9%	
	25	Other Non-Ferrous	0.0%	0.0%	0.0%	0.0%	
		TOTAL METALS	2.1%	2.1%	0.4%	5.1%	
Glass	26	Clear Containers	0.4%	0.5%	0.0%	1.4%	
	27	Green Containers	0.0%	0.0%	0.0%	0.0%	
	28	Brown Containers	0.1%	0.2%	0.0%	0.5%	
	29	Other Glass	5.2%	10.4%	0.6%	26.4%	
		TOTAL GLASS	5.8%	10.9%	0.2%	25.5%	

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Polk County WTE

ICI Results

ICI Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Organic Materials	30	Yard Waste - Grass and Leaves	0.5%	0.8%	0.0%	2.1%	
	31	Yard Waste - woody material	0.0%	0.0%	0.0%	0.0%	
	32	Food Waste	11.3%	4.8%	5.7%	18.6%	
	33	Wood Pallets	1.1%	2.3%	0.2%	6.3%	
	34	Treated Wood	1.0%	1.7%	0.0%	4.6%	
	35	Untreated Wood	0.0%	0.0%	0.0%	0.1%	
	36	Diapers	1.5%	1.9%	0.0%	6.2%	
	37	Other Organic Material	0.1%	0.1%	0.0%	0.3%	
		TOTAL ORGANIC MATERIALS	15.6%	2.4%	12.9%	18.5%	
Problem Materials	38	Televisions	0.0%	0.0%	0.0%	0.0%	
	39	Computer Monitors	0.0%	0.0%	0.0%	0.0%	
	40	Computer Equipment/Peripherals	0.0%	0.0%	0.0%	0.0%	
	41	Electric and Electronic Products	0.1%	0.2%	0.0%	0.4%	
	42	Batteries	0.0%	0.0%	0.0%	0.1%	
	43	Other	0.0%	0.0%	0.0%	0.0%	
		TOTAL PROBLEM MATERIALS	0.1%	0.2%	0.0%	0.4%	
HHW	44	Latex Paint	0.0%	0.0%	0.0%	0.0%	
	45	Oil Paint	0.0%	0.0%	0.0%	0.0%	
	46	Unused Pesti/Fungi/Herbi-cides	0.0%	0.0%	0.0%	0.0%	
	47	Unused Cleaners and Solvents	0.0%	0.0%	0.0%	0.0%	
	48	Compressed Fuel Containers	0.0%	0.0%	0.0%	0.0%	
	49	Automotive - Antifreeze	0.0%	0.0%	0.0%	0.0%	
	50	Automotive - Used oil.filters	0.0%	0.0%	0.0%	0.0%	
	51	Other	0.0%	0.0%	0.0%	0.0%	
		TOTAL HHW	0.0%	0.0%	0.0%	0.0%	
Other Waste	52	Textiles	0.2%	0.2%	0.0%	0.6%	
	53	Carpet	0.0%	0.0%	0.0%	0.0%	
	54	Sharps and Infectious Waste	0.0%	0.0%	0.0%	0.0%	
	55	Rubber	0.0%	0.0%	0.0%	0.1%	
	56	Construction & Demolition Debris	0.0%	0.0%	0.0%	0.0%	
	57	Household Bulky Items	0.0%	0.0%	0.0%	0.0%	
	58	Empty HHW Containers	0.1%	0.2%	0.0%	0.6%	
	59	Miscellaneous	4.2%	4.2%	0.2%	13.1%	
		TOTAL OTHER WASTE	4.6%	4.2%	0.2%	13.9%	
TOTAL			100.0%				

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Polk County WTE

Mixed Results

Mixed Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Paper	1	Newsprint (ONP)	5.7%	3.3%	4.7%	6.7%	
	2	High Grade Office	4.0%	5.9%	2.8%	5.5%	
	3	Magazines/Catalogs	3.9%	3.7%	2.9%	5.1%	
	4	Uncoated OCC - recyclable	4.9%	6.5%	3.7%	6.2%	
	5	Uncoated OCC - nonrecyclable	0.5%	0.6%	0.4%	0.6%	
	6	Coated OCC	0.1%	0.3%	0.0%	0.1%	Yes
	7	Boxboard	3.7%	1.2%	3.4%	4.1%	
	8	Mixed Paper - recyclable	5.4%	2.1%	4.8%	6.0%	
	9	Mixed Paper - nonrecyclable	13.0%	4.9%	11.7%	14.3%	
		TOTAL PAPER	41.2%	9.2%	38.6%	43.8%	
Plastic	10	PET Bottles/Jars - clear	0.6%	0.3%	0.5%	0.7%	
	11	PET Bottles/Jars - colored	0.9%	3.7%	0.5%	1.4%	Yes
	12	Other PET	0.0%	0.1%	0.0%	0.1%	Yes
	13	HDPE Bottles - natural	0.5%	0.4%	0.4%	0.7%	
	14	HDPE Bottles - colored	0.4%	0.3%	0.3%	0.5%	
	15	PVC	0.0%	0.0%	0.0%	0.0%	
	16	Polystyrene	1.0%	0.6%	0.8%	1.1%	
	17	Film - transport packaging	0.1%	0.2%	0.0%	0.1%	Yes
	18	Other Film	4.9%	1.6%	4.5%	5.3%	
	19	Other Containers	0.3%	0.3%	0.3%	0.4%	
	20	Other non-containers	3.1%	1.5%	2.8%	3.5%	
		TOTAL PLASTIC	11.9%	4.0%	10.9%	12.9%	
Metals	21	Aluminum Beverage Containers	1.1%	0.5%	0.9%	1.2%	
	22	Other Aluminum	0.7%	0.8%	0.5%	0.9%	
	23	Ferrrous Containers	2.0%	1.1%	1.7%	2.3%	
	24	Other Ferrous	1.2%	1.8%	0.8%	1.6%	
	25	Other Non-Ferrous	0.1%	0.3%	0.0%	0.1%	Yes
		TOTAL METALS	4.9%	2.3%	4.4%	5.5%	
Glass	26	Clear Containers	2.2%	2.3%	1.6%	2.9%	
	27	Green Containers	0.3%	0.4%	0.2%	0.4%	
	28	Brown Containers	1.2%	2.8%	0.7%	1.8%	Yes
	29	Other Glass	0.3%	0.4%	0.2%	0.4%	
		TOTAL GLASS	3.9%	4.8%	2.9%	5.1%	

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Polk County WTE

Mixed Results

Mixed Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Organic Materials	30	Yard Waste - Grass and Leaves	2.6%	5.4%	1.5%	4.1%	Yes
	31	Yard Waste - woody material	0.0%	0.0%	0.0%	0.0%	
	32	Food Waste	17.7%	7.6%	15.6%	19.8%	
	33	Wood Pallets	0.1%	0.8%	0.1%	0.2%	Yes
	34	Treated Wood	0.9%	3.1%	0.4%	1.4%	Yes
	35	Untreated Wood	0.3%	0.7%	0.2%	0.5%	Yes
	36	Diapers	3.8%	3.8%	2.8%	5.0%	
	37	Other Organic Material	0.7%	0.5%	0.5%	0.8%	
		TOTAL ORGANIC MATERIALS	26.1%	8.8%	23.7%	28.6%	
Problem Materials	38	Televisions	0.0%	0.0%	0.0%	0.0%	
	39	Computer Monitors	0.0%	0.0%	0.0%	0.0%	
	40	Computer Equipment/Peripherals	0.0%	0.0%	0.0%	0.0%	
	41	Electric and Electronic Products	0.2%	0.6%	0.1%	0.4%	Yes
	42	Batteries	0.1%	0.2%	0.1%	0.2%	
	43	Other	0.0%	0.0%	0.0%	0.0%	Yes
		TOTAL PROBLEM MATERIALS	0.3%	0.6%	0.2%	0.5%	
HHW	44	Latex Paint	0.0%	0.0%	0.0%	0.0%	
	45	Oil Paint	0.4%	2.2%	0.1%	0.7%	Yes
	46	Unused Pesti/Fungi/Herbi-cides	0.0%	0.0%	0.0%	0.0%	
	47	Unused Cleaners and Solvents	0.0%	0.1%	0.0%	0.1%	Yes
	48	Compressed Fuel Containers	0.0%	0.0%	0.0%	0.0%	
	49	Automotive - Antifreeze	0.0%	0.0%	0.0%	0.0%	Yes
	50	Automotive - Used oil.filters	0.1%	0.4%	0.0%	0.2%	Yes
	51	Other	0.0%	0.2%	0.0%	0.1%	Yes
		TOTAL HHW	0.6%	2.2%	0.3%	0.9%	Yes
Other Waste	52	Textiles	2.6%	2.6%	1.9%	3.4%	
	53	Carpet	0.3%	0.9%	0.1%	0.5%	Yes
	54	Sharps and Infectious Waste	0.0%	0.0%	0.0%	0.0%	
	55	Rubber	0.7%	1.2%	0.5%	1.0%	
	56	Construction & Demolition Debris	1.2%	3.8%	0.6%	2.1%	Yes
	57	Household Bulky Items	0.0%	0.0%	0.0%	0.0%	
	58	Empty HHW Containers	0.5%	0.4%	0.4%	0.7%	
	59	Miscellaneous	5.7%	3.4%	4.7%	6.9%	
		TOTAL OTHER WASTE	11.1%	6.1%	9.4%	13.0%	
TOTAL			100.0%				

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Prairieland MSW Compost Facility

Aggregate Results

Stratified Weighting

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Paper	1	Newsprint (ONP)	4.4%	4.6%	3.1%	6.1%	
	2	High Grade Office	4.8%	15.6%	1.6%	10.2%	Yes
	3	Magazines/Catalogs	2.4%	4.3%	1.5%	3.8%	
	4	Uncoated OCC - recyclable	3.2%	2.7%	2.2%	4.3%	
	5	Uncoated OCC - nonrecyclabl	0.7%	2.6%	0.3%	1.3%	Yes
	6	Coated OCC	0.0%	0.0%	0.0%	0.0%	
	7	Boxboard	2.9%	1.7%	2.2%	3.6%	
	8	Mixed Paper - recyclable	4.7%	4.0%	3.6%	6.1%	
	9	Mixed Paper - nonrecyclable	11.9%	7.4%	9.2%	15.3%	
		TOTAL PAPER	35.1%	19.6%	27.7%	43.3%	
Plastic	10	PET Bottles/Jars - clear	0.4%	0.3%	0.3%	0.5%	
	11	PET Bottles/Jars - colored	0.6%	3.3%	0.2%	1.5%	Yes
	12	Other PET	0.0%	0.1%	0.0%	0.1%	Yes
	13	HDPE Bottles - natural	0.3%	0.4%	0.2%	0.4%	
	14	HDPE Bottles - colored	0.2%	0.2%	0.1%	0.3%	
	15	PVC	0.1%	0.4%	0.0%	0.2%	Yes
	16	Polystyrene	1.2%	1.2%	0.8%	1.7%	
	17	Film - transport packaging	0.1%	0.3%	0.0%	0.2%	Yes
	18	Other Film	4.3%	2.8%	3.4%	5.5%	
	19	Other Containers	0.3%	0.5%	0.2%	0.5%	
	20	Other non-containers	3.6%	2.2%	2.9%	4.4%	
		TOTAL PLASTIC	11.1%	6.1%	9.1%	13.5%	
Metals	21	Aluminum Beverage Container	0.5%	0.4%	0.3%	0.6%	
	22	Other Aluminum	0.4%	0.5%	0.3%	0.6%	
	23	Ferrrous Containers	1.0%	0.8%	0.7%	1.4%	
	24	Other Ferrous	1.3%	1.4%	0.8%	1.9%	
	25	Other Non-Ferrous	0.1%	0.6%	0.0%	0.3%	Yes
		TOTAL METALS	3.3%	1.9%	2.6%	4.1%	
Glass	26	Clear Containers	1.2%	1.6%	0.7%	1.8%	
	27	Green Containers	0.1%	0.3%	0.1%	0.2%	Yes
	28	Brown Containers	0.4%	0.9%	0.2%	0.7%	Yes
	29	Other Glass	0.3%	0.6%	0.2%	0.5%	
		TOTAL GLASS	2.0%	2.4%	1.3%	2.9%	

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Prairieland MSW Compost Facility

Aggregate Results

Stratified Weighting

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Organic Materials	30	Yard Waste - Grass and Leaves	0.7%	1.3%	0.4%	1.2%	
	31	Yard Waste - woody material	0.2%	1.1%	0.0%	0.5%	Yes
	32	Food Waste	18.4%	20.9%	11.7%	26.6%	
	33	Wood Pallets	0.3%	1.2%	0.1%	0.6%	Yes
	34	Treated Wood	0.8%	1.7%	0.4%	1.4%	Yes
	35	Untreated Wood	2.9%	15.7%	0.1%	8.7%	Yes
	36	Diapers	3.4%	5.6%	2.0%	5.4%	
	37	Other Organic Material	2.1%	3.5%	1.3%	3.3%	
		TOTAL ORGANIC MATERIALS	28.8%	22.3%	20.7%	37.9%	
Problem Materials	38	Televisions	0.0%	0.0%	0.0%	0.0%	
	39	Computer Monitors	0.0%	0.0%	0.0%	0.0%	
	40	Computer Equipment/Peripher	0.1%	0.4%	0.0%	0.2%	Yes
	41	Electric and Electronic Products	1.3%	4.3%	0.5%	2.8%	Yes
	42	Batteries	0.1%	0.2%	0.1%	0.2%	Yes
	43	Other	0.0%	0.1%	0.0%	0.0%	Yes
		TOTAL PROBLEM MATERIALS	1.5%	4.3%	0.7%	3.0%	Yes
HHW	44	Latex Paint	0.0%	0.0%	0.0%	0.0%	
	45	Oil Paint	0.0%	0.0%	0.0%	0.0%	Yes
	46	Unused Pesti/Fungi/Herbi-cide	0.0%	0.0%	0.0%	0.0%	Yes
	47	Unused Cleaners and Solvents	0.0%	0.1%	0.0%	0.0%	Yes
	48	Compressed Fuel Containers	0.0%	0.1%	0.0%	0.1%	Yes
	49	Automotive - Antifreeze	0.0%	0.0%	0.0%	0.0%	
	50	Automotive - Used oil.filters	0.2%	0.4%	0.1%	0.3%	Yes
	51	Other	1.0%	4.2%	0.4%	2.2%	Yes
		TOTAL HHW	1.3%	4.5%	0.5%	2.5%	Yes
Other Waste	52	Textiles	2.3%	2.9%	1.5%	3.3%	
	53	Carpet	1.3%	6.7%	0.2%	4.0%	Yes
	54	Sharps and Infectious Waste	0.0%	0.0%	0.0%	0.0%	
	55	Rubber	0.8%	1.3%	0.4%	1.3%	
	56	Construction & Demolition De	3.7%	12.0%	1.1%	7.4%	Yes
	57	Household Bulky Items	0.2%	1.5%	0.0%	0.9%	Yes
	58	Empty HHW Containers	1.3%	5.0%	0.5%	2.6%	Yes
	59	Miscellaneous	7.4%	7.8%	5.2%	10.4%	
		TOTAL OTHER WASTE	17.0%	17.4%	12.2%	22.9%	
TOTAL			100.0%				

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Prairieland MSW Compost Facility

Residential Results

Residential Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Paper	1	Newsprint (ONP)	5.3%	3.7%	2.7%	8.6%	
	2	High Grade Office	1.7%	1.2%	0.7%	2.9%	
	3	Magazines/Catalogs	1.8%	1.5%	0.6%	3.6%	
	4	Uncoated OCC - recyclable	0.7%	0.4%	0.4%	1.1%	
	5	Uncoated OCC - nonrecyclable	0.5%	0.3%	0.3%	0.8%	
	6	Coated OCC	0.0%	0.0%	0.0%	0.0%	
	7	Boxboard	4.2%	1.9%	2.4%	6.3%	
	8	Mixed Paper - recyclable	6.4%	2.4%	4.3%	9.0%	
	9	Mixed Paper - nonrecyclable	12.6%	5.7%	7.6%	18.7%	
		TOTAL PAPER	33.1%	14.1%	21.0%	46.5%	
Plastic	10	PET Bottles/Jars - clear	0.4%	0.4%	0.1%	0.9%	
	11	PET Bottles/Jars - colored	0.1%	0.1%	0.0%	0.2%	
	12	Other PET	0.0%	0.0%	0.0%	0.1%	
	13	HDPE Bottles - natural	0.3%	0.2%	0.1%	0.5%	
	14	HDPE Bottles - colored	0.4%	0.4%	0.1%	0.7%	
	15	PVC	0.0%	0.0%	0.0%	0.1%	
	16	Polystyrene	1.2%	0.5%	0.8%	1.7%	
	17	Film - transport packaging	0.0%	0.0%	0.0%	0.0%	
	18	Other Film	5.6%	2.7%	3.2%	8.5%	
	19	Other Containers	0.3%	0.3%	0.1%	0.6%	
	20	Other non-containers	4.4%	2.8%	2.5%	6.9%	
		TOTAL PLASTIC	12.8%	5.0%	8.6%	17.6%	
Metals	21	Aluminum Beverage Containers	0.4%	0.4%	0.2%	0.8%	
	22	Other Aluminum	0.5%	0.5%	0.2%	1.0%	
	23	Ferrrous Containers	1.1%	0.8%	0.4%	2.0%	
	24	Other Ferrous	1.1%	1.4%	0.3%	2.4%	
	25	Other Non-Ferrous	0.0%	0.0%	0.0%	0.0%	
		TOTAL METALS	3.2%	1.5%	2.1%	4.5%	
Glass	26	Clear Containers	1.1%	0.8%	0.5%	1.7%	
	27	Green Containers	0.2%	0.3%	0.0%	0.6%	
	28	Brown Containers	0.4%	0.6%	0.1%	1.1%	
	29	Other Glass	0.4%	0.4%	0.1%	0.8%	
		TOTAL GLASS	2.0%	1.0%	1.3%	2.9%	

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Prairieland MSW Compost Facility

Residential Results

Residential Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Organic Materials	30	Yard Waste - Grass and Leaves	1.8%	1.4%	0.6%	3.7%	
	31	Yard Waste - woody material	0.0%	0.0%	0.0%	0.0%	
	32	Food Waste	12.6%	6.5%	6.8%	20.0%	
	33	Wood Pallets	0.0%	0.0%	0.0%	0.0%	
	34	Treated Wood	0.7%	1.8%	0.0%	2.3%	Yes
	35	Untreated Wood	0.5%	0.9%	0.1%	1.2%	
	36	Diapers	6.2%	6.7%	2.0%	12.4%	
	37	Other Organic Material	4.5%	4.6%	1.5%	9.0%	
		TOTAL ORGANIC MATERIALS	26.4%	10.7%	18.5%	35.1%	
Problem Materials	38	Televisions	0.0%	0.0%	0.0%	0.0%	
	39	Computer Monitors	0.0%	0.0%	0.0%	0.0%	
	40	Computer Equipment/Peripherals	0.1%	0.2%	0.0%	0.3%	Yes
	41	Electric and Electronic Products	4.2%	9.9%	0.3%	12.2%	Yes
	42	Batteries	0.1%	0.1%	0.0%	0.2%	
	43	Other	0.0%	0.1%	0.0%	0.1%	Yes
		TOTAL PROBLEM MATERIALS	4.4%	9.9%	0.5%	12.0%	Yes
HHW	44	Latex Paint	0.0%	0.0%	0.0%	0.0%	
	45	Oil Paint	0.0%	0.1%	0.0%	0.1%	Yes
	46	Unused Pesti/Fungi/Herbi-cides	0.0%	0.0%	0.0%	0.0%	
	47	Unused Cleaners and Solvents	0.0%	0.0%	0.0%	0.0%	
	48	Compressed Fuel Containers	0.0%	0.0%	0.0%	0.0%	
	49	Automotive - Antifreeze	0.0%	0.0%	0.0%	0.0%	
	50	Automotive - Used oil.filters	0.1%	0.2%	0.0%	0.2%	Yes
	51	Other	0.1%	0.2%	0.0%	0.4%	
		TOTAL HHW	0.2%	0.2%	0.0%	0.5%	
Other Waste	52	Textiles	2.1%	1.4%	0.9%	3.8%	
	53	Carpet	6.3%	15.8%	0.1%	20.9%	Yes
	54	Sharps and Infectious Waste	0.0%	0.0%	0.0%	0.0%	
	55	Rubber	0.5%	0.5%	0.1%	1.0%	
	56	Construction & Demolition Debris	0.5%	0.7%	0.1%	1.4%	
	57	Household Bulky Items	1.4%	3.7%	0.0%	4.9%	Yes
	58	Empty HHW Containers	0.6%	0.9%	0.1%	1.5%	
	59	Miscellaneous	6.5%	4.1%	2.9%	11.5%	
		TOTAL OTHER WASTE	17.9%	15.1%	9.4%	28.6%	
TOTAL			100.0%				

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Prairieland MSW Compost Facility

ICI Results

ICI Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Paper	1	Newsprint (ONP)	3.5%	5.4%	1.3%	6.7%	
	2	High Grade Office	9.6%	26.0%	1.7%	22.8%	Yes
	3	Magazines/Catalogs	2.7%	6.6%	0.8%	5.8%	Yes
	4	Uncoated OCC - recyclable	2.8%	2.7%	1.4%	4.7%	
	5	Uncoated OCC - nonrecyclable	0.3%	0.8%	0.1%	0.7%	Yes
	6	Coated OCC	0.0%	0.0%	0.0%	0.0%	
	7	Boxboard	2.1%	2.0%	1.1%	3.5%	
	8	Mixed Paper - recyclable	2.3%	2.5%	1.1%	4.0%	
	9	Mixed Paper - nonrecyclable	11.1%	9.4%	5.7%	17.9%	
		TOTAL PAPER	34.5%	27.3%	18.9%	52.0%	
Plastic	10	PET Bottles/Jars - clear	0.2%	0.2%	0.1%	0.4%	
	11	PET Bottles/Jars - colored	1.6%	5.5%	0.3%	3.7%	Yes
	12	Other PET	0.0%	0.0%	0.0%	0.0%	Yes
	13	HDPE Bottles - natural	0.2%	0.3%	0.0%	0.3%	Yes
	14	HDPE Bottles - colored	0.1%	0.2%	0.0%	0.2%	Yes
	15	PVC	0.2%	0.6%	0.1%	0.5%	Yes
	16	Polystyrene	1.4%	1.9%	0.6%	2.5%	
	17	Film - transport packaging	0.1%	0.3%	0.0%	0.2%	Yes
	18	Other Film	3.5%	3.2%	1.8%	5.7%	
	19	Other Containers	0.2%	0.4%	0.1%	0.4%	Yes
	20	Other non-containers	2.9%	2.5%	1.7%	4.5%	
		TOTAL PLASTIC	10.3%	8.5%	6.1%	15.4%	
Metals	21	Aluminum Beverage Containers	0.3%	0.3%	0.1%	0.6%	
	22	Other Aluminum	0.3%	0.6%	0.1%	0.5%	Yes
	23	Ferrrous Containers	0.3%	0.4%	0.1%	0.6%	
	24	Other Ferrous	1.0%	1.2%	0.4%	1.8%	
	25	Other Non-Ferrous	0.0%	0.1%	0.0%	0.0%	Yes
		TOTAL METALS	1.9%	1.9%	0.9%	3.1%	
Glass	26	Clear Containers	1.0%	2.0%	0.3%	2.1%	
	27	Green Containers	0.1%	0.3%	0.0%	0.3%	Yes
	28	Brown Containers	0.3%	1.1%	0.1%	0.8%	Yes
	29	Other Glass	0.1%	0.2%	0.0%	0.3%	
		TOTAL GLASS	1.6%	3.0%	0.5%	3.3%	

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Prairieland MSW Compost Facility

ICI Results

ICI Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Organic Materials	30	Yard Waste - Grass and Leaves	0.1%	0.1%	0.0%	0.1%	
	31	Yard Waste - woody material	0.0%	0.0%	0.0%	0.0%	
	32	Food Waste	25.9%	33.0%	10.6%	45.2%	
	33	Wood Pallets	0.2%	0.9%	0.0%	0.6%	Yes
	34	Treated Wood	1.0%	1.5%	0.3%	2.0%	
	35	Untreated Wood	7.7%	26.6%	0.6%	22.0%	Yes
	36	Diapers	1.5%	4.5%	0.3%	3.4%	Yes
	37	Other Organic Material	0.7%	1.7%	0.2%	1.5%	Yes
		TOTAL ORGANIC MATERIALS	37.1%	35.0%	18.2%	58.4%	
Problem Materials	38	Televisions	0.0%	0.0%	0.0%	0.0%	
	39	Computer Monitors	0.0%	0.0%	0.0%	0.0%	
	40	Computer Equipment/Peripherals	0.1%	0.4%	0.0%	0.2%	Yes
	41	Electric and Electronic Products	0.2%	0.5%	0.0%	0.4%	Yes
	42	Batteries	0.1%	0.2%	0.0%	0.1%	Yes
	43	Other	0.0%	0.0%	0.0%	0.0%	
		TOTAL PROBLEM MATERIALS	0.3%	0.6%	0.1%	0.7%	
HHW	44	Latex Paint	0.0%	0.0%	0.0%	0.0%	
	45	Oil Paint	0.0%	0.0%	0.0%	0.0%	
	46	Unused Pesti/Fungi/Herbi-cides	0.0%	0.0%	0.0%	0.0%	
	47	Unused Cleaners and Solvents	0.0%	0.1%	0.0%	0.1%	Yes
	48	Compressed Fuel Containers	0.0%	0.0%	0.0%	0.0%	
	49	Automotive - Antifreeze	0.0%	0.0%	0.0%	0.0%	
	50	Automotive - Used oil.filters	0.3%	0.6%	0.1%	0.6%	Yes
	51	Other	1.6%	6.1%	0.3%	4.2%	Yes
		TOTAL HHW	1.9%	6.6%	0.4%	4.6%	Yes
Other Waste	52	Textiles	2.3%	4.4%	0.8%	4.7%	
	53	Carpet	0.1%	0.3%	0.0%	0.2%	Yes
	54	Sharps and Infectious Waste	0.0%	0.0%	0.0%	0.0%	
	55	Rubber	0.3%	0.5%	0.1%	0.6%	
	56	Construction & Demolition Debris	0.4%	0.7%	0.1%	0.8%	
	57	Household Bulky Items	0.0%	0.0%	0.0%	0.0%	
	58	Empty HHW Containers	2.3%	8.5%	0.4%	5.7%	Yes
	59	Miscellaneous	6.9%	11.2%	2.5%	13.2%	
		TOTAL OTHER WASTE	12.4%	19.1%	4.9%	22.6%	
TOTAL			100.0%				

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Prairieland MSW Compost Facility

Mixed Results

Mixed Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Paper	1	Newsprint (ONP)	4.8%	4.4%	3.3%	6.5%	
	2	High Grade Office	2.6%	3.3%	1.6%	3.7%	
	3	Magazines/Catalogs	2.4%	2.6%	1.5%	3.4%	
	4	Uncoated OCC - recyclable	4.3%	3.2%	2.9%	5.9%	
	5	Uncoated OCC - nonrecyclable	1.1%	3.8%	0.4%	2.2%	Yes
	6	Coated OCC	0.0%	0.0%	0.0%	0.0%	
	7	Boxboard	2.9%	1.3%	2.4%	3.6%	
	8	Mixed Paper - recyclable	5.9%	5.2%	4.3%	7.8%	
	9	Mixed Paper - nonrecyclable	12.3%	6.1%	9.7%	15.1%	
		TOTAL PAPER	36.3%	13.5%	30.6%	42.2%	
Plastic	10	PET Bottles/Jars - clear	0.4%	0.3%	0.3%	0.6%	
	11	PET Bottles/Jars - colored	0.2%	0.2%	0.1%	0.3%	
	12	Other PET	0.0%	0.1%	0.0%	0.1%	Yes
	13	HDPE Bottles - natural	0.4%	0.4%	0.2%	0.6%	
	14	HDPE Bottles - colored	0.2%	0.2%	0.1%	0.3%	
	15	PVC	0.1%	0.2%	0.0%	0.1%	Yes
	16	Polystyrene	1.0%	0.6%	0.8%	1.3%	
	17	Film - transport packaging	0.1%	0.3%	0.0%	0.3%	Yes
	18	Other Film	4.5%	2.4%	3.5%	5.6%	
	19	Other Containers	0.5%	0.6%	0.3%	0.7%	
	20	Other non-containers	3.7%	1.6%	3.1%	4.3%	
		TOTAL PLASTIC	11.1%	3.8%	9.6%	12.7%	
Metals	21	Aluminum Beverage Containers	0.6%	0.5%	0.4%	0.8%	
	22	Other Aluminum	0.5%	0.3%	0.4%	0.6%	
	23	Ferrrous Containers	1.5%	1.1%	1.1%	2.0%	
	24	Other Ferrous	1.5%	1.6%	0.9%	2.3%	
	25	Other Non-Ferrous	0.2%	0.9%	0.1%	0.5%	Yes
		TOTAL METALS	4.3%	2.1%	3.4%	5.4%	
Glass	26	Clear Containers	1.3%	1.4%	0.7%	2.0%	
	27	Green Containers	0.1%	0.3%	0.0%	0.2%	Yes
	28	Brown Containers	0.4%	0.7%	0.2%	0.7%	
	29	Other Glass	0.4%	0.8%	0.2%	0.7%	Yes
		TOTAL GLASS	2.2%	2.2%	1.3%	3.2%	

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
Prairieland MSW Compost Facility

Mixed Results

Mixed Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Organic Materials	30	Yard Waste - Grass and Leaves	0.8%	1.6%	0.3%	1.4%	Yes
	31	Yard Waste - woody material	0.4%	1.7%	0.1%	0.9%	Yes
	32	Food Waste	14.9%	10.2%	11.2%	19.1%	
	33	Wood Pallets	0.4%	1.6%	0.1%	0.8%	Yes
	34	Treated Wood	0.7%	1.8%	0.3%	1.4%	Yes
	35	Untreated Wood	0.3%	0.6%	0.2%	0.6%	
	36	Diapers	3.8%	5.9%	2.0%	6.3%	
	37	Other Organic Material	2.2%	3.9%	1.2%	3.6%	
		TOTAL ORGANIC MATERIALS	23.6%	10.0%	19.6%	27.8%	
Problem Materials	38	Televisions	0.0%	0.0%	0.0%	0.0%	
	39	Computer Monitors	0.0%	0.0%	0.0%	0.0%	
	40	Computer Equipment/Peripherals	0.1%	0.4%	0.0%	0.3%	Yes
	41	Electric and Electronic Products	1.1%	1.7%	0.5%	1.9%	
	42	Batteries	0.1%	0.2%	0.1%	0.2%	
	43	Other	0.0%	0.1%	0.0%	0.1%	Yes
		TOTAL PROBLEM MATERIALS	1.3%	1.9%	0.7%	2.2%	
HHW	44	Latex Paint	0.0%	0.0%	0.0%	0.0%	
	45	Oil Paint	0.0%	0.0%	0.0%	0.0%	
	46	Unused Pesti/Fungi/Herbi-cides	0.0%	0.0%	0.0%	0.0%	Yes
	47	Unused Cleaners and Solvents	0.0%	0.0%	0.0%	0.0%	Yes
	48	Compressed Fuel Containers	0.0%	0.2%	0.0%	0.1%	Yes
	49	Automotive - Antifreeze	0.0%	0.0%	0.0%	0.0%	
	50	Automotive - Used oil.filters	0.1%	0.3%	0.0%	0.2%	Yes
	51	Other	1.0%	3.1%	0.3%	2.1%	Yes
		TOTAL HHW	1.1%	3.1%	0.4%	2.3%	Yes
Other Waste	52	Textiles	2.3%	1.5%	1.7%	3.0%	
	53	Carpet	0.4%	1.5%	0.1%	0.8%	Yes
	54	Sharps and Infectious Waste	0.0%	0.0%	0.0%	0.0%	
	55	Rubber	1.2%	1.8%	0.6%	2.1%	
	56	Construction & Demolition Debris	7.3%	17.4%	2.7%	14.0%	Yes
	57	Household Bulky Items	0.0%	0.0%	0.0%	0.0%	Yes
	58	Empty HHW Containers	0.7%	0.8%	0.4%	1.1%	
	59	Miscellaneous	8.1%	5.5%	5.9%	10.6%	
		TOTAL OTHER WASTE	20.1%	16.9%	14.1%	26.8%	
TOTAL			100.0%				

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
St. Louis County Landfill

Aggregate Results

Stratified Weighting

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Paper	1	Newsprint (ONP)	3.6%	4.1%	2.6%	4.7%	
	2	High Grade Office	2.0%	3.0%	1.3%	2.8%	
	3	Magazines/Catalogs	2.3%	2.2%	1.7%	3.1%	
	4	Uncoated OCC - recyclable	4.0%	5.0%	2.8%	5.4%	
	5	Uncoated OCC - nonrecyclabl	0.3%	0.6%	0.2%	0.6%	
	6	Coated OCC	0.2%	0.8%	0.1%	0.3%	Yes
	7	Boxboard	2.2%	1.3%	1.8%	2.8%	
	8	Mixed Paper - recyclable	5.1%	3.8%	4.0%	6.5%	
	9	Mixed Paper - nonrecyclable	9.3%	6.7%	7.3%	12.0%	
		TOTAL PAPER	29.0%	13.0%	24.9%	33.3%	
Plastic	10	PET Bottles/Jars - clear	0.4%	0.4%	0.3%	0.6%	
	11	PET Bottles/Jars - colored	0.1%	0.2%	0.1%	0.2%	
	12	Other PET	0.1%	0.1%	0.0%	0.1%	Yes
	13	HDPE Bottles - natural	0.3%	0.3%	0.2%	0.4%	
	14	HDPE Bottles - colored	0.3%	0.4%	0.2%	0.4%	
	15	PVC	0.1%	0.2%	0.0%	0.1%	Yes
	16	Polystyrene	0.7%	0.6%	0.5%	0.9%	
	17	Film - transport packaging	0.2%	0.7%	0.1%	0.4%	Yes
	18	Other Film	4.0%	3.1%	3.1%	5.2%	
	19	Other Containers	0.3%	0.4%	0.2%	0.5%	
	20	Other non-containers	5.1%	6.3%	3.7%	7.0%	
		TOTAL PLASTIC	11.5%	7.7%	9.6%	13.9%	
Metals	21	Aluminum Beverage Container	0.9%	1.4%	0.6%	1.3%	
	22	Other Aluminum	0.5%	1.1%	0.3%	0.7%	Yes
	23	Ferrrous Containers	1.0%	0.8%	0.7%	1.3%	
	24	Other Ferrous	5.1%	9.2%	2.9%	8.4%	
	25	Other Non-Ferrous	0.2%	0.6%	0.1%	0.3%	Yes
		TOTAL METALS	7.6%	8.9%	5.4%	10.5%	
Glass	26	Clear Containers	1.5%	1.7%	1.0%	2.2%	
	27	Green Containers	0.4%	0.9%	0.2%	0.8%	
	28	Brown Containers	0.2%	0.5%	0.1%	0.4%	Yes
	29	Other Glass	0.5%	1.3%	0.3%	0.8%	Yes
		TOTAL GLASS	2.7%	3.0%	1.9%	3.8%	

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
St. Louis County Landfill

Aggregate Results

Stratified Weighting

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Organic Materials	30	Yard Waste - Grass and Leaves	1.7%	4.1%	0.9%	3.0%	Yes
	31	Yard Waste - woody material	0.0%	0.0%	0.0%	0.0%	Yes
	32	Food Waste	12.1%	9.9%	9.1%	16.1%	
	33	Wood Pallets	0.5%	2.4%	0.1%	1.4%	Yes
	34	Treated Wood	2.3%	5.0%	1.2%	4.1%	Yes
	35	Untreated Wood	0.9%	2.0%	0.3%	1.8%	Yes
	36	Diapers	1.8%	2.7%	1.1%	2.7%	
	37	Other Organic Material	0.8%	1.1%	0.5%	1.1%	
		TOTAL ORGANIC MATERIALS	20.0%	10.9%	16.5%	24.0%	
Problem Materials	38	Televisions	0.0%	0.0%	0.0%	0.0%	
	39	Computer Monitors	0.0%	0.0%	0.0%	0.0%	
	40	Computer Equipment/Peripher	0.0%	0.0%	0.0%	0.0%	
	41	Electric and Electronic Products	3.2%	9.7%	1.6%	5.7%	Yes
	42	Batteries	0.1%	0.2%	0.1%	0.1%	Yes
	43	Other	0.0%	0.0%	0.0%	0.0%	Yes
		TOTAL PROBLEM MATERIALS	3.3%	9.7%	1.7%	5.7%	Yes
HHW	44	Latex Paint	0.1%	0.5%	0.0%	0.3%	Yes
	45	Oil Paint	0.0%	0.0%	0.0%	0.0%	Yes
	46	Unused Pesti/Fungi/Herbi-cide	0.0%	0.0%	0.0%	0.0%	
	47	Unused Cleaners and Solvents	0.0%	0.2%	0.0%	0.1%	Yes
	48	Compressed Fuel Containers	0.0%	0.0%	0.0%	0.0%	
	49	Automotive - Antifreeze	0.1%	0.4%	0.0%	0.2%	Yes
	50	Automotive - Used oil.filters	0.1%	0.5%	0.1%	0.3%	Yes
	51	Other	0.8%	2.4%	0.4%	1.5%	Yes
		TOTAL HHW	1.1%	3.1%	0.6%	2.1%	Yes
Other Waste	52	Textiles	4.3%	5.2%	3.0%	5.8%	
	53	Carpet	2.3%	6.0%	1.1%	4.3%	Yes
	54	Sharps and Infectious Waste	0.0%	0.0%	0.0%	0.0%	
	55	Rubber	0.6%	0.9%	0.4%	0.9%	
	56	Construction & Demolition De	4.0%	9.4%	2.2%	6.9%	Yes
	57	Household Bulky Items	5.6%	15.1%	2.7%	10.0%	Yes
	58	Empty HHW Containers	0.6%	0.9%	0.4%	0.9%	
	59	Miscellaneous	7.3%	7.5%	5.3%	9.8%	
		TOTAL OTHER WASTE	24.8%	16.8%	20.0%	29.9%	
TOTAL			100.0%				

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
St. Louis County Landfill

Residential Results

Residential Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Paper	1	Newsprint (ONP)	3.3%	3.3%	1.8%	5.2%	
	2	High Grade Office	0.5%	0.5%	0.2%	0.9%	
	3	Magazines/Catalogs	1.3%	1.6%	0.4%	2.7%	
	4	Uncoated OCC - recyclable	1.5%	3.0%	0.5%	3.0%	Yes
	5	Uncoated OCC - nonrecyclable	0.3%	0.4%	0.1%	0.6%	
	6	Coated OCC	0.0%	0.0%	0.0%	0.0%	
	7	Boxboard	1.8%	1.5%	0.8%	3.2%	
	8	Mixed Paper - recyclable	4.1%	3.0%	2.1%	6.7%	
	9	Mixed Paper - nonrecyclable	7.8%	7.5%	3.2%	14.2%	
		TOTAL PAPER	20.5%	11.1%	14.3%	27.6%	
Plastic	10	PET Bottles/Jars - clear	0.4%	0.4%	0.1%	0.8%	
	11	PET Bottles/Jars - colored	0.1%	0.1%	0.0%	0.1%	
	12	Other PET	0.0%	0.1%	0.0%	0.1%	Yes
	13	HDPE Bottles - natural	0.3%	0.3%	0.1%	0.5%	
	14	HDPE Bottles - colored	0.3%	0.4%	0.1%	0.6%	
	15	PVC	0.0%	0.1%	0.0%	0.1%	
	16	Polystyrene	0.6%	0.6%	0.2%	1.0%	
	17	Film - transport packaging	0.3%	0.9%	0.0%	0.8%	Yes
	18	Other Film	3.3%	3.2%	1.4%	6.1%	
	19	Other Containers	0.5%	0.6%	0.2%	0.9%	
	20	Other non-containers	6.1%	9.6%	2.7%	10.9%	
		TOTAL PLASTIC	11.9%	8.9%	7.6%	17.0%	
Metals	21	Aluminum Beverage Containers	1.0%	1.3%	0.3%	1.9%	
	22	Other Aluminum	0.3%	0.3%	0.2%	0.6%	
	23	Ferrrous Containers	1.2%	0.9%	0.5%	2.1%	
	24	Other Ferrous	6.8%	12.0%	2.2%	13.5%	
	25	Other Non-Ferrous	0.3%	1.0%	0.0%	0.9%	Yes
		TOTAL METALS	9.6%	11.1%	5.1%	15.3%	
Glass	26	Clear Containers	2.4%	2.6%	0.9%	4.6%	
	27	Green Containers	0.6%	1.2%	0.1%	1.5%	
	28	Brown Containers	0.5%	0.9%	0.1%	1.2%	
	29	Other Glass	0.4%	0.4%	0.2%	0.8%	
		TOTAL GLASS	4.0%	4.2%	1.6%	7.4%	

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
St. Louis County Landfill

Residential Results

Residential Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Organic Materials	30	Yard Waste - Grass and Leaves	1.0%	2.6%	0.2%	2.5%	Yes
	31	Yard Waste - woody material	0.0%	0.0%	0.0%	0.0%	
	32	Food Waste	13.8%	12.7%	5.6%	24.9%	
	33	Wood Pallets	0.0%	0.0%	0.0%	0.0%	
	34	Treated Wood	4.7%	7.7%	1.2%	10.4%	
	35	Untreated Wood	0.1%	0.1%	0.0%	0.1%	
	36	Diapers	2.1%	3.1%	0.6%	4.6%	
	37	Other Organic Material	1.0%	1.7%	0.3%	2.1%	
		TOTAL ORGANIC MATERIALS	22.7%	14.1%	13.8%	33.1%	
Problem Materials	38	Televisions	0.0%	0.0%	0.0%	0.0%	
	39	Computer Monitors	0.0%	0.0%	0.0%	0.0%	
	40	Computer Equipment/Peripherals	0.0%	0.0%	0.0%	0.0%	
	41	Electric and Electronic Products	5.2%	14.8%	0.8%	13.1%	Yes
	42	Batteries	0.1%	0.1%	0.0%	0.2%	
	43	Other	0.0%	0.1%	0.0%	0.1%	Yes
		TOTAL PROBLEM MATERIALS	5.3%	14.8%	0.9%	13.0%	Yes
HHW	44	Latex Paint	0.0%	0.0%	0.0%	0.0%	
	45	Oil Paint	0.0%	0.0%	0.0%	0.0%	Yes
	46	Unused Pesti/Fungi/Herbi-cides	0.0%	0.0%	0.0%	0.0%	
	47	Unused Cleaners and Solvents	0.1%	0.3%	0.0%	0.2%	Yes
	48	Compressed Fuel Containers	0.0%	0.0%	0.0%	0.0%	
	49	Automotive - Antifreeze	0.0%	0.0%	0.0%	0.0%	
	50	Automotive - Used oil.filters	0.2%	0.5%	0.0%	0.6%	Yes
	51	Other	0.5%	1.3%	0.1%	1.2%	Yes
		TOTAL HHW	0.8%	1.3%	0.2%	1.6%	
Other Waste	52	Textiles	4.8%	4.0%	2.5%	7.8%	
	53	Carpet	4.2%	9.4%	0.6%	10.9%	Yes
	54	Sharps and Infectious Waste	0.0%	0.0%	0.0%	0.0%	
	55	Rubber	0.3%	0.3%	0.1%	0.6%	
	56	Construction & Demolition Debris	1.7%	5.3%	0.2%	4.5%	Yes
	57	Household Bulky Items	7.2%	12.6%	1.5%	16.6%	
	58	Empty HHW Containers	0.9%	1.3%	0.4%	1.6%	
	59	Miscellaneous	6.1%	5.2%	3.2%	9.8%	
		TOTAL OTHER WASTE	25.1%	17.0%	16.2%	35.2%	
TOTAL			100.0%				

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
St. Louis County Landfill

ICI Results

ICI Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Paper	1	Newsprint (ONP)	0.8%	1.0%	0.2%	1.8%	
	2	High Grade Office	1.2%	1.7%	0.3%	2.8%	
	3	Magazines/Catalogs	1.3%	2.5%	0.2%	3.4%	
	4	Uncoated OCC - recyclable	8.4%	10.1%	3.7%	14.8%	
	5	Uncoated OCC - nonrecyclable	0.6%	1.4%	0.1%	1.6%	Yes
	6	Coated OCC	0.4%	1.0%	0.0%	1.1%	Yes
	7	Boxboard	1.5%	1.1%	0.7%	2.6%	
	8	Mixed Paper - recyclable	3.5%	4.4%	1.1%	7.1%	
	9	Mixed Paper - nonrecyclable	7.2%	9.3%	2.0%	15.3%	
		TOTAL PAPER	25.0%	14.2%	16.3%	34.9%	
Plastic	10	PET Bottles/Jars - clear	0.3%	0.5%	0.1%	0.7%	
	11	PET Bottles/Jars - colored	0.1%	0.1%	0.0%	0.2%	
	12	Other PET	0.0%	0.0%	0.0%	0.0%	
	13	HDPE Bottles - natural	0.0%	0.1%	0.0%	0.1%	Yes
	14	HDPE Bottles - colored	0.2%	0.6%	0.0%	0.6%	Yes
	15	PVC	0.2%	0.5%	0.0%	0.5%	Yes
	16	Polystyrene	0.5%	1.0%	0.1%	1.2%	
	17	Film - transport packaging	0.3%	0.7%	0.0%	0.8%	Yes
	18	Other Film	5.3%	5.4%	2.1%	9.8%	
	19	Other Containers	0.1%	0.1%	0.0%	0.2%	
	20	Other non-containers	7.7%	9.3%	2.7%	14.8%	
		TOTAL PLASTIC	14.6%	13.3%	7.7%	23.2%	
Metals	21	Aluminum Beverage Containers	1.1%	2.7%	0.2%	2.7%	Yes
	22	Other Aluminum	0.3%	0.5%	0.1%	0.7%	
	23	Ferrrous Containers	0.3%	0.7%	0.0%	0.8%	Yes
	24	Other Ferrous	12.2%	16.3%	3.0%	26.5%	
	25	Other Non-Ferrous	0.1%	0.2%	0.0%	0.2%	Yes
		TOTAL METALS	14.0%	15.5%	5.0%	26.4%	
Glass	26	Clear Containers	0.3%	0.5%	0.1%	0.7%	
	27	Green Containers	0.0%	0.0%	0.0%	0.0%	Yes
	28	Brown Containers	0.1%	0.3%	0.0%	0.3%	Yes
	29	Other Glass	0.2%	0.3%	0.0%	0.4%	
		TOTAL GLASS	0.6%	0.8%	0.1%	1.3%	

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
St. Louis County Landfill

ICI Results

ICI Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Organic Materials	30	Yard Waste - Grass and Leaves	3.5%	5.5%	0.5%	8.8%	
	31	Yard Waste - woody material	0.0%	0.0%	0.0%	0.0%	
	32	Food Waste	9.6%	12.2%	2.4%	20.7%	
	33	Wood Pallets	2.5%	5.7%	0.2%	7.1%	Yes
	34	Treated Wood	3.4%	6.6%	0.5%	8.8%	
	35	Untreated Wood	3.7%	4.6%	0.8%	8.5%	
	36	Diapers	0.2%	0.5%	0.0%	0.6%	Yes
	37	Other Organic Material	0.4%	0.7%	0.1%	1.0%	
		TOTAL ORGANIC MATERIALS	23.2%	13.9%	14.2%	33.5%	
Problem Materials	38	Televisions	0.0%	0.0%	0.0%	0.0%	
	39	Computer Monitors	0.0%	0.0%	0.0%	0.0%	
	40	Computer Equipment/Peripherals	0.0%	0.0%	0.0%	0.0%	
	41	Electric and Electronic Products	0.5%	1.1%	0.1%	1.3%	Yes
	42	Batteries	0.0%	0.1%	0.0%	0.1%	Yes
	43	Other	0.0%	0.0%	0.0%	0.0%	
		TOTAL PROBLEM MATERIALS	0.6%	1.1%	0.1%	1.3%	
HHW	44	Latex Paint	0.5%	1.2%	0.0%	1.4%	Yes
	45	Oil Paint	0.0%	0.0%	0.0%	0.0%	
	46	Unused Pesti/Fungi/Herbi-cides	0.0%	0.0%	0.0%	0.0%	
	47	Unused Cleaners and Solvents	0.0%	0.0%	0.0%	0.0%	
	48	Compressed Fuel Containers	0.0%	0.0%	0.0%	0.0%	
	49	Automotive - Antifreeze	0.3%	0.9%	0.0%	1.0%	Yes
	50	Automotive - Used oil.filters	0.0%	0.0%	0.0%	0.0%	Yes
	51	Other	1.4%	4.1%	0.1%	4.2%	Yes
		TOTAL HHW	2.2%	6.2%	0.2%	6.4%	Yes
Other Waste	52	Textiles	2.0%	2.2%	0.7%	3.8%	
	53	Carpet	2.3%	5.2%	0.2%	6.6%	Yes
	54	Sharps and Infectious Waste	0.0%	0.0%	0.0%	0.0%	
	55	Rubber	0.6%	0.7%	0.1%	1.2%	
	56	Construction & Demolition Debris	7.0%	12.9%	1.0%	17.8%	
	57	Household Bulky Items	2.4%	5.0%	0.2%	6.6%	Yes
	58	Empty HHW Containers	0.3%	0.3%	0.1%	0.6%	
	59	Miscellaneous	5.5%	10.3%	0.9%	13.6%	
		TOTAL OTHER WASTE	19.9%	14.0%	11.3%	30.3%	
TOTAL			100.0%				

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
St. Louis County Landfill

Mixed Results

Mixed Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Paper	1	Newsprint (ONP)	4.5%	4.9%	3.3%	6.0%	
	2	High Grade Office	2.7%	3.8%	1.8%	3.9%	
	3	Magazines/Catalogs	2.9%	2.3%	2.2%	3.7%	
	4	Uncoated OCC - recyclable	3.5%	2.8%	2.6%	4.5%	
	5	Uncoated OCC - nonrecyclable	0.3%	0.3%	0.2%	0.4%	
	6	Coated OCC	0.2%	0.9%	0.1%	0.3%	Yes
	7	Boxboard	2.6%	1.3%	2.1%	3.1%	
	8	Mixed Paper - recyclable	6.0%	3.8%	4.8%	7.4%	
	9	Mixed Paper - nonrecyclable	10.5%	5.3%	8.7%	12.6%	
		TOTAL PAPER	33.2%	13.3%	28.6%	38.1%	
Plastic	10	PET Bottles/Jars - clear	0.5%	0.4%	0.4%	0.6%	
	11	PET Bottles/Jars - colored	0.2%	0.2%	0.1%	0.3%	
	12	Other PET	0.1%	0.2%	0.0%	0.1%	Yes
	13	HDPE Bottles - natural	0.3%	0.2%	0.3%	0.4%	
	14	HDPE Bottles - colored	0.3%	0.3%	0.2%	0.4%	
	15	PVC	0.0%	0.1%	0.0%	0.1%	
	16	Polystyrene	0.7%	0.4%	0.6%	0.9%	
	17	Film - transport packaging	0.2%	0.5%	0.1%	0.3%	Yes
	18	Other Film	3.9%	1.9%	3.2%	4.6%	
	19	Other Containers	0.4%	0.4%	0.3%	0.5%	
	20	Other non-containers	3.9%	2.5%	3.2%	4.7%	
		TOTAL PLASTIC	10.5%	4.2%	9.1%	12.0%	
Metals	21	Aluminum Beverage Containers	0.8%	0.7%	0.6%	1.0%	
	22	Other Aluminum	0.6%	1.4%	0.4%	0.9%	Yes
	23	Ferrrous Containers	1.1%	0.7%	0.9%	1.4%	
	24	Other Ferrous	2.3%	2.9%	1.5%	3.3%	
	25	Other Non-Ferrous	0.1%	0.4%	0.1%	0.3%	Yes
		TOTAL METALS	5.0%	3.9%	4.0%	6.1%	
Glass	26	Clear Containers	1.6%	1.6%	1.1%	2.1%	
	27	Green Containers	0.5%	0.9%	0.3%	0.8%	
	28	Brown Containers	0.1%	0.3%	0.1%	0.2%	Yes
	29	Other Glass	0.6%	1.7%	0.4%	1.0%	Yes
		TOTAL GLASS	2.9%	2.9%	2.1%	3.7%	

SOLID WASTE MANAGEMENT COORDINATING BOARD
MSW Composition Study
St. Louis County Landfill

Mixed Results

Mixed Composition

		Material Categories	Average	Standard Deviation	Lower Bound	Upper Bound	Outlier Samples
Organic Materials	30	Yard Waste - Grass and Leaves	1.4%	4.2%	0.7%	2.4%	Yes
	31	Yard Waste - woody material	0.0%	0.0%	0.0%	0.0%	Yes
	32	Food Waste	12.3%	7.7%	9.8%	14.9%	
	33	Wood Pallets	0.1%	0.5%	0.0%	0.2%	Yes
	34	Treated Wood	1.1%	2.5%	0.5%	1.8%	Yes
	35	Untreated Wood	0.3%	0.6%	0.2%	0.5%	
	36	Diapers	2.1%	2.9%	1.3%	3.1%	
	37	Other Organic Material	0.8%	0.9%	0.5%	1.1%	
		TOTAL ORGANIC MATERIALS	18.1%	8.2%	15.2%	21.2%	
Problem Materials	38	Televisions	0.0%	0.0%	0.0%	0.0%	
	39	Computer Monitors	0.0%	0.0%	0.0%	0.0%	
	40	Computer Equipment/Peripherals	0.0%	0.0%	0.0%	0.0%	
	41	Electric and Electronic Products	3.2%	8.7%	1.6%	5.4%	Yes
	42	Batteries	0.1%	0.2%	0.1%	0.2%	Yes
	43	Other	0.0%	0.0%	0.0%	0.0%	
		TOTAL PROBLEM MATERIALS	3.3%	8.6%	1.7%	5.5%	Yes
HHW	44	Latex Paint	0.0%	0.0%	0.0%	0.0%	
	45	Oil Paint	0.0%	0.0%	0.0%	0.0%	Yes
	46	Unused Pesti/Fungi/Herbi-cides	0.0%	0.0%	0.0%	0.0%	
	47	Unused Cleaners and Solvents	0.0%	0.1%	0.0%	0.1%	Yes
	48	Compressed Fuel Containers	0.0%	0.0%	0.0%	0.0%	
	49	Automotive - Antifreeze	0.0%	0.0%	0.0%	0.0%	
	50	Automotive - Used oil.filters	0.1%	0.6%	0.1%	0.3%	Yes
	51	Other	0.7%	1.9%	0.3%	1.3%	Yes
		TOTAL HHW	0.9%	2.0%	0.4%	1.6%	Yes
Other Waste	52	Textiles	4.8%	6.1%	3.3%	6.6%	
	53	Carpet	1.5%	4.4%	0.7%	2.7%	Yes
	54	Sharps and Infectious Waste	0.0%	0.0%	0.0%	0.0%	
	55	Rubber	0.8%	1.1%	0.5%	1.2%	
	56	Construction & Demolition Debris	4.0%	9.3%	2.1%	6.6%	Yes
	57	Household Bulky Items	6.0%	17.8%	2.4%	11.1%	Yes
	58	Empty HHW Containers	0.7%	0.8%	0.4%	1.0%	
	59	Miscellaneous	8.2%	7.3%	6.1%	10.7%	
		TOTAL OTHER WASTE	26.1%	17.5%	20.7%	31.8%	
TOTAL			100.0%				

APPENDIX F
STATISTICAL MEASURES

STATISTICAL PRINCIPLES FOR USE IN APPLYING THE MSW COMPOSITION ANALYSES

Due to the variability of solid waste materials, estimates of solid waste composition are only approximate in nature. Similar to the methods used by statisticians in conducting opinion polls, for example, limited samples of solid waste must be used to describe the characteristics of the entire "population." While it may be desirable to sort every load of solid waste delivered to a facility in order to determine the "exact" composition of the waste stream, usually the entire quantity of solid waste being generated cannot be economically or practically sorted. Therefore, a representative sampling method must be used to obtain study samples and these samples must be analyzed to estimate the composition of the entire waste stream.

Sampling methods for characterizing solid waste have evolved significantly since the early 1970's. Today, the industry offers mathematically advanced, yet practical and economically viable techniques to characterize solid waste.

The terms that are most commonly used to characterize solid waste (and terms used in the solid waste composition analyses throughout this Report) are the "mean," the "confidence interval" and the "level of confidence." The mean is simply the mathematical average. Explanations of the confidence interval and the level of confidence require further discussion.

The confidence interval is an expression of statistical accuracy. It provides the upper and lower limits of the "actual" population mean based on the sampled mean and variance of the observed sampled data. For example, sample mean for the material category newspaper may be 5 percent for a certain generator, with a confidence interval of 4 percent to 6 percent. This implies that the true population mean for paper is between 4 percent and 6 percent.

Given the limited sample size used in calculating the mean, it is also important to know how much confidence we have that the true population mean does, in fact, fall within the 4 percent to 6 percent range. The term used to qualify the amount of confidence we have is the "level of confidence," an expression of how certain we are that the true mean falls within the stated confidence interval. For example, if the level of confidence is 90 percent, we are 90 percent certain that the true population mean is within the stated confidence interval. Combining the terms confidence interval and level of confidence, we use the phrase "90 percent confidence interval." Applying this term to the previous example, we would be

90 percent certain that the true population mean would fall within the 4 percent to 6 percent range.

Other levels of confidence could be calculated, such as 80 percent or 95 percent, for example. However, the 90 percent level of confidence has been accepted as standard practice in solid waste composition studies by the industry. Further, the level of confidence and the confidence interval have an inverse relationship. For example, for an 80 percent level of confidence, the confidence interval will be narrower than if the level of confidence were 90 percent. For the 95 percent level of confidence, the confidence interval will be wider than for a 90 percent level of confidence.

In general, the more samples that are sorted, the narrower the confidence interval becomes for any given level of confidence. Again using the example above, assume that the 90 percent confidence intervals were originally calculated based on 25 samples. It may be that if we sort 40 samples, the 90 percent confidence interval would be narrowed to a 4.5 percent to 5.5 percent range with an associated mean of 5 percent.

An additional statistical principle discussed in this report includes "representativeness." Statistically, results are considered "representative" when samples are collected from a representative sample of facilities within a region rather than a relatively small non-representative number of facilities. For example, the data collected from the five Metropolitan Region facilities is considered representative of the area's waste stream. A total of 249 samples were sorted from facilities with a throughput representing approximately 72% of the Metropolitan Region's tonnage. In addition, the Region's samples were well distributed between the residential and ICI sectors, with a relatively small number of mixed waste samples. However, "representativeness" becomes a concern in assessing the Greater Minnesota results. The three facilities that participated in the study overall manage less than 9% of the waste in the Greater Minnesota area. Further, more than 60% of the samples were from mixed waste loads. Thus, residential and ICI samples were underrepresented.

Finally, the term "outlier" refers to individual samples that have uncharacteristic or extreme material composition. Sample variability is common among ICI and mixed samples, but is less common in residential samples. For example, it is common to find approximately 5% newsprint in any one sorted residential sample. However, a load may be selected and sorted that contains 50% newsprint. Statistically speaking, the residential load that contains 50% newsprint would be considered an "outlier."