Waukesha County Recycling System and Capacity Study
Final Report

***Presented to*:**

Waukesha County

***Prepared by*:**

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WAUKESHA COUNTY RECYCLING SYSTEM & CAPACITY STUDY

Table of Contents

			Page
		Executive Summary	1
		Introduction	4
Section 1		**Future Population and Recyclables Projections**	6
1.a		Population as Basis for Recycling Quantities	6
1.b		Historical Recycling Collection Data	17
	1.b.1	Recycling Data for Participating Municipalities	17
	1.b.2	Recycling Data for Non-Participating Municipalities	20
1.c		Analysis of Composition of Recycling Stream	22
1.d		Conclusions	36
Section 2		**Comparative Analysis of Dual and Single Stream Recycling Systems**	37
2.a		Overview of Current Collection Systems for Participating and Non-Participating Municipalities	37
2.b		Dual Stream vs. Single Stream Collection Attributes	38
2.c		Illustrative Collection Cost and Performance Element Comparison	40
2.d		Literature and Program Review	41
2.e		Examine the Processing Component of Dual Stream vs. Single Stream MRF Systems (Pros and Cons)	43
2.f		Comparison of Recyclables Generation Quantities for Dual Stream vs. Single Stream Municipalities in the County	46
2.g		Conclusions	47
2.h		Basis for Future MRF Sizing	48
Section 3		**Single and Dual Stream Cost Analysis**	49
3.a		Existing Facility Capacity and Costs	49
	3.a.1	Existing Facility Description and Operations	49
	3.a.2	Existing Facility Capacity and Costs	50
	3.a.3	Expansion of Existing Facility	53
	3.a.4	Conclusions	58
3.b		New Facility Dual and Single Stream Capacity and Cost Analysis	59
	3.b.1	New Facility Dual and Single Stream Operating Costs	61
	3.b.2	New Facility Dual and Single Stream Expected Revenues	64
	3.b.3	New Facility Dual and Single Stream Capital Costs	67
	3.b.4	New Facility Dual and Single Stream Cost Benefit Analysis	67
3.c		Single Stream Collection Savings	69
3.d		Single Stream Curbside Cart Requirements and Costs	72
3.e		Summary of Savings	72
3.f		Dual and Single Stream Process Flow	76

		Page
Section 4	**Metro-Wide Review of Landfill and MRF Capacity**	77
4.a	Landfill Capacity	77
4.b	Recycling Capacity and Costs	78
4.c	Regional Options	82
Section 5	**Project Summary and Recommendations**	84 - 98

Appendix

A. Municipal Survey
B. Case Studies
C. Preliminary Meeting with Stakeholders Summary
D. Workshop with Stakeholders on Contracting
E. Letters from Private MRF Operators
F. Facility Operating Cost Spreadsheets
G. Facility Descriptions & Drawings

WAUKESHA COUNTY RECYCLING SYSTEM & CAPACITY STUDY

Executive Summary

RRT Design & Construction and Gershman, Brickner & Bratton, Inc., the Project Team, were directed by Waukesha County to evaluate the existing Waukesha County Recycling System including the existing Dual Stream Materials Recycling Facility (MRF) and recycling program with respect to capacity, participation, and costs associated with expanding the existing facility or building a new Single or Dual Stream Recycling Facility.

Dual Stream is defined as collection of residentially generated fibers (paper and cardboard) and commingled containers (plastic, glass, and metal bottles and cans) in separate compartments of a two compartment vehicle. Single Stream is defined as commingled collection of residentially generated fiber and containers in a non compartmentalized vehicle.

For purposes of the study and financial modeling, the Project Team identified three categories of potential users of the current systems, or any potential future system, as follows:

1. Participating Municipalities—Those municipalities within the County currently using the existing Dual Stream Materials Recycling Facility (MRF) as members of the County Responsible Unit under Wisconsin law;
2. Non-Participating Municipalities---Those Municipalities within the County currently not using the existing Dual Stream Materials Recycling Facility (MRF) that act as individual Responsible Units; and
3. The Cities of Wauwatosa and Milwaukee.

The Project Team additionally looked at the concept of a regional MRF that can support the future recycling activities of all three categories.

Section 1 Future Population and Recyclables Projections
This section presents a base line of historical and current recycling activities of the Participating and Non-Participating Municipalities. Using Wisconsin Department of Administration population projections as its basis, recycling rates are projected for the years 2010, 2015, 2020 and 2025. Tables 3-3 and 3-4 summarize the number of projected tons under both Dual Stream and Single Stream scenarios for the various categories of potential users. In addition, changes to the composition of recycling streams are evaluated in conjunction with changes in packaging and other economic factors.

Section 2 Comparative Analysis of Dual and Single Stream Recycling Systems
This section presents a comparative study of the pros and cons of Single Stream and Dual Stream recycling systems from both a curbside collection and materials processing point of view. Single Stream collection can save as much as $30 per ton when compared to Dual Stream collection. Based on other programs in the county, state, and nationally, the movement from Dual Stream to Single Stream systems has increased the amount of material recycled per household by up to 30%. However the increase is partially offset by an increase in the amount contamination found in Single Stream recyclables that requires landfilling. For purposes of economic modeling, the study assumes an increase in the amount of recyclables to be 25% and the residue (contamination) from a Single Stream system to be 10%. (The five-year average residue rate from the existing Dual Stream facility is 3.6%).

Section 3 Single and Dual Stream Cost Analysis

This section presents a cost analysis of various options available to Waukesha County and evaluates the state of the County's existing facility. The existing facility on Prairie Ave. was built in 1991 and major renovations were made in 1995. Despite its age, the facility continues to service the Participating Municipalities, processing about 24,000 tons of materials annually. However, there are problems that need to be addressed. Most important is the capacity of the mixed container processing line of the facility. Since the design and construction of the container line, there have been substantial changes in the number and weight of plastic containers. This is especially the result of what is referred to as the "single serve" plastic container (i.e. bottled water). Today, the mixed container processing line is all but overwhelmed by plastic, forcing the operator to continuously stop and start the line to keep up with the flow of materials. As a result, the mixed container line typically operates at a rate of less than 4 tons per hour. Also, because of mixed container line limitations, aluminum cans need to be double handled and sorted causing additional labor and time costs. During peak recycling times, the tipping floor is not large enough to contain incoming materials, causing delays for the trucks delivering materials and forcing unprocessed material to be stored outside until processing comes in balance. The inside storage space for finished baled product is also inadequate, forcing double handling of bales and questionable storage techniques. Finally, because of the size of the MRF site, trucks with Dual Stream recyclables need to circle the property by taking a left hand turn onto Prairie Ave. and another left back onto the site. Large trucks making left hand turns on well traveled roads is not a desirable situation.

This section also discusses the possibility of purchasing the Lithoprint property to the north of the existing MRF and expanding the existing Dual Stream MRF to rectify the identified problems. The Project Team spoke with the owner of this 130' by 300' site, and the owner indicated that he would consider discussions with the County. If this site were to be acquired, the existing MRF facility could be expanded to the north, increasing the tipping space, adding bale storage space and renovating the existing process lines. The cost of such an upgrade and expansion is estimated to be between $6,000,000 and $7,000,000 plus the cost of land acquisition.

This section also details the capital and operating costs associated with building a new Single Stream MRF in the County. Operating and maintenance costs are modeled for the three categories of potential users over the 15 years between 2010 and 2025. In terms of revenues from the sale of materials, the Project Team and County staff looked at historical and current prices. While below the actual current value of materials, the team conservatively decided to use the historical median value of $77.78 per ton and to model all scenarios at that revenue level and at levels $15.00 per ton below and above the historical median price. Financial models for both Single and Dual Stream MRF's for all scenarios are included.

Section 3 ends with a detailed discussion of collection cost savings which can be achieved in a well run Single Stream program. It is estimated that overall, the potential to save an average of $1.03 per household per month in collection costs are achievable. Charts 3-13A, 3-13B and 3-13C in Section 3 present an overall picture of the operation and maintenance costs, capital costs, revenues, and collection costs associated with a new Single Stream and Dual Stream MRF located in the County.

Section 4 Metro-Wide Review of Landfill and MRF Capacity
This section presents information on the regional landfill and MRF capacity in the Waukesha County area. Concerning landfills, the study concludes that the there will be no meaningful effect upon landfill capacity from any decision the County may make regarding a recycling facility. However, the study finds that the private sector has, or is currently developing, processing capacity that could service the recycling needs of all, or portions of, the three target categories of potential users. This issue is further discussed in Section 5.

Section 5 Project Summary and Recommendations
This section summarizes the study findings by first asking a series of questions that bring to the forefront the findings of each of the Report Sections. Section 5 then presents and explains the pros and cons for each of the four options available to the County, including;

- Option 1: Continue to Use the Existing Facility
- Option 2: Acquire Lithoprint Site and Expand and Upgrade Existing Facility as Dual Stream MRF
- Option 3: Acquire Lithoprint Site and Expand and Upgrade Existing Facility as Single Stream MRF
- Option 4: Develop Publicly Owned Single Stream Regional Recycling Facility
- Option 5: Use Private Sector MRF Capacity for Materials Processing

The major implications of each option are:

- Option 1: It is feasible to continue to use the existing facility for Participating Municipalities only for the short run. However, the problems associated with the mixed container line will need to be addressed.
- Option 2: The expansion and renovation of the facility as a Dual Stream MRF could be accomplished. It is noted however, that such an expansion may affect operations while being built and will still have truck traffic flow problems.
- Option 3: The expansion and renovation of the facility as a Single Stream MRF could be accomplished. It is noted however, that such an expansion may affect operations while being built and will still have truck traffic flow problems.
- Option 4: The development of a regional Single Stream MRF to service Participating Municipalities, Non-Participating Municipalities and possibly the Cities of Wauwatosa and Milwaukee is cost effective if enough municipalities are willing to commit tonnage to such an undertaking.
- Option 5: The private sector is aggressively soliciting tonnage from municipalities.

Section 5 summarizes the collection savings inherent in moving from Dual Stream to Single Stream collection. However, it is noted that the entity doing the hauling typically gets the savings, and contracting mechanisms need to be in place to help that money flow back to the municipality paying for the services. Moving to coordinated municipal contracts for Single Stream collection is recommended.

The overall recommendation to Waukesha County is that the County, in conjunction with as many municipalities as are willing to participate, develop a Request for Proposals to solicit prices for collection, processing and revenue sharing of recyclable materials from private sector entities. Such an RFP will provide the County and various municipalities the information needed to assess possible private sector contracts versus moving forward with the public entity Options 2, 3, or 4 as detailed in the study.

WAUKESHA COUNTY RECYCLING SYSTEM & CAPACITY STUDY

INTRODUCTION

Waukesha County is home to over 379,000 people and is one of the fastest growing counties in Wisconsin. The County is the Responsible Unit for recycling for 25 municipalities serving a population of approximately 271,000. The remaining 12 municipalities in the County maintain their own Responsible Unit status. The Waukesha County Materials Recycling Facility (MRF) has been in operation with the existing equipment configuration since 1995 and processes approximately 24,000 tons per year of residential recyclables from participating communities in a Dual Stream MRF.

Dual Stream is defined as collection of residentially generated fibers (paper and cardboard) and commingled containers (plastic, glass, and metal bottles and cans) in separate compartments of a two compartment vehicle. Single stream is defined as commingled collection of residentially generated fiber and containers in a non compartmentalized vehicle.

The purpose of this study is to determine how to best meet the long term recycling needs of the County, including a clear determination of the recycling processing capacity of the current system in terms of per capita generation and County population projections, and analysis of the trend toward automation in the collection of trash and recyclables. The study also looks at the total system cost/benefit of dual verses single stream collection and processing for the future. The outcome of the report presented herein will be to create scenarios for increased landfill diversion and to help position municipalities for increasing landfill costs and reduced landfill capacity in the future.

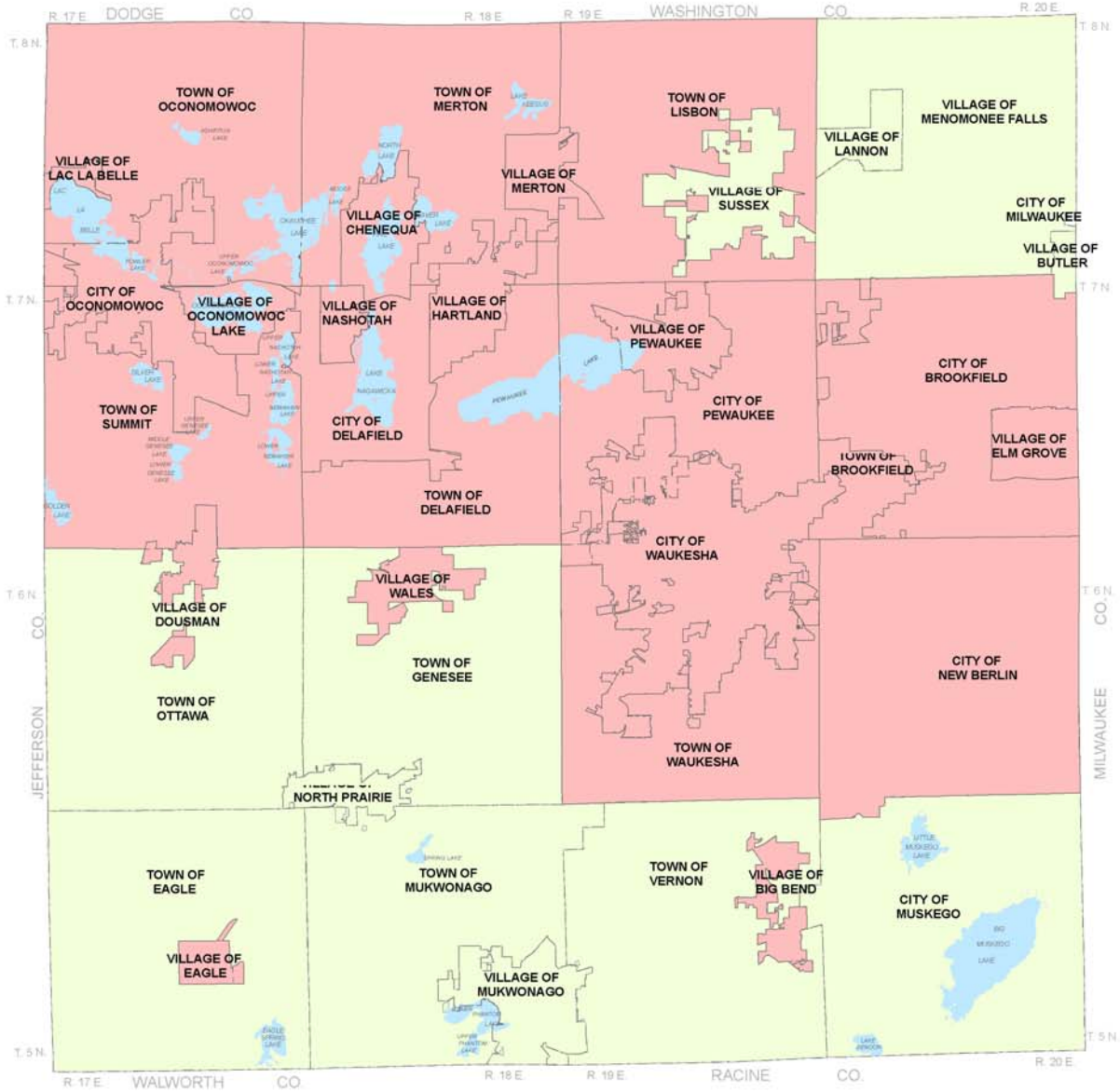
This report discusses whether the capacity of the existing Dual Stream MRF can meet these needs, and, if not, whether the Dual Stream MRF can be expanded at the current location. Also included is the cost of a new Dual Stream MRF, should expansion at the existing site not be possible.

This report evaluates the advantages and disadvantages of single stream vs. Dual Stream systems. This evaluation will provide a clear discussion and compilation of the relative merits and costs of each system as they relate to program participation and collection, facility development, operating costs, and material marketing issues. The evaluation l also includes whether the existing MRF site could be converted to a single stream facility, and if not, the cost of a new single stream MRF.

This report also investigates the feasibility of a publicly or privately owned regional recycling facility in the Waukesha or Milwaukee area designed to meet the long-term needs of Waukesha County and the cities of Milwaukee and Wauwatosa, including the advantages, disadvantages, and barriers to developing such a facility. There are examples of successful regional cooperation among governments in southeast Wisconsin such as the V.A.L.U.E. cooperative purchasing group and the Wisconsin Be SMART Coalition, a group that is working to increase recycling and decrease waste through education. The Final Report of the Governor's Task Force on Waste Materials Recovery and Disposal, December 2006, includes a recommendation to "Promote effective solid waste planning and implementation as well as regional cooperation for both."

The figure below shows the location of Cities, Towns and Villages in the County by Recycling Responsible Unit status under the state recycling law. The Project Team has evaluated both the 25 Participating Municipalities and the 12 Non-Participating Municipalities by the type of collection system and per capita generation rate. Since several municipalities in the County have single stream recycling systems, it is possible to construct an historical review of Dual Stream verses single-stream collection costs and per capita generation.

Waukesha County, Wisconsin Recycling Program
Municipal Responsible Unit Status



Legend

- Participating Municipalities With Waukesha County As Responsible Unit
- Non-Participating Municipalities Acting As Their Own Responsible Units

N

0 1 2 3 4 5 6 Miles

Source: Waukesha County

WAUKESHA COUNTY RECYCLING SYSTEM & CAPACITY STUDY

Section 1: Future Population and Recyclables Projections

Section 1.a. - Population as Basis for Recycling Quantities

The generation of residential recyclables is related, in part, to population. After discussion with County staff, the Final Population Projections, prepared by the Wisconsin Department of Administration (DOA) at five-year intervals through Year 2025, was selected as the baseline population information. Table 1-1 lists all the municipalities in Waukesha County by type of municipality (i.e., City, Town or Village). They are divided by Participating (25 members of the County Responsible Unit) and 12 Non-Participating Municipalities as defined under state recycling law. Their respective population estimates through Year 2025 is provided. For planning purposes, the bottom line of Table 1-1 includes the population growth forecast as a percentage, based on the growth of each of the five-year increments through 2025, versus the previous five-year period.

Table 1-2A reflects similar population information for the City of Milwaukee and the City of Wauwatosa, the two communities that a regional Materials Recovery Facility (MRF) might accommodate. For planning purposes, Table 1-2A also includes the population growth forecast as a percentage, based on each of the five-year increments through 2025.

Using Table 1-1 and Table 1-2A data, it is possible to mathematically calculate the population growth pattern, projected at five-year increments, using Year 2005 as the baseline. This information will be used to project the availability of recyclable materials from each community going forward. Table 1-3A presents the projected five-year incremental population multipliers for each community in Waukesha County. Additionally, an aggregate number for the Non-Participating Municipalities is presented at the bottom of Table 1-3A.

The population growth data from Tables 1-2A and 1-3A is used to project the growth in households to be served, using the actual household data received in the survey of Participating and Non-Participating Municipalities, as well as the Cities of Milwaukee and Wauwatosa. These household projections are presented in Tables 1-2B and 1-3B.

Since the basis of the population projections is Year 2005, the RRT Project Team reviewed the three years (i.e., Years 2003 through 2005) of recyclables materials data supplied by the County for each of the 25 Participating Municipalities. Recognizing that any single year could be an anomaly due to data issues, economic slowdown, reporting mistakes, etc., an average recyclables level over those three years was calculated. Table 1-4 presents the actual pounds per capita of recyclables by Participating Municipality. The RRT Project Team used the average 2003-2005 pounds per capita to forecast municipal increases through Year 2025 based on the Table 1-3A population

forecasts presented on five-year intervals. It is noted that Table 1-4 information is based solely on the County's current dual-stream program tonnages. Year 2006 results are also presented as a point of information.

Table 1-5 uses the average 2003-2005 figures from Table 1-4 and the population trend forecast factors presented in Table 1-3A to forecast the future recyclable materials tonnages that might be generated at five-year intervals through 2025 for each of the current Participating Municipalities with a continuance of the current dual-stream MRF. The actual 2006 total tonnage delivered to the MRF is nearly identical to this revised average 2005 projection. Additionally, all of the Non-Participating Municipalities are treated as an aggregate, and projections are presented at the bottom of Table 1-5.

Table 1-6 provides the RRT Project Team's estimate of the amount of source-separated recyclables associated with a potential "single-stream" collection and processing program. This information is presented on an annual tonnage basis by municipality; Section 2 of this Report describes this type of recyclables collection program in more detail. Based on current field case studies of the conversion of dual-stream collections to single-stream collection, the RRT Project Team has assumed that twenty-five percent (25%) more total recyclables materials will be collected if the system were shifted from dual-stream to single-stream. The bottom of Table 1-6 represents an aggregate number for potential single-stream quantities from the Participating as well as the Non-Participating Municipalities of the County.

A summary of both the City of Milwaukee and the City of Wauwatosa recycling tonnages for the past three years is presented in Table 1-7. Due to data availability, the baseline for Year 2005 baseline projection was assumed to be the most recent three-year average. Using the population projections noted earlier, the average quantity of recyclable materials generated on a lbs/capita/year and lbs/household/year basis was calculated.

Table 1-8 takes the long-term population projections through Year 2025 for the City of Milwaukee and the City of Wauwatosa based on the marginal five-year increases provided in Table 1-2A. Projections for both the dual-stream quantities and the potential single-stream quantities are provided. For the City of Milwaukee it was assumed that ten percent (10%) more total recyclable materials will be collected if the city were shifted from dual-stream to single-stream. The reason for this assumption is that the City of Milwaukee is currently using a single large 96 gallon split cart for dual-stream collection, and therefore the increase from the change to single-stream is not anticipated to be as great as when shifting from small bin dual-stream collection to large cart single-stream collection.

Table 1-9 presents a regional summary of the estimated annual recyclables based on the long-term population projections through Year 2025. These are presented for each of the "potential project participants" that the RRT Project Team was required to evaluate. Also, Table 1-9 provides individual five-year estimates, as well as consolidated data for several potential regional single-stream MRF configurations.

Table 1-1: Historical & Population Projections for Waukesha Co. Municipalities

(The 2000 Census counts include the latest corrections - November 25, 2003)

Type and Name of Municipality		Census	Census	Census	Projection	Projection	Projection	Projection	Projection
Participating	Non-Participating	1980	1990	2000	2005	2010	2015	2020	2025
CITIES									
BROOKFIELD		34,035	35,184	38,649	39,225	39,577	39,959	40,396	41,179
DELAFIELD		4,083	5,347	6,472	6,925	7,322	7,707	8,089	8,530
NEW BERLIN		30,529	33,592	38,220	39,404	40,333	41,265	42,228	43,535
OCONOMOWOC		9,909	10,993	12,382	12,835	13,190	13,542	13,902	14,375
PEWAUKEE		8,922	9,339	11,783	12,616	13,434	14,227	15,009	15,898
WAUKESHA		50,365	56,894	64,825	67,142	68,905	70,666	72,471	74,859
	MUSKEGO	15,277	16,813	21,397	22,369	23,183	23,984	24,791	25,792
TOWNS									
BROOKFIELD		4,364	4,232	6,390	6,698	6,957	7,212	7,468	7,782
DELAFIELD		4,597	5,735	7,820	8,508	9,120	9,712	10,295	10,949
LISBON		8,352	8,277	9,359	9,579	9,751	9,926	10,110	10,378
MERTON		6,025	6,430	7,988	8,389	8,729	9,062	9,397	9,804
OCONOMOWOC		7,340	7,323	7,451	7,442	7,400	7,370	7,354	7,404
SUMMIT		4,050	4,003	4,999	5,134	5,308	5,479	5,653	5,870
WAUKESHA		6,668	7,566	8,596	8,750	8,873	9,001	9,139	9,354
	EAGLE	1,758	2,028	3,117	3,485	3,817	4,138	4,451	4,793
	GENESEE	5,126	5,986	7,284	7,653	7,970	8,281	8,593	8,971
	MUKWONAGO	4,979	5,967	6,868	7,263	7,631	7,989	8,346	8,765
	OTTAWA	2,795	2,988	3,758	3,920	4,057	4,191	4,327	4,497
	VERNON	6,372	7,549	7,227	7,237	7,209	7,192	7,189	7,250
VILLAGES									
BIG BEND		1,345	1,299	1,278	1,242	1,202	1,165	1,132	1,110
CHENEQUA		532	601	583	580	573	568	564	566
DOUSMAN		1,153	1,277	1,584	1,659	1,721	1,781	1,842	1,917
EAGLE		1,008	1,182	1,707	1,817	1,912	2,005	2,097	2,205
ELM GROVE		6,735	6,261	6,249	6,111	5,948	5,802	5,672	5,597
HARTLAND		5,559	6,906	7,905	8,400	8,828	9,247	9,662	10,149
LAC LA BELLE		289	258	329	345	358	372	385	401
MERTON		1,045	1,199	1,926	2,093	2,238	2,378	2,517	2,672
NASHOTAH		513	567	1,266	1,414	1,548	1,677	1,803	1,941
OCONOMOWOC LAKE		524	493	564	642	651	660	670	686
PEWAUKEE		4,637	5,287	8,170	8,771	9,299	9,813	10,320	10,902
WALES		1,992	2,471	2,523	2,537	2,537	2,540	2,548	2,578
	BUTLER	2,059	2,079	1,881	1,828	1,769	1,714	1,666	1,634
	LANNON	987	924	1,009	985	958	933	911	898
	MENOMONEE FALLS	27,845	26,840	32,647	33,769	34,668	35,565	36,483	37,696
	MUKWONAGO	4,014	4,464	6,162	6,540	6,839	7,131	7,422	7,770
	NORTH PRAIRIE	938	1,322	1,571	1,746	1,900	2,048	2,193	2,353
	SUSSEX	3,482	5,039	8,828	9,838	10,745	11,620	12,475	13,412
WAUKESHA COUNTY		**280,203**	**304,715**	**360,767**	**374,891**	**386,460**	**397,922**	**409,570**	**424,472**
Increase - 5 Yr. Interval		**N.A.**	**N.A.**	**N.A.**	**3.9%**	**3.1%**	**3.0%**	**2.9%**	**3.6%**

Source: State Wisconsin Department of Administration (DOA) at five-year intervals through Year 2025;
data rearranged by GBB for purposes of presentation.

Table 1-2A : Historical & Projected Populations - Selected Milwaukee Co. Municipalities

Type and Name of Municipality	Census 1980	Census 1990	Census 2000	Projection 2005	Projection 2010	Projection 2015	Projection 2020	Projection 2025
CITY OF MILWAUKEE	636,295	628,088	596,974	602,692	608,542	616,468	623,608	622,738
Increase - 5 Yr. Interval	N.A.	N.A.	N.A.	1.0%	1.0%	1.3%	1.2%	-0.1%
Increase - 10 Yr. Interval	N.A.	-1.3%	-5.0%	N.A.	1.9%	N.A.	2.5%	N.A.
CITY OF WAUWATOSA	51,308	49,366	47,271	47,392	47,508	47,767	47,971	47,518
Increase - 5 Yr. Interval	N.A.	N.A.	N.A.	0.3%	0.2%	0.5%	0.4%	-0.9%
Increase - 10 Yr. Interval	N.A.	-3.8%	-4.2%	N.A.	0.5%	N.A.	1.0%	N.A.
Two Cities Combined	687,603	677,454	644,245	650,084	656,050	664,235	671,579	670,256
Increase - 5 Yr. Interval	N.A.	N.A.	N.A.	0.9%	0.9%	1.2%	1.1%	-0.2%
Increase - 10 Yr. Interval	N.A.	-1.5%	-4.9%	N.A.	1.8%	N.A.	2.4%	N.A.

Source: Same as Table 1-1

Table 1-2B : Projected Households - Selected Milwaukee Co. Municipalities

Name of Municipality	Households 2000	HH Serviced 2005	Projected Households			
			2010	2015	2020	2025
CITY OF MILWAUKEE	232,188	190,000	191,844	194,343	196,594	196,320
Population Multiplier (1)	N.A.	N.A.	1.00971	1.01302	1.01158	0.99860
CITY OF WAUWATOSA	20,388	20,749	20,800	20,913	21,002	20,804
Population Multiplier (1)	N.A.	N.A.	1.00245	1.00545	1.00427	0.99056
TWO CITIES COMBINED	252,576	210,749	212,644	215,256	217,596	217,124

(1) Population multipliers are from Table 1-2A
(2) Households based on data received from each municipality.

Table 1-3A: Population Projections for County Municipalities (1)

Type and Name of Participating Municipality	Projection 2005	Projection 2010	Projection 2015	Projection 2020	Projection 2025
CITIES					
BROOKFIELD	39,225	100.9%	101.9%	103.0%	105.0%
DELAFIELD	6,925	105.7%	111.3%	116.8%	123.2%
NEW BERLIN	39,404	102.4%	104.7%	107.2%	110.5%
OCONOMOWOC	12,835	102.8%	105.5%	108.3%	112.0%
PEWAUKEE	12,616	106.5%	112.8%	119.0%	126.0%
WAUKESHA	67,142	102.6%	105.2%	107.9%	111.5%
TOWNS					
BROOKFIELD	6,698	103.9%	107.7%	111.5%	116.2%
DELAFIELD	8,508	107.2%	114.2%	121.0%	128.7%
LISBON	9,579	101.8%	103.6%	105.5%	108.3%
MERTON	8,389	104.1%	108.0%	112.0%	116.9%
OCONOMOWOC	7,442	99.4%	99.0%	98.8%	99.5%
SUMMIT	5,134	103.4%	106.7%	110.1%	114.3%
WAUKESHA	8,750	101.4%	102.9%	104.4%	106.9%
VILLAGES					
BIG BEND	1,242	96.8%	93.8%	91.1%	89.4%
CHENEQUA	580	98.8%	97.9%	97.2%	97.6%
DOUSMAN	1,659	103.7%	107.4%	111.0%	115.6%
EAGLE	1,817	105.2%	110.3%	115.4%	121.4%
ELM GROVE	6,111	97.3%	94.9%	92.8%	91.6%
HARTLAND	8,400	105.1%	110.1%	115.0%	120.8%
LAC LA BELLE	345	103.8%	107.8%	111.6%	116.2%
MERTON	2,093	106.9%	113.6%	120.3%	127.7%
NASHOTAH	1,414	109.5%	118.6%	127.5%	137.3%
OCONOMOWOC LAKE	642	101.4%	102.8%	104.4%	106.9%
PEWAUKEE	8,771	106.0%	111.9%	117.7%	124.3%
WALES	2,537	100.0%	100.1%	100.4%	101.6%
Pop. Projections	**268,258**	**275,714**	**283,136**	**290,723**	**300,641**
Participating Multipliers		**102.8%**	**102.7%**	**102.7%**	**103.4%**
Name of Non-Participating Municipalities					
MUSKEGO	22,369	103.6%	107.2%	110.8%	115.3%
EAGLE	3,485	109.5%	118.7%	127.7%	137.5%
GENESEE	7,653	104.1%	108.2%	112.3%	117.2%
MUKWONAGO	7,263	105.1%	110.0%	114.9%	120.7%
OTTAWA	3,920	103.5%	106.9%	110.4%	114.7%
VERNON	7,237	99.6%	99.4%	99.3%	100.2%
BUTLER	1,828	96.8%	93.8%	91.1%	89.4%
LANNON	985	97.3%	94.7%	92.5%	91.2%
MENOMONEE FALLS	33,769	102.7%	105.3%	108.0%	111.6%
MUKWONAGO	6,540	104.6%	109.0%	113.5%	118.8%
NORTH PRAIRIE	1,746	108.8%	117.3%	125.6%	134.8%
SUSSEX	9,838	109.2%	118.1%	126.8%	136.3%
Pop. Projections	**106,633**	**110,746**	**114,786**	**118,847**	**123,831**
Non Participating Multipliers		**103.9%**	**103.6%**	**103.5%**	**104.2%**

Source: State Wisconsin Department of Administration (DOA) at five-year intervals through Year 2025 ; data rearranged by GBB for purposes of presentation.

(1) Multipliers are each based on comparison with the previous five-year period

Table 1-3B : Household Projections for County Municipalities

Name of Municipality	Households 2000	HH Serviced 2005	Projected Households			
			2010	2015	2020	2025
PARTICIPATING MUNICIPALITIES	97,859	86,279	88,677	91,064	93,504	96,694
Population Multiplier (1)	N.A.	N.A.	1.02779	1.02692	1.02680	1.03411
NON-PARTICIPATING MUNICIPALITIES	37,370	40,618	42,185	43,724	45,270	47,169
Population Multiplier (1)	N.A.	N.A.	1.03857	1.03648	1.03538	1.04194
WAUKESHA COUNTY TOTAL	135,229	126,897	130,862	134,788	138,775	143,863

(1) Population multipliers are from Table 1-3A
(2) Households based on survey data received from each municipality.

Table 1-4: LBS./CAPITA RECYCLABLES COLLECTED, PARTICIPATING MUNICIPALITY

COMMUNITY	ACTUAL 2003	ACTUAL 2004	ACTUAL 2005	AVERAGE 2003 - 2005	ACTUAL 2006 (1)
CITIES					
BROOKFIELD	215	201	204	207	201
DELAFIELD	187	155	150	164	166
NEW BERLIN	164	172	169	169	174
OCONOMOWOC	167	170	157	165	166
PEWAUKEE	217	187	183	196	171
WAUKESHA	158	168	164	163	169
TOWNS					
BROOKFIELD	173	147	158	159	148
DELAFIELD	191	173	177	180	194
LISBON	206	189	162	186	156
MERTON	172	187	199	186	188
OCONOMOWOC	169	179	177	175	198
SUMMIT	191	184	180	185	163
WAUKESHA	208	212	195	205	212
VILLAGES					
BIG BEND	242	213	196	217	199
CHENEQUA	288	267	300	285	246
DOUSMAN	177	191	190	186	178
EAGLE	150	115	185	150	167
ELM GROVE	222	219	234	225	205
HARTLAND	177	179	182	179	166
LAC LABELLE	137	96	102	112	142
MERTON	168	128	108	135	159
NASHOTAH	136	102	105	114	150
OCONOMOWOC LAKE	225	226	201	217	207
PEWAUKEE	140	141	101	127	108
WALES	235	219	244	233	229
Ave., lbs/capita/yr.(2)	**180**	**178**	**175**	**178**	**175**

Source: Annual data provided by Waukesha County

(1) Data for 2006 provided as information only, as the average for 2003-2005 utilized in the baseline analysis

(2) Based on recent year trends, the 2006 County population was assumed to be 272,300 for this calculation

Table 1-5: PROJECTED DUAL STREAM RECYCLABLES COLLECTED, TONS PER YEAR BASIS

ALL PARTICIPATING MUNICIPALITIES	AVERAGE 2003 - 2005 (Assumed Baseline) (1)	Revised Projection for 2005, TPY (2) (for modelling purposes)	Dual Stream Projections, Tons Per Year (3)			
			Projected for 2010	Projected for 2015	Projected for 2020	Projected for 2025
CITIES						
BROOKFIELD	207	4052	4088	4128	4173	4254
DELAFIELD	164	567	600	631	662	699
NEW BERLIN	169	3322	3400	3479	3560	3670
OCONOMOWOC	165	1057	1086	1115	1145	1184
PEWAUKEE	196	1234	1314	1392	1468	1555
WAUKESHA	163	5482	5626	5770	5918	6113
TOWNS						
BROOKFIELD	159	534	555	575	595	621
DELAFIELD	180	768	823	876	929	988
LISBON	186	890	906	922	939	964
MERTON	186	780	812	843	874	912
OCONOMOWOC	175	651	648	645	644	648
SUMMIT	185	475	491	507	523	543
WAUKESHA	205	897	910	923	937	959
VILLAGES						
BIG BEND	217	135	130	126	123	120
CHENEQUA	285	83	82	81	80	81
DOUSMAN	186	154	160	166	171	178
EAGLE	150	136	143	150	157	165
ELM GROVE	225	687	669	652	638	629
HARTLAND	179	753	792	829	867	910
LAC LABELLE	112	19	20	21	21	22
MERTON	135	141	151	160	169	180
NASHOTAH	114	81	89	96	103	111
OCON. LAKE	217	70	71	72	73	75
PEWAUKEE	127	559	592	625	657	695
WALES	233	295	295	296	297	300
TOTAL,TPY	**N.A.**	**23,823**	**24,452**	**25,080**	**25,724**	**26,575**

ALL NON-PARTICIPATING			Based on Current Collection System, tons per year (4)			
Net Population Multiplier			**3.9%**	**3.6%**	**3.5%**	**4.2%**
TOTAL,TPY (4)	**N.A.**	**11,744**	**12,197**	**12,642**	**13,089**	**13,638**

(1) Average Annual Lbs/Capita Collected; from Table 1-4

(2) Column 1 times the annual population shown on Table 1-1

(3) Projections for 2010 through 2025 based on 2005 tonnage to the left times the 5-Year population multipliers on Table 1-3A

(4) Projections for 2010 - 2025 based on average 2005 tonnage to the left times the 5-Year population multipliers noted above.

Table 1-6: PROJECTED SINGLE-STREAM RECYCLABLES COLLECTED (1)

PARTICIPATING MUNICIPALITIES	Single-Stream Projections, Tons Per Year				
	Adjusted projection for 2005 (2) (tpy)	Projected for 2010 (tpy)	Projected for 2015 (tpy)	Projected for 2020 (tpy)	Projected for 2025 (tpy)
CITIES					
BROOKFIELD	5065	5110	5160	5216	5317
DELAFIELD	709	750	789	828	873
NEW BERLIN	4152	4250	4348	4450	4588
OCONOMOWOC	1322	1358	1394	1431	1480
PEWAUKEE	1543	1643	1740	1835	1944
WAUKESHA	6853	7033	7213	7397	7641
TOWNS					
BROOKFIELD	668	693	719	744	776
DELAFIELD	959	1028	1095	1161	1235
LISBON	1112	1132	1153	1174	1205
MERTON	975	1015	1053	1092	1140
OCONOMOWOC	814	810	806	805	810
SUMMIT	594	614	634	654	679
WAUKESHA	1121	1137	1153	1171	1199
VILLAGES					
BIG BEND	168	163	158	153	150
CHENEQUA	103	102	101	101	101
DOUSMAN	193	200	207	214	223
EAGLE	170	179	188	196	207
ELM GROVE	859	836	815	797	787
HARTLAND	942	990	1037	1083	1138
LAC LABELLE	24	25	26	27	28
MERTON	176	188	200	212	225
NASHOTAH	101	111	120	129	139
OCON. LAKE	87	88	90	91	93
PEWAUKEE	698	741	781	822	868
WALES	369	369	370	371	375
TONS, TPY	**29,779**	**30,565**	**31,350**	**32,155**	**33,219**

SUMMARY FOR ALL NON-PARTICIPATING MUNICIPALITIES					
		Based on Current S-S Collection System (3)			
TOTAL,TPY (3)	**11,744**	**12,197**	**12,642**	**13,089**	**13,638**

(1) Assumes Increase for Single Stream vs. Dual Stream system to be 25% for Participating Municipalities

(2) Values shown are for projection purposes only in 2005 and are used to reflect tonnages in years 2010-2025

(3) Based on Table 1-5 without change, since most are single stream collection currently

Table 1-7: REGIONAL RECYCLABLES COLLECTED, HISTORICALLY

	City of Milwaukee		City of Wauwatosa
Per Capita Review:			
Actual 2004 TONS (1)	25,802		4,205
Actual 2005 TONS (1)	25,483		4,125
Actual 2006 TONS (1)	25,300		3,506
3-Yr. Average, TONS	25,528		3,945
Est. of 2005 Population (2)	602,692		47,392
Annual Lbs./Capita (3)	NA		166
Per Household Review:			
2005 No. of Households (1)	190,000		20,749
Annual Lbs./Household/Year	269		380

(1) Based on data received from each City
(2) Population and data are from the State of Wisconsin Department of Administration
(Only available through 2025)
(3) City program does not service all the population included in the DOA projections

Table 1-8: CURRENT & PROJECTED RECYCLABLES TO BE COLLECTED

(Tons Per year basis)

	Used for 2005	Projected for 2010	Projected for 2015	Projected for 2020	Projected for 2025
CITY OF MILWAUKEE:					
Population (1)	602,692	608,542	616,468	623,608	622,738
Incremental Population Multiplication Factor	Base Year	1.010	1.023	1.035	1.033
Tons To Dual Stream MRF(2)	25,528	25,776	26,112	26,414	26,377
Curbside Single Stream Collection (3)		28,354	28,723	29,056	29,015
CITY OF WAUWATOSA:					
Population (1)	47,392	47,508	47,767	47,971	47,518
Incremental Population Multiplication Factor	Base Year	1.002	1.008	1.012	1.003
Blue Bags To Single Stream MRF (2)	3,945	3,955	3,977	3,994	3,956
Curbside Single Stream Collection (3)		4,944	4,971	4,992	4,945

(1) Population and Data is from the State of Wisconsin Department of Administration (Only available through 2025)
The Multiplication Factor is based on year 2005 Population
(2) Based on Table 1-7
(3) Assumes Projected Increase for future Single Stream vs. current Dual Stream as follows:
City of Milwaukee = 10 percent
City of Wauwatosa = 25 percent

Table 1-9: Summary of Projected Recyclables for Processing, 2010-2025

Municipal Group	Tonnages Projected for 2010 (tpy)	Tonnages Projected for 2015 (tpy)	Tonnages Projected for 2020 (tpy)	Tonnages Projected for 2025 (tpy)
Dual-Stream Project Requirements:				
Waukesha Co. Participating Municipalities(1)	24,452	25,080	25,724	26,575
Single-Stream Project Requirements:				
Waukesha Co. Participating Municipalities (2)	30,565	31,350	32,155	33,219
Waukesha Co. Non-Participating Municipalities (2)	12,197	12,642	13,089	13,638
City of Milwaukee (3)	28,354	28,723	29,056	29,015
City of Wauwatosa (3)	4,944	4,971	4,992	4,945
Total - All Entities as Regional Single-Stream MRF	76,060	77,686	79,292	80,817
Total w/o Non-Participating Municipalities	63,863	65,044	66,203	67,179

(1) From Table 1-5

(2) From Table 1-6

(3) From Table 1-8

Section 1.b. - Historical Recycling Collection Data

Section 1.b.1. Recycling Data For Participating Municipalities

Figure 1-1 presents the average recyclables generation rates (as pounds per capita per year) for each of the 25 Participating Municipalities dating back to 1997. As can be seen, the current dual-stream program peaked in 2002, and has slightly decreased in recent years. However, this is a small percentage drop; thus, the generation rates can generally be described as "flat" over the past five years.

As a statewide reference benchmark to the current County system, Table 1-10 presents a summary of information reported to the DNR for calendar years 1997 though 2003, plus a column on the right (added by the RRT Project Team) that specifically indicates the performance of Waukesha County as one of the Responsible Units (RU). Table 1-10 cross-references the RU population versus the average pounds per capita per year of recyclables reported statewide. A comparison of the information with the right-hand column within the >100,000 Responsible Unit Population reflects that the Waukesha County rates are running almost forty percent (40%) higher in certain years versus the statewide average for the comparative RUs in this population category.

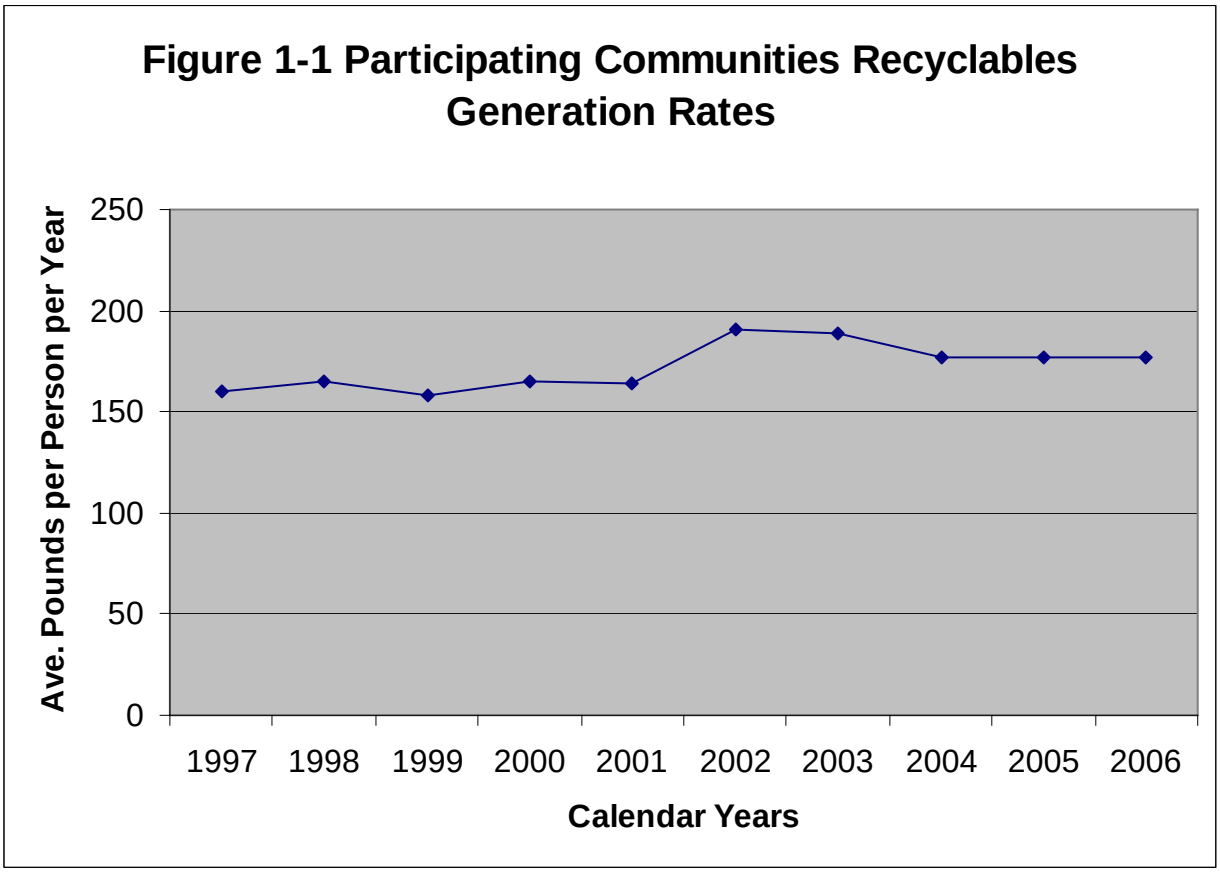


Table 1-10: Statewide Recyclables Collected by Responsible Units, Including Comparison with Waukesha County

(Paper & Commingled Recyclables Only, based on Population of RU) - 1997-2003

Responsible Unit Population	Report Year	Number of Responsible Units in State	Total Population, within class	Statewide: #/Capita/Year	Performance of Waukesha County (as RU): #/Capita/Year
< 5,000	1997	932	1,204,089	141.2	
	1998	926	1,197,056	141.4	
	1999	914	1,190,262	144.6	
	2000	912	1,194,795	145.8	
	2001	906	1,191,859	142.7	
	2002	896	1,198,769	142.4	
	2003	896	1,208,377	145.2	
5,000 - 50,000	1997	135	2,061,488	166.0	
	1998	139	2,102,361	161.2	
	1999	140	2,038,732	163.5	
	2000	142	2,061,506	166.6	
	2001	148	2,153,058	163.2	
	2002	148	2,180,426	157.5	
	2003	148	2,200,198	154.5	
50,001 - 100,000	1997	9	614,352	141.4	
	1998	9	617,376	127.8	
	1999	11	722,089	126.2	
	2000	11	724,516	120.9	
	2001	11	727,763	121.5	
	2002	11	728,736	117.2	
	2003	11	732,683	115.5	
> 100,000 (Incl. Waukesha Co.)	1997	5	1,333,400	134.4	159.8
	1998	5	1,338,530	128.7	165.5
	1999	5	1,344,337	135.4	158.0
	2000	5	1,349,893	123.8	164.8
	2001	5	1,349,723	132.3	164.1
	2002	5	1,360,120	128.3	191.0
	2003	5	1,365,310	129.0	188.6
Overall Totals	1997	1,081	5,213,329	149.3	
	1998	1,079	5,255,323	144.5	
	1999	1,070	5,295,420	147.0	
	2000	1,070	5,330,710	144.9	
	2001	1,070	5,422,403	145.4	
	2002	1,060	5,468,051	141.5	
	2003	1,060	5,468,051	141.5	

Source: Wisconsin DNR Bureau of Waste Management Database: published 12/09/2004

Note: DNR Table adjusted to include the Waukesha County Column for comparison purposes.

In addition to the detailed historical quantity data presented for each of the Participating Members in Section 1.a, Table 1-11 presents an overview of the summary data compiled for 2006 on the specific costs for local collection services and the current service provider for each of the Participating Members.

Table 1-11 Survey Data for Participating Communities

All contracting communities receive weekly collection of trash and recyclables delivered to County MRF by private hauler.
Dual stream system: paper separate from containers.

Community	Households(1)	Trash - for 2006		Recyclables for 2006		Total Cost per HH per Mo.	Contractor & Expiration Date	Type of Service (2)
	Number	Cost per HH per Mo.	Annual Cost	Cost per HH per Mo.	Annual Cost			
CITIES								
BROOKFIELD	14,948	$ 10.18	$ 1,346,699	$ 3.06	$548,784	$ 13.24	Veolia 12/08	UD
DELAFIELD	2,788	$ 9.14	$ 342,412	$ 2.22	$95,875	$ 11.36	Veolia 12/10	UD & C
NEW BERLIN	10,313		Subscription		Subscription			
OCONOMOWOC	4,984	$ 8.08	$ 483,199	$ 3.65	$218,449	$ 11.73	Veolia 8/09	UD & C
PEWAUKEE	4,300	$ 8.83	$ 455,800	$ 2.50	$129,000	$ 11.33	Veolia 1/09	UD
WAUKESHA	19,985	$ 5.54	$ 1,161,805	$ 2.35	$562,287	$ 7.89	Veolia 12/07	C
TOWNS								
BROOKFIELD	1,979	$ 8.68	$ 200,905	$ 3.46	$83,963	$ 12.14	Veolia 3/08	UD
DELAFIELD	2,988	$ 9.33	$ 334,000	$ 3.50	$122,262	$ 12.83	Veolia 12/08	UD
LISBON	3,316	$ 10.79	$ 413,207	$ 2.70	$103,302	$ 13.48	Veolia 12/08	UD
MERTON	1,867		Subscription		Subscription			
OCONOMOWOC	2,970		Subscription		Subscription			
SUMMIT	2,019	$ 9.42	$ 204,828	$ 3.49	$81,778	$ 12.91	Veolia 12/09	UD
WAUKESHA	3,051	$ 9.00	$ 329,508	$ 3.40	$124,480	$ 12.40	Veolia 12/09	UD & C
VILLAGES								
BIG BEND	465	$ 7.19	$ 55,241	$ 2.85	$15,401	$ 10.04	WM 12/08 (3)	C
CHENEQUA	260	$ 11.22	$ 35,001	$ 4.81	$15,009	$ 16.03	Veolia 12/09	UD
DOUSMAN	597	$ 8.21	$ 50,499	$ 3.35	$20,614	$ 11.56	Veolia 12/07	C
EAGLE	651	$ 9.20	$ 63,058	$ 3.50	$25,203	$ 12.70	John's 12/08	C
ELM GROVE	2,057	$ 7.38	$ 185,615	$ 3.82	$99,056	$ 11.20	Veolia 3/10	UD
HARTLAND	2,559	$ 7.68	$ 235,939	$ 3.67	$112,596	$ 11.35	Veolia 12/10	C
LAC LABELLE	124	$ 8.20	$ 12,214	$ 4.17	$6,212	$ 12.37	Veolia 12/07	UD
MERTON	810	$ 8.46	$ 78,123	$ 3.05	$49,533	$ 11.50	Veolia 12/11	C
NASHOTAH	402	$ 8.57	$ 41,381	$ 3.27	$15,811	$ 11.84	Veolia 12/09	UD
OCONOMOWOC LAKE	275	$ 10.10	$ 36,232	$ 3.60	$10,123	$ 13.70	Veolia 12/09	UD
PEWAUKEE	1,678	$ 7.00	$ 130,231	$ 3.50	$58,502	$ 10.50	Veolia 12/09	C
WALES	893	$ 8.55	$ 90,061	$ 3.15	$29,000	$ 11.70	Veolia 12/07	C

(1) Served by curbside collection. Dual stream system: paper separate from containers.
(2) C=Curbside; UD=Up the Drive
(3) WM= Waste Management

Note: Summary of data compiled from the Municipal Survey Forms completed by each jurisdiction and 2006 state recycling grant report.

Section 1.b.2. Recycling Data For Non-Participating Municipalities

The private hauler with its own single-stream MRF is John's Disposal. A representative municipal flyer distributed by John's is presented in Appendix E.

The RRT Project Team has assembled the annual historical recyclables information on the twelve Non-Participating Municipalities, organized in Table 1-12 by type of municipality. Five municipalities have single-stream programs.

Table 1-13 provides (1) a summary of these Non-Participating Municipalities' generation data for calendar year 2006 (on a pounds per capita per year basis) by type of community, and (2) a comparison of the recyclables generation rates (on a pounds per capita per year basis) of the 25 participating and 12 Non-Participating Municipalities. Interestingly, for all three types of municipalities, the "mean generation rate for recyclables per capita" over the last three years was higher for the Non-Participating Municipalities with single stream programs than the participating municipalities in the County dual stream program. Towns with single stream programs collected 93 pounds per capita per year more and Villages collected 76 pounds per capita per year more than their counterparts with dual stream collection. The single stream programs collect the same materials as the dual stream programs, except the Town of Vernon, which collects all plastic bottles and aseptic containers.

Table 1-12: Survey Data for Non - Participating Communities

Note: All contracting communities receive weekly collection of trash.

Community	Households(1)	Trash - for 2006		Recyclables - for 2006		Total Cost per HH per Mo.	Type of Collection (3)	Frequency (4)	Contractor & Expiration Date	Revenue Share 2006
	Number	Cost per HH per Month	Annual Cost	Cost per HH per Month	Annual Cost					
CITIES										
MUSKEGO	8,957	$ 4.52	$ 480,900	$ 2.46	$ 261,700	$6.98	DS	E-O-W	Veolia 12/08	No
TOWNS										
EAGLE	1,289	$ 9.80	$ 143,852	$ 3.65	$ 56,458	$13.45	DS	Weekly	John's 12/07	No
GENESEE	2,615	$ 9.35	$ 279,617	$ 3.70	$ 113,555	$13.05	SS	E-O-W	John's 12/10	No
MUKWONAGO	2,771	$ 8.50	$ 280,823	$ 3.70	$ 122,241	$12.20	SS	E-O-W	John's 12/11	No
OTTAWA	1,450		Subscription		Subscription					
VERNON	2,793	$ 6.08	$ 161,293	$ 2.36	$ 146,128	$8.44	SS	E-O-W	Waste Mgt 12/10	No
VILLAGES										
BUTLER	757	$ 6.05	$ 61,548	$ 2.61	$ 27,312	$8.66	DS	Weekly	Waste Mgt 12/09	$2,000
LANNON	280	$ 6.56	$ 24,204	$ 2.20	$ 9,327	$8.76	DS	Weekly	Waste Mgt	No
MENOMONEE FALLS	14,300	$ 6.19	$ 1,055,110	$ 2.61	$ 359,297	$8.80	DS	Weekly	Waste Mgt 7/09	$80,000
MUKWONAGO	2,090	$ 7.15	$ 249,692	$ 4.70	$ 151,980	$11.85	SS	E-O-W	John's 12/08	No
NORTH PRAIRIE	650	$ 8.40	$ 64,254	$ 3.60	$ 28,436	$12.00	SS	E-O-W	John's 12/08	No
SUSSEX	2,666	$ 8.66	$ 283,289	$ 3.02	$ 96,349	$11.68	DS	Weekly	Veolia 12/07	$24,584

(1) Served by curbside collection
(2) Includes cost of carts for John's SS programs
(3) DS = Dual Stream and SS = Single Stream
(4) E-O-W = Every Other Week

Note: Summary of data compiled from the Municipal Survey Forms completed by each jurisdiction and follow up phone calls.

Table 1-13: Comparison of 2006 Recyclables Generation Rates
(Including Dual Stream vs. Single Stream Communities)

Type of Municipality	Participating Communities (all dual stream)	(lbs/cap/yr)	Mean-All (lbs/cap/yr)	Non-Participating Communities	(lbs/cap/yr)	Mean-All (lbs/cap/yr)	Mean-SS Only (lbs/cap/yr)	% Increase SS Versus Part. Comm Dual Stream
CITY			169.5			180		
	Brookfield	201		Muskego	180			
	New Berlin	172						
	Pewaukee	171						
	Waukesha	168						
	Delafield	165						
	Oconomowoc	161						
TOWN			187			275	280	49.7%
	Waukesha	210		Vernon	286 (SS)			
	Delafield	192		Genesee	280 (SS)			
	Oconomowoc	192		Mukwonago	275 (SS)			
	Merton	187		Eagle	252			
	Summit	163		Ottawa	187			
	Lisbon	154						
	Brookfield	147						
VILLAGE			178			208	254	42.7%
	Chenequa	244		North Prairie	285 (SS)			
	Wales	226		Butler	255			
	Oconomowoc Lake	207		Mukwonago	223 (SS)			
	Elm Grove	205		Men. Falls	208			
	Big Bend	199		Lannon	197			
	Dousman	178		Sussex	191			
	Eagle	164						
	Hartland	164						
	Nashotah	150						
	Merton	148						
	Lac LaBelle	142						
	Pewaukee	108						

Note: Single stream programs collect the same materials as dual stream programs, except the Town of Vernon which collects all plastic bottles and aseptic containers.

Section 1.c. - Analysis of Composition of Recycling Stream

Table 1-14 details the percentage of the recyclables materials stream of each commodity shipped from the Waukesha MRF between 2002 and 2006. Table 1-15 details the tons of each commodity shipped during those same years. This Section of the Report discusses the need to understand "packaging" trends and how they may effect the composition and amounts of recyclables. The RRT Project Team understands that for purposes of this Task, "packaging" is meant to include all recyclables currently being processed at the Waukesha MRF. The intent of this work is to better understand what compositional and volume-related changes may be expected from non-demographic-related market forces.

Table 1-14: Percentage of Commodities Shipped
Waukesha MRF 2002-2006

Commodity	2002	2003	2004	2005	2006
Newspaper #8*	63.91%	62.38%	61.85%	61.20%	61.58%
Corrugated cardboard	6.65%	6.83%	6.85%	7.34%	7.47%
Household mail/paper	0.76%	0.72%	0.80%	0.60%	0.56%
FE/Tin	3.25%	3.06%	2.87%	2.70%	2.31%
Aluminum	1.75%	1.74%	1.34%	1.56%	1.67%
Plastic, HDPE natural	1.61%	1.72%	1.59%	1.66%	1.53%
Plastic, HDPE color	1.36%	1.38%	1.49%	1.54%	1.54%
Plastic, PETE	2.30%	2.99%	3.35%	3.75%	3.71%
Glass, green	2.56%	2.27%	1.99%	2.26%	2.68%
Glass, amber	1.21%	0.75%	1.01%	0.82%	1.10%
Glass, flint	2.67%	0.84%	1.13%	1.48%	1.66%
Glass, mixed	11.94%	15.27%	15.63%	15.05%	14.09%
Scrap Metal	0.00%	0.04%	0.10%	0.04%	0.10%
TOTAL	100%	100%	100%	100%	100%
RESIDUE	4.47%	4.35%	3.33%	2.59%	3.08%

* Includes phone books and magazines

Table 1-15: Tons of Commodities Shipped
Waukesha MRF 2002-2006

Commodity	2002 Tons	2003 Tons	2004 Tons	2005 Tons	2006 Tons
Newspaper #8*	13,770.73	13,381.67	13,275.87	13,035.20	14,273.32
Corrugated cardboard	1,433.79	1,464.84	1,471.01	1,562.43	1,731.42
Household mail/paper	164.49	155.42	171.56	127.99	130.40
Total Fiber	**15,369.01**	**15,001.93**	**14,918.44**	**14,725.62**	**16,135.14**
FE/Tin	701.09	655.59	614.97	575.68	536.49
Aluminum	378.05	372.72	288.09	331.72	386.29
Plastic,HDPE nat.	347.07	369.97	342.14	353.58	353.90
Plastic,HDPE color	293.23	296.73	320.64	327.05	357.93
Plastic,PETE	495.19	640.72	718.84	799.33	860.05
Glass, green	552.44	486.53	427.14	482.06	622.04
Glass, amber	261.50	161.94	215.80	174.78	253.97
Glass, flint	575.65	180.74	241.89	316.11	385.34
Glass, mixed	2,573.06	3,275.50	3,354.72	3,205.16	3,265.00
Scrap Metal	0.00	9.00	21.16	9.02	22.14
Total Containers	**6,177.28**	**6,440.44**	**6,524.23**	**6,565.47**	**7,021.01**
TOTAL	21,546.29	21,451.37	21,463.83	21,300.11	23,178.29
TONS RESIDUE	1,082.90	1,048.13	804.96	613.96	733.97

*Includes phone books and magazines

Figure 1-2 : Fiber and Containers Shipped

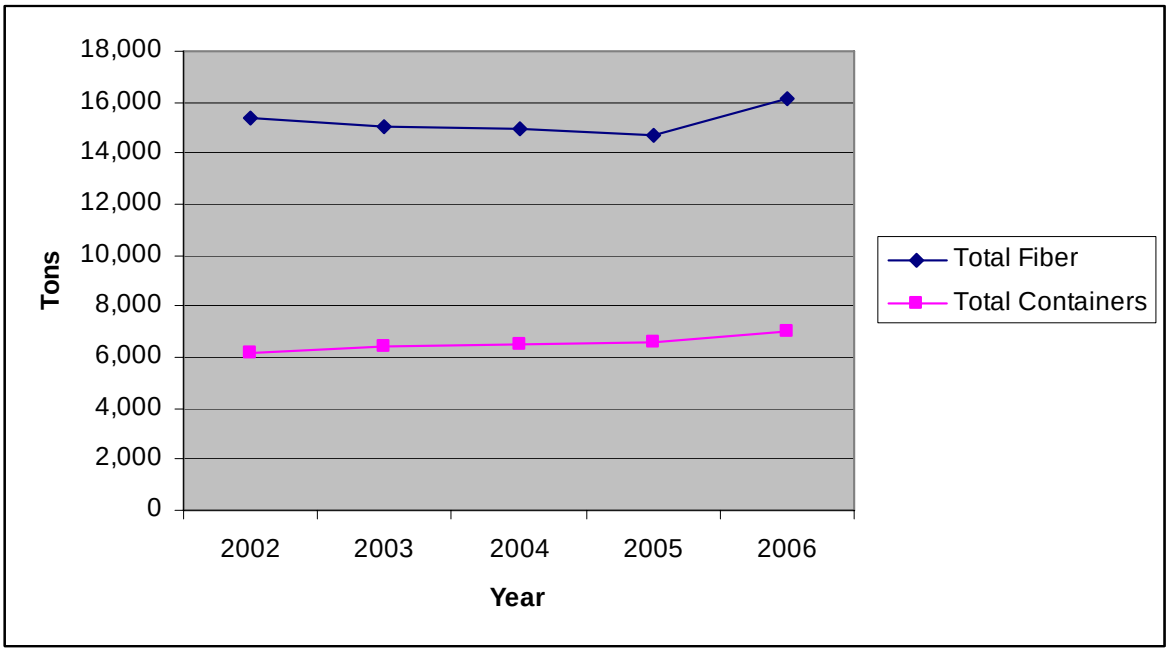


Figure 1-3 : Newspaper Shipped

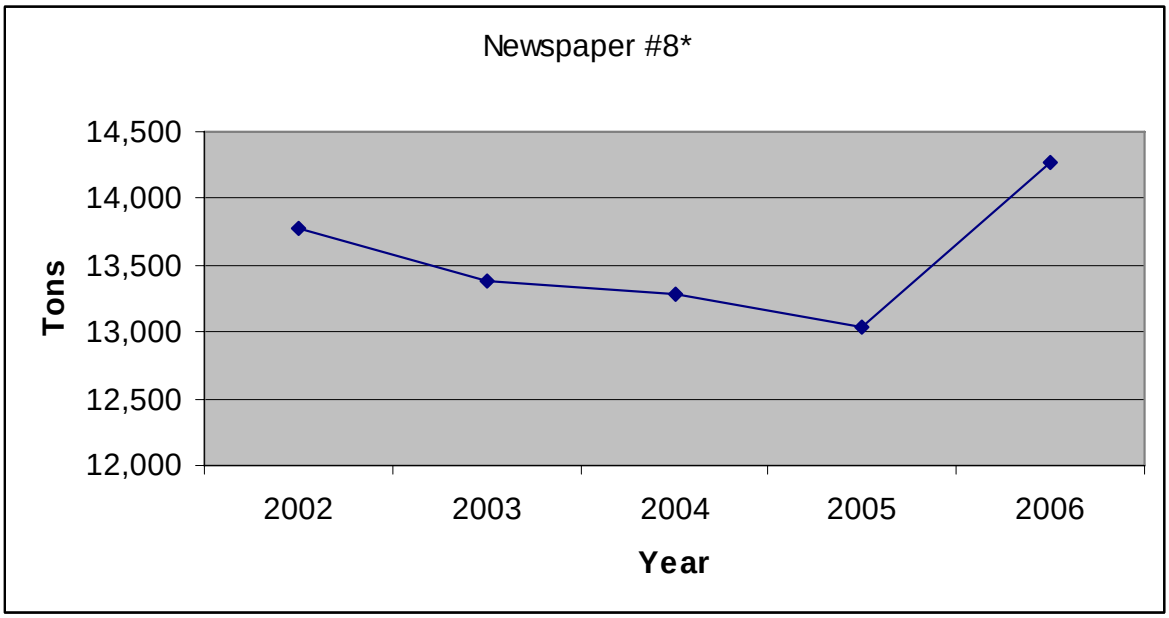
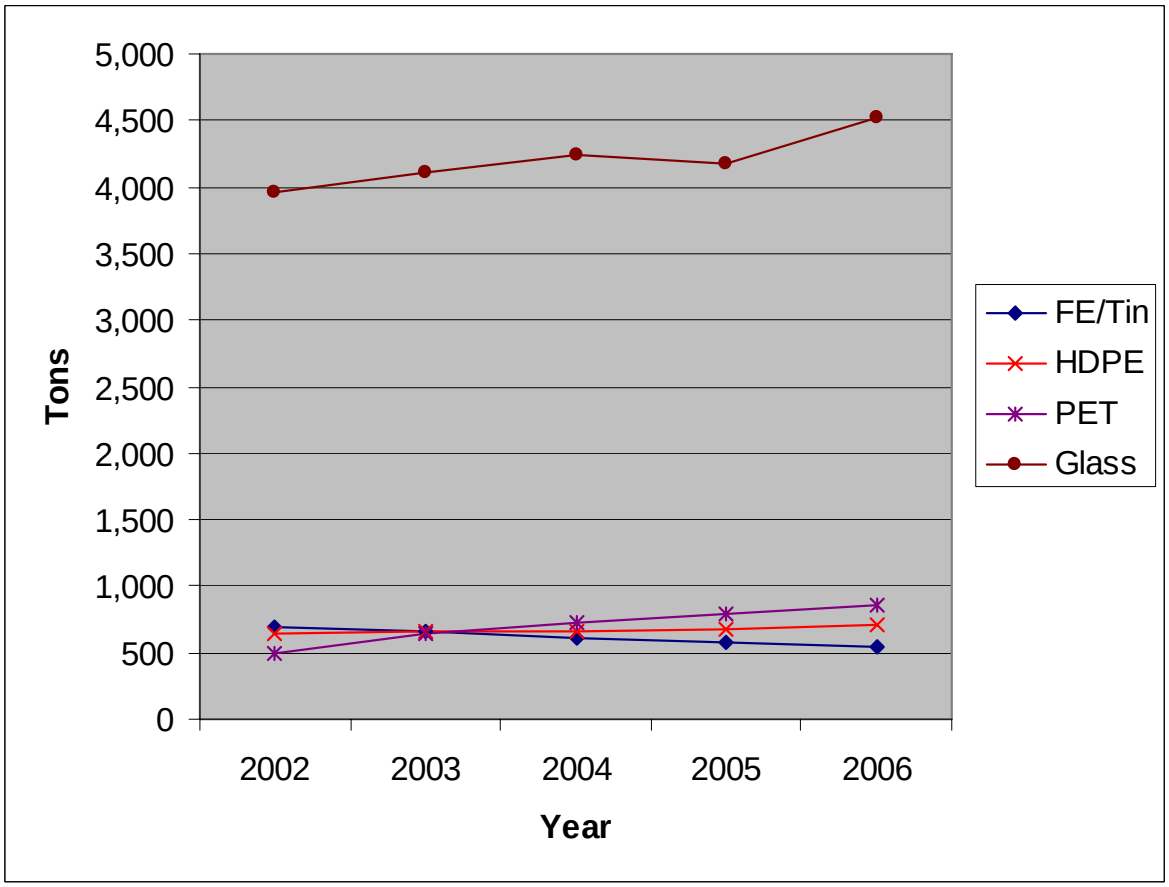


Figure 1-4 : Ferrous, HDPE, PET, & Glass Shipped



One of the better examples of non-demographic related market forces bringing about compositional related changes to the recycling stream is the growth in general of plastic containers and the specific growth in the use PET containers. Consider the following Table 1-16, which summarizes the PET and All Plastics composition changes at the Waukesha MRF between 2002 and 2006.

Table 1-16: Growth of Plastic Containers at County MRF

	PET 2002	PET 2006	Increase	All Plastics 2002	All Plastics 2006	Increase
Percent of Total Materials	2.3%	3.7%	1.4%	5.3%	6.8%	1.5%
Percent of Total Containers	8.0%	12.2%	4.2%	18.3%	22.3%	4.0%
Percent of Sortable Containers (Containers less Mixed Glass)	13.7%	22.7%	9.0%	31.3%	41.5%	10.2%
Percent Weight Increase of Sortable Containers		65.6%			32.3%	

While on the surface the increase in PET of 1.4% of all materials seems marginal, when looked at as the percentage of the weight of containers requiring sorting, the increase becomes a 9% increase or 65% by weight over five years. This type of increase (which MRF's all over the nation have seen) makes obsolete most MRF PET sorting stations. Along with the 65% increase by weight, this is a significantly larger percentage increase in the number of containers requiring hand sorting, as the average number of containers per pound has increased during this same period due to the emergence of single serve containers. The RRT Project Team observed numerous and regular stoppages of the container processing line at the Waukesha MRF due to the sorters being overwhelmed with the amount of plastic on the sort line and the need to stop the system to catch up.

This increase in the number of plastic containers will necessitate that any new or retrofitted recycling facility will require the use of automated plastic identification and sorting equipment. These systems, based upon near-infrared optical sorting technology are considered state of the art in MRF technology today.

The above example is used to illustrate how changes in the percent composition of the recovered materials stream may affect future operations, costs and revenues. The challenge is to look into the future to understand what changes, if any, may be predicted.

The generation rates and composition of acceptable program materials evolves over time in response to a number of non-population related factors such as:

- Overall regional and national economic activity
- Changes in consumer buying patterns
- Emergence of new consumer products or the disappearance of existing product brands
- Technological innovations, especially in product packaging
- Changes in the weight per unit of containers

Changes within each type of factor, as well as the unpredictable interactions between them, make the task of projecting waste stream changes very challenging. The RRT Project Team did an extensive search for existing research in this area. We came to understand that very little work has been done to isolate these factors. In retrospect, the team discussed how material projections were developed in the early 1990's when projects such as the Waukesha MRF were developed. At the time, both here in Wisconsin and around the country little thought was given to changes in material stream configuration. Subjects such as the development of the single serve PET container, the effect of the internet of print media and residential OCC generation were not considered. As we look forward it is extremely difficult to guess future changes in packaging habits and materials and how these can and will affect material flows through our recycling facilities.

The best reference this project can draw upon with respect to this issue is the "Wisconsin Waste Characterization & Management Study Update 2000" that was prepared by Franklin Associates for the State of Wisconsin (published in July 2002). This work was done prior to the Wisconsin Statewide Waste Characterization Study that was completed in 2003. For this reason, the principal value of the earlier Franklin Associates assessment is to rely on it for guidance regarding expected growth rates for acceptable program materials that the upgraded MRF will be receiving.

The Franklin Associates estimating methodology is based on analyzing production data from manufacturers and other organizations on the assumption that these products represent future components of the municipal solid waste (MSW) stream. This is especially reasonable with respect to the MRF acceptable program materials since they generally are derived from products that are consumed within a year of their manufacture. This methodology has been successfully used for many years by Franklin Associates in work they have performed for the U.S. Environmental Protection Agency in estimating national MSW generation rates and composition trends. What is particular useful about this study is that, where possible, Franklin Associates utilized Wisconsin specific production data where it was available.

Table 1-17 summarizes Franklin Associates waste generation estimates for years 2000, 2005 and 2010 for program materials from residential sources in tons / year. The column "% Change" refers to the change in total tons from the previous estimate year. Changes of less than 0.5% are rounded to 0%. It must be noted that Franklin Associates used both projected population changes and projected non-population-related factors to compute their projections.

Table 1-17: Estimated Future Tons Per Year Residential Recyclables

Material	2000 Tons	2005 Tons	% Change	2010 Tons	% Change
Newspaper	194,420	209,800	7%	218,880	4%
Corrugated	66,160	70,390	6%	75,810	7%
Magazines	30,530	31,900	4%	32,570	2%
Alum. cans	26,360	26,240	0%	26,160	0%
Steel cans	42,740	42,740	0%	42,580	0%
PET – soda *	19,550	15,640	-25%	20,410	23%
HDPE – nat. *	8,440	8,060	-5%	9,250	13%
Glass Cont.	150,760	156,460	4%	154,570	-1%

Source: Franklin Associates Waste Stream Analysis,
2000-2010 Available Tons per Year Wisconsin

*These are the only plastic categories for which 2000, 2005 and 2010 estimates were prepared.

The RRT Project Team is not satisfied with the Franklin data as the soul source of packaging trends. It shows, for example a sharp decline in the manufacture of PET containers between 2000 and 2005. This decline does not reflect the real increase in PET containers during this period.

Looking forward, the most significant growth is occurring in plastic PET and HDPE containers and Corrugated. One important contributor to the growth of residential OCC is the steady increase in online sales, resulting in higher deliveries of purchases in OCC packaging to residential customers. Newspapers are showing declining growth due to loss of print readership while glass container utilization is declining due to its replacement by plastics as a packaging material. There is no significant growth in metal containers.

Looked at from the per capita Pounds Per Person Per Year (PPPY) point of view in Table 1-18, the Franklin Associates projections are:

Table 1-18: Franklin Associates Waste Stream Analysis
2000-2010 Available Pounds Per Person Per Year (PPPY) Wisconsin

	2000	2005	% Change	2010	% Change
Wisconsin Population *	5,363,725	5,580,787	4.05%	5,751,470	3.05%
Material	PPPY	PPPY		PPPY	
Newspaper	72.5	75.1	3.58%	76.1	1.33%
Corrugated	24.7	25.2	2.02%	26.4	4.76%
Magazines	11.4	11.4	0.00%	11.3	0.00%
Al. cans	9.8	9.4	(4.08%)	9.1	(3.19%)
Steel cans	15.9	15.3	(3.77%)	14.8	(3.26 %)
PET – soda	7.3	5.6	(23,28)	7.1	26.78%
HDPE – nat.	3.1	2.9	(6.45%)	3.2	10.34%
Glass Cont.	56.2	56	0.00%	53.4	(4.64%)

Source: Franklin Associates Waste Stream Analysis

One important caveat made by Franklin Associates is that its estimating methodology cannot account for changes that are due to new products resulting from technological innovations. One recent example will be discussed to highlight this issue.

PET is the most prevalent packaging material used for the delivery of soft drink, water, juice and ready to drink products, especially in single serving products. However, BIOTA, a Colorado-based spring water products company recently unveiled a compostable clear water bottle based on PLA (Polylactic Acid) resin derived from corn that is manufactured by Natureworks, a biopolymer company owned by Cargill. This bottle looks like a typical PET water bottle and, for this reason, has alarmed a number of commercial and municipal recyclers, especially those located in the Colorado region, about its potential intrusion into the PET streams received by area MRF's. This type of plastic container is not in commercial use currently in the U.S. Midwest but the possibility exists that it could if PLA-based containers prove to be cost and functionally competitive with PET.

Table 1-19 illustrates the 2005 actual percent composition of materials processed at the Waukesha MRF. Also presented is a projection of percent compositions in 2010 based upon the information contained in the Franklin report as presented above.

Table 1-19: Projected Composition of MRF Tons

Commodity	Tons 2005	Composition (Dual Stream)	Projected Franklin Change 2005 to 2010	Net Change in Tons*	Tons 2010	Projected Composition (Dual Stream) **
Newspaper #8(1)	13,035	61.2%	1.33%	173	13,208	61.17%
Corrugated	**1,562**	**7.33%**	**4.76%**	**74**	**1,636**	**7.58%**
Office Mix Paper	128	0.60%		0	128	0.59%
FE/Tin	576	2.70%	-3.26%	-19	557	2.58%
Aluminum	332	1.56%	-3.19%	-11	321	1.49%
HDPE Natural	353	1.66%	10.34%	37	390	1.81%
HDPE Colored	327	1.54%		0	327	1.52%
PET	**799**	**3.75%**	**26.78%**	**214**	**1013**	**4.70%**
Green Glass	482	2.26%	-4.64%	-22	460	2.13%
Amber Glass	175	0.82%	-4.64%	-8	168	0.78%
Flint Glass	316	1.48%	-4.64%	-15	301	1.40%
Mixed Glass	3,205	15.05%	-4.64%	-149	3,056	14.17%
Scrap Metal	9	0.04%		0	9	0.04%
Total	21,299				21,574	

(1) Includes phone books and magazines

* The net change is calculated by multiplying the current tons by the Percentage Change in composition due to non-population related factors per the PPPY calculation above. Where the Franklin work does not address a specific commodity (phone books for instance), the net change in tons due to non-population factors is assumed to be 0.

** This calculation assumes no change in population, no change in collection, no change in the program and no change in participation rates. It is for modeling purposes only.

Analyzing the above, we see according to Franklin, net increases in PET Plastics and Corrugated, which appear to match packaging trends and decreases in Glass, Tin and Aluminum which are the result of plastics continuing to take market share from these materials. However, the Franklin report also shows an increase in the PPPY for Newsprint. This we question.

The Newsprint Producers Association is a trade association made up of 20 members accounting for 98% of the newsprint produced in North America. They publish certain data, including Per Capita demand for newsprint in North America and other parts of the world. According to this group, North American Per Capita demand for newsprint has fallen 16.3% between 1975 and 2005. Most striking is a decrease in demand of 6.4% between 2004 and 2005.

To further understand the amount of newsprint that may be available for recycling, the RRT Project Team studied a report published by the University of California, Berkeley in 2002 titled, U.S. Newsprint Demand Forecasts to 2020[1]. This report compared various forecasting methodologies including;

- A classical model where the economic activity variable (GDP) and the price of newsprint are assumed to be the major determinants of newsprint demand
- A model based upon a Bayesian variation of the classical model, which allows for subjective prior information (such as industry expert views) to be part of the forecasting formula
- An ad hoc model, which uses known changes in newspaper circulation as the major explanatory variable

Table 1-20 illustrates some of the forecasts for US Newsprint Consumption detailed in this report (in millions metric tons);

Table 1-20: Actual and Projected Newsprint Consumption in U.S. (millions metric tons)

Model	1994	2000	2010	2020
Actual Values	11.9	12.2		
United Nations Food and Agriculture (1999)		13.5	16.4	
U.S. Forest Service RPA Timber Assessment (2001)			10.9	10.6
Classical 1971-2000			13.9	15.1
Classical 1971-1987	18	21.8	26.8	32.7
Classical 1987-2000			11.9	11.8
Classical Static 1971-2000			14.4	15.9
Classical Per Capita 1971-2000			15.3	17.3
Bayesian Prior Panel 1989-2013			11.9	11.7
Newspaper Circulation 1987-2000			11.1	7.4

[1] Source: US Newsprint Demand Forecasts to 2020, Lauri Hetemaki and Michael Obersteiner, University of California Berkeley, 2002

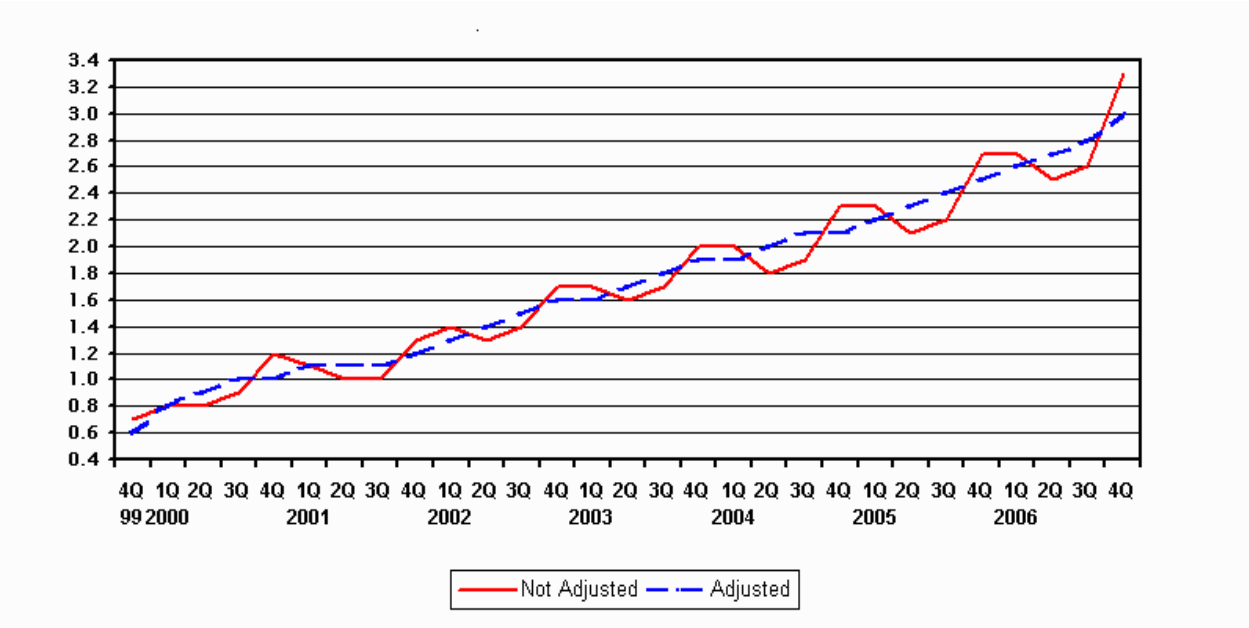
In its conclusions, the authors make clear that, "…the classical forest products demand model, still commonly used in the forest economics literature, could not explain or forecast the recent structural change in US newsprint consumption." The authors discuss the Newspaper Circulation Model and its basis in pragmatic reasoning and data analysis. However, they stress that it does not take into account other structural changes that may occur including the likely downsizing of newspapers due to advertising and editorial and other content moving towards online newspapers. In southeast Wisconsin a specific example is the reduction in sheet size of the Milwaukee Journal Sentinel twice in the past several years; in April 2003 and again in March 2007.

A further discussion related to Old Corrugated Containers in the residential recycling stream needs to be addressed. Antidotal evidence exists that primarily due to online sales of products, more OCC can be expected to be found in fibers picked up at the curb from residential sources. At the Waukesha MRF we have seen OCC increase modestly over the last five years. Data released by the U.S. Census Bureau tracks internet sales as a percentage of overall retail sales. Tables 1-21 thru 1-23 indicate that e-commerce sales as a percent of all retail sales have grown from 0.6% in 2000 to 3% in 2006. As the data shows, this is a consistent 25% quarter over previous year quarter increase.

The expected result of the continued rise in on-line retail shopping is more OCC in the residential recycling stream. The Project Team believes that this will make necessary the use of an OCC screen in any newly designed dual or single stream system.

Table 1-21: Estimated Quarterly U.S. Retail E-commerce Sales as a Percent of Total Quarterly Retail Sales: 4th Quarter 1999–4th Quarter 2006

Percent of Total



Source: U.S. Census Bureau News

Estimates are adjusted for seasonal variation and holiday and trading-day differences, but not for price changes.

Table 1-22: Estimated Quarterly U.S. Retail Sales: Total and E-commerce1

Quarter	Retail Sales (millions of dollars)		E-commerce as a Percent of Total	Percent Change From Prior Quarter		Percent Change From Same Quarter A Year Ago	
	Total	E-commerce[1]		Total	E-commerce	Total	E-commerce
Adjusted [2]							
4th quarter 2006(p)	990,835	29,286	3.0	-0.2	6.3	4.6	24.6
3rd quarter 2006(r)	992,603	27,544	2.8	0.8	4.7	5.3	21.1
2nd quarter 2006	984,548	26,304	2.7	0.8	4.4	6.5	22.8
1st quarter 2006	976,652	25,190	2.6	3.1	7.2	8.2	25.2
4th quarter 2005(r)	946,903	23,506	2.5	0.4	3.3	6.2	22.8
Not Adjusted							
4th quarter 2006(p)	1,034,272	33,854	3.3	4.1	32.2	4.0	25.0
3rd quarter 2006(r)	993,749	25,608	2.6	-0.8	3.4	4.8	20.4
2nd quarter 2006	1,002,064	24,758	2.5	10.5	1.0	6.9	22.9
1st quarter 2006	906,635	24,509	2.7	-8.8	-9.5	8.0	25.5
4th quarter 2005	994,452	27,080	2.7	4.9	27.3	6.0	23.1

Source: U.S. Census Bureau News

1 E-commerce sales are sales of goods and services where an order is placed by the buyer or price and terms of sale are negotiated over an Internet, extranet, Electronic Data Interchange (EDI) network, electronic mail, or other online system. Payment may or may not be made online.

2 Estimates are adjusted for seasonal variation and holiday and trading-day differences, but not for price changes.

Table 1-23: Estimated Quarterly U.S. Retail Sales (Not Adjusted1): Total and E-commerce2

Quarter	Retail Sales (millions of dollars)		E-commerce as a Percent of Total	Percent Change From Prior Quarter		Percent Change From Same Quarter A Year Ago	
	Total	E-commerce[1]		Total	E-commerce	Total	E-commerce
4th quarter 2005(p)	1,009,498	26,549	2.6	4.9	27.5	6.0	23.4
3rd quarter 2005(r)	962,513	20,815	2.2	1.1	5.1	8.6	26.4
2nd quarter 2005	952,392	19,812	2.1	11.8	3.6	8.1	25.8
1st quarter 2005	852,249	19,124	2.2	-10.5	-11.1	6.3	23.4
4th quarter 2004	952,572	21,519	2.3	7.5	30.6	8.3	24.0
3rd quarter 2004	886,091	16,473	1.9	0.6	4.6	6.3	22.1
2nd quarter 2004	880,936	15,752	1.8	9.8	1.7	7.4	24.0
1st quarter 2004	802,110	15,494	1.9	-8.8	-10.7	8.1	27.2
4th quarter 2003	879,500	17,357	2.0	5.6	28.6	5.3	22.9
3rd quarter 2003	833,206	13,495	1.6	1.5	6.3	4.9	25.3
2nd quarter 2003	820,540	12,699	1.5	10.6	4.3	3.6	25.2
1st quarter 2003	742,161	12,180	1.6	-11.2	-13.7	3.2	26.0
4th quarter 2002	835,607	14,120	1.7	5.2	31.1	0.8	30.7
3rd quarter 2002	794,520	10,774	1.4	0.3	6.2	5.0	39.0
2nd quarter 2002	792,382	10,146	1.3	10.2	5.0	1.7	30.3
1st quarter 2002	718,959	9,666	1.3	-13.3	-10.5	2.0	23.7
4th quarter 2001	829,127	10,802	1.3	9.5	39.4	4.7	21.3
3rd quarter 2001	756,857	7,751	1.0	-2.9	-0.4	1.5	13.7
2nd quarter 2001	779,224	7,784	1.0	10.6	-0.4	3.7	30.3
1st quarter 2001	704,615	7,815	1.1	-11.0	-12.3	1.5	43.1
4th quarter 2000	791,679	8,907	1.1	6.2	30.7	3.3	73.3
3rd quarter 2000	745,674	6,817	0.9	-0.8	14.1	5.5	NA
2nd quarter 2000	751,524	5,972	0.8	8.3	9.3	7.4	NA
1st quarter 2000	694,130	5,462	0.8	-9.4	6.3	11.1	NA
4th quarter 1999	766,184	5,140	0.7	8.4	NA	9.0	NA

Source: U.S. Census Bureau News

1 E-commerce sales are sales of goods and services where an order is placed by the buyer or price and terms of sale are negotiated over an Internet, extranet, Electronic Data Interchange (EDI) network, electronic mail, or other online system. Payment may or may not be made online.

2 Estimates are adjusted for seasonal variation and holiday and trading-day differences, but not for price changes.

The RRT Project Team notes a modest decrease in the amount of aluminum cans collected at the Waukesha MRF as reflected in the overall material percentage composition. The Franklin data suggests a further decline. To understand this we need to look at two factors; one, the weight of each aluminum can and two, the overall recycling rate. Consider the following table:

Table 1-24: Aluminum Can Production and Recycling Data
Aluminum Can Reclamation – 1995-2000

Year	Pounds of Aluminum Collected [1] (millions)	No. of Cans per Pound of Aluminum [2]	No. of Aluminum Cans Collected [3] (billions)	No. of Aluminum Cans Shipped [4] (billions)	Percent of Aluminum Cans Collected
1995	2,017	31.07	62.7	100.7	62.2
1996	1,969	31.92	62.8	99.0	63.5
1997	2,052	32.57	66.8	100.5	66.5
1998	1,938	33.04	64.0	102.0	62.8
1999	1,930	33.10	63.9	102.2	62.5
2000	1,891	33.12	62.6	100.8	62.1
2001	1,665	33.40	55.6	100.3	55.4
2002	1,591	33.79	53.8	100.8	53.4
2003	1,479	33.72	49.9	99.7	50.0
2004	1,518	33.92	51.5	100.5	51.2
2005	1,511	34.01	51.4	98.9	52.0

Source: The Aluminum Association, Inc.; Can Manufacturers Institute and; Institute of Scrap Recycling Industries, Inc.

(1) Used beverage cans melted by U.S. facilities plus exports of can scrap. Includes imports of UBC scrap melted in the U.S. Statistics based on joint survey by the Aluminum Association and Institute of Scrap Recycling Industries.
(2) Survey by the Can Manufacturers Institute
(3) Total pounds collected multiplied by can weight.
(4) Can Manufacturers Institute reported shipments of aluminum beverage cans lagged one quarter.

Since 2000, the data indicates a continued decrease in both the weight of each can – a 9% decrease over 10 years (expressed as the number of cans per pound), as well as a decrease in the overall percentage of cans collected (16% over 10 years. These trends and this data help explain the information we see at the MRF in terms of UBC recycling. However, it does not explain the decrease in the overall percentage of UBC collected, which is beyond the scope of this Report.

1.d - Conclusions

The RRT Project Team was asked to look at non-population-related factors that could affect the Waukesha County recycling program in the future. Past trends are easy to see, for example, the increase in plastic containers and the decrease in glass over the last two decades. However, looking forward is much more problematic. A search of the literature revealed very little work in this area as regards the future composition of waste and recyclable streams. The Franklin Associates study for the State of Wisconsin in 2002 does give us a certain view of what can be expected. However, its projection of an increase in the amount of newsprint available for recycling on a pounds/capita/year basis may not be accurate. The Franklin study suggests that newsprint tonnages will rise slightly between 2005 and 2010. However, other studies not relying on classical methods suggest a 10% drop in the overall demand for newsprint between 2000 and 2010 and the potential for an overall decrease of up to 40% by 2020 from 2000 levels.

Recent tonnage history at the Waukesha MRF indicates that the percentage of newsprint/magazines has remained stable during the past five years. Based upon most models, 2010 levels are projected at worst to fall in the 10% range from 2000 levels. This suggests that the Franklin numbers for newsprint, though high, will be no more off than approximately 1,300 tons per year or approximately 100 tons per month. As this is lower than the current seasonality of tons delivered to the MRF, we see no reason to change the design specifications beyond what is suggested in Table 1-19 (in the right-hand column).

- Due to significant growth in PET and HDPE containers a newly designed dual-stream or single-stream facility should include automation for plastic identification and removal using optical sorting technology.
- Include automated OCC sorting technology (rotating screens) at either a newly designed dual-stream or single-stream facility to handle the expected increase in corrugated and chipboard from increased online shopping and direct shipping.

WAUKESHA COUNTY RECYCLING SYSTEM & CAPACITY STUDY

Section 2: Comparative Analysis of Dual and Single Stream Recycling Systems

Section 2.a - Overview of the current collection system for the 25 "Participating" Municipalities and 12 "Non-Participating" Municipalities

Dual Stream is defined as collection of residentially generated fibers (paper and cardboard) and commingled containers (plastic, glass, and metal bottles and cans) in separate compartments of a two compartment vehicle. Single Stream is defined as commingled collection of residentially generated fiber and containers in a non compartmentalized vehicle.

The current County system is based on dual-stream collection and processing at the County MRF. Based on the information provided by the County and the responses to the municipal questionnaires (See Appendix A for the survey document), the RRT Project Team compiled and examined the collection systems for the 25 participating municipalities. As noted in Section 1, all participating municipalities currently have weekly collection of trash and recyclables. The vast majority of the participating municipalities use small bins for setting out their recyclables for the dual-stream program collection.

Data was also solicited from the twelve (12) non-participating municipalities in the county via questionnaires. The Project Team examined the collection and processing system and costs reported, then compiled and analyzed the data in order to plan for the possibility of their participation with the County in the future. As noted in Section 1, of the 12 non-participating municipalities, five (5) have weekly recyclables collection, six (6) have every-other-week (E-O-W) recyclables collection, and one has individual subscription service by homeowners. Five of the six municipalities that have E-O-W collection indicated that they use large wheeled carts for the storage of household generated recyclables and that the materials go to a private haulers Single-stream MRF. The municipalities with weekly collection continue to use small bins for setting out their recyclables for a dual-stream collection program offered by a private hauler.

Section 2.b - Dual Stream vs. Single Stream Collection Attributes

This section of the report presents a brief comparison and overview opinion of the current manual "dual-stream" bin-based collection system vs. a typical "single-stream" cart-based collection system using semi-automated or fully automated vehicles.

The drawbacks to manual collection of small bins (or trash in bags) are:

- As the day progresses fatigue sets in and affects the speed of operation.
- Higher injuries than semi/fully automated.
- Increased chance of lifting injuries.
- Increased chance of injuries from boarding or leaving vehicle.
- Cannot handle as large a route as semi/fully automated collection per worker.
- Greater percentages of severe injuries.
- Crew physical burnout and increased absenteeism.
- Crews must be physically capable of performing repetitious sustained lift of 50lbs or more.

Advantages of semi-automated cart collection:

- Larger containers can be used, normally 80 to 90 gallons.
- Lifting is done mechanically resulting in reduced injures.
- Rigid containers eliminate puncture wounds by sharps.
- Existing manually loaded collection vehicles can be used.
- Modification using hydraulic lifters is easy and inexpensive, about $5000.

Advantages of automated collection:

- No dismounting, no manual collection or dumping.
- Reduction to one person per collection vehicle.
- The person is an operator not a collector.
- Fatigue is minimal.
- Dramatic reduction in injuries due to the less physical demands and individuals with less physical strength can operate the vehicles.

Additionally, there are several safety improvements that are inherent in the use of single steam wheeled carts in recycling collection systems, both automated and semi-automated collection programs. These include:

- Lifting is done mechanically resulting in reduced injures.
- Rigid containers eliminate puncture wounds by sharps.
- Collectors do not come in direct contact with material that may be infected with germs or viruses.
- Less blowing of trash and recyclables (litter) due to closed containers.

Certain municipalities currently offer “up the drive” service as part of their collection system. This might be for both trash collection and small bin dual-stream recyclable collection (or even a rolling cart-based system) as a service to homeowners. However, to reduce costs of the individual service on a $/Household/Month basis, the high capital cost truck and automated system needs to be utilized on the collection route as much as possible. The benefits of single-stream recyclables collection starts with shifting recyclables collection into larger carts (typically, 96-gallon rolling carts) and having the automated vehicle operated by only a single driver. If a community wants to still offer “up the drive” collection services to all or part (e.g., handicapped or elderly residents), at least two approaches could be considered as follows:

(1) While not preferred due to costs and reduced efficiency, the driver of the single-stream collection vehicle could stop his vehicle and walk “up the drive” and grab the recyclables cart to the curb for servicing. He would have to re-enter the truck, work the controls, and after the empty cart is placed back on the curb, either (a) roll it back up the drive to place it in the original location, or (b) leave the empty cart at curbside for the resident to roll back “up the drive”. This service, with full responsibility for grabbing and returning the cart residing with the truck driver is offered in Nashville, TN, as an optional service with the added monthly charge approximately $10-$15/month/household. In Clark Township, NJ this additional residential “up-the-drive” service is priced at $5/month/household.

(2) Alternatively, the community or service provider could arrange to have a “pull-out-service” that is used to complement the expensive fully automated truck service. This service would consist of a less expensive driver with a small pick-up truck who travels the routes ahead of the automated truck and actually performs the grab-and-pull services to get the “up the drive” cart to curbside and the much more expensive automated truck and operator are able to keep moving and maintain the high efficiency of the more expensive operation. It would be optional for this less expensive driver to either return the carts “up the drive” after servicing or leave them at the curb, thus visiting the residence only once when the cart is full, and always moving ahead of the collection vehicle. Also, oftentimes, many types of waste materials collection are performed on the same day, and this pull-out-service would usually pull any and all carts - e.g., trash, recyclables and yard waste as/if applicable - to curbside for dumping. The City of Pasadena, CA, for example, has this pull-out cart service on an as-needed basis for those wanting to subscribe to it.

Section 2.c - Illustrative Collection Cost and Performance Element Comparison

Single-stream recycling is credited with providing a more economical way to collect recyclable materials. A representative comparison of cost elements involved in the collection process for recyclable materials is shown in Table 2-1.The method of collection utilized for single-stream: wheeled carts coupled with automated or semi-automated pickup, generally result in lower collection costs.

Table 2-1: Illustrative Collection Cost and Performance Element Comparison

Cost Element	Single-stream Recycling	Dual-stream Recycling
Container	Cart, $40 to $60	Bin(s), $5 to $10 Some systems use 2 bins, Fairfax County, VA
Collection Vehicle	Automated, $260,000	Split Packer, $210,000
	Semi-automated, $190,000	Single compartment body, $185,000, two passes required
Crew	Automated, 1 person, $36,000	Manual, 2 person, $60,000
	Semi-automated, 2 person, $60,000	Semi-automated, 2 person, $60,000
Productivity (1)	Automated, 1000 to 1200 stops/route	Manual or semi-auto, 600 to 700 stops/route
	Semi-automated, 600 to 700 stops/route	
Injury & Workman's Compensation	Automated and Semi-automated both minimize lifting injuries	
Unload Time	Single dump, one location on tipping floor, 6 minutes	Two dumps, two different locations on same tipping floor, 15 minutes

(1) For example, the City of Fort Worth TX currently reports to GBB that it has 131 recycle routes. These routes were established in February of 2006 at the time of their last major rerouting. At that time, the City had 173,100 residential customers for an average of 1,321 customers per route. The City has grown very rapidly and as of July 2007 the City reports having 185,800 residential customers. This gives them an average house count of 1,418 per route. Obviously some routes are higher and some are lower in house counts and this total would include "…drive-bys, collected & non-set out houses". This productivity is indicated to be achieved on an average 9.5 hours per day basis.

Section 2.d - Literature and Program Review

A specific review of published literature and related information of single-stream vs. dual-stream recycling systems, including anecdotal information from owners and industry researchers is presented in Appendix B of this Project Report.

Participation and Diversion

Both participation and diversion have increased in curbside collection programs that have adopted single-stream recycling. The Project team has compiled data from several municipalities around the United States providing examples of municipal program designs using single stream MRF's. This information is summarized in Table 2-2.

Some of these "reference communities" have also adopted Pay-As-You-Throw (PAYT) programs at the same time. This is the situation in Fort Worth, TX where the participation rate in recycling increased from 21% to 85% in the four years since the program's introduction. Fort Worth also experienced an increase in diversion from 6% to 21% during the same time. While some experts in the industry argue that the increase diversion is due to the PAYT system, others attribute the increase to the convenience, size and aesthetics of the carts. This latter view is supported by the data from Montgomery County, MD where carts are used in a dual-stream collection for mixed paper. During the three years since the introduction of the carts for paper the paper diverted has increased from 64,168 to 77,179 tons per year or 20 percent. The commingled container recycling has remained flat at approximately 24,000 tons per year. Even single steam recycling collection systems peak on diversion. Per household recycling in Seattle, WA has remained roughly constant for the last 10 years leading that city to ban recyclables from the waste and institute enforcement starting in 2005.

Table 2.2: REPRESENTATIVE JURISDICTIONS COMPARED TO WAUKESHA COUNTY (WITH RESPECT TO RECYCLABLES COLLECTION AND PROCESSING ACTIVITIES)

	Jurisdiction	Population	Households		Single Family Recyclables Service & Performance Data						Recyclables Processing	Misc. Comments
REF.	Name & State		Number Served	Type	Service Cost ($/HH/Month)	Type of Collection	Form	Recyclable Generation Type Mat'l	Recyclable Generation PPPWk	Generation P/HH/Month		
A.	Waukesha County, WI	374,891 (2005 est.)	141,432 (2005 est.)	S-F & M-F	$2.90	Dual Stream Weekly Collection Private Contract	Small Bins	RMP Containers Total	2.4 1.2 3.6	27.5 13.8 41.3	Dual Stream MRF Owned by the County Private Contractor Operates	12 municipalities in County NOT in the County MRF program and use private haulers to pickup and provide contracted MRF services. Typically these others go to Private S-S MRF
B.	Baltimore, MD	633,000	250,677	S-F		Dual Stream Every-Other-Week Curbside Collection Public Works Dept.		RMP Containers Total	1.5 0.8 2.3	16.4 8.7 25.1		
C.	Fort Worth, TX PAYT	661,850	172,000	S-F	(Included in Trash Costs)	Single Stream Weekly, Curbside Private Contract with WMI	64 gal. cart	Single Stream Total	3.8	63.3	Single Steam MRF Abitibi contractor Cost ???	Converted to single stream in 2003 Recycling Participation went from 21% to 85% Diversion; 6% to 21% Residue 43%
D.	Santa Monica, CA PAYT	91,495	7,819 41,788	S-F M-F	Gross Annual SF = $90.87/Yr Net Annual after Recyclables = $53.40	Single Stream Weekly, Curbside Public Works Dept.	95 gal. cart	Single Stream Total	4.1	32.5	Single Stream MRF Private contractor O/O on a public provided site.	
E.	San Jose, CA PAYT	945,000	152,268 (data only on two of three districts	S-F & M-F	(Included in Trash Costs)	Single Stream Weekly, Curbside Private Contract	32 gal. cart 64 gal. cart 96 gal. cart	Single Stream 81,840 tons of S.S.	Not Available	89.6	Single Stream MRF Private contractor on Private site.	#1 thru #7 plastics Used oil in jugs (hauler places in racks on truck) 134,638 tons disposed from same 2 of 3 districts
F.	Nashville, TN In City receiving service	595,714	133,000 (out of 248,911 total units)	S-F & M-F	$1.49 Per HH/Mo.	Single Stream (excluded glass) Monthly, Curbside Public Works Dept.	64 gal. 96 gal.	curbside tons 15,494	Not Available	19.4	Single Stream MRF Private contractor O/O on Private site. Min. of $15/T paid to City	No glass allowed in curbside recycling City of Nashville also has 13 drop-off centers which received 7,883 tons
G.	Montgomery County, MD	925,000	207,000	S-F & M-F (M-F< 6 units)	$4.06 Contract Price Collection Only (no MRF cost)	Dual Stream Weekly Collection Private Contract Paper = 77,197 Tons Cont. = 24,288 Tons	64 gal. cart plus Bin for containers	RMP Containers	Not Available Not Available Total	62.2 19.6 81.7	Private Paper MRF County Container MRF	Distributed 152,000 carts for RMP in 2004
H.	Seattle, WA		150,313	S-F & M-F		Single Stream (excludes glass) Glass into 10gal. Bin E-O-W curbside Private Contract	60 or 90 gal. Glass 10 gal.	Single Stream since 2000	Not Available	Citywide 70.8 Jan.-June 2006		64,102 tons were collected in 2005 w/curbside recyc. This was calculated by City to be 71.5 #/HH/Mo. Note: 31,909 tons collected 1st 6 months 2006
I.	Outagamie Co. WI	186,487 (2006 est.)	66,000 (32 Muni's)		$1.77 (Recyclables collection costs are $1.4 million/year	Curbside Collection (Every Other Week) Require Materials be put in two separate Blue Bins (or equal)	Bins Sold for: 18 gal: $6.50 24 gal: $12.00	Dual Stream (Must Separate Containers & Paper)	3.9	47.1	Dual Stream MRF	32 Municipalities Participate in the County Program

NOTES:

- **A.** Recyables Collection Cost is the average of the charges to the 25 Participating Communities by Private Haulers. The Generation Rate per Household is for the same 25 Participating Municipalities
- **B.** Dual Stream - Every Other Week (E-O-W) Collection
- **C.** Pay as you throw (PAYT) Trash Billing System for cost to residences
- **D.** Pay as you throw (PAYT) Trash Billing System for cost to residences
- **E.** Pay as you throw (PAYT) Trash Billing System for cost to residences
- **F.** There are no fees paid directly for trash or recyclables collection; all costs are covered by the GeneralFund. The costs indicated for recycling are based on Full Cost Accounting modelling. Trash contractors bid costs
- **G.** Recycling Service Costs are from contract hauler and these costs are embedded in the Trash Service Costs.
- **H.** Note: City law beginning January 2006 that the recycling required is being enforced by not collecting garbage cans which contain more than 10% recyclables!
- **I.** Dual Stream - Every Other Week (E-O-W) Collection; Paper is processed at the Outagamie County MRF, but Commingled Containers are shipped to the Brown County MRF for processing.

Section 2.e - Examine the Processing Component of Dual-Stream vs. Single-Stream MRF Systems (Pros and Cons)

This section discusses the advantages and disadvantages related to potentially switching it's the county recycling program to Single Stream vs. continuing with the existing Dual Stream program. The RRT Project Team has conducted an analysis of the issues surrounding dual-stream vs. single-stream MRF processing technologies.

Curbside recycling of residential recyclables gathered wide spread municipal support in the late 1980's and early 1990's. Most of this first wave of programs were based upon source separation or dual stream methodologies and included both drop off and curb side approaches to collection. However, as early as in 1991 the industry saw the first attempt at single stream processing in Phoenix, AZ. This facility, based upon European technology worked, though at such a high cost that the efficiency and throughput were not justifiable. In the mid 1990's single stream facilities began to be economically cost justified with the introduction of advanced screening technologies which enable the fiber to be efficiently separated from the containers early in the process at a properly equipped Materials Recovery Facility. Further advances in separation technologies enable certain fiber grades to be sorted via automation as well as certain plastic types. Today, automated systems for sorting glass by color and plastic by resin type are also available. With this technology comes, of course, costs. There are approximately 100 facilities in the United States relying on single stream methodologies using various levels of technology.

The processing capacities of MRF's present a readily apparent difference in the programs. Single-stream MRF's, especially the generation being constructed today, tend to be much larger than many of the dual-stream MRF's. This size difference allows for the economical investment in more extensive mechanical sorting equipment. The trend in single steam MRF's is to replace manual sort labor with this equipment. This trend is paralleled by the increased availability and reliability of new sorting equipment including electro-magnetic spectrum sensing and computer controlled sorting as well as more specialized screens (disc and star screens and trommels). Replacement of the manual laborers by this machinery reduces the risk of injury in the MRF processing area.

Once collected and delivered to a MRF, single-stream recyclable materials have an increased cost of processing. A single-stream MRF is essentially the same as a dual-stream MRF with the addition of an initial processing step to separate the single-stream material into two streams, mixed paper and commingled containers. The equipment utilized in one facility includes: OCC screen for corrugated cardboard> ONP screen for newspapers and magazines> glass breaker screen. Many single-stream MRF's include a presort to remove contaminants prior to any mechanical processing. Additional screening and separation equipment in the paper and commingled container lines will further reduce contamination of the products and increase quality.

The increasing use of Single Stream methodologies has fostered discussion related to the pros and cons of Single Stream verses Dual Stream systems. Table 2-3 provides an overview of this information.

Table 2-3: Comparison of Pros and Cons of Single Stream verses Dual Stream Systems

Single Stream Pros	Single Stream Cons
Decreased Collection Costs • *Common Trucks for Garbage and Recyclables* • *Better Control of Fleet Capital Expenditures* • *Fewer Spare Vehicles Required* • *Reduced Spare Parts Stocking* • *Reduced Training Costs* • *Higher Route Efficiencies (Stops Per Hour)* • *Reduced Labor Requirements* • *Reduced Safety Risks* • *Reduced Employee Turnover* • *Lower Workman Compensation Costs* • *Potential for Every-Other Week (E-O-W)Recyclables Collection* Allows Automated Systems to Collect Recyclables • *Rolling Carts Used Instead of Bins* • *Container Lid Keeps Recyclables Dry and keeps material from blowing* • *More Capacity in Carts for Bulky Items Such as Corrugated Containers* • *Can go to alternate week collection*	Increases Capital Costs of the MRF • *Need for Higher Daily through-put to amortize the Capital Costs* • *Need for Increased Inspection Capability* • *Need Screens to Perform Primary and Secondary Separation of Fiber and Containers* • *Additional Transfer Conveyors Required* • *Increases Square Footage Requirement of Facility* • *Need for a Pre-Sort Station* Increases Residue Level at MRF
Higher Overall Participation Rates Due to Convenience and Ease of SS Program • *Higher Recycling Volumes* • *High Public Approval* • *Higher Diversion Rates/lower garbage costs*	Potential for Increased Contamination of Processed Recyclables • *Possibility of Glass Shards Contaminating Fiber* • *Reduction and Possible Elimination of Recovery of Color Sorted Glass for Recycling at Bottle Plants* • *Potential for Decrease in Materials Marketing Options and price*
Potential Switch to Compaction Vehicles Reduces Trips to the MRF	Increased Labor Costs for processing • *Additional Labor for Increased Upfront Inspection for Materials that May Harm Screens or Screening Process* • *Additional Labor to Remove Cross Contaminated Fiber and or Containers Missed by Screens*

Contamination

Contamination in the residential setouts for collection has been a problem in many systems that have converted from dual-stream to single stream. Phoenix, AZ and San Jose, CA initially had residue rates at their single-stream MRF's of over 30%. Part of this was due to the residents not being fully informed and the conversion to single steam coincided with the expansion of the materials collected giving the idea everything was recyclable. These problems can be addressed with education for the residents and enforcement of the recycling rules for those few residents for whom education does not work. Both Phoenix and San Jose have reduced their residue rates at their MRFs. However, the operator of two single-stream facilities in Phoenix reports residue rates in the 20% to 25% range. The City of San Jose reports the 2005-2006 residue rate as 17.6%. This he attributes, to some extent, to the fact that neither MRF is equipped with a dedicated glass breaking system and that glass does end up in the residue. A new single-stream MRF is being built with a guaranteed maximum residue rate of 10% (Ocean County, NJ). This can be compared to Montgomery County, MD's overall residue rate of 3.4%, which is the weighted average of the commingled system residue of 11% and the paper system residue of 1%.

Contamination of recovered products is defined as the inclusion of unacceptable material in the product. The specifications published by the Institute of Scrap Recycling Industries (ISRI) are very specific. For example, the specification for #8 News allows no prohibited materials and 0.25% of Outthrows, defined as papers other than newspapers or magazines and catalogs, such as brown paper bags. Prohibited materials include plastic and glass. Contamination, particularly of paper products, is lower with dual-stream collection because the glass is kept separate from the paper during collection. During single stream collection, breakage of glass occurs, especially for collection vehicles with compaction. Small pieces of glass are imbedded in softer materials such as paper and plastic. The glass constitutes a contaminant to the paper and/or plastic that must be removed during the paper remanufacturing process. This adds cost to the remanufacture of recovered paper and plastic. For a more extensive discussion of the impact of contamination on paper remanufacturing see the American Forest and Paper Association (AF&PA) report, which are sited as references in this Report (also see Appendix B information).

One aspect of contamination where single-stream collection provides an advantage is in the control of moisture. The ISRI specification and contracts for paper products are based upon 12% moisture content. The use of 32 to 96 gallon wheeled carts with lids prevents recycling setouts from gaining moisture during rainy or snowy setout collection conditions versus dual-stream programs with open-top bins or paper bags.

Increased contamination in the recovered products from single-stream MRF's has not caused major economic impacts on the overall recycling systems in the recent past. This is because the market for recovered products is very strong. However, the commodity markets are notoriously cyclical and when the market is weak, contaminated materials will have a more difficult time finding markets or be downgraded in price when there is a tight market.

Section 2.f. - Comparison of Recyclables Generation Quantities For Dual Stream vs Single Stream Municipalities in the County

The most significant outcome of this review of the non-participating municipalities was that the six municipalities reported to have cart-based Single-stream collection reported the highest recycling rates among all the municipalities. Looking at the far-right hand column of Table 1-13 in Section 1 of this Report, a significantly higher Mean generation rate is exhibited for these Single-stream municipalities in the County. Mean generation rates of the Participating Dual-stream rates versus these six municipalities with Single-stream reflect the following percentage increases using 2006 reported figures:

- Town comparison (49.7 % higher recyclables rate reported with single stream)
- Village comparison (42.7 % higher recyclables rate reported with single stream)

Where a distinct cost of complete recyclables service for single stream setouts is presented [i.e. (1) the private sector supply of carts, (2) the private sector collection of recyclables and (3) the private sector processing of recyclables and marketing of products], the mean cost for 2006 appears to be about $3.70 per month per household, based on servicing by John's Disposal Service, Inc.

Section 2.g - Conclusions

From the Project Team's review of the above noted programs and literature, a number of underlying themes emerge from the multitude of reports and studies on the subject of single stream verses dual stream recycling programs.

1. It appears absolute that a state of the art single stream collection system will save the hauler between $15 and $30 per ton. A state of the art collection system includes a single person in each collection vehicle operating a mechanical device which picks up a rolling cart set out at the curb, dumps the contents into the vehicle and returns the cart to the curb.

2. In addition to the collection efficiencies, there is much evidence that set out rates and pounds per set out increase with a single stream system. Here the evidence is less clear as to what that number will be. On the low end, one indicated only a 2% to 5% increase can be expected when switching from dual stream to single stream. Others indicate much more dramatic increases, showing recycling rates going up 300% versus drop off programs and up to 100% verses dual stream programs. The reasons for any increase appear to be mainly twofold. One, the obvious convenience factor of single stream over any type of sort system and two, the fact that state of the art collection systems associated with single stream typically provide the resident with much larger containers. In one important study, the size of the container was determined to be the factor that, more than anything else, drove recycling rates upwards.

3. The cost to operate a single stream processing facility is higher than the cost to operate a dual stream facility. On the high end, one study reported operating cost increases of $5 to $15 per ton. However, RRT's own experience indicates cost increases in the $2 to $7 per ton range.

4. The controversy surrounding the quality of fiber produced at single verses dual stream facilities is less of a controversy over fact than an issue of costs. One study that has been prepared from the paper mill point of view does indicate that mill costs do increase with single verses dual stream fiber. However, quality is recycling facility specific and there is evidence that state of the art systems produce much higher quality fiber than first generation systems. There is no evidence in the literature showing that fiber from single stream systems cannot be sold and successfully recycled.

5. The level of residue in any recycling system, single or dual, is extremely dependent upon the level of public education. Broome County, an upstate New York community, reports single stream residue at 3.5%. Other communities report similar levels at or below 10%. On the other hand some operators report overall residue in the 20% to 25% range. The higher percentages appear to be from facilities that do not have up to date glass recovery systems and allow glass to be lost in the residue.

6. One important finding from the county survey is that no municipal hauling contracts break out the collection cost from the disposal cost, so municipalities do not know the true cost of disposal. Therefore when residents recycle more or reduce the amount of trash set out, the municipality does not see the savings. An item for discussion with municipal officials would be developing a model Request for Proposals to break out these costs and investigating a joint proposal for several municipalities.

The body of evidence indicates that single stream recycling is here to stay and should be considered the state of the art when properly designed and operated. This conclusion is reached because of its obvious advantages to the user, the increase in collected tons, and that collection cost savings can be significant.

Section 2.h - Basis for Future MRF Sizing

For purposes of modeling projections required in Section 3 of the Project Report the following assumptions will be used:

- If municipalities switch to a single stream system, and institute state of the art collection systems along with appropriate public education, the amount of materials collected can increase by 20% to 30%. For purposes of modeling 25% will be used for Waukesha County participating municipalities and for the City of Wauwatosa. For the City of Milwaukee, 10% will be used as the city is already using a large cart for collection of dual stream recyclables (split cart) and therefore tonnages would not be expected to grow by 25%.

- In recent years the Waukesha MRF has been generating between 3 and 3.5% residue. The evidence suggests that a state of the art well managed single stream collection and public education program can result in total residue levels of well under 10%. For purposes of modeling, 10% will be used.

WAUKESHA COUNTY RECYCLING SYSTEM & CAPACITY STUDY

Section 3: Single and Dual Stream Cost Analysis

Section 3.a - Existing Facility Capacity and Costs

3.a.1 Existing Facility Description and Operations

The current County Dual Stream MRF is located at 200 South Prairie Ave. in Waukesha, Wisconsin. The facility was purchased by the County and has been used for recycling since 1991. In 1995 major renovations were made and the facility attained its existing configuration.

Today, the facility consists of a tipping area encompassing approximately 9,000 square feet. Trucks enter at the north-east corner of the property and are weighed on a truck scale by the scale master / administrative assistant located in the office on the eastern side of the building. Following weighing, trucks containing dual streams of fiber and containers continue to the rear (western side) of facility where two large overhead doors to the tipping area are located. The trucks typically drive towards the western fence of the property and then back into the tipping area, dumping their commingled containers on the northern side of the tipping area and their fiber on the southern side of the tipping area.

The operator uses a front end loader to pile the received fiber and commingled containers separately against the eastern, northern and southern push walls of the tipping area. When processing, the loader is then used to load the commingled container infeed conveyor located on the north side of the tipping area and the paper infeed conveyor located on the south side of the tipping area.

The processing and bale storage area of the facility consists of approximately 16,000 square feet. Once loaded onto the fiber infeed conveyor, the paper is conveyed onto an inclined conveyor that reaches a sort conveyor with 12 picking stations. Currently two grades of fiber plus trash are positively picked from the mixed fiber, Old Corrugated Containers (OCC) (including brown bags) and Office Paper. These materials are deposited into the chutes on the fiber sort line and go into bins located under the fiber sort line. The Newspaper and magazines are negatively sorted (left to run off the end of the conveyor) into either of two bins located at the end of and under the north end of the fiber sort conveyor. When processing fiber, 4 sorters remove the OCC, Office Paper and Trash.

The fiber is baled using the Bollegraf baler located on the southern side of the processing area. Fiber is deposited onto the baler feed conveyor via the walking floor bins under the fiber line. This conveyor runs north to south loading the baler with the grade of fiber being baled. The fiber sort operation can process approximately 8 tons per hour.

The commingled containers are loaded onto their infeed conveyor which runs to the east and inclines prior to making a 90 degree turn to the north and being conveyed under an overhead belt magnet to remove ferrous materials. Ferrous materials are conveyed to the ferrous holding bin. Following ferrous removal, a vibratory screen is used to remove broken glass to the mixed glass bunker located to the west of the processing area outside under an overhang of the building. An air sort is then employed to separate aluminum and plastic from the remaining glass containers. The glass containers continue along the sort conveyor where it is sorted into green, brown and clear grades.

The plastic is manually sorted into Natural and Colored HDPE and PET. Aluminum is negatively sorted and as much trash as possible is removed from the line. While the plastic grades are baled directly from their respective bins on the Harris container baler, the aluminum is directed to the paper baler where it is further subjected to quality control and sorting by 4 to 6 people at a rate of under 1 ton per hour. The commingled container processing operation can process between 3.5 and 4 tons per hour using 7 sorters.

The facility currently employs the following twenty (20) personnel:

7 Commingled Container Sorters
4 Paper Sorters
1 Team Leader
1 Maintenance Person
2 Baler Operators
2 Loader and Fork Lift Operators
1 Operations Supervisor
1 Administrative Assistant / Scale Master
1 Manager

3.a.2 Existing Facility Capacity & Costs

The tons of material delivered per day varies greatly with the season creating the need for scheduling flexibility. In winter months incoming material is far lower than the spring and better weather months. For example in February, 2006 there were approximately 67 incoming tons per day and in September, 2006 there were approximately 96 incoming tons per day. This necessitates split shifts where the commingled container system must be operated up to 13 hours per day.

It should be strongly noted that the amount of plastic on the commingled container line regularly overwhelms the plastic sorters and they need to stop the line to catch up. The containers on the plastic sort line actually begin to overflow onto the floor. As discussed in Section 1 of this Report, the number, weight and mass of plastic containers delivered to the Waukesha MRF and all other MRFs has increased steadily over recent years. This fact is primarily due to the continued market evolution in packaging from glass to plastics, and most importantly, due to the emergence and growing use of single service plastic beverage containers. During a recent trip to the MRF, the Project Team observed the need to stop the plastic sort line and therefore the whole commingled container processing line every couple of minutes.

The commingled container processing line is only capable of processing 3.5 to 4 tons per hour, and is the bottleneck to capacity expansion at the existing facility. Its design, though state of the art in the 1990's does not take into account changes in the recycling stream such as the increase in plastics volumes and how glass can be better handled. Systems to handle the current mix of recyclables employ screens and optical sorters. The space available for this equipment is marginal in the existing facility.

Bale storage within the facility is an on-going problem, especially at higher tonnage levels. Storage space exists along the south eastern wall of the process building but is not adequate. To attain the most revenue for the MRFs materials, the operator needs to be able to store at least full load of each grade of material plus enough of each grade to allow for delays in truck pick up of the accumulated grade. The Waukesha MRF can only be deemed marginal in its ability to do this. The space issue is especially exasperated as we look at the seasonality of deliveries, which in turn, require more space for finished goods. At best, the current storage needs are being met by having to double or triple handle some material causing increased operator costs, potential materials contamination and potential safety concerns. Even during low delivery seasons, some plastic and aluminum bales need to be stored along the ramp leading to the load out docks to the north of the building. This is unacceptable from an operations point of view as it limits the use of the ramp and could cause safety related issues.

Facility management noted that on heavy delivery days, the limited size of the tipping area makes it very difficult to keep the piles of fiber and commingled containers within the facility, creating litter problems. During high delivery times the limited tipping area affects processing rates and efficiencies because the piles become so large that they make it difficult for the front end loader operators to keep the material inside the facility and at the same time feed the process lines. It is also difficult to service the incoming recycling trucks, causing delays and backup of vehicles.

The Project Team also noted that vehicle traffic flow at the site is limited by the site boundaries. After unloading, trucks must make a left hand turn out of the south end of the facility on to Prairie Ave., and another left across traffic to re-enter the scale area at the north end of the site. This creates a potentially dangerous situation, as trucks must cross traffic on Prairie Ave. twice.

As noted in other sections of this Report, the facility has historically processed the following quantities of material.

Table 3-1 : Waukesha County Recycling Facility Tons Processed

Year	Fiber (Tons Shipped)	Commingled Container (Tons Shipped)	Generated Residue (Tons Shipped)	Total (Tons Shipped)
2002	15,369	6,177	1,083	22,629
2003	15,001	6,540	1,048	22,589
2004	14,918	6,545	805	22,268
2005	14,726	6,574	614	21,914
2006	16,134	7,044	734	23,912

The following Table 3-2 summarizes the County costs for the last 3 years to operate the facility.

Table 3-2 : Waukesha County Recycling Facility Operations and Cost Summary

	2004	2005	2006
Existing MRF Costs Paid FCR by County			
FCR Contract for Operating (County Cost in $/Ton)	$ 21.16	$ 21.59	$ 22.20
Recyclables Received (Tons)	23,836	23,720	23,941
Total Annual Operating Costs Paid by County to FCR (a)	$ 504,370	$ 512,115	$ 531,490
Total Cost of Current MRF to County, including FCR Payment (1)	$ 815,165	$ 749,752	$ 764,863
Total Cost/Ton to County, before any Materials Revenue Sharing	$ 34.20	$ 31.61	$ 31.95
Total Revenues Received from Sales of Recyclables,$	$ 2,234,387	$ 2,372,000	$ 2,400,803
Revenue Share to FCR at 50% (b), $	$ 1,117,193	$ 1,186,000	$ 1,200,402
Revenue Share to County at 50% (c), $	$ 1,117,193	$ 1,186,000	$ 1,200,402
Value of Material Revenue to County, $/Ton	$ 46.87	$ 50.00	$ 50.14
Total Amount Paid to FCR			
Annual Operating Fee [see (a) above], $ per year	$ 504,370	$ 512,115	$ 531,490
Revenue Share from Sale of Recylables,[see (b) above], $ per year	$ 1,117,193	$ 1,186,000	$ 1,200,402
Total Funds Received by FCR, $ per year	$ 1,621,563	$ 1,698,115	$ 1,731,892
Total Funds Received by FCR in $/Ton	$ 68.03	$ 71.59	$ 72.34
Estimate of Participating Households per Report, Table 3-13	86,279	86,279	86,279
Calculated Payment Made to FCR per Household Served [$/HH/Month] (2)	$ 1.57	$ 1.64	$ 1.67
Net County Income [Total County Cost (1) minus County Share of Revenues (c)]	$ 302,028	$ 436,248	$ 435,539
Net County Income ($/Ton as Received at MRF)	$ 12.67	$ 18.39	$ 18.19
Estimate of Participating Households per Report, Table 3-13	86,279	86,279	86,279
Net County Income from MRF ($ per Household per Month Basis)	$ 0.29	$ 0.42	$ 0.42

(1) Includes County fee to FCR for processing, equipment depreciation, building repair and maintenance, sprinkler, security, elevator monitoring & repair, insurance, parking lot maintenance, electrical/plumbing repair.

(2) Cost for processing and marketing of materials; does not include any collection costs.

The Project Team wishes to note that this Table 3-2 data is presented on a $/Ton as well as a $/HH/Month basis to allow current and future comparison of the current MRF contracted cost information. This is presented from the prospective of both the costs and income to the County, as well as overall cash flow paid to the current MRF contractor. In Appendix B, several Case Study summaries are presented. More specifically, in Subsections 17 and 18 of Appendix B, the Project Team provides a brief discussion of other Southeast Wisconsin community recyclables collection and processing programs, including cost of service information in certain areas, as additional marketplace data that might be of interest to the County.

3.a.3 Expansion of Existing Facility

Assuming no substantial tonnage changes, the current County Dual Stream MRF can process the range of recyclables currently being received and anticipated to be received from the "Participating Municipalities". However, the commingled system can only process 3.5 to 4 tons per hour and because of the increase in plastic containers over the years, the system is inefficient and requires starting and stopping to keep up with the flow of materials. During peak tonnage this causes a bottleneck in the system that affects service to the haulers delivering recyclables to the facility. Additionally, the lack of sufficient bale storage and trailer loading docks requires outside storage of materials as well numerous operational inefficiencies in the warehouse. In order to address this situation, the commingled processing system will need to be updated within the next five years by adding screens and optical sorters to handle the current mix of recyclables and the warehouse needs to be expanded. The space available for this equipment is marginal in the existing facility and the site is too constrained to even consider any building expansion.

Approximately 70% of all tons delivered to the facility are fiber tons which are processed at a rate of approximately 8 tons per hour. On average, this requires just over 8 hours per day of processing and as noted above, will vary with the seasonality of deliveries.

Approximately 30% of all tons delivered to the facility are commingled containers. On average, this requires one full shift per day to process. However, as noted above, seasonal fluctuations in tons require up to 13 hours per day during certain months to process commingled containers.

If the "Non-Participating Municipalities" were to begin using the County facility, approximately 12,000 total tons per year of additional recyclables would need to be processed, including 3,600 tons per year of commingled containers and 8,400 tons per year of fiber. On average, the commingled line would need to be run just under 4 additional hours per day and the fiber line just over 4 hours. In theory, a second shift dedicated to processing 4 hours of commingled containers and 4 hours of fiber could accommodate these tons. However, the seasonality of deliveries would require the equivalent of more than a second shift during some months. Given the issues with the size of the tipping floor, the lack of adequate bale storage and the seasonality of deliveries, the existing facility could not accommodate the delivery of recyclables from all of the currently Non-Participating Municipalities.

The facility with its existing footprint of approximately 26,000 square feet (tipping & processing area) cannot be converted to a Single Stream facility. A Single Stream facility for these tonnage levels requires 20,000 square feet minimum for additional screening equipment to separate fiber from commingled containers, additional tip floor area, additional presort and quality control sorting areas, additional space for automated OCC sorting and additional space to accommodate the increased percentage of plastics and the potential for automated optical sorting of same.

The existing MRF is located on a plot of land approximately 290' by 300' or approximately two acres of land. From the building to the fence lines to the north and south there is approximately sixty feet (60') on each side. The area to the north is currently being used by the truck scale to load outgoing material and as a roadway to the tipping area located on the western side of the facility. The area to south of the building is taken up by a compactor for trash, the air circulation system, and it is used as a roadway for trucks to leave the facility. The open area between the building (tip floor doors) and the fence line to the west is only fifty feet (50') and is used by trucks to position themselves to back into the facility. The facility footprint cannot be expanded on its existing plot of land.

The Project Team contacted the owners of the two properties located to the north and south of the existing facility. The business to the north of the facility is the Lithoprint Company, a commercial printing operation. The owner indicated that he would entertain discussions with the County to purchase his business and property. The business to the south of the facility is Old Tavern Food Products. Old Tavern is a wholesale manufacturer of cheese products and operates a retail store at the plant on Prairie Ave. The owner told the Project Team that they are very satisfied with their current operations and that their customer base of 82 years of business is well established and that they would be extremely reluctant to consider selling their property to the County to expand the recycling facility.

If the Lithoprint site was acquired by the County, the approximately one (1) acre site could potentially be used to expand the existing facility; adding space for additional tipping area, adding Single Stream fiber/container separating screens, and reconfiguring the container and fiber processing lines. Given the space limitations, we estimate that the expansion would encompass an additional 20,000 square feet.

Specifically, the expansion (using the acquired land) of the existing facility as a Dual Stream MRF would include;

- Demolish existing Lithoprint building.
- Expand existing MRF to the north and build a new container tipping and processing area with the existing two-ram baler relocated.
- Expand existing loading dock and re-orient for three docks.
- Remove existing container line; use existing container tipping area for added paper tipping and also OCC screening system if desired. Use area for old container line for added bale storage of container bales.
- Ramp to be retained to get to larger dock.
- Glass area to be retained for glass and residue.
- Add scale inbound and outbound. Trailers for products to reverse and back off scale and get to their dock. We would need to have gates to leave room for trucks to back off.
- New building would be built as large as possible to available space on land.
- Old street entrance used only for administration and employees.

The expansion of the existing facility as a Single Stream MRF would include;

- Demolish existing Lithoprint building.
- Expand existing MRF to the north and build a new tipping area for Single Stream recyclables.
- Expand existing loading dock and re-orient for three docks.
- Remove existing container line: use space of existing container processing line and existing tipping floor area for Single Stream screening system and new container sorting system.
- Ramp to be retained to get to larger dock.
- Glass area to be retained for glass and residue.
- Add scale inbound and outbound. Trailers for products to reverse and back off scale and get to their dock. We would need to have gates to leave room for trucks to back off.
- New building would be built as large as possible to available space on land.
- Old street entrance used only for administration and employees.

Such an expansion would cost approximately $3.0 million for the building and site work in both cases, not including cost of additional property. Adding higher capacity Dual Stream processing capability along with an OCC screen would cost approximately $3.5 million, bringing the total cost to an estimated $6.5 million. Adding Single Stream capability and reconfiguring the current process lines would cost approximately $4.0 million, bringing the total to an estimated $7.0 million. These options would serve the needs of the Participating Municipalities as well as, potentially, the Non-Participating Municipalities.

Due to space and site limitations, neither of these options could serve as a full regional MRF with the projected tonnages of all Participating and Non-Participating Municipalities, in addition to those from Wauwatosa and Milwaukee.

The following tables 3.a.3-1 and 3.a.3-2 present the capital costs and a cost benefit matrix for the expansion of the existing facility:

Table 3.a.3-1: Expansion of Existing Facility Estimated Capital Costs (2007 Dollars)

	Equipment and Systems	Building Costs	Total Costs
Dual Stream	$3,500,000	$3,000,000	$6,500,000
Single Stream	$4,000,000	$3,000,000	$7,000,000

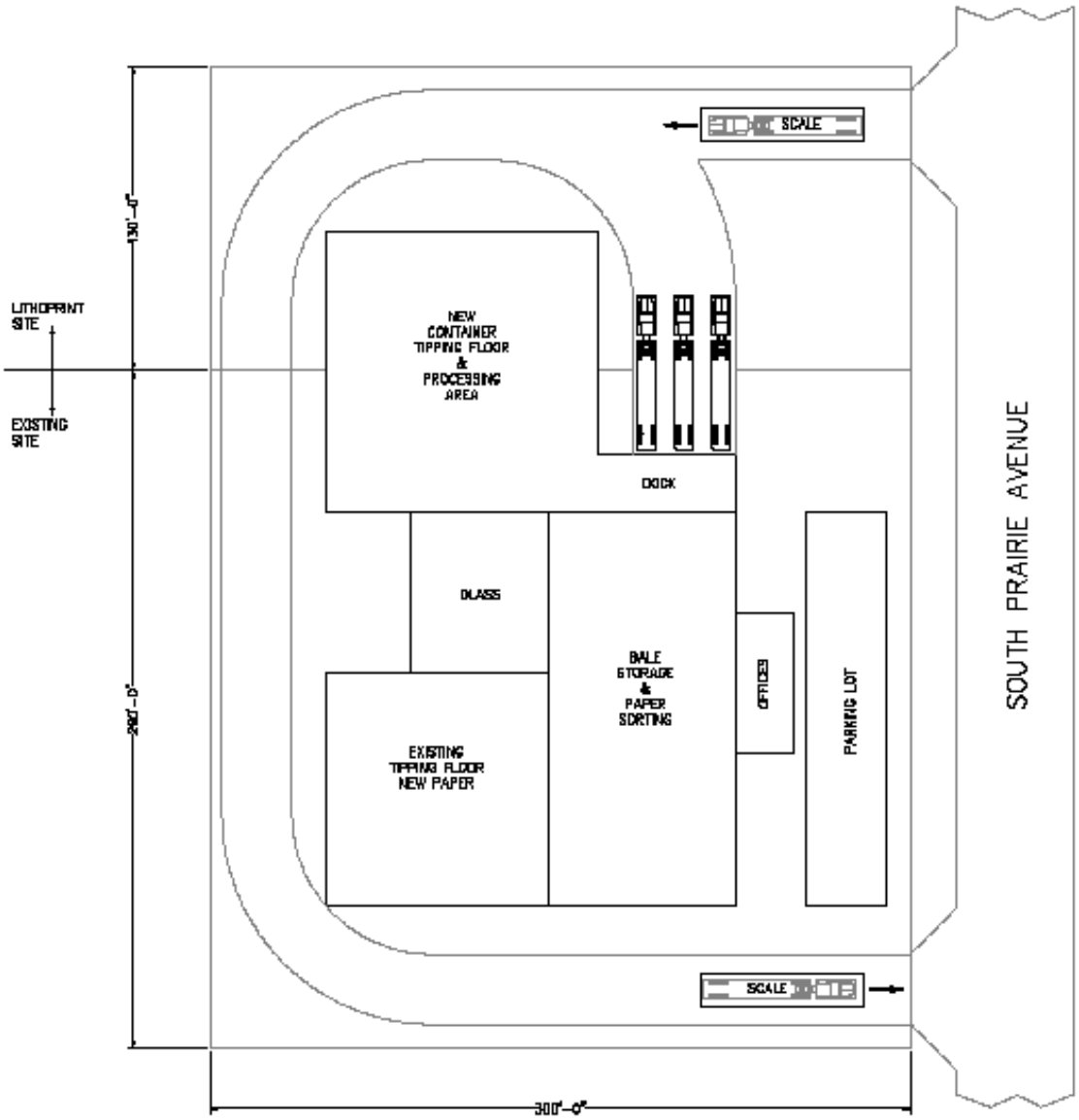
Table 3.a.3-2 : Expanded MRF Cost Benefit Matrix-Median Revenues

Operating Scenario	Year	Annual Capital Cost (1)	Annual Operating Costs (2)	Net Materials Sales Revenue Projection (3)	Est. Yearly Income (Deficit)	Per Ton Income (Deficit) (4)
		Ref. "A"	Ref. "B"	Ref. "C"	Total C-(A+B)	
Dual Stream Participating Only	2010	$626,225	$1,050,351	$1,806,783	$130,207	$5.32
Single Stream Participating Only	2010	$674,396	$1,345,614	$2,139,611	$119,601	$3.91

(1) Based on a Table 3.a.3-1 with a 15 year financing @ 5% interest rate
(2) Based on Table 3-5
(3) Based on Table 3-8 Materials Net Revenue Projection
(4) Based on Est. Yearly Income divided by the MRF tonnage estimates presented in Table 3-3 and 3-4

The following photo shows the existing County MRF facility and the Lithoprint site to the north:

The following drawing depicts the addition to the existing facility with the purchase of the Lithoprint site.



EXISTING WAUKESHA COUNTY MRF
&
EXPANSION TO NORTH

3.a.4 Conclusions

- Assuming no changes to existing programs (including no changes to automated cart pick-up and no substantial increase in tons delivered to the facility), the existing Waukesha County Recycling Facility and processing systems can maintain operations at the tonnage levels associated with the currently Participating Municipalities. However, the existing commingled container processing system was not designed for today's materials stream—especially given the increase in single serve plastic containers. This could be corrected with additional equipment; however, the space within the existing facility for this equipment is marginal. In order to maintain longer term use of the facility, the commingled line will need to be renovated and reconfigured.
- Should those Waukesha County municipalities currently not participating choose to deliver their recyclables to the County facility, drastic changes would need to be made in operating procedures and operating hours and additional space would be required for material processing and storage.
- The facility cannot be expanded in its existing footprint to become a Single Stream facility or to address the current Dual Stream shortfalls in the tipping floor, bale storage or commingled processing line.
- The existing footprint of the facility could be expanded with the purchase of additional land adjacent to the facility.
- If the existing facility was expanded, it could serve the future needs of all Waukesha County municipalities (Participating and Non-Participating), either as a Single Stream or Dual Stream facility. However, it would be very unlikely for a Non-Participating municipality that has already switched to Single Stream, to switch back to a Dual Stream system.
- The County should consider developing a new facility to accommodate any operating scenario that includes the addition of recyclables from the Cities of Milwaukee and Wauwatosa.

3.b. New Facility Dual and Single Stream Capacity and Cost Analysis

In order to understand the range of possibilities and potential outcomes, the project team performed economic analysis of Waukesha County building a new MRF using six potential tonnage scenarios: three for Dual Stream and three for Single Stream.

Dual Stream:

- The baseline of the current Participating Municipalities.
- The currently Participating Municipalities plus the Non-Participating Municipalities.
- The currently Participating Municipalities plus the Non-Participating Municipalities plus Wauwatosa plus Milwaukee Dual Stream. This is referred to as Dual Stream Regional MRF.

Single Stream:

- The baseline of the current Participating Municipalities.
- The currently Participating Municipalities plus the Non-Participating Municipalities.
- The currently Participating Municipalities plus the currently Non-Participating Municipalities plus Wauwatosa plus Milwaukee Single Stream. This is referred to Single Stream Regional MRF.

Each of these scenarios has been modeled for years 2010, 2015, 2020 and 2025 in terms of expected tonnages based upon population with cost inflation assumed to be 3% per year. Section 1 of this Report details the tonnage projections used and these are summarized in Table 3-3 and Table 3-4. While any of these scenarios are possible, it is more likely that some combination of tons would be delivered to a regional MRF in Waukesha County. The Project Team believes that the ranges of potential tons and operating costs modeled herein do accurately provide the range of possible per ton operating costs at different tonnage levels subjected to future inflation.

Table 3-3 : MRF Tonnage Projections - Dual Stream					
Operating Scenario	Year	Tons per Year	Tons per Hour Fiber (Footnote 3)	Tons per Hour Containers (Footnote 2)	Tons per Hour Total (Footnote1)
Participating					
	2010	24,452	8.64	3.12	11.76
	2015	25,080	8.86	3.20	12.06
	2020	25,724	9.09	3.27	12.36
	2025	26,575	9.39	3.39	12.78
Participating & Non-Participating					
	2010	36,649	12.95	4.67	17.62
	2015	37,722	13.33	4.81	18.14
	2020	38,813	13.72	4.94	18.66
	2025	40,213	14.21	5.12	19.33
Participating, Non-Participating, Wauwatosa, Milwaukee					
	2010	66,380	11.73	4.23	15.96
	2015	67,811	11.98	4.32	16.30
	2020	69,221	12.36	4.45	16.81
	2025	70,546	12.46	4.50	16.96

Table 3-4 : MRF Tonnage Projections - Single Stream					
Operating Scenario	Year	Tons per Year	Tons per Hour Fiber (Footnote 3)	Tons per Hour Containers (Footnote 2)	Tons per Hour Total (Footnote1)
Participating					
	2010	30,565	10.80	3.89	14.69
	2015	31,350	11.07	4.00	15.07
	2020	32,155	11.36	4.10	15.46
	2025	33,219	11.74	4.23	15.97
Participating & Non-Participating					
	2010	42,762	15.11	5.45	20.56
	2015	43,992	15.55	5.60	21.15
	2020	45,244	15.99	5.85	21.84
	2025	46,857	16.56	5.96	22.52
Participating, Non-Participating, Wauwatosa, Milwaukee					
	2010	76,060	13.44	4.85	18.28
	2015	77,686	13.73	4.95	18.67
	2020	79,292	14.01	5.05	19.06
	2025	80,817	14.28	5.15	19.43

Footnotes:

(1) The tons per hour for all scenarios except Regional MRF are based upon 8 hours. The Regional MRF tons per hour are based upon a two shift or 16 hour operation.
(2) Containers are calculated to be 26.5% of the total tonnage for dual and single stream.
(3) Fiber is calculated to be 73.5% of the total tonnage for dual and single stream.

The highest tonnage scenarios modeled here for both a single and dual stream tonnage would be the participating plus the non-participating municipalities in a single shift. In the year 2025 the dual stream facility would need to be able to process, just over 14 tons per hour of fiber and just over 5 tons per hour of commingled containers. The Single Stream facility would need to process approximately 23 tons per hour of total material with almost 17 being fiber and almost 6 being commingled. Based upon these calculations, we recommend that the design basis for a Dual Stream MRF be 17.5 tons per hour of fiber and 7.5 tons per hour of commingled containers. The design basis for a Single Stream MRF should be 25 tons per hour total materials, with 17.5 tons being fiber and 7.5 tons being commingled. Note that "tons per hour" design is the same for both systems. It is assumed that additional materials captured by Single Stream collection would be processed during a second shift.

Because either of the Regional MRF scenarios requires two-shift processing, any design must provide a tipping floor capable of storing materials received during normal collection hours and processed during a second shift. If the County expects the facility to operate as a regional MRF, up to 500 tons of tipping floor storage could be required by the year 2025.

3.b.1 New Facility Dual and Single Stream Operating Costs

For each of the six operating scenarios, the primary factor to operating costs over time is inflation. All operating costs have been modeled using an inflation factor of 3% per year. Over the 15-year life of the projected new MRF, this has a very measurable effect. We believe this is probably the worst case. A secondary effect on operating costs is tonnage. Per Section 1, the tonnage levels of each operating scenario changes as a result of projected population changes over time.

Single Stream operating costs are higher than Dual Stream costs. This is primarily due to the increased levels of residue in the single stream material resulting in additional labor to pre-screen incoming recyclables. Also, additional quality control personnel are needed to sort any fiber or containers that the screens do not automatically sort into the proper screen. Because of the additional screening systems required to sort fiber from containers, Single Stream Systems are more costly resulting in higher amortization costs. Single Stream systems affect labor needs in different ways; they create the need for additional labor for quality control while reducing labor relative to a Dual Stream system by automating the removal of both mixed broken glass and residue. The net effect is generally that Single Stream systems require additional personnel when compared to technologically comparable Dual Stream Systems.

While the capital costs associated with various hourly throughputs within a fairly narrow range are mostly constant, operating costs are not. Per ton Operations and Maintenance costs vary substantially in the same facility at different throughput levels. Similarly, dual and single stream operating costs also vary. Attached to this report as Appendix F are the detailed operating cost worksheets for the proposed MRF for the six operating scenarios and years, 2010, 2015, 2020, and 2025. These costs are summarized in the attached table 3-5.

The specific operating costs included in Table 3-5 include;

- Labor Costs (Including Overtime)
- Administrative Costs
- Disposal Cost for Generated Residue
- Utilities
- Repair/Maintenance Costs
- Fuel
- Insurance
- Office Supplies
- Telephone
- Postage
- Safety Supplies
- Janitorial Expense
- Security Expense
- Travel
- Other

Key Assumptions are;

- 3% inflation factor per year.
- Residue generation rate of 5% for Dual Stream and 10% for Single Stream.
- Residue disposal cost of $35/ton.
- Benefits at 30%.
- Amortization of capital expenses is not included as an operating cost but is included in Tables 3-10 and 3-11 as a distinct cost item.

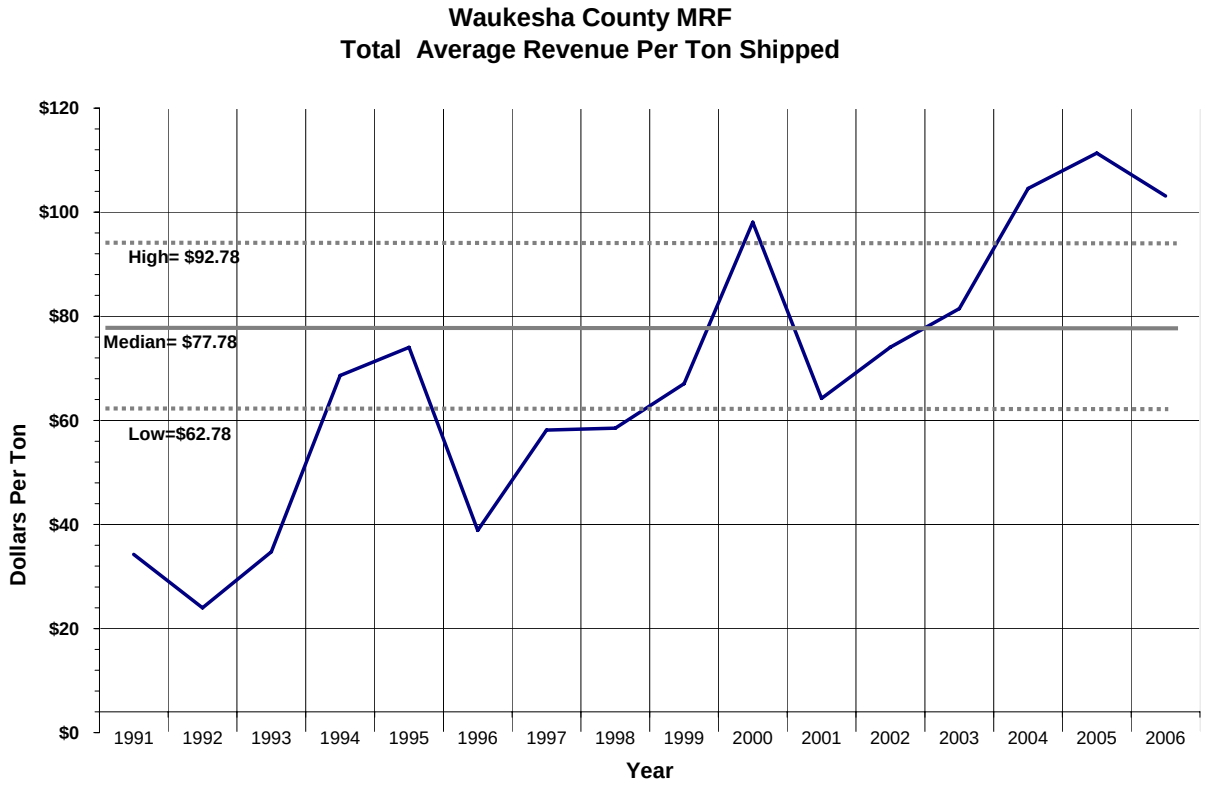
Table 3-5 : Projected MRF Operating Costs - Dual Stream vs. Single Stream

DUAL STREAM MRF				SINGLE STREAM MRF			
Operating Scenario	Year	Annual O&M Cost	Per Ton Operating Cost	Operating Scenario	Year	Annual O&M Cost	Per Ton Operating Cost
Participating				Participating			
	2010	$ 1,050,351	$ 42.96		2010	$ 1,345,614	$ 44.02
	2015	$ 1,206,698	$ 48.11		2015	$ 1,539,199	$ 49.10
	2020	$ 1,396,262	$ 54.28		2020	$ 1,782,981	$ 55.45
	2025	$ 1,617,853	$ 60.88		2025	$ 2,068,875	$ 62.28
Participating & Non-Participating				Participating & Non-Participating			
	2010	$ 1,272,078	$ 34.71		2010	$ 1,620,057	$ 37.89
	2015	$ 1,462,762	$ 38.78		2015	$ 1,863,500	$ 42.36
	2020	$ 1,695,903	$ 43.69		2020	$ 2,162,426	$ 47.79
	2025	$ 1,969,541	$ 48.98		2025	$ 2,514,158	$ 53.66
Participating, Non-Participating, Wauwatosa, Milwaukee				Participating, Non-Participating, Wauwatosa, Milwaukee			
	2010	$ 2,140,086	$ 32.24		2010	$ 2,791,624	$ 36.70
	2015	$ 2,457,636	$ 36.24		2015	$ 3,206,164	$ 41.27
	2020	$ 2,850,166	$ 41.17		2020	$ 3,713,494	$ 46.83
	2025	$ 3,293,953	$ 46.69		2025	$ 4,300,199	$ 53.21

3.b.2 New Facility Dual and Single Stream Expected Revenues

Figure 3-1 depicts the actual average dollars per ton received from the sale of all commodities from the Waukesha County MRF 1991-2006.

Figure 3-1



Over this period of time, 292,559 tons of various commodities have been sold resulting in total revenues of $21,372,917. This equates to an average per ton value of $73.06 and a median value of $77.78 per ton. The high and low figures used in modeling potential revenue scenarios represent a generalized market range (+/- $15/ton) for recyclable materials experienced by the county program during the past 10 years. The median, the high and low generalized market ranges are used to illustrate the effect of market prices upon facility operating parameters. The following table 3-6 summarizes these values.

Table 3-6 : MRF Per Ton Revenue
Used for Facility Revenue Projections

$/Ton Net Revenue		
Low	High	Median
$ 62.78	$ 92.78	$ 77.78

(1) Median Revenue is actual median value of recyclable materials shipped for last 10 years.

(2) Low and High Revenue values are $15/ton below and above median value. This represents the generalized market range experienced by the County program over the last 10 years

Projecting the pricing for recyclables in the future is a variable that is most difficult to predict. Following discussions with Waukesha County staff and the Project Team, we believe that using real numbers from Waukesha County will provide those evaluating this report, the best understanding of what potential revenue streams may be in the future. The assumption one makes in this area will determine how one perceives the economic benefits or costs of the recycling program. The balance of the analysis in Section 3.b. includes a Low Price Assumption, a High Price Assumption, and a Median Price Assumption based upon the total operating history of the Waukesha MRF. The following, Tables 3-7 and 3-8 summarizes the total system revenue under the range of dual and single stream operating scenarios.

Net Revenues is the amount of money the facility would produce net of the cost of freight. The charts below detail total revenues and do not include any revenue sharing should a third party operator be used.

Table 3-7 : Projected MRF Material Revenues - Dual Stream

Year	Operating Scenario	Incoming Tons (1)	Tons Shipped (2)	Low Net Revenue Projection [$62.78 per Ton]	High Net Revenue Projection [$92.78 per Ton]	Median Net Revenue Projection [$77.78 per Ton]
	Participating					
2010		24,452	23,229	$ 1,458,342	$ 2,155,224	$ 1,806,783
2015		25,080	23,826	$ 1,495,796	$ 2,210,576	$ 1,853,186
2020		25,724	24,438	$ 1,534,205	$ 2,267,339	$ 1,900,772
2025		26,575	25,246	$ 1,584,960	$ 2,342,347	$ 1,963,653
	Participating & Non-Participating					
2010		36,649	34,817	$ 2,185,783	$ 3,230,280	$ 2,708,031
2015		37,722	35,836	$ 2,249,778	$ 3,324,855	$ 2,787,316
2020		38,813	36,872	$ 2,314,846	$ 3,421,017	$ 2,867,931
2025		40,213	38,202	$ 2,398,344	$ 3,544,414	$ 2,971,379
	Participating, Non-Participating, Wauwatosa, Milwaukee					
2010		66,380	63,061	$ 3,958,970	$ 5,850,800	$ 4,904,885
2015		67,811	64,420	$ 4,044,316	$ 5,976,929	$ 5,010,623
2020		69,221	65,760	$ 4,128,410	$ 6,101,208	$ 5,114,809
2025		70,546	67,019	$ 4,207,434	$ 6,217,995	$ 5,212,714

(1) Projected tons of incoming recyclables are from Table 1-9.
(2) Projected tons of recyclables shipped are 95% of incoming tons for dual stream.

Table 3-8 : Projected MRF Material Revenues - Single Stream

Year	Operating Scenario	Incoming Tons (1)	Tons Shipped (2)	Low Net Revenue Projection [$62.78 per Ton]	High Net Revenue Projection [$92.78 per Ton]	Median Net Revenue Projection [$77.78 per Ton]
	Participating					
2010		30,565	27,509	$ 1,726,984	$ 2,552,239	$ 2,139,611
2015		31,350	28,215	$ 1,771,338	$ 2,617,788	$ 2,194,563
2020		32,155	28,940	$ 1,816,822	$ 2,685,007	$ 2,250,914
2025		33,219	29,897	$ 1,876,940	$ 2,773,853	$ 2,325,396
	Participating & Non-Participating					
2010		42,762	38,486	$ 2,416,139	$ 3,570,713	$ 2,993,426
2015		43,992	39,593	$ 2,485,636	$ 3,673,420	$ 3,079,528
2020		45,244	40,720	$ 2,556,376	$ 3,777,964	$ 3,167,170
2025		46,857	42,171	$ 2,647,514	$ 3,912,653	$ 3,280,084
	Participating, Non-Participating, Wauwatosa, Milwaukee					
2010		76,060	68,454	$ 4,297,542	$ 6,351,162	$ 5,324,352
2015		77,686	69,917	$ 4,389,414	$ 6,486,936	$ 5,438,175
2020		79,292	71,363	$ 4,480,157	$ 6,621,041	$ 5,550,599
2025		80,817	72,735	$ 4,566,322	$ 6,748,381	$ 5,657,352

(1) Projected tons of incoming recyclables are from Table 1-9.
(2) Projected tons of recyclables shipped are 90% of incoming tons for single stream.

3.b.3 New Facility Dual and Single Stream Capital Costs

For purposes of modeling and projections, Table 3-9 summarizes the estimated capital costs for the recommended dual and single stream facility.

Table 3-9: Estimated Capital Costs (2007 Dollars)

	Equipment and Systems	Building Costs	Site Improvement Costs	Total Costs
Dual Stream	$3,500,000	$3,500,000	$750,000	$7,750,000
Single Stream	$4,000,000	$3,500,000	$750,000	$8,250,000

Note: These costs include engineering on a green field site not requiring extensive site work or foundation piling, excluding land purchase.

3.b.4 New Facility Dual and Single Stream Cost Benefit Analysis

Tables 3-10 and 3-11 on the following page summarizes the economics of developing either a dual or single stream MRF in Waukesha County for the six different operating scenarios in years 2010, 2015, 2020 and 2025. Cases are presented for low, high, and median material revenues to illustrate the effect of material prices on the economics.

These numbers do not include any revenue share or service fee payments to or from a potential third party operator. They represent the projected costs and revenues associated with building, paying for and operating a dual or single stream MRF in Waukesha County at various tonnage levels over a 15-year period ending in 2025. Clearly, the assumption that all costs will escalate at an annual 3% rate combined with the further assumption that secondary materials revenues will, over time, have a non escalating average strongly affects the results of this analysis. It causes the MRF in lower tonnage operating scenarios to be in a net deficit operating mode during the later years of its life. Of course, higher tonnages, as expected, raise the overall return of any MRF. No profits for a third party operator are included in costs and payments to or from a potential operator and/or sharing of revenue is not calculated. The analysis above, however, provides the County a framework to evaluate its options and select the contract structure most in its advantage.

What is most important under any scenario of MRF development is for the County to determine what tonnages would be made available by local municipalities. The Project Team's recommendations are included in Section 5 of this Report.

Table 3-10 : Dual Stream MRF Cost Benefit Matrix

Operating Scenario	Year	Annual Capital Cost (1)	Annual Operating Costs (2)	Low Materials Revenue: Net Materials Sales Revenue Projection (3)	Low Materials Revenue: Est. Yearly Income (Deficit)	Low Materials Revenue: Per Ton Income (Deficit) (4)	High Materials Revenue: Net Materials Sales Revenue Projection (3)	High Materials Revenue: Est. Yearly Income (Deficit)	High Materials Revenue: Per Ton Income (Deficit) (4)	Median Materials Revenue: Net Materials Sales Revenue Projection (3)	Median Materials Revenue: Est. Yearly Income (Deficit)	Median Materials Revenue: Per Ton Income (Deficit) (4)
		Ref. "A"	Ref. "B"	Ref. "C"	Total C-(A+B)		Ref. "C"	Total C-(A+B)		Ref. "C"	Total C-(A+B)	
Participating	2010	$746,653	$1,050,351	$1,458,342	($338,662)	($13.85)	$2,155,224	$358,220	$14.65	$1,806,783	$9,779	$0.40
	2015	$746,653	$1,206,698	$1,495,796	($457,555)	($18.24)	$2,210,576	$257,225	$10.26	$1,853,186	($100,165)	($3.99)
	2020	$746,653	$1,396,262	$1,534,205	($608,710)	($23.66)	$2,267,339	$124,424	$4.84	$1,900,772	($242,143)	($9.41)
	2025	$746,653	$1,617,853	$1,584,960	($779,546)	($29.33)	$2,342,347	($22,159)	($0.83)	$1,963,653	($400,852)	($15.08)
Participating and Non-Participating	2010	$746,653	$1,272,078	$2,185,783	$167,053	$4.56	$3,230,280	$1,211,549	$33.06	$2,708,031	$689,301	$18.81
	2015	$746,653	$1,462,762	$2,249,778	$40,363	$1.07	$3,324,855	$1,115,440	$29.57	$2,787,316	$577,901	$15.32
	2020	$746,653	$1,695,903	$2,314,846	($127,710)	($3.29)	$3,421,017	$978,461	$25.21	$2,867,931	$425,376	$10.96
	2025	$746,653	$1,969,541	$2,398,344	($317,850)	($7.90)	$3,544,414	$828,220	$20.60	$2,971,379	$255,185	$6.35
Participating, Non-Participating, Wauwatosa, Milwaukee	2010	$746,653	$2,140,086	$3,958,970	$1,072,230	$16.15	$5,850,800	$2,964,060	$44.65	$4,904,885	$2,018,145	$30.40
	2015	$746,653	$2,457,636	$4,044,316	$840,027	$12.39	$5,976,929	$2,772,641	$40.89	$5,010,623	$1,806,334	$26.64
	2020	$746,653	$2,850,166	$4,128,410	$531,590	$7.68	$6,101,208	$2,504,389	$36.18	$5,114,809	$1,517,990	$21.93
	2025	$746,653	$3,293,953	$4,207,434	$166,828	$2.36	$6,217,995	$2,177,389	$30.86	$5,212,714	$1,172,109	$16.61

(1) Based on a Table 3-9 with a 15 year financing @ 5% interest rate
(2) Based on Table 3-5
(3) Based on Table 3-7 Materials Net Revenue Projection
(4) Based on Est. Yearly Income divided by the MRF tonnage estimates presented in Table 3-3

Table 3-11 : Single Stream MRF Cost Benefit Matrix Revised 5-08

Operating Scenario	Year	Annual Capital Cost (1)	Annual Operating Costs (2)	Low Materials Revenue: Net Materials Sales Revenue Projection (3)	Low Materials Revenue: Est. Yearly Income (Deficit)	Low Materials Revenue: Per Ton Income (Deficit) (4)	High Materials Revenue: Net Materials Sales Revenue Projection (3)	High Materials Revenue: Est. Yearly Income (Deficit)	High Materials Revenue: Per Ton Income (Deficit) (4)	Median Materials Revenue: Net Materials Sales Revenue Projection (3)	Median Materials Revenue: Est. Yearly Income (Deficit)	Median Materials Revenue: Per Ton Income (Deficit) (4)
		Ref. "A"	Ref. "B"	Ref. "C"	Total C-(A+B)		Ref. "C"	Total C-(A+B)		Ref. "C"	Total C-(A+B)	
Participating	2010	$674,396	$1,345,614	$1,726,984	($293,026)	($9.59)	$2,552,239	$532,229	$17.41	$2,139,611	**$119,601**	$3.91
	2015	$674,396	$1,539,199	$1,771,338	($442,257)	($14.11)	$2,617,788	$404,193	$12.89	$2,194,563	($19,032)	($0.61)
	2020	$674,396	$1,782,981	$1,816,822	($640,555)	($19.92)	$2,685,007	$227,630	$7.08	$2,250,914	($206,463)	($6.42)
	2025	$674,396	$2,068,875	$1,876,940	($866,331)	($26.08)	$2,773,853	$30,582	$0.92	$2,325,396	($417,875)	($12.58)
Participating and Non-Participating	2010	$674,396	$1,620,057	$2,416,139	$121,686	$2.85	$3,570,713	$1,276,260	$29.85	$2,993,426	$698,973	$16.35
	2015	$674,396	$1,863,500	$2,485,636	($52,260)	($1.19)	$3,673,420	$1,135,524	$25.81	$3,079,528	$541,632	$12.31
	2020	$674,396	$2,162,426	$2,556,376	($280,445)	($6.20)	$3,777,964	$941,143	$20.80	$3,167,170	$330,349	$7.30
	2025	$674,396	$2,514,158	$2,647,514	($541,039)	($11.55)	$3,912,653	$724,100	$15.45	$3,280,084	$91,530	$1.95
Participating, Non-Participating, Wauwatosa, Milwaukee	2010	$794,824	$2,791,624	$4,297,542	$711,094	$9.35	$6,351,162	$2,764,714	$36.35	$5,324,352	**$1,737,904**	$22.85
	2015	$794,824	$3,206,164	$4,389,414	$388,427	$5.00	$6,486,936	$2,485,949	$32.00	$5,438,175	$1,437,188	$18.50
	2020	$794,824	$3,713,494	$4,480,157	($28,161)	($0.36)	$6,621,041	$2,112,723	$26.64	$5,550,599	$1,042,281	$13.14
	2025	$794,824	$4,300,199	$4,566,322	($528,701)	($6.54)	$6,748,381	$1,653,358	$20.46	$5,657,352	$562,329	$6.96

(1) Based on a Table 3-9 with a 15 year financing @ 5% interest rate and Table 3.a.3-2
(2) Based on Table 3-5
(3) Based on Table 3-8 Materials Net Revenue Projection
(4) Based on Est. Yearly Income divided by the MRF tonnage estimates presented in Table 3-4

3.c Single Stream Collection Savings

Table 3-12 details the trash and recyclable collection costs for each Participating Municipality in Waukesha County. For the twenty-two Participating Municipalities that reported specific cost data, the current average recycling collection cost is slightly less than $3 per month per household. Therefore, the current total recycling collection cost for all of the Participating Municipalities is approximately $3,000,000 to have an estimated 24,000 tons of recyclables collected and delivered to the County MRF. This equates to approximately $125 per ton for recyclables collection only.

Section 2 of this Report, and additional information provided in the case studies of Appendix B, details the collection savings realized by other communities switching from dual stream programs to single stream programs. Conservatively, the Project Team estimates at least a 10% savings in overall "collection related" costs could be achieved by Waukesha County participants in switching from a Dual Stream to more efficient and cost effective Single Stream MRF-based system.

It is important to understand that the cost per month for Trash Collection reported in Table 3-12 is actually a combination of the "Trash Collection plus the Trash Disposal" costs rolled-up into one charge to the local governments. However, the Recyclables Collection cost per month reported in Table 3-12 is truly just the collection charge as the recyclables processing and marketing component is handled by the County at the County MRF.

During 2006, the total MSW waste stream of Waukesha County was reported to be 121,439 tons. The 12 Non-Participating Municipalities generated 34,260 tons of MSW and the 25 Participating Municipalities generated 87,179 tons. The 22 municipalities under MSW collection contracts produced 68,442 tons of MSW in 2006. Based on the cost data provided in Table 3-12, their total MSW collection cost was $6,285,958 which is equal to $91.84 per ton for collection and disposal costs. If the landfill disposal cost were assumed to average $35 per ton, by subtraction, the collection cost for MSW is estimated to be $56.84/ton.

As presented above, this total or "aggregated hauling cost" for recycling and trash of approximately $8.8 million per year for the twenty-two Participating Municipalities equals approximately $10.33 per household per month. The other three municipalities have a subscription service.

Table 3-12 : 2006 Survey Data for Participating Municipalities

Municipality	Number of Households (1)	Trash Collection & Disposal: Cost/HH Month	Trash Collection & Disposal: Annual Cost	Recycling Collection: Cost/HH Month	Recycling Collection: Annual Cost	Total Trash, Disposal, & Recycling Collection: Cost/HH Month	Total Trash, Disposal, & Recycling Collection: Annual Cost	Type of Service (2): Service Location	Type of Service (2): Contractor (3) & Exp.Date
CITIES									
BROOKFIELD	14,948	$ 10.18	$ 1,346,699	$ 3.06	$ 548,784	$ 13.24	$ 1,895,483	UD	Veolia 12/08
DELAFIELD	2,788	$ 9.14	$ 342,412	$ 2.22	$ 95,875	$ 11.36	$ 438,287	UD & C	Veolia 12/10
NEW BERLIN	10,313		Subscription		Subscription		Subscription		
OCONOMOWOC	4,984	$ 8.08	$ 483,199	$ 3.65	$ 218,449	$ 11.73	$ 701,648	UD & C	Veolia 8/09
PEWAUKEE	4,300	$ 8.83	$ 455,800	$ 2.50	$ 129,000	$ 11.33	$ 584,800	UD	Veolia 1/09
WAUKESHA	19,985	$ 5.54	$ 1,161,805	$ 2.35	$ 562,287	$ 7.89	$ 1,724,092	C	Veolia 12/07
TOWNS									
BROOKFIELD	1,979	$ 8.68	$ 200,905	$ 3.46	$ 83,963	$ 12.14	$ 284,868	UD	Veolia 3/08
DELAFIELD	2,988	$ 9.33	$ 334,000	$ 3.50	$ 122,262	$ 12.83	$ 456,262	UD	Veolia 12/08
LISBON	3,316	$ 10.79	$ 413,207	$ 2.70	$ 103,302	$ 13.48	$ 516,509	UD	Veolia 12/08
MERTON	1,867		Subscription		Subscription		Subscription		
OCONOMOWOC	2,970		Subscription		Subscription		Subscription		
SUMMIT	2,019	$ 9.42	$ 204,828	$ 3.49	$ 81,778	$ 12.91	$ 286,606	UD	Veolia 12/09
WAUKESHA	3,051	$ 9.00	$ 329,508	$ 3.40	$ 124,480	$ 12.40	$ 453,988	UD & C	Veolia 12/09
VILLAGES									
BIG BEND	465	$ 7.19	$ 55,241	$ 2.85	$ 15,401	$ 10.04	$ 70,642	C	WM 12/08
CHENEQUA	260	$ 11.22	$ 35,001	$ 4.81	$ 15,009	$ 16.03	$ 50,010	UD	Veolia 12/09
DOUSMAN	597	$ 8.21	$ 50,499	$ 3.35	$ 20,614	$ 11.56	$ 71,113	C	Veolia 12/07
EAGLE	651	$ 9.20	$ 63,058	$ 3.50	$ 25,203	$ 12.70	$ 88,261	C	John's 12/08
ELM GROVE	2,057	$ 7.38	$ 185,615	$ 3.82	$ 99,056	$ 11.20	$ 284,671	UD	Veolia 3/10
HARTLAND	2,559	$ 7.68	$ 235,939	$ 3.67	$ 112,596	$ 11.35	$ 348,535	C	Veolia 12/10
LAC LABELLE	124	$ 8.20	$ 12,214	$ 4.17	$ 6,212	$ 12.37	$ 18,426	UD	Veolia 12/07
MERTON	810	$ 8.46	$ 78,123	$ 3.05	$ 49,533	$ 11.50	$ 127,656	C	Veolia 12/11
NASHOTAH	402	$ 8.57	$ 41,381	$ 3.27	$ 15,811	$ 11.84	$ 57,192	UD	Veolia 12/09
OCONOMOWOC LAKE	275	$ 10.10	$ 36,232	$ 3.60	$ 10,123	$ 13.70	$ 46,355	UD	Veolia 12/09
PEWAUKEE	1,678	$ 7.00	$ 130,231	$ 3.50	$ 58,502	$ 10.50	$ 188,733	C	Veolia 12/09
WALES	893	$ 8.55	$ 90,061	$ 3.15	$ 29,000	$ 11.70	$ 119,061	C	Veolia 12/07
Subtotal 22 Municipalities (Excl. Subscriptions)	71,129		$ 6,285,958		$ 2,527,240		$ 8,813,198		
					Households, excl. Subscription		71,129		
Total 25 Municipalities	86,279								
						Avg.Total Cost $/HH/Mo	$ 10.33		

(1) Served by curbside collection
(2) C=Curbside and UD=Up the Drive
(3) WM= Waste Management

Notes: 1) Summary of data compiled from the Municipal Survey Forms completed by each jurisdiction and 2006 state recycling grant report.
2) All contracting municipalities receive weekly collection of trash and recyclables delivered to County MRF by private hauler.

If switching over to a Single Stream collection system were able to generate a combination of the 10% overall savings forecast, it would come from a combination of the following:

(1) lower trash collection costs experienced by the haulers with slightly extended routes (i.e. more customers collected to fill up their route trucks) due to less trash being generated per household serviced (i.e. a portion of the previous trash materials can now be placed into the expanded system accommodated by a Single Stream MRF);

(2) capturing the avoided landfill disposal fees as more recyclable materials (formerly in the trash containers) are moved into the larger recycling carts for processing at a Single Stream MRF (i.e. less waste is hauled to the landfill per household); and

(3) due to a more efficient collection system being utilized that includes automated side loaders and carts, the haulers recycling routes are less costly per household (some municipalities are even being serviced once every two weeks) creating the benefit to lower unit costs.

If this estimated 10% overall savings were realized, and able to be captured by the program participants through lower collection costs, versus just being put into the “profits” column of the collectors, this could potentially amount to a $1.03 per household per month reduction in charges. However, the Project Team wished to note that this is an average County estimate for the collection system component and will not necessarily directly apply to each community. Some may be higher and others lower than this figure. The savings will depend upon the community demographics; the age and type of collection system currently utilized, the last time collection bids were actually received, route efficiency capabilities, the ability to integrate routes with other municipalities to achieve economy-of-scale, etc. Additionally, the amount of local collector competition as well as the cost of fuel will also be major issues the next time collection services are procured by the local municipalities.

3.d Single Stream Curbside Carts Requirements & Costs

If the County were to implement a Single Stream program, the curbside materials collection system would need to be changed from small bins (typically 18 gallon in size) to a larger rolling cart system typically 96 gallon in size (as depicted in Appendix G and currently provided by John's Disposal for their Single Stream customers). Some of the largest bin and cart providers include manufacturers such as Toter, Otto, Cascade, Rehrig Pacific and Schaefer.

While the small bin is a pretty static device with no moving parts and typically emptied manually, carts have wheels and rotating lids are usually mechanically lifted for dumping. These moving components provide the opportunity, over time, for parts failure and maintenance requirements. Additionally, the shape of the small bins allows nesting of the bins in shipping from the manufacture to the community and/or service provider. The larger volume taken up by the wheeled carts has provided challenges in trying to control the shipping costs, the costs of cart distributions to households, and the long-term maintenance of these carts.

As the shift from relatively inexpensive bins to much more expensive carts has occurred, many municipalities receiving cart services have begin to look at these larger more expensive carts as another municipal asset, and questioning the ownership and maintenance roles of the service provider versus the service recipient. One of the key issues is that carts can last up to 20 years, while collection service contracts usually are 3 to 5 years, maybe increasing to 7-10 years in some recent solicitations. Thus, the typical short duration of a contract involving expensive carts has led to higher cost of collection charges to cover the amortization, distribution costs (including potential removal after only a 3 year contract period) and maintenance.

Within the context of this Project, and based on the above discussion ,the Project Team recommends that the County consider buying large carts required for any new system directly from the cart manufacturers. Additionally, since these carts have a potential useful life matching the base term of any new MRF, i.e. 15 years, the Project Team suggests the carts be financed through the same mechanism as the other capital assets. Therefore, as noted in Table 3-11, a 15 year term and 5% interest rate is being used for the 96 gallon Single Stream cart purchases.

The number of carts purchased will depend upon the actual participants in any new Project. However, assuming that the cost of a 96 gallon recycling cart for each household cost $55 to purchase, ship and distribute, the annual cost of ownership [based on the financing assumption noted in the previous paragraph] above would be $6.26 per year or $0.52 per household per month.

3.e Summary of Savings

Tables 3-13A, 3-13B, and 3-13C present an overview and summary of the detailed system costs comparing the financial differences and cost benefits of a new Dual Stream MRF versus a new Single Stream MRF. The summary of costs in these tables reflect all of the cost and revenue conditions presented earlier in this Section of the Report, for the three material revenue projections (low, high, and median). As can be seen, the incorporation of the Single Stream collection cost savings makes a substantial difference in helping to justify the Single Stream MRF approach. In addition to presenting the specific marginal cost benefit on a per household per month basis, Table 3-13A, B, and C also provides the total estimated differential between the two systems if all the households noted within each Operating Scenario actually participate in the new program. Additionally, the amount of material recycled will be higher with the Single Stream program as discussed earlier.

Table 3-13A : Summary of Economic Analysis of Dual Stream & Single Stream Programs-Low Material Revenue Projection

			DUAL STREAM MRF		SINGLE STREAM MRF					SINGLE STREAM vs. DUAL STREAM MRF	
Operating Scenario	**Year**	**Number of House Holds (1)**	**Est. Yearly Income (Deficit) (2)**	**Equivalent $/HH/Month**	**Est. Yearly Income (Deficit) (3)**	**Equivalent $/HH/Month**	**Single Stream "Collection System" Savings, $/HH/Month (4)**	**Cart Ownership for Single Stream Collection $/HH/Month (5)**	**Est. of Net Cost or Income w/Credit, $/HH/Month**	**$/HH/Month Summary of Calculated Savings (Cost) w/ Single Stream MRF System**	**Annual Summary of Projected Savings for ALL Participating Households w/Single Stream MRF System (6)**
				Ref. "A"		Ref. "B"	Ref. "C"	Ref. "D"	B+C+D= Ref "E"	E-A="F"	
Participating	2010	88,677	($338,662)	($0.32)	($413,454)	($0.39)	$1.03	($0.52)	$0.12	$0.44	$467,911
	2015	91,064	($457,555)	($0.42)	($562,685)	($0.51)	$1.03	($0.52)	($0.00)	$0.41	$452,182
	2020	93,504	($608,710)	($0.54)	($760,983)	($0.68)	$1.03	($0.52)	($0.17)	$0.37	$419,973
	2025	96,694	($779,546)	($0.67)	($986,759)	($0.85)	$1.03	($0.52)	($0.34)	$0.33	$384,555
		-									
Participating + Non-Participating	2010	130,862	$167,053	$0.11	$1,258	$0.00	$0.70	($0.52)	$0.18	$0.07	$113,676
	2015	134,788	$40,363	$0.02	($172,688)	($0.11)	$0.70	($0.52)	$0.07	$0.04	$71,427
	2020	138,775	($127,710)	($0.08)	($400,873)	($0.24)	$0.69	($0.52)	($0.07)	$0.01	$16,595
	2025	143,863	($317,850)	($0.18)	($661,467)	($0.38)	$0.69	($0.52)	($0.21)	($0.03)	($46,182)
		-									
Participating, Non-Participating, Wauwatosa, Milwaukee	2010	343,506	$1,072,230	$0.26	$711,094	$0.17	$0.74	($0.52)	$0.39	$0.13	$545,719
	2015	350,044	$840,027	$0.20	$388,427	$0.09	$0.74	($0.52)	$0.31	$0.11	$472,515
	2020	356,371	$531,590	$0.12	($28,161)	($0.01)	$0.74	($0.52)	$0.21	$0.09	$381,069
	2025	360,987	$166,828	$0.04	($528,701)	($0.12)	$0.74	($0.52)	$0.10	$0.06	$257,476

(1) Based on Tables 1-2B and 1-3B using survey data and population growth projections.
(2) Based on Table 3-10
(3) Based on Table 3-11
(4) Participating Community entries are based on Table 3-12 and discussion presented in Section 3.c
Participating + Non-Participating Communities are based on prorating existing Single Stream Collection programs at Non-Part with no cost savings
Region Program assumes Milwaukee Dual Stream and Wauwatosa Blue Bag could see cost savings and used Waukesha Average
(5) Based on writeup in Section 3.d and assumes all initial carts are financed with the MRF project.
(6) Column "E" times 12 months/year times Number of Households estimated to be serviced by program

Table 3-13B : Summary of Economic Analysis of Dual Stream & Single Stream Programs -High Material Revenue Projection

			DUAL STREAM MRF		SINGLE STREAM MRF					SINGLE STREAM vs. DUAL STREAM MRF	
Operating Scenario	**Year**	**Number of House Holds (1)**	**Est. Yearly Income (Deficit) (2)**	**Equivalent $/HH/Month**	**Est. Yearly Income (Deficit) (3)**	**Equivalent $/HH/Month**	**Single Stream "Collection System" Savings, $/HH/Month (4)**	**Cart Ownership for Single Stream Collection $/HH/Month (5)**	**Est. of Net Cost or Income w/Credit, $/HH/Month**	**$/HH/Month Summary of Calculated Savings (Cost) w/ Single Stream MRF System**	**Annual Summary of Projected Savings for ALL Participating Households w/Single Stream MRF System (6)**
				Ref. "A"		Ref. "B"	Ref. "C"	Ref. "D"	B+C+D= Ref "E"	E-A="F"	
Participating	2010	88,677	$358,220	$0.34	$411,801	$0.39	$1.03	($0.52)	$0.90	$0.56	$596,284
	2015	91,064	$257,225	$0.24	$283,765	$0.26	$1.03	($0.52)	$0.77	$0.53	$583,852
	2020	93,504	$124,424	$0.11	$107,202	$0.10	$1.03	($0.52)	$0.61	$0.49	$555,024
	2025	96,694	($22,159)	($0.02)	($89,846)	($0.08)	$1.03	($0.52)	$0.43	$0.45	$524,081
		-									
Participating + Non-Participating	2010	130,862	$1,211,549	$0.77	$1,155,832	$0.74	$0.70	($0.52)	$0.91	$0.14	$223,754
	2015	134,788	$1,115,440	$0.69	$1,015,096	$0.63	$0.70	($0.52)	$0.80	$0.11	$184,134
	2020	138,775	$978,461	$0.59	$820,715	$0.49	$0.69	($0.52)	$0.67	$0.08	$132,013
	2025	143,863	$828,220	$0.48	$603,672	$0.35	$0.69	($0.52)	$0.52	$0.04	$72,886
		-									
Participating, Non-Participating, Wauwatosa, Milwaukee	2010	343,506	$2,964,060	$0.72	$2,764,714	$0.67	$0.74	($0.52)	$0.89	$0.17	$707,509
	2015	350,044	$2,772,641	$0.66	$2,485,949	$0.59	$0.74	($0.52)	$0.81	$0.15	$637,424
	2020	356,371	$2,504,389	$0.59	$2,112,723	$0.49	$0.74	($0.52)	$0.71	$0.13	$549,154
	2025	360,987	$2,177,389	$0.50	$1,653,358	$0.38	$0.74	($0.52)	$0.60	$0.10	$428,974

(1) Based on Tables 1-2B and 1-3B using survey data and population growth projections.
(2) Based on Table 3-10
(3) Based on Table 3-11
(4) Participating Community entries are based on Table 3-12 and discussion presented in Section 3.c
Participating + Non-Participating Communities are based on prorating existing Single Stream Collection programs at Non-Part with no cost savings
Region Program assumes Milwaukee Dual Stream and Wauwatosa Blue Bag could see cost savings and used Waukesha Average
(5) Based on writeup in Section 3.d and assumes all initial carts are financed with the MRF project.
(6) Column "E" times 12 months/year times Number of Households estimated to be serviced by program

Table 3-13C : Summary of Economic Analysis of Dual Stream & Single Stream Programs -Median Material Revenue Projection Revised 5-08

			DUAL STREAM MRF		SINGLE STREAM MRF					SINGLE STREAM vs. DUAL STREAM MRF	
Operating Scenario	**Year**	**Number of House Holds (1)**	**Est. Yearly Income (Deficit) (2)**	**Equivalent $/HH/Month**	**Est. Yearly Income (Deficit) (3)**	**Equivalent $/HH/Month**	**Single Stream "Collection System" Savings, $/HH/Month (4)**	**Cart Ownership for Single Stream Collection $/HH/Month (5)**	**Est. of Net Cost or Income w/Credit, $/HH/Month**	**$/HH/Month Summary of Calculated Savings (Cost) w/ Single Stream MRF System**	**Annual Summary of Projected Savings for ALL Participating Households w/Single Stream MRF System (6)**
				Ref. "A"		Ref. "B"	Ref. "C"	Ref. "D"	B+C+D= Ref "E"	E-A="F"	
Participating	2010	88,677	$9,779	$0.01	$119,601	$0.11	$1.03	($0.52)	$0.62	$0.61	$652,526
	2015	91,064	($100,165)	($0.09)	($19,032)	($0.02)	$1.03	($0.52)	$0.49	$0.58	$638,445
	2020	93,504	($242,143)	($0.22)	($206,463)	($0.18)	$1.03	($0.52)	$0.33	$0.54	$607,927
	2025	96,694	($400,852)	($0.35)	($417,875)	($0.36)	$1.03	($0.52)	$0.15	$0.50	$574,746
Participating + Non-Participating	2010	130,862	$689,301	$0.44	$698,973	$0.45	$0.70	($0.52)	$0.62	$0.18	$289,143
	2015	134,788	$577,901	$0.36	$541,632	$0.33	$0.70	($0.52)	$0.51	$0.15	$248,208
	2020	138,775	$425,376	$0.26	$330,349	$0.20	$0.69	($0.52)	$0.37	$0.12	$194,732
	2025	143,863	$255,185	$0.15	$91,530	$0.05	$0.69	($0.52)	$0.23	$0.08	$133,780
Participating, Non-Participating, Wauwatosa, Milwaukee	2010	343,506	$2,018,145	$0.49	$1,737,904	$0.42	$0.74	($0.52)	$0.64	$0.15	$626,614
	2015	350,044	$1,806,334	$0.43	$1,437,188	$0.34	$0.74	($0.52)	$0.56	$0.13	$554,969
	2020	356,371	$1,517,990	$0.35	$1,042,281	$0.24	$0.74	($0.52)	$0.46	$0.11	$465,111
	2025	360,987	$1,172,109	$0.27	$562,329	$0.13	$0.74	($0.52)	$0.35	$0.08	$343,225

(1) Based on Tables 1-2B and 1-3B using survey data and population growth projections.
(2) Based on Table 3-10
(3) Based on Table 3-11
(4) Participating Community entries are based on Table 3-12 and discussion presented in Section 3.c
Participating + Non-Participating Communities are based on prorating existing Single Stream Collection programs at Non-Part with no cost savings
Region Program assumes Milwaukee Dual Stream and Wauwatosa Blue Bag could see cost savings and used Waukesha Average
(5) Based on writeup in Section 3.d and assumes all initial carts are financed with the MRF project.
(6) Column "F" times 12 months/year times Number of Households estimated to be serviced by program

3.f Dual and Single Stream Process Flow

Drawings and a description of generic Dual Stream MRF and Single Stream MRF facilities have been developed by the Project Team are attached to this Report as Appendix G.

Section 4: Metro-wide Review of Landfill and MRF Capacity

Section 4.a Landfill Capacity

The Project Team has reviewed DNR information to assess landfill capacity in Southeast Wisconsin. As presented in Table 4-1, six landfills exist in the region with Waste Management and Veolia controlling those sites. Three of these sites, noted in the highlighted area in Table 4-1, are the major sites currently utilized by the private waste collectors in Waukesha County. The column to the far right lists the current "Estimated Site Life" for all of these locations based on the DNR records. The categories of materials received at these different locations are presented in this table as well.

Table 4-1: State DNR Permitted Landfills -- Nearby Locations and/or Use for Waukesha CO. Waste Materials

(Latest Annual Information Available from the Wisconsin DNR)

Facility Name	County	Capacity as of Jan. 2007 In Cu Yds	Cat 1-MSW	Cat 2-24	Total Annual receipts - 2006	Other Cat. 2-6 Waste Received	Cat. 19-24 "Cover Material" Utilized	Out-of-State Rec'd in Tons) from Illinois	Estimated Site Life In Years
KESTREL HAWK LF	Racine	2,394,562	178,976	119,343	298,319	36,245	83,098	135,457	8
MALLARD RIDGE RECYCLING & DISPOSAL FACILITY	Walworth	7,888,001	431,369	110,975	542,344	37,806	73,169	209,955	10
METRO LANDFILL	Milwaukee	1,832,290	347,273	193,617	540,890	72,308	121,309	3,796	4
VEOLIA ES EMERALD PARK LANDFILL LLC	Waukesha	5,238,055	454,324	435,934	890,257	72,547	363,387	0	7
VEOLIA ES GLACIER RIDGE LF LLC	Dodge	8,966,100	211,508	64,155	275,663	27,322	36,833	11,503	3
W M W I - DEER TRACK PARK INC	Jefferson	6,317,090	305,923	49,521	355,444	27,554	21,967	0	13
W M W I - ORCHARD RIDGE RECYCLING & DISPOSAL	Waukesha	8,848,177	844,528	382,661	1,227,189	145,686	236,975	0	2
W M W I - PHEASANT RUN RECYCLING & DISPOSAL	Kenosha	3,908,788	886,821	133,169	1,019,990	110,865	22,304	828,049	1

KEY

Category 1: Municipal Waste
Category 2: Utility Ash/Sludges
Category 3: Pulp/Papermill Mfg waste
Category 4: Foundry Waste
Category 5: POTW Sludges
Category 6: All other SW (not HW)
Category 19: Fee Exempt waste used for dikes, berms, etc
Category 20: Energy Recovery Incinerator Ash
Category 21: High Volume Industrial used for daily cover,etc
Category 22: Shredder Fluff used for daily cover
Category 23: Treated Contaminated Soil used for daily cover
Category 24: Exempt Unusable Paper Making Materials

Currently, four landfills handle the majority of the Waukesha County residential solid waste required to be landfilled. As noted in Table 4-1, these sites are:

- Emerald Park Landfill in Muskego
- Orchard Ridge Landfill in Menomonee Falls,
- Glacier Ridge Landfill in Mayville and
- Metro Landfill in Franklin

The two largest sites are in Waukesha County and the smallest is in Dodge County. Currently, the County generates about 125,000 tons per year of solid waste that gets landfilled. As depicted in Table 4-1, each of these four main landfills receive considerably more municipal waste (MSW) annually and thus serve to one degree or another as regional landfills for Southeast Wisconsin.

The DNR information presented on the estimated site life of these locations is presented in the far right column and all three sites currently reflect less than a 10 year life. This number does not reflect pending and/or potential holdings for expansions, but the key point is that at the current time an "over abundance" of capacity is not illustrated in the DNR-based report.

Therefore, the County needs to be aware that market forces and disposal options drive the economics for trash disposal. Thus, the more tons of "current municipal waste" that can eventually be drawn into a more robust recycling program to avoid the consumption of landfill space now and in the future, the better off the County will be as space availability decreases, and costs increase due to longer hauls to more distant landfills.

Section 4.b Recycling Capacity and Costs

The Project Team has developed information on existing and proposed Material Recycling Facilities (MRF's) in the Milwaukee metropolitan area. The information gathered includes the location, ownership, capacity available for southeastern Wisconsin generators, description of the type of system used (or planned to be developed) and general cost data on these MRF facilities.

The Project Team identified permitted volumes, additional processing capacity, and throughput data as available at existing MRF sites. The Project Team also identified a facility in southeastern Wisconsin known to be working through the state and local permitting process.

This report provides a framework for the "near-term" economic baseline for current MRF capacity and economics, as well as indicates how much processing capacity exists for recycling collection programs.

The Project Team identified the data base the WDNR compiles as an annual listing of "Self Certified Materials Recovery Facilities" operating in the State. The Project Team sorted this published DNR data and Table 4-2 presented herein identifies all the MRF's on the State list located in Southeast Wisconsin. It is noted that many of these are specific recycling plants just for certain local municipal use and the handling of their materials (e.g. public drop-off stations) and others are private locations for the drop-off of only certain types of materials.
Using this regional data, the Project Team has sorted out the specific locations that handle municipally-generated "dual stream" as well as single stream materials. The shortlist of specific locations where materials are handled that are similar to those being generated by the municipalities in the County are more precisely identified in Table 4-3. While identified, all are still not available as "options" to Waukesha County.

The Project Team has specifically talked to the owners of those MRF's that are currently servicing the Waukesha County marketplace. Veolia, which has hauling contracts with County municipalities, is hauling the dual stream recyclables from all participating municipalities to the County MRF. Recyclables from non-participating municipalities are processed at either the

Waste Management MRF, John's Disposal MRF, or is transferred to Resource Management in Illinois. Waste Management is hauling their single stream materials to their MRF in Grayslake IL and John's Disposal is hauling single stream material to their private MRF in Whitewater.

Table 4-2 Self Certified MRF's Providing Processing to communities in Southeast WI.
(Form 4400-182 of Annual Report for Recycling Programs for 2006, with updates as known)

MRF ID	MRF Name	County Name	Contact Name	Street	City	State	Zip	Phone
2068	Carroll Bros. Recycling,	Dodge	Douglas D Carroll	Po Box 577	Hustisford	WI	53034	(920)349-3688
390	Town of Ashippun	Dodge	James Schoenike	W1266 Cth 0	Oconomowoc	WI	53066	(920)474-4781
770	City of Watertown	Jefferson	James K Hintz	727 W Cady St	Watertown	WI	53094	(920)262-4070
2685	John'S Disposal Service	Jefferson	Brian Jongetjes	Po Box 329	Whitewater	WI	53190	(262)473-4700
3342	John'S Disposal Service	Jefferson	Brian Jongetjes	107 Hwy U	Whitewater	WI	53190	(262)473-4700
2403	Onyx Waste Services (Fort Atkinson)	Jefferson	Andrew T Naber	1215 Klement St	Fort Atkinson	WI	53538	(920)563-4505
751	Town of Ixonia	Jefferson	Victor Karaliunas	W262 Hillendale Dr	Oconomowoc	WI	53066	(262)548-7377
4518	Resource Management	Kenosha	Kristina A Kaar	9999 Andersen Ave.	Chicago Ridge	IL	60415	(708)425-8565
4669	Waste Management Grayslake	Kenosha	Donald Schmidt	P.O. Box 189	Grayslake	IL	60030	(847)548-1755
2707	Onyx Waste Services (Kenosha)	Kenosha	William Neve	5421 46th Street	Kenosha	WI	53144	(262)652-6970
3443	A-1 Recycling	Milwaukee	John Avery	2101 West Morgan Ave.	Milwaukee	WI	53221	(414)281-8900
1058	City of Milwaukee	Milwaukee	Michael Engelbart	841 N. Broadway, Rm 620	Milwaukee	WI	53202	(414)286-2355
4463	Waste Management- Milwaukee N.	Milwaukee	Margret Mucci	9601 N. Wausaukee Rd.	Milwaukee	WI	53224	(414)761-7249
2679	Waste Management- Milwaukee S.	Milwaukee	Margret Mucci	10712 South 124th Street	Franklin	WI	53123	(414)253-8465
2420	West Allis Salvage Co.,	Milwaukee	Phil Rehberg	1911 S. 80th St	West Allis	WI	53219	(414)321-4134
1182	Town of Cedarburg	Ozaukee	James Marquardt	1293 Washington Ave.	Cedarburg	WI	53012	(262)377-4509
2215	Lynn'S Waste Paper Co Inc	Washington	Bob Lynn	121 Auxiliary Court	West Bend	WI	53095	(262)334-9542
1751	Town of West Bend	Washington	Mary Smith	6355 Hwy Z	West Bend	WI	53095	(262)338-3417
1760	County of Waukesha	Waukesha	Karen Fiedler	220 S Prairie	Waukesha	WI	53186	(262)548-9707
1769	Town of Ottawa	Waukesha	Richard Arrowood	W355 S3370 Hawks Hollow	Dousman	WI	53118	(262)965-3013

Table 4-3 Primary Materials Recovery Facilities Potentially Available in Southeast WI
(for Waukesha Co. Dual Stream or Single Stream Materials, as MRF design allows)
(Data as of 01/04/2007 from State Annual Report for Recycling Programs for 2006 and updated for Report)

MRF ID	MRF Name	County (if WI location)	Contact Name	Street	Location	State	Zip	Phone
3342	John'S Disposal Service	Jefferson	Brian Jongetjes	107 Hwy U	Whitewater	WI	53190	(262)473-4700
2403	Onyx Waste Services (Fort Atkinson)	Jefferson	Andrew T Naber	1215 Klement St	Fort Atkinson	WI	53538	(920)563-4505
1058	City of Milwaukee	Milwaukee	Michael Engelbart	841 N. Broadway, Rm 620	Milwaukee	WI	53202	(414)286-2355
4463	Waste Management- Milwaukee N.	Milwaukee	Margret Mucci	9601 N. Wausaukee Rd.	Milwaukee	WI	53224	(414)761-7249
2679	Waste Management- Milwaukee S.	Milwaukee	Margret Mucci	10712 South 124th Street	Franklin	WI	53123	(414)253-8465
1760	County of Waukesha	Waukesha	Karen Fiedler	220 S Prairie	Waukesha	WI	53186	(262)548-9707
4669	Waste Management Grayslake	NA	Donald Schmidt	P.O. Box 189	Grayslake	IL	60030	(847)548-1755
4669	Rockford IL	NA			Rockford	IL		

Grayslake IL Waste Management Single Stream MRF

Introduction: In October 2006, Waukesha County staff visited the Grayslake IL Single Stream MRF for a tour conducted by Donald Schmidt, MRF Manager and Bob Van Tholen, the WMI District Manager for Illinois/Indiana. All of the following information was reported by County staff and summarized by the Project Team as information deemed specifically relevant for this Metro-wide MRF section of the Project Report.

The plant has been in existence for 8 years, originally as a dual stream MRF. In March 2002 it was converted to single stream and as of the tour, the system was processing 12-13,000 tons/month in two 8 hr. shifts (@30 tons/hr.). WMI added more equipment such as Cyclone, screens, and bunkers in 2006.

This Single Stream MRF has 72 employees and all shipping & receiving are done on the 1st shift. The facility has a separate tip floor and sort line for commercial fiber, as well as containers and fiber from households. WMI staff reported that the processing costs are higher for single-stream MRF versus Dual Stream MRF, (i.e. indicated to be approximately $20 – 25/ton) but you make up for this increase by collection system savings and increased recyclables. It was also noted that reduced workman's compensation claims and expenses are a big issue for a large company like WMI.

It was reported that the change from Dual Stream to Single Stream increased recycling quantities by 20-30% per household. Also, with 65-gallon carts used for single stream recyclables in Lake County IL, the fully automated collection trucks can service approximately 1,000 homes per day

Finally, it was reported by County staff that the Grayslake MRF residue amount was noted as running 7.5 - 8% compared to 6.5% WMI staff noted from their previous Dual Stream MRF configuration at Grayslake.

Waste Management in Germantown Single Stream MRF

In addition to the currently operating plants serving Waukesha County, the most significant news about MRF availability in the region is the announced intentions of Waste Management Recycle America (WMI-RA) to spend $18 million to build a mega-single stream MRF in Germantown, WI. The Project Team contacted WMI-RA and talked to Mr. Jeff Fielkow, their Market Area Vice President. The Project Team received confirmation that a very "high volume", state-of-the-art single stream plant was indeed being constructed and the intent is to be operational in December 2007 with full scale operation during the first quarter of 2008. It was indicated that this facility will be the most sophisticated and mechanically equipped single stream plant ever built. The intent is to attract single stream residential recyclables and single stream commercial recyclables.

The stated goal of this new venture is to have enough capacity to draw from a 300 mile radius. The new MRF plant size was indicated to be 120,000 square feet and designed to be able to process more than 20,000 tons per month on a 5 day-per-week 2-shift basis. As of late March 2007, the facility was in final design and construction was estimated to take 8 months.

At this time, the single stream material from Madison WI is transloaded and hauled by WMI to their Grayslake IL MRF which was indicated to be handling about 15,000 tons per month. In the future, all of this Madison material will go to the Germantown plant. He noted that the City of Madison has seen a greater than twenty percent (20%) increase in materials in switching from dual stream to single stream. However, they had also added small businesses and commercial materials during the switch so the before and after figures are not directly comparable.

Our discussions with the WMI-RA representative indicated that any shift to single stream must be "all inclusive" and definitely must include the change of the collection system and container system as well to obtain the maximum benefits from the expense incurred in building a single stream plant. He indicated that changing from 18 gallon carts to a 64 gallon wheeled bin is fine, but going to a 96 gallon bin is even better. Mr. Fielkow also noted that going to every-other-week (E-O-W) collection is also good, but some communities might complain thinking they are

getting less service). However, he stressed that this is part of reducing the collection costs by having less passes through a community.

Mr. Fielkow also noted that his company is definitely seeing a safer operating environment with single stream and automated collection. However, for any community not willing to "change it all", (i.e. both the collection program as well as the processing system) continuing their dual stream will be cheaper.

Mr. Fielkow is responsible for five (5) WMI-RA single stream MRF's. With respect to residue and product sales, he indicated that their entire group of Single Stream MRF's run less residue with the large capital investment that they made in equipment, and that Recycle America sells all of their paper materials as premium paper and makes three good streams of glass products.

John's Disposal Whitewater WI MRF

The Project Team discussed the John's Disposal Single Stream MRF located in Whitewater WI with Brian Jongetjes. This MRF currently provides single stream processing services for about 40,000 residential units on an 8-9 hour basis. The system was reported to currently process 50-60 tons of recyclables per day, and that this is not full capacity. While it was indicated that this MRF currently only operates for one shift, it was clearly indicated by the John's Disposal representative that they have site and processing capacity to handle a significant increase of single stream material from Waukesha County if it were available.

It is currently reported by John's Disposal that their shift capacity is at 75 tons. The facility indicated that it could process 150 tons per day by adding a second shift. Additionally, they have two 20,000 square foot processing buildings and only use one at the present time; the other is storage and used to be the home of their dual stream processing system. If material capacity were available, they would consider putting one or two lines in that building if they had commitments (i.e. contracts) for the tonnage and could conceivably handle up to 450 tons per day over a two-shift operation with the appropriate processing equipment installed.

The system includes a Lubo/Bollegraf processing line with several of the conveyors built by John's Disposal staff. Based on the current location and hauling constraints, they expressed capability to provide additional MRF-related services within a 40 to 50 mile radius. This would essentially cover all of Waukesha County. They use 95 gallon carts for both weekly trash and recyclables, with the latter recyclables collection service typically provided every-other-week (EOW).

Based on their truck depot and MRF both located in Whitewater, they typically service the trash customers in the morning with a mid-day discharge at a private landfill. After cleanout of the truck, they return to the same service area and perform recyclables collection, with this service done EOW. They then return to their MRF discharging the single stream recyclables and check-in their vehicle.

John's Disposal mainly uses Heil 28-33 cubic yard fully automated collection vehicles with 96 gallon carts. Their trucks typically provide services to 800-900 residences per day for the weekly trash collection in the morning (with a goal to be done by 11 a.m.) After cleanout, the truck then typically returns to the same community and collects recyclables from 400-450 residential units (on an EOW basis noted above). The weight of recyclables collected will vary from 6-8 tons per vehicle load, but they try to average at least 6 tons per load.

When they provide service to more rural areas where more mileage and drive time is required, they might average 400 trash customers per load prior to dumping at the landfill and then 200 EOW rural recyclables pickups on the way back to their MRF. Their representative indicated that the company currently has 15 trucks, but not all are currently used every day of the week.

Capacity of the Existing Single Stream MRF's

As of this writing, the WMI Grayslake, IL MRF and the John's Disposal MRF could both provide processing capacity for materials collected within Waukesha County. As noted above, in early 2008 WMI will be shifting most, of their Single Stream materials to their new Germantown location. At this time, WMI would not discuss the actual charge for future Single Stream services at this MRF. If a public competitive solicitation for collection and/or processing recyclables were to be issued, WMI would be interested in responding.

John's Disposal MRF

All of the material processed at this MRF originates from John's Disposal's own curbside recyclables collection programs. John's Disposal currently services five (5) Waukesha County municipalities with trash collection (trash goes to a third-party landfill for disposal) and recyclables collection/processing.

It was noted in Section 1, that the published cost of recycling services provided by John's Disposal to their five County municipalities ranges from $3.60 to $4.70 per month per unit. Most are around the $3.60-$3.70 cost per month, but Village of Mukwonago charge is currently $4.70 per month per unit. These prices include John's Disposal providing the large 96 gallon carts for both trash collection and recyclables collection.

Section 4.c Regional Options

Based on the above information the private sector is in a position to provide Single Stream recyclables collection and processing services to Waukesha County and the current "participating' municipalities in the County "Responsible Unit" program. This is not to say that the economics are competitive with any County-sponsored Dual-Stream or Single Stream MRF, merely that (1) John's Disposal was adamant in their capability and interest as a private sector participant to provide expanded services to the local Waukesha County municipalities with their Single Stream MRF, and (2) the new WMI Germantown Single Stream MRF is also interested in capturing significant regional capacity as it opens this winter (based on current schedule).

As noted in Appendix B, the City of Madison is now collecting 20,500 tons per year or about 1,700 tons per month (2006 data point) of single stream recyclables. Section 1 of this Report indicated that all of regional interests that are the subject of this project review (i.e. the Participating and Non-Participating Municipalities within Waukesha County, the City of Wauwatosa and the City of Milwaukee) are in total estimated to generate 80,000 tons per year (about 6,700 tons per month) of Single Stream materials in Year 2010. Therefore, even with Madison materials added, the input capacity calculates to be less than 50% of the 2-shift capacity for the new Germantown Single Stream MRF.

The Project Team wishes to note that during the course of this Project other multi-State regional information has been reviewed as many different communities in the Upper Midwest are looking at Single Stream MRF opportunities. As noted in the WMI write-up, they have a large Single Stream MRF in Minneapolis MN. While not verified, information reported by a Recycling Coordinator for Outagamie County indicates that WMI is currently charging Brooklyn Park $1.83/HH/month, and Brooklyn Center, Crystal and New Hope each $2.22/HH/month for EOW single stream collection and processing, with WMI supplying the large carts but with no revenue sharing. While these costs are not necessarily what WMI might offer when their new facility in Germantown opens, they are assumed to be indicative of what large capacity Single Stream MRF's , i.e. 15,000 tons per month or larger, might be priced for collection and processing services. Additionally, a report from Fond du Lac indicates that their 2006 charge for Single Stream collection and processing by Waste Management was $2.12/HH/month, with WMI supplying the large carts but with no revenue sharing.

It is also important to note that the overall costs for these recycling services is a combination of the following: (1) collection costs, where household density impacts collection stop rates and travel time efficiencies; (2) setout quantities per household which impacts revenue generation potential for material processed; (3) the cost of bins or carts and who is the party paying for these (e.g. City of Madison owns their carts and does municipal Single-Stream collection as well, but John's Disposal has the trash cart and recyclables carts included in their service fees); (4) the processing costs associated with older less sophisticated dual stream MRFs vs. the highly automated new Single Stream MRFs built for high productivity and future growth potential; (5) the deal negotiated regarding materials revenue sharing (e.g. Waukesha Co. is now 50/50 with the MRF operator but the John's Disposal customers have no revenue sharing); and (6) the duration of the collection/MRF processing contract term desired and/or negotiated. All these items, as well as the nearby level of competition, factor into the final market prices obtained.

WAUKESHA COUNTY RECYCLING SYSTEM & CAPACITY STUDY

Section 5: Project Summary & Recommendations

This section provides a summary of the findings of the Report and answers key planning and implementation questions for the County to consider, and where appropriate, specific recommendations are made. Throughout this Report, the current "Dual Stream" recycling program (requiring resident and hauler separation of paper from containers) is compared to "Single Stream" systems (where such separation is not required). More information on these two types of recycling systems is provided in Section 2 of this report.

5.a What is the expected growth and nature of recyclable materials in Participating Municipalities, Non-Participating Municipalities, Wauwatosa and Milwaukee?

Future population growth, recyclable generation, and recyclable composition have been analyzed by the Project Team in Section 1 of this Report. As indicated on Table 1-3, the total population base of the current Participating Municipalities is projected to grow from 268,258 in year 2005 to 300,641 in year 2025, an increase of 12 percent. Using this population increase, and assuming the annual Dual Stream recyclables generation of 23,823 tons in year 2005 grows accordingly, the amount of Dual Stream recyclables from the Participating Municipalities in 2025 would be 26,575 tons.

For a larger Single Stream MRF facility, the supply of materials from Non-Participating Municipalities, Wauwatosa and the Milwaukee were evaluated. Based on current recyclables generation rates, and assuming that 25 percent more materials would be generated on average per household, the projected flow of Single Stream materials from these four segments of interest in year 2010 would be as follows:

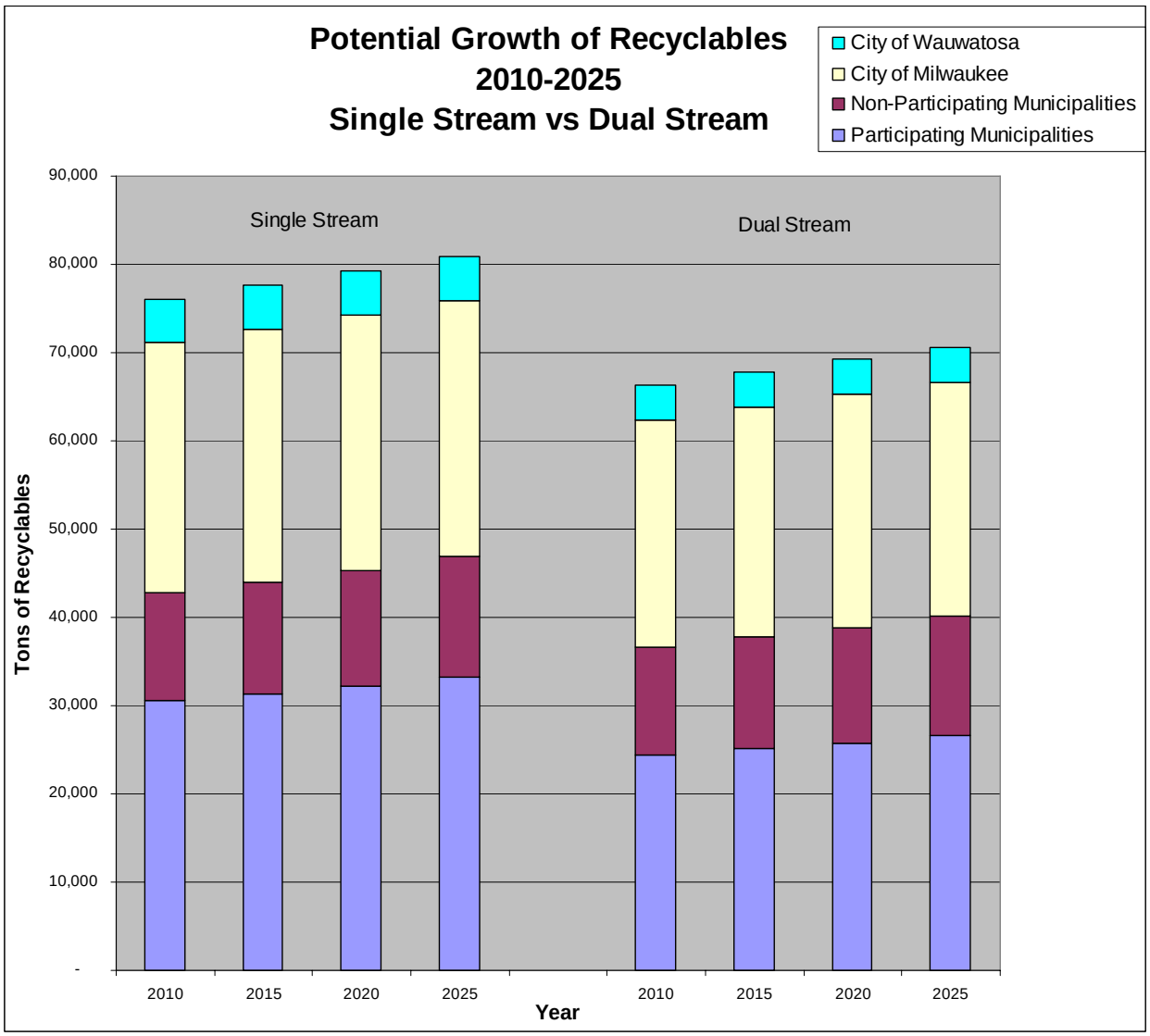
- Participating Municipalities – 30,565 tons
- Non-Participating Municipalities – 12,197 tons
- City of Wauwatosa – 4,944 tons
- City of Milwaukee – 28,354 tons

Therefore, if all these entities participated in a new regional Single Stream MRF the total amount of materials available in 2010 is estimated to be 76,060 tons. The growth of recyclable quantities are shown in the charts on the following page.

A detailed review of recyclables collection practices and quantities by the Project Team revealed what was expected, i.e. that the current "Non-Participating" Municipalities in Waukesha County, primarily due to their use of Single Stream MRF's and associated "best practices" collection system using automated collection vehicles with large 96 gallon carts for recyclables, have recycling rates (on a #/capita/year basis) higher than the "Participating" Municipalities in the County with Dual Stream programs (see Table 1-13). The five non-participating municipalities that have Single Stream collection had more than a 40 percent higher average recyclables setout rate versus their municipal counterparts that are Participating Municipalities setting out acceptable Dual Stream materials.

As illustrated in Table 1-10, the Project Team wishes to point out that the County's overall recycling rate continues to exceed current State of Wisconsin averages. However, in order for the County to move to even higher recycling rates, it will be necessary to convert to Single Stream recycling. All of the current Dual Stream or Single Stream generation rates, by municipality, are detailed in Table 1-13 of the Report.

Additionally, even with the current Dual Stream system used by the County, Section 1 illustrates how the composition of the recyclables collected and shipped from the County MRF has changed over the past five years of operation (see Table 1-15). These continuing changes in the manufacturing processes and packaging will also change the available recyclables composition (see Table 1-19) and require changes even if the current County Dual Stream MRF system were left in operation. The prime example of this is the use of plastic containers replacing glass, and the continued growth of single serve plastic containers.



5.b What are the primary advantages and disadvantages of Dual Stream and Single Stream collection and processing systems?

Single Stream and Dual Stream collection and processing systems were analyzed by the Project Team in Section 2 of this Report. This analysis shows that based on the experience of over 50 Single Stream MRF's and their associated collection programs, Single Stream recycling increases the amount of recyclables collected and reduces the overall waste collection/disposal costs. Excerpts from Table 2-3, deemed an important overview summary of the Single Stream program, is presented herein.

Single Stream Pros	Single Stream Cons
Decreased Collection Costs	Increases Capital Costs of the MRF
Allows Automated Systems to Collect Recyclables	Increases Residue Level at MRF
Higher Overall Participation Rates Due to Convenience and Ease of SS Program	Potential for Increased Contamination of Processed Recyclables
Potential Switch to Compaction Vehicles Reduces Trips to the MRF	Increased Labor Costs for Processing

Section 2.6 of the Report (and the Appendix B Case Studies) provides more the Project Team's review of Single Stream versus Dual Stream programs. An overview of the key findings follows:

1. It appears absolute that a state of the art Single Stream collection system will cost between $15 and $30 per ton less than a Dual Stream system. For current participating municipalities, this would mean a total savings of $532,000 or $0.50 per household, using the median material revenue estimates.

2. In addition to the collection efficiencies, there is much evidence that collection rates increase considerably with a Single Stream system. For this Report an assumption of 25% is used.

3. The cost to operate a Single Stream processing facility is higher than the cost to operate a Dual Stream facility.

4. Revenue, on a dollar per ton of incoming material basis, is less in a single versus Dual Stream program due to higher residue and lower glass prices. However, with more total tons being processed and recycled, the overall revenues will be higher.

5. The controversy surrounding the quality of fiber produced at single verses Dual Stream facilities is less of a controversy over fact than an issue of costs. Although Single Stream processing produces a fiber grade of slightly lower quality than Dual Stream, there is no evidence in the literature showing that fiber from Single Stream systems cannot be sold and successfully recycled.

6. The level of residue in any recycling system, single or dual, is extremely dependent upon the level of public education.

7. The body of evidence indicates that the trend in the recycling industry is toward Single Stream recycling and should be considered the state the art when properly designed and operated.

8. Single Stream systems have significant overall collection and operating advantages that far outweigh any of the disadvantages discussed.

9. Waukesha County municipalities could avoid future cost increases at the landfills by driving more tons of the "current municipal solid waste" into a more robust recycling program, such as the benefits offered by Single Stream recycling. In order to achieve savings, collection contracts would need to be changed so the benefits of reduced disposal costs accrue to municipalities rather than the hauler.

5.c What is the status of the existing County Recycling Facility and can it be expanded?

Section 1 provides the historical overview of the current County MRF operated in conjunction with 25 Participating Municipalities. Over the past fifteen years it has well served these municipalities and provided the ability to receive Dual Stream recyclable materials and process the materials in a cost effective manner.

However, the current MRF has reached design capacity and the ability to make technological changes at the tight site location to serve the future decades with adequate service and cost effective operations is problematic. This is especially apparent with the commingled container processing line at the current facility being over run with single serve plastic containers.

As detailed in Section 3, the current Dual Stream MRF is barely adequate for the range and amount of recyclables currently being received from the Participating Municipalities. If the current Non-Participating Municipalities were to begin using the current facility, or a potential regional partner like the City of Wauwatosa, more building space would be required for material processing and storage. The MRF is located on a two (2) acre site, approximately 290' by 300'. The Dual Stream MRF could not be expanded on this site nor could a Single Stream MRF be constructed with these site limitations.

The potential may exist to acquire the 39,000 square foot site to the north of the existing facility. Under this scenario, the existing facility would be expanded to include additional tipping space and upgrade the existing processing lines as a Dual Stream or Single Stream MRF. The cost of the MRF expansion and upgrade would be approximately $6.5 million to $7.0 million plus the acquisition costs of the adjacent property.

It should be noted that even with this expansion, the expanded facility tonnage would be limited to that approximating the currently Participating Municipalities, the Non-Participating Municipalities and potentially some additional tonnage such as the City of Wauwatosa. Because the site would be only three acres in total, size limitations would limit the amount of truck traffic and building expansion. This site would not be suitable as a regional MRF including the recyclables from the City of Milwaukee.

5.d What are the projected costs of a new MRF facility?

The Project Team analyzed the capacity, operating costs, material revenues, and construction costs of both Dual Stream and Single Stream new facilities that could potentially be built by Waukesha County. This analysis was done for three scenarios; 1) current Participating Municipalities only, 2) Participating and Non-Participating Municipalities, and 3) Participating Municipalities, Non-Participating Municipalities, and additional regional cities (Wauwatosa and Milwaukee).

The cost benefit analysis for this information is presented in Section 3. This analysis shows that the potential cost savings are substantial if the current system of collection and processing is converted from Dual Stream to Single Stream. The analysis clearly shows that when additional tons are added to the system, increases in the dollars per ton and per household net revenues occur. This is discussed in more detail in following questions.

The capital cost of a Single Stream green field facility will be over $8.0 million plus the land acquisition cost estimated to be approximately $500,000.

5.e How does recycling affect landfill capacity in the region?

The Project Team analyzed, in Section 4 of the Report, the current landfill capacity in Southeastern Wisconsin. This analysis makes it clear that there is no “over-abundance” of capacity in the area at this time. However, this project will have no significant impact on landfill capacity, regardless of the direction taken with the recycling program.

5.f What would be the primary advantages, disadvantages and barriers to developing a regional recycling facility?

The main advantage in developing a regional MRF is the factor that economy of scale benefits will far outweigh the institutional dilemma’s associated with several independent municipalities (in this case a County and potentially one or two Cities) attempting to work together for the mutual best interests of each within the group. Additionally, another advantage is that each community would not be spending capital construction funds and operations costs to independently develop and find markets for the materials, versus a larger consortium flexing more muscle in the marketplace and most likely commanding a better pricing structure than smaller independent operations.

One of the key disadvantages is the complexity of the decision-making process and timing that would be required for a multi-public sector venture. The participation and approval process will most likely be long and complicated, but still could be worth the time and effort consumed by the process. Since each party has their own individual interests at this time, the benefits of the

cooperative effort must be very clear and understood by each potential participant, and the strength of working together could overcome the potential inertia generated by diverse interests.

One of the key barriers that needs to ultimately be overcome is the methodology for the potential implementation of the services and agreement among the key participants as to their specific roles in the process, which might include ownership responsibility and key business decisions on operations and marketing matters. Typically one entity plays the lead role and the others participate in the process from the standpoint of supplying tonnages and participating in the economic benefits of the total group. However, it is possible to form a more unified group that share responsibility and risks in the overall venture based on recyclables contributions, for example.

As detailed herein, a further barrier is the fact that private sector entities are currently active in aggressively attempting to obtain the commitment of municipalities in the region for their recyclables. It needs to be determined if a public facility can offer its municipalities an overall better economic and program related "deal" than private sector entities.

There is a model for an intergovernmental recycling agreement in Wisconsin. At the current time, the three Fox River Counties of Winnebago, Outagamie and Brown have a mutual working agreement and share landfill capacity as well as MRF capacity. A copy of their agreement has been provided by the Project Team to Waukesha County staff under separate cover.

5.g What are the pros and cons of a publicly owned versus privately owned regional facility and are there interested private entities in the area?

In this particular case, the key issue with public ownership of a regional facility will be obtaining the longer-term commitment of recyclable materials from individual municipalities. As noted in a number of places in this Report, as the number of tons in the system go up, economies of scale make the economics better for all stakeholders.

Public ownership implies overall responsibility as well, but as the County has experienced for many years, one can own a MRF and the site on which it is built, but subcontract all of the operational risks and materials marketing responsibilities, if that is deemed necessary.

Public ownership will provide municipalities with long-term financial stability. Additionally, public ownership will help shield municipalities from major price changes in the value of secondary commodities or other structural changes.

Contracting recycling processing with private entities will, in the short run, cause competition among processors to offer the public sector attractive pricing. However, in the longer-term, the lack of public competition and consolidation of infrastructure and facilities, may limit competition and allow the remaining private entities to put upward pressure on prices.

Given the nature of changes to the values of secondary commodities and other potential structural changes, private entities could become more or less financially stable in the future. However, a good contract with a financially stable company and appropriate securities for performance can go a long way to mitigate this concern.

Another aspect of the response to this question is the capacity and economies of scale of the publicly-owned or private-owned MRF. It is possible for a privately-owned MRF, even with

somewhat higher financing costs than the public sector associated with it, to have enough "economy of scale" cost benefits to actually lower the unit development costs per ton substantially. Thus, even with higher financing costs, the net capital cost component could be competitive with a smaller public sector MRF similar to that being considered by Waukesha County. However, until Waukesha County or more public entities start solicitations for service, the specific charges from this particular private hauler (and their new Single Stream MRF) won't be known.

The Project Team analyzed the existing and proposed private MRF's currently serving the Southeastern Wisconsin area. Based on this analysis, it is apparent that the private sector is in a position to provide Single Stream collection and processing to the municipalities covered by this Report. The Project Team's recommendations for determining the costs of such a private sector approach follow in this Section, Question 5.i.

5.h What are the primary options for Waukesha County and the cities of Milwaukee and Wauwatosa?

Essentially, the County is faced with four choices.

Option 1: Continue To Use Existing Facility:

Pros:

- Current program and systems are cost effective.
- No immediate outlay of capital beyond normal repair and replacement costs.
- Central location provides cost saving hauling alternatives for most municipalities.
- No need for new public education programs, new literature or new training initiatives.
- Public ownership continues to give municipalities long-term pricing stability.
- Existing assets, which have been paid for by the County, continue to serve the public.
- Allows for the continuation of the on-site educational programs currently made available to the community at the MRF.

Cons:

- Major renovation to the commingled line will be needed within the next 5 years to process tonnage from Participating Municipalities.
- The commingled container system is obsolete and cannot easily be modified in the current space.
- Participating municipalities cannot benefit from the lower costs associated with Single Stream collection and decreased waste disposal costs.
- Processing additional tonnage will be very difficult due to tipping floor issues, finished product storage issues and processing issues.

Option 2: Acquire Lithoprint Site Expand and Upgrade Existing Facility as Dual Stream MRF

Pros:

- Resolves current issues with tipping floor space and bale storage, upgrades processing lines and prepares Participating Municipalities for future recycling processing needs.
- Owner of property to the north has indicated willingness to consider talking with the County.
- Capital required will be less than developing totally new facility.
- County preserves benefits of public private partnership with public ownership and private operations.
- Public ownership continues to give municipalities long-term pricing stability.
- Allows for the continuation of the on-site educational programs currently made available to the community at the MRF.
- Allows for "Non-Participating Municipalities to join the county program and for standardization of educational programs.

Cons:

- No guarantee that deal can be made with property owner.
- Participating Municipalities cannot benefit from the lower costs associated with Single Stream collection and decreased waste disposal costs.
- The approximately one acre that may be available would not be enough land to process all potential tonnages as a regional MRF (including the Cities of Milwaukee and Wauwatosa).
- System would not be as efficient as new facility.
- Does not fully address existing truck traffic issues.
- Though cheaper than development of new facility, would be substantial capital outlay.
- At some point in the project, existing operations would be affected as the two systems are married together.
- Non-Participating Municipalities that already practice single stream would not likely switch back to Dual Stream.

Option 3: Acquire Lithoprint Site Expand and Upgrade Existing Facility as Single Stream MRF

Pros:

- Resolves current issues with tipping floor space and bale storage, upgrades processing lines and prepares Participating Municipalities for future recycling collection and processing needs.
- Allows Participating Municipalities to benefit from the lower costs associated with Single Stream collection and decreased waste disposal costs.
- Allows for "Non-Participating" Municipalities to join the county program and for standardization of educational programs.
- Owner of property to the north has indicated willingness to consider talking with the County.

- Capital required will be less than developing totally new facility.
- Increases recyclable tonnage and associated revenues compared to Dual Stream.
- County preserves benefits of public private partnership with public ownership and private operations.
- Public ownership continues to give municipalities long-term pricing stability.
- Allows for the continuation of the on-site educational programs currently made available to the community at the MRF.

Cons:

- No guarantee that deal can be made with property owner.
- Does not fully address truck traffic issues.
- System would not be as efficient as new facility.
- Though cheaper than development of new facility, would be substantial capital outlay.
- At some point in the project, existing operations would be affected as the two systems are married together.
- Need to re-educate public, new literature, etc.
- The approximately one acre that may be available would not be enough land to process all potential tonnages as a regional MRF (including the Cities of Milwaukee and Wauwatosa).

Option 4: Develop New Publicly Owned Single Stream Regional Recycling Facility

Pros:

- Economies of scale based upon broad participation will provide the most economically beneficial returns to all Participating Municipalities.
- Public ownership continues to give municipalities long-term pricing stability.
- County preserves benefits of public private partnership with public ownership and private operations.
- Allows all municipalities to consider Single Stream collection and realize lower collection costs and decreased waste disposal costs.
- Provides pricing alternative to private sector initiatives.
- Allows for the continuation of the on-site educational programs currently made available to the community at the MRF.
- Insures on-going competitive pricing to compare to private sector initiatives.
- Would allow all municipalities to be included in the County wide system and enable the County to standardize public education and programs.

Cons:

- Complexity of institutional structures and developing inter-municipal agreements.
- Capital cost is substantial.
- Potential negative impacts to collection efficiencies for some municipalities depending upon location.
- Would need to coordinate timing of existing contracts.

Option 5: Use of Private Sector MRF Capacity for Materials Processing

Note: As discussed in Section 4 of the Report, the Project Team identified a number of private sector processors who have expressed interest in processing municipally generated recyclables from Waukesha municipalities. Sections 5.i and 5.j further discuss this.

Pros:

- No or very low (carts only for example) County or municipal capital expense
- Competition among private sector entities will, at least in the short run, likely provide very competitive pricing.
- County administrative and oversight costs and duties will be less than other options involving public ownership.
- Would allow participating municipalities to consider Single Stream collection and realize the lower collection costs and decreased waste disposal costs.

Cons:

- Reduced competition and lack of long-term price stability, especially when markets for recyclables fluctuate.
- If needed due to changes in circumstances, starting up the process of developing a publicly owned facility from scratch would be time consuming.
- Potential negative impacts to collection efficiencies due to location.
- May not allow for comparable level of convenient on-site educational programs.

5.i What are the Financial Implications of the Options Presented?

In Section 5.h, the pros and cons of each option are listed. Additionally, it is necessary to look at each of the options from a financial point of view. Note that the County numbers do not include costs for education, administration, servicing drop off sites, dividends/rebates to municipalities, state grant revenues, or recycling bins.

Option 1: Continue To Use Existing Facility

Currently, the County has an operating contract with FCR, Inc. This contract has been extended for one year. It is unclear at this time if the County and FCR can or will extend the agreement for an additional period of time such that implications of the options discussed in this Report can be fully understood. If possible and necessary, the Project team would suggest the shortest possible extension be negotiated as to allow for the longer-term decision making process to take place.

This contract provides for the County to pay FCR, per Table 3-2, $22.20 per ton of materials received in 2006. In return, the County pays certain other costs (equipment depreciation, insurance, etc.) and receives 50% of net material revenues from the sale of recyclables. In recent years, the value of recyclables has been substantially higher ($100.28 per ton in 2006) than longer-term averages resulting in the County receiving more revenue from the sale of materials than the total of its costs and the cost of paying FCR its operating fee. In fact, in 2006, the County received, net of its costs, $435,539 which, on a per household per month basis (based upon the number of households reported by municipalities in the County survey) equates to $0.42 per household per month.

Should the County and municipalities decide that the existing MRF will remain operating for an extended period of time, we suggest that a new RFP for an operations contractor be developed. If this is to be the case, the commingled container line should be renovated such that the selected operator's costs are based upon the capabilities of the new container line.

Option 2: Acquire Lithoprint Site Expand and Upgrade Existing Facility as Dual Stream MRF

Option 2 requires the County to negotiate with the current owner of the 130' X 300' site to the north of the current MRF for the purchase of that property. Once complete the additional space can be used to expand the existing MRF as an upgraded Dual Stream MRF. There are a number of procurement options that could be considered.

- Issue an RFP for a Design Build contract.
- Issue an RFP for a Design Build Operations contract.
- Issue plans and specifications for a low bid contract procurement.

It is estimated that the expansion of the MRF using the Lithoprint site will cost approximately $6.5 million plus the cost of the site. How this compares to other options for projected net revenues is shown in Tables 5-1A and 5-1B below.

Option 3: Acquire Lithoprint Site Expand and Upgrade Existing Facility as Single Stream MRF

Option 3 requires the County to negotiate with the current owner of the 130' X 300' site to the north of the current MRF for the purchase of that property. Once complete the additional space can be used to expand the existing MRF as an upgraded Dual Stream MRF. There are a number of procurement options that could be considered.

- Issue an RFP for a Design Build contract.
- Issue an RFP for a Design Build Operations contract.
- Issue plans and specifications for a low bid contract procurement.

It is estimated that the expansion of the MRF using the Lithoprint site will cost approximately $7.0 million plus the cost of the site. How this compares to other options for projected net revenues is shown in Tables 5-1A and 5-1B below.

Option 4: Develop New Publicly Owned Single Stream Regional Recycling Facility

Option 4 needs to be looked at from the point of view of how the system's costs and revenues are affected by additional tonnage being committed to a new facility.

The Project Team has projected operating costs, revenues, and capital costs under a number of operating scenarios as shown in Section 3 of this Report. The net revenues of the system are very much tonnage-driven with additional tons lowering per ton costs and raising per ton and per household revenues. Table 5-1B below shows how the addition of other municipalities, as discussed in Section 3, affects the projected net revenues for a new regional single stream facility.

Table 5-1A: Projected 2010 Net MRF Operating Revenue for Options 2 and 3

Operating Scenario (2010 Basis)	Tons (1)	Households (2)	Net Revenue From Operations (3)	Net Revenue Per House Hold Per Month
Option 2: Acquire Property and Expand Existing MRF as Dual Stream, Participating Municipalities	24,452	88,677	$ 130,207	$ 0.12
Option 3: Acquire Property and Expand Existing MRF as Single Stream, Participating Municipalities	30,565	88,677	$ 119,601	$ 0.11

(1) Tons are from Table 3-3 and 3-4
(2) Household projections from Table 1-3B.
(3) Net revenue projections from Table 3.a.3-2.

Table 5-1B: Projected 2010 Net MRF Operating Revenue for Option 4

Operating Scenario (2010 Basis)	Tons (1)	Households (2)	Net Revenue From Operations (3) (4)	Net Revenue Per House Hold Per Month
Option 4: Single Stream Participating and Non-Participating	42,762	130,862	$ 578,545	$ 0.37
Option 4: Single Stream Participating, Non-Participating, Wauwatosa, and Milwaukee	76,060	343,506	$ 1,737,904	$ 0.42

(1) Tons are from Table 3-4
(2) Household projections from Tables 1-2B and 1-3B..
(3) Net revenue projections from Table 3-11.
(4)The cost of procuring a green field industrial site of approximately 5 acres is estimated to be $500,000. If amortized over 25 years at 5%, this cost equates to between less than $.01 and $.02. per month per household depending upon the number of households in the system.

Note: Comparing the current 2006 revenue stream to the County under the existing contract with FCR with projections from this Report is not a direct comparison due to several factors including;

- The current revenue stream to the County is based in part upon current material revenues of $100.28 per ton verses the projected median value of $77.78 per ton used for all green field projects including the new Single Stream alternatives.
- The current contract with FCR requires the County to pay certain costs (insurance, equipment depreciation, etc.) directly, to pay FCR a per ton operating fee, and in turn receive a 50% share of material revenues. Projections of costs for 2010 and beyond for Options 2, 3 and 4 are based upon total system costs and total system revenues from the sale of recyclable materials.
- Amortization and depreciation amounts are far different. Currently the County MRF building and site are fully depreciated and the only depreciation costs currently being incurred by the County are for certain pieces of equipment. On the other extreme projected full amortization and depreciation costs for the new projected facilities are in excess of $575,000 per year for an expanded facility and in excess of $675,000 for a Single Stream facility on a green field site.

Option 5: Use of Private Sector MRF Capacity for Materials Processing

The Project Team has identified private MRF operators who have or are developing materials processing capabilities in the area. These processors have indicated their hope that they will be given the opportunity to process materials from the County. The Team is also aware of other private MRF operators who may be interested in developing private processing capacity to service the County.

Obtaining pricing information from private operators to compare to the scenarios presented in this Report without the issuance of a formal RFP for services is problematic. A number of surveys have been conducted to obtain the prices which other municipalities are paying private operators. However, the results from those surveys may or may not reflect the results of a Waukesha County solicitation. In the following Section, 5.j, the Project Team identifies its recommendation that the County solicit collection and processing costs from private sector entities using an RFP process.

Collection Savings

In addition to the MRF's Net Revenues from Operations, as detailed in Section 3, the potential cost savings of moving from Dual Stream to Single Stream collection is approximately $.0.74 per household per month with appropriate program changes and automated cart pickup of both recyclables and trash. Therefore, under any scenario (public MRF or Private MRF) Single Stream collection with automation is strongly recommended.

5.j What is the next recommended step in addressing the needs of the County and potential regional partners?

The Report provides the "projected costs" for the County to proceed with either a new Dual Stream or Single Stream recycling program. The Project Team has also reviewed at least two local private entities that during the course of the Project expressed strong interest in providing recyclables collection and MRF processing services for municipalities within the County as well as the other regional municipalities. The Project Team is also aware of other private sector entities that more than likely would respond to certain municipal bidding opportunities related to a MRF, including just operating a new County-owned facility. However, while showing enthusiasm and promoting interest, it is recognized that such overtures are neither obligations nor contracts. Additionally, using cost information from other municipalities in Southeast Wisconsin, while good for estimating purposes, does not reflect any specific offering geared directly towards the needs of Waukesha County and other potentially participating municipalities.

Therefore, in order to advance both the current "consultant's estimates" and the "pricing alternatives of third party private firms operating in the region", it is recommended by the Project Team that the County should immediately begin undertaking a formal Request for Proposal (RFP) process. Such an RFP would firm up the available capacity and pricing options of interested private firms in the region. This in turn will provide the County and other municipalities the information needed to decide if reasonable prices and a fair business deal are forthcoming from private businesses, or if a public sector MRF arrangement is the most appropriate opportunity to pursue.

The RFP should include a variety of processing capacities to meet not only the baseline Waukesha County Participating Community needs for a minimum of ten (10) years, but also those including the current twelve (12) Non-Participating Municipalities within the County. Also, the potential tons of recyclables from the City of Wauwatosa and the City of Milwaukee should be made part of the solicitation, but only if these municipalities are still interested in advancing a regional project upon review of the design and the projected costs presented in this Report.

The RFP should allow a variety of different cost scenarios and combinations of services in order to be able to fully evaluate the potential benefits of private-sector participation. An RFP versus a Request for Bids (RFB) is recommended so as to allow the proposer, based upon their experience, to propose any additional private sector offerings that the proposer might deem to be of interest to the issue. This is not the case in an RFB process.

It is recommended that the RFP provide for separate collection and processing proposals at various tonnage levels. However to obtain the best possible proposals from the private sector, it will be necessary for municipalities to indicate, in advance their intention to join a County or regionally sponsored program whether the processor(s) ultimately comes from the private sector or a publicly owned facility is developed.

If the private sector proposals to the RFP are not deemed to be acceptable and thus not in the best interest of the municipalities, they will then need to advance the development of their own publicly-owned Single Stream MRF, with the size depending upon the number of public sector municipalities interested in such an effort, including regional partners, if any. Such a system could be developed as an A/E design, with an RFB issued for the construction of the designed facility, or it could be purchased under a design/build RFP process with definitive design

concepts and equipment parameters presented in the RFP, but the exact detailed design only forthcoming with the contracting process.

5.k Several of the Participating Municipalities have collection contracts that are nearing an end; what should they consider doing near-term for these services?

An important finding from the Waukesha County survey is that no municipal hauling contracts break out the collection cost from the disposal cost, so municipalities do not know the true cost of disposal. Therefore when residents recycle more or reduce the amount of trash set out, the municipality does not see the savings.

The Project Team suggests that no Participating Municipality enter into a new long-term agreement that would jeopardize maintaining their curbside collection options wide open. This would include both solid waste collection/disposal and recyclables collection. The options of (1) expanding the existing MRF, (2) constructing a new MRF or (3) potentially utilizing a new or existing private-sector MRF are all still being considered. The decision on these options will impact the services requested and the amount of materials (trash and recyclables) to be collected as discussed in the Report. The basic decision of continuing to use a County Dual Stream MRF (existing or new) or going in the near-term future to a Single Stream MRF system (public or private) are still working through the decision-making process; thus status quo for the near-term seems the best route.

WAUKESHA COUNTY RECYCLING SYSTEM & CAPACITY STUDY

Appendix A – Municipal Survey
Appendix B – Case Studies
Appendix C – Preliminary Meeting with Stakeholders Summary
Appendix D – Workshop with Stakeholders on Contracting
Appendix E – Letters from Private MRF Operators
Appendix F – Facility Operating Cost Spreadsheets
Appendix G – Facility Descriptions & Drawings

APPENDIX A

Waukesha County Municipal Solid Waste and Recycling Survey
January 2007

To use this FILLABLE form, please use the TAB key to advance to the next field. The Check Boxes can be selected by left-clicking your mouse. Please DO NOT USE THE ENTER KEY!

(Please check one and fill in name)
☐ **City of _____**
☐ **Town of _____**
☐ **Village of _____**

Name of Contract Person: _____ Date:_____

Telephone/Email address: _____ / _____

Solid Waste and Recycling Collection

1. How does your municipality currently provide the following services? Check all that apply:

A. Recyclables Collection	☑	**B. Solid Waste Collection/Disposal**	☑	**C. Processing of Recyclables**	☑
Municipal contract	☐	Municipal contract	☐	County MRF	☐
Drop Off Site	☐	Drop Off Site	☐	Hauler MRF	☐
Private hauler subscription	☐	Private hauler subscription	☐	Other private MRF Facility name: _____	☐

Comments: _____

2. A. If you checked "Municipal contract" in the table above, when does your current contract expire?
Month _____ Year _____ Name of Company _____

B. If you do not have a municipal contract for solid waste and recycling service, are you considering contracting in the near future? ☐Yes ☐No
Comments _____

3. How many household units currently receive solid waste/recycling collection under contract or by private hauler subscription in your community? Number of units_____
Comments: _____

4. What materials are collected and how? Check all that apply:

	Hauler Contract		Private subscription		Drop off site	Special pickup
	At Curb/ End of drive	Up the drive	At Curb/ End of drive	Up the drive	☐	☐
Trash	☐	☐	☐	☐	☐	☐
Recyclables	☐	☐	☐	☐	☐	☐
Yard Waste	☐		☐		☐	☐
Appliances	☐		☐		☐	☐
Lead batteries	☐		☐		☐	☐
Tires	☐		☐		☐	☐
Motor Oil	☐		☐		☐	☐
Large items such as furniture, carpet, etc.	☐		☐		☐	☐
Other _____	☐		☐		☐	☐

Comments: _____

5. What is the Collection Frequency:
   A. For waste (check one): ☐ Weekly ☐ every other week ☐ Other _____
   B. For recyclables (check one): ☐ Weekly ☐ every other week ☐ Other _____

6. On what day(s) is Recyclables Collection provided in your Community? _____

7. What type of container is used for setout? Check appropriate box.

	Bin	Cart	Bag or can	Other
Recycling	☐	☐	☐	_____
Solid Waste	☐	☐	☐	_____

8. What changes would you like to see in your recycling program related to collection, processing, education, etc.? _____

9. Which landfill is used for disposal of solid waste from your municipality? _____

Cost/Revenue

10. What is the contractor cost per household per month for:
(Please use the TAB key to advance to the next field. The Total Cost will automatically fill in. Do NOT use the Enter key.)

A. Recycling	$
B. Yard Waste	$
C. Trash	$
Total/HH cost	$ 0.00

11. Is the fee based on volume of waste set out? ☐Yes ☐ No

12. Costs for **2006:**
a. Total collection and disposal costs for trash $ _____
b. Total collection and processing costs for recycling $ _____

13. Do you know your solid waste disposal cost separate from collection costs? ☐Yes ☐No
If "Yes" what is the 2006 cost for collection only? $_____
Comments: _____

14. Does your hauler contract provide revenue sharing? ☐Yes ☐No
If "Yes", what was your payment/credit for 2006 $ _____
Comments:_____

15. How is your solid waste/recycling program funded: Check all that apply:
A. ☐General tax levy
B. ☐Special fee on utility bill
C. ☐Special fee on property tax bill
D. ☐Resident pays hauler directly
E. ☐Drop off site charge to residents
F. ☐County recycling dividend/rebate
G. ☐State Recycling Grant
H. ☐Other _____

General

16. Do you feel that recycling drop off sites operated by municipalities are worthwhile? ☐Yes ☐No ☐ Somewhat ☐Don't know What changes would you suggest, if any?_____

17. The county is planning a half-day workshop for municipal staff on effective contracting for recycling and solid waste collection. The list below contains some potential topics. Which issues would you like to see addressed? Check your top three choices:

Choose 3

☐	a. Automated collection
☐	b. Reporting requirements
☐	c. Fuel surcharges
☐	d. Performance-based contracts
☐	e. Incentives for more recycling
☐	f. Breaking out cost of disposal from collection so community gets the benefit of increased recycling/reduction
☐	g. Including small businesses and school districts in the contract
☐	h. Volume based fees (Pay as You Throw) where residents are charged based on usage
☐	i. Other _____

18. See attached WI Department of Administration population projection chart. Do you believe the projections for your community are accurate? ☐Yes ☐No Comments: _____

General Comments:

_____

Please complete and **return by February 7** to:

Waukesha County Parks and Land Use **FAX 262-896-8298**
Recycling and Solid Waste
1320 Pewaukee Road, Room 260
Waukesha WI 53188
kfiedler@waukeshacounty.gov

APPENDIX B

The RRT Project Team reviewed numerous background documents surrounding dual stream vs. single stream programs and the issues discussed herein. The following is a review of some of these studies and information available.

B.1 Evaluation of Enhanced Residential Waste and Recyclables Collection and Processing for New Castle County[1]

Background:
Currently New Castle County's comprehensive drop off Programs (75 sites) result in a recycling rate of approximately 6% including oil, leaf, and yard waste recovery and only 1.4% excluding these items. Only 20 to 30% of households participate in the program and only 14% of commonly collected recyclable materials are estimated to being recovered. The purpose of the report was for a feasibility study to evaluate different residential recycling and collection alternatives for New Castle County.

Relevant Findings: (Relevant Findings are those excerpted because of their potential in decision making process the Waukesha County Study):

The project team evaluated a number of options including increasing the materials collected at the drop off centers, curb side collection based upon subscription, integrating curb side collection with MSW collection, various dual and single stream scenarios and finally, using a Pay As You Though (PAYT) system with single stream collection. The following table summarizes the results from this study:

System	Tons Diverted	Percent of Available Recyclables	Residential Recycling Rate	Cost Per Ton
Current Drop off System	10,800	14%	6%	$190
Expansion of Materials Collected at Drop Off	13,800	18%	7%	$183
Subscription Service	15,100	19%	8%	$206
Integrated Collection in Incorporated Areas Only	19,500	25%	10%	$71
Integrated Collection in all Areas of County DS, Bi-weekly	29,500	38%	13%	$147
Integrated Collection in all Areas of County DS, Weekly	33,400	43%	15%	$237
Integrated Collection in all Areas of County SS, Bi-weekly	37,300	48%	16%	$195
Integrated Collection in all Areas of County SS, Weekly	45,100	58%	19%	$136
Integrated Collection in all Areas of County SS, Weekly, with PAYT	50,100	64%	21%	$141

[1] Report Prepared by DSM Environmental Services, Inc. for Delaware Recycling Public Advisory Council, 2003

The study concludes that Instituting a Single Stream Weekly collection program would result in a collection and processing cost of $136 per ton compared the County's cost to collect and landfill MSW of $180 per ton.

B.2 Single Stream: An Investigation Into the Interaction between Single Stream Recycling Collection Systems and Recycled Paper Manufacturing [2]

Background:
Sonoma County Waste Management Agency requested Conservatree to prepare a report on potential problems created for the paper industry by single stream collection. Approximately 75% by weight of the materials in a typical municipal recycling program are fibers, most of which is newspaper. As Single Stream collection spiraled upwards in the first years of this century, certain paper manufacturers began to complain about the quality of the fiber they were purchasing from these programs. The specifications for secondary fiber bought and sold are typically governed by specifications developed by the Institute of Scrap Recycling Industries. The specification for #8 Newspaper, which is the grade of newspaper most municipal facilities attempt to produce, calls for 0% Prohibitives. Prohibitives include all non-fiber materials such as glass, plastics, and metal. In June of 2002 the American Forest & Paper Association approved a policy opposing any collection program that includes glass with paper. Conservatree interviewed both operators of single stream systems and paper mills which purchase materials from single stream programs.

Relevant Findings:
A paper mill's ability and desire to use fiber from a single stream program is dependent on the products which that mill is producing (tissue verses newspaper for example) and the type and extent of fiber cleaning systems available at that mill.

Mill representatives reported that glass is a severe problem, causing a number of problems.

- Equipment damage.
- Worker safety.
- Customer safety.
- Public confidence.

Mills also reported having problems with plastic in bales from single stream programs, especially plastic bags.

Many tons of Newsprint recovered from Single Stream systems are currently being exported to China. There is no evidence to suggest that these mills hand sort the fiber or are built to accept lower quality fiber than mills in North America.

There is concern that Single Stream systems are beginning to be used to collect office paper, which typically goes to mills producing high end papers.

The authors suggest that there may be some evidence that mills that previously used recycled newsprint have converted back to wood.

[2] Report prepared by Conservatree for the Sonoma County Waste Management Agency

Despite paper mill objections, all fiber from Single Stream systems interviewed by Conservatree was successfully marketed to paper mills.

The report points out that the fact that some mills are able to use Single Stream fiber does not mean that all or even most can do so.

The report recommends removing glass from Single Stream collections.

B.3 Single Stream Total Cost Analysis [3]

Background:
The American Forest & Paper Association (AF&PA) is the largest trade association representing the paper making industry in the United States. In 2003 it commissioned this report to better understand the impact of recycling processes on a system wide, cost basis. Specifically, the report attempts to identify the impacts on recovered paper costs and recovered paper volumes at three stages - collection, processing, and papermaking – for Single Stream and Modified Single Stream programs (ones where glass is not collected or collected separately) compared to Dual Stream. For collection and processing costs comparisons, over 100 MRF's were used.

Relevant Findings:
The overall costs differences between operating a Single Stream or Dual Stream program were reported as follows:

- Single Stream collection results in a savings of $15 to $20 per ton
- Single Stream processing results in increased costs of $5 to $15 per ton
- Single Stream papermaking results in increased costs for the paper mill of $5 to $13 per ton
- Single Stream programs result in an average net increase in system wide costs of $3 per ton

The report authors projected an increase of 2% to 5% of materials collected in a Single Stream program verses a Dual Stream. However, they conclude that this is offset by increases in residue generated at the facility and further residue generated at the mill.

B.4 Recovered Fiber Quality Study [4]

Background:
For the same reasons stated above, the AF&PA commissioned this report, which is referenced and used as a data source often in the Single Stream Cost Analysis work. For this work, R.W. Beck directed field tests and characterizations of sorted fiber coming from 13 total Single and Dual Stream facilities.

Relevant Findings:
Single Stream Newspaper (Grades #7 and #8) contained the following compared to Dual Stream ONP:

- More Newspaper (79.9% verses 75.6%)
- Significantly less OCC (1.2% verses 2.7%)

[3] Report prepared for the American Forest & Paper Association by Jaakko Poyry and SERA, 2004
[4] Report prepared for the American Forest & Paper Association by R.W. Beck, 2002

- Less other recyclable paper (15.6 verses 19.8)
- 65% higher percentage of Prohibitives (3.3% verses 2%)
- Twice as much non recyclable fiber (0.8% verses 0.4%)
- Over twice as much plastic by weight (1.1% verses 0.4%)
- More metal (0.5% verses 0.3%)
- Slightly less glass fines (0.5% verses 0.6%)
- Other Prohibitives (0.4% verses 0.2%)

Similarly, the team analyzed the difference between Single and Dual Stream collected Residential Mixed Paper (RMP). This is a grade made by some facilities that do not positively sort any fiber from programs that encourage the residents to recycle all paper products. RMP from Single Stream programs contained:

- Significantly less Newspaper (43% verses 74.2%)
- More than twice as much Corrugated (25.5% verses 12.3%)
- More than twice as much other recyclable paper (29.9% verses 12.3%)
- 64% more Prohibitives (1.8% verses 1.1%)
- Over twice as much plastic (0.5% verses 0.2%)
- Twice as much glass fines (0.4% verses 0.2%)
- The same amount of non-recyclable paper and metal (0.5% and 0.1%)
- Twice as much other prohibitives (0.2% and 0.1%)

Therefore, it appears that including RMP in a Single Stream program, the overall character of collected paper will change as more non-newsprint fiber is recycled.

B.5 A Comparative Analysis of Applied Recycling Collection Methods[5]

Background:
Eureka Recycling is a non-profit organization that manages the recycling program for St. Paul, Minnesota. The study primarily focuses on five different collection methodologies. Specifically, it compares the current bi-weekly source separation in bins program with bi-weekly Dual Stream collection in carts, bi-weekly Dual Stream collection in bins, weekly Dual Stream collection in bins plus organics and bi-weekly Single Stream collection in carts. The table below summarizes the results of the study:

Collection Method	Capacity in Total Gallons for Two Weeks	Increase in Materials	Increase in Participation
Dual Stream carts bi-weekly 70 gal	70	32.8%	7%
Dual Stream bins weekly 36 gal	72	26.1%	7%
Single Stream carts bi-weekly 32 gal	64	20.8%	5%
Dual Stream Bins bi-weekly36 gal	36	7.3%	4%
Source Separated bi-weekly	36	6.2%	4%

The Eureka Recycling team concluded that the data indicates that bin or cart capacity, not less sorting is the most important factor in determining the quantities of materials which will be recycled from a particular program.

[5] Report by Eureka Recycling, 2002

The Eureka Recycling team recommended that St. Paul proceed with a Dual Stream in bins collected weekly collection program. This recommendation was driven to a large extent by the team's concern over increased residue from a Single Stream program and a potential decrease in materials values.

B.6 Presentation by Waste Management[6]

Background:
Waste Management, Inc., the country's largest waste hauler and largest operator (currently operating under the name Recycle America Alliance) of recycling facilities processing residentially generated materials is a proponent of Single Stream programs. This presentation, at a Northeast Recycling Council (NERC) conference in 2002 highlighted the common pros and cons of Single Stream and proceeded to address the cons.

Relevant Findings:
The author presented a discussion concerning how the proper selection of equipment impacts material quality, including making the point that certain screens can even make a Newsprint / Mixed Paper split.

With the use of a screen for Corrugated and proper equipment selection, labor costs can be controlled relative to Dual Stream systems.

Optical sorting is an option to color sort glass in high volume situations.

Residue percentage can be kept below 4% if glass is not sorted (recycled as aggregate) and plastic is not sorted and is recycled as a mixed #1 through #7 grade for further downstream sorting and processing.

Quality at the curb can be controlled by using manual or semi-automated routes and performing quality control of employee effectiveness.

Revealed certain statistics:

- Dayton, OH converted from Dual to Single and route productivity increased by 55%.
- Equated to saving $31.67 per ton on collection costs.
- Stated that $10 to $15 cost increases on processing side for Single Stream are justified.

B.7 Single-Stream Versus Multistream Recycling[7]

Background:
In this article the author explores Single and Multistream recycling by citing various municipal examples.

Relevant Findings:
The City of Whitewater, WI with 2230 households began Dual Stream recycling in 1992 with 28 gallon bins and switched to Single Stream in 2002. The switch was promulgated by the City's

[6] Presentation by Waste Management, Inc. to Northeast Recycling Council, 2002
[7] Single Stream Versus Multistream Recycling, *MSW Management*, 2004, Darlene Snow

hauler who, for an extension of its MSW and recycling contracts, offered to supply carts to all households. 96 and 48 gallon rolling carts are offered. In 2002 according to the author, the City recycled 32% of its total waste stream. In addition to the increase in the recycling rate, City managers applaud how less unsightly the City is. The City is paying the hauler $3.59 per unit for recycling and $7.03 for MSW and bulky.

The City of Ann Arbor, MI has a long established Dual Stream program which has achieved a 50% diversion rate. City managers are pleased with the community's response and are reluctant to make any changes.

In 1999 Portland, ME switched from a drop off program with a 7% diversion rate to a multistream system accompanied by a pay-as-you-throw system. 17 gallon bins for containers are offered. No containers for fiber are supplied. The diversion rate immediately moved to 35%. City managers argue that with the PAYT system in place they are achieving 90% participation and that Single Stream would offer little increased diversion.

Los Angeles County primarily operates under a subscription system with each hauler offering a package of recycling, refuse and yard waste (this package is determined by County ordinance). In 2000, one hauler was given a waiver to offer a single stream system where all three streams can be commingled. This hauler operates a dirty MRF type sorting facility at a transfer station. The hauler, Athens Services, maintains that operating the sorting facility is cheaper than the offsetting costs of three stream pickup in separate vehicles and that they are achieving a 30% diversion rate.

B.8 Why We Say "No" To Single-Stream Recycling Collection[8]

Background:
The North Shore Recycling Program (NSRP) is tri-municipal government agency responsible for planning and administering residential waste reduction and recycling activities in three communities a total population of 180,000 just north of Vancouver, BC.

Relevant Findings:
The current program consists of a 3 sort system- Newspaper, Mixed Paper and Commingled Containers. Each home is given a bin for containers, a blue plastic "envelope for Newsprint and a yellow "envelope" for Mixed Paper. Weekly collection is provided. Multi family dwellings are provided with rolling carts for each type of material. Three compartment vehicles are used. The Newsprint is transferred loose directly to a local paper mill and recycled into new newspaper. Diversion rate in 2001 was 19.3 from their 3 sort system.

The authors reviewed the pros and cons of Single Stream systems.

They stated that the Paper Board Packaging Environmental Council in Canada issued a position paper that favored source separation of fiber from containers. The Council made the point that mills have made substantial investments to be able to remove the existing contaminants from residentially generated fiber and will be facing additional investments because of Single Stream. The Council stated that Single Stream may actually hurt recovery levels because of increased residue percentages. Finally, the Council stated that there is no evidence as to the system wide overall economics of Single Stream recycling being positive.

[8] A presentation by The North Shore Recycling Program, 2002

The authors summarized why Single Stream will not work for them:

- Current participation rate is over 95%
- ONP recovery is 95 lbs./capita. Closest rival municipality is 53.50/capita
- Highly educated public which is happy with current system. Curb sort demonstrates "respect for commodities".
- Collection and processing is the same company, giving route personnel incentive to collect clean materials.
- Deposit legislation (which is very comprehensive in BC) has made bin capacity a non issue.
- Processing costs are less due to three sort
- Processing equipment does not need to be high tech
- High quality product (newspaper) generates higher revenues
- No available Single Stream facility to take materials if they were to be collected

B.9 Pacific Waste in Partnership with the City of Chula Vista[9]

Background:
In 2003, Pacific Waste and the City of Chula Vista made a presentation before the California Integrated Waste Management Board at the Single Stream Collections and Recyclables Workshop. The City and its hauler, Pacific Waste, had recently completed transitioning their program from a three sort system consisting of containers in 18 gallon bins, bundled newspaper, and bundled corrugated to a single stream system using automated collection of rolling carts. This was accomplished along side the transitioning of their trash collection to automated carts and initiating a variable rate system.

Relevant Findings:
Initial concerns by the City included the fear that increased processing costs would not be offset by increased volume and that their revenue would fall do to contamination and lower quality recyclables. Additionally, they were concerned that change would confuse residents and that many would not have room for the carts.

Residents were offered 96, 64, or 32 gallon black carts for trash and pricing was variable depending upon the choice. Recycling and yard waste is free. Residents were also offered the same choices for their blue recycling cart. An intensive public education program was put in motion which included a call center handling up to 1500+ calls per day when the program was rolled out.

One of the goals of the program was to improve the City's appearance. This has worked out very well with uniform looking carts.

Pacific converted their entire fleet to 20% biodiesel mixture from soy beans. Existing trucks were able to be used for the transition to automated trash and recycling because the company choose a European designed front loader box with the lift arm for the carts mounted directly on the box.. This has resulted in an estimated 500 ton reduction in emissions related pollution annually. Automation is safer for employees with no more heavy lifting, reducing the chance of injury. The operator has excellent forward vision as the cart is dumped in front of him or her.

[9] A presentation by Pacific Waste and the City of Chula Vista, 2003

Service is quieter because the equipment operates at idle creating less hydraulic and engine noise.

The program has resulted in an 11% decrease in solid waste, an 89% increase in recycling tons, and a 2% increase in yard waste.

The authors offered the following advice. One, expect large numbers of phone calls no matter how much other public information is provided. Two, keep the education simple. Three, have a good plan for delivering carts.

B.10 Transcript of Meeting California Integrated Waste Management Board Single Stream Workshop[10]

Background:
This workshop, attended by municipal officials, haulers, and recyclers was held in April, 2003 in order to better educate attendees as to best practices related to implementing Single Stream programs. During opening remarks, Board Member Jones, made the point that he does not see many communities reaching mandated diversion rates without the use of Single Stream.

Relevant Findings:
Joel Corona of Waste Management, Inc. gave a presentation consisting mostly of the common pros and cons of Single Stream, focusing on the pros and ways of overcoming cons. Of note he related Waste Management's processing strategy to be changing from multiple processing facilities to a hub and spoke network with larger, more complex facilities processing both local municipalities and other materials brought in from remote transfer stations. This strategy, to some extent, is being fueled by the capital intensive nature of Single Stream.

The CEO of Edco Disposal, Steve South, which operates 14 recycling facilities including the one where Chula Vista's materials are processed, gave a brief presentation. His company was in the process of transitioning their facilities from Dual to Single Stream. Ten (10) had converted thus far. Working with numerous communities who have transitioned to Single Stream, he sees the contamination issue as very site specific. Many variables including, very importantly, the level of public education will impact contamination levels. Chula Vista, for example, saw little increase in contamination levels because it had a very active public education program prior to conversion to Single Stream and the public education for the new program was intense. Also, in Chula Vista, the drivers can see what is being dumped and they are trained to get out of the truck, remove if possible the objectionable material and leave it tagged for the resident. Mr. South also made an interesting point about marketing materials from Single Stream systems. He noted that paper mill buyers are less and less pricing fiber on a grade basis and more and more pricing it on a facility by facility basis.

Mr. Sloan, an independent hauler, remarked that the major benefit of Single Stream is the ability to automate collection into compactor trucks. He reported collection costs of approximately $150 per ton for Dual Stream systems verses $40 to $80 per ton for Single Steam.

Numerous comments were made from panelists and questions indicating that once the transition to Single Stream is completed, the public "loves the program".

[10] Transcript of Meeting California Integrated Waste Management Board Single Stream Collections and Recyclables Workshop, 2003

Much discussion occurred concerning reducing contamination. Successful programs stressed the importance of joint efforts by the municipality, the haulers and the processors.

A representative of AF&PA made a presentation focusing on quality. He made the point that the past, with most programs being dual stream, made contamination easier to deal with. While the answer to pollution is not dilution, in practice mills would mix more contaminated materials with their large percentages of well sorted materials and blend the poor material in. His concern is that major haulers are talking about 80% of tons being from Single Stream Systems in the future. He then gave some specifics related to screen ware, conveyor ware and general maintenance costs associated with west coast mills purchasing fiber from Single Stream systems. The examples primarily related to the glass shard problem. He stressed up front program and system planning and the need to design and implement good programs with the most up to date systems for removing contamination.

A long and detailed discussion followed lead by a number of recyclers and fiber brokers concerning the China market. China is the market for much fiber from the west coast. In China, labor is cheap enough to enable the mills to hand sort all fiber that comes in from around the world.

A number of large Single Stream facilities were discussed where total residue is well below 10%. The comment was made that if residue is above 10% there is a problem with either the hauler, the municipality or the most likely the physical processing system. The importance of the municipality being ultimately responsible for the programs integration and success was reiterated by Board Member Jones.

B.11 Broome County, New York Division of Solid Waste Management[11]

Background:
This upstate New York County has approximately 250,000 people, with a mix of rural and urban areas. In late 2002 a Single Stream MRF owned and operated by Waste Management was contracted by the County to begin accepting County subsidized residentially generated Single Stream Material.

Relevant Findings:
The facility is currently processing approximately 12,500 tons per year of Single Stream recyclables. A privately operated competing facility is processing approximately 8,000 tons per year of Dual Stream recyclables from the County.

The County is paying Waste Management a processing fee of $38.80 per ton and has a revenue sharing agreement based upon total weighted revenues per ton.

Glass is processed into a uniform aggregate which the County recycles as alternative daily cover or use in road building at its land fill.

Residue from the Single Stream facility is approximately 3.5%.

[11] Documents released by Broome County Division of Solid Waste Management, 2003

B.12 To Market, To Market, Some Advice About Single-Stream Sorting Equipment[12]

Background:
This article in the publication, MSW Management, explores the question, "Does the Market Influence Single-Stream Processing?"

Relevant Findings:
Quoting primarily providers and operators of Single Stream systems, each of these individuals stressed the relationship between the MRF and markets. Throughout, one quote after another stressed the need for high quality, proven systems and the need to match your system to your expected markets. Nathiel Egosi, of RRT Design & Construction, makes the point that markets were much more considered as a "driver" to decisions and plans surrounding MRF's 10 years ago than they are today and the importance of returning to that frame of mind when considering Single Stream.

B.13 Single Stream, Many Questions[13]

Background:
Scrap Magazine, in an article in December of 2002, discusses whether Single Stream programs will "produce more paper or more headaches".

Relevant Findings:
Specific examples of the problems and costs facing paper mills receiving fiber contaminated with glass and or plastic are discussed. A representative of SP Newsprint Co., a recycled newspaper producer with mills in Georgia and Oregon, is quoted as saying "glass is poison for the mills". He goes on to say that his Georgia mill will not accept fiber from single stream programs while in Oregon, they will receive Single Stream fiber from programs that exclude glass such as that in Portland. A representative of Weyerhaeuser (which handles little residential paper) explained that they threatened to cease purchasing one community's fiber if they switched to Single Stream.

The point was made that paper mills with a drum pulping process are much more able to deal with glass and plastic contamination than mills which do not have this technology.

Offsetting these stories, the authors and mill people make clear that some Single-Stream processors are able to produce acceptable product. The fiber quality situation is clearly program, facility, and mill specific.

B.14 Single-Stream Recycling: Assessing the Trade-Offs[14]

Background:
This article summarizes the author's findings relative to the impacts of moving from a Dual Stream to a Single Stream program.

Relevant Findings:

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[12] To Market, To Market, *MSW Management,* Penelope Grenoble O'Malley, 2002
[13] Single Stream, Many Questions, *Scrap,* Robert L. Reid, 2002
[14] Single Stream Recycling, *Resource Recycling,* Lisa Skumatz and Charles Bicknell, 2004

Collection Impacts

- Significant increases in recycling tons collected.
- Significant savings in per ton collection costs.
- Single containers and single collection days improve program results.
- Larger containers improve program results.
- Public education program key to success.

Processing Impacts

- Increased processing cost. Less increases at larger facilities.
- In real world, many operators have not increased their fees to municipalities for Single Stream.
- While residue and contamination rates do increase, this does not significantly reduce the tons of material shipped to market.
- Success is a function of equipment choice.
- Operations need to adjust speeds and other processing variables to meet local or environmental (weather) conditions.
- There is a net savings when collection and processing are factored together

Contamination and End User Issues

- Single Stream material does not produce good or bad materials. Specific programs and facilities produce good or bad materials.
- Some dual stream material is more contaminated than other dual stream material.
- While contamination (especially glass and plastic) is an issue, “one mill indicated that they absolutely refused to accept single-stream product, while a broker stated that they sold single-stream product to that mill but the mill just didn’t know it.”
- Final screening of fiber may be necessary in some cases.
- Certain paper mill products are more or less tolerant of contamination (tissue verses chipboard, for example).
- The incremental paper mill cost to remove contamination may be more in some cases than the net savings from collection and processing.

Market Issues

- Currently the market place does not differentiate between materials contaminated to different levels. Therefore there are no current incentives to having higher quality materials. The authors suggest that the market place should become more processing facility oriented than grade oriented in terms of pricing.
- Longer term purchase contracts with facilities producing know quality would help stabilize the marketplace.
- There may be a need for periodic inspections by third party entities.
- Mills may need to consider installing preprocess equipment.

Conclusion

- All Single Stream programs are not good or bad.
- Appropriateness depends upon local conditions.
- The market place should signal, through price, good and bad materials which will drive improvements in public education, processing systems and operations procedures.

B.15 Single Stream: Closing the Loop Taking a Whole Systems Approach[15]

Background:
This Roundtable discussion devoted entirely to Single Stream recycling included presentations by Lynn France of the City of Chula Vista, Richard Abramowitz of Recycle America Waste Management and Donna Perala of the City of San Jose.

Relevant Findings:
Lynn France from the City of Chula Vista reported that;

- 100% increase in recycling volume due to Single Stream conversion

- Chula Vista's single stream program has a 7% contamination rate (trash, nonrecyclables) compared to a 2% contamination rate for the previous dual stream program.

- Lynn pointed out that converting to a single stream program requires a major public education campaign, but this revitalizes recycling participation and awareness. Also, in order to adequately process the single stream materials, Edco, the MRF that Chula Vista delivers to, needed to do considerable retooling of both its collection and processing operations in order to maximize efficiencies and minimize contamination of commodities.

- Chula Vista made three changes at the same time: 1) automated, 2) single stream, and 3) changed to unit pricing or PAYT.

Richard Abramowitz of Recycle America reported that Recycle America had, at the time, 24 recycling facilities in California, 11 of which were Single Stream. He indicated that RAA has seen these single stream changes result in:

- Higher participation rates
- Higher recovery rates (20-30% in California)
- Reduced unit costs (time per stop, trucks on street, processing costs per ton)
- Reduced collection and MRF employee safety risks
- Reduced total recordable incidence rates (TRIR)
- Reduced employee turnover
- Reduced worker compensation rates
- Optimized fleet utility
- Increased recycling opportunities
- Improved aesthetics and convenience
- Making residential recycling economical and sustainable
- "Securing" and growing the residential fiber stream

Donna Perala, City of San Jose reported that after a difficult start-up the first year - including a nearly five-fold increase in its residue rate (hitting an average of 30%) and an actual decrease in diversion - San Jose is now able to say its program is on its way to meeting its performance standards. The city has seen single-family recycling tonnages increase by 25%, and diversion by 11.5%, above that which was achieved under the prior dual stream system. San Jose's

[15] Transcript of Roundtable presented by California Integrated Waste Management Board, Sacramento, CA May 23, 2005

residential diversion rate is now at an all-time high of 49.5%. [WAS THIS A SOURCE SEPARATED OR DUAL STREAM SYSTEM BEFORE CONVERSION? IT IS NOT CLEAR SINCE BOTH TERMS ARE USED. ALSO DOES THE 49% RESIDENTIAL DIVERSION RATE INCLUDE YARD DEBRIS?]

B.16 Single Stream[16]

Background:
Kent Harrel, Minnesota Market Area Director of Operations with Waste Management made a presentation at the NRC conference in October, 2006 and presented data on Waste Management's experience with single stream recycling in the upper mid-west.

Relevant Findings:
In general it was found that single stream increased collection volumes up to 15lbs. per household per month and lowered collection costs by 20%. Emphasized the need for program changes such as providing larger containers, using automation and focused public education are needed to reach these levels. Specifically;

- Blaine, MN saw an increase from 40 lbs. per household per year to 56 lbs. (i.e. 40% increase) between 2003 and 2005.
- Saint Peter, MN realized an increase from 26 lbs. per household per year in 2003 to 42 lbs. (i.e. 62% increase) in 2006.
- Hopkins, MN saw its participation rate up 8.4%, its recovery rate up 16%, and the amount of MSW collected down 20%.

B.17 City of Madison, Wisconsin[17]

Background:
The City of Madison switched from a curbside dual stream program to a single stream program in September, 2005. At the same time, collection was automated using 65 or 95 gallon containers and Mixed Paper was added to the program.

Relevant Findings:

- Recovered materials increased by 35%, from 15,141 tons in 2004 to 20,553 tons, in 2006.
- Corresponding tons of MSW were reduced by 10% showing an almost ton for ton exchange with the increased recycling due to the new Single Stream program.
- City collection labor costs were reduced by 14%.

[16] Single Stream, Presentation at NRC Conference, October 2006, Kent Harrel, Waste Management
[17] Interview with George Dreckmann, City of Madison Street Division, Recycling Coordinator, February 2007

- Mr. Dreckmann reports much better recycling rates for multi-family dwellings due to ease of new program.

B.18 Representative Southeast Wisconsin Recyclables Collection & Processing Prices[18]

Background:
The City of Wauwatosa is considering what to do with their Blue Bag program as a result of the fire at their transfer facility. As a result, City staff, led by Mr. Bill Ramcheck, have been canvassing the State to gather "representative" charges from local haulers for the collection of recyclables and the processing of said materials. As a result of that canvassing, the City has identified several very cost competitive communities that are receiving services similar to those being evaluated by Waukesha County. Based on this information, the Project Team presents a few cost examples to illustrate additional "geographic" based charges as information and comparison value as this Report is being reviewed and considered. Three examples of very good costs tendered into the marketplace by private sector collectors for Single Stream Recyclables is as follows:

- City of Oak Creek, WMI collects EOW with automated collection, their carts and processes Single Stream for $2.08/HH/Mo
- City of Cudahy, WMI collects with EOW with carts supplied by WMI for $2.48/HH/Mo and processes in single stream MRF
- The City of Fond Du Lac, WMI uses automated collection of recyclables EOW with carts supplied by WMI for $2.12/HH/Mo with Single Stream MRF

Note: It is cautioned that each of these cities would have had specific terms and conditions in their purchasing documents that may or may not apply to the County and would need to be further reviewed and evaluated for "specific applicability" to the County. However, as public information available on other regional programs this data is deemed worth sharing in this Report.

[18] Interview with George Dreckmann, City of Madison Street Division, Recycling Coordinator, February 2007

Appendix C
Preliminary Meeting with Stakeholders Summary

The RRT Project Team, with Bob Brickner of Gershman, Brickner & Bratton, Inc. (GBB) as the main workshop presenter, conducted three (3) meetings with key stakeholders on March 6th and 7th, 2007. The first meeting was held from 9:30 AM to 12:00 noon on March 6 for stakeholders from participating communities, county staff, and County Board members. The second Task 4 meeting was held from 7:00 PM to 9:00 PM on March 6 for input from citizens, elected officials, and waste haulers. The third meeting was held from 9:00 AM to 12:00 noon on March 7 for stakeholders from non-participating communities. The purpose of the meetings was to present a brief review of the existing County-owned MRF and recent recycling performance levels as well as present an introductory overview of the ongoing Recycling System & Capacity Study and to receive local input for the Project. Attached to this report is a list of attendees for all three Task 4 meetings.

The following is a summary of relevant information, questions, and comments gleaned from the participating stakeholders who attended the three meetings:

March 6, 9:30 AM Meeting

- In the current dual-stream system, the collectors sometimes make a decision to "reject" items at the curb because papers are not bundled or bagged. This action may cause people to reduce recycling.
- What are the current limitations of the existing MRF, relative to its size and location?
- Why aren't all Waukesha County municipalities part of the current county system?
- Do Waukesha County communities that use larger bins for the dual stream system have higher recycling rates?
- The County is now distributing more blue bins because some residents cannot fit all their recyclables into one bin, some bins are badly cracked, and some are missing.
- The County executive should consider doing PSA's promoting recycling on the local cable television system.
- There needs to be more education for citizens as to what is recyclable; for instance, junk mail.
- There should be more recycling education done through the school system.
- How can we have the haulers distribute recycling brochures?
- Education should not only point out the revenues from recycling, but also the avoided landfill costs and environmental benefit.
- What are the incentives for change…how do we convince citizens to recycle more and reduce trash….pay as you throw would be more fair.
- If "Pay As You Throw" was implemented, citizens would put their trash on the side of the road or in park dumpsters. How do we control illegal dumping?
- Is there a model for collaboration between communities on hauling contracts?

- Can we give haulers an incentive to bring more recyclables to the MRF?
- If we change to a single stream system, will we get stuck with paper we can't sell? How does single stream impact the quality of materials and therefore markets?
- Single stream would be good because there would be less "dumpster divers" going through the recyclables that are set out at the curb.
- Lids on single stream carts would eliminate some of the current litter problems with the recycling bins.
- Can we look to communities in our area that have converted to single stream and learn from their experience?
- How do Wisconsin's landfill bans affect single stream recycling? For instance, if we eliminate glass from recycling, we would need an exemption?
- The fact that residue percentage increases with single stream may affect the public perception of recycling.
- The fact that there would be more recyclables collected with single stream would play well with Waukesha County's educated population.
- If we convert to single stream, we need to be really clear about the advantages…people are resistant to change.
- What is the approximate timeline if we decide to change to single stream? We are concerned how it may affect upcoming hauler contracts.
- There was a concern about 64 vs. 96 gallon carts, in that the 96 gallon carts may be too heavy / large for some residents.
- The City of Waukesha has recently had to enforce the rule that residents cannot use carts larger than 32 gallons for trash. This is because the hauler picks up non-automated and had worker injury concerns with larger containers.
- The Village of Merton is transitioning to new carts for trash. Veolia is converting to automated trash collection.
- The current Waukesha County communities that have a single stream program have higher per capita recycling rates, according to 2006 reports.
- Elm Grove and Brookfield residents have "up the drive" service. If we convert to single stream, residents will resist change. How do we prepare them for a future that may not be "up the drive"?
- If we convert to automated single stream collection, there is a concern that automated vehicles will ruin trees, have problems with parked cars, and encounter problems in alleys.
- Since Waste Management is building a new single stream facility in the area, aren't we competing with them? How will we deal with this issue?

<u>March 6, 7:00 PM Meeting</u>

- Why do we need to convert to single stream? Wouldn't just a larger blue bin increase recycling rates?
- Haulers are moving to fully automated collection and would be in favor of single stream recycling.
- Recycling rates could be down because the newspaper portion of the fiber stream is lower (fewer, smaller newspapers).

- What is the impact of lighter weight packaging on recycling trends?
- Concern expressed about the quality of paper going to market. Must be convinced that paper quality can be maintained at a single stream MRF.
- Residents are generating recyclables "outside their homes" in today's society. These recyclables could be captured by including small businesses in recycling contracts.
- Recycling rates could be down because residents are selling their own recyclables in this strong market.
- Can we compare single stream MRF's in bottle bill states with non bottle bill states?
- Would our community be better off just letting the haulers keep all the recyclables in exchange for a lower collection cost?
- The County needs to modernize its system and upgrade to new technology.
- Automated collection has the advantages of efficiency and safety of workers.

March 7, 9:00 AM Meeting

- Town of Genesee converted to single stream about 5 years ago. What increase, if any, was seen in the recycling rate?
- When the Town of Genesee converted to single stream, they were surprised that there were very few complaints. In a survey taken, 89% of residents surveyed said they were pleased with single stream. There are very few complaints now, maybe one a month. Residents have a choice of either a 48 or 96 gallon cart, most choose the larger cart. Recyclables are picked up every other week, on the same day as trash. Bulky waste is picked up once a month.
- If a new single stream facility is constructed, it seems like a good idea to include the acquisition of carts in the overall cost.
- What are the advantages and disadvantages of a publicly vs. privately owned and operated facility?
- The City of Milwaukee collects recyclables once a month. The system is a dual stream, semi-automated collection, with split carts. During the snow season recycling trucks and workers plow snow and collection is not regular.
- The City of Milwaukee does not anticipate changing to fully automated collection, but could adapt to single stream.
- Based on a survey conducted by the City, 45% of the City of Milwaukee residents think that recyclable collection should be more frequent.

Appendix D
Workshop with Stakeholders on Contracting

The RRT Project Team with Bob Brickner of Gershman, Brickner & Bratton, Inc. (GBB) as the main workshop presenter, conducted a special "Collection Contracting Workshop" meeting for key Participating Municipal stakeholders on March 6th from 1:00 PM to 3:30 PM.

The meeting consisted of a PowerPoint presentation related to the issues in soliciting and writing municipal recyclables hauling contracts and those also associated with solid waste collection contracting so as to provide information designed to stimulate increasing diversion.

Some of the comments made during the workshop were as follows:

- A request was made that a copy of the presentation be made available to participants. This will be made available.
- There was a discussion about how two small communities could work together to negotiate a hauling contract and possibly bring in better bids.
- There was a discussion about the ways to encourage more competition for hauling/disposal contracts.
- A comment was made that sometimes there is little competition for collection because only two haulers have landfills.
- A request was made that a follow up workshop be considered with real example contracts and request for proposal documents.

A list of workshop attendees is attached to this report.

Waukesha County Recycling Study Input Meetings and Workshop – March 2007
Final Participant List

March 6th 9:30-noon Input meeting	March 6th 1-3:30 PM Contracting Workshop	March 6th 7-9 PM Input meeting	March 7th 9-11 AM Input meeting
Mary Elsner Town of Delafield	Chuck Trevorrow	Mary Burt Citizen	Russ Evans Town of Genesee
Susan Johnson City of Delafield	**Char Brunner**	Joann Kreimendahl Citizen	Bill Ramcheck City of Wauwatosa
Mike Flaherty Village of Elm Grove	Tom Nelson	Charlene Lemoine WEAL	Rick Meyers City of Milwaukee
Dave DeAngelis Village of Elm Grove		Laurie Longtine WEAL	
Char Brunner City of Waukesha		Bob Tallinger Town of Waukesha	
Mayor Larry Nelson City of Waukesha		Dan McNeil Veolia ES- hauler	
Paul Griffin Town of Merton		Alderman Bill Moore City of New Berlin	
Tom Nelson Village of Merton		Nancy Gloe Citizen	
Chuck Trevorrow City of New Berlin			
Bill Mitchell County Board- LUPE			
Pauline Jaske County Board- LUPE			
Dan Vrakas County Executive			
County Parks and Land Use and Dept. of Administration Staff			

APPENDIX E

*** New Garbage and Recycling Carts**
Each home will receive 2-96 gallon carts free of charge. One Brown (Garbage only) and one Green (Recycling only).

*** Garbage is collected weekly**
All material must fit in the brown (garbage) cart. Automated trucks cannot pick up any material that is next to the cart. **Please put the garbage cart out the night before your collection day or by 6:00 a.m. the morning of pick up.**

*** Recycle is collected every other week**
Loose recycling must fit in the green (recycle) cart. Automated trucks cannot pick up any material that is next to the cart. **Please put the recycle cart out the night before your collection day or by 6:00 a.m. the morning of pick up.** If your green recycle cart is out on the wrong week it cannot be collected!

*** Bulk items are collected once a month**
Please see the collection calendar for your bulk pick up day. This day is for any extra garbage or recycling you have or items that are too big to fit in the carts. **This does not include yardwaste, construction material or hazardous material.** Place all large items including furniture, carpeting, large metal, large cardboard boxes (emptied and flattened) and appliances 6 ft. away from, not in front of, or next to the carts. Small items such as automotive batteries, tires (2 per home per month) drain oil (in sealed 1-5 gallon containers) should also be 6 ft. away from the carts. Extra paper or bulk recycling should be bagged in clear plastic bags and placed at the road away from the carts. **Please note that the green recycling carts are emptied every other week and cannot be emptied by the bulk collection crews.**

JOHNS
DISPOSAL SERVICE, INC.

Office Hours

Mon thru Fri 8:00 - 4:30

Service Provided by
Johns Disposal Service, Inc.
P.O. Box 329
107 Cty. Hwy. U
Whitewater, WI 53190
1-262-473-4700
www.johnsdisposal.com
office@johnsdisposal.com

Town of Mukwonago

Automated Curbside Garbage and Recycle Collection

4600 N. Port Washington Road
Milwaukee, WI 53212-1039
414.967.1881
414.967.1805 (fax)

Jeffrey Fielkow
Market Area Vice President

June 27, 2007

Ms. Karen Fiedler, Solid Waste Supervisor
Waukesha County Parks and Land Use
1320 Pewaukee Road, Room 260
Waukesha, WI 53188

RE: Recycling System Analysis

Dear Karen:

Thank you for this opportunity to offer suggestions regarding the recycling system analysis Waukesha County is leading.

As I mentioned at the meeting, I believe you have done a great service by advancing consideration of single-stream recycling. Allowing residents to combine containers, paper and cardboard in a single recycling cart typically boosts recycling 30% or more, in my experience. What's more, single-stream programs can also improve worker safety, fleet and route optimization, community aesthetics, fuel conservation and emissions.

Those benefits are driving communities across the country to convert to single-stream recycling. The gains are so significant, in fact, that a number of Wisconsin communities have already implemented single-stream collection and are exporting recyclables to Minnesota and Illinois for the intensive processing single-stream entails.

Waste Management's commitment to single-stream recycling is evidenced by the company's construction of an $18-million single-stream recycling facility (MRF) in Germantown at W132 N10487 Grant Dr., fewer than four miles from the Waukesha County line. We've acquired the land and building, finalized engineering and design, secured all permits, contracted for construction and ordered equipment. Site work is now underway, putting the plant on track to be fully operational in early 2008. The MRF will be capable of sorting and processing more than 20,000 tons of recyclables a month, or 240,000 tons a year. Put in perspective, that's sufficient to handle more than a third of the residential recyclables now collected in the State of Wisconsin.

We would be keenly interested in contracting with Waukesha County and all interested communities to process recyclables generated by the County's participating communities. I believe that the private sector, and Waste Management in particular, can offer the County significant advantages that will become apparent if the County undertakes a robust examination of the relative costs, risks and benefits of public versus private ownership and operation.

PRIVATE MRFs REDUCE RISK:
Contracting with a privately owned MRF such as Waste Management's would significantly reduce local governments' exposure to certain risks and ultimately save the taxpayers money:

- **Rising costs and decreasing revenues**. A private MRF provides long-term price stability to local governments through a contract and performance guarantees. A public MRF, in contrast, saddles taxpayers with rising costs of operation and any financial losses. While the draft study suggests private facilities reduce competition and price stability, experience proves otherwise. Waukesha County and the City of Milwaukee have successfully contracted for MRF services for more than a decade, for instance, and the City of Milwaukee has realized price decreases during its 30-plus years of contracting for waste disposal.

- **Changing technology**. A high-volume, private MRF will retire and replace equipment more frequently as the stream composition or technology changes, whereas public MRFs tend to retrofit facilities less often. Capital available to private MRFs provides opportunities to upgrade and improve the MRF infrastructure, increase service to local communities, and handle the demands of an evolving waste stream. As demonstrated throughout the country, Waste Management is committed to invest in new technologies that would likely be beyond the risk tolerance of a publicly owned MRF. Our new single-stream regional MRF, for instance, will be the first MRF in the nation to deploy a new plastics and fiber-sorting technology designed to improve the recovery rate of various commodities. We are committed to reinvent the single-stream systems as the stream composition evolves. An example would be our deployment of new optical fiber sorting equipment at our Elkridge, Maryland facility after it had been open for less than one year. The addition of the state-of-the-art technology made it easier for residents to recycle more material and improve the recovery rate at the MRF.

- **Market fluctuations**. A private, nationally-linked MRF operator will have options for marketing material even during dramatic downturns. Waste Management has the most comprehensive marketing team in the industry, which continues to secure outlets worldwide for recycled materials. This approach has enabled fluid material movement at premium prices throughout the wide market fluctuations associated with the recycling industry.

- **Emergencies**. Waste Management has an emergency contingency plan. If processing at our local MRF is interrupted, we can divert recyclables to our three other high volume single-stream plants in the Midwest (two in Chicago and one in Minneapolis).

BENEFITS OF SCALE AND EXPERTISE
Our experience strongly supports the draft study's findings that volume of scale significantly affects costs, and single-stream processing is more complex. The benefits of scale and required expertise, though, will not be fully realized by a stand-alone MRF sized to process recyclables from Waukesha County, Milwaukee and Wauwatosa. In comparison, Waste Management's 27 single-stream plants processed more than two million four hundred thousand tons of recyclables during 2006, enabling the company to provide a scale, reach and expertise that cannot be matched by a smaller facility. As a dedicated MRF operator, we bring to bear specialists and experience in operation, brokerage, engineering, maintenance, safety and training, employee development and other specialties crucial to successful MRF management.

I hope you will incorporate these ideas into the final report and include this letter in its entirety in that document. We stand ready to assist you in your efforts to foster a thorough and thoughtful analysis of the future of recycling in Waukesha County.

Sincerely,

WM RECYCLE AMERICA, L.L.C.

Jeff Fielkow
Market Area Vice President

cc: Preston Cole, City of Milwaukee, Environmental Services

WEST ALLIS SALVAGE CO., INC.

1909 South 80th Street, West Allis, WI 53219
414-321-4134 / Fax: 414-321-4636
www.westallissalvage.org

July 18, 2007

Karen Fiedler:

Per our phone conversation, West Allis Salvage Inc. would like Waukesha County to consider our Waukesha plant as a possible future site for the county MRF.

We have a 5.5 acre site with 30,000 sq. ft. of warehouse and office space, currently being used as a recycling plant. The site also has a 70' truck scale, an 8,000 sq. ft. tipping floor, 6 loading docks, heavy power, and 22' to 28' ceiling height. The building is constructed of concrete block and poured walls. It also has the capability of adding an additional 20,000 sq. ft. of warehouse plus 7,000 sq. ft. of office space.

We feel this site offers the County everything it needs from size to a centralized location to meet the County's needs well into the future.

Thank you for your consideration,

Phil Rehberg
President
West Allis Salvage Inc.

APPENDIX F

Facility Operating Cost Spreadsheets

Operating Cost Worksheets
Sheet 1 of 2

Participating Communities
Dual Stream

Year	2010	2015	2020	2025
Tons	24,452	25,080	25,724	26,575
Labor Cost	$494,759	$568,973	$654,319	$752,467
Administrative Cost	$120,000	$138,000	$158,700	$182,505
Benefits @ 30%	$184,428	$212,092	$243,906	$280,492
Non Labor Operating Costs	$251,164	$287,633	$339,337	$402,389
Total Operating Costs	$1,050,351	$1,206,698	$1,396,262	$1,617,853
Operating Costs Per Ton	$42.96	$48.11	$54.28	$60.88

Participating and Non Participating
Dual Stream

Year	2010	2015	2020	2025
Tons	36,649	37,722	38,813	40,213
Labor Cost	$588,125	$676,344	$777,796	$894,465
Administrative Cost	$120,000	$138,000	$158,700	$182,505
Benefits @ 30%	$212,438	$244,303	$280,949	$323,091
Non Labor Operating Costs	$351,515	$404,115	$478,458	$569,480
Total Operating Costs	$1,272,078	$1,462,762	$1,695,903	$1,969,541
Operating Costs Per Ton	$34.71	$38.78	$43.69	$48.98

Participating, Non Participating, Wauwatosa, Milwaukee
Dual Stream

Year	2010	2015	2020	2025
Tons	66,380	67,811	69,724	70,546
Labor Cost	$1,063,031	$1,222,485	$1,405,858	$1,616,737
Administrative Cost	$120,000	$138,000	$158,700	$182,505
Benefits @ 30%	$354,909	$408,146	$469,367	$539,773
Non Labor Operating Costs	$602,146	$689,005	$816,241	$954,938
Total Operating Costs	$2,140,086	$2,457,636	$2,850,166	$3,293,953
Operating Costs Per Ton	$32.24	$36.24	$40.88	$46.69

Operating Cost Worksheets
Sheet 2 of 2

Participating Communities
Single Stream

Year	2010	2015	2020	2025
Tons	30,565	31,350	32,155	33,219
Labor Cost	$642,823	$739,246	$850,133	$977,653
Administrative Cost	$120,000	$138,000	$158,700	$182,505
Benefits @ 30%	$228,847	$263,174	$302,650	$348,047
Non Labor Operating Costs	$353,944	$398,779	$471,498	$560,670
Total Operating Costs	$1,345,614	$1,539,199	$1,782,981	$2,068,875
Operating Costs Per Ton	$44.02	$49.10	$55.45	$62.28

Participating and Non-Participating
Single Stream

Year	2010	2015	2020	2025
Tons	42,762	43,992	45,244	46,857
Labor Cost	$759,530	$873,460	$1,004,479	$1,155,150
Administrative Cost	$120,000	$138,000	$158,700	$182,505
Benefits @ 30%	$263,859	$303,438	$348,954	$401,297
Non Labor Operating Costs	$476,668	$548,602	$650,293	$775,206
Total Operating Costs	$1,620,057	$1,863,500	$2,162,426	$2,514,158
Operating Costs Per Ton	$37.89	$42.36	$47.79	$53.66

Participating, Non Participating, Wauwatosa, Milwaukee
Single Stream

Year	2010	2015	2020	2025
Tons	76,060	77,686	79,292	80,817
Labor Cost	$1,407,011	$1,618,062	$1,860,772	$2,139,888
Administrative Cost	$120,000	$138,000	$158,700	$182,505
Benefits @ 30%	$458,103	$526,819	$605,842	$696,718
Non Labor Operating Costs	$806,510	$923,283	$1,088,180	$1,281,088
Total Operating Costs	$2,791,624	$3,206,164	$3,713,494	$4,300,199
Operating Costs Per Ton	$36.70	$41.27	$46.83	$53.21

APPENDIX G

Facility Descriptions & Drawings

Dual Stream Processing System Description

Operations Description-Fiber Processing System

After unloading and inspection at the tipping floor, Paper will be fed by front-end wheel loader onto infeed metering conveyor C-200 with a metering drum. C-200 will be variable speed driven so that the operator can manually adjust the feed rates to the system as well as use the metering drum to levelize the burden depths based on incoming quantities and composition. C-200 discharges onto inclined conveyor C-201 which transfers material to conveyor C-202. C-201 is also variable speed driven and equipped with a metering drum at the tail pulley transition with C-200 in order to automatically adjust the burden depth of material on the conveyors.

Pre-Sort conveyor C-202 is variable speed driven and is located on an elevated pre-sort platform where sorters will remove bulky trash, reject material, straps, cords, etc. through sorting chutes located along the sides of C-202. Sorting will be from both sides of the belt. C-202 is variable speed driven to provide control of processing rates and sorter utilization and safety lanyards are mounted along the sides of all sorting conveyors. Reject material will transfer to the automatic Trash Handling System via C-211 and C-212 to the Live Bottom Storage Conveyor C-214 for accumulation and baling.

The remaining paper stream will transfer onto the OCC Screen V-200 which will separate OCC from all other paper material. OCC will pass over the screen decks onto transfer conveyor C-203. C-203 will then discharge the OCC onto the Live Bottom OCC Storage Conveyor C-204 which will accumulate the OCC for baling. A QC station for removal of trash from OCC as required is located along C-203.

The screened paper will fall through the two decks of OCC Screen V-200 and will be collected by conveyor C-205. C-205 will transfer the paper via C-206 to the ONP sorting conveyor C-207. C-207 will have sorting chutes along both the sides of the conveyor. At the first pair of sorting stations, reject material will be manually sorted and transferred to the Trash Handling System via C-213. At the second pair of sorting stations, small OCC will be manually sorted and dropped directly into the OCC Push Thru Storage Bunker located underneath the chutes. At the third and final pair of sorting stations, mixed paper will be manually sorted and dropped directly into the Mixed Paper Push Thru Storage Bunker located underneath the chutes. When the push-through storage bunkers are full, material will be pushed by skid steer loader to the baler feed conveyor.

The remaining ONP stream will transfer off the end of C-207 to the ONP reversible transfer conveyor C-208. C-208 will transfer the ONP to the Live Bottom ONP Storage Conveyors C-209 and C-210.

Source Separated OCC and Mixed Paper will be received on the tipping floor and transferred through the OCC and Mixed Paper Push Thru Storage Bunkers to the baler feed conveyor. When sufficient material has been accumulated for baling, the paper grades will be fed to the baler feed conveyor C-802 and baled.

Sorting and Quality Control Station Description

The Paper Processing System combines both automated and manual sorting for maximizing the recovery of recyclable materials. The Paper Processing System sorting and quality control stations include:

Location	Description
C-202 Pre-Sort	Remove bulky trash, reject and non-processable material from material fed to the system.
C-203 Quality Control	Remove trash and non-OCC materials from the OCC transferring to the OCC storage conveyor.
C-207 Sorting Stations	Removal of trash and recovery of OCC and Mixed Paper from the ONP transferring to ONP storage conveyors.

Operations Description - Container Processing System

After unloading and inspection at the tipping floor, Containers will be fed by front-end wheel loader onto infeed metering conveyor C-100 with a metering drum. C-100 will be variable speed driven so that the operator can manually adjust the feed rates to the system as well as use the metering drum to levelize the burden depths based on incoming quantities and composition. C-100 discharges onto inclined conveyor C-101 which transfers material to conveyor C-102. C-101 is also variable speed driven and equipped with a metering drum at the tail pulley transition with C-100 in order to automatically adjust the burden depth of material on the conveyors.

C-102 is located on an elevated Pre-Sort platform where sorters will remove bulky trash, reject material, bulky (rigid) plastics and bulky ferrous material. Trash and reject material will be dropped through sorting chutes located along the sides of C-102 to the transfer conveyor C-900 and transferred to Trash Storage Conveyor C-902. The next pair of sorting chutes will be utilized for bulky metals, bulky rejects, and bulky rigid plastics. These materials will be stored in self dumping hoppers and fed directly to the baler feed conveyor for baling. Sorting will be from both sides of the belt. C-102 is variable speed driven to provide control of processing rates and sorter utilization and safety lanyards are mounted along the sides of all sorting conveyors.

C-102 transfers material underneath the overhead electromagnetic separator E-100. The magnet automatically separates tin and ferrous metal containers from C-102. Ferrous is then dropped onto C-500 where it is transferred to a ferrous storage bin.

The remaining container stream will transfer onto Debris Rolling Screen V-100. The V-100 is a fines separating screen which will separate broken glass from the remainder of the container stream. The unders from V-100 will transfer to the Glass Processing System via C-600 Then the remaining container stream will transfer on to the Glass Breaker Screen V-101. The first deck of V-101 is a glass breaker screen which will break all the whole glass bottles. The second stage of V-101 will separate broken glass from the stream. Broken glass will fall through the screen and transfer to the Glass Processing System via C-600. Conveyor C-600 will transfer the glass to the Mixed Broken Glass Module. Broken glass will first pass across vibratory screen V-102 for fines (unders) removal which will transfer to a fines storage hopper. Overs from V-102 will transfer via conveyor C-601 to optical sorting unit A-102 which will automatically separate glass from contaminants using optical sorting. The prepared glass will transfer to a storage hopper and the contaminants will transfer to a storage silo. The storage hoppers are located beneath the Mixed Broken Glass Module. When full, glass from the silos will be emptied into dump trailers for shipment to markets.

After separation of glass within the first two decks of V-101, the remaining stream will transfer onto the third deck of the screen where small plastics, aluminum and trash will be automatically separated. This material will fall onto Eddy Current Separator (ECS) G-400 where aluminum will be separated from all other material. Aluminum will be conveyed via C-400 and C-401 across an elevated quality control (QC) station located along C-401 into the Aluminum Storage Bin. A sorter located at the QC station will remove any trash and drop these material into a chute located along the side of conveyor C-401. This material will transfer to the Trash Handling System via conveyor C-901. Any PET in the stream will be dropped into a chute located along the side of conveyor C-401. The PET material will transfer to the PET Storage Bin 2 via conveyor C-113. The aluminum QC sorter will also remove any foil and drop through a dedicated chute for baling.

The non-aluminum (plastics and trash) materials discharging from ECS G-400 are joined by the V-101 overs stream and are then conveyed via C-103 to the Optical Sorting System delivery conveyor C-104. This material will proceed to the first Optical Sorting unit A-100 via accelerating feed conveyor C-105. PET is optically separated and automatically ejected and conveyed via C-109 past an elevated QC station and then transfers into PET Storage Bin 1. At the QC station, rejects are dropped into drop chute for transfer to Rejects conveyor C-901, HDPE plastics are tossed across into the HDPE (C) Storage Bin 2, and aluminum is dropped onto the aluminum return line C-114. The remaining material (primarily HDPE) not ejected at the first Optical Sorting unit will transfer via Pos. C-106 to the second Optical Sorting unit A-101 where Colored and Natural HDPE are optically separately and automatically ejected onto conveyors C-110 and C-111 respectively. Both HDPE grades pass opposing elevated QC stations where HDPE cross contamination is corrected by tossing onto the opposite conveyor. In addition, at the QC stations, rejects are dropped onto C-901. As previously noted, all QC stations are provided with safety lanyards located along the sides of the conveyors. Natural HDPE transfers via C-110 to the HDPE (N) Storage Bin. Colored HDPE transfers via C-111 and C-112 to the HDPE (C) Storage Bin 1. All PET is dropped onto the plastic return conveyor C-113 for transfer to the PET Storage Bin 2. Aluminum is dropped onto the aluminum return conveyor C-114. The balance of plastics not ejected by optical sorting unit A-101 is transferred via conveyor C-107 and C-108 past an elevated QC station to Trash Storage Conveyor C-902. At the QC station, any remaining aluminum is dropped into a drop chute for transfer to Aluminum return

conveyor C-114, any remaining PET plastics are dropped into a drop chute above the PET Storage Bin 2, Aseptic containers are tossed across into the Aseptic storage bin, and any remaining HDPE is dropped into a drop chute for transfer to HDPE (C) Storage Bin 2 via conveyor C-115.

The material in the storage bins will accumulate until sufficient material is available for baling. Each storage bin combination is capable of storing in excess of one bale of material. Each storage bin is equipped with a guillotine style door, activated by an electric chain hoist at a local panel at the baler B-800 operator control station. The floor of each bin is sloped so that when the door is opened, material automatically transfers onto the baler feed conveyors C-800 and C-801.

Sorting and Quality Control Station Description

The Container Processing System combines both automated and manual sorting for maximizing the recovery of recyclable materials. The Container Processing System sorting and quality control stations include:

Location	Description
C-102 Pre-Sort	Remove bulky trash, reject and non-processable material, bulky ferrous and bulky rigid plastics from material fed to the system.
C-108 Trash Quality Control	Recovery of HDPE, PET, aluminum and aseptic containers from the material that will be transferring to the trash storage conveyor.
C-109 PET Quality Control	Recovery of HDPE and aluminum, and removal of trash from the material that will be transferring to the PET bin.
C-110 HDPE (N) Quality Control	Sorting of cross contaminated HDPE (N) and HDPE (C), recovery of PET and aluminum, and removal of trash from the material that will be transferring to the HDPE (N) bin.
C-111 HDPE (C) Quality Control	Sorting of cross contaminated HDPE (N) and HDPE (C), recovery of PET and aluminum, and removal of trash from the material that will be transferring to the HDPE (C) bin.
C-401 Aluminum Quality Control	Removal of non-UBC non-ferrous materials such as foil, PET and trash from the material that will be transferring to the aluminum bin.
C-801 Baler Feed Quality Control	Quality control of all materials being baled to maximize and ensure bale purity.

Single Stream Processing System Description

Operations Description

After unloading and inspection at the tipping floor, Paper will be fed by front-end wheel loader onto infeed metering conveyor C-200 with a metering drum. C-200 will be variable speed driven so that the operator can manually adjust the feed rates to the system as well as use the metering drum to levelize the burden depths based on incoming quantities and composition. C-200 discharges onto inclined conveyor C-201 which transfers material to conveyor C-202. C-201 is also variable speed driven and equipped with a metering drum at the tail pulley transition with C-200 in order to automatically adjust the burden depth of material on the conveyors.

Pre-Sort conveyor C-202 is variable speed driven and is located on an elevated pre-sort platform where sorters will remove bulky trash, reject material, straps, cords, etc. through sorting chutes located along the sides of C-202. Sorting will be from both sides of the belt. C-202 is variable speed driven to provide control of processing rates and sorter utilization and safety lanyards are mounted along the sides of all sorting conveyors. Reject material will transfer to the automatic Trash Handling System via C-224 and C-225 to the Live Bottom Storage Conveyor C-227 for accumulation and baling.

The remaining single stream material will transfer onto a pre-screening conveyor for removal of broken glass. Material will then be transferred onto the OCC Screen V-200 which will separate OCC from all other single steam material. OCC will pass over the screen decks onto transfer conveyor C-203. C-203 will then discharge the OCC onto the Live Bottom OCC Storage Conveyor C-204 which will which will accumulate the OCC for baling. A QC station for removal of trash from OCC as required is located along C-203.

The screened single stream material will fall through the two decks of V-200 and will split between two sorting conveyors C-205 and C-206, which are located on an elevated sorting platform. Each of these two conveyors will have sorting chutes along the sides of the conveyors. At the first pair of sorting stations on each conveyor, reject material will be manually sorted and transferred to the Live Bottom Trash Storage Conveyor C-227 via C-225. At the second pair of sorting stations, small OCC will be manually sorted and conveyed via C-223 to the Live Bottom OCC Storage Conveyor C-204.

The remaining single stream material will transfer from C-205 and C-206 onto two parallel Primary Screens V-201 and V-202 which separate ONP from all other single stream material. Mixed paper and container unders will be automatically removed from the stream and will be conveyed to the Secondary Screens. The ONP overs will be transferred to the ONP QC conveyors.

ONP which transfers over the top of Primary Screens V-202 will be transferred directly onto ONP sorting conveyor C-210. ONP which transfers over V-201 will be transferred via C-207 and C-208 onto ONP sorting conveyor C-209. Along each of the ONP sorting conveyors C-209 and C-210, rejects are manually removed and dropped into the first pair of sorting chutes on each conveyor. This material transfers into the trash transfer conveyor C-226 located underneath the sorting platform. Small OCC will be dropped through the next pair of sorting chutes on each conveyor into the OCC Push-Through Bunker. Mixed paper will be dropped through the next pair of sorting chutes on each conveyor into the Mixed Paper Push-Through Storage Bunker. Along both C-209 and C-210, all sorters will remove any tramp containers. The remaining ONP stream will transfer off the end of C-209 and C-210 to the ONP reversible transfer conveyor C-211. C-211 will transfer the ONP to the Live Bottom Storage Conveyors C-212 and C-213.

The mixed paper and container unders from the Primary Screens V-201 and V-202 are transferred via conveyors C-216 and C-218, and C-214, C-215 and C-217 to two parallel Secondary Screens V-203 and V-204. Secondary Screen V-203 and V-204 automatically separate bottles and cans (containers) from mixed paper. The container unders will fall through the decks of V-203 and V-204 and are transferred via conveyor C-221 to the container return line C-222 and C-228. The containers are conveyed via C-222 past an elevated QC station to the Container Processing System tipping floor. At the elevated QC stations, any paper material is dropped into drop chutes for transfer to the mixed paper line via C-219.

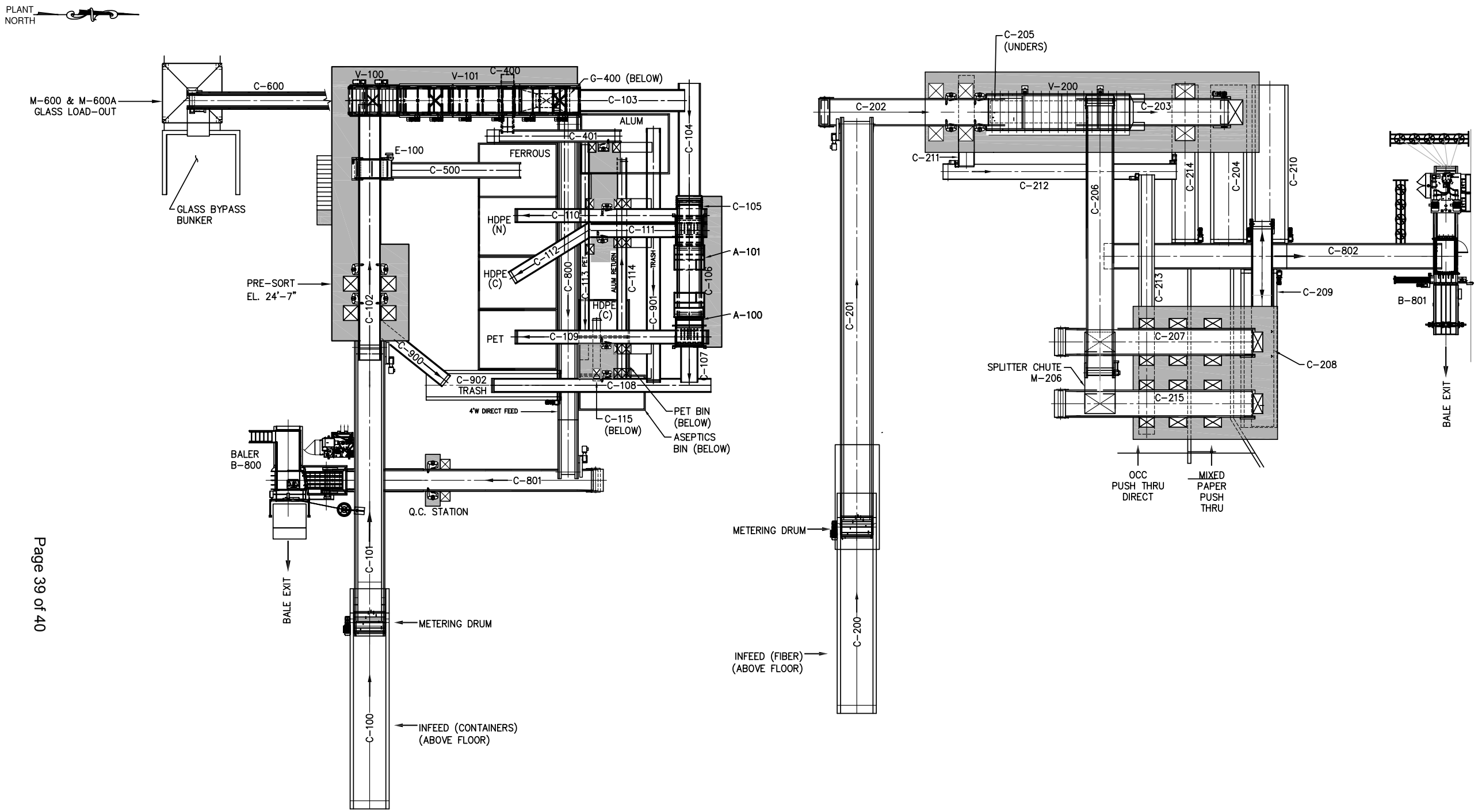
For the Single Stream System, a small paper removal system consisting of a blower and cyclone will be integrated with the mixed broken glass handling system for removal of small paper from the glass.

The mixed paper which transfers over the top of the Secondary Screens V-203 and V-204 will be transferred to the mixed paper QC conveyor C-220 via conveyor C-219. As previously noted, all QC stations are provided with safety lanyards located along the sides of the conveyors. All paper sorting positions are located on elevated sorting platforms. Reject material is manually sorted and dropped through the first sorting chute onto C-226 located underneath the sorting platform for transfer to the Live Bottom Trash Storage Conveyor. Small OCC will be manually sorted and dropped through the next sorting chute to the OCC Push-Through Storage Bunker located on the floor underneath the sorting platform. The remaining mixed paper will drop into the mixed paper Push-Through Storage Bunker located on the floor underneath the sorting platform. When the push-through storage bunkers are full, material will be pushed by loader to the baler feed conveyor C-802.

Sorting and Quality Control Station Description

The Single Stream Processing System combines both automated and manual sorting for maximizing the recovery of recyclable materials. The Single Stream Processing System sorting and quality control stations include:

Location	Description
C-202 Pre-Sort	Remove bulky trash, bulky ferrous, reject and non-processable material from material fed to the system.
C-203 Quality Control	Remove trash and non-OCC materials from the OCC transferring to the OCC storage conveyor.
C-205 and C-206 Sorting Stations	Removal of trash and recovery of OCC from the unders stream of the OCC Screen.
C-209 and C-210 Sorting Stations	Removal of trash and recovery of OCC and Mixed Paper from the overs stream of the Primary Screens plus any tramp containers.
C-220 Quality Control	Removal of trash and recovery of OCC as required from the Mixed Paper transferring to the Mixed Paper Push-thru Bunker.
C-222 Quality Control	Recovery of Mixed Paper from the container stream separated by the Secondary Screens.



EQUIPMENT LIST

EQUIP. NO.		EQUIP. NO.	DESCRIPTION	EQUIP. NO.	DESCRIPTION	EQUIP. NO.	DESCRIPTION
C-100	60"W X 37'-0"L – ROLLER CHAIN BELT INFEED CONVEYOR W/ METERING DRUM	C-500	36"W X 28'-0"L – FLAT IDLER CONVEYOR	C-200	66"W X 37'-0"L – ROLLER CHAIN BELT INFEED CONVEYOR W/ METERING DRUM	C-215	48"W X 39'-0"L – TROUGH SLIDER Q.C. CONVEYOR
C-101	54"W X 60'-0"L – CHAIN BELT METERING CONVEYOR	C-600	30"W X 56'-6"L – TROUGH IDLER CONVEYOR	C-201	60"W X 92'-0"L – ROLLER CHAIN BELT METERING CONVEYOR	M-206	SPLITTER CHUTE
C-102	54"W X 61'-6"L – TROUGH SLIDER SORTING CONVEYOR	C-800	36"W X 78'-0"L – ROLLER CHAIN BELT CONVEYOR	C-202	60"W X 33'-0"L – TROUGH SLIDER SORTING CONVEYOR		
C-103	48"W X 35'-6"L – TROUGH SLIDER CONVEYOR	C-801	48"W X 50'-6"L – TROUGH SLIDER CONVEYOR	C-203	60"W X 20'-0"L – TROUGH SLIDER SORTING CONVEYOR		
C-104	48"W X 24'-0"L – FLAT IDLER CONVEYOR	C-900	36"W X 27'-0"L – FLAT IDLER CONVEYOR	C-204	72"W X 32'-6"L – BUNKER STORAGE CONVEYOR		
C-105	72"W X 23'-0"L – FLAT SLIDER ACCELERATOR CONVEYOR	C-901	30"W X 51'-6"L – FLAT IDLER CONVEYOR	C-205	48"W X 20'-6"L – TROUGH SLIDER CONVEYOR		
C-106	60"W X 20'-0"L – FLAT SLIDER ACCELERATOR CONVEYOR	C-902	60"W X 28'-0"L – BUNKER STORAGE CONVEYOR	C-206	48"W X 60'-0"L – TROUGH SLIDER CONVEYOR		
C-107	36"W X 37'-0"L – FLAT IDLER CONVEYOR	E-100	48"W CROSS BELT ELECTRO MAGNET	C-207	48"W X 39'-0"L – TROUGH SLIDER Q.C. CONVEYOR		
C-108	30"W X 45'-0"L – FLAT BELT CONVEYOR	V-100	DEBRIS ROLL SCREEN	C-208	48"W X 40'-0"L – REVERSIBLE FLAT IDLER CONVEYOR		
C-109	30"W X 40'-0"L – TROUGH SLIDER Q.C. CONVEYOR	V-101	GLASS BREAKER SCREEN	C-209	72"W X 32'-6"L – BUNKER STORAGE CONVEYOR		
C-110	30"W X 38'-6"L – TROUGH SLIDER Q.C. CONVEYOR	G-400	48"W EDDY CURRENT SEPARATOR	C-210	72"W X 32'-6"L – BUNKER STORAGE CONVEYOR		
C-111	30"W X 24'-0"L – TROUGH SLIDER Q.C. CONVEYOR	A-100	OPTICAL SORTER	C-211	36"W X 18'-6"L – FLAT IDLER CONVEYOR		
C-112	30"W X 20'-0"L – TROUGH IDLER CONVEYOR	A-101	OPTICAL SORTER	C-212	36"W X 46'-6"L – FLAT IDLER CONVEYOR		
C-113	18"W X 43'-6"L – FLAT IDLER CONVEYOR	B-800	TWO RAM BALER	C-213	36"W X 52'-6"L – FLAT IDLER CONVEYOR		
C-114	18"W X 46'-6"L – FLAT IDLER CONVEYOR	M-600	GLASS HOPPER	C-214	48"W X 32'-6"L – BUNKER STORAGE CONVEYOR		
C-115	18"W X 12'-6"L – FLAT IDLER CONVEYOR	M-600A	SLIDE GATE	C-802	60"W X 72'-0"L – ROLLER CHAIN BELT CONVEYOR		
C-400	24"W X 11'-6"L – FLAT IDLER CONVEYOR	–	MATERIAL STORAGE BINS	V-200	OCC SCREEN		
C-401	24"W X 28'-0"L – FLAT IDLER CONVEYOR			B-801	SINGLE RAM BALER		

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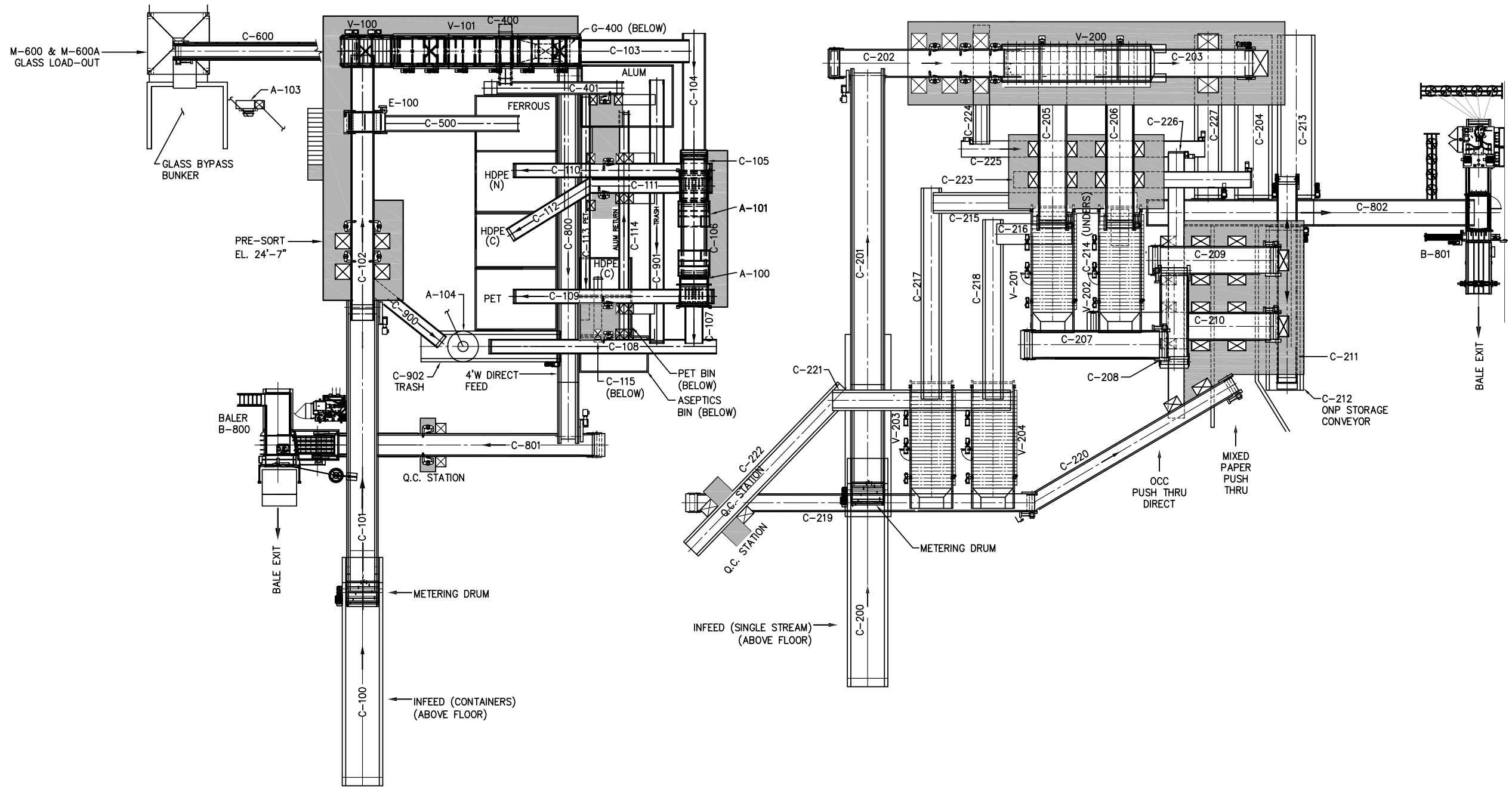
WAUKESHA COUNTY
RECYCLING SYSTEM &
CAPACITY STUDY

GENERIC DUAL STREAM
GENERAL ARRANGEMENT

	BY	DATE		
DRAWN	V.V.	3/5/07	PROJ. No: 384-014	SCALE: 3/32" = 1'-0"
CHECKED	NE	3/5/07	DWG. NO: GA-1	
DESIGNED	V.V.	3/5/07		
APPROVED	NE	3/19/07	CAD FILE: 384-014 GA-1	
APPROVED			SHEET SIZE: D-24x36	REV



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EQUIPMENT LIST

EQUIP. NO.	DESCRIPTION	EQUIP. NO.	DESCRIPTION	EQUIP. NO.	DESCRIPTION	EQUIP. NO.	DESCRIPTION
C-100	60"W X 37'-0"L – ROLLER CHAIN BELT INFEED CONVEYOR W/ METERING DRUM	C-500	36"W X 28'-0"L – FLAT IDLER CONVEYOR	–	MATERIAL STORAGE BINS	C-217	36"W X 46'-0"L – FLAT IDLER CONVEYOR
C-101	54"W X 60'-0"L – CHAIN BELT METERING CONVEYOR	C-600	30"W X 56'-6"L – TROUGH IDLER CONVEYOR	C-200	66"W X 37'-0"L – ROLLER CHAIN BELT INFEED CONVEYOR W/ METERING DRUM	C-218	36"W X 40'-0"L – FLAT IDLER CONVEYOR
C-102	54"W X 61'-6"L – TROUGH SLIDER SORTING CONVEYOR	C-800	36"W X 78'-0"L – ROLLER CHAIN BELT CONVEYOR	C-201	60"W X 92'-0"L – ROLLER CHAIN BELT METERING CONVEYOR	C-219	36"W X 66-0"L – FLAT IDLER CONVEYOR
C-103	48"W X 35'-6"L – TROUGH SLIDER CONVEYOR	C-801	48"W X 50'-6"L – TROUGH SLIDER CONVEYOR	C-202	60"W X 33'-0"L – TROUGH SLIDER SORTING CONVEYOR	C-220	36"W X 48'-0"L – FLAT IDLER CONVEYOR
C-104	48"W X 24'-0"L – FLAT IDLER CONVEYOR	C-900	36"W X 27'-0"L – FLAT IDLER CONVEYOR	C-203	60"W X 20'-0"L – TROUGH SLIDER SORTING CONVEYOR	C-221	36"W X 35'-0"L – FLAT IDLER CONVEYOR
C-105	72"W X 23'-0"L – FLAT SLIDER ACCELERATOR CONVEYOR	C-901	30"W X 51'-6"L – FLAT IDLER CONVEYOR	C-204	72"W X 32'-6"L – BUNKER STORAGE CONVEYOR	C-222	36"W X 46'-6"L – TROUGH SLIDER CONVEYOR
C-106	60"W X 20'-0"L – FLAT SLIDER ACCELERATOR CONVEYOR	C-902	60"W X 28'-0"L – BUNKER STORAGE CONVEYOR	C-205	60"W X 46'-0"L – TROUGH SLIDER Q.C. CONVEYOR	C-223	36"W X 48'-0"L – FLAT IDLER CONVEYOR
C-107	36"W X 37'-0"L – FLAT IDLER CONVEYOR	E-100	48"W CROSS BELT ELECTRO MAGNET	C-206	60"W X 46'-0"L – TROUGH SLIDER Q.C. CONVEYOR	C-224	36"W X 25'-0"L – FLAT IDLER CONVEYOR
C-108	30"W X 45'-0"L – FLAT BELT CONVEYOR	V-100	DEBRIS ROLL SCREEN	C-207	48"W X 28'-0"L – TROUGH SLIDER CONVEYOR	C-225	36"W X 50'-0"L – FLAT IDLER CONVEYOR
C-109	30"W X 40'-0"L – TROUGH SLIDER Q.C. CONVEYOR	V-101	GLASS BREAKER SCREEN	C-208	48"W X 18'-0"L – TROUGH SLIDER CONVEYOR	C-226	36"W X 52'-0"L – FLAT IDLER CONVEYOR
C-110	30"W X 38'-6"L – TROUGH SLIDER Q.C. CONVEYOR	G-400	48"W EDDY CURRENT SEPARATOR	C-209	48"W X 24'-0"L – TROUGH SLIDER Q.C. CONVEYOR	C-227	48"W X 32'-6"L – BUNKER STORAGE CONVEYOR
C-111	30"W X 24'-0"L – TROUGH SLIDER Q.C. CONVEYOR	A-100	OPTICAL SORTER	C-210	48"W X 36'-6"L – TROUGH SLIDER Q.C. CONVEYOR	C-802	60"W X 74'-0"L – ROLLER CHAIN BELT CONVEYOR
C-112	30"W X 20'-0"L – TROUGH IDLER CONVEYOR	A-101	OPTICAL SORTER	C-211	48"W X 40'-0"L – REVERSIBLE FLAT IDLER CONVEYOR	V-200	OCC SCREEN
C-113	18"W X 43'-6"L – FLAT IDLER CONVEYOR	A-103	BLOWER	C-212	72"W X 32'-6"L – BUNKER STORAGE CONVEYOR	V-201	PRIMARY SCREEN
C-114	18"W X 46'-6"L – FLAT IDLER CONVEYOR	A-104	CYCLONE	C-213	72"W X 32'-6"L – BUNKER STORAGE CONVEYOR	V-202	PRIMARY SCREEN
C-115	18"W X 12'-6"L – FLAT IDLER CONVEYOR	B-800	TWO RAM BALER	C-214	48"W X 10'-0"L – TROUGH SLIDER CONVEYOR	V-203	SECONDARY SCREEN
C-400	24"W X 11'-6"L – FLAT IDLER CONVEYOR	M-600	GLASS HOPPER	C-215	48"W X 45'-0"L – TROUGH SLIDER CONVEYOR	V-204	SECONDARY SCREEN
C-401	24"W X 28'-0"L – FLAT IDLER CONVEYOR	M-600A	SLIDE GATE	C-216	48"W X 15'-0"L – TROUGH SLIDER CONVEYOR	B-801	SINGLE RAM BALER

REV	DESCRIPTION	DATE BY CHK

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WAUKESHA COUNTY
RECYCLING SYSTEM &
CAPACITY STUDY

GENERIC SINGLE STREAM
GENERAL ARRANGEMENT

	BY	DATE
DRAWN	V.V.	3/5/07
CHECKED	NE	3/5/07
DESIGNED	NE/V.V.	3/5/07
APPROVED	NE	3/19/07
APPROVED		

PROJ. No: 384-014
SCALE: 3/32" = 1'-0"
DWG. NO: GA-2
CAD FILE: 384-014 GA-2.dwg
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