WAKE COUNTY WASTE CHARACTERIZATION STUDY

Wake County, North Carolina

April 1999

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April 5, 1999

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Mr. Lowell Shaw
Recycling Coordinator
Wake County Solid Waste Management
Wake County Office Building
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Raleigh, North Carolina 27602

Subject: **Final Report**

Dear Lowell:

R. W. Beck, Inc. and our special consultant, Dorn and Associates, are pleased to provide you with the final Wake County Waste Characterization Study. Enclosed are five bound copies and one camera-ready copy of the final report. We have also included one electronic copy excluding the detailed waste characterization results. To finalize the report, we have completed the minor revisions recommended by staff and incorporated an executive summary.

Thank you for the opportunity to provide these services. You can reach me by phone at (651) 994-8415 if you have any additional questions.

Sincerely,

R. W. BECK, INC.

Robert W. Craggs

Robert W. Craggs
Senior Director Environmental Services

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WAKE COUNTY WASTE CHARACTERIZATION STUDY

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This report has been prepared for the use of the client for the specific purposes identified in this report. The conclusions, observations and recommendations contained herein attributed to R. W. Beck, Inc. constitute the opinions of R. W. Beck, Inc. To the extent that statements, information and opinions provided by the client or others have been used in the preparation of this report, R. W. Beck, Inc. has relied upon the same to be accurate, and for which no assurances are intended and no representations or warranties are made. R. W. Beck, Inc. makes no certification and gives no assurances except as explicitly set forth in this report.

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EXECUTIVE SUMMARY

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C&D

The following table depicts the results of the visual characterization of C&D materials.

TABLE ES-2 VISUAL WASTE CHARACTERIZATION CONSTRUCTION AND DEMOLITION DEBRIS	
CATEGORY	C&D COMPOSITION
OCC/Kraft Paper	0.4%
Other Paper	0.1%
Film	0.0%
Other Plastic	0.4%
Ferrous Scrap	7.7%
Roofing Material	17.1%
Drywall	13.4%
Insulation	1.2%
Concrete	7.2%
Carpeting	0.5%
Land Clearing Debris	3.9%
Bricks	4.1%
Other	0.2%
Wood (1)	43.9%
Untreated Wood	18.2%
Treated Wood	19.2%
TOTAL	100%

(1) The percentages for untreated wood and treated wood do not add up to the total for wood because there were a few samples in which untreated and treated could not be differentiated.

OVERALL RESULTS

The following table presents the overall results for the municipal solid waste characterization and solid waste characterization.

TABLE ES-3 WASTE CHARACTERIZATION FIELD SORTS OVERALL RESULTS		
CATEGORY	MSW COMPOSITION (1) (MEAN PERCENTAGE)	SOLID WASTE COMPOSITION (2) (MEAN PERCENTAGES)
Paper	34.1%	28.2%
Plastic	12.9%	10.6%
Metal	5.9%	4.9%
Glass	3.2%	2.6%
HHW	0.5%	0.4%
Yard Waste	1.8%	1.5%
Food Waste	12.1%	10.0%
Wood	10.3%	8.5%
C&D Debris	6.3%	22.5%
Durables	4.1%	3.4%
Textiles	2.9%	2.4%
Diapers	2.2%	1.9%
Rubber	0.3%	0.2%
Sharps	0.0%	0.0%
Other Organic	1.5%	1.3%
Other Inorganic	1.7%	1.4%
Other	0.1%	0.1%
TOTAL	100%	100%

(1) Includes only the residential, CII and mixed generator type results.
(2) Includes C&D as well as the MSW, excluding the results of the visual characterization of C&D.

The MSW composition represents the combined composition of the residential, CII and mixed generator types. It is recommended that this characterization be used when comparing results to other regions and states. The solid waste composition represents all generator types including residential, CII, mixed and construction and demolition. This characterization should be used when identifying materials comprising a substantial portion of the overall waste stream that are being landfilled.

WASTE DIVERSION OPPORTUNITIES

SELECTION OF TARGET MATERIALS

To select the materials offering the greatest additional waste diversion potential, the following criteria were applied:

TABLE ES-1
WASTE CHARACTERIZATION FIELD SORTS
RESIDENTIAL, CII AND MIXED

CATEGORY	RESIDENTIAL COMPOSITION (1) (MEAN PERCENTAGES)	CII COMPOSITION (2) (MEAN PERCENTAGES)	MIXED COMPOSITION (3) (MEAN PERCENTAGES)
Paper	33.3%	24.1%	39.7%
Plastic	10.4%	13.9%	14.5%
Metal	5.8%	9.9%	4.1%
Glass	4.1%	1.5%	3.2%
HHW	0.5%	0.4%	0.5%
Yard Waste	3.3%	0.9%	0.9%
Food Waste	11.6%	6.9%	15.1%
Wood	9.5%	23.3%	4.6%
C&D Debris	6.8%	9.6%	4.4%
Durables	3.6%	2.7%	5.3%
Textiles	4.7%	0.9%	2.3%
Diapers	3.1%	0.6%	2.4%
Rubber	0.3%	0.5%	0.2%
Sharps	0.0%	0.0%	0.0%
Other Organic	1.3%	2.6%	1.3%
Other Inorganic	1.8%	2.2%	1.4%
Other	0.2%	0.0%	0.0%
TOTAL	100%	100%	100%

(1) From the sampling of 35 vehicle loads and the sorting of approximately 7,650 pounds of materials.
(2) From the sampling of 49 vehicle loads and the sorting of approximately 11,315 pounds of materials.
(3) From the sampling of 16 vehicle loads from transfer trailers and the sorting of 3,490 pounds of materials.

BACKGROUND

The primary objectives of the Wake County (County) Solid Waste Characterization Study (Study) are to:

- Develop baseline data by conducting a waste characterization to measure the effectiveness of waste reduction and recycling efforts;
- Determine the materials currently entering the North Wake Sanitary Landfill that have market potential for recycling, reuse, or reduction; and
- Provide a recommended strategy for the County to enhance or expand its waste reduction/recycling programs to divert additional materials from disposal.

APPROACH

To achieve the objectives described above, the Project Team first gathered statistically representative information that can be used to reliably characterize and quantify the County's solid waste stream. This approach included conducting a field sort for materials from residential and commercial/industrial/institutional (CII) generators. In addition, the Project Team conducted a generator-based assessment of CII and construction and demolition waste generators in conjunction with a materials flow. Based on the results of the waste sort and assessment, we then completed on-site interviews/visits of selected CII generators. The above information and analysis was then used to develop a set of recommended waste diversion strategies for the County.

RESULTS

RESIDENTIAL, CII AND MIXED WASTE

Provided below is a summary table representing the combined two-season results for residential, CII and mixed MSW characterization.

- Prevalence of each material in the solid waste stream, as indicated by the waste characterization study and generator survey results;
- The material's market value and overall marketability, as determined through the markets assessment and Project Team knowledge concerning secondary materials markets;
- Ease of potential diversion, as indicated by the extent to which recovery and processing infrastructure currently exists to move the material into the market place.

OVERALL STRATEGY RECOMMENDATIONS

The table below summarizes our strategy recommendations by material type.

TABLE ES-4
MATERIAL STRATEGY RECOMMENDATIONS

MATERIAL	STRATEGY RECOMMENDATIONS
C&D Debris	▪ Develop markets (e.g. grinding of wallboard and composting with yard waste) ▪ Facilitate source separated processing of C&D disposal/transfer sites ▪ Mandate recovery plans as part of obtaining a build permit ▪ Promote C&D recovery via grant funding from DPPEA
Food Waste	▪ Develop markets (e.g. animal feed) ▪ Pursue grant funding for a food waste pilot project focus on CII generators ▪ Explore the expanding of existing yard waste compost programs to include food waste composting ▪ Promote awareness surrounding the need to divert fo waste from landfill disposal
Non-Treated Wood	▪ Promote pallet recovery at landfill and transfer stati through a contract with a private pallet recycler ▪ Consider a pallet ban upon providing pallet generators w technical assistance concerning source reduction a recycling alternatives ▪ Increase pallet recovery capacity at the City of Raleigh y waste composting facility
Mixed Paper and High Grades	▪ Enhance the paper recycling program at Wake cou schools by establishing a uniform, centrally managed syst for fiber ▪ Encourage the development of commercial mixed pa collection through a partnership with key suppliers ▪ Promote new and revitalize existing office paper recycl programs through information and technical assistance

TABLE ES-4 MATERIAL STRATEGY RECOMMENDATIONS	
MATERIAL	STRATEGY RECOMMENDATIONS
Old Corrugated Containers (OCC)	■ Promote more effective enforcement of the recyclable corrugated surcharge policy at the landfill ■ Establish OCC collection at all convenience centers ■ Promote the overall benefits of OCC recycling to CII generators
Old Newspapers (ONP)	■ Consider a landfill disposal ban for ONP ■ Promote the benefits of ONP recycling through cooperation with area newspapers
Post-Consumer Textiles	■ Provide collection opportunities for textiles at the convenience centers ■ Provide a collection opportunity for textiles at the Town of Cary's recyclable materials drop-off located at the transfer station ■ Create a partnership with existing post-consumer textile recyclers in the region to assess the need for additional collection infrastructure
Film Plastic	■ Provide technical assistance to CII generators surrounding the recycling of film plastic ■ Further identify the types of generators most likely to generate recoverable quantities of film plastic via additional generator-based assessments ■ Promote the location and development of a plastic film processor in or near Wake County
Ferrous Metals	■ Provide collection opportunities for ferrous scrap at all convenience centers ■ With adequate collection, processing, and end-use infrastructure in place, consider a ban on certain types of ferrous scrap ■ Provide incentives for haulers to segregate metals from their C&D loads

SECTION 1
INTRODUCTION

BACKGROUND

The primary objectives of the Wake County (County) Solid Waste Characterization Study (Study) are to:

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- Determine the materials currently entering the North Wake Sanitary Landfill that have market potential for recycling, reuse, or reduction; and
- Provide a recommended strategy for Wake County to enhance or expand its waste reduction/recycling programs to divert additional materials from disposal.

APPROACH

To achieve the objectives described above, the Project Team first gathered statistically representative information that can be used to reliably characterize and quantify the County's solid waste stream. This approach included conducting a field sort for materials from residential and commercial/industrial/institutional (CII) generators. In addition, the Project Team conducted a generator-based assessment of CII and construction and demolition waste generators. In the first part of the assessment, surveys were sent to various types of CII and C&D generators. Based on the results of the waste sort and the survey process we then completed on-site interviews/visits of selected CII generators.

In order to provide background information on the Wake County waste management system, a materials flow was developed. The materials flow describes the collection, processing and disposal of solid waste in the County.

The data gathered from the waste sorts, generator-based assessment and materials flow are linked to the development of recommended strategies for diverting additional materials from the waste stream. These strategies address the issues of collection, processing and end-use markets.

EXISTING SOLID WASTE MANAGEMENT SYSTEM

INTRODUCTION

In this section, the existing solid waste management system in Wake County is discussed. Understanding of the existing system is important in development of recommendations for additional opportunities for waste diversion as discussed in Section 5.

MATERIALS FLOW

Solid waste, yard waste, and recyclable materials are generated in Wake County by residences, businesses, industries, institutions, and construction and demolition (C&D) operations. These materials are transported by a number of different routes before reaching their final destination. Figure 2-1 depicts the flow of materials generated in Wake County from point of generation to final destination. Collected materials are taken either directly to a landfill, a processing facility or market, or are routed through a transfer station and then on to one or more final destination points. Within Wake County, there are reported to be three municipal solid waste (MSW) transfer stations, two C&D landfills, eight land clearing and inert debris (LCID) landfills, two yard waste management facilities, and one MSW landfill that have been permitted by the State. MSW is also disposed at BFI's Sampson County Landfill and Waste Management's landfill in Kernersville. These facilities and their locations are listed in Table 2-1. In addition, Waste Industries operates a yard waste transfer station at the North Wake MSW Landfill. Table 2-1 also lists six materials recovery facilities (MRFs) in Wake County that process recyclables recovered primarily in Wake County. This list of MRFs includes all major facilities identified by the Project Team. There may be additional facilities handling smaller volumes of material.

Figure 2-1

Flow of MSW, Recyclables, and Yard Wastes from Generation to Final Disposition

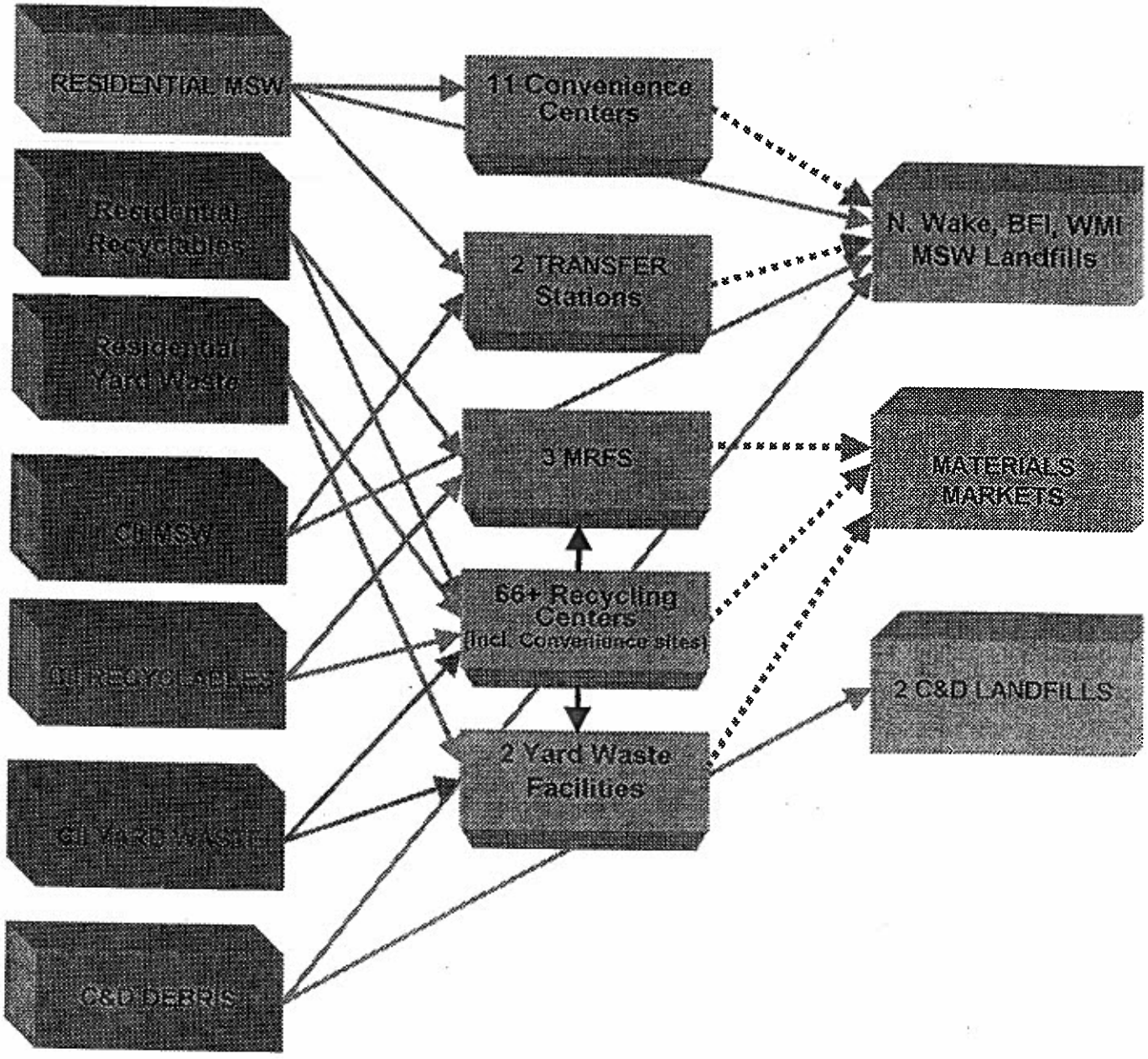

TABLE 2-1
SOLID WASTE MANAGEMENT AND RECYCLING FACILITIES LOCATED IN WAKE COUNTY

FACILITY TYPE	FACILITY OPERATOR/NAME	LOCATION
MSW Landfill	North Wake Sanitary Landfill	SR2006, Raleigh
C&D Landfill	BFI-Holly Springs Disposal	SR1153, Holly Springs
C&D Landfill	Wake County C&D Landfill	NC 55 Feltonsville
LC&I Debris Landfill	Colonial Building Co.	Norwood Rd./SR1834, Raleigh
LC&I Debris Landfill	Currin Bros. Landfill	Sunset Lake/SR1301, Fuquay-Var
LC&I Debris Landfill	Massengill & Sons	Widespan Dr./SR2558, Garner
LC&I Debris Landfill	Neuse Demo Landfill	Wayne Adams Thornton, Raleigh
LC&I Debris Landfill	Robuck Landfill	Victory Church Rd., Raleigh
LC&I Debris Landfill	Rowland Demo Landfill	3000 Gresham Lake Rd., Raleigh
LC&I Debris Landfill	W E Garrison Co.	Wake Co.
MSW Transfer Station	Town of Cary Transfer Station	Dixon Ave, Cary
MSW Transfer Station	South Wake Transfer Station	6000 Old Smithfield Rd, Apex
MSW Transfer Station	Waste Management of Raleigh-Durham	Globe Rd, Morrisville
Yard Waste Processing	City of Raleigh YW Facility	900 New Hope Rd, Raleigh
Yard Waste Processing	Waste Industries Woodwaste Facility	3741 Conquest Dr., Garner
Materials Recovery Facility	Waste Management of Raleigh-Durham MRF	Globe Rd., Morrisville
Materials Recovery Facility	BFI Recycling Systems Recyclery	Memo Ct., RTP
Materials Recovery Facility	Waste Industries Inc./Garner MRF	Jones Sausage Rd., Garner
Materials Recovery Facility	Paper Stock Dealers, Inc.	Maywood Ave., Raleigh
Materials Recovery Facility	Paper Stock Dealers Raleigh MRF	Capitol Blvd., Raleigh
Materials Recovery Facility	Phoenix Resources Recycling	Triangle Dr., Raleigh

The flow of solid waste materials in any jurisdiction is influenced by a number of factors including:

- Type of material;
- Cost of collection services;
- Facility tipping fees;
- Value of recovered materials;
- Proximity of facilities to source of materials;
- Relationship of each facility owner/operator to the hauling entity;
- Existing service agreement terms; and
- Preferences on the part of those entities having flow control. (e.g., haulers may prefer not to use their competitor's facilities)

Provided below is a discussion of the collection and disposition practices for solid waste, recyclable, and compostable materials generated in Wake County. Following this discussion is an assessment of the extent to which the collection,

processing, and end use infrastructure exists to support increased waste diversion efforts. Information presented in this section was obtained from numerous sources including:

- Interviews with representatives from local and state government, waste management and recycling facilities, and private haulers;
- Various municipal and county records and reports;
- Local and state agency web sites;
- Annual solid waste management reports filed with the state; and
- General consultant knowledge and prior work efforts.

COLLECTION

Solid waste, yard waste, and recyclable materials generated in Wake County are either hauled directly by the generator to a transfer station, processing or disposal facility, or are collected by one or more municipal or private haulers. The nature of the collection systems differs for residential, CII, and C&D materials.

RESIDENTIAL MATERIALS

In incorporated areas, residential solid waste is collected on a scheduled basis from single family residents by each municipality either directly or indirectly via one or more contractors. Table 2-2 lists the service providers for each municipality by type of service. In addition to collection of solid waste, all Wake County municipalities, with the exception of Morrisville and Rolesville, provide curbside collection of recyclables including plastic milk and soda bottles, glass containers, aluminum and steel cans, and ONP. Some municipalities collect additional items. The Town of Cary also collects OCC, OMG, aseptic packaging, all plastic bottles, aluminum foil and 6-pack rings in addition to the standard materials; and the City of Raleigh also collects magazines, catalogs, and "white paper direct ("junk") mail." Recyclables are also collected from several multi-family complexes by the City of Raleigh and the Town of Cary. All of the municipalities with the exception of Rolesville provide a means of collecting yard waste, given the statewide ban on yard waste landfilling.

TABLE 2-2
SOLID WASTE AND RECYCLING SERVICE PROVIDERS
BY WAKE COUNTY MUNICIPALITY

MUNICIPALITY	SINGLE FAMILY MSW	SINGLE FAMILY RECYCLABLES	SINGLE FAMILY YARD WASTE	MULTI-FAMILY RECYCLING	COMMERC MSW
Apex	Waste Industries	Waste Industries	Apex	Private	Waste Indus
Cary	Cary	Cary	Cary	None	Private
Fuquay-Varina	BFI	N/A	N/A	N/A	N/A
Garner	WMI	WMI	WMI	Private	Private
Holly Springs	N/A	N/A	N/A	N/A	Private
Knightdale	Waste Industries	Waste Industries	Waste Industries	None	Private
Morrisville	WMI	None	WMI	None	Private
Raleigh	Raleigh	Raleigh	Raleigh	Raleigh	Private
Rolesville	WMI	None	None	None	Private (Waste Industries)
Wake Forest	WMI	WMI	Wake Forest	None	Private or by Town via Waste Indus
Wendell	Waste Industries	Waste Industries	Wendell	None	Waste Indus
Zebulon	Waste Industries	Waste Industries	Zebulon	None	N/A

Source: Interviews with Lowell Shaw, Wake County Recycling Coordinator and representatives from spec communities.

Both incorporated and unincorporated residents may self-haul solid waste and recyclable materials to one of 11 County convenience centers or directly to the landfill, and may take recyclables to one of over 64 drop-off recycling centers (located at the convenience center sites, selected public schools, 6 Raleigh locations, and selected other sites). The materials collected at the convenience centers include the following:

- Residential solid waste;
- Residential construction & demolition debris and other bulky materials; and
- Recyclables
  - Newspapers with inserts
  - Magazines & catalogs
  - Junk mail
  - Aluminum beverage cans
  - Plastic milk/soda containers
  - Clear, green & brown container glass
  - Steel food cans
  - Scrap metal (collected at seven convenience centers)

- Corrugated cardboard and chip board (collected at four convenience centers)

Residents in unincorporated areas who desire direct service may contract with a private hauler to collect solid waste and specified recyclables on a fee-for-service basis.

Haulers operating in Wake County are required to be licensed by the County. An estimated 25 haulers are licensed to collect MSW in Wake County. The majority of these licensees are small sanitation companies serving residential and/or commercial customers. Three licensees service NCSU, the State Farmers Market and the State fairgrounds. Three are municipalities: Raleigh, Cary, and Fuquay-Varina. Four haulers handle the greatest amount of tonnage in Wake County: Waste Industries, Waste Management (with 2 licensees), and BFI.

Entities that collect or manage the largest residential tonnages in Wake County are the jurisdictions of Raleigh, Cary, Garner, and Wake County along with their respective hauling and/or processing contractors. The three municipalities each provide for separate collection of solid waste, recyclables and yard waste from single family residences. Additionally, Raleigh provides for recyclables collection at selected multi-family housing complexes, depending upon management approval, availability of space, and other similar considerations. The tonnage managed by Wake County is primarily residential solid waste generated by unincorporated households that is taken to the convenience centers. It also includes recyclable materials generated by residents throughout the County that are taken to County-sponsored drop-off centers located at the convenience centers, the landfill and selected schools. Small businesses and incorporated residents may also use the centers from time to time.

COMMERCIAL/ INDUSTRIAL/INSTITUTIONAL (CII) MATERIALS

CII generators include *commercial establishments* such as distributors and retail outlets; *industrial operations* such as manufacturing facilities; and *institutions* such as public schools, colleges, universities, government agencies, and hospitals. Virtually all CII solid waste is collected directly by private haulers on a contractual basis. The primary exception to this is that collection service may be provided by the municipality or its contract service provider in the central business districts of some municipalities and for small businesses not requiring bulk container service. In some instances, CII waste is self-hauled by the generator to one or more landfills/transfer stations.

Recyclable materials diverted from the CII waste stream may be picked up by one or more local haulers or recycling processors, may be shipped directly to market, or may be transported by the generator directly to a processing facility or end market.

The predominant entities involved in collection issues related to the CII waste stream are the generators themselves and their designated haulers. For larger corporations, decisions regarding how solid wastes and recyclables are managed

are typically made at the corporate level. Often such decisions affect the choice of contractors as well as whether recyclable materials are sold locally or shipped to a central point for consolidation with loads from other facilities.

Table 2-3 depicts the relative market share of the major contributors of nonresidential materials to the North Wake Landfill, based on recent landfill tonnage data. In addition to materials hauled to the North Wake Landfill, an undetermined percentage of the County's nonresidential solid waste is hauled to private disposal facilities. MSW from CII sources is taken primarily by BFI to BFI's Sampson County Landfill and by Waste Management to its landfill in Kernersville.

TABLE 2-3
NONRESIDENTIAL MATERIALS DISPOSED IN NORTH WAKE LANDFILL

HAULER	PERCENT OF NONRESIDENTIAL MARKET
Waste Industries	52.5%
BFI	11.5%
Waste Management	4.8%
All others (including municipal haulers)	31.3%
	100.0%

Note: Convenience center waste is included in nonresidential tonnage, due to reporting methods.
In categorizing truckloads of waste that enter the North Wake Landfill, rear loading vehicles are considered residential and front end loading vehicles are considered commercial. However, rear loading vehicles may actually contain commercial waste. Therefore, the records provided by the landfill may not represent the actual breakdown of nonresidential waste by hauler.
Source: North Wake Landfill tipping fee records, 1997.

CONSTRUCTION AND DEMOLITION (C&D) MATERIALS

Waste materials from C&D operations are generally removed from the job site and disposed in one or more of the following ways:

- The builder/general contractor hauls material from the job site directly;
- The builder arranges for debris hauling service with one of the area hauling companies; or
- Individual subcontractors haul their own debris directly to either the County MSW landfill or one of the area C&D disposal sites.

Some contractors work to return unused building materials to their suppliers or, less frequently, to move them on to another job site. Based upon research

conducted as part of the Triangle J Council of Governments Regional C&D Reduction and Recycling Study in 1993, some non-treated wood scraps are burned on site, particularly during winter months as a source of heat or as a means of waste disposal.

There is currently no formal recycling infrastructure for C&D debris recycling in Wake County. The management approach performed by individual builders is limited to items having substantial market value such as salvageable building materials, or wire scrap. A very limited number of builders may recycle selected other items. One international commercial builder interviewed by the Project Team was establishing a recycling program in order to receive ISO 14001 certification.[1] ISO 14001 is intended to encourage businesses to incorporate environmental aspects into operations and product standards. The final standard was adopted by the International Organization for Standardization in 1996.[2] Other international companies with operations in Wake County may also be pursuing ISO 14001 certification in order to improve their ability to compete for contracts overseas.

In 1997, a pilot C&D recycling project (the Woodbin 2 Homebuilder Recycling Initiative) was undertaken in Wake County in cooperation with select area home builders. Through this project it was determined that brick and block, drywall, and untreated wood were the easiest materials to recover from home construction sites, as well as the most prevalent materials - comprising approximately 60 percent of the total home construction waste stream.[3]

DISPOSITION

Table 2-4 presents the total tonnages landfilled, recycled and processed in FY 97-98.[4]

[1] See interview notes, Appendix E.
[2] Source: Web page by GZA GeoEnvironmental describing ISO 14001: http://www.gza.net/iso14000/iso14000asp and a web page by Capaccio Environmental Engineering, Inc.: http://www.iso14000.com/iso14_cee_overview.htm
[3] Source: Homebuilder Recycling Initiative Final Report, Woodbin 2, November 1997.
[4] Source: FY 97-98 Annual Solid Waste Reports submitted to NC DEHNR by Wake County and private waste management facility operators.

TABLE 2-4 TONNAGES LANDFILLED, RECYCLED AND PROCESSED IN WAKE COUNTY		
	TONNAGE	PERCENTAGE OF TOTAL
Yard Waste Processing	**67,441**	**7%**
Recycled	**30,456**	**3%**
Total MSW and C&D Landfilled	**874,300**	**90% of total waste generated**

Note: Yard and wood waste mulched, composted or given away for farm or garden use.
Source: FY 97-98 Annual Solid Waste Reports submitted to North Carolina Department of Environment, Health and Natural Resources (NC DEHNR) by Wake County and private waste management facility operators.

Table 2-5 reflects the disposition of both MSW and C&D debris from all sources landfilled in the last 6 months of FY 97-98 and tipping fees reported by the various facilities to the State. As shown in the table, approximately 66 percent of MSW and C&D debris was taken to one of four MSW landfill sites, and 34 percent (C&D debris only) was disposed in one of two C&D landfills operating during that time period. It is estimated that the North Wake Landfill receives approximately 88 percent of the MSW or 58 percent of both the MSW and C&D debris that is generated in Wake County. The BFI-Holly Springs C&D landfill receives approximately 30 percent of all Wake County solid waste generated (both MSW and C&D), and the remaining sites combined receive approximately 13 percent.

Based upon FY 97-98 tonnage data reported to the State, approximately 126,300 tons or 20 percent of all MSW were routed through one of three transfer stations prior to being landfilled. Wake County is in the process of seeking a permit for another MSW landfill in the Holly Springs area to replace the North Wake landfill. Siting and development of this landfill would further affect the flow and disposition of waste materials generated in Wake County.

TABLE 2-5 DISPOSITION OF WAKE COUNTY MSW AND C&D DEBRIS: JAN 1-JUN 30, 1998				
FACILITY	OPERATOR	JAN 1-JUN 30, 1998 TONS	% OF TOTAL	TIP FEE $/TON
MSW Landfills				
BFI-Sampson Co. LF	BFI	26,165	6%	$26.75
Waste Mgmt - Piedmont SLF (Kernersville)	Waste Mgmt of Ral-Dur	5,415	1%	$32.50
Addington - Upper Piedmont Sanitary LF	Addington	3,562	1%	$30.00
Wake Co. LF (N. Wake)	Santek/Wake Co.	254,995	58%	$25.00
		290,137	66%	
C&D Landfills				
BFI-Holly Springs C&D LF	BFI	130,425	30%	$22.00
Wake Co. LF (C&D/Feltonsville)	Wake Co.	20,879	5%	$25.00
		151,304	34%	
Total Landfill Disposal				
TOTAL LF Disposal		441,441	100%	

Source: FY 97-98 Solid Waste Management Facility Annual Reports submitted to DEHNR by each facility.

RESIDENTIAL MATERIALS

SOLID WASTE

Residential solid waste generated in Wake County is disposed primarily in the North Wake MSW landfill. A portion of the solid waste collected by the Town of Cary is transported to BFI's Sampson County landfill. It is assumed that some of the residential solid waste collected by WMI is transferred out-of-county to WMI's Kernersville landfill, given WMI's operation of a transfer station in Morrisville.

RECYCLABLE MATERIALS

Residential recyclables generally require some degree of processing prior to marketing, ranging from screening for contaminants to sorting and densification. Consequently, most such material is routed through one of the six MRFs located in Wake County. Which MRF is utilized depends on the contractor handling the collection operations. Both the City of Raleigh and the Town of Cary collect recyclables curbside directly and contract with Paper Stock Dealers solely for processing. Each processing entity makes its own decisions with respect to materials markets. The majority of recyclable materials processed in the County are shipped to out-of-county end users. Only two end users were found to be

located in Wake County, based on the North Carolina Division of Pollution Prevention and Environmental Assistance (NC DPPEA) recycling markets directory-- Southern Case in Raleigh, consuming HDPE, and Potters Industries in Apex, consuming clear glass containers (in cullet form) and plate and window glass in making highway safety products and glass spheres.

YARD WASTE

Each jurisdiction in Wake County assumes responsibility for the disposition of residential yard waste collected within their boundaries, with the exception of Rolesville which reported no yard waste recycling in FY 97-98. The City of Raleigh owns and operates a yard waste processing facility, by far the largest in the region, accepting nearly 21,501 tons of yard waste plus 306 tons of pallets in FY 97-98. Waste Industries also operates a yard waste processing facility which reported accepting 5,539 tons from Raleigh sources during the same period. In addition, some municipalities provide leaf vacuuming service and give the leaves away to area farmers for land application. Some municipalities, including Cary and Apex, have small chippers that they use to chip brush, tree limbs, Christmas trees, and other such material for use as mulch by the Town, schools and/or area residents.

CII MATERIALS

SOLID WASTE

As indicated in Table 2-4, most MSW, including MSW from CII sources, is disposed in the North Wake landfill, with limited quantities (12 percent) leaving the county for disposal in private landfills.

RECYCLABLE MATERIALS

CII recyclables recovered in Wake County are either taken to a MRF for further sorting, contaminant removal, and/or densification prior to sale; transported directly to one of a number of local scrap dealers handling specific commodities; or shipped by the generator directly to an end user or to a corporate center for later shipment to market. The MRFs handling the largest tonnage of recyclables in Wake County are operated by BFI, Waste Industries, and Paper Stock Dealers. This conclusion is based on the Project Team's research of the solid waste infrastructure in Wake County. These companies have a significant presence in the area - BFI and Waste Industries have most of the OCC collection containers sited around the County and Waste Industries' residential contracts are sizable. Paper Stock Dealers handles both Raleigh's and Cary's curbside materials. A limited amount of recyclables recovered in Wake County is taken out-of-county for processing. Information about specific local and regional markets for recyclables is presented in Section 5 for those materials recommended as targets for further diversion efforts.

YARD WASTE

CII landscaping waste and a limited amount of other processable wood waste materials (primarily wooden shipping pallets) are taken to one of the two permitted yard waste management facilities in the county, as mentioned above. It is also assumed that a substantial amount of yard waste, as well as land clearing and inert debris, is being deposited in the eight LCID landfill sites in Wake County listed in Table 2-1. While recovery and utilization of this material cannot be counted toward the State waste reduction goal, LCID material has beneficial uses and could be recovered instead of buried.

C&D MATERIALS

C&D debris is disposed in one of several facilities, depending on the nature of the materials in each load, and the proximity of the generator's site to the disposal facilities. As shown in Table 2-4, the majority (greater than 80 percent) of tonnage disposed in a permitted C&D landfill is taken to BFI's C&D landfill in Holly Springs. These loads comprise 30 percent of all solid waste generated in Wake County. A much smaller number of such loads (comprising 5 percent of the county's entire solid waste stream) is taken to the County's C&D landfill in Feltonsville. Numerous loads of C&D debris that may or may not require disposal in an MSW landfill are taken to the North Wake landfill for disposal. Based on the waste characterization results, these types of loads comprise an estimated 22.5 percent by weight of all solid waste disposed at this site. Approximately six percent of C&D material is reported as municipal solid waste when it is brought to the North Wake landfill for disposal. Inert C&D materials may find their way to one of the 8 LCID sites in Wake County.

The Project Team's research indicated that very little recycling of C&D debris occurs. However, the research revealed that material such as wire scrap is recycled and some materials are moved from one job site to another, or are salvaged by building demolition firms. Disposition practices of this type include:

- Returning materials to building product suppliers for refund;
- Relocating materials to other job sites;
- Salvaging material for resale as used building materials;
- Donating material to organizations such as Habitat for Humanity; and
- Recovering material having sufficient scrap value for recycling.

There are no C&D debris processing operations accepting mixed C&D loads in Wake County.

STATUS OF RECYCLING INFRASTRUCTURE SERVING WAKE COUNTY

The Project Team reviewed information on the collection system, and processors and end users of recyclable materials serving the Wake County area. In addition to using information sources mentioned earlier in this report, the Project Team reviewed information obtained via online and print telephone directory listings for scrap dealers and recycling firms, the online *Directory of Markets for Recyclable Materials* maintained by the NC Department of Environment, Health and Natural Resources (DEHNR), and the draft update of the *Assessment of the Recycling Industry and Recycling Materials in North Carolina* report now being compiled by DEHNR's DPPEA.

Preliminary findings resulting from this assessment indicate that Wake County has the infrastructure largely in place to move traditionally captured recyclable materials and yard wastes into the marketplace, with the following exception: *There is virtually no sorting capability to separate commingled recyclables - either commingled containers or mixed paper grades.* The existing MRFs handle materials sorted at the truckside, and do not have sorting lines for commingled materials.

For nontraditional recyclable and compostable materials, such as textiles, food wastes and C&D materials, the infrastructure needs further development in key specific areas.

Table 2-5 presents a brief summary of these preliminary findings regarding the extent to which recovery, processing and end use infrastructure exist on a material-specific basis, or would need to be developed if more of this material were to be recovered and recycled. More detailed information concerning markets is presented later in this report for materials recommended as targets for future waste diversion efforts. In Table 2-5, the terms "exist" and "needed" are used to describe the status of the existing infrastructure. These terms are defined as follows:

- Exists - Physically present and does not need to be developed.
- Needed - If this material was going to be recovered and recycled, the infrastructure would need to be developed.

TABLE 2-6
STATUS OF MATERIALS HANDLING INFRASTRUCTURE FOR POTENTIALLY RECYCLABLE MATERIALS GENERATED IN WAKE COUNTY

Material	Status of Existing Infrastructure		
	Collection	Processing	End Use
Glass containers	Exists for residential except no curbside collection in Rolesville or Morrisville; lacking for small quantity CII generators	Exists for source separated glass; Container Recovery Alliance (CRA) is adding color sorting of mixed glass residue	Exists
Plate and window glass	Needed, particularly for small quantity generators	Exists for CII supply	Exists
C&D	Needs development if source separation is required	Needed	Exists for some materials, needed for others
Non-treated wood	Needed	Exists to some extent (e.g., Raleigh yd waste facility)	Further development needed
Food waste	Needed	Needed	Needed
Yard waste	Exists, except no curbside collection in Rolesville	Exists	Exists
Mixed paper/ High grades	Drop off opportunities exist; curbside service lacking for all but Raleigh and Cary; needed for small quantity CII generators	Exists for marketable grades, sorting capacity is limited	Exists and expanding wit new tissue mill planned
OCC	Needs further development of residential, largely exists for CII	Exists	Exists, with demand expected to increase
ONP	Exists, but no curbside collection in Rolesville or Morrisville	Exists	Exists and stable, althoug pricing fluctuates
Aseptic packaging	Exists in Cary, needed elsewhere	Needed	Exists
Paperboard	Needed	Needed	Needed
OMG and catalogs	Drop off opportunities and resid. collection in Raleigh and Cary exist, collection in other towns lacking	Further development needed	Exists
Plastic bottles	Exists for milk and soda except in Morrisville and Rolesville; needs further development for other #1 & #2 and all #3-7 resins	Exists, if mixed bottles are sold; needed if sorting is required	Exists, for separated resins, except for PVC bottles
Plastic film	Needed	Further development needed	Exists and growing for certain resins
Other post-consumer plastics	Needed	Needed	Needed
Aluminum cans and other nonferrous metal	Exists for aluminum cans except no curbside collection in Rolesville or Morrisville; exists for CII and C&D suppliers having sufficient quantities	Exists	Exists
Ferrous scrap and cans	Largely exists, but further development would be beneficial; needed for cans from food service establishments	Exists	Exists, but pricing is depressed at present
Textiles	Exists for large quantity CII generators, needed for residential	Partially exists; capacity to handle residential material is needed	Exists and relatively stabl

WASTE CHARACTERIZATION FIELD SORTS

OBJECTIVE

The objective of the waste characterization field sorts was to gather statistically representative information that can be used to reliably characterize and quantify the County's solid waste stream.

METHODOLOGY

MATERIAL DEFINITIONS

The material categories selected for this Study were based upon discussions with the Wake County Solid Waste Department and the Project Team's waste composition experience. In addition, the American Plastics Council (APC) provided funding to separate plastics into 23 categories. The APC was interested in developing composition and recycling rate data for rigid plastic containers. The material categories are consistent with the project objective to determine the materials currently entering Wake County landfills that have market potential for recycling, reuse, or reduction.

A total of 58 categories were selected for this study. The definitions of each of these categories are included in Appendix A for reference.

PRE-SORT SITE ASSESSMENT

Project Team staff conducted a site visit at the selected site, the North Wake Landfill, prior to initiating the actual waste sorts. During the site assessment, the Project Team discussed with the facility operator their standard operations, including materials recovery and record keeping practices, as well as logistics for conducting the sort, equipment needs and the scheduled dates for the first sort.

Prior to the site visit, data related to disposal was requested from the landfill operator. This information was reviewed to identify the average weekly and daily quantities of materials received at the North Wake Landfill, to determine types of hauling vehicles used at each facility, and to gain an overview of the scope of the activity. The site visits also allowed the Project Team to clarify the data to be received from the facility operator prior to developing the waste sort protocol.

WASTE SORT PROTOCOL

Development of a protocol is essential to obtaining consistent and reliable waste characterization data. Because the potential for local communities to directly influence the management of the residential waste stream is generally greater than with the commercial/industrial/institutional (CII) waste stream, gathering reliable data for the residential generator type was considered of primary importance to the Study. Moreover, waste materials are transported to the North Wake Sanitary Landfill from residential generators, CII generators, and by waste haulers with materials from a mix of generator types (mixed). Consequently, the protocol includes identifying the various samples as originating from three generator types – residential, CII and mixed. Samples were selected from all three categories from loads tipped by private or municipal haulers. The residential category included samples from materials that were self-hauled by residents to the landfill. Results were developed for each of these generator types, as well as for a combination of the three generator types.

The protocol included sorting samples from the municipal solid waste (MSW) received at the North Wake Sanitary Landfill. Except for the quantities of C&D mixed in with the MSW, the quantities of C&D materials received were calculated per facility records. C&D was then factored into the overall waste characterization to develop a separate "solid waste" characterization. The solid waste characterization represents all solid waste materials landfilled (MSW and C&D) as opposed to MSW alone.

In addition to the MSW sorts, the composition of several samples of C&D debris were visually characterized. Neither the MSW nor the solid waste characterization results include the visual inspection of the C&D debris. The reason for the exclusion is that the categories utilized in the visual characterizations did not match those used in the MSW sorting. The categories were more focused on C&D debris such as drywall, roofing materials, etc. Therefore, these results were compiled separately.

CONDUCT WASTE SORT

A two season waste sort was initiated at the North Wake Landfill in 1998. A one-week sorting event was conducted in the summer during the week of August 10th. The fall sorting event took place during the week of October 19th.

A team of four experienced waste sorters conducted the waste sorts. The Project Team supplied the needed health and safety equipment, as well as a scale for weighing the sorted waste materials. Wake County provided a loader for selecting samples from the loads and the staff to assist in selecting the material samples.

The selection of vehicles to secure waste materials for sampling was based upon the data gathered from the pre-sort site assessment. Vehicles were randomly selected from within each of the three generator types – residential, CII and mixed. This approach assures sort data from each of these generators which can

be used to develop a waste characterization for each generator type. From the randomly selected loads, a minimum of 200 pound samples were taken for sorting. An employee of Santek, the landfill operator, operated the County-leased equipment to select the sample. Two to three hundred pound samples are considered the appropriate size to provide representative results. The samples were randomly chosen from the selected loads using various random cell selection processes.

The materials were sorted by the sorting team into individual containers representing the various 58 material categories. Then, each container was weighed to determine the quantity of materials by material type in each sample. These weights were recorded on individual data sheets to document the sorting process.

STATISTICAL MODELING

The data collected during each of the sorting events in the summer and the fall were input into R.W. Beck's specially designed waste composition statistical model (Model). The Model statistically manipulates the data to calculate both the mean and 90 percent confidence intervals as waste composition measures. In evaluating the results, both measures should be considered. The mean represents the average percentage of each material in the waste stream. The 90% confidence interval indicates that there is a 90% level of confidence that the true population mean falls within the upper and lower intervals. The narrower the intervals the less variability in the data. Following the completion of the fall 1998 sorts, the confidence intervals, narrowed and the reliability of the reported results was enhanced with the additional data.

For the solid waste composition results, confidence intervals are not provided because the C&D category was not physically sampled separately and thus confidence intervals were not available. Only a mean percentage for these material types is provided.

The results of the C&D visual characterizations were analyzed differently than the MSW samples. Since the visual characterizations were estimated based on volume, the volumes had to be converted to weights to develop weight-based composition numbers. To complete this conversion, the volume percentages were assumed to represent the volume in cubic yards. These volume numbers were converted to weight per assumptions for the densities (in pounds per cubic yard) of all the materials identified based upon industry estimates. The calculated weights were then input into the Model.

REVIEW SORT DATA

After the data was entered into the Model, the results were reviewed to identify any outlying data. A few samples with outliers were excluded from the results. This is further described in the results section.

RESULTS

INTRODUCTION

A total of 100 samples were sorted between the two sorting events. In the first sort, 25 residential samples were sorted. Based on reviewing the confidence intervals in the first sort, the Project Team concluded that in the second sort, the Team would focus primarily on the CII sector.

Tables depicting the summarized results are shown below. The detailed results are compiled in Appendix B.

RESIDENTIAL, CII AND MIXED WASTE

Provided below is a summary table representing the combined two-season results for residential, CII and mixed MSW characterization.

TABLE 3-1
WASTE CHARACTERIZATION FIELD SORTS
RESIDENTIAL, CII AND MIXED

CATEGORY	RESIDENTIAL COMPOSITION (1) (MEAN PERCENTAGES)	CII COMPOSITION (2) (MEAN PERCENTAGES)	MIXED COMPOSITION (3) (MEAN PERCENTAGES)
Paper	33.3%	24.1%	39.7%
Plastic	10.4%	13.9%	14.5%
Metal	5.8%	9.9%	4.1%
Glass	4.1%	1.5%	3.2%
HHW	0.5%	0.4%	0.5%
Yard Waste	3.3%	0.9%	0.9%
Food Waste	11.6%	6.9%	15.1%
Wood	9.5%	23.3%	4.6%
C&D Debris	6.8%	9.6%	4.4%
Durables	3.6%	2.7%	5.3%
Textiles	4.7%	0.9%	2.3%
Diapers	3.1%	0.6%	2.4%
Rubber	0.3%	0.5%	0.2%
Sharps	0.0%	0.0%	0.0%
Other Organic	1.3%	2.6%	1.3%
Other Inorganic	1.8%	2.2%	1.4%
Other	0.2%	0.0%	0.0%
TOTAL	100%	100%	100%

(1) From the sampling of 35 vehicle loads and the sorting of approximately 7,650 pounds of materials.
(2) From the sampling of 49 vehicle loads and the sorting of approximately 11,315 pounds of materials.
(3) From the sampling of 16 vehicle loads from transfer trailers and the sorting of 3,490 pounds of materials.

When the results were compiled for the August sort, it was found that there was an unusually large amount of wood waste and metal in the CII generator category. Therefore, an additional category was created entitled: CII–Construction & Demolition. In order to determine which samples should go in the subcategory, the individual sample results were examined. Seven samples were found to contain approximately 200 pounds or greater of wood waste. One more sample that was included in the CII–C&D category contained approximately 230 pounds of ferrous metal or 90 percent of the entire sample. These eight samples were removed from the CII category to avoid skewing the results. Subsequent to the creation of the CII–C&D category, it appeared that there were other samples that had unique results. Therefore another subcategory was created, called CII–Industrial, for samples that appeared to be byproducts of industry. Finally, the remainder of samples were put in an CII–Commercial category. These subcategories were maintained for the analysis in the second sort. However, the CII category above represents the total of all CII samples sorted, including all subcategories.

C&D

The following table depicts the results of the visual characterization of C&D materials.

TABLE 3-2 VISUAL WASTE CHARACTERIZATION CONSTRUCTION AND DEMOLITION DEBRIS	
CATEGORY	C&D COMPOSITION
OCC/Kraft Paper	0.4%
Other Paper	0.1%
Film	0.0%
Other Plastic	0.4%
Ferrous Scrap	7.7%
Roofing Material	17.1%
Drywall	13.4%
Insulation	1.2%
Concrete	7.2%
Carpeting	0.5%
Land Clearing Debris	3.9%
Bricks	4.1%
Other	0.2%
Wood (1)	43.9%
Untreated Wood	18.2%
Treated Wood	19.2%
TOTAL	100%

(1) The percentages for untreated wood and treated wood do not add up to the total for wood because there were a few samples in which untreated and treated could not be differentiated.

OVERALL RESULTS

The following table presents the overall results for municipal solid waste characterization and solid waste characterization.

TABLE 3-3
WASTE CHARACTERIZATION FIELD SORTS
OVERALL RESULTS

CATEGORY	MSW COMPOSITION (1) (MEAN PERCENTAGE)	SOLID WASTE COMPOSITION (2) (MEAN PERCENTAGES)
Paper	34.1%	28.2%
Plastic	12.9%	10.6%
Metal	5.9%	4.9%
Glass	3.2%	2.6%
HHW	0.5%	0.4%
Yard Waste	1.8%	1.5%
Food Waste	12.1%	10.0%
Wood	10.3%	8.5%
C&D Debris	6.3%	22.5%
Durables	4.1%	3.4%
Textiles	2.9%	2.4%
Diapers	2.2%	1.9%
Rubber	0.3%	0.2%
Sharps	0.0%	0.0%
Other Organic	1.5%	1.3%
Other Inorganic	1.7%	1.4%
Other	0.1%	0.1%
TOTAL	100%	100%

(1) Includes only the residential, CII and mixed generator type results.
(2) Includes C&D as well as the MSW, excluding the results of the visual characterization of C&D.

The MSW composition represents the combined composition of the residential, CII and mixed generator types. It is recommended that this characterization be used when comparing results to other regions and states. The solid waste composition represents all generator types including residential, CII, mixed and construction and demolition. This characterization should be used when identifying materials comprising a substantial portion of the overall waste stream that are being landfilled.

INTRODUCTION

In order to characterize the waste disposed by key CII and C&D generators, the Project Team utilized the following three methods:

- Sampling at the North Wake Landfill;
- Written survey process; and
- Generator on-site interviews/visits.

As discussed in the previous section, samples of CII and C&D waste were physically and visually sorted during the waste characterization. Based on the results of the sort and review of information related to businesses in Wake County, the Project Team compiled a list of target generators to survey. With the results of the survey and the preceding waste characterization information, the Project Team selected generators to visit in order to develop an understanding of their waste management practices.

SURVEY

IDENTIFYING GENERATORS TO SURVEY

The first step in completing the survey task was to identify generator categories to be targeted. The key generator categories were identified as a result of discussions with County staff including the Commercial Waste Reduction Specialist, the Solid Waste Advisory Committee (SWAC) and waste haulers. The targeted generator categories are as follows:

- Medical centers,
- Lodging,
- Multi-tenant office space,
- Schools,
- Government,
- Transportation,
- Correctional Institutions,
- Restaurants,
- Shopping centers,
- Discount mega-stores,

- Farmer's markets,
- Manufacturers,
- Construction and Demolition, and
- Grocery stores.

Within the targeted categories, specific generators to be surveyed were then identified. This list was compiled based on information from two key sources:

- Employment statistics; and
- Results from solid waste sorts at the landfill.

EMPLOYMENT STATISTICS

Based on statistics from the North Carolina Department of Commerce, it was estimated that the overall breakdown of employment in Wake County is as follows:

TABLE 4-1
EMPLOYMENT BY SECTOR IN WAKE COUNTY

INDUSTRY GROUP	PERCENTAGE OF TOTAL WORK FORCE
Agriculture	0.9 %
Construction	5.8 %
Finance/Insurance/Real Estate	5.5 %
Government	**19.0 %**
Manufacturing	8.7 %
Retail/Wholesale Trade	**24.1 %**
Service	**29.5 %**
Transportation/Communications/ Public Utilities	6.3 %
TOTAL	100%

As seen in the table above, the large employment sectors are:

- Government;
- Retail/wholesale trade; and
- Service.

These categories matched several of our previously selected categories. This data showed that emphasis should be placed in these categories when proportioning the number of surveys to send out in each category. Specific generators from these categories were identified through trade associations, data from the state health department, phone book, and several guides to businesses in Wake County from the Greater Raleigh Chamber of Commerce.

WASTE SORT RESULTS

During the two-season waste sort, several loads were identified that appeared to have a high percentage of recyclable materials. Several of these loads were determined to originate from manufacturers. Therefore, in assembling the list of generators to survey, a number of manufacturers were included. The manufacturers were selected by comparing a list of employment by SIC code from the U.S. Census with a Wake County manufacturers directory published by Wake County Economic Development. Sectors with a large number of employees and those more likely to generate recyclable materials were chosen to be surveyed.[1]

During the sorts it was also noted that there was a large amount of wood waste disposed. Therefore, several wood products manufacturers were identified to be surveyed.

In addition to recyclable materials from manufacturers, during the visual characterizations of construction and demolition debris, it was observed that there was a large percentage of potentially recyclable materials disposed at the Landfill from other generators. Therefore, we elected to survey several homebuilders and C&D contractors.

SURVEY DEVELOPMENT

The Project Team worked with the County to develop a survey instrument based on the County's objectives in this project. The survey instrument addressed the following information:

- Characterization of materials disposed;
- Specific waste hauler;
- Frequency of collection; and
- Materials recycled.

A draft survey instrument was submitted to the County for review and was modified based on staff input. Surveys were generated with questions specific to each generator category. A copy of the survey is included in Appendix C. A transmittal letter was also developed to accompany surveys and was sent out on Wake County letterhead to promote responses from those surveyed.

[1] Sources of data:
1) 1995 U.S. Census for Wake County (http://www.census.gov/epcd/cbp/map/95data/37/183.txt)
2) Wake County Economic Development and the Greater Raleigh Chamber of Commerce. "Major Employers Directory of Major Employers in Raleigh/Wake County & Research Triangle Park: 1997-98."
3) Wake County Economic Development. "Manufacturers Directory: 1998-99."

SURVEY DISTRIBUTION

Upon finalizing the survey design, the surveys were assembled and sent to the Wake County Solid Waste Department for signature and distribution. A total of 75 surveys were mailed out. After the surveys were distributed, R.W. Beck staff contacted several survey recipients that had not returned the survey within the two weeks given to respond. Additional responses were received as a result of this follow-up.

RESULTS

Twenty surveys were received. The following table lists the survey respondents.

TABLE 4-2
LIST OF SURVEY RESPONDENTS

SURVEY RESPONDENT	GENERATOR TYPE
Guilford Fibers	Manufacturer
PYA Monarch	Manufacturer
Lufkin/Cooper Tools	Manufacturer
Perstorp Flooring, Inc.	Manufacturer
Square D Company	Manufacturer
Austin Quality Foods	Manufacturer
Alcatel	Manufacturer
ABB ETI	Large Single Tenant Generator
La Quinta Inns	Hotel
Wake Technical Community College	School
Wake County Public School System	School
Squires Homes	Construction and Demolition Contractor
J.M. Thompson Construction Company	Construction and Demolition Contractor
Wake Med	Hospital
State Farmer's Market	Farmer's Market
Town of Garner	Government
Town of Cary	Government
RDU Airport	Transportation
Arby's	Restaurant
Hardee's	Restaurant

The detailed results of these surveys are included in Appendix D.

SITE VISITS

INTRODUCTION

In order to enhance the knowledge gained from the results of the CII surveys, site visits to several organizations were conducted. The criteria for selecting organizations to visit included:

- Quantity of materials generated;
- Opportunity to recycle;
- Key generating sector; and
- Feasibility of successfully scheduling a site visit and obtaining useful information.

Organizations that met these qualifications were selected by reviewing the results of the surveys and all of the information gathered previously.

The Project Team developed a written procedure for the site visits. This protocol included discussing the generator's operations, materials flow, waste reduction and disposal practices. A cursory inspection of the contents of their disposal containers was also conducted to identify recyclable materials with diversion potential.

RESULTS

During the week of January 18th, seven site visits were conducted. Two visits had been conducted immediately following the October waste sort. The following generators were included in the site visits:

- RDU Airport Authority,
- North Carolina State Facilities,
- Lowes,
- Jeff Fike Builders,
- PYA Monarch,
- Winn Dixie,
- Wake Forest Middle School,
- Wake County Schools, and
- Davidson Jones and Beers.

Detailed results are included in Appendix E.

OVERALL RESULTS AND CONCLUSIONS

From the results of the generator-based assessment, it was determined that there is an opportunity for additional diversion from several business types within the CII generator category. It was also determined that certain generators are recycling and composting when feasible. For example, at PYA Monarch, a food distributor, non-saleable food is collected by a local food bank. Also, Davidson Jones and Beers is establishing a protocol to recycle wastes generated at commercial construction sites in its effort to become ISO 14001 certified. However, others are not aware of the opportunity to recycle, specifically the local or regional markets. At PYA Monarch, a large amount of shrink wrap is generated. The warehouse maintenance manager had unsuccessfully searched for a market for the shrink wrap several years ago. Potential markets for shrink

wrap are discussed in Section 5. In some cases, the recycling infrastructure exists, but the collection program is not being used to its maximum potential.

At Wake Forest Middle School, a student club sets out bins for collecting paper and transports them weekly to the recycling igloos located behind the school. However, upon looking at the recycling and refuse containers, it was evident that a large amount of valuable high grade paper is not being recycled.

The information gathered in the generator-based assessment was also used in selecting materials targeted for diversion, as described in the next section. In addition, the results provided a background for developing strategy recommendations for diverting those targeted materials.

SECTION 5
WASTE DIVERSION OPPORTUNITIES

SELECTION OF TARGET MATERIALS

To select the materials offering the greatest additional waste diversion potential, the following criteria were applied:

- Prevalence of each material in the solid waste stream, as indicated by the waste characterization study and generator survey results;
- The material's market value and overall marketability, as determined through the markets assessment and Project Team knowledge concerning secondary materials markets;
- Ease of potential diversion, as indicated by the extent to which recovery and processing infrastructure currently exists to move the material into the market place.

Table 5-1 presents the results of applying these criteria to the various waste materials. The percentage figures presented in each column of Table 5-1 pertain to the percent by weight of each material for the applicable waste stream, as determined by the waste characterization study performed at the North Wake Sanitary Landfill. The waste stream categories included in the table are solid waste, MSW, CII and residential. As discussed in Section 3, the solid waste characterization represents all solid waste materials landfilled (MSW and C&D) as opposed to just MSW.

Generally, materials omitted from the list of target materials in Table 5-1 were not included either because they did not contribute significantly to the waste stream (comprised less than 2.4 percent by weight of the total solid waste stream - e.g., computer and electronic equipment) or were considered to have little to no value for reuse or recycling - e.g., non-recyclable paper.

A major source of information for this section is the NC DPPEA Assessment of the Recycling Industry and Recycling Materials in North Carolina - Draft Update. This publication is updated every three years.

TABLE 5-1 MATERIALS WITH ADDITIONAL DIVERSION POTENTIAL PREVALENT IN WAKE COUNTY SOLID WASTE STREAM				
MATERIAL	SOLID WASTE (% BY WEIGHT)	MSW (% BY WEIGHT)	CII (% BY WEIGHT)	RESIDENTIAL (% BY WEIGHT: SF/MF)
C&D debris	22.5%	6.3%	9.6%	1.0%/5.9%
Non-treated wood	4.9%	5.9%	18.2%	
Food waste	10.0%	12.1%	6.9%	14.6%/12.3%
Mixed paper	3.4%	4.1%	2.0%	6.7%/5.3%
High grades	2.9%	3.5%	4.2%	2.3%/3.8%
OCC	4.9%	5.9%	7.7%	3.8%/4.2%
ONP	4.7%	5.7%		8.6%/10.4%
Plastic film	4.6%	5.6%	5.9%	5.2%/4.1%
Ferrous scrap	2.9%	3.5%	8.9%	4.1%/1.4%
Textiles	2.4%	2.9%		2.4%/6.2%

Source: Waste characterization 1998 sort data obtained from North Wake Landfill.
Note: Percentage figures for non-treated wood and ferrous scrap do not reflect the amount of these materials from C&D debris generators.
Solid waste represents all solid waste materials landfilled (C&D and MSW) as opposed to MSW alone.
The percentages for residential non-treated wood, CII ONP and CII textiles are not included in the table. This is because these waste streams represent a limited opportunity for diversion due to their small percentages in the overall waste generated.

Diversion opportunities vary for the different materials in the CII, C&D and residential waste streams. Of these generator types, C&D debris generators produce the greatest tonnage of potentially recoverable material, thereby offering the greatest additional diversion potential.

C&D debris, according to the solid waste characterization study results, comprises 22.5 percent of all solid waste disposed in the North Wake Landfill as well as an additional 25,000+ tons per month deposited in local C&D landfills. Of the C&D waste loads visually characterized – non-treated wood, drywall, ferrous scrap, concrete and brick are the primary materials with diversion potential. Of the MSW loads, C&D debris comprises 6.3 percent of the waste stream. Based on observations during the MSW sorts, it can be concluded that the composition of this material is somewhat different than C&D debris from non-MSW sources, with less roofing material and a variety of other materials present. Opportunities for recovering and recycling these C&D debris materials do exist but both the recovery infrastructure and in some cases the markets themselves need to be developed.

Non-treated wood comprises 4.9 percent of the solid waste stream landfilled at the North Wake facility. Assuming the visual characterization performed on selected C&D loads is an accurate representation of the percentage of non-treated wood

in C&D debris, this would contribute an additional 4 percent. This percent was calculated by applying the percentage of non-treated wood in the C&D debris from the visual characterization, 18.2 percent, to the amount of C&D debris in the total waste stream, 22.5 percent.

A substantial amount of non-treated wood waste is present in the CII stream (18.2 percent by weight), the majority of which is wooden shipping pallets. Pallets were not included as a separate material type for the waste sort. However, upon observation of a significant number of pallets from CII sources, the percentage of pallets was estimated following completion of the sorts. Based on results from the statistical model, it was found that during the second sort, pallets comprised 16.5 percent of the CII waste stream and 0.3 percent of the C&D waste stream. The infrastructure for processing non-treated wood waste is partially in place; and markets for processed, clean non-treated wood waste already exist. The collection infrastructure would largely need to be developed.

Food waste is also a substantial portion of the waste stream, comprising 10 percent of all solid waste and 12.1 percent of MSW. A substantial amount of food waste is present in both the CII and residential waste streams. The collection and processing infrastructure as well as markets would need to be developed to recover and recycle this material. However, food waste does have substantial value as a feedstock in certain product manufacturing applications and can be composted into a high quality soil amendment for horticultural and agricultural applications.

ONP comprises an estimated 4.7 percent of the total solid waste stream disposed in the North Wake landfill and is 5.7 percent of MSW alone. Virtually all of it is generated by residential sources -- particularly multi-family residents. The infrastructure to recover this material is already in place and market demand exists but is relatively flat at present.

Recyclable OCC and kraft paper bags are estimated to comprise close to 5 percent of the total solid waste disposed in the North Wake landfill, even though higher tipping fees are charged for CII loads received at the landfill containing more than 10 percent recyclable OCC. Measurable quantities of OCC/kraft paper were found in both the CII and residential waste streams. The recovery infrastructure is in place for capturing OCC and kraft from CII sources, but needs further development for the residential sector. Markets exist for consuming OCC and kraft paper, although prices are currently low in comparison to historic levels.

Mixed paper and high grades were categorized as two separate grades during the waste characterization analysis, but may be recovered and marketed as a number of different grades depending upon such factors as market conditions, the degree of mixing of types of paper, and nature of contaminants present. Combined, these two categories comprise approximately 6.3 percent of the total solid waste stream disposed in the North Wake landfill. Inclusion of magazines and uncoated boxboard would add another 1.9 percent and 1.8 percent respectively (See Appendix B for these detailed results by generator type). Different types and amounts of recyclable paper are prevalent in both the CII

and residential waste streams. Recovery costs, market prices, and generator preferences largely determine how and to what extent the various grades of paper are captured from each of the different source sectors. Markets serving Wake County exist for high grades and some mixed paper grades. A recovery infrastructure serving residents and businesses is largely in place, although not as convenient as some would desire. An economical means of collecting paper from small quantity CII generators and curbside collection of residential mixed paper in some communities and for some types of paper is lacking. The capability of processors to sort paper into various grades is also very limited.

Plastic film, bags, and wrap comprise 4.6 percent of the total solid waste stream and are prevalent in both CII and residential waste. Capture of plastic film (i.e shrink wrap) from the CII waste stream has greater feasibility, due to larger quantities of cleaner material produced by individual generators. This material is primarily related to transport packaging in the form of shrink wrap and bags. Recyclable plastic film in residential waste is primarily shopping bags and dry cleaning wrap. There is no reported existing infrastructure specifically for collecting plastic film, other than for grocery bags which are accepted for recycling at selected grocery stores in the County. Several end markets for clean baled plastic film exist. The processing infrastructure for preparing plastic film for market generally exists, but existing processors may not wish to handle this type of material, due to its bulky nature, and unfamiliarity with costs and market risks associated in doing so.

Ferrous scrap comprises a relatively small percentage of the solid waste stream (2.9 percent). This estimate does not account for ferrous metals that are a component of C&D debris. Including this source of metal would contribute an estimated additional 2 percent, given that 7.7 percent of the C&D debris is metal and C&D debris comprises 22.5 percent of the solid waste stream. Ferrous scrap can be found in all three waste streams: C&D, CII, and residential. Given that there are at least four scrap metal dealers serving the Wake County area, the infrastructure for processing and marketing ferrous metal already exists. Ferrous metal markets have been depressed lately, but some industry analysts predict improvement in market conditions is forthcoming.

Post-consumer textiles, such as used clothing, towels and linens, comprise a relatively minor component of the total solid waste stream (2.4 percent), but comprise a substantial component of the overall residential waste stream (4.7 percent) and have relatively high market value ($40/ton)[1]. The infrastructure to process and market used clothing for reuse and recycling is largely in place, with at least two buyers actively working with North Carolina communities to obtain additional supply. Given that no such processors are reported in the Triangle region, a recovery system for textiles would need to be established to collect, store and ship the textiles to a processor which will then market the material.

[1] NC DPPEA *Assessment of the Recycling Industry and Recycling Materials in NC - Draft Update*

Provided in the remainder of this section is a detailed discussion of markets, sources of supply, barriers to further diversion and proposed diversion strategy recommendations pertaining to each of these target materials.

DEVELOPMENT OF STRATEGY RECOMMENDATIONS

SUMMARY DESCRIPTION BY MATERIAL TYPE

CONSTRUCTION AND DEMOLITION (C&D) DEBRIS

MARKETS AND MARKET CONDITIONS

C&D waste has a limited recycling history, but alternatives to disposal of C&D debris are growing. In November 1998, *Resource Recycling* reported that in 1996 an estimated 1,800 C&D recycling facilities were operating in the United States, including more than 1,000 asphalt and concrete crushing facilities, 500 scrap wood processing plants and 300 mixed-waste C&D facilities. As of the date of the article, the number of C&D debris recycling facilities had nearly doubled, to approximately 3,500.

The term *construction & demolition waste* can be misleading since it includes a number of material types. Further complicating discussion of C&D waste are the varied practices among builders and a wide range of building projects (i.e., residential vs. commercial; new construction vs. renovation vs. demolition).

Markets for C&D waste can be discussed from two fundamental perspectives – commingled materials (mixed C&D waste) and source-separated materials. Commingled C&D materials require some degree of separation and/or processing in preparation for potential markets. Conversely, C&D materials which have been separated at the point of generation may be suitable with little or no additional handling and/or processing for market acceptance.

Mixed C&D Materials

At mixed C&D waste processing facilities, the different C&D components are separated either mechanically or manually. Basic mechanical separation includes screening, grinding, and magnetic separation. Further processing to separate heavy aggregates (such as brick or block) from lighter materials (such as wood or cardboard) may include air or water separation. End products include recycled aggregate for a gravel substitute, wood chips for fuel or mulch, recyclable cardboard, plastics, and miscellaneous soil-like materials or fines. The market value of the end products is a function of the efficiency of the separation process, requirements of the end user, and transportation costs.

There are at least four mixed C&D processing facilities in North Carolina – located in Wilson, New Bern, Greenville, and Charlotte. Three of the facilities are operated under the name of Phoenix Recycling Corporation. The Greenville facility is operated by EJE Recycling & Disposal, Inc. These facilities are capable

of receiving commingled C&D materials and processing them into marketable products. At the New Bern facility, approximately 75 percent of the incoming material is recycled. The current tipping fee at the New Bern facility is $33.50 per ton for commingled material. There is a tiered tipping fee structure for source-separated materials; for example, clean wood and clean aggregate (concrete, block, brick) are accepted at the facility for under $20 per ton. The facility in Wilson, which is slated to close, charges $10.50 per cubic yard of mixed material. Both facilities are approximately 30 acres in size. The facility is privately owned and operated and disposes of its residuals at the local landfill. The EJE processing facility incorporates screening, manual picking and grinding to produce marketable soil, aggregate, paper, metals and an agricultural gypsum substitute. The Project Team is unaware of any facilities in Wake County which accept mixed C&D materials for processing and recycling.

Salvage and Reuse of Building Materials

There are a number of companies in North Carolina that recover and/or sell salvaged building materials. Locally, the Habitat for Humanity of Wake County - ReUse Center operates a facility that receives donations from individuals and area businesses for resale to the public. Last year (June 1997- October 1998), they received 574 tons of material generated from within Wake County. During the same period, they also received 20 tons of material donated from the Orange County Landfill.

Source-Separated C&D Materials

Whether commingled or source-separated, the individual components of C&D waste have different uses and values. Prevalent materials in the Wake County C&D waste stream considered to have good potential for economical recovery are untreated wood, drywall and masonry. A brief discussion of markets for these three materials is provided in the following paragraphs. Wooden pallets, OCC, ferrous scrap and plastic film, if recovered from the C&D waste stream, can be handled through existing recycling infrastructure discussed later in this section.

Untreated Wood

Clean wood waste has a number of uses both on- and off site.

- **On-site reuse** – Construction-grade lumber scraps may be incorporated into new work at the same construction site, or for use on another project. On-site uses for wall studs and other construction-grade lumber and timber include temporary or permanent framing and general construction. Plywood scrap can be used in concrete forms, for floor protection, or as replacement for new plywood.
- **Remanufacture** – According to NC DPPEA market research, clean dimensional lumber scrap can be finger-jointed into longer pieces, a practice becoming common in the Pacific Northwest. The finger-jointed lumber is reported to be generally straighter than ordinary 2X4's and is approved for structural use. DPPEA reports that there is now a company in North Carolina

that does this. This company, R24 Lumber Company, is located in Charlotte and is in the startup phase of making finger-jointed lumber from scrap 2 x 4 cutoffs.

- **Landscape mulch** – In addition to on-site use and re-manufacturing into construction products, clean dimensional lumber scrap can also be made into mulch. A high-end market has been developing recently for mulch products that have been dyed to retain a consistent coloring. Chipped or shredded lumber is reported to accept colorants better than some other wood waste materials. The price paid for a ton of clean dimensional lumber will vary based on the size of the load and the distance to the processing facility. Mulch markets are competitive in North Carolina, where bark products predominate.
- **Fuel** – Because it is kiln dried, dimensional lumber chip has a high fuel value. NC DPPEA market research cites a national study reporting prices for processed wood for fuel at $8-20/ton. Prices quoted from North Carolina markets range from $12/ton for dimensional lumber chipped to less than 2" in diameter to $25/ton for unprocessed dimensional lumber.
- **Bulking agent** – Wood chips are the most commonly used bulking agent for composting municipal biosolids. The compost process requires bulking agents to provide a source of carbon, add porosity, and increase the solids content of the mixture. There are an estimated 11 operating biosolids composting plants in North Carolina, handling an estimated 42 dry tons per day of biosolids (*BioCycle*, December 1998). Assuming average bulk densities and bulking agent ratios, this represents demand for approximately 13,000 tons per year of wood chips.

Aggregates and Masonry

Aggregates include asphalt pavement, concrete, reinforced concrete, cinder block, brick, glass, rock, sand, soil, and miscellaneous fines that result from the construction, renovation, or demolition of residential and commercial structures. Visual characterization of 30 loads of C&D waste entering the Wake County landfill indicated 7.2 percent concrete and 4.1 percent bricks.

The largest amounts of aggregates are generated from the demolition of commercial concrete or brick structures, and from the foundations of residential structures. All of these materials can be combined together and processed to produce a low-grade gravel substitute or solid fill material. Crushed masonry (concrete, brick, and cinder blocks) can be used as a road base aggregate and as a landscaping product. Portable crushing units can be contracted but are typically economical only for very large quantities.

Individual components of the aggregate are more valuable, however, when source-separated. Whole bricks have a significant resale value for direct reuse in restoration projects and in residential and commercial building.

Drywall (Sheet Rock)

Drywall is composed primarily of gypsum or calcium sulfate and a paper backing. Recovered gypsum from construction may be incorporated into the production of several marketable products, as discussed below.

- **Cat litter and oil absorbent products** – New construction waste drywall that is dry and paint-free is accepted at a facility in Goldston, North Carolina in the manufacture of cat litter and oil absorbent products.
- **Agricultural applications** – When processed appropriately, drywall can be processed as a substitute source of agricultural gypsum, which is widely used in North Carolina as a soil amendment. At the EJE facility in Greenville mentioned above, scrap gypsum wallboard is accepted from Pitt County for processing into an agricultural gypsum substitute.
- **Composting** - A study[2] conducted by the Clean Washington Center (CWC) in 1997 illustrated that gypsum wallboard can be successfully incorporated into the composting process without hindering end product quality. Product end use, process control, and grinding optimization efforts are important factors affecting successful incorporation of gypsum wallboard into a compost operation. For facilities that compost biosolids, scrap gypsum can be utilized as the bulking agent to provide necessary porosity, balance the carbon to nitrogen ratio of the mix, and absorb excess water. Chipped wallboard can also be an appropriate aeration component to help prevent the generation of odors in yard waste composting facilities that do not have an adequate supply of woody bulking material to provide porosity.

A listing of specific markets for C&D debris is provided in Appendix F.

SOURCES OF ADDITIONAL SUPPLY

Given that a construction boom has been underway in Wake County for several years, primary sources of C&D materials are from new construction projects versus demolition and renovation projects. According to a pilot project conducted in 1997, the home construction industry in Wake County generates a substantial amount of C&D waste, about 60 percent of which could be recycled if source separated and marketed.[3]

This pilot project was initiated by Woodbin2, a non-profit organization in Wake County dedicated to recycling construction waste. Woodbin2 developed the Home Builder Recycling Initiative to explore options and techniques for builders to recycle. Project participants included three Wake County builders and a local hauler. These participants tested sorting, collection, and marketing of recyclable construction debris over a 7-month construction period of five residential homes in Cary. In addition, Woodbin2 surveyed Wake County Home Builder members and held a discussion group with general contractors to learn about attitudes of the building community regarding waste management issues.

2 *Clean Washington Center, October 1997, "Evaluation of the Potential for Composting Gypsum Wallboard Scraps."*
3 *Homebuilders Recycling Initiative Final Report*, Woodbin 2, November 1997.

The commercial construction industry also generates a significant amount of C&D debris, some of which is already being recovered due to its value and the amount generated at each job site. For example, wire and steel scrap are often recycled.

The supply of C&D debris in general is considerably greater than the current demand for recovery. C&D debris recycling is based on cost-avoidance and not necessarily revenue generation. Thus, the quantity of C&D debris recovered is directly related to the cost of disposal. In areas of the country where landfill tipping fees are significantly higher, more material is being diverted. However, in North Carolina where tipping fees average $24 per ton, there is less incentive for C&D recycling. A majority of C&D debris continues to be disposed in North Carolina, including Wake County.

It is, therefore, the markets that must be developed, as well as a recovery infrastructure, to accommodate the large supply of potentially recyclable C&D materials from the Wake County waste stream.

BARRIERS TO ADDITIONAL DIVERSION

There are barriers to economical recycling of materials from C&D activities. Two key barriers include:

- The cost of collecting, sorting, and processing materials in Wake County may exceed the cost to landfill them, based on current landfill tipping fee rates.
- Local markets for some materials, such as wallboard do not exist and would need to be developed, or materials would need to be transferred to markets located elsewhere.

In addition to the above factors, there is often resistance on the part of builder and contractor employees to source-separate materials on the job site even if their employers support doing so. In addition, there are complex siting, zoning, and other regulatory requirements for waste processing facilities and accompanying public opposition. Although public opposition to a materials recovery or other C&D processing facility may be overcome by public relations efforts and education, it is still a daunting obstacle.

STRATEGY RECOMMENDATIONS

Wake County should continue its efforts to develop C&D material reuse and recycling infrastructure. Emphasis should be placed on recovery processes that are economically competitive with disposal. Given the current low landfill tipping fees in the County, mixed C&D processing does not appear to be economical; however, the recovery and recycling of selected materials that are source separated may be feasible. Transportation distances, as well as tipping fees, must be considered. The optimal situation would be to have recovery options available at or near disposal sites, so that builders and other generators of recoverable C&D materials can optimize their hauling practices.

Specific recommendations include:

- Initiate dialogue with potential vendors that can provide processing and marketing of source separated C&D materials. Consider siting such a facility at the South Wake landfill, if permitted, or at one of the County's or Raleigh's other waste management facilities.
- Consider focusing on one or two items such as wall board and/or non-treated wood as opposed to targeting the full range of C&D materials for recovery. As an example, Pitt County recently established a transfer station for drywall.
- Investigate opportunities for grinding wallboard and mixing it with yard debris for composting and use as a soil amendment.
- Work with the NC Home Builders Association and other local construction industry associations to develop best practices guidelines for adoption by area builders and contractors. (The National Home Builders Association has prepared materials that would be useful in this effort.)
- Encourage international construction companies active in Wake County to seek ISO 14001 certification and thereby develop waste reduction programs, as is being done by Beers Construction in Wake County (one of the companies interviewed for this project -- see notes in Appendix E).
- Continue to foster the reduction and recycling of C&D wastes through education of citizens, homebuilders, contractors, and local government officials.
- Encourage local building materials suppliers to accept surplus building materials for return with no restocking charge.
- Develop an ordinance similar to Orange County's that requires builders to submit waste management plans in order to obtain a building permit.
- Make it County policy that future County construction projects, including construction of new schools, include specifications requiring C&D waste recycling to the extent feasible.
- Pursue grant funding where available from the DPPEA for further development of C&D material recycling programs. C&D material recovery is a recent focus of the DPPEA.
- Publicize and promote donations of building materials to Habitat for Humanity of Wake County ReUse Center.

NONTREATED WOOD: WOODEN PALLETS

MARKETS AND MARKET CONDITIONS

Based on the waste characterization study, it is estimated that wooden pallets comprise 16.5 percent of Wake County's CII waste stream. This represents the majority (91 percent) of non-treated wood waste present in the CII waste stream, and 72 percent of all CII wood. Wooden pallets are made primarily from

hardwoods. Some 45 to 50 percent of U.S. hardwoods go into manufacturing new wooden pallets. Wooden shipping containers are made from a variety of materials -- hardwood, softwood, and composite wood products (e.g. plywood and particleboard). According to the National Wooden Pallet & Container Association, about one-third of U.S. manufactured pallets measure 48" by 40" (the GMA standard size). The next most prevalent size accounts for less than 10 percent of production.

The primary pallet recovery pathways in Wake County are through pallet refurbishers and through wood waste recycling operations in place at disposal facilities. Refurbishers rely primarily on old and broken pallets generated by large shipping operations and central distribution facilities. They have minimum quantity requirements in order to provide collection services. Refurbishers generally pay a nominal fee for pallets delivered to them. Based on information in the DPPEA market assessment update, it can be concluded that competition for these high volume sources appears to be strong between the refurbishers.

There is economic incentive to refurbish old pallets. Increased cost for lumber to manufacture pallets has significantly increased the cost of new pallets. Costs have risen to the point where the cost to disassemble pallets and rebuild new ones from salvageable pieces is less than the cost to make a new one. At the present time, refurbished pallets can sell for less than new pallets and still turn a profit. According to the DPPEA draft market assessment, a new pallet costs $7 while a reused or refurbished pallet costs between $3 and $6.

Based on the DPPEA market assessment update, nationally, 55 percent of pallets are recovered, and almost half of pallet manufacturers also rebuild old pallets. Most pallet refurbishing businesses prefer to handle Grocery Manufacturers Association (GMA) standard pallets -- 48" by 40" four-way pallets. There is much less demand for other size pallets because their variability limits the ability to use components from one pallet to refurbish another one. In many cases, pallet recycling companies will pay a nominal price for GMA pallets, and will accept minimal quantities of non-standard and/or damaged pallets in the load at no charge.

Existing pallet recycling efforts focus on large quantity generators. Many small pallet generators may not have access to economical recycling, and therefore dispose of their pallets. This is thought to be the main source of waste pallets in Wake County's waste stream.

When a wooden pallet can no longer be reused or repaired, it can be managed like other waste wood and processed into products such as mulch or boiler fuel. Many local governments in North Carolina accept pallets for grinding in their yard waste management programs, and many private recyclers also grind pallets that are no longer usable or repairable. Wood waste recycling operations which accept wooden pallets for grinding in Wake County include Raleigh's yard waste facility (currently accepting waste pallets from Raleigh sources only) and Waste Industries in Garner. Pallets are accepted at many of the land-clearing and inert

debris (LCID) landfills and BFI's C&D landfill in Holly Springs; however this is primarily for disposal only.

At its yard waste facility, the City of Raleigh has an ongoing grinding operation for incoming pallets and has developed a consistent demand for the ground product. Residents and small businesses located in Raleigh can purchase the mulch on-site. The City is considering the purchase of dyeing equipment to further enhance the value of the pallet mulch.

According to recent research conducted by the NC DPPEA, generation of wooden pallets may be affected by an industry movement toward the use of alternative (non-wood) pallets. Although wood pallets currently dominate the market, plastic and corrugated cardboard pallets have the potential for capturing market share.

A number of perceived advantages of plastic pallets over traditional wood pallets expressed by grocery distribution companies suggest that, even though the initial cost of a plastic pallet is as significantly higher, the cost per use factor appears to favor plastic. In a large operation, plastic pallets may never leave the company, until they can no longer be used. There is no need for bringing another entity into the loop, i.e. a refurbisher. A significant growth in the acceptance of plastic pallets would result in a proportionate decrease in the generation of wooden pallets.

Corrugated cardboard pallets work better in "open-loop" systems where durability and retrieval is less important, and can readily be recycled within existing OCC recovery infrastructure. NC DPPEA research reveals that almost a quarter of all pallets used by the health/pharmaceutical industry are corrugated.

Included in Appendix F is a listing of pallet recyclers serving central North Carolina.

SOURCES OF ADDITIONAL SUPPLY

Pallet recovery infrastructure appears to be fully developed for large quantity generators in Wake County, i.e., where the economics of collection and transportation are favorable. However, there are still significant quantities of wooden pallets currently being disposed at the North Wake and other landfills. Transportation costs to get used pallets to existing recycling services makes recycling non-competitive for small quantity generators. It may be possible to develop collection and consolidation procedures for these generators.

Notable quantities of wooden pallets were observed from the following CII generators during the waste sort at the North Wake Landfill:

- Retail building supply,
- Food distributor,
- Office complex,
- Utility company,

- Retail office supply, and
- Retail auto supply.

BARRIERS TO ADDITIONAL DIVERSION

Key barriers to additional pallet recovery and reuse or recycling are as follows:

- Pallets that have been painted or have absorbed spilled liquid chemicals or petroleum products are not acceptable to most pallet refurbishers or grinding operations.
- Lack of standardization of pallet sizes and quality, results in disposal of non-standard pallets making cost-effective recovery difficult. (The pallet industry has been attempting to increase standardization.)
- Economies of scale preclude many small quantity generators from pursuing recovery options.

STRATEGY RECOMMENDATIONS

The NC DPPEA reports that the statewide pallet recycling infrastructure appears healthy and growing, suggesting that market demand for pallets will remain steady at a minimum, and probably increase. Demand is adequate to meet the supply. The activity in the recovery infrastructure suggests that a much higher recommended diversion rate for pallets is possible. The following recommendations are intended to increase pallet recovery in Wake County:

- Identify which CII generators are consistently discarding recyclable wooden pallets and target them for diversion efforts. Information from the waste characterization study may assist in this effort.
- Provide information to generators regarding source reduction and recycling alternatives, including the use of standard size, higher quality, and more durable pallets.
- Provide technical assistance to help pallet generators find alternatives to disposal.
- Provide incentives for generators to divert pallets away from disposal and to reuse/grinding markets;
- Designate a pallet recovery area at municipal and County transfer stations and landfills and pursue a contractual arrangement with a private pallet recycler to service the recovered pallets.
- Investigate means of increasing the capacity of the Raleigh yard waste management facility to receive and grind pallets from non-City sources. This may require additional equipment and/or staff.

FOOD WASTE

MARKETS AND MARKET CONDITIONS

Food waste is a highly variable waste material, due to the variety of foods and the numerous commercial and household activities involved in processing and preparing foods for consumption. Generators are numerous and diverse, including residential dwellings, commercial and institutional kitchens, restaurants, grocery stores, and food product manufacturers. Therefore, it is not possible to develop a highly detailed specification of food waste applicable to all sources of supply.

Food waste from residential, commercial, and institutional sources accounts for an estimated 12 percent of MSW (approximately 90,000 tons per year) in Wake County. The estimated rate of food waste recovery in North Carolina is less than 2 percent (DPPEA), although insufficient information exists to develop highly accurate recovery estimates.

Food waste can be used for a wide variety of products that fall into four categories: recovery for human consumption, animal feeds, compost products, and other products. Table 5-2 lists various products and their applications.

TABLE 5-2 PRODUCTS AND APPLICATIONS FOR FOOD WASTE
Surplus Food Recovery for Human Consumption ■ Perishable and prepared food recovered for distribution to the needy ■ Canned foods and dry goods recovered for distribution to the needy
Animal/Fish Feed ■ Direct feeding of food waste to swine, dairy cattle, and other livestock ■ Conversion of food waste into animal/fish feed or ingredients for animal/fish feed
Compost ■ Soil amendment for bed preparation, planting backfill, seeding and sodding, sod production, turf top dressing, and civil engineering applications (erosion control, slope stabilization, and soil remediation) ■ Mulch products for planting beds, around trees and shrubs, and civil engineering applications ■ Ingredient in manufactured soil products for sale as topsoil or loam and use in landscape construction ■ Ingredient in plant growing media (potting soil) for general purpose and specialty mixes ■ Manufacture of wetland soils for use in wetland remediation and artificial wetlands construction
Other Products ■ Fertilizer ■ Tallow ■ Industrial chemicals

Surplus Food Recovery for Human Consumption

Demand for food donor programs has grown consistently over the past several years. In a recent initiative by the U.S. Department of Agriculture (the Food Recovery and Gleaning Initiative), a goal was set to increase the amount of food recovered nationally by 33 percent by the year 2000. As reported in the NC DPPEA recycling markets assessment draft update, recent steps taken by the USDA to meet this goal include the following:

- Working with the National Restaurant Association to produce a food recovery handbook for their members;
- Helping hunters donate venison to food banks; empowering schools to donate excess food from the National School Lunch Program;
- Encouraging airlines to donate unserved meals;
- Working with the U.S. Department of Transportation to develop a comprehensive way to transport recovered foods;
- Facilitating the donation of excess food from the Department of Defense; and

- Providing technical assistance to community-based groups and private citizens. "Good Samaritan" laws have been enacted in all U.S. States to protect food donors from potential liability.

Food donor programs provide edible foods to the needy through food banks, and prepared and perishable food programs (PPFPs). Food banks focus on distributing large volumes of nonperishable (canned, dried, or prepackaged) food. Much of the food distributed by food banks is diverted from the landfill; however, they also distribute foods donated by citizens (that would not have been discarded).

Food banks generally receive large quantities of food items from commercial generators (e.g., supermarkets and food product manufacturers) and distribute them to numerous charitable organizations. The Food Bank of North Carolina (Raleigh) recovers frozen and refrigerated food as well as produce and other perishables including canned and boxed items. A significant portion results from over-ordering, advertising misprints, dented cans, and other surplus retail conditions. Volunteers clean, sort, and otherwise prepare items for donation to agencies within the community (soup kitchens, food pantries, homeless shelters, etc.). Primary donors are grocery stores, Sam's Warehouse, food manufacturers and food drives. The Food Bank moved into a new building in 1997 with larger capacity allowing them to increase their throughput.

In 1998, the Inter-Faith Food Shuttle in Raleigh recovered 2,278,000 pounds of food in Wake County. The majority (about 1 million pounds) was surplus fruit and vegetables from the State Farmer's Market. Another 800,000 pounds came from grocery stores. The remainder came from caterers, vending machine companies, institutional kitchens, and some hotels. The Food Bank of NC distributes food to numerous local charitable organizations.

Some of the Wake County grocery chains are committed to working with food rescue organizations – Hannaford and Harris Teeter have made a corporate commitment. Winn-Dixie, Food Lion, and Kroger stores have not made a corporate commitment, but have worked with the recovery organizations on an individual store basis.

There is a new (1-year old) non-profit food rescue organization in Cary that collects canned and frozen foods from families and businesses that are moving out of the Triangle. During their first year, they collected about 3,000 pounds and donated it to agencies that feed the hungry. Their goal for this year is 8,000 pounds.

Animal Feed

Direct Animal Feeding - Direct animal feeding of human food waste is a traditional farming practice. The most common practice is swine feeding. Pig farms that practice direct animal feeding prefer post-consumer food waste because it is heterogeneous. The mix of food wastes provides a wider variety of nutrition and food value to the pigs as compared to food processing wastes, which tend to be very uniform. While this practice undoubtedly occurs in Wake

County, there is limited documentation to confirm it. There are few hog farms located within the County or within economical transportation distance to generators. There is one licensed garbage feeder located in Wake County. There may be a number of small-scale hog farmers located in or near Wake County which have informal arrangements with individual grocers or restaurants, but this information is not documented.

Manufactured Animal Feed - Manufactured animal and fish feeds are highly consistent products that have very low moisture content. They may be either pelletized or a meal. Animal feeds are generally produced for the agricultural market, e.g., poultry pellets and cattle feed supplements. These markets are the most amenable for feeds derived from food waste, in contrast to pure grain feed products for animals like horses. Manufacturing feed requires feedstock consistent in terms of content and moisture. These requirements place constraints on the types of food waste amenable to feed manufacturing, i.e., consistent characteristics and relatively low moisture content. Rendering facilities represent the largest industry which produces animal feed from *animal* by-products.

Compost

There are a number of composting technologies that can be used to compost food waste at a commercial scale. Whatever technology is used, the composting operation must produce a stable and consistent quality product in order to meet market requirements. There are currently no permitted large-scale food waste composting operations in Wake County.

Demand for compost for landscaping and horticultural uses is growing due to increasing awareness of its benefits. There has been a lot of effort on both regional and national levels to develop wholesale and retail compost markets. In metropolitan areas, the primary markets are landscape contractors, soil blenders, bulk suppliers, and public agencies. In rural areas and small towns, the primary markets are citizens, public agencies, and agriculture.

In addition to the centralized, commercial composting approach, there are a few programs throughout the country that have successfully merged urban food waste sources with local farmers for on-farm composting. A project in Massachusetts, for example, links commercial food waste generators, commercial waste haulers, and farm composting sites with a goal of diverting 170 tons per week. Currently 57 generators, 5 haulers, and 9 farmers participate in the program. The majority of food waste comes from supermarkets and a large wholesale grocer. Generators have reported 12 to 20 percent reductions in their solid waste management costs. One supermarket chain reported 23 percent reduction in trash generated.

The NC DPPEA has recently appropriated grant funds to stimulate compost programs throughout the state, including food waste composting.

Industrial and Manufacturing Products

Current commercial scale activities utilizing food waste are limited primarily to rendering plants. Rendering plants utilize fat and bone, grease trap waste, and used cooking oils to produce tallow, meat and bone meal, and yellow grease. Tallow is used in manufacturing soaps, cosmetics, and pharmaceutical creams. Meat and bone meals and yellow grease are used in manufacturing animal feeds and pet foods.

Markets for various food wastes in Wake County and vicinity are listed in Appendix F.

SOURCES OF ADDITIONAL SUPPLY

Residential sources represent a significant untapped source of food waste in Wake County. Due to the required level of collection and transportation infrastructure, however, recovery of food waste from the residential sector is probably the least viable from an economic perspective. Backyard composting is a viable strategy for diverting food waste and has been encouraged by Wake County for some time. The amount of food waste diverted from home composting efforts, however, cannot be reliably quantified. It is likely that continued efforts to expand backyard composting can increase food waste diversion.

The CII sector also represents a significant untapped supply of food waste in Wake County. Although there is a lack of infrastructure for collecting and processing food waste from CII sources, recovery from this sector holds much greater promise for economic viability than from residential sources. The most obvious targets are large-quantity generators of food waste that either is or can easily be separated from other waste materials. Specific generators that fall into this category are supermarkets, restaurants, farmer's markets, food processing businesses, and institutional cafeterias (schools, universities, hospitals, and some larger businesses).

Large amounts of food are discarded that are still fit for human consumption. Expansion of perishable and prepared food programs has been spurred on recently by passage of Federal and state Good Samaritan laws that limit the liability of donors. Even so, food bank and PPFP managers indicate that there is significant potential to increase the recovery of surplus food. There are major generators who still discard all their food waste. For example, food services for state offices and universities do not recover surplus food at the present time. The demand for surplus food is generally believed to be greater than the potential supply. Thus, there is an opportunity to expand the amount of material recovered through the existing programs and to establish new services.

BARRIERS TO ADDITIONAL DIVERSION

The supply of recovered food waste is limited due to economics and lack of infrastructure for collection and handling, especially for residential food waste. Separate collection of food waste poses a significant technical and economic

challenge to higher levels of food waste recovery. Large scale generators (such as food manufacturers, supermarkets, and food processing industries) tend to have the greatest incentive to separate food waste because they have a significant potential to lower overall solid waste management costs.

Current barriers to increased recovery for surplus food operations include:

- Information -- Program managers have difficulty getting information about collection possibilities to the thousands of food generators. In addition, there is significant turnover in the number of commercial food operations and their staffing.
- Financing -- Food banks and PPFPs can have problems securing enough funding to run their programs. Grants and donations must be sought every year to cover operating costs.
- Attitudinal -- Surplus food generators have concern over potential liability. Despite the fact that national and state Good Samaritan laws limit liability, some generators still are too fearful of legal impacts from donating surplus food.

In metropolitan areas, it is difficult to develop large scale food waste recycling facilities (either composting or feed manufacturing) because of the lack of cost-competitive collection infrastructure, low cost disposal options, and difficulties in siting facilities. At the same time transferring food waste to more rural sites may not be cost effective due to the transportation costs. There appears to be a niche for small-scale, urban composting (and vermi-composting) initiatives at the neighborhood level.

Key barriers to food waste composting are as follows:

- It can be difficult to site food waste consolidation and composting operations due to the potential for odors. The Not-In-My-Backyard (NIMBY) problem can be especially great in densely populated areas where the greatest amount of residential food waste is generated.
- On-farm composting requires a level of management largely beyond that which farmers are willing to undertake without economic incentives. In addition, food waste can contain more contaminants than farms are typically willing to address.
- State compost regulations require that significant design and operational procedures be integrated into any large scale food waste composting facility in order to adequately control potential environmental impacts. These regulations result in increased development and operating costs.
- Markets for compost products are still not fully developed; thus market development efforts must be undertaken before composting becomes economically viable.

STRATEGY RECOMMENDATIONS

Food Recovery Programs

Program managers for food recovery programs in Wake County believe that there is tremendous potential for increasing recovery from various sources. Wake County can facilitate additional recovery through these channels with the following strategies:

- Promote further awareness of food recovery programs within CII sector (including better promotion of Good Samaritan laws).
- Work with grocers and other generators to get corporate commitment to food waste recovery.
- Work with existing Wake County food recovery organizations in documenting their progress and identifying additional ways to facilitate maximum recovery.
- Develop a goal to recover 100 percent of surplus edible foods from all Wake County institutional food kitchens (schools, hospitals, etc.) through coordination with existing food recovery organizations.

Composting

The use of food waste as a feedstock in compost is both technically and economically feasible, although economic challenges still remain with regards to cost effective collection and handling. As current food waste recovery rates are low, there is significant opportunity for expanded production of food waste-based compost.

Numerous models for food waste-based composting businesses exist but have not been fully explored, including agricultural composting, commercial composting, municipal composting, and community-based composting. It is recommended that Wake County investigate the viability of food-waste composting by taking the following actions:

- Research opportunities for agricultural composting operations that could include food waste.
- Explore the possibility of expanding existing municipal yard waste composting operations to include food waste.
- Initiate discussion with vendors regarding startup of commercial composting operations that include food waste.
- Solicit proactive community organizations to consider community-based, small-scale urban composting operations.
- Communicate with NC DPPEA regarding ongoing or planned demonstration projects involving food waste diversion to gain additional information for future implementation.

- Identify opportunities and pursue grant funding for demonstration of pilot projects which divert food waste; work with CII generators that have indicated a willingness to participate in food waste diversion efforts.

Exploration of composting as an option will require simultaneous consideration of end uses. Efforts to conduct research on compost uses, educate potential users, and promote compost's benefits currently underway by NC DPPEA and other organizations.

Animal feeds

Although there are a number of challenges to developing the market for dried commercial animal feeds, it is considered to have a higher added value than the compost market. Therefore it is recommended that the size of the animal feed market in Wake County and neighboring communities should be quantified to help determine the viability of this market opportunity.

OLD NEWSPAPERS (ONP)

MARKETS AND MARKET CONDITIONS

Old Newspaper (ONP) technically includes old news, special news, deinking news, over-issue news, white blank news, groundwood computer print out (CPO), mixed groundwood and flyleaf shavings, and coated groundwood sections. #8 ONP is dry and free from other types of paper including old magazines (OMG) and kraft paper bags as well as free from contaminants. This is the highest value ONP grade, desired by newsprint mills, the largest consumer of ONP. Other end uses for ONP include paperboard, cellulose insulation, and animal bedding. According to DPPEA market research, paperboard mills consumed around one-third of all ONP consumed in the southeast; however these mills are beginning to rely on other low grade paper sources as alternative feedstocks. The manufacture of cellulose insulation is growing nationwide; hence ONP demand to feed this industry may increase in the future. Use of ONP for animal bedding does not offer much market potential in Wake County despite efforts on the part of the Raleigh News and Observer to develop this marketplace.

Despite relatively flat demand nationwide and a softening of market value, consumption of ONP remains strong in North Carolina, due to the presence of several large newspaper mills in the region. A listing of newsprint mills consuming ONP from North Carolina sources as compiled by DPPEA is listed in Appendix F. Demand is expected to remain stable or to increase slightly in future years, due to efficiency improvements and efforts by some mills to increase the recycled content of their product.

SOURCES OF ADDITIONAL SUPPLY

In Wake County, ONP is collected through all residential recycling programs operated by the County, its municipalities and private haulers serving unincorporated residents. Businesses and institutions may be recycling ONP in

the workplace or may be taking ONP to one of the numerous area drop off centers. In spite of ongoing recycling efforts, a substantial amount of ONP was found in the residential waste stream–7.3 percent by weight of the residential loads sampled.

In light of this finding, sources of additional ONP in Wake County are most likely single family and multi-family residents that currently do not recycle their old newspapers or do not do so consistently. Some ONP is also generated in the CII sector, for example by area hotels and the Raleigh Durham Airport Authority, which may also offer potential for recovery.

BARRIERS TO ADDITIONAL DIVERSION

Barriers associated with recycling additional ONP are recovery versus marketing related, with the following exceptions:

- The presence of flexographic ONP generated by the Raleigh News and Observer limits the market outlets accepting ONP to those which can handle this feedstock which may affect its market value.
- The relatively low market value of ONP makes it an unlikely target for capture by CII generators.

As the infrastructure is largely in place to capture residential ONP, recovery related barriers are educational and attitudinal in nature:

- Although such information is available to those who seek it, some residents (such as newcomers to Wake County, residents living in multi-family complexes without recycling programs, and unincorporated residents) may not be aware of their options for recycling ONP.
- Residents may be aware of ONP recycling opportunities but may not be motivated to do so.
- Some residents may recycle ONP but not consistently, for reasons such as lack of storage space or inconvenience.

STRATEGY RECOMMENDATIONS

Recommendations for increasing the capture and recycling of ONP are as follows:

- Conduct a recycling and waste reduction media campaign that promotes recycling in general and informs the public about recycling benefits and opportunities county wide. Consider partnering with the Raleigh News and Observer in this effort.
- Develop a special fact sheet on ONP recycling benefits and opportunities for inclusion in and in cooperation with area newspapers.
- Encourage area hotels to reconsider the practice of distributing newspapers to every guest room and to make them available in the lobby for pick up by guests as desired.

- Work with the Airport Authority and the airlines to find an affordable means of establishing a recycling program for ONP generated in the terminals and by each airline.
- Consider banning ONP from disposal in the landfill, as is currently the case statewide for aluminum cans.

OLD CORRUGATED CONTAINERS (OCC)

MARKETS AND MARKET CONDITIONS

OCC includes corrugated containers, kraft paper such as brown paper grocery bags, and carrier stock as well as cuttings for each. The primary market for OCC is the U.S. paperboard industry, which uses OCC in making corrugating medium, linerboard, recycled paperboard, and other paper products. Some OCC is used domestically in making tissue products, some OCC is exported, and a small percentage of OCC is used in various other applications. Information on OCC consuming mills located in North Carolina is listed in Appendix E, followed by a list of other mills in the Southeast that consume OCC.

Based upon the supply and demand assessment recently completed by the NC DPPEA, demand exceeds supply of OCC for both North Carolina and the southeast. DPPEA's research determined that several end users would welcome additional supply of OCC; however, markets have been weak in recent months due to rising mill inventories and soft export demand. Industry analysts indicate that prices are beginning to swing upward once again.

Concerns over the future availability of OCC supply as well as contamination concerns are prompting some end users to increase their reliance on other types of recovered paper. A major source of contamination is the wax coating used on some corrugated containers. This problem may diminish as a result of technological advancements in wax dispersion and removal technologies and the development of alternative coatings that do not impede OCC recycling. If application of these new technologies occurs, coated OCC will become available for recovery and recycling, thereby increasing the potential OCC capture rate.

SOURCES OF ADDITIONAL SUPPLY

As shown in Table 5-1, sources of additional uncaptured OCC in Wake County are primarily from the CII sector, with some OCC generated by residences. It is assumed that CII establishments generating large quantities of OCC on a routine basis are likely to have OCC recovery programs in place. Grocery stores are one such type of establishment, and project interviews supported this assumption. Therefore, uncaptured OCC in the CII stream is likely to be generated by smaller businesses, or large businesses generating small or sporadic quantities of OCC.

With respect to residential waste, most OCC generated is in the form of moving boxes with more OCC generated by multi-family residents where the generation of OCC associated with move-ins is higher, due to higher tenant turnover.

A limited amount of OCC is generated by new construction and renovation projects, particularly resulting from the delivery of appliances and cabinetry. The Woodbin 2 Homebuilder Recycling Initiative project determined that OCC is not readily recoverable from home construction job sites. However, capture of OCC from selected commercial construction projects might be feasible if sufficient OCC were generated to warrant transportation to market, or separate placement in waste loads headed to the North Wake landfill where OCC is accepted for recycling.

BARRIERS TO ADDITIONAL DIVERSION

The primary barriers to the recovery of additional OCC are economic in nature:

- OCC market prices are currently depressed, thereby reducing the economic benefit associated with recycling this material. Some small haulers may have ceased collecting OCC from sites generating small quantities, or raised fees associated with this service.
- Wake County's Recyclable Corrugated Cardboard Surcharge Program provided economic incentive for many CII establishments to source separate and recycle their OCC, initially, and resulted in the private sector's establishment of a County-wide collection and processing system to move this material into the market place. However, in conducting the waste characterization study it was determined that measurable quantities of OCC are still being landfilled and that the surcharge ordinance is not being effectively enforced.

Other key barriers to additional OCC recovery include the following:

- The labor and inconvenience associated with breaking down boxes and pulling out contaminants prior to placement of OCC in the OCC collection containers results limits participation even when a recovery system is in place.
- Contaminants such as wax and poly coatings on OCC limit the recycling of such containers and results in these type of containers being a source of contamination for recyclable OCC.
- Residents have limited options for locations where they can take their OCC for recycling, given that this material is not accepted in most of the residential curbside recycling programs, the Wake County recycling centers at area schools, or seven of the County convenience centers.

STRATEGY RECOMMENDATIONS

To address these barriers and increase OCC recycling, the following strategies are recommended:

- Enforce the Recyclable Corrugated Cardboard Surcharge policy at the County's landfill sites, current and future. This has the potential to make a substantial difference in the amount of OCC diverted from disposal.

- Establish OCC collection opportunities at all convenience centers that have adequate space to do so.
- Establish a partnership with selected area merchants that have OCC collection containers on site to permit their customers to deposit their OCC for recycling.
- Promote all opportunities for OCC recycling (as well as recycling of other materials) through such low cost avenues as the Bell South Real Consumer tips service, County Solid Waste Department web site, the cable Television network, etc.

MIXED PAPER AND HIGH GRADES

MARKETS AND MARKET CONDITIONS

Mixed paper is a combination of paper grades that can include virtually any kind of recyclable paper, but is usually defined as excluding OCC and ONP. High grade paper includes office paper, computer paper, bleached sulfite and sulfate, and coated book stock. This category is comprised mostly of chemical pulp grades. It includes both pulp substitutes (defined as print-free grades that do not require deinking) and deinking grades. High grades can be a component of mixed paper, or can be recovered and marketed separately at higher market value. Both grades can be supplied by residential or nonresidential sources, with high grade paper collected primarily from CII generators.

Mixed paper can be used in making paperboard, linerboard, corrugating medium, and tissue. In addition it can be used in making selected non-paper products such as roofing felt and some molded pulp products. The primary markets for high grades is in making new printing and writing (P&W) papers and tissue.

Demand for mixed paper is growing but its value is relatively low, and supply has the potential to exceed demand during periods of lower demand, particularly for lower quality mixes. Demand for high grades has historically exceeded supply with prices fluctuating with the value of deinked market pulp.

Included in Appendix F is information compiled by the DPPEA on end users in North Carolina consuming mixed paper and/or high grades as feedstock, followed by a list of mills elsewhere in the Southeast that consume these grades. Recently it was announced that Wisconsin Tissue, a subsidiary of Virginia based Chesapeake Corp., will be building a new tissue mill in Halifax County, North Carolina that will have the capacity to consume over 100,000 tons per year of recovered paper. Acceptable feedstock is likely to include office grades and potentially even high quality residential mixed paper. If this mill is constructed as planned, ultimately it will have a major impact on the markets for mixed paper and high grades in Wake County. The mill is expected to begin operation in 2001, however, initial operations may be limited to converting. Furthermore, concerns have been raised about the plant's impact on the Roanoke River, which may

result in permitting difficulties and possible delays in the mill's ability to begin making tissue, if permits are indeed granted.

SOURCES OF ADDITIONAL SUPPLY

High grades and mixed paper are already being recovered to a certain degree in Wake County. Project-related interviews and survey results indicate that most of the larger businesses, the larger colleges and universities, and virtually all municipal, county and state government offices recover and recycle selected office grades. Several private haulers and some recycling firms offer collection of selected office grades to businesses and institutions on a fee-for-service basis. In addition, the City of Raleigh, Town of Cary, and the County's drop off centers collect selected types of paper comprising these grades from residential sources. Some small businesses also use the municipal and County recycling centers.

Likely sources of additional high grade and mixed paper supply include multi-tenant office buildings, small businesses in detached buildings, the Wake County public schools, and Wake Tech Community College. In addition, many of those entities already recycling such paper have the potential to improve their paper capture rates.

BARRIERS TO FURTHER DIVERSION

An infrastructure for capturing additional high grade and mixed paper to feed current markets is largely in place. Key barriers to additional recovery are institutional, economic, informational, and attitudinal in nature:

- Markets are not secure for residential mixed paper containing the full range of paper grades found in this waste stream.
- The current low market value of paper makes the net costs associated with recovery and processing higher, and in some cases cost-prohibitive – particularly for small quantity CII generators, multi-tenant property managers, and operators of curbside recycling programs.
- Some generators may find it is cost effective to recycle their office paper, particularly high grades, but may lack information on how to do so effectively.
- Some generators may simply have no desire to participate in paper recycling.

STRATEGY RECOMMENDATIONS

The DPPEA offers the following recommendations for increasing high grade and mixed paper recovery, which are applicable in Wake County:

- Work with building managers to facilitate office paper recycling. The DPPEA suggests that local governments take an active role in fostering alliances with local chapters of the Building Owners and Managers Association (BOMA). Through these alliances, BOMA members could be educated about how to set up effective office paper recycling programs, including how to evaluate

collection service options, establish agreements with service providers, investigate options for reducing solid waste collection service and its associated costs, promote participation, etc.

- Work to revitalize existing office paper recovery programs. The National Office Paper Recycling Project (NOPRP) has developed materials aimed at revitalizing existing programs, such as a recycling guide for building managers. Wake County could distribute some of the NOPRP's materials, as appropriate, or develop similar materials of its own. Such information, including promotional material, could be placed in downloadable form on the County's web site.

- Encourage the creation of mixed commercial paper routes. This alternative may be particularly advantageous for Wake County in the future, if established in partnership with Wisconsin Tissue or one of its key suppliers. Such routes could focus on a mixture of office paper and old corrugated containers. As many businesses already have separate collection of OCC, collection of this mixture may simply involve permitting other types of paper to be placed in the same container. The OCC would need to be sorted out, which is technically feasible with available screening technology. As this type of sorting system does not exist in Wake County, suitable processing capacity would need to be developed.

- Educate generators about the need for properly sorted, contaminant-free office paper. This kind of communication should entail learning about the supply needs of the mills receiving paper from Wake County sources, and informing generators about set out procedures that will help these mills improve the quality and quantity of paper they require.

In addition to the above recommendations, it is recommended that special emphasis be placed on increasing the capture and recycling of paper through the Wake County schools. Two reasons support this recommendation: 1) A substantial amount of recyclable paper is generated by the schools that is not now being recycled; and 2) There is a benefit in teaching Wake County's youth about the need for and proper means of recycling. More specifically, it is recommended that Wake County:

- Develop and implement a uniform, centrally managed recycling system for high grades, mixed paper, and OCC (and selected other materials), including uniform signage, collection and storage containers, and participation and operating procedures.

- Establish a cooperative effort between the County Solid Waste Management Department, the Wake County Public School System, and each municipality to ensure that school system recycling efforts are integrated and compatible with existing community recycling efforts.

- Train custodial staff, administrative staff, faculty, and students on proper recycling procedures and reasons for recycling.

- Incorporate student participation in recycling as an integral part of the environmental education curriculum.
- Involve the PTAs, school clubs, and parents in supporting the recycling effort.
- Develop a system for improving coordination of decision-making pertaining to purchasing, food service operations, school facility design, with waste management to ensure that decisions which impact waste generation and management are made in ways that support the County's waste diversion goals and programs.
- Promote community use of the drop off centers at the schools and examine ways of utilizing the revenue to promote participation.
- Investigate opportunities to reduce the number of waste containers and/or container pulls at each school, and to establishing a cooperative contracting arrangement for waste management and recycling services between the school system and County offices and facilities to cut costs.

POST-CONSUMER TEXTILES

MARKETS AND MARKET CONDITIONS

Textiles are made of either natural fibers (wool, cotton, silk) or synthetic (polyester, nylon, spandex). They are found in a wide variety of durable and non-durable goods in MSW, including used clothing and footwear, bedding and towels, upholstery and drapery, and carpets.

Nationally, 48 percent of post consumer textiles that are recovered go to second hand clothing, 20 percent are used as industrial wipers, and 26 percent are converted to fiber to be used in various industries including automotive, home furnishing, mattresses, etc.[4] Used textiles are sorted by fiber and color. Reusable clothing is extracted for resale. Cotton, absorbent clothing that is too torn or stained for reuse is made into industrial cloth wipers. Other materials are fiberized and sold to end use market to be made into a variety of products from insulation to car hood liners.

There are thirteen used clothing recyclers listed in the NC DPPEA market directory. These recyclers are listed as brokers, exporters, processors and handlers. Two of them are working with local governments in North Carolina. The most notable is Carolina Textile Recycling that is located in Walterboro and accepts scrap textiles as well as clothing for reuse. Sources for Carolina Textile Recycling include local government and charitable organizations. The majority of the collected textiles are exported to other countries for reuse. The textiles that are not wearable are made into industrial rags. J.G. Thompson Enterprises is another post-consumer textile recycler located in Spindale, NC.

According to a representative at Carolina Textile Recycling and confirmed by the draft DPPEA report, currently there is not a strong demand for post-consumer

4 Source: Council for Textile Recycling website: http://www.textilerecycle.org/ctrinfo.html

textiles. The decreased demand can be attributed in part to instability of foreign economies. The strength of the market is not static, as it is related to the dynamics of foreign economies, according to the DPPEA market assessment update. Current market prices for textiles are $40 per ton per the DPPEA update report or range from $0 to $100 for the south region in the January 11, 1999 issue of *Waste Age's Recycling Times*. According to the Recycling Times issue, the overall average price for textiles is $60 per ton, down from $120 last year.[5] Despite the low demand, textiles still have a relatively high market value as compared to other materials.

SOURCES OF ADDITIONAL SUPPLY

In Wake County, textiles in the waste stream are primarily generated by residences. According to the waste characterization results, 4.7 percent of the residential waste stream is textiles. They are not currently collected in the County's recycling program, nor by any of the municipalities. However, residents may recycle textiles through charitable organizations such as Goodwill. Thus, the most significant source of supply lies in the residential waste stream where textiles are being disposed.

BARRIERS TO FURTHER DIVERSION

Key barriers to increased diversion of textiles include:

- A recovery system for textiles is not established to collect, store and ship textiles.
- Currently, post-consumer textiles are in relatively low demand due to fluctuations in foreign economies. Despite the low demand and perhaps due to textiles' relatively high market value, textile recyclers contacted for the DPPEA report expressed an interest in expanding programs.
- There may be a conflict between charitable organizations. By developing a local government collection program, charitable organizations may lose a significant portion of their donations.

Textile recyclers have cited problems with the presence of non-textile materials, unacceptable textile materials, and moisture-related contamination. Thus quality is presently an issue as related to collection of textiles.

STRATEGY RECOMMENDATIONS

Key strategy recommendations include the following:

- Since the County currently has a network of convenience centers and recyclables drop-off centers, it may be possible to collect textiles by adding an additional container to these sites. In order to implement this approach, Wake County would need to implement a public education program to

[5] "The Markets Page," Waste Age's Recycling Times, January 11, 1999, Volume 11, Number 1. The prices quoted from Recycling Times are prices paid by processors (e.g brokers).

explain to residents that they have two options for recycling their textiles – through the drop-off program or through donations. Residents may choose to bring their materials to the convenience centers when they are dropping off their regular trash and recyclables.

- An additional location for implementing a textiles drop-off program is the Town of Cary's drop-off center at their transfer station.
- A curbside program, however, would be more challenging to implement since it may not be economically feasible.

FILM PLASTIC

MARKETS AND MARKET CONDITIONS

Film is made from a variety of plastics including polyethylenes, polypropylenes, ethylvinyl acetate (EVA), and flexible polyvinyl chloride (PVC).

LDPE, LLDPE, and HDPE films in a combination with other resins are used to make film plastics and molded plastic goods. Film products that can be made with secondary resin include trash, grocery, merchandise and garment bags that have reduced need for color consistency. Film plastics that package consumer products must be free of contamination and therefore cannot tolerate a secondary resin.

Nineteen outlets for plastic film are listed in the NC DPPEA markets directory. None are located in Wake County. Three of the facilities closer to Wake County are listed in Appendix F. The first of these is Trex, a plastic lumber manufacturer located in Virginia, that produces a composite lumber product. Their lumber contains approximately 50 percent sawdust or other recycled fiber and 50 percent post-consumer plastic film, including pallet wrap, plastic grocery and dry cleaning bags. They accept only baled polyethylene film. They obtain a large portion of their materials from the CII sector. In addition, they purchase materials from local governments through a broker or collector. Trex will be opening a new facility in Nevada.

Based on information from the DPPEA market directory, Polymer Reclaimer and Exchange in Burlington processes a wide range of post-industrial plastic resins including bales of HDPE, LDPE, and LLDPE stretch wrap.

FCR's Facility in Rockingham processes a wide range of plastic resins. Regarding film plastics, the facility accepts baled HDPE, LDPE, and LLDPE stretch wrap that is label free, contains no PVC.

Prices for most secondary plastic grades have been depressed over the past six months due to worldwide prime resin production over-capacity and importation of cheap resin into the U.S. The market situation is near an all time low. Some industry analysts say that a price upswing is not expected at least until next summer, while some feel that prices may have bottomed out, particularly for HDPE. While prices are low, however, end users for plastic film do exist.

SOURCES OF ADDITIONAL SUPPLY

Films are the most common type of plastic packaging and are found in bags and stretch wrap, derived primarily from commercial sources. Stretch film is widely used in the transport and storage of commercial goods. Transported goods are bound to pallets with stretch wrap and then sliced off at their destination rendering the stretch film not reusable, but usually uncontaminated nonetheless. Residential film waste in the form of plastic bags, on the other hand, can be heavily contaminated with items such as food and paper. Therefore, capture of plastic film from the CII waste stream has greater feasibility, due to larger quantities of cleaner material produced by individual generators.

At a site visit to a large food distributor in Wake County, a staff person responsible for waste management at this distributor stated that all of the pallets entering the facility are wrapped in shrink wrap. He had an interest in recycling this material and had searched unsuccessfully for possible markets five or six years ago. Up to 25 percent of this distributor's waste was shrink wrap.

BARRIERS TO FURTHER DIVERSION

Key barriers to further diversion are as follows:

- Post consumer secondary plastic film has a high degree of contamination, and is difficult and expensive to separate. Producers can utilize equipment to screen out the contamination. Continuous screening technology is available to clean and prepare secondary film feedstock for use as a raw material in the production of new plastic film; however this equipment is relatively expensive.
- A representative from Trex stated[6] that their approach is to request that a business stockpile their plastic bales and then Trex will send out a truck to pick up the materials. This may be a problem for businesses that do not have sufficient storage space.
- Generators of shrink wrap may not be aware that this material can be recycled.

STRATEGY RECOMMENDATIONS

Strategies for increasing diversion of shrink wrap include:

- Encourage businesses to recycle their film plastic and provide information on processors that are interested in purchasing these materials. The processors prefer to purchase baled plastic. According to Trex, many businesses already have an OCC baler that could be used to bale film plastic. These businesses need to be aware of the opportunity they have.

[6] Discussion with representative of Trex, February, 1999.

- Infrastructure should be developed to recover film from large quantity generators (warehouses, distribution centers, grocers, dry cleaners) who have film from the same resin and relatively low contamination rates.
- Conduct a detailed survey to determine generator types most likely to have recoverable quantities of this material.
- Investigate capacity and demand of existing reclaimers and end users.

FERROUS SCRAP

MARKETS AND MARKET CONDITIONS

According to the waste characterization results, ferrous scrap consists of 8.9 percent of the CII waste stream. Based on the visual characterization of C&D debris, ferrous metals constitute 7.7 percent of the C&D debris. The residential sector was not considered in this discussion because relatively smaller amounts of ferrous metals are generated by this sector. The ferrous scrap in the samples of CII and C&D waste included metal steel beams, fencing and a rim for a tire. Steel beams were the most prevalent items found in the samples.

The ferrous scrap market has been depressed this year relative to years past, largely due to cheap steel imports to the US and weak markets for domestic steel products worldwide. Weakened demand for finished products means that American steel mills are not operating at full capacity. Consumption of ferrous scrap continues to decline.

While there are several companies buying scrap metal in the Wake County area, lower scrap prices are likely to be affecting the recovery and recycling rate for ferrous scrap. A list of companies accepting scrap metal in the County is included in Appendix F.

SOURCES OF ADDITIONAL SUPPLY

The sources of additional supply are the CII and C&D sectors. The infrastructure to collect scrap is largely in place. The means to collect additional metal needs to be put into place but can largely be integrated into existing collection operations, such as placement of scrap metal bins at all of the County convenience centers. Currently, there are scrap metal bins at seven of the eleven convenience centers. Based upon the results from the waste sorts, it can be concluded that most of the companies disposing of ferrous scrap are small businesses. Larger businesses seem to have a recycling infrastructure in place. One fencing company disposed of significant amounts of ferrous fencing and poles.

BARRIERS TO FURTHER DIVERSION

The main barriers to achieving further diversion of ferrous scrap are economic:

- Current depressed market conditions for ferrous metals limit the economic incentive to recycle this material. The low demand for ferrous has depressed prices.

- The costs of recovering and transporting ferrous metal to market may be higher than any revenue and disposal costs savings realized, particularly for smaller quantity generators.

STRATEGY RECOMMENDATIONS

Strategies for increasing diversion of ferrous metals include the following:

- Provide for ferrous metal collection at all of the convenience centers where space permits, as well as at the landfill and transfer stations.
- Monitor the metals disposed as the markets rebound. If metals continue to be disposed, consider a ban on disposal with the adequate infrastructure in place.
- Permit and encourage small businesses to deposit recyclables, including ferrous metal (but not trash) at the convenience centers. (Current convenience center brochures state that these centers are for use specifically by residents.)
- Encourage haulers and generators arriving at the landfill to segregate metals in their loads for deposit in drop-off containers. Emphasize that they can reduce their tipping fees by doing so.

OVERALL STRATEGY RECOMMENDATIONS

Throughout this section, several recommendations have been made to increase diversion of Wake County's solid waste from disposal. In this section, the Project Team has highlighted the recommendations offering the greatest opportunity for increasing waste diversion. These strategies were selected because of ease of implementation or likelihood to affect a large amount of materials that can be diverted. The table below summarizes the opportunities by material type.

TABLE 5-3 WAKE COUNTY MATERIAL STRATEGY RECOMMENDATIONS	
MATERIAL	STRATEGY RECOMMENDATIONS
C&D Debris	■ Develop markets (e.g. grinding of wallboard and co-composting with yard waste) ■ Facilitate source separated processing of C&D at disposal/transfer sites ■ Mandate recovery plans as part of obtaining a building permit ■ Promote C&D recovery via grant funding from DPPEA
Food Waste	■ Develop markets (e.g. animal feed) ■ Pursue grant funding for a food waste pilot project focusing on CII generators ■ Explore the expanding of existing yard waste composting programs to include food waste composting ■ Promote awareness surrounding the need to divert food waste from landfill disposal
Non-Treated Wood	■ Promote pallet recovery at landfill and transfer stations through a contract with a private pallet recycler ■ Consider a pallet ban upon providing pallet generators with technical assistance concerning source reduction and recycling alternatives ■ Increase pallet recovery capacity at the City of Raleigh yard waste composting facility
Mixed Paper and High Grades	■ Enhance the paper recycling program at Wake county schools by establishing a uniform, centrally managed system for fiber ■ Encourage the development of commercial mixed paper collection through a partnership with key suppliers ■ Promote new and revitalize existing office paper recycling programs through information and technical assistance
Old Corrugated Containers (OCC)	■ Promote more effective enforcement of the recyclable corrugated surcharge policy at the landfill ■ Establish OCC collection at all convenience centers ■ Promote the overall benefits of OCC recycling to CII generators
Old Newspapers (ONP)	■ Consider a landfill disposal ban for ONP ■ Promote the benefits of ONP recycling through cooperation with area newspapers
Post-Consumer Textiles	■ Provide collection opportunities for textiles at the convenience centers ■ Provide a collection opportunity for textiles at the Town of Cary's recyclable materials drop-off located at the transfer station ■ Create a partnership with existing post-consumer textile recyclers in the region to assess the need for additional collection infrastructure

TABLE 5-3
WAKE COUNTY MATERIAL STRATEGY RECOMMENDATIONS

MATERIAL	STRATEGY RECOMMENDATIONS
Film Plastic	■ Provide technical assistance to CII generators surround the recycling of film plastic ■ Further identify the types of generators most likely generate recoverable quantities of film plastic via additic generator-based assessments ■ Promote the location and development of a plastic f processor in or near Wake County
Ferrous Metals	■ Provide collection opportunities for ferrous scrap at convenience centers ■ With adequate collection, processing, and end- infrastructure in place, consider a ban on certain types ferrous scrap ■ Provide incentives for haulers to segregate metals from tl C&D loads

Below we provide additional strategy recommendations that address the entire waste stream rather than being material specific. The recommendations are grouped in specific categories traditionally used in addressing the diversion of materials. The recommendations are as follows:

- Policies
  - Wake County should stimulate demand for end-use products by further promoting procurement of recycled content products in the community and among state and local government agencies. This can be done through "buy recycled" policies, training procurement officers to specify recycled-content goods and elimination of artificial purchasing barriers to those goods.
  - The County should consider requiring businesses to submit waste reduction/recycling plans upon application or renewal of their business and/or privilege licenses and permits.
  - The County should consider requiring the plans for any new CII establishment or multi-family housing complex to include space to accommodate recycling.[7]
  - The County should consider enacting additional materials bans similar to the OCC ban.
- Economic incentives and financing options
  - It is the Project Team's understanding that the County has a put or pay agreement with the existing landfill operators. This means that a certain amount of waste must be disposed at the landfill. If they do not meet that goal, the County is responsible for the cost difference of the tonnage disposed and the tonnage goal. This arrangement may deter diverting materials from the landfill. However, it is assumed that the County will not have difficulty meeting the tonnage goal considering the rapid growth in the County, even accounting for additional diversion. The terms of this agreement should be revisited.
  - The County should consider a pay-as-you-throw program at the municipal level.
- Evaluation and monitoring
  - The County should develop a centralized evaluation and monitoring system for all municipal and county recycling efforts to facilitate benchmarking and program fine tuning and enhancement.
  - The County should enforce the existing landfill bans. As discussed previously in this report, it appears that the OCC ban is not being effectively enforced.

[7] Taken from: *Wake County Private and Public Waste Reduction Task Force Final Report*, June 1992

- Education strategies
  - The County Solid Waste Department should focus on working with the County schools to educate children through participation in recycling at school.
  - The County should focus on educating CII generators about opportunities to recycle.

APPENDIX A
MATERIAL CATEGORY DEFINITIONS

RW BECK

APPENDIX A
MATERIAL CATEGORY DEFINITIONS

PAPER	
Newspaper	Black and white newspaper news print including other paper normally distributed inside a newspaper such as colored advertisements, comics, fliers, tabloids.
Magazines	All magazines plus promotional materials printed on slick paper; catalogs.
High Grade Office	High grade continuous form computer paper, white paper including bond, photocopy or notebook paper and colored ledger paper primarily from offices.
Recyclable OCC and Kraft Bags	Uncoated cardboard boxes with a wavy core and not contaminated with other materials such as a wax or plastic coating wood. Includes brown paper bags.
Non-Recyclable OCC	Wax-coated, contaminated with oil, paint, blood, or other organics, or cardboard with permanently attached packing material.
Uncoated Boxboard	Uncoated chipboard boxes such as cereal, other food, and clothes boxes
Mixed Recyclable Paper	Envelopes with and without windows, egg cartons, toilet paper cores and other mixed recyclable paper. Includes books and phone books.
Non-Recyclable Paper	Paper products including waxed, plastic, metal coated paper, or wet strength paperboard; napkins, paper towels, frozen food packaging, tissues, paper plates and cups, and contaminated recyclable paper
PLASTICS	
PET #1 Containers	Clear, plastic containers coded #1.
PET (#1) Soft Drink Containers > or = 1 liter	Carbonated soft drink (CSD) bottles > or = 1 liter. CSD bottles include seltzer water and any other carbonated beverages packed in PET bottles.
PET (#1) Soft Drink Containers < 1 liter	Single serve carbonated soft drink bottles < 1 liter (24, 20, and 16 ounce bottles). CSD bottles include seltzer water and any other carbonated beverages packed in PET bottles.
PET (#1) Custom Bottles > or = 1 liter	Gatorade, Powerade, and All Sport (sports drink) bottles, detergent bottles, liquor bottles, edible oil bottles.
PET (#1) Custom Bottles < 1 liter	Single serve water bottles, Gatorade, Powerade, and All Sport (sports drink) bottles.
PET (#1) Jars and Containers	Peanut butter jars, tennis ball cans.

HDPE #2 Containers	Plastic containers such as milk jugs, shampoo bottles, and laundry detergent bottles coded #2.
HDPE (#2) Natural Bottles	Unpigmented milk, water, and juice bottles
HDPE (#2) Pigmented Bottles	Colored bottles for milk, household chemicals, laundry detergent, motor oil, and other products.
HDPE (#2) Tubs/Containers	Margarine tubs and other containers
PVC #3	
PVC (#3) Bottles	Automotive fluid bottles, shampoo bottles, household cleaning fluid bottles
PVC (#3) Tubs/Containers	Food and non-food tubs/jars
LDPE #4	
LDPE (#4) Bottles	Mustard bottles, other food bottles.
LDPE (#4) Tubs/Containers	Food, pharmaceutical, cosmetic, and toiletries containers
PP #5	
PP (#5) Bottles	Bottles for ketchup, syrup, juice.
PP (#5) Tubs/Containers	Margarine tubs, Cool Whip containers, yogurt cups
PS #6 Bottles and Containers	Cottage cheese containers, yogurt containers, pharmaceutical bottles.
Other #7 Plastic Bottles and Containers	Tropicana brand orange juice bottles, other plastic bottles and containers coded #7.
Other Plastic Products	End-user products including molded toys, extruded pipes and hoses, clothes hangers, cleaning tools and razors; and other plastic packaging.
Film Plastic	Trash bags, grocery bags, storage bags, sheet film plastic.
METALS	
Aluminum Beverage Containers	All beverage containers made from aluminum.
Ferrous Food and Beverage Containers	Food and beverage containers commonly called tin cans.
Other Ferrous Scrap	Ferrous metal besides containers, including clothes hangers, sheet metal products, pipes, miscellaneous metal scraps, and other magnetic metal items.
Other Non-Ferrous Scrap	Other aluminum scrap besides beverage containers such as aluminum dinner trays, door frames, and foil. Also includes other non-ferrous metal scrap such as brass, copper, or other non-magnetic metal.

GLASS	
Clear Glass	All clear glass food, beverage, wine, liquor and beer containers.
Green Glass	All green glass food, beverage, wine, liquor and beer containers.
Brown Glass	All brown glass food, beverage, wine, liquor and beer containers.
Other Mixed Cullet	Glass items other than food and beverage containers Includes ceramics, drinking glasses, glass plates, cooking utensils, ash trays, mirrors, perfume bottles, CRT glass, and laboratory glass.
YARD WASTE	
	Debris such as grass clippings, leaves, garden waste, brush, and trees. Yard waste does include tree stumps.
FOOD WASTE	
	Food preparation wastes, food scraps, spoiled food.
WOOD	
Treated	Wood that is painted, stained, treated for exterior use, or glued such as plywood.
Non-treated	Pallets, crates, and wood not defined as treated.
DEMOLITION/RENOVATION/CONSTRUCTION DEBRIS	
	Waste building materials including, metals, and rubble which result from construction or demolition of structures. Such waste shall also include carpets, rugs, bricks, mortar, shingles, and drywall. Wood should be sorted into the wood categories.
DURABLES	
Electrical and Household Appliances	TV's, toaster, stereos, other small appliances and electronic equipment.
Computer Equipment	Keyboards, monitors, hard drives, etc.
Other Durables/Bulky Wastes	Household furniture and mattresses.
TEXTILES AND LEATHER	
	Clothing and apparel, shop rags, blankets, shoes, leather products such as wallets, purses, belts and scrap leather.
DIAPERS	
	Adult or infant disposable diapers, clean or soiled.
RUBBER	
	Rubber tubing, mats, hose, tires and some shoes.

HHW	
HHW	Substances categorized by the U.S. Environmental Protection Agency (EPA) as: Corrosive , destroy human tissue or corrode metal; flammable, easily ignitable; toxic, poisonous; reactive, react violently when exposed to heat, sudden shock, pressure or other chemicals.
Automotive Products	
Paints and Solvent	
Pesticides, Herbicides, Fungicides	
Household Cleaners	
Lead Acid Batteries	
Other Batteries	
Other HHM	
Light Bulbs	Fluorescent, incandescent, and HID
SHARPS	
	Hypodermic needles.
OTHER	
Other Organic	Organic materials not classified as part of the other organic material categories.
Other Inorganic	Inorganic materials not classified as part of the other inorganic material categories.
Other	Please specify.

APPENDIX B
DETAILED SORT RESULTS

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COMBINED TWO SEASON SORT RESULTS

R·W·BECK

Wake County
Summer and Fall 1998 - Combined MSW

Sample Size =	100	loads
Total Wt Sorted =	22,454	pounds
Avg Wt per Sample =	225	pounds
Est. Tons Disposed/2 Weeks	16,436	tons/2 weeks

WASTE CATEGORIES / Material	Mean Percentage		Estimated Tons per Material	
PAPER	34.1%		5,599	
Newspaper		5.7%		938
Magazines		2.4%		387
High Grade/ Office		3.5%		572
Recyclable OCC and Kraft Bags		5.9%		971
Non-Recyclable OCC		1.3%		209
Uncoated Boxboard		2.1%		352
Mixed Recyc Paper		4.1%		676
Non-Recyclable Paper		9.1%		1492
PLASTIC	12.9%		2,113	
#1 PET Soft Drink Cont. >or= 1 liter		0.3%		42
#1 PET Soft Drink Cont. < 1 liter		0.2%		41
#1 PET Custom Bottles. >or= 1 liter		0.1%		16
#1 PET Custom Bottles. < 1 liter		0.2%		27
#1 PET Jar and Cont.		0.0%		8
#1 PET Subtotal		0.8%		134
#2 HDPE Natural Bottles		0.3%		55
#2 HDPE Pigmented Bottles		0.3%		41
#2 HDPE Tubs/Cont.		0.2%		31
#2 HDPE Subtotal		0.8%		128
#3 PVC Bottles		0.0%		3
#3 PVC Tubs/Cont.		0.0%		2
#3 PVC Subtotal		0.0%		5
#4 LDPE Bottles		0.0%		0
#4 LDPE Tubs/Cont.		0.0%		0
#4 LDPE Subtotal		0.0%		0
#5 PP Bottles		0.0%		2
#5 PP Tubs/Cont.		0.1%		13
#5 PP Subtotal		0.1%		16
#6 PS Bottles/Cont.		0.0%		5
#7 Other Plastic Bottles/Cont.		0.0%		4
Other Plastic Products		5.5%		901
Film/Wrap/Bags		5.6%		921
METAL	5.9%		975	
Aluminum Beverage Containers		0.5%		88
Ferrous Food		0.9%		155
Other Ferrous Scrap		3.5%		580
Other Non-Ferrous Scrap		0.9%		153
GLASS	3.2%		523	
Clear		1.5%		241
Green		0.5%		81
Blue		0.0%		1
Brown		1.0%		159
Other Mixed Cullet		0.3%		41
HHM	0.5%		79	
Automotive Products		0.2%		26
Paints and Solvents		0.0%		6
Pesticides, Herbicides & Fungicides		0.0%		1
Household Cleaners		0.1%		16
Batteries (lead -acid)		0.0%		1
Batteries (other)		0.1%		17
Other (HHM containers w/prod inside)		0.0%		4
Light Bulbs		0.0%		7
YARD WASTE	1.8%		295	
Yard Waste		1.8%		295
FOOD WASTE	12.1%		1,984	
Food Waste		12.1%		1984
WOOD	10.3%		1698	
Non-Treated Wood		5.9%		972
Treated Wood		4.4%		726
C&D DEBRIS	6.3%		1043	
C&D Debris		6.3%		1043
DURABLES	4.1%		682	
All Electrical and Household Appl.		1.0%		169
Computer Equipment		0.8%		137
Other Durables		2.3%		376
TEXTILES	2.9%		480	
Textiles and Leather		2.9%		480
DIAPERS	2.2%		369	
Diapers		2.2%		369
RUBBER	0.3%		47	
Rubber		0.3%		47
SHARPS	0.0%		0	
Sharps		0.0%		0
OTHER ORGANIC	1.5%		254	
Other Organic		1.5%		254
OTHER INORGANIC	1.7%		281	
Other Inorganic		1.7%		281
OTHER	0.1%		12	
Other		0.1%		12
TOTAL PERCENT	100.0%	TOTAL TONS	16,436	

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Wake County
Summer and Fall 1998 - Combined Solid Waste

Sample Size =	100	loads
Total Wt Sorted =	22,454	pounds
Avg Wt per Sample =	225	pounds
Est. Tons Disposed/2 Weeks	19,872	tons/2 weeks

WASTE CATEGORIES	Material	Mean Percentage		Estimated Tons per Material	
PAPER		28.2%		5,599	
	Newspaper		4.7%		938
	Magazines		1.9%		387
	High Grade/ Office		2.9%		572
	Recyclable OCC and Kraft Bags		4.9%		971
	Non-Recyclable OCC		1.1%		209
	Uncoated Boxboard		1.8%		352
	Mixed Recyc Paper		3.4%		676
	Non-Recyclable Paper		7.5%		1,492
PLASTIC		10.6%		2,113	
	#1 PET Soft Drink Cont. >or= 1 liter		0.2%		42
	#1 PET Soft Drink Cont. < 1 liter		0.2%		41
	#1 PET Custom Bottles. >or= 1 liter		0.1%		16
	#1 PET Custom Bottles. < 1 liter		0.1%		27
	#1 PET Jar and Cont.		0.0%		8
	#1 PET Subtotal		0.7%		134
	#2 HDPE Natural Bottles		0.3%		55
	#2 HDPE Pigmented Bottles		0.2%		41
	#2 HDPE Tubs/Cont.		0.2%		31
	#2 HDPE Subtotal		0.6%		128
	#3 PVC Bottles		0.0%		3
	#3 PVC Tubs/Cont.		0.0%		2
	#3 PVC Subtotal		0.0%		5
	#4 LDPE Bottles		0.0%		0
	#4 LDPE Tubs/Cont.		0.0%		0
	#4 LDPE Subtotal		0.0%		0
	#5 PP Bottles		0.0%		2
	#5 PP Tubs/Cont.		0.1%		13
	#5 PP Subtotal		0.1%		16
	#6 PS Bottles/Cont.		0.0%		5
	#7 Other Plastic Bottles/Cont.		0.0%		4
	Other Plastic Products		4.5%		901
	Film/Wrap/Bags		4.6%		921
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	Aluminum Beverage Containers		0.4%		88
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	Clear		1.2%		241
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	Blue		0.0%		1
	Brown		0.8%		159
	Other Mixed Cullet		0.2%		41
HHM		0.4%		79	
	Automotive Products		0.1%		26
	Paints and Solvents		0.0%		6
	Pesticides, Herbicides & Fungicides		0.0%		1
	Household Cleaners		0.1%		16
	Batteries (lead -acid)		0.0%		1
	Batteries (other)		0.1%		17
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	Light Bulbs		0.0%		7
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	Yard Waste		1.5%		295
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	Food Waste		10.0%		1,984
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	Non-Treated Wood		4.9%		972
	Treated Wood		3.7%		726
C&D DEBRIS		22.5%		4,479	
	C&D Debris		22.5%		4,479
DURABLES		3.4%		682	
	All Electrical and Household Appl.		0.8%		169
	Computer Equipment		0.7%		137
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TEXTILES		2.4%		480	
	Textiles and Leather		2.4%		480
DIAPERS		1.9%		369	
	Diapers		1.9%		369
RUBBER		0.2%		47	
	Rubber		0.2%		47
SHARPS		0.0%		0	
	Sharps		0.0%		0
OTHER ORGANIC		1.3%		254	
	Other Organic		1.3%		254
OTHER INORGANIC		1.4%		281	
	Other Inorganic		1.4%		281
OTHER		0.1%		12	
	Other		0.1%		12
	TOTAL PERCENT	100.0%	TOTAL TONS	19,872	

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Wake County
Summer and Fall 1998 - Residential

Sample Size =	35	loads
Total Wt Sorted =	7,649	pounds
Avg Wt per Sample =	219	pounds

WASTE CATEGORIES Material	Mean Percentage		90% Confidence Interval (%) Lower	Upper
PAPER	33.3%		27.2%	39.6%
Newspaper		7.3%	5.3%	9.4%
Magazines		3.2%	2.2%	4.4%
High Grade/ Office		2.3%	1.6%	3.2%
Recyclable OCC and Kraft Bags		3.7%	2.8%	4.6%
Non-Recyclable OCC		0.5%	0.3%	0.8%
Uncoated Boxboard		2.5%	1.8%	3.3%
Mixed Recyc Paper		5.3%	4.0%	6.9%
Non-Recyclable Paper		8.5%	6.6%	10.6%
PLASTIC	10.4%		8.8%	12.0%
#1 PET Soft Drink Cont. >or= 1 liter		0.3%	0.2%	0.4%
#1 PET Soft Drink Cont. < 1 liter		0.3%	0.2%	0.3%
#1 PET Custom Bottles. >or= 1 liter		0.1%	0.1%	0.2%
#1 PET Custom Bottles. < 1 liter		0.2%	0.2%	0.3%
#1 PET Jar and Cont.		0.1%	0.0%	0.1%
#1 PET Subtotal		1.0%	0.7%	1.2%
#2 HDPE Natural Bottles		0.5%	0.3%	0.6%
#2 HDPE Pigmented Bottles		0.4%	0.3%	0.5%
#2 HDPE Tubs/Cont.		0.2%	0.1%	0.4%
#2 HDPE Subtotal		1.0%	0.8%	1.4%
#3 PVC Bottles		0.0%	0.0%	0.1%
#3 PVC Tubs/Cont.		0.0%	0.0%	0.0%
#3 PVC Subtotal		0.0%	0.0%	0.1%
#4 LDPE Bottles		0.0%	0.0%	0.0%
#4 LDPE Tubs/Cont.		0.0%	0.0%	0.0%
#4 LDPE Subtotal		0.0%	0.0%	0.0%
#5 PP Bottles		0.0%	0.0%	0.0%
#5 PP Tubs/Cont.		0.1%	0.1%	0.2%
#5 PP Subtotal		0.2%	0.1%	0.2%
#6 PS Bottles/Cont.		0.1%	0.0%	0.1%
#7 Other Plastic Bottles/Cont.		0.1%	0.0%	0.1%
Other Plastic Products		4.1%	3.2%	5.0%
Film/Wrap/Bags		4.0%	3.0%	5.1%
METAL	5.8%		4.3%	7.5%
Aluminum Beverage Containers		0.5%	0.4%	0.7%
Ferrous Food		1.1%	0.8%	1.4%
Other Ferrous Scrap		3.4%	2.0%	5.2%
Other Non-Ferrous Scrap		0.7%	0.5%	1.0%
GLASS	4.1%		3.0%	5.4%
Clear		1.6%	1.1%	2.2%
Green		0.7%	0.4%	1.1%
Blue		0.0%	0.0%	0.0%
Brown		1.3%	0.8%	2.0%
Other Mixed Cullet		0.4%	0.3%	0.6%
HHM	0.5%		0.3%	0.6%
Automotive Products		0.1%	0.0%	0.2%
Paints and Solvents		0.1%	0.0%	0.1%
Pesticides, Herbicides & Fungicides		0.0%	0.0%	0.0%
Household Cleaners		0.2%	0.1%	0.3%
Batteries (lead -acid)		0.0%	0.0%	0.0%
Batteries (other)		0.1%	0.0%	0.1%
Other (HHM containers w/prod inside)		0.0%	0.0%	0.1%
Light Bulbs		0.0%	0.0%	0.0%
YARD WASTE	3.3%		1.9%	4.9%
Yard Waste		3.3%	1.9%	4.9%
FOOD WASTE	11.6%		8.7%	14.6%
Food Waste		11.6%	8.7%	14.6%
WOOD	9.5%		5.2%	15.0%
Non-Treated Wood		2.8%	1.4%	4.6%
Treated Wood		6.8%	3.6%	10.8%
C&D DEBRIS	6.8%		3.4%	11.2%
C&D Debris		6.8%	3.4%	11.2%
DURABLES	3.6%		2.0%	5.7%
All Electrical and Household Appl.		1.6%	0.9%	2.5%
Computer Equipment		0.1%	0.0%	0.2%
Other Durables		1.9%	0.8%	3.5%
TEXTILES	4.7%		3.1%	6.7%
Textiles and Leather		4.7%	3.1%	6.7%
DIAPERS	3.1%		2.1%	4.2%
Diapers		3.1%	2.1%	4.2%
RUBBER	0.3%		0.2%	0.4%
Rubber		0.3%	0.2%	0.4%
SHARPS	0.0%		0.0%	0.0%
Sharps		0.0%	0.0%	0.0%
OTHER ORGANIC	1.3%		0.9%	1.7%
Other Organic		1.3%	0.9%	1.7%
OTHER INORGANIC	1.8%		0.9%	2.9%
Other Inorganic		1.8%	0.9%	2.9%
OTHER	0.2%		0.1%	0.4%
Other		0.2%	0.1%	0.4%
TOTAL PERCENT	100.0%			

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Wake County
Summer and Fall 1998 - Residential - Multi-Family

Sample Size =	7	loads
Total Wt Sorted =	1,449	pounds
Avg Wt per Sample =	207	pounds

WASTE CATEGORIES Material	Mean Percentage		90% Confidence Interval (%) Lower	Upper
PAPER	37.1%		32.0%	42.3%
Newspaper		10.4%	6.5%	15.1%
Magazines		2.9%	2.1%	3.7%
High Grade/ Office		3.8%	1.4%	7.1%
Recyclable OCC and Kraft Bags		4.2%	2.1%	6.9%
Non-Recyclable OCC		0.4%	0.1%	0.8%
Uncoated Boxboard		2.7%	1.1%	4.8%
Mixed Recyc Paper		5.3%	3.5%	7.3%
Non-Recyclable Paper		7.6%	5.8%	9.6%
PLASTIC	11.1%		9.0%	13.4%
#1 PET Soft Drink Cont. >or= 1 liter		0.4%	0.1%	0.6%
#1 PET Soft Drink Cont. < 1 liter		0.2%	0.1%	0.4%
#1 PET Custom Bottles. >or= 1 liter		0.2%	0.1%	0.4%
#1 PET Custom Bottles. < 1 liter		0.3%	0.1%	0.5%
#1 PET Jar and Cont.		0.1%	0.0%	0.3%
#1 PET Subtotal		1.1%	0.6%	1.7%
#2 HDPE Natural Bottles		0.5%	0.3%	0.8%
#2 HDPE Pigmented Bottles		0.6%	0.4%	0.7%
#2 HDPE Tubs/Cont.		0.6%	0.1%	1.7%
#2 HDPE Subtotal		1.6%	0.8%	2.8%
#3 PVC Bottles		0.1%	0.0%	0.2%
#3 PVC Tubs/Cont.		0.0%	0.0%	0.0%
#3 PVC Subtotal		0.1%	0.0%	0.2%
#4 LDPE Bottles		0.0%	0.0%	0.0%
#4 LDPE Tubs/Cont.		0.0%	0.0%	0.0%
#4 LDPE Subtotal		0.0%	0.0%	0.0%
#5 PP Bottles		0.0%	0.0%	0.1%
#5 PP Tubs/Cont.		0.1%	0.0%	0.3%
#5 PP Subtotal		0.2%	0.0%	0.3%
#6 PS Bottles/Cont.		0.1%	0.0%	0.1%
#7 Other Plastic Bottles/Cont.		0.1%	0.0%	0.2%
Other Plastic Products		4.0%	3.2%	4.8%
Film/Wrap/Bags		4.1%	2.8%	5.6%
METAL	3.7%		2.5%	5.1%
Aluminum Beverage Containers		0.7%	0.4%	0.9%
Ferrous Food		1.2%	0.7%	1.7%
Other Ferrous Scrap		1.4%	0.4%	2.9%
Other Non-Ferrous Scrap		0.5%	0.3%	0.7%
GLASS	7.8%		4.8%	11.5%
Clear		2.4%	1.4%	3.8%
Green		1.1%	0.5%	2.0%
Blue		0.0%	0.0%	0.0%
Brown		3.5%	1.1%	7.3%
Other Mixed Cullet		0.7%	0.2%	1.5%
HHM	0.4%		0.1%	0.8%
Automotive Products		0.0%	0.0%	0.0%
Paints and Solvents		0.0%	0.0%	0.0%
Pesticides, Herbicides & Fungicides		0.0%	0.0%	0.1%
Household Cleaners		0.3%	0.1%	0.6%
Batteries (lead -acid)		0.0%	0.0%	0.0%
Batteries (other)		0.0%	0.0%	0.1%
Other (HHM containers w/prod inside)		0.1%	0.0%	0.2%
Light Bulbs		0.0%	0.0%	0.0%
YARD WASTE	4.6%		1.1%	10.3%
Yard Waste		4.6%	1.1%	10.3%
FOOD WASTE	12.3%		8.1%	17.1%
Food Waste		12.3%	8.1%	17.1%
WOOD	2.2%		0.1%	6.9%
Non-Treated Wood		0.1%	0.0%	0.2%
Treated Wood		2.2%	0.1%	6.9%
C&D DEBRIS	5.9%		0.1%	19.7%
C&D Debris		5.9%	0.1%	19.7%
DURABLES	1.4%		0.1%	3.9%
All Electrical and Household Appl.		1.4%	0.1%	3.9%
Computer Equipment		0.0%	0.0%	0.0%
Other Durables		0.0%	0.0%	0.0%
TEXTILES	6.2%		2.9%	10.5%
Textiles and Leather		6.2%	2.9%	10.5%
DIAPERS	2.9%		0.9%	6.1%
Diapers		2.9%	0.9%	6.1%
RUBBER	0.3%		0.0%	0.7%
Rubber		0.3%	0.0%	0.7%
SHARPS	0.0%		0.0%	0.0%
Sharps		0.0%	0.0%	0.0%
OTHER ORGANIC	1.4%		0.8%	2.1%
Other Organic		1.4%	0.8%	2.1%
OTHER INORGANIC	2.9%		0.4%	7.6%
Other Inorganic		2.9%	0.4%	7.6%
OTHER	0.0%		0.0%	0.0%
Other		0.0%	0.0%	0.0%
TOTAL PERCENT	100.0%			

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Wake County
Summer and Fall 1998 - Residential - Single Family

Sample Size =	20	loads
Total Wt Sorted =	4,321	pounds
Avg Wt per Sample =	216	pounds

WASTE CATEGORIES Material	Mean Percentage		90% Confidence Interval (%) Lower	Upper
PAPER	41.0%		36.3%	45.8%
Newspaper		8.6%	6.7%	10.6%
Magazines		4.5%	3.1%	6.1%
High Grade/ Office		2.3%	1.5%	3.2%
Recyclable OCC and Kraft Bags		3.8%	2.9%	4.8%
Non-Recyclable OCC		0.7%	0.3%	1.3%
Uncoated Boxboard		3.2%	2.6%	3.9%
Mixed Recyc Paper		6.7%	5.1%	8.5%
Non-Recyclable Paper		11.4%	10.0%	12.8%
PLASTIC	12.2%		11.1%	13.3%
#1 PET Soft Drink Cont. >or= 1 liter		0.4%	0.3%	0.5%
#1 PET Soft Drink Cont. < 1 liter		0.4%	0.3%	0.5%
#1 PET Custom Bottles. >or= 1 liter		0.1%	0.1%	0.2%
#1 PET Custom Bottles. < 1 liter		0.3%	0.2%	0.4%
#1 PET Jar and Cont.		0.1%	0.0%	0.1%
#1 PET Subtotal		1.2%	1.0%	1.5%
#2 HDPE Natural Bottles		0.5%	0.4%	0.7%
#2 HDPE Pigmented Bottles		0.4%	0.3%	0.5%
#2 HDPE Tubs/Cont.		0.2%	0.1%	0.3%
#2 HDPE Subtotal		1.1%	0.9%	1.3%
#3 PVC Bottles		0.0%	0.0%	0.0%
#3 PVC Tubs/Cont.		0.0%	0.0%	0.0%
#3 PVC Subtotal		0.0%	0.0%	0.1%
#4 LDPE Bottles		0.0%	0.0%	0.0%
#4 LDPE Tubs/Cont.		0.0%	0.0%	0.0%
#4 LDPE Subtotal		0.0%	0.0%	0.0%
#5 PP Bottles		0.0%	0.0%	0.0%
#5 PP Tubs/Cont.		0.2%	0.1%	0.3%
#5 PP Subtotal		0.2%	0.1%	0.3%
#6 PS Bottles/Cont.		0.1%	0.0%	0.1%
#7 Other Plastic Bottles/Cont.		0.1%	0.0%	0.1%
Other Plastic Products		4.2%	3.1%	5.4%
Film/Wrap/Bags		5.2%	4.4%	6.2%
METAL	7.0%		4.5%	10.0%
Aluminum Beverage Containers		0.6%	0.5%	0.8%
Ferrous Food		1.4%	1.2%	1.7%
Other Ferrous Scrap		4.1%	1.9%	7.3%
Other Non-Ferrous Scrap		0.8%	0.5%	1.1%
GLASS	4.1%		3.1%	5.3%
Clear		1.9%	1.3%	2.5%
Green		0.8%	0.4%	1.3%
Blue		0.0%	0.0%	0.0%
Brown		1.1%	0.6%	1.7%
Other Mixed Cullet		0.4%	0.2%	0.6%
HHM	0.6%		0.4%	0.8%
Automotive Products		0.1%	0.1%	0.3%
Paints and Solvents		0.0%	0.0%	0.1%
Pesticides, Herbicides & Fungicides		0.0%	0.0%	0.0%
Household Cleaners		0.2%	0.1%	0.3%
Batteries (lead -acid)		0.0%	0.0%	0.0%
Batteries (other)		0.1%	0.1%	0.2%
Other (HHM containers w/prod inside)		0.0%	0.0%	0.1%
Light Bulbs		0.0%	0.0%	0.0%
YARD WASTE	4.1%		2.2%	6.6%
Yard Waste		4.1%	2.2%	6.6%
FOOD WASTE	14.6%		11.9%	17.5%
Food Waste		14.6%	11.9%	17.5%
WOOD	2.1%		1.1%	4.7%
Non-Treated Wood		1.0%	0.3%	2.0%
Treated Wood		1.1%	0.4%	1.9%
C&D DEBRIS	1.0%		0.4%	1.9%
C&D Debris		1.0%	0.4%	1.9%
DURABLES	2.9%		1.3%	4.9%
All Electrical and Household Appl.		1.8%	0.7%	3.4%
Computer Equipment		0.1%	0.0%	0.3%
Other Durables		0.9%	0.3%	1.9%
TEXTILES	2.4%		1.7%	3.2%
Textiles and Leather		2.4%	1.7%	3.2%
DIAPERS	4.2%		3.0%	5.5%
Diapers		4.2%	3.0%	5.5%
RUBBER	0.3%		0.1%	0.4%
Rubber		0.3%	0.1%	0.4%
SHARPS	0.0%		0.0%	0.0%
Sharps		0.0%	0.0%	0.0%
OTHER ORGANIC	1.6%		1.1%	2.1%
Other Organic		1.6%	1.1%	2.1%
OTHER INORGANIC	1.7%		0.6%	3.4%
Other Inorganic		1.7%	0.6%	3.4%
OTHER	0.4%		0.1%	0.8%
Other		0.4%	0.1%	0.8%
TOTAL PERCENT	100.0%			

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Wake County
Summer and Fall 1998 - Residential - Convenience Centers

Sample Size =	5	loads
Total Wt Sorted =	1,198	pounds
Avg Wt per Sample =	240	pounds

WASTE CATEGORIES Material	Mean Percentage		90% Confidence Interval (%) Lower	Upper
PAPER	4.8%		0.0%	18.0%
Newspaper		0.2%	0.0%	1.0%
Magazines		0.1%	0.0%	0.3%
High Grade/ Office		0.1%	0.0%	0.4%
Recyclable OCC and Kraft Bags		3.6%	0.0%	14.8%
Non-Recyclable OCC		0.0%	0.0%	0.0%
Uncoated Boxboard		0.0%	0.0%	0.2%
Mixed Recyc Paper		0.2%	0.0%	0.9%
Non-Recyclable Paper		0.6%	0.0%	2.9%
PLASTIC	4.3%		0.0%	16.1%
#1 PET Soft Drink Cont. >or= 1 liter		0.0%	0.0%	0.1%
#1 PET Soft Drink Cont. < 1 liter		0.0%	0.0%	0.2%
#1 PET Custom Bottles. >or= 1 liter		0.0%	0.0%	0.0%
#1 PET Custom Bottles. < 1 liter		0.0%	0.0%	0.1%
#1 PET Jar and Cont.		0.0%	0.0%	0.0%
#1 PET Subtotal		0.1%	0.0%	0.4%
#2 HDPE Natural Bottles		0.0%	0.0%	0.0%
#2 HDPE Pigmented Bottles		0.1%	0.0%	0.3%
#2 HDPE Tubs/Cont.		0.0%	0.0%	0.0%
#2 HDPE Subtotal		0.1%	0.0%	0.3%
#3 PVC Bottles		0.0%	0.0%	0.0%
#3 PVC Tubs/Cont.		0.0%	0.0%	0.0%
#3 PVC Subtotal		0.0%	0.0%	0.0%
#4 LDPE Bottles		0.0%	0.0%	0.0%
#4 LDPE Tubs/Cont.		0.0%	0.0%	0.0%
#4 LDPE Subtotal		0.0%	0.0%	0.0%
#5 PP Bottles		0.0%	0.0%	0.0%
#5 PP Tubs/Cont.		0.0%	0.0%	0.0%
#5 PP Subtotal		0.0%	0.0%	0.0%
#6 PS Bottles/Cont.		0.0%	0.0%	0.0%
#7 Other Plastic Bottles/Cont.		0.0%	0.0%	0.0%
Other Plastic Products		3.9%	0.0%	15.5%
Film/Wrap/Bags		0.3%	0.0%	1.2%
METAL	5.9%		0.0%	21.7%
Aluminum Beverage Containers		0.3%	0.0%	1.4%
Ferrous Food		0.2%	0.0%	1.0%
Other Ferrous Scrap		5.2%	0.0%	21.3%
Other Non-Ferrous Scrap		0.3%	0.0%	1.4%
GLASS	0.6%		0.0%	3.0%
Clear		0.1%	0.0%	0.5%
Green		0.1%	0.0%	0.7%
Blue		0.0%	0.0%	0.0%
Brown		0.2%	0.0%	0.8%
Other Mixed Cullet		0.2%	0.0%	1.1%
HHM	0.1%		0.0%	0.7%
Automotive Products		0.1%	0.0%	0.7%
Paints and Solvents		0.0%	0.0%	0.0%
Pesticides, Herbicides & Fungicides		0.0%	0.0%	0.0%
Household Cleaners		0.0%	0.0%	0.0%
Batteries (lead -acid)		0.0%	0.0%	0.0%
Batteries (other)		0.0%	0.0%	0.0%
Other (HHM containers w/prod inside)		0.0%	0.0%	0.0%
Light Bulbs		0.0%	0.0%	0.0%
YARD WASTE	0.0%		0.0%	0.0%
Yard Waste		0.0%	0.0%	0.0%
FOOD WASTE	0.7%		0.0%	3.1%
Food Waste		0.7%	0.0%	3.1%
WOOD	41.8%		1.0%	93.1%
Non-Treated Wood		9.6%	0.0%	37.6%
Treated Wood		32.2%	0.4%	82.6%
C&D DEBRIS	24.6%		0.1%	71.1%
C&D Debris		24.6%	0.1%	71.1%
DURABLES	11.6%		0.0%	47.7%
All Electrical and Household Appl.		1.6%	0.0%	8.6%
Computer Equipment		0.2%	0.0%	0.9%
Other Durables		9.9%	0.0%	43.2%
TEXTILES	4.5%		0.0%	19.5%
Textiles and Leather		4.5%	0.0%	19.5%
DIAPERS	0.1%		0.0%	0.3%
Diapers		0.1%	0.0%	0.3%
RUBBER	0.4%		0.0%	1.9%
Rubber		0.4%	0.0%	1.9%
SHARPS	0.0%		0.0%	0.0%
Sharps		0.0%	0.0%	0.0%
OTHER ORGANIC	0.2%		0.0%	1.0%
Other Organic		0.2%	0.0%	1.0%
OTHER INORGANIC	0.4%		0.0%	2.5%
Other Inorganic		0.4%	0.0%	2.5%
OTHER	0.0%		0.0%	0.0%
Other		0.0%	0.0%	0.0%
TOTAL PERCENT	100.0%			

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Wake County
Summer and Fall 1998 - ICI

Sample Size =	49	loads
Total Wt Sorted =	11,314	pounds
Avg Wt per Sample =	231	pounds

WASTE CATEGORIES Material	Mean Percentage		90% Confidence Interval (%) Lower	Upper
PAPER	**24.1%**		**18.8%**	**29.3%**
Newspaper		1.5%	1.0%	2.2%
Magazines		1.0%	0.6%	1.5%
High Grade/ Office		4.2%	2.7%	6.1%
Recyclable OCC and Kraft Bags		7.7%	5.7%	10.1%
Non-Recyclable OCC		0.8%	0.4%	1.4%
Uncoated Boxboard		1.3%	0.8%	1.8%
Mixed Recyc Paper		2.0%	1.4%	2.8%
Non-Recyclable Paper		5.5%	3.8%	7.5%
PLASTIC	**13.9%**		**10.3%**	**18.0%**
#1 PET Soft Drink Cont. >or= 1 liter		0.0%	0.0%	0.1%
#1 PET Soft Drink Cont. < 1 liter		0.2%	0.1%	0.2%
#1 PET Custom Bottles. >or= 1 liter		0.0%	0.0%	0.0%
#1 PET Custom Bottles. < 1 liter		0.1%	0.1%	0.1%
#1 PET Jar and Cont.		0.0%	0.0%	0.0%
#1 PET Subtotal		0.3%	0.2%	0.4%
#2 HDPE Natural Bottles		0.2%	0.1%	0.2%
#2 HDPE Pigmented Bottles		0.1%	0.1%	0.2%
#2 HDPE Tubs/Cont.		0.1%	0.1%	0.2%
#2 HDPE Subtotal		0.4%	0.2%	0.5%
#3 PVC Bottles		0.0%	0.0%	0.0%
#3 PVC Tubs/Cont.		0.0%	0.0%	0.0%
#3 PVC Subtotal		0.0%	0.0%	0.0%
#4 LDPE Bottles		0.0%	0.0%	0.0%
#4 LDPE Tubs/Cont.		0.0%	0.0%	0.0%
#4 LDPE Subtotal		0.0%	0.0%	0.0%
#5 PP Bottles		0.0%	0.0%	0.0%
#5 PP Tubs/Cont.		0.0%	0.0%	0.1%
#5 PP Subtotal		0.1%	0.0%	0.1%
#6 PS Bottles/Cont.		0.0%	0.0%	0.0%
#7 Other Plastic Bottles/Cont.		0.0%	0.0%	0.0%
Other Plastic Products		7.3%	4.9%	10.2%
Film/Wrap/Bags		5.9%	4.2%	7.8%
METAL	**9.9%**		**6.2%**	**14.3%**
Aluminum Beverage Containers		0.3%	0.2%	0.4%
Ferrous Food		0.4%	0.2%	0.6%
Other Ferrous Scrap		8.9%	5.2%	13.5%
Other Non-Ferrous Scrap		0.3%	0.2%	0.4%
GLASS	**1.5%**		**0.9%**	**2.2%**
Clear		0.6%	0.4%	0.9%
Green		0.2%	0.1%	0.3%
Blue		0.0%	0.0%	0.0%
Brown		0.5%	0.3%	0.9%
Other Mixed Cullet		0.1%	0.1%	0.2%
HHM	**0.4%**		**0.2%**	**0.7%**
Automotive Products		0.3%	0.2%	0.5%
Paints and Solvents		0.1%	0.0%	0.1%
Pesticides, Herbicides & Fungicides		0.0%	0.0%	0.0%
Household Cleaners		0.0%	0.0%	0.0%
Batteries (lead -acid)		0.0%	0.0%	0.0%
Batteries (other)		0.0%	0.0%	0.0%
Other (HHM containers w/prod inside)		0.0%	0.0%	0.0%
Light Bulbs		0.0%	0.0%	0.1%
YARD WASTE	**0.9%**		**0.5%**	**1.5%**
Yard Waste		0.9%	0.5%	1.5%
FOOD WASTE	**6.9%**		**4.3%**	**10.0%**
Food Waste		6.9%	4.3%	10.0%
WOOD	**23.3%**		**15.3%**	**32.3%**
Non-Treated Wood		18.2%	11.2%	26.5%
Treated Wood		5.1%	3.0%	7.7%
C&D DEBRIS	**9.6%**		**4.9%**	**15.5%**
C&D Debris		9.6%	4.9%	15.5%
DURABLES	**2.7%**		**0.8%**	**2.5%**
All Electrical and Household Appl.		0.3%	0.2%	0.5%
Computer Equipment		0.7%	0.4%	1.2%
Other Durables		1.7%	0.8%	2.8%
TEXTILES	**0.9%**		**0.3%**	**0.9%**
Textiles and Leather		0.9%	0.5%	1.3%
DIAPERS	**0.6%**		**0.3%**	**1.0%**
Diapers		0.6%	0.3%	1.0%
RUBBER	**0.5%**		**0.2%**	**0.5%**
Rubber		0.5%	0.3%	0.7%
SHARPS	**0.0%**		**0.0%**	**0.0%**
Sharps		0.0%	0.0%	0.0%
OTHER ORGANIC	**2.6%**		**0.3%**	**1.0%**
Other Organic		2.6%	1.1%	4.7%
OTHER INORGANIC	**2.2%**		**0.3%**	**1.0%**
Other Inorganic		2.2%	1.1%	3.8%
OTHER	**0.0%**		**0.0%**	**0.0%**
Other		0.0%	0.0%	0.0%
TOTAL PERCENT	**100.0%**			

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Wake County
Summer and Fall 1998 - ICI - Commercial

Sample Size =	32	loads
Total Wt Sorted =	7,030	pounds
Avg Wt per Sample =	220	pounds

WASTE CATEGORIES Material	Mean Percentage		90% Confidence Interval (%) Lower	Upper
PAPER	29.8%		23.9%	36.1%
Newspaper		2.2%	1.4%	3.3%
Magazines		1.4%	0.7%	2.3%
High Grade/ Office		5.4%	3.4%	7.8%
Recyclable OCC and Kraft Bags		8.1%	5.9%	10.6%
Non-Recyclable OCC		1.3%	0.6%	2.3%
Uncoated Boxboard		1.9%	1.2%	2.7%
Mixed Recyc Paper		2.6%	1.8%	3.5%
Non-Recyclable Paper		7.0%	4.7%	9.7%
PLASTIC	15.0%		11.6%	18.6%
#1 PET Soft Drink Cont. >or= 1 liter		0.1%	0.0%	0.1%
#1 PET Soft Drink Cont. < 1 liter		0.2%	0.1%	0.3%
#1 PET Custom Bottles. >or= 1 liter		0.0%	0.0%	0.0%
#1 PET Custom Bottles. < 1 liter		0.1%	0.1%	0.2%
#1 PET Jar and Cont.		0.0%	0.0%	0.0%
#1 PET Subtotal		0.4%	0.3%	0.6%
#2 HDPE Natural Bottles		0.2%	0.1%	0.4%
#2 HDPE Pigmented Bottles		0.1%	0.1%	0.2%
#2 HDPE Tubs/Cont.		0.1%	0.1%	0.2%
#2 HDPE Subtotal		0.5%	0.3%	0.7%
#3 PVC Bottles		0.0%	0.0%	0.0%
#3 PVC Tubs/Cont.		0.0%	0.0%	0.0%
#3 PVC Subtotal		0.0%	0.0%	0.0%
#4 LDPE Bottles		0.0%	0.0%	0.0%
#4 LDPE Tubs/Cont.		0.0%	0.0%	0.0%
#4 LDPE Subtotal		0.0%	0.0%	0.0%
#5 PP Bottles		0.0%	0.0%	0.0%
#5 PP Tubs/Cont.		0.1%	0.0%	0.1%
#5 PP Subtotal		0.1%	0.0%	0.1%
#6 PS Bottles/Cont.		0.0%	0.0%	0.1%
#7 Other Plastic Bottles/Cont.		0.0%	0.0%	0.0%
Other Plastic Products		7.4%	5.3%	9.9%
Film/Wrap/Bags		6.5%	4.6%	8.7%
METAL	8.1%		5.3%	11.4%
Aluminum Beverage Containers		0.4%	0.3%	0.6%
Ferrous Food		0.6%	0.3%	0.9%
Other Ferrous Scrap		6.7%	3.8%	10.2%
Other Non-Ferrous Scrap		0.4%	0.2%	0.6%
GLASS	2.2%		1.3%	3.4%
Clear		0.9%	0.5%	1.4%
Green		0.3%	0.1%	0.6%
Blue		0.0%	0.0%	0.0%
Brown		0.8%	0.4%	1.4%
Other Mixed Cullet		0.1%	0.1%	0.2%
HHM	0.6%		0.3%	1.0%
Automotive Products		0.5%	0.2%	0.9%
Paints and Solvents		0.1%	0.0%	0.1%
Pesticides, Herbicides & Fungicides		0.0%	0.0%	0.0%
Household Cleaners		0.0%	0.0%	0.0%
Batteries (lead -acid)		0.0%	0.0%	0.0%
Batteries (other)		0.0%	0.0%	0.0%
Other (HHM containers w/prod inside)		0.0%	0.0%	0.1%
Light Bulbs		0.0%	0.0%	0.0%
YARD WASTE	1.4%		0.6%	2.6%
Yard Waste		1.4%	0.6%	2.6%
FOOD WASTE	10.0%		6.0%	14.9%
Food Waste		10.0%	6.0%	14.9%
WOOD	18.7%		10.8%	28.3%
Non-Treated Wood		13.0%	6.8%	20.9%
Treated Wood		5.7%	2.9%	9.4%
C&D DEBRIS	5.4%		2.2%	9.9%
C&D Debris		5.4%	2.2%	9.9%
DURABLES	4.2%		2.1%	6.9%
All Electrical and Household Appl.		2.3%	1.0%	4.1%
Computer Equipment		1.1%	0.5%	2.0%
Other Durables		0.8%	0.3%	1.5%
TEXTILES	1.3%		0.7%	2.0%
Textiles and Leather		1.3%	0.7%	2.0%
DIAPERS	0.8%		0.3%	1.4%
Diapers		0.8%	0.3%	1.4%
RUBBER	0.7%		0.3%	1.1%
Rubber		0.7%	0.3%	1.1%
SHARPS	0.0%		0.0%	0.0%
Sharps		0.0%	0.0%	0.0%
OTHER ORGANIC	1.0%		0.5%	1.7%
Other Organic		1.0%	0.5%	1.7%
OTHER INORGANIC	1.0%		0.4%	1.7%
Other Inorganic		1.0%	0.4%	1.7%
OTHER	0.0%		0.0%	0.0%
Other		0.0%	0.0%	0.0%
TOTAL PERCENT	100.0%			

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Wake County
Summer and Fall 1998 - ICI - Industrial

Sample Size =	8	loads
Total Wt Sorted =	1,892	pounds
Avg Wt per Sample =	237	pounds

WASTE CATEGORIES Material	Mean Percentage		90% Confidence Interval (%) Lower	Upper
PAPER	21.5%		7.8%	39.7%
Newspaper		0.3%	0.0%	1.0%
Magazines		0.6%	0.1%	1.5%
High Grade/ Office		4.2%	0.3%	12.3%
Recyclable OCC and Kraft Bags		8.4%	2.1%	18.4%
Non-Recyclable OCC		0.1%	0.0%	0.2%
Uncoated Boxboard		0.3%	0.1%	0.7%
Mixed Recyc Paper		2.2%	0.4%	5.4%
Non-Recyclable Paper		5.4%	1.8%	10.9%
PLASTIC	24.4%		7.6%	46.9%
#1 PET Soft Drink Cont. >or= 1 liter		0.0%	0.0%	0.0%
#1 PET Soft Drink Cont. < 1 liter		0.1%	0.0%	0.2%
#1 PET Custom Bottles. >or= 1 liter		0.0%	0.0%	0.0%
#1 PET Custom Bottles. < 1 liter		0.1%	0.0%	0.2%
#1 PET Jar and Cont.		0.0%	0.0%	0.0%
#1 PET Subtotal		0.2%	0.1%	0.4%
#2 HDPE Natural Bottles		0.0%	0.0%	0.1%
#2 HDPE Pigmented Bottles		0.0%	0.0%	0.0%
#2 HDPE Tubs/Cont.		0.1%	0.0%	0.3%
#2 HDPE Subtotal		0.1%	0.0%	0.4%
#3 PVC Bottles		0.0%	0.0%	0.0%
#3 PVC Tubs/Cont.		0.0%	0.0%	0.0%
#3 PVC Subtotal		0.0%	0.0%	0.0%
#4 LDPE Bottles		0.0%	0.0%	0.0%
#4 LDPE Tubs/Cont.		0.0%	0.0%	0.0%
#4 LDPE Subtotal		0.0%	0.0%	0.0%
#5 PP Bottles		0.0%	0.0%	0.0%
#5 PP Tubs/Cont.		0.0%	0.0%	0.0%
#5 PP Subtotal		0.0%	0.0%	0.0%
#6 PS Bottles/Cont.		0.0%	0.0%	0.0%
#7 Other Plastic Bottles/Cont.		0.0%	0.0%	0.0%
Other Plastic Products		14.5%	1.9%	36.2%
Film/Wrap/Bags		9.6%	3.3%	18.7%
METAL	2.7%		0.4%	6.9%
Aluminum Beverage Containers		0.2%	0.1%	0.4%
Ferrous Food		0.1%	0.0%	0.2%
Other Ferrous Scrap		2.3%	0.1%	7.1%
Other Non-Ferrous Scrap		0.1%	0.0%	0.2%
GLASS	0.2%		0.0%	0.5%
Clear		0.1%	0.0%	0.4%
Green		0.0%	0.0%	0.0%
Blue		0.0%	0.0%	0.0%
Brown		0.0%	0.0%	0.0%
Other Mixed Cullet		0.1%	0.0%	0.2%
HHM	0.3%		0.0%	0.8%
Automotive Products		0.0%	0.0%	0.0%
Paints and Solvents		0.1%	0.0%	0.3%
Pesticides, Herbicides & Fungicides		0.0%	0.0%	0.0%
Household Cleaners		0.0%	0.0%	0.0%
Batteries (lead -acid)		0.0%	0.0%	0.0%
Batteries (other)		0.0%	0.0%	0.0%
Other (HHM containers w/prod inside)		0.0%	0.0%	0.0%
Light Bulbs		0.1%	0.0%	0.5%
YARD WASTE	0.1%		0.0%	0.3%
Yard Waste		0.1%	0.0%	0.3%
FOOD WASTE	2.0%		0.5%	4.6%
Food Waste		2.0%	0.5%	4.6%
WOOD	25.8%		6.5%	52.2%
Non-Treated Wood		23.8%	5.2%	50.3%
Treated Wood		2.0%	0.1%	6.0%
C&D DEBRIS	0.2%		0.0%	0.7%
C&D Debris		0.2%	0.0%	0.7%
DURABLES	0.0%		0.0%	0.1%
All Electrical and Household Appl.		0.0%	0.0%	0.0%
Computer Equipment		0.0%	0.0%	0.1%
Other Durables		0.0%	0.0%	0.0%
TEXTILES	0.1%		0.0%	0.2%
Textiles and Leather		0.1%	0.0%	0.2%
DIAPERS	0.6%		0.0%	2.0%
Diapers		0.6%	0.0%	2.0%
RUBBER	0.0%		0.0%	0.1%
Rubber		0.0%	0.0%	0.1%
SHARPS	0.0%		0.0%	0.0%
Sharps		0.0%	0.0%	0.0%
OTHER ORGANIC	12.2%		0.0%	43.0%
Other Organic		12.2%	0.0%	43.0%
OTHER INORGANIC	9.8%		0.2%	31.1%
Other Inorganic		9.8%	0.2%	31.1%
OTHER	0.0%		0.0%	0.0%
Other		0.0%	0.0%	0.0%
TOTAL PERCENT	100.0%			

Wake County
Summer and Fall 1998 - ICI - C&D

Sample Size =	9	loads
Total Wt Sorted =	2,392	pounds
Avg Wt per Sample =	266	pounds

WASTE CATEGORIES Material	Mean Percentage		90% Confidence Interval (%) Lower	Upper
PAPER	6.1%		1.4%	13.6%
Newspaper		0.0%	0.0%	0.1%
Magazines		0.0%	0.0%	0.1%
High Grade/ Office		0.0%	0.0%	0.0%
Recyclable OCC and Kraft Bags		5.9%	1.4%	13.4%
Non-Recyclable OCC		0.0%	0.0%	0.0%
Uncoated Boxboard		0.0%	0.0%	0.1%
Mixed Recyc Paper		0.0%	0.0%	0.0%
Non-Recyclable Paper		0.1%	0.0%	0.1%
PLASTIC	1.2%		0.4%	2.4%
#1 PET Soft Drink Cont. >or= 1 liter		0.0%	0.0%	0.0%
#1 PET Soft Drink Cont. < 1 liter		0.0%	0.0%	0.0%
#1 PET Custom Bottles. >or= 1 liter		0.0%	0.0%	0.0%
#1 PET Custom Bottles. < 1 liter		0.0%	0.0%	0.0%
#1 PET Jar and Cont.		0.0%	0.0%	0.0%
#1 PET Subtotal		0.0%	0.0%	0.0%
#2 HDPE Natural Bottles		0.0%	0.0%	0.0%
#2 HDPE Pigmented Bottles		0.1%	0.0%	0.3%
#2 HDPE Tubs/Cont.		0.0%	0.0%	0.0%
#2 HDPE Subtotal		0.1%	0.0%	0.3%
#3 PVC Bottles		0.0%	0.0%	0.0%
#3 PVC Tubs/Cont.		0.0%	0.0%	0.0%
#3 PVC Subtotal		0.0%	0.0%	0.0%
#4 LDPE Bottles		0.0%	0.0%	0.0%
#4 LDPE Tubs/Cont.		0.0%	0.0%	0.0%
#4 LDPE Subtotal		0.0%	0.0%	0.0%
#5 PP Bottles		0.0%	0.0%	0.0%
#5 PP Tubs/Cont.		0.0%	0.0%	0.0%
#5 PP Subtotal		0.0%	0.0%	0.0%
#6 PS Bottles/Cont.		0.0%	0.0%	0.0%
#7 Other Plastic Bottles/Cont.		0.0%	0.0%	0.0%
Other Plastic Products		0.6%	0.1%	1.6%
Film/Wrap/Bags		0.4%	0.1%	1.0%
METAL	22.6%		2.6%	54.3%
Aluminum Beverage Containers		0.0%	0.0%	0.0%
Ferrous Food		0.0%	0.0%	0.0%
Other Ferrous Scrap		22.6%	2.5%	54.5%
Other Non-Ferrous Scrap		0.0%	0.0%	0.0%
GLASS	0.2%		0.0%	0.5%
Clear		0.0%	0.0%	0.0%
Green		0.0%	0.0%	0.0%
Blue		0.0%	0.0%	0.0%
Brown		0.0%	0.0%	0.0%
Other Mixed Cullet		0.2%	0.0%	0.5%
HHM	0.0%		0.0%	0.1%
Automotive Products		0.0%	0.0%	0.0%
Paints and Solvents		0.0%	0.0%	0.1%
Pesticides, Herbicides & Fungicides		0.0%	0.0%	0.0%
Household Cleaners		0.0%	0.0%	0.0%
Batteries (lead -acid)		0.0%	0.0%	0.0%
Batteries (other)		0.0%	0.0%	0.0%
Other (HHM containers w/prod inside)		0.0%	0.0%	0.0%
Light Bulbs		0.0%	0.0%	0.0%
YARD WASTE	0.0%		0.0%	0.0%
Yard Waste		0.0%	0.0%	0.0%
FOOD WASTE	0.0%		0.0%	0.0%
Food Waste		0.0%	0.0%	0.0%
WOOD	37.3%		9.8%	70.4%
Non-Treated Wood		31.7%	5.9%	66.3%
Treated Wood		5.6%	1.0%	13.6%
C&D DEBRIS	32.7%			
C&D Debris		32.7%	6.7%	66.8%
DURABLES	0.0%		0.0%	0.0%
All Electrical and Household Appl.		0.0%	0.0%	0.0%
Computer Equipment		0.0%	0.0%	0.0%
Other Durables		0.0%	0.0%	0.0%
TEXTILES	0.0%		0.0%	0.0%
Textiles and Leather		0.0%	0.0%	0.0%
DIAPERS	0.0%		0.0%	0.0%
Diapers		0.0%	0.0%	0.0%
RUBBER	0.0%		0.0%	0.0%
Rubber		0.0%	0.0%	0.0%
SHARPS	0.0%		0.0%	0.0%
Sharps		0.0%	0.0%	0.0%
OTHER ORGANIC	0.0%		0.0%	0.0%
Other Organic		0.0%	0.0%	0.0%
OTHER INORGANIC	0.0%		0.0%	0.0%
Other Inorganic		0.0%	0.0%	0.0%
OTHER	0.0%		0.0%	0.0%
Other		0.0%	0.0%	0.0%
TOTAL PERCENT	100.0%			

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Wake County
Summer and Fall 1998 - Mixed

Sample Size =	16	loads
Total Wt Sorted =	3,490	pounds
Avg Wt per Sample =	218	pounds

WASTE CATEGORIES Material	Mean Percentage		90% Confidence Interval (%) Lower	Upper
PAPER	39.7%		32.9%	46.8%
Newspaper		6.4%	3.9%	9.4%
Magazines		2.3%	1.3%	3.6%
High Grade/ Office		4.2%	2.7%	5.9%
Recyclable OCC and Kraft Bags		7.0%	4.6%	9.9%
Non-Recyclable OCC		2.1%	0.8%	4.1%
Uncoated Boxboard		2.3%	1.8%	2.8%
Mixed Recyc Paper		4.1%	2.8%	5.5%
Non-Recyclable Paper		11.4%	8.1%	15.3%
PLASTIC	14.5%		11.4%	17.9%
#1 PET Soft Drink Cont. >or= 1 liter		0.3%	0.2%	0.5%
#1 PET Soft Drink Cont. < 1 liter		0.3%	0.2%	0.4%
#1 PET Custom Bottles. >or= 1 liter		0.1%	0.0%	0.2%
#1 PET Custom Bottles. < 1 liter		0.2%	0.1%	0.3%
#1 PET Jar and Cont.		0.1%	0.0%	0.1%
#1 PET Subtotal		0.9%	0.6%	1.4%
#2 HDPE Natural Bottles		0.3%	0.2%	0.5%
#2 HDPE Pigmented Bottles		0.2%	0.1%	0.4%
#2 HDPE Tubs/Cont.		0.2%	0.1%	0.4%
#2 HDPE Subtotal		0.8%	0.4%	1.2%
#3 PVC Bottles		0.0%	0.0%	0.0%
#3 PVC Tubs/Cont.		0.0%	0.0%	0.0%
#3 PVC Subtotal		0.0%	0.0%	0.1%
#4 LDPE Bottles		0.0%	0.0%	0.0%
#4 LDPE Tubs/Cont.		0.0%	0.0%	0.0%
#4 LDPE Subtotal		0.0%	0.0%	0.0%
#5 PP Bottles		0.0%	0.0%	0.0%
#5 PP Tubs/Cont.		0.1%	0.0%	0.1%
#5 PP Subtotal		0.1%	0.0%	0.1%
#6 PS Bottles/Cont.		0.0%	0.0%	0.0%
#7 Other Plastic Bottles/Cont.		0.0%	0.0%	0.0%
Other Plastic Products		5.8%	4.3%	7.5%
Film/Wrap/Bags		6.9%	5.1%	8.9%
METAL	4.1%		2.8%	5.6%
Aluminum Beverage Containers		0.7%	0.5%	0.9%
Ferrous Food		1.1%	0.6%	1.6%
Other Ferrous Scrap		0.9%	0.5%	1.5%
Other Non-Ferrous Scrap		1.4%	0.5%	2.8%
GLASS	3.2%		2.1%	4.5%
Clear		1.8%	1.1%	2.6%
Green		0.4%	0.2%	0.8%
Blue		0.0%	0.0%	0.0%
Brown		0.9%	0.4%	1.5%
Other Mixed Cullet		0.2%	0.1%	0.3%
HHM	0.5%		0.3%	0.9%
Automotive Products		0.1%	0.0%	0.3%
Paints and Solvents		0.0%	0.0%	0.1%
Pesticides, Herbicides & Fungicides		0.0%	0.0%	0.0%
Household Cleaners		0.1%	0.0%	0.1%
Batteries (lead -acid)		0.0%	0.0%	0.1%
Batteries (other)		0.2%	0.1%	0.3%
Other (HHM containers w/prod inside)		0.0%	0.0%	0.0%
Light Bulbs		0.1%	0.0%	0.2%
YARD WASTE	0.9%		0.3%	1.9%
Yard Waste		0.9%	0.3%	1.9%
FOOD WASTE	15.1%		9.1%	22.4%
Food Waste		15.1%	9.1%	22.4%
WOOD	4.6%		2.0%	8.1%
Non-Treated Wood		2.6%	0.8%	5.3%
Treated Wood		2.0%	0.8%	3.7%
C&D DEBRIS	4.4%			
C&D Debris		4.4%	1.7%	8.2%
DURABLES	5.3%		1.7%	10.7%
All Electrical and Household Appl.		0.9%	0.3%	1.8%
Computer Equipment		1.6%	0.3%	3.7%
Other Durables		2.9%	0.6%	6.9%
TEXTILES	2.3%		1.3%	3.6%
Textiles and Leather		2.3%	1.3%	3.6%
DIAPERS	2.4%		1.1%	4.1%
Diapers		2.4%	1.1%	4.1%
RUBBER	0.2%		0.1%	0.4%
Rubber		0.2%	0.1%	0.4%
SHARPS	0.0%		0.0%	0.0%
Sharps		0.0%	0.0%	0.0%
OTHER ORGANIC	1.3%		0.6%	2.2%
Other Organic		1.3%	0.6%	2.2%
OTHER INORGANIC	1.4%		0.6%	2.7%
Other Inorganic		1.4%	0.6%	2.7%
OTHER	0.0%		0.0%	0.0%
Other		0.0%	0.0%	0.0%
TOTAL PERCENT	100.0%			

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Wake County
Summer and Fall 1998 - Construction & Demolition Materials

Sample Size = 30 loads
Est Tons Disposed/Week = 3,436 tons/week

WASTE CATEGORIES Material		90% Confidence Interval (%)		Estimated Tons per Material	90% Confidence Interval (Tons)	
		Lower	Upper		Lower	Upper
OCC/Kraft Paper	0.4%	0.2%	0.7%	14	7	23
Other Paper	0.1%	0.0%	0.2%	4	1	7
Film	0.0%	0.0%	0.0%	0	0	1
Other Plastic	0.4%	0.2%	0.7%	15	7	26
Ferrous Scrap	7.7%	3.6%	13.1%	264	125	450
Roofing Material	17.1%	6.2%	31.9%	587	214	1,096
Drywall	13.4%	5.8%	23.4%	460	201	805
Insulation	1.2%	0.5%	2.2%	42	19	75
Concrete	7.2%	3.0%	13.0%	247	103	445
Carpeting	0.5%	0.2%	1.0%	18	7	33
Land Clearing Debris	3.9%	1.5%	7.4%	133	50	253
Bricks	4.1%	1.6%	7.7%	140	54	264
Other	0.2%	0.1%	0.3%	7	3	12
Wood [1]	43.9%	27.8%	60.8%	1,509	954	2,088
Untreated Wood	18.2%	9.6%	28.8%	626	330	990
Treated Wood	19.2%	9.7%	31.1%	661	332	1,069
TOTAL PERCENT	**100.0%**	**TOTAL TONS:**		3,436		

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SUMMER 1998 SORT RESULTS

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Wake County
Summer 1998 - Combined MSW

Sample Size =	50	loads
Total Wt Sorted =	11,465	pounds
Avg Wt per Sample =	229	pounds
Est. Tons Disposed/Week	8,668	tons/week

WASTE CATEGORIES Material	Mean Percentage		Estimated Tons per Material	
PAPER	33.1%		2,866	
Newspaper		5.2%		447
Magazines		2.5%		216
High Grade/ Office		3.0%		264
Recyclable OCC and Kraft Bags		6.3%		545
Non-Recyclable OCC		2.2%		194
Uncoated Boxboard		1.8%		156
Mixed Recyc Paper		3.9%		336
Non-Recyclable Paper		8.2%		709
PLASTIC	9.8%		848	
#1 PET Soft Drink Cont. >or= 1 liter		0.2%		21
#1 PET Soft Drink Cont. < 1 liter		0.2%		20
#1 PET Custom Bottles. >or= 1 liter		0.0%		4
#1 PET Custom Bottles. < 1 liter		0.2%		14
#1 PET Jar and Cont.		0.0%		2
#1 PET Subtotal		0.7%		61
#2 HDPE Natural Bottles		0.4%		31
#2 HDPE Pigmented Bottles		0.3%		23
#2 HDPE Tubs/Cont.		0.2%		22
#2 HDPE Subtotal		0.9%		75
#3 PVC Bottles		0.0%		2
#3 PVC Tubs/Cont.		0.0%		1
#3 PVC Subtotal		0.0%		3
#4 LDPE Bottles		0.0%		0
#4 LDPE Tubs/Cont.		0.0%		0
#4 LDPE Subtotal		0.0%		0
#5 PP Bottles		0.0%		1
#5 PP Tubs/Cont.		0.1%		7
#5 PP Subtotal		0.1%		8
#6 PS Bottles/Cont.		0.0%		3
#7 Other Plastic Bottles/Cont.		0.0%		2
Other Plastic Products		3.8%		331
Film/Wrap/Bags		4.2%		366
METAL	6.7%		580	
Aluminum Beverage Containers		0.5%		40
Ferrous Food		0.9%		81
Other Ferrous Scrap		3.9%		340
Other Non-Ferrous Scrap		1.4%		119
GLASS	3.3%		283	
Clear		1.5%		132
Green		0.4%		36
Blue		0.0%		0
Brown		1.1%		93
Other Mixed Cullet		0.3%		22
HHM	0.5%		42	
Automotive Products		0.2%		17
Paints and Solvents		0.0%		2
Pesticides, Herbicides & Fungicides		0.0%		0
Household Cleaners		0.1%		12
Batteries (lead -acid)		0.0%		2
Batteries (other)		0.1%		4
Other (HHM containers w/prod inside)		0.0%		3
Light Bulbs		0.0%		1
YARD WASTE	1.8%		160	
Yard Waste		1.8%		160
FOOD WASTE	14.3%		1,237	
Food Waste		14.3%		1,237
WOOD	8.8%		759	
Non-Treated Wood		4.3%		373
Treated Wood		4.4%		386
C&D DEBRIS	6.9%		602	
C&D Debris		6.9%		602
DURABLES	5.8%		506	
All Electrical and Household Appl.		1.4%		121
Computer Equipment		1.3%		116
Other Durables		3.1%		268
TEXTILES	2.6%		222	
Textiles and Leather		2.6%		222
DIAPERS	2.2%		191	
Diapers		2.2%		191
RUBBER	0.3%		29	
Rubber		0.3%		29
SHARPS	0.0%		0	
Sharps		0.0%		0
OTHER ORGANIC	2.1%		186	
Other Organic		2.1%		186
OTHER INORGANIC	1.7%		149	
Other Inorganic		1.7%		149
OTHER	0.1%		9	
Other		0.1%		9
TOTAL PERCENT	100.0%	TOTAL TONS	8,668	

Wake County
Summer 1998 - Combined Solid Waste

Sample Size =	50	loads
Total Wt Sorted =	11,465	pounds
Avg Wt per Sample =	229	pounds
Est. Tons Disposed/Week	10,257	tons/week

WASTE CATEGORIES Material	Mean Percentage		Estimated Tons per Material	
PAPER	27.9%		2,866	
Newspaper		4.4%		447
Magazines		2.1%		216
High Grade/ Office		2.6%		264
Recyclable OCC and Kraft Bags		5.3%		545
Non-Recyclable OCC		1.9%		194
Uncoated Boxboard		1.5%		156
Mixed Recyc Paper		3.3%		336
Non-Recyclable Paper		6.9%		709
PLASTIC	8.3%		848	
#1 PET Soft Drink Cont. >or= 1 liter		0.2%		21
#1 PET Soft Drink Cont. < 1 liter		0.2%		20
#1 PET Custom Bottles. >or= 1 liter		0.0%		4
#1 PET Custom Bottles. < 1 liter		0.1%		14
#1 PET Jar and Cont.		0.0%		2
#1 PET Subtotal		0.6%		61
#2 HDPE Natural Bottles		0.3%		31
#2 HDPE Pigmented Bottles		0.2%		23
#2 HDPE Tubs/Cont.		0.2%		22
#2 HDPE Subtotal		0.7%		75
#3 PVC Bottles		0.0%		2
#3 PVC Tubs/Cont.		0.0%		1
#3 PVC Subtotal		0.0%		3
#4 LDPE Bottles		0.0%		0
#4 LDPE Tubs/Cont.		0.0%		0
#4 LDPE Subtotal		0.0%		0
#5 PP Bottles		0.0%		1
#5 PP Tubs/Cont.		0.1%		7
#5 PP Subtotal		0.1%		8
#6 PS Bottles/Cont.		0.0%		3
#7 Other Plastic Bottles/Cont.		0.0%		2
Other Plastic Products		3.2%		331
Film/Wrap/Bags		3.6%		366
METAL	5.7%		580	
Aluminum Beverage Containers		0.4%		40
Ferrous Food		0.8%		81
Other Ferrous Scrap		3.3%		340
Other Non-Ferrous Scrap		1.2%		119
GLASS	2.8%		283	
Clear		1.3%		132
Green		0.4%		36
Blue		0.0%		0
Brown		0.9%		93
Other Mixed Cullet		0.2%		22
HHM	0.4%		42	
Automotive Products		0.2%		17
Paints and Solvents		0.0%		2
Pesticides, Herbicides & Fungicides		0.0%		0
Household Cleaners		0.1%		12
Batteries (lead -acid)		0.0%		2
Batteries (other)		0.0%		4
Other (HHM containers w/prod inside)		0.0%		3
Light Bulbs		0.0%		1
YARD WASTE	1.6%		160	
Yard Waste		1.6%		160
FOOD WASTE	12.1%		1,237	
Food Waste		12.1%		1,237
WOOD	7.4%		759	
Non-Treated Wood		3.6%		373
Treated Wood		3.8%		386
C&D DEBRIS	21.4%		2191	
C&D Debris		21.4%		2191
DURABLES	4.9%		506	
All Electrical and Household Appl.		1.2%		121
Computer Equipment		1.1%		116
Other Durables		2.6%		268
TEXTILES	2.2%		222	
Textiles and Leather		2.2%		222
DIAPERS	1.9%		191	
Diapers		1.9%		191
RUBBER	0.3%		29	
Rubber		0.3%		29
SHARPS	0.0%		0	
Sharps		0.0%		0
OTHER ORGANIC	1.8%		186	
Other Organic		1.8%		186
OTHER INORGANIC	1.5%		149	
Other Inorganic		1.5%		149
OTHER	0.1%		9	
Other		0.1%		9
TOTAL PERCENT	100.0%	TOTAL TONS	10,257	

Wake County
Summer 1998 - Residential

Sample Size =	25	loads
Total Wt Sorted =	5,461	pounds
Avg Wt per Sample =	218	pounds

WASTE CATEGORIES Material	Mean Percentage		90% Confidence Interval (%) Lower	Upper
PAPER	36.0%		29.0%	43.2%
Newspaper		8.1%	5.6%	10.9%
Magazines		3.7%	2.4%	5.2%
High Grade/ Office		2.8%	1.8%	4.1%
Recyclable OCC and Kraft Bags		3.8%	2.7%	5.1%
Non-Recyclable OCC		0.7%	0.4%	1.2%
Uncoated Boxboard		2.4%	1.7%	3.4%
Mixed Recyc Paper		5.7%	4.0%	7.6%
Non-Recyclable Paper		8.7%	6.7%	11.0%
PLASTIC	10.5%		8.7%	12.5%
#1 PET Soft Drink Cont. >or= 1 liter		0.3%	0.2%	0.4%
#1 PET Soft Drink Cont. < 1 liter		0.3%	0.2%	0.4%
#1 PET Custom Bottles. >or= 1 liter		0.1%	0.1%	0.2%
#1 PET Custom Bottles. < 1 liter		0.2%	0.2%	0.3%
#1 PET Jar and Cont.		0.1%	0.0%	0.1%
#1 PET Subtotal		1.0%	0.7%	1.3%
#2 HDPE Natural Bottles		0.5%	0.4%	0.7%
#2 HDPE Pigmented Bottles		0.4%	0.3%	0.5%
#2 HDPE Tubs/Cont.		0.3%	0.1%	0.5%
#2 HDPE Subtotal		1.2%	0.9%	1.6%
#3 PVC Bottles		0.0%	0.0%	0.1%
#3 PVC Tubs/Cont.		0.0%	0.0%	0.0%
#3 PVC Subtotal		0.1%	0.0%	0.1%
#4 LDPE Bottles		0.0%	0.0%	0.0%
#4 LDPE Tubs/Cont.		0.0%	0.0%	0.0%
#4 LDPE Subtotal		0.0%	0.0%	0.0%
#5 PP Bottles		0.0%	0.0%	0.0%
#5 PP Tubs/Cont.		0.2%	0.1%	0.2%
#5 PP Subtotal		0.2%	0.1%	0.3%
#6 PS Bottles/Cont.		0.1%	0.0%	0.1%
#7 Other Plastic Bottles/Cont.		0.0%	0.0%	0.1%
Other Plastic Products		4.1%	3.3%	4.9%
Film/Wrap/Bags		3.9%	3.0%	5.0%
METAL	6.1%		4.1%	8.5%
Aluminum Beverage Containers		0.6%	0.4%	0.8%
Ferrous Food		1.1%	0.8%	1.4%
Other Ferrous Scrap		3.6%	1.7%	6.2%
Other Non-Ferrous Scrap		0.8%	0.5%	1.1%
GLASS	4.3%		3.0%	5.9%
Clear		1.7%	1.2%	2.4%
Green		0.6%	0.3%	0.9%
Blue		0.0%	0.0%	0.0%
Brown		1.5%	0.8%	2.4%
Other Mixed Cullet		0.5%	0.3%	0.7%
HHM	0.6%		0.4%	0.8%
Automotive Products		0.1%	0.1%	0.2%
Paints and Solvents		0.1%	0.0%	0.1%
Pesticides, Herbicides & Fungicides		0.0%	0.0%	0.0%
Household Cleaners		0.2%	0.1%	0.4%
Batteries (lead -acid)		0.0%	0.0%	0.0%
Batteries (other)		0.1%	0.0%	0.2%
Other (HHM containers w/prod inside)		0.0%	0.0%	0.1%
Light Bulbs		0.0%	0.0%	0.0%
YARD WASTE	3.4%		1.8%	5.6%
Yard Waste		3.4%	1.8%	5.6%
FOOD WASTE	11.4%		8.2%	14.9%
Food Waste		11.4%	8.2%	14.9%
WOOD	9.3%		4.3%	16.0%
Non-Treated Wood		3.5%	1.5%	6.4%
Treated Wood		5.8%	2.7%	10.1%
C&D DEBRIS	4.3%		1.7%	7.9%
C&D Debris		4.3%	1.7%	7.9%
DURABLES	3.6%		1.8%	6.0%
All Electrical and Household Appl.		1.8%	0.9%	3.1%
Computer Equipment		0.1%	0.0%	0.2%
Other Durables		1.7%	0.6%	3.3%
TEXTILES	4.1%		2.9%	5.5%
Textiles and Leather		4.1%	2.9%	5.5%
DIAPERS	3.4%		2.3%	4.7%
Diapers		3.4%	2.3%	4.7%
RUBBER	0.4%		0.2%	0.6%
Rubber		0.4%	0.2%	0.6%
SHARPS	0.0%		0.0%	0.0%
Sharps		0.0%	0.0%	0.0%
OTHER ORGANIC	1.5%		1.0%	2.1%
Other Organic		1.5%	1.0%	2.1%
OTHER INORGANIC	0.9%		0.4%	1.7%
Other Inorganic		0.9%	0.4%	1.7%
OTHER	0.3%		0.1%	0.6%
Other		0.3%	0.1%	0.6%
TOTAL PERCENT	100.0%			

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Wake County
Summer 1998 - Residential - Multi-Family

Sample Size	5	loads
Total Wt Sorte	1,027	pounds
Avg Wt per Sam	205	pounds

WASTE CATEGORIES Material	Mean Percentage		90% Confidence Interval (%) Lower	Upper
PAPER	38.8%		31.6%	46.3%
Newspaper		11.6%	5.7%	19.2%
Magazines		2.6%	1.6%	3.8%
High Grade/ Office		4.6%	1.1%	10.5%
Recyclable OCC and Kraft Bags		5.0%	2.0%	9.2%
Non-Recyclable OCC		0.5%	0.1%	1.1%
Uncoated Boxboard		2.7%	0.6%	6.2%
Mixed Recyc Paper		4.3%	2.8%	6.0%
Non-Recyclable Paper		7.7%	5.9%	9.6%
PLASTIC	11.3%		8.9%	14.0%
#1 PET Soft Drink Cont. >or= 1 liter		0.3%	0.1%	0.8%
#1 PET Soft Drink Cont. < 1 liter		0.2%	0.0%	0.5%
#1 PET Custom Bottles. >or= 1 liter		0.1%	0.0%	0.3%
#1 PET Custom Bottles. < 1 liter		0.3%	0.1%	0.6%
#1 PET Jar and Cont.		0.0%	0.0%	0.1%
#1 PET Subtotal		0.9%	0.5%	1.5%
#2 HDPE Natural Bottles		0.5%	0.2%	1.0%
#2 HDPE Pigmented Bottles		0.6%	0.4%	0.8%
#2 HDPE Tubs/Cont.		0.8%	0.0%	2.7%
#2 HDPE Subtotal		1.9%	0.7%	3.9%
#3 PVC Bottles		0.1%	0.0%	0.2%
#3 PVC Tubs/Cont.		0.0%	0.0%	0.0%
#3 PVC Subtotal		0.1%	0.0%	0.2%
#4 LDPE Bottles		0.0%	0.0%	0.0%
#4 LDPE Tubs/Cont.		0.0%	0.0%	0.0%
#4 LDPE Subtotal		0.0%	0.0%	0.0%
#5 PP Bottles		0.0%	0.0%	0.1%
#5 PP Tubs/Cont.		0.1%	0.0%	0.3%
#5 PP Subtotal		0.1%	0.0%	0.4%
#6 PS Bottles/Cont.		0.1%	0.0%	0.2%
#7 Other Plastic Bottles/Cont.		0.1%	0.0%	0.3%
Other Plastic Products		3.6%	2.7%	4.7%
Film/Wrap/Bags		4.5%	3.1%	6.1%
METAL	3.4%		1.9%	5.3%
Aluminum Beverage Containers		0.7%	0.3%	1.1%
Ferrous Food		1.1%	0.6%	1.8%
Other Ferrous Scrap		1.1%	0.1%	2.9%
Other Non-Ferrous Scrap		0.5%	0.3%	0.9%
GLASS	9.0%		4.6%	14.6%
Clear		2.9%	1.4%	4.7%
Green		0.9%	0.2%	2.0%
Blue		0.0%	0.0%	0.0%
Brown		4.5%	1.3%	9.4%
Other Mixed Cullet		0.8%	0.2%	1.9%
HHM	0.5%		0.1%	1.3%
Automotive Products		0.0%	0.0%	0.0%
Paints and Solvents		0.0%	0.0%	0.0%
Pesticides, Herbicides & Fungicides		0.1%	0.0%	0.2%
Household Cleaners		0.3%	0.0%	0.9%
Batteries (lead -acid)		0.0%	0.0%	0.0%
Batteries (other)		0.0%	0.0%	0.0%
Other (HHM containers w/prod inside)		0.1%	0.0%	0.4%
Light Bulbs		0.0%	0.0%	0.0%
YARD WASTE	6.3%		1.7%	13.7%
Yard Waste		6.3%	1.7%	13.7%
FOOD WASTE	11.8%		7.1%	17.5%
Food Waste		11.8%	7.1%	17.5%
WOOD	3.0%		0.0%	12.1%
Non-Treated Wood		0.1%	0.0%	0.3%
Treated Wood		2.9%	0.0%	12.4%
C&D DEBRIS	0.2%		0.0%	0.7%
C&D Debris		0.2%	0.0%	0.7%
DURABLES	1.9%		0.1%	6.2%
All Electrical and Household Appl.		1.9%	0.1%	6.1%
Computer Equipment		0.0%	0.0%	0.0%
Other Durables		0.0%	0.0%	0.0%
TEXTILES	7.8%		3.2%	14.1%
Textiles and Leather		7.8%	3.2%	14.1%
DIAPERS	2.6%		0.7%	5.5%
Diapers		2.6%	0.7%	5.5%
RUBBER	0.4%		0.0%	1.2%
Rubber		0.4%	0.0%	1.2%
SHARPS	0.0%		0.0%	0.0%
Sharps		0.0%	0.0%	0.0%
OTHER ORGANIC	1.7%		0.9%	2.6%
Other Organic		1.7%	0.9%	2.6%
OTHER INORGANIC	1.4%		0.0%	5.5%
Other Inorganic		1.4%	0.0%	5.5%
OTHER	0.0%		0.0%	0.0%
Other		0.0%	0.0%	0.0%
TOTAL PERCENT	100.0%			

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APPENDIX D

NAME OF ORGANIZATION	COMPOSITION OF WASTE						MATERIALS RECYCLED	TOTAL AMOUNT RECYCLED (TONS PER YEAR)	RECYCLABLES COLLECTION	MATERIALS THAT COULD BE RECYCLED	BARRIERS TO RECYCLING
	PAPER	GLASS	PLASTICS	METALS	ORGANICS	OTHER					
Wake County Public School System	0	0	10%	10% ferrous and 1% non-ferrous	5% yard waste, 20% food waste and 20% lumber	0	OCC, office paper, polystyrene, ferrous metals, non-ferrous metals and cooking oil	876	Waste Industries, Grime Control, News and Observer, Orange Recycling and East Coast Resources	Not specified	Space, cost, lack of education and training
Wake Technical Community College	25% OCC, 30% office paper and 45% other paper	0	0	0	0	0	Not clear	No response	No response	Cans and plastic	Space constraints, participation, cost
Wake Med	8% OCC and 7% office paper	<1	<1	No response	No response	No response	OCC and other paper	163	OCC collected twice per week and office paper collected once per week	Small amount of plastic and glass bottles	Cost for collection and storage until pick-up
La Quinta Inn	5% OCC, 5% office paper, 5% other paper	5%	10%	0	2% food waste	5% miscellaneous	OCC, office paper, newspaper, other paper, glass and plastics	Less than one	No response	Maybe	No space for recycling. No manpower
Hardee's	4% OCC, 90% other paper	0	1%	0	5% food waste	0	OCC	12	Waste Industries	No	
Arby's	25%	0	0	0	75% food waste	0	OCC	Not specified	Waste Industries	No	

SCHOOLS, HOSPITAL, LODGING AND RESTAURANTS

NAME OF ORGANIZATION	NUMBER OF STUDENTS/ PATIENTS/ CUSTOMERS	NUMBER OF EMPLOYEES	AMOUNT OF SOLID WASTE GENERATED ANNUALLY (TONS UNLESS SPECIFIED)	CONTRACTED WASTE HAULER	FREQUENCY OF COLLECTION (PER WEEK)	COST FOR DISPOSAL	DISPOSAL FACILITY	AMOUNT OF WASTE DISPOSED AT FACILITY (TONS PER YEAR)	COMPOSTING
Wake County Public School System	91,299	Approx. 10,000	10,082 (310,201 cubic yards)	Waste Industries	From one to five	$540,000 per year	Feltonsville Transfer Station and Wake County Landfill	No response	Brush and yard waste composted on-site
Wake Technical Community College	Over 1,000	Over 100	2,419 [1]	Waste Industries	Two	$17,267 per year	No response	No response	No
Wake Med	Over 500	Over 3,000	1,915	BFI	Three	$27 per ton	Landfill and Han River Incinerator	1900 tons at landfill and 250 tons at incinerator	Yes, not described
La Quinta Inn	Over 100	Over 20	154	CSI	Two	No response	Landfill	No response	No
Hardee's	501-750	11-20	213 (850 cubic yards)	Waste Industries	Two	$4,476 per year	Landfill	No response	No
Arby's	301-500	Over 20	192 [1]	Waste Industries	Two	$3,000 per year	Landfill	No response	No

CONSTRUCTION AND DEMOLITION, TRANSPORTATION, GOVERNMENT AND FARMER'S MARKET

NAME OF ORGANIZATION	GENERATOR SPECIFIC INFORMATION	NUMBER OF EMPLOYEES	AMOUNT OF SOLID WASTE GENERATED ANNUALLY (TONS UNLESS SPECIFIED)	CONTRACTED WASTE HAULER	FREQUENCY OF COLLECTION (PER WEEK)	COST FOR DISPOSAL	DISPOSAL FACILITY	AMOUNT OF WASTE DISPOSED AT FACILITY (TONS PER YEAR)	COMPOSTING
Squires Homes	Involved in public infrastructure and private homes	26-50	45,000 (300,000 cubic yards)	Curb Appeal, Debris Removal, Jeff Kilpatric	Once	$250,000 per year	Landfill	Not specified	No
J.M. Thompson Construction Company	Construction of public buildings and private commercial buildings	Over 75	780	Waste Industries	Ten	$28 per ton	Envirotec Landfill in Apex and North Wake Landfill	1,000 (500 in each facility)	150 tons of gravel, sand, tree, lumber composted in back lot of office annually. Collected in company trucks twice per month at a cost of $5.00 per ton.
RDU Airport Authority		101-500	2,650 (13,230 cubic yards)	BFI	Maximum of 6	$60,000 per year	Feltonsville TS and North Wake Landfill	840	No
Town of Cary	206,531 square feet	501-5,000	1,081 [1] (5,406 cubic yards)	Waste Industries	Once	$23 per ton	Feltonsville Transfer Station	Not specified	No
Town of Garner	32,529 square feet	101-500	7,440	Waste Management of the Carolinas	Garbage and yard waste once per week; recycling every other week	$645,526 per year	North Wake Landfill and Feltonsville Transfer Station	20 tons per day	No
State Farmer's Market	28 full time year round vendors; 20-75 farmers in season; occupies 227,033 square feet	Over 50	1,683	BFI and Waste Industries	Two to four	$75,000 per year	North Wake Landfill	1,682	No

Name of Organization	Composition of Waste						Materials Recycled	Total Amount Recycled (Tons per Year)	Recyclables Collection	Materials that Could be Recycled	Barriers to Recycling
	Paper	Glass	Plastics	Metals	Organics	Other					
Squires Homes	5%	0%	5%	5% ferrous metal	5% food waste and 70% lumber	10% concrete products	None	N/A	N/A	No response	No response
J.M. Thompson Construction Company	10% OCC and 10% other paper	0%	5%	5% ferrous	1% yard waste, 1% food waste and 23% lumber	50% miscellaneous other	Office paper, other paper, lumber, iron and aluminum	43	Office paper collected by BFI once per month and other materials hauled by J.M. Thompson as needed.	Some lumber	Cost factors
RDU Airport Authority	OCC, office paper and mixed paper	Yes	Yes (large amount of plastic cups)	Not much	Large amount of food waste	Tires	OCC, office paper, newspaper, aluminum cans, pallets, tires, glass, cooking oils and lard	60 tpy of paper	BFI collects	Newspapers, plastics, food waste	Cost
Town of Cary	Large amount of other paper	N/A	N/A	N/A	N/A	N/A	OCC, office paper, newspaper, other paper, glass, scrap ferrous, aluminum, Xerox cartridges	97	Collected by town employee or Phoenix Resources	Kraft paper/envelopes, glue bound publications	Markets
Town of Garner[2]	0.25% OCC, 0.08% office paper, 5.6% other paper	1.7%	0.63%	0.15% ferrous and 0.36% non-ferrous	11.94% yard waste	0.073% white goods	OCC, office paper, newspaper, other paper, glass, plastic, steel, aluminum and white goods	831 (Report 26.35% recycling rate)	Collected once weekly or every other week by Waste Management	Certain types of magazines, plastics, textiles, etc.	Market
State Farmer's Market	OOC, office paper, other paper	No	No	No	Yard waste and food waste	Miscellaneous other	OCC, office paper, newspaper, pallets, aluminum, fruits and vegetables	889	Fruits and vegetables picked up by Inter-Faith Food Shuttle, OCC hauled by Farmer's Market employees 5 times per week. Pallets hauled by Farmer's Market	Not specified	Cost, space, labor, time and market

[2] Waste composition numbers for the Town of Garner do not add up to 100 percent. The survey respondent explains that their contractor is required to report this information for certain materials. For the other materials, the data is not recorded. The percentages are of the total solid waste.

APPENDIX E
SUMMARY OF SITE VISITS

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COMMERCIAL/INDUSTRIAL/INSTITUTIONAL GENERATOR SITE VISITS

Organization	Contact Name	Contact Title	Category	Organization Information	Materials Disposed	Materials Recycled	Comments
Fike Builders	Torin Bussey	Construction Manager	Home Builder	Build twenty-five homes per year, 3,500 square feet and larger. Sixty percent are custom built.	Lunch wastes and other miscellaneous trash (shrink wrap, carpet padding, paint buckets, etc.)	As part of pilot project recycled: wood, brick and block, metals, asphalt shingles, OCC, beverage containers, dry wall and pallets	■ Fike Builders participated in a pilot project to separate recyclables at home building sites - resulted in high diversion, but at a cost to the builder ■ There is little economic incentive for homebuilders to recycle - exception: returning unused building products to suppliers (actually "reuse") ■ Some material suppliers charge a restocking fee for excess materials that are returned. This deters construction companies from returning extra materials and so they dispose of them. ■ Mr. Bussey recommended identifying a few items to target initially for recycling e.g. OCC, sheet rock and wood. ■ Any program should include input from the Wake County Home Builder's Association ■ Sheet rock is a huge waste
Davidson Jones and Beers	Randy Juliani	Project Manager, Corporate Services	Construction	Main office is in Atlanta. DJB does large-scale commercial construction. They have approximately 20 active jobs in Wake County.	Brick, concrete block, gypsum, wood and cardboard	Office paper	■ The company is in the process of becoming ISO 14001 certified. They are developing a plan to be certified by the end of 1999. ■ In order to be certified, they have to have an environmental management system already in place. ■ Subcontractors will be responsible for following the environmental management protocol. ■ Each project manager is responsible for hauling contracts. For some materials, there is a restocking charge that discourages the contractor from returning their excess materials to the supplier. ■ Of all the materials that are generated at a job site, sheet rock is the most abundant. However, there is no place to recycle sheet rock here. ■ The company has an office paper recycling program.

Organization	Contact Name	Contact Title	Category	Organization Information	Materials Disposed	Materials Recycled	Comments
Wake Forest Middle School	John Owens	Vice Principal	School		Steel cans, film plastic	Office paper, magazines, junk mail, aluminum cans, ONP, OCC, polystyrene food trays and utensils (HDPE, PET, and glass also accepted at drop off center on site)	■ Recyclables were found in the trash containers, e.g., OCC in the waste dumpster, office paper in the waste baskets. ■ Lack of clear signage and participation instructions were evident. ■ School staff have been more aggressive in past. ■ Have a machine in the cafeteria that processes food waste and styrofoam trays. ■ The Eco Club has a paper recycling program. Each classroom has a box for paper. Club members collect materials once a week. They take the boxes to the recycling igloos at the side of the school. ■ Community uses recycling and dumpsters on site.
Wake County Public Schools	Nick Harrison	Maintenance and Operations	School	106 schools in the school district		Office paper and yard waste	■ Recycle through igloo program for both schools and residents. The igloo program reimburses each school for the recyclables revenue. Revenue amounts for each school range from $8 to $86 per month. ■ Schools may not be promoting the igloos. ■ There is a code that all trash must be removed from buildings each day. According to Nick Harrison, this includes recyclables. ■ Have problems with illegal dumping of trash in school dumpsters. Increases the school system's disposal costs. ■ Terms of contract with Waste Industries include charges per pull. Different costs for OCC and trash. ■ A possible way to save money would be through an audit to confirm if dumpsters are full when pulled. Wake County offers a $10,000 grant that might be used for this purpose.

Organization	Contact Name	Contact Title	Category	Organization Information	Materials Disposed	Materials Recycled	Comments
RDU Airport	George Cumpston	Assistant Maintenance Manager	Transportation		Plastics, food waste, lumber and woody materials, newspaper	OCC, office paper, newspaper, aluminum cans, pallets, tires, glass, cooking oils and lard	■ RDU pays a company 50 cents per pallet to take them away. The company reworks some of them and then sells them to Carolina Pallet in Oxford. ■ Do not recycle more because it is not cost-effective. ■ RDU not responsible for Terminal C. American Airlines owns and operates this terminal. ■ Newspaper in terminals not recycled.
NC Facilities	Bernard Torain		Government	Maintain 160 buildings. State owns half of their buildings and leases the rest.		Newspaper, phone books, glass, glossy paper, OCC, UBCs, yard waste, pallets, computers	■ Orange Recycling separates white fiber from colored fiber. Bernard Torain and Orange Recycling are looking into further source-separation. Space constraints are a problem. ■ Have a computer recycling warehouse that refurbishes computers and sells metal parts. ■ Have a State Surplus Property store.
PYA Monarch	John Keyes	Warehouse Maintenance Manager	Large single tenant	Food product distributor. Zebulon warehouse is 187,000 square feet. PYA Monarch also has a smaller operation in Raleigh. They sell anything related to the food service business.	Paper packaging, office paper, shrink wrap, steel cans, food waste	OCC, food waste, pallets	■ As part of their business, there are some products that are not shipped out of their warehouse because of recalls or damage. The products that are recalled for health reasons have to be disposed. In some cases, one can of a load may be dented or damaged. The remainder is donated to an orphanage. They pick it up once a week. Forty percent of the products that are not distributed have been recalled. The remainder is damaged. ■ The OCC baler is supplied by Recycling Solutions. Occasionally, they provide a portion of the revenue to PYA Monarch. ■ The majority of the pallets that come in are shrink wrapped. The company tried to find a market for the shrink wrap 5 to 6 years ago without success. ■ Pallets Unlimited (Benson, NC) accepts the old pallets, repairs them and brings back new ones.

Organization	Contact Name	Contact Title	Category	Organization Information	Materials Disposed	Materials Recycled	Comments
Winn-Dixie	Bob Sterner	Store Manager	Grocery store		Wooden boxes, waxed OCC, food waste (produce, paper)	OCC, plastic bags and shrink wrap, deli grease, meat scraps, plastic and wooden shipping pallets and crates, national brands of foods that could not be sold.	■ All recyclables except deli grease are transported back to the warehouse in Clayton. ■ If an item is damaged, and still has customer value, the price is marked down. ■ Company brand products that can't be sold are discarded. ■ National brand products that can't be sold such as broken bags of dog food, are sent back to the warehouse where they are repackaged for bulk sale to the public. Store gets credited for cost of the goods. ■ Manager estimated that waste stream consists of 50% food. ■ Central warehouse in Clayton does all contracting.
Lowes	Ron Brown	Receiving Manager	Discount mega-store	Opened three months ago	Wood, office paper, broken pallets, concrete, plastic	OCC, pallets, appliances, aluminum cans	■ Contracts handled by corporate headquarters in North Wilkesboro. ■ Waste Industries responsible for collection. ■ They sell smaller pieces of wood at lower prices rather than disposing of the scraps. ■ They may obtain an open top dumpster for the greenhouse area in the spring. ■ Lowes recycles pallets through Pallet Express ■ No office paper recycling.

APPENDIX F
MATERIAL-SPECIFIC MARKETS

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A. MARKETS FOR C&D DEBRIS

TABLE F-1 MARKETS FOR C&D MATERIALS IN CENTRAL NC	
Axel Demolition & Salvage, Hillsborough, NC	Accepts concrete & brick, scrap lumber
B&B Topsoil Mine, Durham, NC	Accepts wood waste, scrap lumber, concrete & brick land-clearing debris, sheet rock
G.S. Materials, Inc., Burlington, NC	Mobile processor of concrete & brick, land-clearing debris
George's Pallets, Dunn, NC	Accepts scrap lumber, wooden pallets, railroad ties roofing materials
Habitat for Humanity of Wake County – ReUse Center, Raleigh, NC	Accepts donations of useable building materials fo retail sale to public
International Aggregates, Timberlake, NC	Mobile processor of concrete & brick, land-clearing debris
Jerry Russell Recycling, Star, NC	Accepts wood waste, scrap lumber
McGill Environmental Systems, Rose Hill, NC	Accepts wood waste, wooden pallets (shredded) land-clearing debris for composting
Orange Recycling Services, Inc., Durham, NC	Accepts wood waste, wooden pallets, scrap metal wire, mixed plastic
Pallet Recycling Service, Bear Creek, NC	Accepts wooden pallets, scrap lumber
Phoenix Recycling Corporation, Wilson, NC	Accepts wood waste, wooden pallets, concrete & brick, land-clearing debris, sheet rock, scrap lumber roofing material, metal, mixed plastic
RT Soil Sciences, Rocky Mount, NC	Accepts wood waste, sheet rock for composting
Waste Industries, Inc. Recycling, Garner, NC	Accepts wood waste, pallets for grinding
Waste Reduction Products Corp., Goldston, NC	Accepts clean, dry drywall for manufacture of cat litter and oil absorbent

Source: NC DPPEA, *Assessment of the Recycling Industry and Recycling Materials in NC -- Draft Update.*

B. MARKETS FOR PALLET RECYCLING

TABLE F-2 PALLETS RECYCLERS IN CENTRAL NC	
East Industries Rocky Mount, NC	Wooden pallets
George's Pallets Dunn, NC	Wooden pallets
George's Pallets Dunn, NC	Wooden pallets (40x48 or 48x48)
Orange Recycling Services, Inc. Durham, NC	Wooden pallets
Pallet Express Greensboro, NC	Wooden pallets
Pallet Recycling Service Bear Creek, NC	Wooden pallets
Phoenix Recycling Corporation Wilson, NC 252-294-6941	Wooden pallets
Southern Pallets Butner, NC	Wooden pallets (accepts only non-hazardous)
The Wood Company Oxford, NC	Wooden pallets
Waste Industries, Inc. Recycling Garner, NC	Accepts wood waste, pallets for grinding
Source: NC DPPEA, *Directory of Markets for Recyclable Materials, Online version.*	

C. MARKETS FOR FOOD WASTE

TABLE F-3 REGIONAL MARKETS FOR FOOD WASTES	
CBP Resources, Inc., Greensboro, NC	Cooking oil, meat by-products, restaurant grease
Food Bank of NC, Raleigh, NC	Edible food items (canned goods, frozen refrigerated items)
Inter-Faith Food Shuttle, Raleigh, NC	Prepared and perishable food
McGill Environmental Systems, Rose Hill, NC	Bakery waste, batter waste, beverage waste, brew waste (liquid & solid), cooking oil, fluid da products, meat by-products, restaurant grease, yeas
Movable Feast,* Cary, NC	Frozen and pantry foods from households movi out of the Triangle
RT Soil Sciences, Rocky Mount, NC	Brewery waste (solid), yeast
Smith Farms Princeton, NC	Bakery waste, solid brewery waste, batter waste, fl dairy products
Wastek Pittsboro, NC	Bakery waste, brewery waste (solid), yeast

Source: NC DPPEA, *Directory of Markets for Recyclable Materials – Online version*
**from other sources*

D. MARKETS FOR NEWSPRINT

TABLE F-4 NEWSPRINT MILLS SERVING NORTH CAROLINA	
Alabama River Newsprint Co., Perdue Hill, AL	Product: Newsprint sheet – 1997 capacity was 245,000 tons with approximately 115,500 tons of recovered paper, of which 2.5% came from NC sources. Feedstock: 91% of the recovered feedstock consisted of No. 8 ONP with the remaining 9% from pre-consumer coated groundwood.
Augusta Newsprint Company, Augusta, GA	Product: 35% recycled content newsprint, potentially increasing to 40% by 2002. Feedstock: Number 8 ONP, with approx. 15% supplied from NC sources. (160,000 tons consumed in 1997) and OMG, with less than 1% from NC sources (60,000 tons consumed in 1997)
Bear Island Paper Co., L.L.C., Ashland, VA	Product: Newsprint sheet with approximately 34% recycled content, with plans to achieve a 40% in the long term Feedstock: 90% ONP/ 10% OMG mix, with 12% of its total 92,000 tons coming from NC sources.
Bowater, Calhoun,TN	Product: Newsprint sheet varying in recycled content from 20-40%. Feedstock: Recovered paper feedstock was approx. 70% ONP/ 30% OMG, with 200,000 tons of recovered paper used in 1997. Can recycle both offset and flexographic printed newspaper.
Southeast Paper Manufacturing Co. & Southeast Recycling Corp., Dublin, GA	Product: 100 percent recycled content newspaper - 530,000 tons produced in 1997 Feedstock: ONP, with, with approx. 4% from NC sources. Can process flexographic and offset ONP.

Source: NC DPPEA, *Assessment of the Recycling Industry and Recycling Materials in NC -- Draft Update.*

E. MARKETS FOR OCC

TABLE F-5 OCC CONSUMING MILLS IN NORTH CAROLINA	
Carolina Paper Board Corp., Charlotte, NC	Products: 100 percent recycled rigid and folding boxboard chipboard. Total paperboard capacity: 50,730 mt/yr. Feedstock: OCC, double-lined kraft (DLK), ONP, mixed pa and pulp substitutes. Carolina Paper Board used about 16 tons of OCC from North Carolina last year.
Halifax Paperboard Co., Inc., Roanoke Rapids, NC	Products: rigid and folding boxboard, chipboard, pasted bo and mounting and laminated board. Production capacity: tons daily. Total paperboard capacity: 34,360 mt/yr. Feedstock: OCC, DLK, ONP, mixed paper and pulp substit
Jackson Paper Manufacturing Co., Sylva, NC	Products: 100 percent recycled corrugating med Production capacity: 240 tons daily. Total paperboard capa 85,100 mt/yr. Feedstock: OCC.
U.S. Packaging, Inc., Maxton, NC	Products: cellulose wadding for packing and cushion Production capacity: 12 tons daily. Total capacity: 4,000 mt/
Weyerhaeuser Paper Co., Plymouth, NC	Products: corrugating medium, kraft linerboard and var fine papers. Production capacity: 1,100 tons daily containerboard, 1,000 tons daily for fine papers. paperboard capacity: 785,400 mt/yr, with 425,000 mt/yr linerboard and 360,000 mt/yr for corrugating medium. Feedstock: OCC. Current expansion includes two contin digesters, two oxygen delignification systems and a new bl plant at a cost of $500 million.

Source: NC DPPEA, *Assessment of the Recycling Industry and Recycling Materials in NC -- Draft Update.* Extracted AF&PA, *PaperMatcher*, 4th ed., Miller Freeman, Inc., *1997 Lockwood-Post's Directory of the Pulp, Paper and Allied T* Miller Freeman, Inc., *1998 International Pulp & Paper Directory*, manufacturer surveys conducted by DPPEA.

The following mills in surrounding states also use OCC as feedstock:

CONTAINERBOARD MILLS:

- Georgia-Pacific Corp., Big Island, VA
- Interstate Resources Inc., Riceboro, GA
- Temple-Inland Inc., New Johnsonville, TN
- Riverwood Intl., Macon, GA
- St. Laurent Paperboard, West Point, VA
- Somerset Fiber Co., Cowpens, SC
- Stone Container Corp., Florence, SC and Port Wentworth, GA
- Tenneco Packaging, Counce, TN
- Union Camp Corp., Savannah, GA
- Virginia Fibre Corp., Amherst, VA
- Visy Paper Inc., Conyers, GA
- Westvaco Corp., Covington, VA

PAPER BOARD MILLS:

- Caraustar Industries, Inc., Austell, GA, Chattanooga, TN and Taylors, SC
- Jefferson Smurfit Corp., Cedartown, GA
- Richmond Paperboard Corp., Richmond, VA
- Rock-Tenn Co., Chattanooga, TN and Lynchburg, VA
- Sonoco Products Co., Atlanta, GA, Hartsville, SC, Newport, TN, and Richmond, VA

TISSUE MILLS:

- Fort James Paper Co., Rincon, GA
- Power Paper Co., Harriman, TN

F. MARKETS FOR MIXED PAPER AND HIGH GRADES

TABLE F-6 END USERS OF MIXED PAPER AND/OR HIGH GRADES IN NORTH CAROLINA	
Carolina Paper Board Co., Charlotte, NC	Products: 100 percent recycled rigid and folding boxboard and chipboard. Total paperboard production capacity: 50,730 mt/yr. Feedstock: OCC, double-lined kraft (DLK), ONP, mixed paper, and pulp substitutes.
Cascades Industries, Inc., Rockingham, NC	Products: tissue and toweling, jumbo rolls, roll toilet tissue boxed facial tissue. Production: 69 tons daily. Tissue production capacity: 25,000 tpy. Feedstock: high-grade deinking, mixed paper, pulp substitutes.
Halifax Paper Board Co., Inc., Roanoke Rapids, NC	Products: rigid and folding boxboard, chipboard, pasted board, and mounting and laminated board. Production capacity: 105 tons daily. Total paperboard production capacity: 34,360 mt/yr. Feedstock: OCC, DLK, ONP, mixed paper and pulp substitutes.
Laurel Hill Paper Co., Cordova, NC	Products: facial tissues and toweling. Production: 30-50 tons daily. Tissue capacity: 15,000 tpy. Est. deinking capacity: 18,000 tpy. Feedstock: high-grade deinking.

Source: NC DPPEA, *Assessment of the Recycling Industry and Recycling Materials in NC -- Draft Update.* Extracted from: AF&PA, *PaperMatcher*, 4th ed., Miller Freeman, Inc., *1997 Lockwood-Post's Directory of the Pulp, Paper and Allied Trades*, Miller Freeman, Inc., *1998 International Pulp & Paper Directory*, manufacturer surveys conducted by DPPEA.

The following additional mills in the Southeast consume high grades and/or mixed paper:

CONTAINER BOARD:

- Somerset Fiber Co., Cowpens, SC

PAPER BOARD:

- Caraustar Industries, Inc., Taylors, SC

- Sonoco Products Co., Hartsville, SC

TISSUE:

- Fort James Corp., Rincon, GA
- Kimberly-Clark Corp., Loudon, TN
- Boise Cascade, Jackson, AL

P&W PAPER:

- International Paper, Selma, AL
- Union Camp Corp., Franklin, VA

G. MARKETS FOR PLASTIC FILM

TABLE F-7 HANDLERS OF PLASTIC FILM	
Trex Company, LLC Winchester, VA	Feedstock: polyethylene plastic bags and grocery bags, stretchwrap and sawdust
Polymer Reclaim & Exchange Burlington, NC	Feedstock: HDPE, LDPE, and LLDPE stretch wrap.
FCR Rockingham, NC	Feedstock: HDPE, LDPE, and LLDPE stretch wrap

H. MARKETS FOR FERROUS SCRAP

Companies in Wake County that accept scrap metal include:

- K&L Scrap Service, Inc.
  Raleigh, NC
- Hallman Foundry, Inc.
  Sanford, NC
- TT&E Iron & Metal, Inc.
  Garner, NC
- S. Swartz & Sons, Inc.
  Durham, NC
- Lee Iron & Metal Company, Inc.
  Sanford, NC
- ARH International
  Raleigh, NC